AR TARGET SHEET

The following document was too large to scan as one unit, therefore, it has been broken down into sections.

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PART III –

APPROACH AND RATIONALE FOR THE 241-CX TANK SYSTEM AND HEXONE STORAGE AND TREATMENT FACILITY RCRA TSD UNITS

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7.0 APPROACH AND RATIONALE FOR THE 241-CX TANK SYSTEM AND HEXONE STORAGE AND TREATMENT FACILITY RCRA TSD UNITS

Part III of the work plan provides the approach for characterizing chemical, radiological, and physical conditions in the soil at five 200-IS-1 OU RCRA TSD tanks. These waste sites are in the CX tank system (tanks 241-CX-70, 241-CX-71, and 241-CX-72) and the HSTF (276-S-141 and 276-S-142 tanks). The characterization process follows the CERCLA format, with modifications to concurrently satisfy RCRA requirements, including closure/post-closure requirements. The RCRA closure plan for the CX tank system and the revision to DOE/RL-92-40, Rev. 0, *Hexone Storage and Treatment Facility Closure Plan*, will be submitted in conjunction with the 200-IS-1 and 200-ST-1 OU FS. The technical approach that will be taken for the RCRA TSD units in the 200-IS-1 OU is presented below. Additional information concerning these waste sites is presented in Appendices A and D.

7.1 SUMMARY OF DATA QUALITY OBJECTIVE PROCESS

The RI data needs for assessing potential human health impacts from the 241-CX tank system and the HSTF tanks within the 200-IS-1 OU were developed in accordance with the DQO process (EPA 600/R-96/055, EPA QA/G-4). Results of the DQO process for characterizing these RCRA TSD units in the 200-IS-1 OU are presented in CP-13196, *Remedial Investigation Data Quality Objectives Summary Report – 200-IS-1 and 200-ST-1 Operable Units*. The nature of these waste sites to be investigated in the RI supports the use of focused sampling as identified in *Washington State Department of Ecology Toxics Cleanup Program Guidance on Sampling and Data Analysis Methods* (Ecology 1995). This guidance document defines focused sampling as selective sampling of areas where potential or suspected soil contamination can reliably be expected if a hazardous substance is released. Contaminant distributions are expected to follow relatively predictable patterns based on process knowledge and existing environmental data.

7.1.1 Data Uses

Data generated during characterization of the RCRA TSD units will consist mainly of soil contamination data. The data will be used to define the nature and vertical extent of radiological and nonradiological contamination, to support an initial evaluation of potential human health risks, and to assist in evaluating and selecting a remediation alternative. By defining the type and vertical distribution of contamination, the conceptual model for contaminant distribution can be verified or refined. The lateral extent of contamination is assumed to be confined within each site boundary but could be evaluated further through geophysical logging results or test pits. The lateral extent of contamination might be evaluated further during the confirmatory sampling phase as necessary to support remedial design. A limited amount of data will be collected to characterize the physical properties of soils. The data will be used to support an initial assessment of risk (e.g., RESRAD or other risk modeling) and fate and transport modeling, as required. Contaminant and soil property data will be obtained by collecting and analyzing soil samples.

7.1.2 Data Needs

Information available for the RCRA TSD units is insufficient to develop individual conceptual contaminant distribution models for these sites. The most pertinent existing information was used to develop site-specific conceptual contaminant distribution models for the CX tank system and the HSTF. Information is available about location, construction design, and major types of waste disposed in the waste sites. However, the data needed to verify and/or refine the site conceptual models and develop conceptual contaminant distribution models are limited. These data are needed to support remedial decision making at these sites. As defined by the DQO process, the focus of the 200-IS-1 OU RI is to determine the nature and vertical extent of contamination in the vadose zone within the boundaries of the RCRA TSD units. Specifically, the type, concentrations (particularly the highest concentration), and vertical distribution of radiological and nonradiological contamination in the vadose zone at RCRA TSD units are the major data needs.

Data are also required to determine the physical properties of soils. These data will provide additional input to support a risk evaluation through the use of models for fate and transport of contaminants through the vadose zone to groundwater, exposure to radionuclides, and exposure to chemicals.

7.1.3 Data Quality

Data quality was addressed during the DQO process. Data quality and quantity were determined to be insufficient to support the RI/FS process for these waste sites; therefore, additional data collection is needed through the RI process. The process of identifying the final list of COCs is summarized in Section 3.6. Analytical performance criteria were established by evaluating potential ARARs and PRGs, which are regulatory thresholds and/or standards or derived risk-based thresholds. These potential ARARs and PRGs represent chemical-, location-, and action-specific requirements that must be met to protect human health and the environment. Regulatory thresholds and/or standards or preliminary action levels provide the basis for establishing cleanup levels and dictate analytical performance levels (i.e., laboratory detection limit requirements). Detection limit requirements and standards for precision and accuracy are used to define data quality.

To provide the necessary quality of data, detection limits should be lower than the preliminary action levels. Additional data quality is gained by establishing specific policies and procedures for generating analytical data and field quality assurance and quality control requirements. These requirements are discussed in detail in the SAP (Appendix B). Analytical performance requirements are specified in Table B-4 of the SAP. Potential ARARs and PRGs for the 200 Area waste sites are discussed in Section 4.0 and 5.0 of DOE/RL-98-28.

7.1.4 Data Quantity

Data quantity refers to the number of samples collected. The number of samples needed to refine the site conceptual model and make remedial decisions is based on a biased sampling approach. Biased sampling is the intentional location of a sampling point within a waste site based on process knowledge of the waste stream and expected behavior of the potential COCs. It is the preferred sampling approach as defined in Section 6.2.2 of DOE/RL-98-28 for the RI phase. Using this approach, sampling locations can be selected that increase the chance of encountering the highest contamination in the local soil column.

Sample locations at the 241-CX tank system and the HSTF were selected based on the preliminary conceptual models of contaminant distribution presented in CP-13196. The locations were selected with the goal of intersecting the areas of highest potential for contamination and determining the type and vertical extent of contamination. The RCRA TSD units cover only relatively small areas; therefore, knowing the lateral extent of contamination within the site boundaries is not considered necessary for making remediation decisions. Extra soil samples could be collected as warranted by observations of such anomalies as changes in lithology, visual indications of contamination, and field screening results. This biased sampling approach was designed to provide the data needed to meet DQOs for this phase of the RI/FS process.

7.2 CHARACTERIZATION APPROACH

This section provides an overview of characterization activities planned to collect the data identified in the DQO process. These activities may include some or all of the following: GPR and EMI surveys, borehole drilling, excavation of test pits, driven soil probe, soil sampling, and geophysical logging using gross gamma, spectral gamma, passive neutron, and neutron moisture tools. An offsite laboratory will conduct sample analysis following a contract-required quality program. The sampling strategy is designed to provide access to potentially contaminated subsurface areas. Sample collection will be guided by field screening and a sampling scheme that identifies critical sampling depths. The SAP (Appendix B) provides additional details concerning the characterization approach to determine if a release from the tanks has occurred and impacted surrounding soil. Characterization requirements to determine composition of residual material remaining inside the tanks will be specified later in the RI/FS process, after data from the vadose zone soil sampling have been reviewed. Analysis of the residual, stabilized material, within the tanks would be used to make waste management decisions if a removal action is required.

7.2.1 Ground-Penetrating Radar and Electromagnetic Induction

Surface geophysical surveys using the GPR and EMI techniques will be used to determine the location of tanks and other underground features. The survey results also will be used to finalize the specific location of each sampling point.

GPR uses a transducer to transmit FM frequency electromagnetic energy into the ground. Interfaces in the ground, defined by contrasts in dielectric constants, magnetic susceptibility, and, to some extent, electrical conductivity, reflect the transmitted energy. The GPR system measures the travel time between transmitted pulses and arrival of reflected energy. Geologic features (i.e., cross-bedding, lateral and vertical changes in soil properties, and rock interfaces) can reflect a portion of the electromagnetic energy. The reflected energy provides the means for mapping the subsurface features of interest, whether constructed or geologic. The display and interpretation of GPR data are similar to those used for seismic reflection data. When numerous adjacent profiles are collected, often in two orthogonal directions, a plan view map showing the location and depth of underground features can be generated.

The EMI technology is a noninvasive method of detecting, locating, and/or mapping shallow subsurface features. It complements GPR because of its response to metallic subsurface anomalies and because it provides reconnaissance-level information over large areas to help focus GPR efforts. The EMI techniques are used to determine the electrical conductivity of the subsurface soil, rock, and groundwater and are generally used for shallow investigations. The method is based on a transmitting coil radiating an electromagnetic field that induces eddy currents in the earth. A resulting secondary electromagnetic field is measured at a receiving coil as a voltage that is linearly related to the subsurface conductivity.

7.2.2 Drilling and Sampling

For borehole characterization, the depth of drilling and associated soil sampling will be based on site-specific conditions. When available information indicates the presence of deep vadose zone contamination or that groundwater has been impacted by a release, soil samples will be gathered to the water table. For those waste sites where deep contamination has not been observed or no information exists, sampling to groundwater might not be necessary. In this case, the drilling and sampling depths will be determined using the observational approach. As a minimum, samples will be collected to the deepest significant confining geological unit (e.g., Cold Creek unit, if present), and as a maximum, to the water table. The Cold Creek unit is expected to be a zone of higher moisture content than the surrounding soil where contaminants would tend to concentrate. Decisions to collect samples past the Cold Creek unit will be based on field screening procedures screened for radioactive contamination and/or soil gas surveys.

As a result, soil samples will be collected down to and within the Cold Creek unit. The soil samples/drill cutting from the Cold Creek unit will be screened using a hand-held rate meter with a gamma detector. If contamination is three times greater than background, drilling and sampling will be continued, as specified in the SAP (Appendix B), to the next sample interval until contamination is less than three times background. The three-times-greater-than-background criterion is considered appropriate to minimize the potential for a false positive. If contamination is less than three times background, the borehole will be logged with the spectral gamma logging (SGL) system to confirm that significant contamination is not present before abandoning the borehole. These decisions will be made in the field by the site geologist, task lead, or field engineer.

This sample-collection strategy has been designed to thoroughly characterize the vadose zone materials beneath the sites to the Cold Creek unit or to the top of the groundwater table, as appropriate. Sampling generally will begin at the first sign of radiological contamination, as determined through field screening. Significant contamination is expected to begin at the historic bottom of the site (i.e., tank or diversion box bottom), but if contamination is detected in backfill materials above the waste site bottom, the backfill materials also will be sampled. Borehole samples typically will be collected at smaller intervals near the release point (i.e., the bottom of the tank or diversion box), then at larger intervals with depth. Samples that were identified as critical during the DQO process were from 4.6 m (15 ft) bgs and 7.6 m (25 ft) bgs. The SAP also provides that samples can be collected at the discretion of the geologist or sampler based on field screening and geologic information (e.g., changes in lithology). A detailed sample location profile for each borehole is presented in the SAP (Appendix B).

All drilling will be conducted in accordance with approved procedures and will conform to site-specific technical specifications for environmental drilling services. The drill rig generally will require a 23-m (75-ft)-square pad with a 5-m (16-ft)-wide access road. Cleaning and decontamination activities will also be performed according to approved procedures.

Likely drilling methods for this project are cable tool, sonic, and diesel hammer. The drilling method must allow for the use of a 13-cm (5-in.) outside-diameter split-spoon sampler. Use of a split-spoon sampler will necessitate compositing the sample over at least 0.3 m (1 ft) to obtain enough sample material for analysis. The drilling method must not use any system that circulates air or water. Air-based drilling methods could compromise the sample collection and data quality for volatile constituents by introducing air to the soils. In addition, the air circulated in these methods may dry the formation and negatively affect moisture-logging activities.

The presence of water-saturated soil will indicate that the water table has been contacted, as determined by the site geologist. Up to three strings of casing could be telescoped to the proposed depth to minimize the transport of contaminants in the vadose zone from the drilling operations. The casings will be of sufficient size to accommodate a split-spoon sampler to the bottom of the borehole. Downsizing of the casing will be commensurate with the expected decrease in contamination levels with decreasing depth. Actual conditions during drilling could warrant changes; the changes may be implemented after consultation with and the approval by the task lead and the subcontract technical representative. All casings will be removed from the boreholes when drilling and sampling are completed. If required to support Hanford Site groundwater monitoring needs, boreholes may be completed as groundwater wells. Otherwise, the borehole will be backfilled and decommissioned in accordance with WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."

7.2.3 Test Pit Excavation and Sampling.

For waste sites requiring test pits for characterization, the depth of excavation and associated soil sampling will be based on site-specific conditions. The test pit locations were chosen to target the accessible areas of maximum potential for contamination within the site. Therefore, the soils collected close to the bottom of the site should reflect maximum contamination levels.

The sample collection strategy has been designed to characterize the vadose zone materials directly beneath the sites (Figures 3-7 through 3-10). Sampling generally will begin at the first sign of radiological contamination, as determined by field measurements. This contamination is expected to begin at the historic bottom of the site, but if contamination is detected in backfill materials above the waste site bottom, the backfill materials also will be sampled. Samples typically will be collected at smaller intervals near the release point (i.e., the bottom of the tank or diversion box), and at larger intervals with increasing depth. Samples that were identified as critical during the DQO process will be collected at 4.6 m (15 ft) bgs and 7.6 m (25 ft) bgs. Additional samples may be collected at the discretion of the geologist or sampler based on field screening and geologic information (e.g., changes in lithology). If the disposal of mobility-enhancing chemicals creates a potential for significant contamination below the 7.6 m (25 ft) depth of a standard test pit, assessing the contamination at a depth greater than 7.6 m (25 ft) may be required.

All test pits will be conducted in accordance with an approved procedure. The excavator generally will require a 5-m (16-ft)-wide access road. Cleaning and decontamination activities also will be performed according to approved procedures.

7.2.4 Field Screening

All samples and/or cuttings drawn from the boreholes or excavated from test pits will be field screened for evidence of radionuclides. The three-times-greater-than-background criterion is considered appropriate to minimize the potential for a false positive. Except for critical samples, soil radioactivity screening will assist in refining the sampling intervals identified in the SAP (Appendix B).

7.2.5 Analysis of Soil

Soil samples will be collected for analysis of radiological and nonradiological constituents and the determination of select soil properties. The list of analytes for this investigation was developed based on an evaluation of all potential contamination that was discharged to the waste sites. How this list of COCs was developed is explained in Section 3.6. Tables B-6 and B-7 of the SAP (Appendix B) list details of the analytical methods, holding times, and quality assurance and quality control procedures for each contaminant. A limited number of samples will be analyzed to determine soil physical properties (e.g., moisture content and particle size).

7.3 GEOPHYSICAL LOGGING

Geophysical logging is planned for boreholes and driven soil probes.

7.3.1 Borehole Geophysics

All boreholes will be logged using a high-resolution SGL system to provide continuous vertical logs of gamma-emitting radionuclides and a neutron moisture-logging system to identify moisture changes. In addition to the logging performed on the new borings, SGL is proposed in existing boreholes near the representative waste sites. The SGL of existing boreholes near a waste site can be a cost-effective method of providing supplemental data on the vertical and lateral distribution of gamma-emitting radionuclides, provided that the boreholes are located sufficiently close to the waste site and are appropriately constructed (e.g., single borehole casing in contact with the formation).

The SGL system uses standard laboratory high-purity germanium (HPGe) detector instrumentation to identify and quantify gamma-emitting radionuclides in boreholes as a function of depth. The HPGe detector is calibrated to National Institute of Standards and Testing requirements and includes corrections for environmental conditions that deviate from the standard calibration condition. The HPGe detector has been used to locate, identify, and monitor the distribution and movement of contaminants in more than 600 boreholes at the Hanford Site. The precision of this detector is such that movement of mobile constituents in the subsurface can be identified to as little as 0.07 m (0.25 ft) at depths of up to 168 m (550 ft). The detector requires constant cooling with liquid nitrogen and was designed to operate completely submerged in water. The nitrogen gas is vented to the surface using a specially designed logging cable.

The neutron moisture-logging system that measures moisture employs a weak americium-beryllium neutron source and neutron detector to provide a direct reading of hydrogen atom distribution in the soil surrounding the borehole. This detector will be used to measure continuous vertical moisture in the vadose zone.

The SGL logs will be used to supplement the laboratory radionuclide data to determine the vertical distribution of radionuclides in the vadose zone beneath the units and aid in geological interpretation of subsurface stratigraphy. The deep boreholes will be logged through the casing before adding a new casing string and after the borehole has reached total depth. The SGL equipment is calibrated annually, and the data acquired during the calibrations are used to derive factors that convert measured peak area count rate to radionuclide concentrations in picocuries per gram. Corrections are applied to the data to compensate for the gamma-ray attenuation by the casing. A list of boreholes to be logged is identified in the SAP (Appendix B)

All geophysical logging will be conducted in accordance with ES-SSPM-001, *Sampling and Services Procedure Manual*, Section 17, "Geophysical Logging," and Section 18, "Geophysical Logging Analysis," or equivalent. Applicable detection limits, analytical methods, and accuracy and precision requirements are defined in the documents governing borehole logging. The site geologist will record the types of geophysical surveys and the depth intervals of initial and repeat runs on the well construction summary report form.

Logging runs will be made before changing casing sizes and at the total depth of the borehole. The down-hole tools and cable will be subject to the same rules as the drill rig and equipment and will be decontaminated and surveyed between boreholes.

7.3.2 Geophysical Logging Through Driven Soil Probes

The radioactive contamination, which also would be an indicator of nonradiological contamination, may need to be assessed at a number of locations perpendicular to pipelines. Based on process knowledge, the radioactive contamination is expected to be represented by gamma emitters (e.g., cesium-137). Driven soil probes will be installed and logged with a gamma-logging tool (gross gamma tool for GeoProbe or CPT and high-resolution SGL system). The depth of a driven soil probe is limited by the subsurface conditions (i.e., cobbles or gravel). The hole will be pushed as deep as possible, but a maximum depth of approximately 18 m (60 ft) bgs is anticipated for investigation planning. The GG/PN logging of soil probes also may be used to determine areas of high americium-241 and plutonium-239/240 concentrations in a series of shallowly driven, small-diameter soil probes.

The GG/PN system uses bismuth-germanium detector instrumentation for gross counting of the gamma-emitting radionuclides in the soil probes as a function of depth. The passive neutron-logging instrument is a helium-3 detector configured to detect the neutron flux present in the below-ground soil probe environment.

7.3.3 Soil Gas Surveys Through Driven Soil Probes

A GeoProbe Model 5400 hydraulic ram system will be used to install soil gas sampling points near hexone storage tanks 276-S-141 and 276-S-142. The hydraulic ram will be operated in accordance with the manufacturer's instructions and applicable procedures. The system is equipped with a 4.46-cm (1.75-in.)-diameter probe and a detachable steel tip. At the desired depth, a 16.51-cm (6.5-in.)-long, fine-mesh, stainless-steel soil gas screen connected to the surface with 0.79-cm (0.31-in.) outside-diameter Tygon tubing is inserted down the center of the push rod. The push rod assembly is then withdrawn approximately 7.6 cm (3 in.) to release the steel tip and allow the sampling point to extend into the void space below the push rod. Approximately 205 mL of 20/40 mesh silica sand continues to be added while the push rods are extracted; sand is generally built to 30.5 cm (12 in.) above the screen. The remaining push rods are then removed and soil is allowed to collapse around the Tygon tubing. At approximately 0.9 m (3 ft) bgs, granular bentonite is added through the center of the push rod. The bentonite will not be hydrated.

After allowing each soil gas screen to equilibrate for a minimum of 24 hours, small-volume soil vapor samples (approximately 500 mL) will be collected and analyzed for the volatile COCs associated with the HSTF. The soil gas samples will be collected and analyzed in accordance with applicable approved procedures.

8.0 REMEDIAL INVESTIGATION/FEASIBILITY STUDY PROCESS

This section describes the RI/FS (assessment) process for the 200-IS-1 OU 241-CX tank system and the HSTF units. The development of and rationale for this process are provided in DOE/RL-98-28 and summarized in Figure 1-1. The process follows the CERCLA format, with modifications to concurrently satisfy the requirements specific to RCRA TSD units undergoing closure. Generally, the RI is expected to characterize the nature, the vertical extent, and in some cases the lateral extent of contamination within the confines of the waste site; contaminant concentration; and potential transport of contaminants. The RI also is expected to provide data to determine the need for and type of remediation. The information that will be collected to carry out these tasks is described in the SAP (Appendix B). Tasks to be completed following the RI include an FS with a RCRA TSD units closure plan, a proposed plan, and proposed RCRA Permit modification, followed by a ROD and RCRA Permit modification.

Project management occurs throughout the RI/FS process. Project management is used to direct and document project activities so objectives of the work plan are met and the project remains within budget and on schedule. The initial project management activity will be to assign individuals according to roles established in Section 7.2 of DOE/RL-98-28. Other project management activities include day-to-day supervision of and communication with project staff and support personnel; meetings; control of cost, schedule, and work; records management; progress and final reports; quality assurance; health and safety; and community relations.

Appendix A of DOE/RL-98-28 provides the overall quality assurance framework that was used to prepare an OU-specific quality assurance project plan for the RI. Appendix B of DOE/RL-98-28 includes a review of data management activities that apply to the investigation activities and describes the process for the collection/control of data, records, documents, correspondence, and other information associated with RI/FS activities.

8.1 REGULATORY PROCESS

RCRA and CERCLA regulatory processes will be integrated to address closure and environmental requirements as effectively and efficiently as possible. Integrating RCRA and CERCLA allows additional options for disposal, closure, removal, and/or remedial actions. By allowing flexibility in final disposal options, DOE, Ecology, and EPA intend to minimize disposal costs as much as possible while remaining fully protective of human health and the environment. The CERCLA and RCRA integration process that will be used in this work plan to address the regulatory requirement for the 241-CX tank system and the HSTF units is described in Section 5.1.

8.2 REMEDIAL INVESTIGATION ACTIVITIES

This section summarizes the planned tasks that will be performed during the RI phase for the 200-IS-1 OU 241-CX tank system and the HSTF units, including the following:

- Planning
- Field investigation
- Management of IDW
- Laboratory analysis and data verification
- Data evaluation and reporting.

These tasks and subtasks reflect the work structure that will be used to manage the work and develop the project schedule provided in Section 9.0.

8.2.1 Planning

The planning subtask includes activities and documentation that must be completed before field activities can begin. These include the preparation of a site-specific health and safety plan (HASP) in accordance with the National Contingency Plan (40 CFR 300.430[b][6]) and 29 CFR 1910.120, and a preliminary hazard classification. If required, a final hazard classification and safety analysis will be performed in accordance with approved procedures. Radiological work permits, excavation permits, supporting surveys (e.g., cultural, radiological, wildlife, and utilities), work instructions, personnel training, and the procurement of materials and services (e.g., drilling and geophysical logging services) will also be required. In addition, characterization locations identified in Figures 8-1 and 8-2 will be located using a global positioning satellite system.

DOE/RL-98-28, Appendix B, provides a general HASP that outlines health and safety requirements for RI activities. A site-specific HASP will be prepared for characterization activities, following requirements of the general HASP. Initial surface radiological surveys will be performed to document any radiological surface contamination and background levels in and around the sampling locations. This information will be used to document initial site conditions.

8.2.2 Field Investigation

The field investigation task involves data-gathering activities performed in the field that are required to satisfy the project DQOs. The field characterization approach is summarized in Section 7.2 and detailed in the SAP (Appendix B). The scope includes soil sampling and analysis to characterize the vadose zone at five RCRA TSD units. Major subtasks associated with the field investigation include the following:

- Driven soil probes, borehole drilling, test pits, soil sampling, and collection of data from geophysical logging
- Preparation of a field report.

8.2.2.1 Driven Soil Probes, Borehole Drilling, and Soil Sampling

This subtask involves driving soil probes or drilling boreholes to perform soil gas monitoring, to perform geophysical logging, and/or to collect soil samples.

Samples will be collected with soil probe or split-spoon samplers and packaged for shipment to an offsite laboratory, if radiation levels permit; otherwise, samples will be shipped to an onsite laboratory. At the completion of sampling, the driven soil probes and boreholes will be abandoned and the initial site conditions reestablished. Alternatively, the boreholes could be completed as groundwater monitoring wells if the Hanford Site groundwater monitoring program needs them. Other activities include work zone setup, mobilization and demobilization of equipment, equipment decontamination, and field analyses. Planned field analyses include radiological field screening, a soil gas survey, geologic logging, and geophysical logging of soil probes and boreholes.

- All samples and drill cuttings will be field screened for radionuclides to provide additional characterization data that will be used to assist in selecting sample intervals (e.g., hot spots) and establishing radiation control measures and to ensure worker health and safety.
- Geophysical logging will be used to gather in situ radiological and physical data from the borehole and from existing wells as specified in the SAP. Gross gamma, high-resolution SGL, or passive neutron monitoring will be performed to assess the distribution of gamma-emitting and neutron radionuclides. Neutron logging also will be performed for moisture content distribution over the borehole interval.

8.2.2.2 Preparation of Field Report

At the completion of the field investigation, a field report will be prepared to summarize activities performed and information collected in the field. The report will include survey data for driven soil probe and borehole locations, the number and types of samples collected and associated HEIS numbers, inventory of IDW containers, geological logs, field screening results, and geophysical logging results.

8.2.3 Management of Investigation-Derived Waste

Waste-designation DQOs will be established before beginning the characterization activities to ensure that the information collected during the field effort supports the designation of all project IDW. During the IDW DQO effort, any listed waste issues will be resolved. Any additional sampling requirements or analytes needed to support waste designation activities will be identified and the requirements implemented through the waste-designation DQO summary report that will be prepared at that time.

Waste generated during the RI will be managed in accordance with a waste control plan to be prepared for the sampling effort. DOE/RL-98-28, Appendix E, provides general waste management processes and requirements for this IDW and forms the basis for activity-specific waste control plans. The site-specific waste control plan addresses the handling, storage, and disposal of IDW generated during the RI phase. Furthermore, the plan identifies governing procedures and discusses types of waste expected to be generated, the waste designation process, and the final disposal location. The IDW management task begins when IDW is first generated at the start of the field investigation through waste designation and disposal.

8.2.4 Laboratory Analysis and Data Validation

Soil samples collected via boreholes will be analyzed for a suite of radiological and nonradiological constituents identified as COCs and for select physical properties based on established DQOs and as defined in the SAP (Appendix B). The SAP lists the analytes, methods, and associated target detection limits. This task includes the laboratory analysis of samples, the compilation of laboratory results into data packages, and the validation of a representative number of laboratory data packages.

8.2.5 Remedial Investigation Report

This section summarizes data evaluation and interpretation subtasks leading to the production of an RI report. The primary activities include a data quality assessment (DQA); evaluating the nature, extent, and concentration of contaminants based on sampling results; assessing contaminant fate and transport; refining the site conceptual models; and evaluating risks through a risk assessment. These activities will be performed as part of the RI report preparation task.

8.2.5.1 Data Quality Assessment

A DQA will be performed on the analytical data to determine if they are the right type, quality, and quantity for their intended use. The DQA completes the data lifecycle of planning, implementation, and assessment that began with the DQO process. In this task, the data will be examined to see if it meets the analytical quality criteria outlined in the DQO and is adequate to evaluate the decision rules in the DQO.

8.2.5.2 Risk Assessment

A summary of the risk assessment assumptions and goals for the 200-IS-1 waste sites is presented in Section 5.2.5.1.

8.2.5.2.1 Human Health Risk Assessment. The human health risk assessment process to be followed for the 200-IS-1 OU 241-CX tank system and the HSTF is discussed in Section 5.2.5.2.

8.2.5.2.2 Ecological Risk Assessment. The ecological risk assessment process to be followed for the 200-IS-1 OU 241-CX tank system and the HSTF is discussed in Section 5.2.5.2.

8.2.5.3 Data Evaluation and Conceptual Model Refinement

This task will consist of evaluating the information collected during the investigation. The nonradiological and radiological data obtained from the boreholes will be compiled, tabulated, and statistically evaluated to gain as much information as possible to satisfy data needs. Data evaluation tasks may include the following:

- Graphically evaluating the data for vertical distribution of contamination within each driven soil probe, borehole, or test pit, as required.
- Stratifying the data and computing basic statistical parameters such as mean and standard deviation for individual levels when sufficient data are available. This evaluation can provide an indication of contaminant distribution.
- Constructing contour diagrams and variograms to evaluate spatial correlations within each stratum. This evaluation will indicate whether or not contamination is concentrated in a particular area (e.g., near the influent end for trenches).
- Performing statistical tests on the data to evaluate the presence or absence of contamination. This step has many facets including determining the distribution of the data and selecting the appropriate statistical tests. The initial screening for contamination should evaluate the data with respect to background, by using simple comparisons of an upper bound of the data to background concentrations (e.g., *Model Toxics Control Act* tests), or through more complex comparisons, such as nonparametric hypothesis tests

(e.g., Wilcoxon rank sum test). These tests also can be used to compare the data to appropriate cleanup levels.

These statistical evaluations will aid in refining the conceptual model for these waste sites and selecting the remedial alternative. However, because these waste sites represent point-source types of releases, statistical analysis might not always be possible. At least one borehole is planned for each site; if the resulting data are not sufficient for statistical analysis, maximum or average concentrations will be used in the data evaluation process.

Data on the soil physical properties will be used to determine the soil type, which will assist in choosing the proper unsaturated hydraulic conductivity-moisture retention curve. Identifying the soil type and soil moisture will allow the determination of unsaturated hydraulic conductivity, which will be used as needed in modeling flow and transport.

The combined chemical, physical, and geophysical data for the 200-IS-1 RCRA TSD waste sites will be used for correlating subsurface data, for refining the preliminary conceptual contaminant distribution models, and as inputs to a qualitative risk assessment.

8.2.6 Assessment of Need for Treatability Studies

In conjunction with the RI data compilation and assessment, FS and closure strategies will be considered and include the identification of potential remedial alternatives. The need to conduct a treatability study(s) in association with the evaluation of a potential remedy(s) for these RCRA TSD units will be evaluated early in the RI. Treatability studies may be required to verify the feasibility of a potential technology, cost of a remedy, or applicability of a technology or action. For the five 200-IS-1 RCRA TSD tanks, evaluation of cost savings related to ex situ waste handling and processing over multiple facilities will also be considered.

8.3 FEASIBILITY STUDY AND RCRA TREATMENT, STORAGE, AND DISPOSAL UNIT CLOSURE PLAN

After the RI is complete, remediation alternatives and closure strategies will be developed and evaluated against performance standards and evaluation criteria in the FS and appended RCRA TSD unit closure plans. The FS process consists of the following steps:

1. Defining RAOs and RCRA closure and RCRA corrective action performance standards.
2. Identifying general response actions to satisfy RAOs.
3. Identifying potential technologies and process options associated with each general response action.
4. Screening process options to select a representative process for each type of technology based on its effectiveness, implementability, and cost.
5. Assembling viable technologies or process options into alternatives representing a range of treatment and containment plus a no action alternative.
6. Evaluating alternatives and presenting information needed to support remedy selection and RCRA closure of the unit as a landfill or under modified or clean closure pursuant to Hanford Facility RCRA Permit, Condition II.K (WA 7890008967, *Hanford Facility RCRA Permit*).

The RCRA closure performance standards (WAC 173-303-610[2]) will also be used to evaluate the ability of alternatives to comply with RCRA closure requirements. These standards require closure of TSD units in a manner that achieves the following:

- Minimizes the need for further maintenance.
- Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous waste constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere.
- Returns the land to the appearance and use of surrounding land areas to the degree possible, given the nature of the previous dangerous waste activity.

In addition, RCRA corrective action performance standards (WAC 173-303-646[2]) will be used to evaluate how well the alternatives comply with RCRA corrective action requirements. These standards state that corrective action must achieve the following:

- Protect human health and the environment for all releases of dangerous waste and dangerous constituents, including releases from all solid waste management units at the facility.
- Occur regardless of the time at which waste was managed at the facility or placed in such units, and regardless of whether such facilities or unit were intended for the management of solid or dangerous waste.
- Be implemented by the owner/operator beyond the facility boundary where necessary to protect human health and the environment.

The FS also will include supporting information needed to complete the detailed analysis and meet regulatory integration needs, including the following:

- Summarize the RI, including the nature and extent of contamination, the contaminant distribution models, and an assessment of the risks to help establish the need for remediation and to estimate the volume of contaminated media.
- Refine the conceptual exposure pathway model to identify pathways that might need to be addressed by remedial action.
- Provide a detailed evaluation of potential ARARs, beginning with potential ARARs identified in the Implementation Plan (DOE/RL-98-28, Section 4.0).
- Refine potential RAOs and PRGs identified in the Implementation Plan (DOE/RL-98-28, Section 5.0) based on the results of the RI, ARAR evaluation, and current land-use considerations.
- Refine the list of remedial alternatives, identified in the Implementation Plan (DOE/RL-98-28, Appendix D) and in this section, based on the RI.
- Provide corrective action recommendations for RPPs to fulfill the requirements for a CMS report.
- Include as appendices closure plans to address RCRA TSD units in the OU. The closure plans will incorporate, by reference, specific sections of the work plan or RI report containing specific closure plan information. The closure plans will include closure

performance standards, a closure strategy, general closure activities including verification sampling, and a general post-closure plan.

Additional RCRA integration guidance for preparing an FS/closure plan is provided in DOE/RL-98-28, Section 2.4.

8.4 PROPOSED PLAN AND PROPOSED RCRA PERMIT MODIFICATION

The decision-making process for the 241-CX tank system and the HSTF units will incorporate the use of a proposed plan, ROD, and modification to the Hanford Facility RCRA Permit. The proposed plan will include a draft permit modification with unit-specific permit conditions for the RCRA TSD units for incorporation into the Hanford Facility RCRA Permit.

During the RI/FS process, a number of options for development of proposed plans and RODs will be evaluated. Remedial decisions may proceed on an OU-by-OU basis, but it is also likely that alternative site groupings will be considered for waste sites in the Central Plateau. Several alternatives are currently under consideration, some of which may be used for these waste sites.

Three alternatives to the OU-by-OU remediation approach have been identified to provide flexibility in the decision-making process, facilitate early action, and remediate and close specific areas or zones. Examples of these alternatives are presented in Sections 5.4.1, 5.4.2, and 5.4.3.

8.5 PERMIT MODIFICATION AND POST-CLOSURE ACTIVITIES

After the ROD and Hanford Facility RCRA Permit modification have been issued, a RDR/RAWP will be prepared to detail the scope of the remedial action, which will include RCRA closure and corrective action requirements. As part of this activity, DQOs will be established and SAPs will be prepared to direct confirmatory and verification sampling and analysis efforts. Before beginning remediation, confirmation sampling will be performed to ensure that sufficient characterization data are available to confirm that the selected remedy is appropriate for the waste sites, to collect data necessary for the remedial design, and to support an additional risk assessment, if needed. Verification sampling will be performed after the remedial action is complete to determine if ROD requirements have been met and if the remedy was effective. Additional guidance for confirmatory and verification sampling is provided in DOE/RL-98-28, Section 6.2.

The RDR/RAWP will contain an integrated schedule of remediation activities for the 200-IS-1 OU, including the schedule for RCRA TSD unit closures, and will satisfy the requirements for an RPP corrective measures implementation work plan and design report. Remediation activities will be designed to ensure integration of CERCLA cleanup activities and RCRA corrective actions and closure. Following the completion of the remediation effort, closeout activities will be performed as specified in the ROD, RDR/RAWP, and the RCRA Permit.

The RCRA closure activities and schedules will be defined in the closure plan and will be consistent with those identified in the RDR/RAWP. Enforceable sections of the closure plan will be identified in the Hanford Facility RCRA Permit modification. Certification of closure in accordance with WAC 173-303-610(6) will be performed after cleanup actions are complete. The site will be restored as appropriate for future land use. If clean closure is not attained at a TSD unit, post-closure care requirements will be met. These requirements will include final-status groundwater monitoring, maintenance and monitoring of institutional controls and/or surface barriers, and certification of post-closure at the completion of the post-closure.

Figure 8-1. Location of Planned and Existing Boreholes at the 241-CX Tank System.

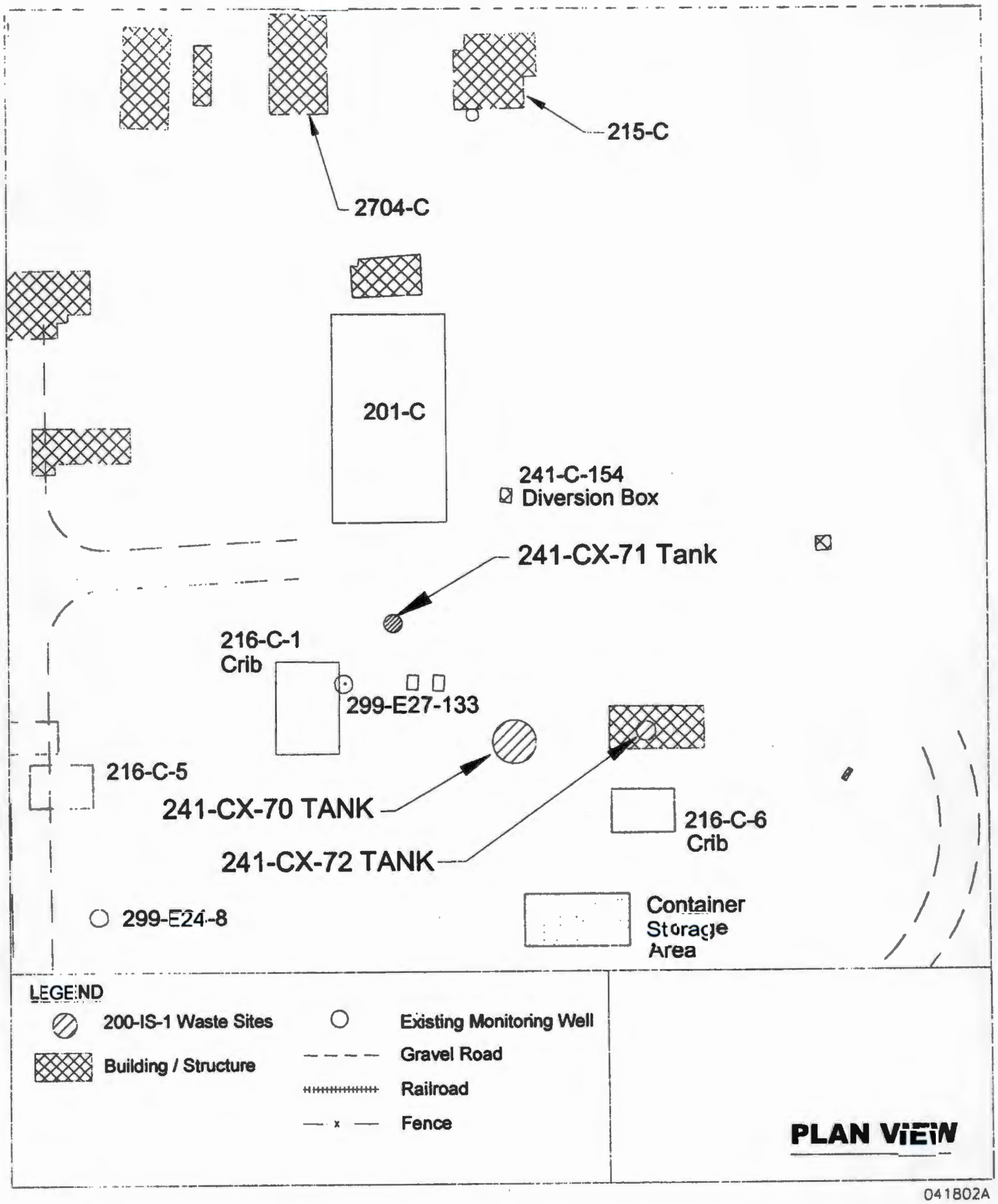
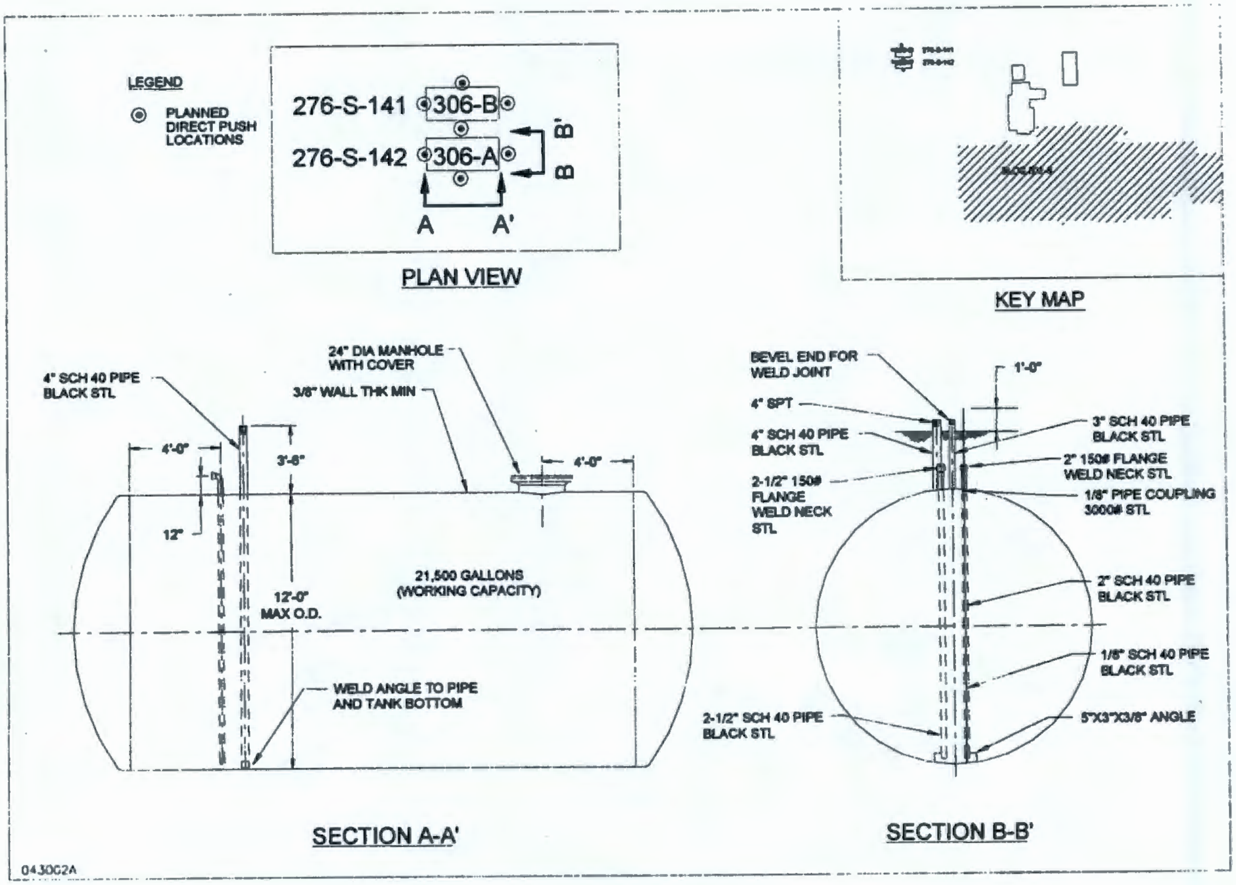


Figure 8-2. Location of Planned and Existing Boreholes at the Hex one Storage and Treatment Facility.



9.0 PROJECT SCHEDULE

The project schedule for activities discussed in the RCRA TSD units portion of this work plan is shown in Figure 9-1. This schedule will serve as the baseline for the work-planning process and will be used to measure the progress of implementing this work plan. The schedule for preparing, reviewing, and issuing the RI and FS/closure plan is also shown in Figure 9-1. The schedule concludes with the preparation of a ROD. The Hanford Facility RCRA Permit will be modified after the ROD is issues, during Ecology's annual modification process.

The portions of this schedule most germane to this work plan are for the period of FY05 through FY08. One Tri-Party Agreement milestone that is associated with this work plan and the RI/FS process is M-20-54, "Submit 241-CX-70 Storage Tank, 241-CX-71 Neutralization Tank, 241-CS-72 Storage Tank Closure/Post-Closure Plan to Ecology in Coordination with the 200-IS-1 Tanks/Lines/Pits/Boxes Operable Unit Work Plan Feasibility Study Scheduled Under M-13-00M (December 31, 2008)."

The following are proposed project milestone completion dates for key activities:

- Submit RI report for regulatory review: September 29, 2006
- Submit FS/closure plan for regulatory review: December 31, 2007
- Submit proposed plan/permit modification for regulatory review: December 31, 2007.

A single RI, FS, and proposed plan will be generated for all sites included in Parts II, III, and IV.

Interim milestones to be designated under the Tri-Party Agreement will be established through negotiations between DOE, Ecology, and EPA. A Class II change form will be submitted to Ecology and EPA to request the addition of any interim milestones.

Figure 9-1. Project Schedule for 200-IS-1 Operable Unit RCRA TSD Units. (2 sheets)

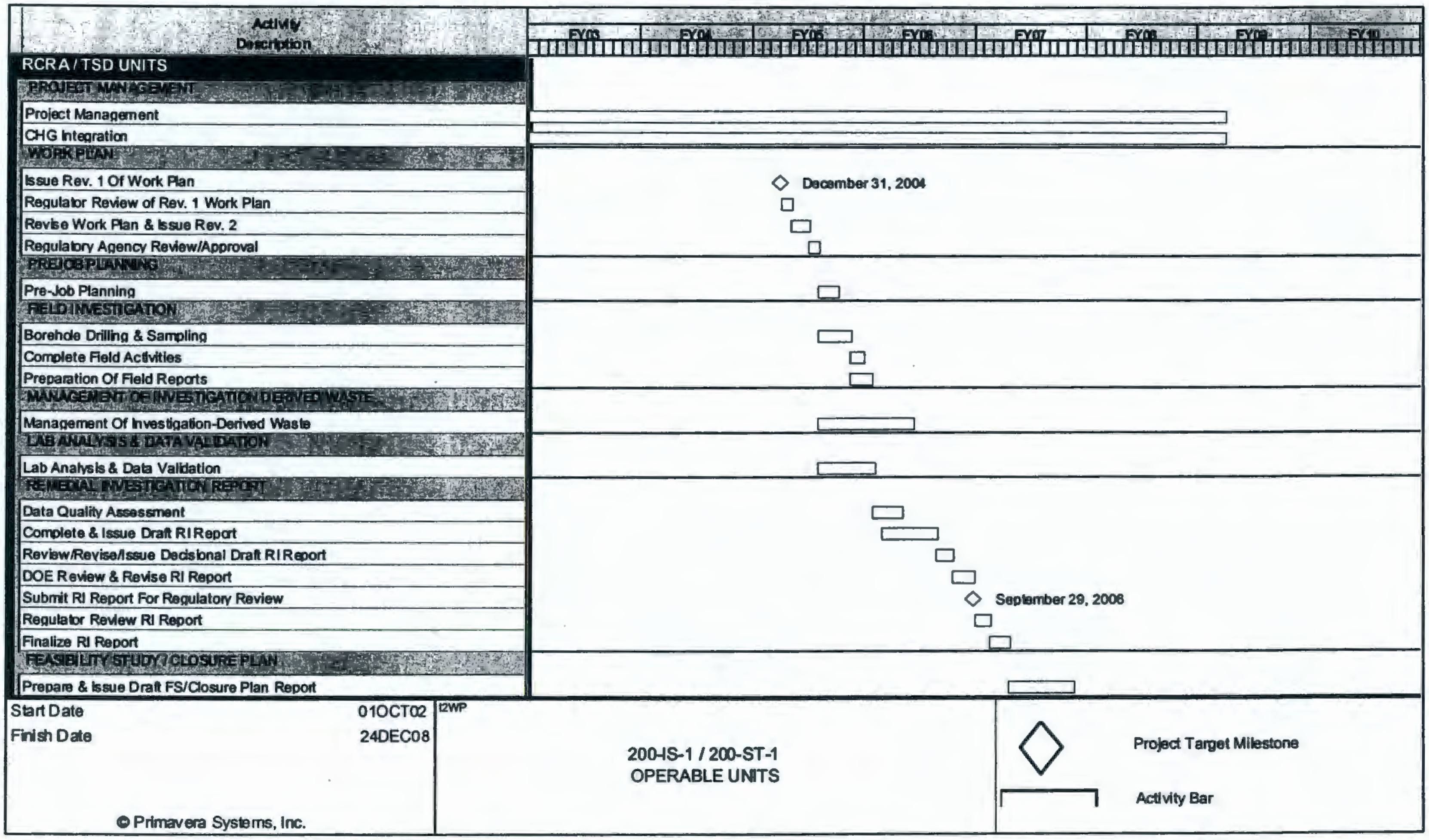
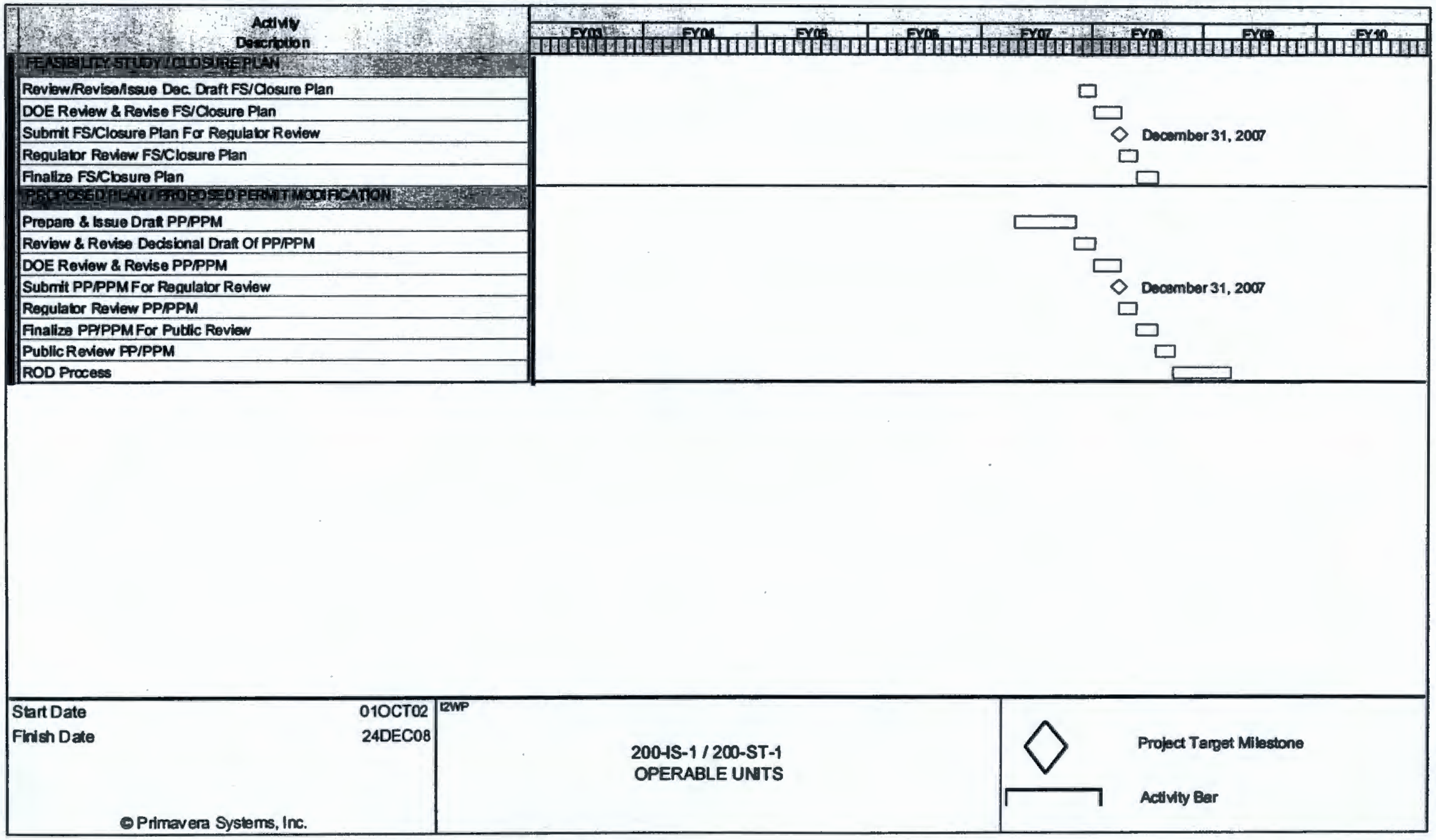


Figure 9-1. Project Schedule for 200-IS-1 Operable Unit RCRA TSD Units. (2 sheets)



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PART IV –

APPROACH AND RATIONALE FOR SEPTIC TANKS AND DRAIN FIELDS

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PART IV – APPROACH AND RATIONALE FOR SEPTIC TANKS AND DRAIN FIELDS

10.0 APPROACH AND RATIONALE FOR SEPTIC TANKS AND DRAIN FIELDS

Part IV of the work plan provides the approach for characterizing chemical, radiological, and physical conditions in the soil for the 200-ST-1 waste sites. Waste sites comprising the 200-ST-1 Septic Tanks and Drain Fields Waste Group OU received or continue to receive largely nonradioactive, nonhazardous, sanitary sewer waste from sources such as sinks, showers, and toilets. Each waste site typically consists of a large-capacity holding, or septic, tank that overflows to a gravel-filled drain field. Each septic tank/drain field waste site either serves a single occupied building or a number of adjacent buildings. The volume and inventory of waste discharged to these waste sites were not tracked.

For inactive waste sites, the concern was the remote possibility of radiological contamination of sanitary sewer effluents from showers or janitorial drains at radiological facilities. For active sites, the concern was their potential to provide a driving force to adjacent soil column disposal sites or UPRs rather than their potential to add significant contamination to the soil column.

The analogous site concept discussed in the Implementation Plan (DOE/RL-98-28) can be effectively used for the 200-ST-1 OU waste sites because waste sites within this OU share common features and disposal histories. When a representative site is selected using this approach, it is selected with all waste sites in mind, including those that may be added in the future. Although a degree of uncertainty exists in employing the analogous site concept, substantial benefit is realized in the early selection of a remedy that allows early cleanup actions to be performed.

Neither the original 200-ST-1 OU sites nor those sites added since the Implementation Plan (DOE/RL-98-28) was prepared had been screened to determine their appropriateness as subjects of an RI/FS work plan and associated remedial action processes. Therefore, all waste sites currently identified with this work plan had to be reviewed before the representative site could be selected.

After this initial screening, the remaining waste sites were reviewed based on their configuration for receiving waste, the source of the waste stream, and contaminants expected to be in the waste stream. A conceptual contaminant distribution model was developed and a representative site was selected, based on the approach outlined in the Implementation Plan (DOE/RL-98-28). The 2607-W3 septic tank was selected as the representative site for 200-ST-1 OU waste sites.

Using the analogous site concept, a comprehensive field investigation is conducted at the representative site using the SAP. Representative site characterization activities described in the SAP are based on implementing the data quality objectives process documented in CP-13196, *Remedial Investigation Data Quality Objectives Summary Report for the 200-IS-1 and 200-ST-1 Operable Units*. These site characterization activities are described in the SAP presented in Appendix B of this work plan. The investigative activities provide data to refine the conceptual contaminant distribution models, support an assessment of risk, and evaluate remedial alternatives for waste sites in this OU. Confirmatory field investigation at the analogous sites is conducted to support the presence or absence of contaminants and to ensure the appropriateness of the remedy for the analogous sites.

10.1 SUMMARY OF DATA QUALITY OBJECTIVE PROCESS

The RI data needs for assessing potential human health impacts from waste sites within the 200-ST-1 OU were developed in accordance with the DQO process (EPA 600/R-96/055, EPA QA/G-4). The DQO goal for the 200-ST-1 OU was to provide data needed to refine the preliminary conceptual contaminant distribution model and to support remedial decisions. The need for additional data to support the assessment of potential ecological impacts will be evaluated through a separate Central Plateau DQO process.

Results of the DQO process for characterizing the representative 200-ST-1 OU waste site are presented in CP-13196. No representative sites were identified in DOE/RL-98-28; therefore, the DQO waste site review process identified a representative waste site for the 200-ST-1 OU.

The nature of the waste sites to be investigated in the RI supports the use of focused sampling as identified in *Washington State Department of Ecology Toxics Cleanup Program Guidance on Sampling and Data Analysis Methods* (Ecology 1995). This guidance document defines focused sampling as selective sampling of areas where potential or suspected soil contamination can reliably be expected if a hazardous substance is released. Contaminant distributions are expected to follow relatively predictable patterns based on process knowledge and existing environmental data.

10.1.1 Representative Site Selection Process

The original set of waste sites assigned to this OU in DOE/RL-98-28 was based on the following rationale: The 200-ST-1 OU was created for sites that had received or continue to receive largely nonradioactive, nonhazardous, sanitary sewer waste. The concern for the active waste sites was more in their potential to provide a driving force to adjacent soil column disposal sites or UPRs than their potential to add significant contamination to the soil column. A remote possibility of radiological contamination did exist for effluent from showers and janitorial sinks at radiological facilities.

In addition, new waste sites were assigned to this OU in accordance with RL-TPA-90-0001, *Tri-Party Agreement Handbook Management Procedures*, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)." Neither the original sites nor those added since the publication of DOE/RL-98-28 had been screened to determine their appropriateness as the subject of an RI/FS work plan and associated remedial action processes. Therefore, the team had to review all the sites identified in WIDS currently assigned to the 200-ST-1 OU before selecting the representative site for this OU. This selection approach was designed to ensure that waste sites added to the OU in the future fit into the subgroups for which representative sites have been selected.

The results of the waste site review process are shown in Appendix E, Tables E-1 through E-5, and are summarized as follows:

- Table E-1: Waste sites assigned to the 200-ST-1 OU as of September 2004.
- Table E-2: Waste sites assigned to the 200-ST-1 OU that are in the process of being removed, or have been removed, from consideration as a RPP waste site. These

reclassifications are supported by data packages provided to the Tri-Party Agreement reclassification team and require team approval before being removed.

- Table E-3: Waste sites assigned to 200-ST-1 OU septic systems planned to be moved from the CERCLA process to the unit category "Septic." This change is based on whether the system was connected to a contaminated facility. Supporting data are not yet included in the WIDS database but will be added when the recategorization is approved in accordance with RL-TPA-90-0001. In addition, septic tanks and drain fields still in service were identified as excluded.
- Table E-4: Lists those 200-ST-1 OU waste sites currently identified within WIDS that are the responsibility of ORP. This table addresses programmatic responsibility for these waste sites.
- Table E-5: Waste sites assigned to the 200-ST-1 OU that currently are considered to be included in this work plan. This table is meant to show current site tracking conditions and will change if new waste sites are identified.

The septic tank and drain field waste sites identified for this work plan (Appendix E, Table E-5) were reviewed based on their configuration for receiving waste, the source of the waste stream, and expected contaminants. A representative site was then selected and a conceptual contaminant distribution model developed based on the approach outlined in DOE/RL-98-28. For septic tanks and drain fields, the selected representative site was the 2607-W3 septic tank.

10.1.2 Data Uses

Data generated during characterization of the representative site will consist mainly of soil analytical data. The data will be used to define the nature and vertical extent of radiological and nonradiological contamination (if present), support an initial evaluation of potential human health risks, and assist in evaluating and selecting remediation alternatives as needed. By defining the type and vertical distribution of contamination, the conceptual model for contaminant distribution can be verified or refined. The lateral extent of contamination is assumed to be confined within the site boundary, but could be evaluated further through geophysical logging results or test pits. The lateral extent of contamination might be evaluated further during the confirmatory sampling phase as necessary to support remedial design. Verification of the current conceptual contaminant distribution model will direct the application of the analogous site concept at the remaining 200-ST-1 waste sites. A limited amount of data will be collected to characterize the physical properties of soils. Data will be used to support an initial assessment of risk (e.g., RESRAD or other risk modeling) and fate and transport modeling, as required. Contaminant and soil property data will be obtained by collecting and analyzing soil samples.

10.1.3 Data Needs

Some data are available for the representative waste site; however, the data are insufficient to develop individual conceptual contaminant distribution models for all the sites. The most pertinent existing information was used to develop a site-specific conceptual contaminant distribution model for the 2607-W3 septic tank.

For the representative waste site (and, in general, the other waste sites in the OU), information is available about location, construction design, and major types of waste disposed. However, the data needed to verify and/or refine the site conceptual models and develop conceptual contaminant distribution models are limited. These data are needed to support remedial decision making at the representative site and any analogous sites. As defined by the DQO process, the focus of the 200-ST-1 OU RI is to determine the nature and vertical extent of contamination in the vadose zone within the boundaries of the representative waste site. Specifically, the type, concentrations (particularly the highest concentration), and vertical distribution of radiological and nonradiological contamination in the vadose zone at the representative waste site, are the major data needs.

Data area also required to determine the physical properties of soils; these data will provide additional inputs to support a risk evaluation through the use of models for fate and transport of contaminants through the vadose zone to groundwater, exposure to radionuclides, and exposure to chemicals.

10.1.4 Data Quality

Data quality was addressed during the DQO process. Data quality and quantity were determined to be insufficient to support the RI/FS process for this OU; therefore, additional data collection is needed through the RI process. The process of identifying the final list of COCs is summarized in Section 3.6. Analytical performance criteria were established by evaluating potential ARARs and PRGs, which are regulatory thresholds and/or standards or derived risk-based thresholds. These potential ARARs and PRGs represent chemical-, location-, and action-specific requirements that must be met to protect human health and the environment. Regulatory thresholds and/or standards or preliminary action levels provide the basis for establishing cleanup levels and dictate analytical performance levels (i.e., laboratory detection limit requirements). Detection limit requirements and standards for precision and accuracy are used to define data quality.

To provide the necessary quality of data, detection limits should be lower than preliminary action levels. Additional data quality is gained by establishing specific policies and procedures for generating analytical data and field quality assurance and quality control requirements. These requirements are discussed in detail in the SAP (Appendix B). Analytical performance requirements are specified in Table 3-6 of CP-13196. The potential ARARs and PRGs for the 200 Area waste sites are discussed in Sections 4.0 and 5.0 of DOE/RL-98-28.

10.1.5 Data Quantity

Data quantity refers to the number of samples collected. The number of samples needed to refine the site conceptual model and make remedial decisions is based on a biased sampling approach. Biased sampling is the intentional location of a sampling point within a waste site based on process knowledge of the waste stream and expected behavior of the potential COCs. It is the preferred sampling approach as defined in Section 6.2.2 of DOE/RL-98-28 for the RI phase. Using this approach, sampling locations can be selected that increase the chance of encountering the highest contamination in the local soil column.

The sampling location at the representative site was selected based on the preliminary conceptual models of contaminant distribution presented in the CP-13196. The location was selected with the goal of intersecting the area of highest potential for contamination and determining the type and vertical extent of contamination at the representative site. The representative site covers a relatively small area; therefore, knowing the lateral extent of contamination within the site boundaries is not considered necessary for making remediation decisions. Extra soil samples could be collected as warranted by observations of such anomalies as changes in lithology, visual indications of contamination, and field screening results. This biased sampling approach was designed to provide the data needed to meet DQOs for this phase of the RI/FS process.

10.2 CHARACTERIZATION APPROACH FOR 200-ST-1 OU

This section provides an overview of characterization activities planned to collect the data identified in the DQO process. These activities may include some or all of the following: GPR and EMI surveys, borehole drilling, and sampling and geophysical logging using spectral gamma and neutron moisture tools. An offsite laboratory will conduct sample analysis following a contract-required quality program. The sampling strategy is designed to provide access to potentially contaminated subsurface areas. Sample collection will be guided by field screening conducted during the RI and a sampling scheme that identifies critical sampling depths. The SAP (Appendix B) presents the characterization approach.

10.2.1 Ground-Penetrating Radar and Electromagnetic Induction

Surface geophysical surveys using the GPR and EMI technologies will be used to determine the location of tanks and other underground features. The survey results also will be used to determine the specific location of the sampling point. Additional information on GPR and EMI investigative methods are discussed in Section 7.2.1.

10.2.2 Drilling and Sampling

The SAP for the 2607-W3 septic tank specifies sampling the septic tank's sludge to determine which contaminants entered the drain field. A borehole will be installed at the site for additional sampling and characterization (Figure 10-1).

For borehole characterization, the depth of drilling and associated soil sampling will be based on site-specific conditions. When available information indicates the presence of deep vadose zone contamination or that groundwater has been contaminated by a waste site, soil samples will be gathered to the water table. For waste sites where deep contamination has not been observed or no information exists, sampling to groundwater might not be necessary. In this case, the drilling and sampling depths will be determined using the observational approach. As a minimum, samples will be collected to the deepest significant confining geological unit (e.g., the Cold Creek unit, if present), and as a maximum, to the water table. The Cold Creek unit is expected to be a zone of higher moisture content than the surrounding soil where contaminants would tend to concentrate. Decisions to collect samples past the Cold Creek unit will be based on field screening procedures screened for radioactive contamination and/or soil gas surveys.

As a result, soil samples will be collected down to and within the Cold Creek unit. The soil samples/drill cutting from the Cold Creek unit will be screened using a hand-held rate meter with a gamma detector. If contamination is three times greater than background, drilling and sampling will be continued, as specified in the SAP (Appendix B), to the next sample interval until contamination is less than three times background. The three-times-greater-than-background criterion is considered appropriate to minimize the potential for a false positive. If contamination is less than three times background, the borehole will be logged with the SGL system to confirm that significant contamination is not present before abandoning the borehole. These decisions will be made in the field by the site geologist, task lead, or field engineer.

This sample-collection strategy has been designed to thoroughly characterize the vadose zone materials beneath the sites to the Cold Creek unit or to the top of the groundwater table, as appropriate. Sampling generally will begin at the sign of radiological contamination, as determined through field screening. Significant contamination is expected to begin at the historic bottom of the site (i.e., tank or diversion box bottom), but if contamination is detected in backfill materials above the waste site bottom, the backfill materials also will be sampled. Borehole samples typically will be collected at smaller intervals near the release point (i.e., the bottom of the tank or diversion box), then at larger intervals with depth. Samples that were identified as critical during the DQO process were from 4.6 m (15 ft) bgs and 7.6 m (25 ft) bgs. The SAP also provides that samples can be collected at the discretion of the geologist or sampler based on field screening and geologic information (e.g., changes in lithology). A detailed sample location profile for each borehole is presented in the SAP (Appendix B).

All drilling will be conducted in accordance with approved procedures and will conform to site-specific technical specifications for environmental drilling services. The drill rig generally will require a 23 m (75 ft)-square pad with a 5 m (16 ft)-wide access road. Cleaning and decontamination activities will also be performed according to approved procedures.

Likely drilling methods for this project are cable tool, sonic, and diesel hammer. The drilling method must allow for the use of a 13 cm (5-in.) outside-diameter split-spoon sampler. Use of a split-spoon sampler will necessitate compositing the sample over at least 0.3 m (1 ft) to obtain enough sample material for analysis. The drilling method must not use any system that circulates air or water. Air-based drilling methods could compromise the sample collection and data quality for volatile constituents by introducing air to the soils. In addition, the air circulated in these methods may dry the formation and negatively affect moisture-logging activities.

The presence of water-saturated soil will indicate that the water table has been contacted as determined by the site geologist. Up to three strings of casing could be telescoped to the proposed depth to minimize the transport of contaminants in the vadose zone from the drilling operations. The casings will be of sufficient size to accommodate a split-spoon sampler to the bottom of the borehole. Downsizing of the casing will be commensurate with the expected decrease in contamination levels with decreasing depth. Actual conditions during drilling could warrant changes; the changes may be implemented after consultation with and the approval by the task lead and the subcontract technical representative. All casings will be removed from the boreholes when drilling and sampling are completed. If required to support Hanford Site groundwater monitoring needs, boreholes may be completed as groundwater wells. Otherwise, the borehole will be backfilled and decommissioned in accordance with WAC 173-160.

10.2.3 Field Screening

All samples and/or cuttings drawn from the boreholes or excavated from test pits will be field screened for evidence of radionuclides. The three-times-greater-than-background criterion is considered appropriate to minimize the potential for a false positive. Except for critical samples, soil radioactivity screening will assist in refining the sampling intervals identified in the SAP (Appendix B).

10.2.4 Analysis of Soil

Soil samples will be collected for analysis of radiological and nonradiological constituents and the determination of select soil properties. The list of analytes for this investigation was developed based on an evaluation of all potential contamination that could have been discharged to the waste site. How this list of COCs was developed is explained in Section 3-6. Tables B-4 and B-5 of the SAP (Appendix B) provide details concerning the analytical methods, holding times, and quality assurance and quality control procedures for each sample. A limited number of samples will be analyzed to determine soil physical properties (e.g., moisture content and particle size).

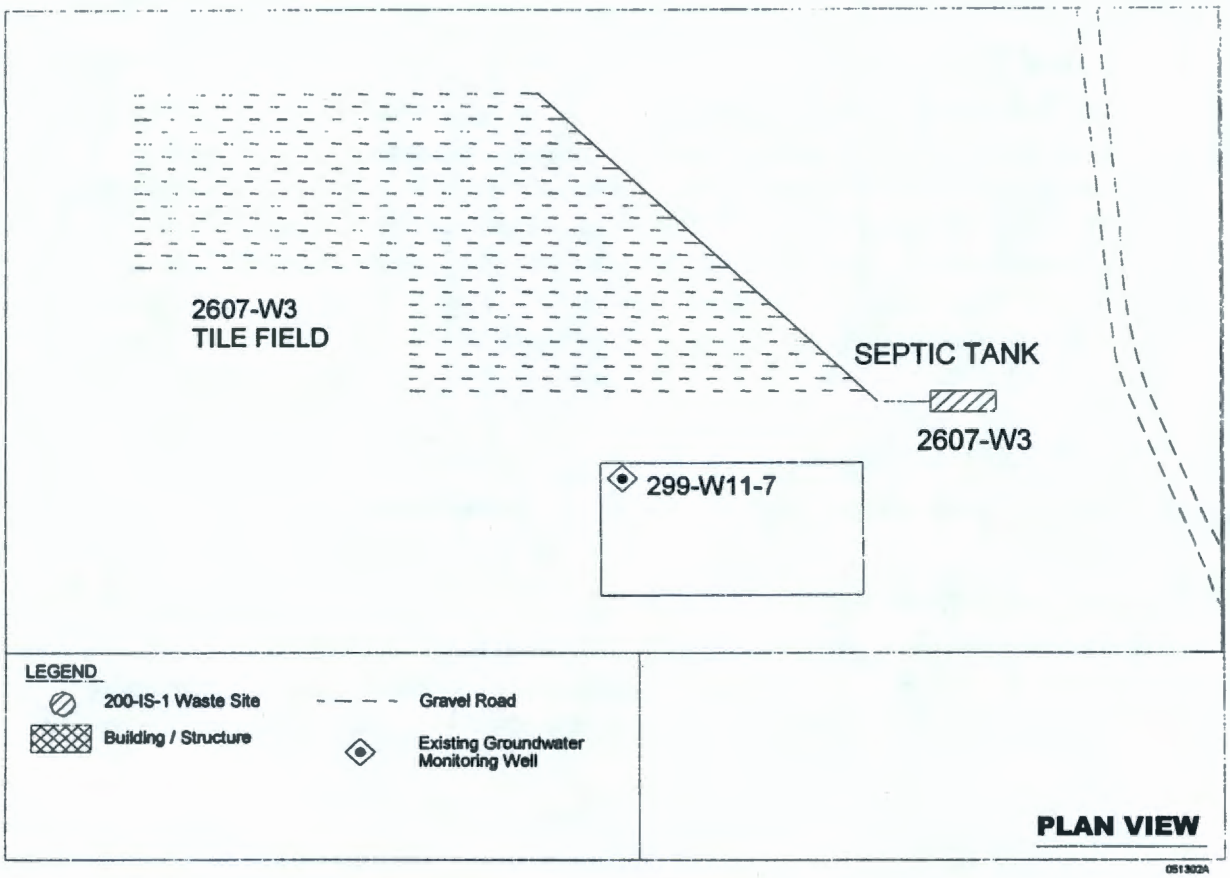
10.3 GEOPHYSICAL LOGGING

Geophysical logging is planned if boreholes or driven soil probes are installed.

10.3.1 Borehole Geophysics

Boreholes will be logged using a high-resolution SGL system to provide continuous vertical logs of gamma-emitting radionuclides and a neutron moisture-logging system to identify moisture changes. Additional discussion concerning borehole geophysical logging techniques is provided in Section 7.3.1.

Figure 10-1. Location of Planned and Existing Boreholes at the 2607-W3 Septic Tank.



11.0 REMEDIAL INVESTIGATION/FEASIBITY STUDY PROCESS

This section describes the RI/FS (assessment) process for the 200-ST-1 OU. The development of and rationale for this process are provided in DOE/RL-98-28 and are summarized in Figure 1-1. The process follows CERCLA requirements. Generally, the RI is expected to characterize the nature, the vertical extent, and in some cases the lateral extent of contamination within the confines of the waste site; contaminant concentration; and potential transport of contaminants. The RI also is expected to provide data to determine the need for and type of remediation. The information that will be collected to carry out these tasks is described in the SAP (Appendix B). Tasks to be completed following the RI include an FS and a proposed plan, followed by a ROD.

Project management occurs throughout the RI/FS process. Project management is used to direct and document project activities so objectives of the work plan are met and the project remains within budget and on schedule. The initial project management activity will be to assign individuals according to roles established in Section 7.2 of DOE/RL-98-28. Other project management activities include day-to-day supervision of and communication with project staff and support personnel; meetings; control of cost, schedule, and work; records management; progress and final reports; quality assurance; health and safety; and community relations.

Appendix A of DOE/RL-98-28 provides the overall quality assurance framework that was used to prepare an OU-specific quality assurance project plan for the RI. Appendix B of DOE/RL-98-28 includes a review of data management activities that apply to the investigation activities at this OU and describes the process for the collection/control of data, records, documents, correspondence, and other information associated with OU activities.

11.1 REGULATORY PROCESS

The CERCLA regulatory process will be followed to address closure and environmental requirements as effectively and efficiently as possible for the 200-ST-1 OU waste sites. CERCLA allows options for disposal, closure, removal, and/or remedial actions. By allowing flexibility in final disposal options, DOE, Ecology, and EPA intend to minimize disposal costs as much as possible while remaining fully protective of human health and the environment.

11.2 REMEDIAL INVESTIGATION ACTIVITIES

This section summarizes the planned tasks that will be performed during the RI phase for the 200-ST-1 OU, including the following:

- Planning
- Field investigation
- Management of IDW
- Laboratory analysis and data verification
- Data evaluation and reporting.

These tasks and subtasks reflect the work structure that will be used to manage the work and develop the project schedule provided in Section 12.0.

11.2.1 Planning

The planning subtask includes activities and documentation that must be completed before field activities can begin. These include the preparation of a site-specific HASP in accordance with 29 CFR 1910.120 and a preliminary hazard classification. If required, a final hazard classification and safety analysis will be performed in accordance with approved procedures. Radiological work permits, excavation permits, supporting surveys (e.g., cultural, radiological, wildlife, and utilities), work instructions, personnel training, and the procurement of materials and services (e.g., drilling and geophysical logging services) also will be required. In addition, characterization locations identified in Figure 10-1 will be located using a global positioning satellite system.

Appendix B of DOE/RL-98-28 provides a general HASP that outlines health and safety requirements for RI activities. A site-specific HASP will be prepared for characterization activities, following requirements of the general HASP. Initial surface radiological surveys will be performed to document any radiological surface contamination and background levels in and around the sampling locations. This information will be used to document initial site conditions.

11.2.2 Field Investigation

The field investigation task involves data-gathering activities performed in the field that are required to satisfy the project DQOs. The field characterization approach is summarized in Section 10.2 and detailed in the SAP (Appendix B). The scope includes collection of a sludge sample from the septic tank and soil sampling and analysis to characterize the vadose zone at the head of the tile field. Major subtasks associated with the field investigation include the following:

- Borehole drilling, soil sampling, and collection of data from geophysical logging
- Preparation of a field report.

11.2.2.1 Borehole Drilling and Soil Sampling

This subtask involves drilling boreholes to perform logging and to collect soil samples. Samples will be collected with soil probe or split-spoon samplers and packaged for shipment to an offsite laboratory, if radiation levels permit; otherwise, samples will be shipped to an onsite laboratory. At the completion of sampling, the driven soil probes and boreholes will be abandoned and the initial site conditions reestablished. Alternatively, the boreholes could be completed as groundwater monitoring wells if the Hanford Site groundwater monitoring program needs them. Other activities include work zone setup, mobilization and demobilization of equipment, equipment decontamination, and field analyses. Planned field analyses include radiological field screening, a soil gas survey, geologic logging, and geophysical logging of soil probes and boreholes.

All samples and drill cuttings will be field screened for radionuclides to provide additional characterization data that will be used to assist in selecting sample intervals (e.g., hot spots) and establishing radiation control measures, and to ensure worker health and safety.

Geophysical logging will be used to gather in situ radiological and physical data from the borehole and from existing wells as specified in the SAP. Gross gamma, high-resolution SGL, or passive neutron monitoring will be performed to assess the distribution of gamma-emitting and neutron radionuclides. Neutron logging also will be performed for moisture content distribution over the borehole interval.

11.2.2.2 Preparation of Field Report

At the completion of the field investigation, a field report will be prepared to summarize activities performed and information collected in the field. The report will include survey data for the borehole location(s), the number and types of samples collected and associated HEIS numbers, inventory of IDW containers, geological logs, field screening results, and geophysical logging results.

11.2.3 Management of Investigation-Derived Waste

Waste-designation DQOs will be established before beginning the characterization activities to ensure that the information collected during the field effort supports the designation of all project IDW. During the IDW DQO effort, any listed waste issues also will be resolved. Any additional sampling requirements or analytes needed to support designation activities will be identified and the requirements implemented through the waste-designation DQO summary report that will be prepared at that time.

Waste generated during the RI will be managed in accordance with a waste control plan to be prepared for the sampling effort. DOE/RL-98-28, Appendix E, provides general waste management processes and requirements for this IDW and forms the basis for activity-specific waste control plans. The site-specific waste control plan addresses the handling, storage, and disposal of IDW generated during the RI phase. Furthermore, the plan identifies governing procedures and discusses types of waste expected to be generated, the waste designation process, and the final disposal location. The IDW management task begins when IDW is first generated at the start of the field investigation through waste designation and disposal.

11.2.4 Laboratory Analysis and Data Validation

Soil samples collected via boreholes will be analyzed for a suite of radiological and nonradiological constituents identified as COCs (Table 3-4), and for select physical properties based on established DQOs and as defined in the SAP. The SAP lists the analytes, methods, and associated target detection limits. This task includes the laboratory analysis of samples, the compilation of laboratory results into data packages, and the validation of a representative number of laboratory data packages.

11.2.5 Remedial Investigation Report

This section summarizes data evaluation and interpretation subtasks leading to the production of an RI report. The primary activities include a DQA; evaluating the nature, extent, and concentration of contaminants based on sampling results; assessing contaminant fate and transport; refining the site conceptual models; and evaluating risks through a risk assessment. These activities will be performed as part of the RI report preparation task.

11.2.5.1 Data Quality Assessment

A DQA will be performed on the analytical data to determine if they are the right type, quality, and quantity for their intended use. The DQA completes the data lifecycle of planning, implementation, and assessment that began with the DQO process. In this task, the data will be examined to see if they meet the analytical quality criteria outlined in the DQO and are adequate to evaluate the decision rules in the DQO.

11.2.5.2 Risk Assessment

An overview of the framework for the risk assessment for the 200-ST-1 waste sites is presented in Section 5.2.5.1.

11.2.5.2.1 Human Health Risk Assessment. A human health risk assessment will be conducted for the 200-ST-1 OU waste sites. Analogous 200-ST-1 waste sites will be evaluated in the FS following the analogous site approach described in Section 2.5.1 of DOE/RL-98-28. Important considerations in determining an appropriate representative site for the analogous site approach includes the following:

- Waste site configuration and construction
- Volume of effluent received in relation to the available pore volume for the waste site
- Types and amounts of contaminants received and contaminant inventory
- Method of discharge and purpose of waste site
- Expected distribution of contamination based on method of discharge and purpose of waste site
- Geological setting
- Neighboring waste sites, structures, or utilities
- Potential for hydrologic and contaminant impacts to groundwater.

The available information from each waste site in the 200-ST-1 OU will be evaluated in the FS against information from the representative site. In cases where characterization data are available from an analogous waste site, the data will be evaluated for sufficiency to support a site-specific evaluation of risk. If the data are sufficient, a risk estimate for the analogous site will be calculated and then used to support the evaluation and selection of the appropriate remedial action for that waste site. If the data from a particular waste site are insufficient to support a risk estimate, the available data and information will be used to support the comparison and assignment to an appropriate representative site. In most cases, little or no characterization data are available from the analogous sites. In these instances, existing information from the WIDS database, discharge information, and general process information will be used to make assignments.

The characterization data from representative sites is intended to provide sufficient information to select remedies for the waste group. However, site-specific data may also be needed to verify that the selected remedial alternative is appropriate. Following the decision in the ROD, additional sampling would be conducted as needed to confirm the selected remedy for each of the analogous waste sites and to collect data to support remedial design. Following remedial action, an additional data collection activity would be conducted as needed to verify achievement of cleanup goals.

The risk analysis and data from the representative sites are used to support the risk evaluation and remedial decisions for those analogous sites without data to support a site-specific risk estimate. The use of the risk assessment from the representative sites presents some risk management decisions for the decision makers. If an analogous site is well represented by the representative site (i.e., the evaluation criteria of waste stream, size and construction, geology, waste inventory, effluent volume received, etc., are similar or equal to the representative site), then the decision to apply the representative site risk and preferred alternative pose minimal risk and minimal consequences of an incorrect decision. Similarly, if the representative site bounds the contamination problem at an analogous site, the application of the representative site risk and remedial action pose minimal consequences from a human health and ecological risk standpoint, but may significantly impact costs through the potential application of an unnecessary remedy. In this situation, no or limited confirmatory sampling may be needed to confirm the nature of the contamination, the risk, and the appropriate remedial action. Design data may be needed depending on the preferred alternative. If an analogous site is not bound by the representative site because contamination may be greater at that analogous site, then application of the representative site risk estimate and preferred alternative poses the greatest decision risk and resulting consequences. In this case, mandatory confirmatory sampling would be conducted to ensure selection of the appropriate alternative based on a better understanding of the nature and risk of the analogous site. This last scenario is unlikely for most sites because the analogous site approach tends to target the worst-case waste sites and the worst contamination locations in those sites in an effort to bound all the contamination circumstances associated with a waste group.

In some cases, the representative site may not appropriately represent a particular analogous site; however, a representative site from another OU may more closely align with the analogous site. In these instances, the representative sites from other OUs may be used to evaluate analogous sites. The analogous sites would be evaluated against the corresponding representative site using the process discussed above.

11.2.5.2.2 Ecological Risk Assessment. The ecological risk assessment process to be followed for the 200-ST-1 OU is discussed in Section 5.2.5.2.

11.2.5.3 Data Evaluation and Conceptual Model Refinement

This task will consist of evaluating the information collected during the investigation. The nonradiological and radiological data obtained from the boreholes will be compiled, tabulated, and statistically evaluated to gain as much information as possible to satisfy data needs. Data evaluation tasks may include the following:

- Graphically evaluating the data for vertical distribution of contamination within each driven soil probe, borehole, or test pit as required.
- Stratifying the data and computing basic statistical parameters such as mean and standard deviation for individual levels when sufficient data are available. This evaluation can provide an indication of contaminant distribution.

- Constructing contour diagrams and variograms to evaluate spatial correlations within each stratum. This evaluation will indicate whether or not contamination is concentrated in a particular area (e.g., near the influent end for trenches).
- Performing statistical tests on the data to evaluate the presence or absence of contamination. This step has many facets including determining the distribution of the data and selecting the appropriate statistical tests. The initial screening for contamination should evaluate the data with respect to background, by using simple comparisons of an upper bound of the data to background concentrations (e.g., *Model Toxics Control Act* tests), or through more complex comparisons, such as nonparametric hypothesis tests (e.g., Wilcoxon rank sum test). These tests also can be used to compare the data to appropriate cleanup levels.

These statistical evaluations will aid in refining the conceptual model for this OU and selecting the remedial alternative. However, because the sites within the 200-ST-1 OU represent point-source types of releases, statistical analysis might not always be possible. Single boreholes are planned at the representative site; if the resulting data are not sufficient for statistical analysis, maximum or average concentrations will be used in the data evaluation process.

Data on the soil physical properties will be used to determine the soil type, which will assist in choosing the proper unsaturated hydraulic conductivity-moisture retention curve. Identifying the soil type and soil moisture will allow the determination of unsaturated hydraulic conductivity, which will be used as needed in modeling flow and transport.

The combined chemical, physical, and geophysical data for the 200-ST-1 representative waste site will be used for correlating subsurface data, for refining the preliminary conceptual contaminant distribution models, and as inputs to a qualitative risk assessment.

11.3 FEASIBILITY STUDY

After the RI is complete, remediation alternatives and closure strategies will be developed and evaluated against performance standards and evaluation criteria in the FS. The FS process consists of the following steps:

1. Defining RAOs.
2. Identifying general response actions to satisfy RAOs.
3. Identifying potential technologies and process options associated with each general response action.
4. Screening process options to select a representative process for each type of technology based on its effectiveness, implementability, and cost.
5. Assembling viable technologies or process options into alternatives representing a range of treatment and containment plus a no action alternative.
6. Evaluating alternatives and presenting information needed to support remedy selection.

11.4 PROPOSED PLAN AND RECORD OF DECISION

The decision-making process for the 200-ST-1 OU will incorporate the use of a proposed plan and ROD. During the RI/FS process, a number of options for development of a proposed plan and ROD will be evaluated. Remedial decisions may proceed on an OU-by-OU basis, but it is also likely that alternative site groupings will be considered for waste sites in the Central Plateau. Several alternatives are currently under consideration, some of which may be used for the waste sites addressed in this work plan.

Three alternatives to the OU-by OU remediation approach have been identified to provide flexibility in the decision-making process, facilitate early action, and remediate and close specific areas or zones. Examples of these alternatives are presented in Sections 5.4.1, 5.4.2, and 5.4.3.

11.5 POST-RECORD OF DECISION

After the ROD has been issued, a RDR/RAWP will be prepared to detail the scope of the remedial action. As part of this activity, DQOs will be established and a SAP will be prepared to direct confirmatory and verification sampling and analysis efforts. Before beginning remediation, confirmation sampling will be performed to ensure that sufficient characterization data are available to confirm that the selected remedy for the waste site is appropriate, to collect data necessary for the remedial design, and to support future risk assessments, if needed. Verification sampling will be performed after the remedial action is complete to determine if ROD requirements have been met and if the remedy was effective. Additional guidance for confirmatory and verification sampling is provided in DOE/RL-98-28, Section 6.2.

The RDR/RAWP will contain an integrated schedule of remediation activities for the OU and will satisfy the requirements for an RPP corrective measures implementation work plan and design report. Remediation activities will be designed to ensure that CERCLA cleanup requirements are obtained. Following the completion of the remediation effort, closeout activities will be performed as specified in the ROD and RDR/RAWP. Closure activities and schedules will be defined in the RDR/RAWP. After completion of cleanup actions, the site will be restored, as appropriate, for future land use.

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12.0 PROJECT SCHEDULE

The project schedule for activities discussed in the 200-ST-1 septic tank and drain fields portion of this work plan is shown in Figure 12-1. This schedule will serve as the baseline for the work-planning process and will be used to measure the progress of implementing this work plan. The schedule for preparing, reviewing, and issuing the RI and FS/closure plan is also shown in Figure 12-1. The schedule concludes with the preparation of a ROD.

The portions of this schedule most germane to this work plan are for the period of FY05 through FY08. One Tri-Party Agreement milestone that is associated with this work plan and the RI/FS process is M-15-00, "Complete RI/FS (or RFI/CMS) Process for All Operable Units (December 31, 2008)."

The following are proposed project milestone completion dates for key activities:

- Submit RI report for regulatory review: September 29, 2006
- Submit FS/closure plan for regulatory review: December 31, 2007
- Submit proposed plan for regulatory review: December 31, 2007.

A single RI, FS, and proposed plan will be generated for all sites included in Parts II, III, and IV.

Interim milestones to be designated under the Tri-Party Agreement will be established through negotiations between DOE, Ecology, and EPA. A Class II change form will be submitted to Ecology and EPA to request the addition of any interim milestones.

Figure 12-1. Project Schedule for 200-ST-1 Operable Unit. (2 sheets)

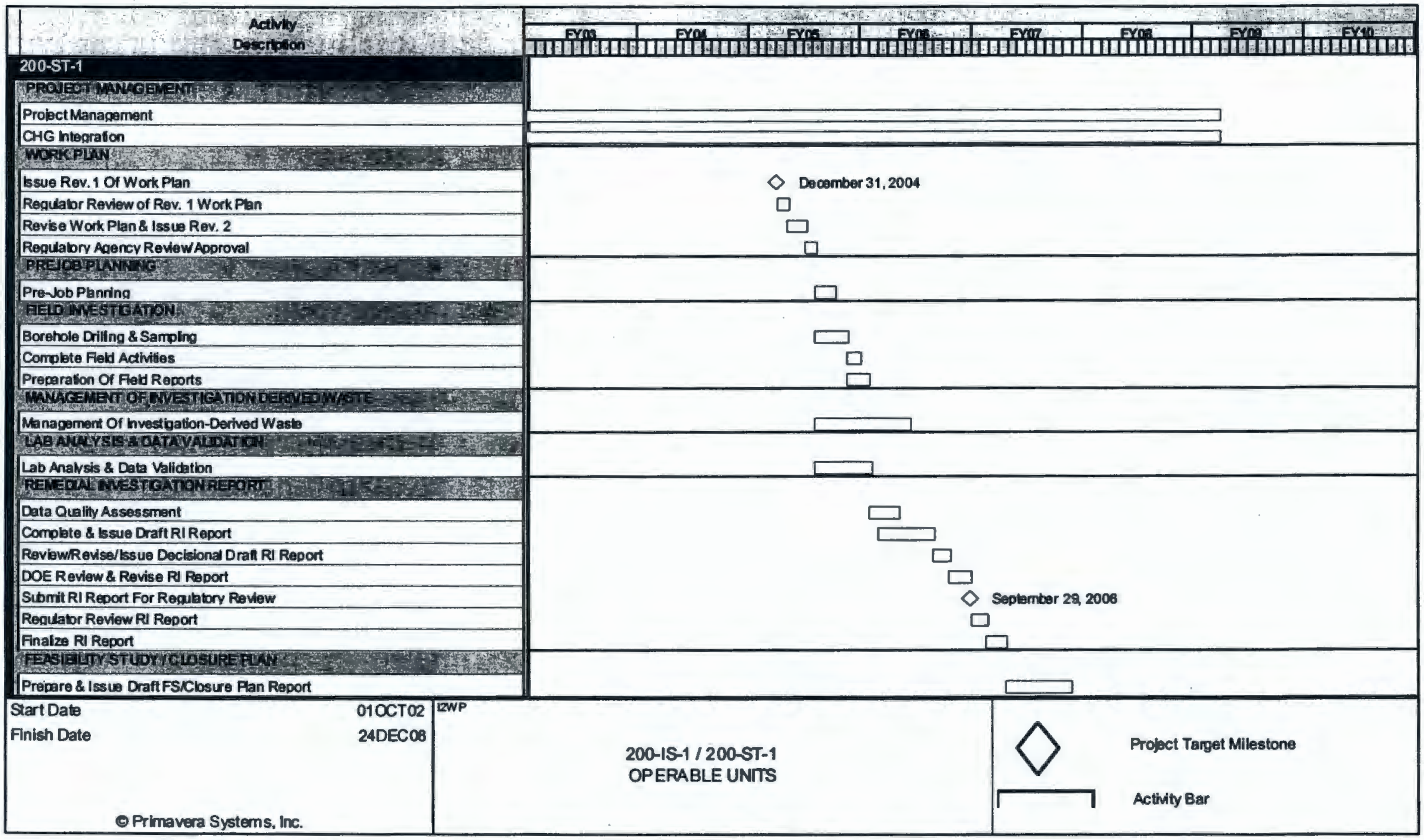
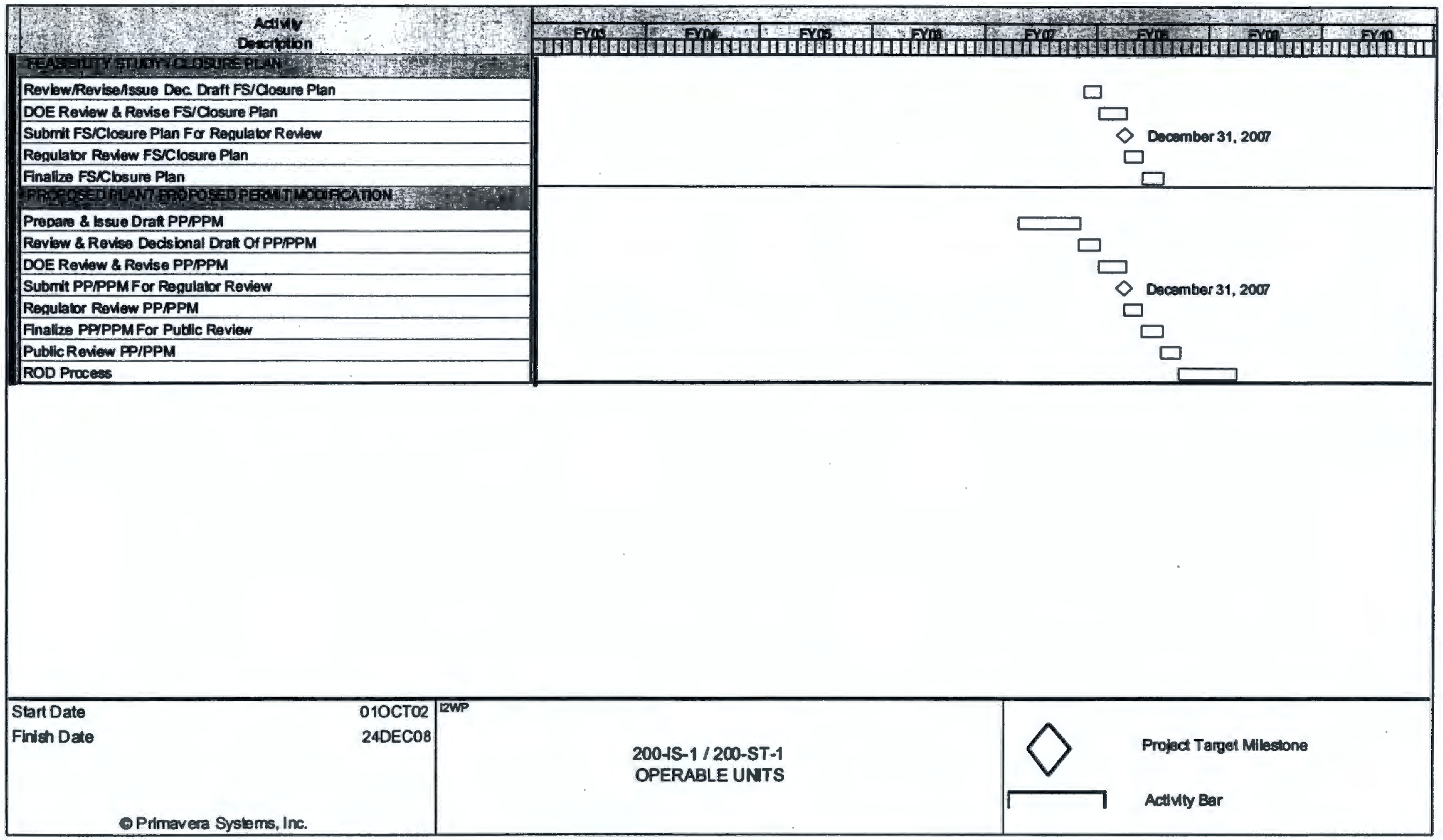


Figure 12-1. Project Schedule for 200-ST-1 Operable Unit. (2 sheets)



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APPENDIX A

200-IS-1 OPERABLE UNIT RCRA TSD UNITS AND COMPONENTS

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Table A-1. 200-IS-1 Operable Unit RCRA TSD Units and Components. (4 sheets)

Count	RCRA TSD Units	RCRA TSD Components Identified By Waste Site Name	Identified as TSD Unit or Component in WIDS (Y/N)	Component	Documentation and/or Comment
1	241-CX Tank System	241-CX-70	Y	Tank	Dangerous Waste Permit Application, Part A, Form 3, 241-CX Tank System (DOE/RL-88-21)
2	241-CX Tank System	241-CX-71	Y	Tank	Dangerous Waste Permit Application, Part A, Form 3, 241-CX Tank System (DOE/RL-88-21)
3	241-CX Tank System	241-CX-72	Y	Tank	Dangerous Waste Permit Application, Part A, Form 3, 241-CX Tank System (DOE/RL-88-21)
4	Hexone Storage and Treatment Facility	276-S-141	Y	Tank	Dangerous Waste Permit Application, Part A, Form 3, Hexone Storage and Treatment Facility (DOE/RL-88-21) RCRA closure plan (DOE/RL-92-40, Rev. 0)
5	Hexone Storage and Treatment Facility	276-S-141	Y	Tank	Dangerous Waste Permit Application, Part A, Form 3, Hexone Storage and Treatment Facility (DOE/RL-88-21) RCRA closure plan (DOE/RL-92-40, Rev. 0)
6	DST*	241-EW-151	Y	Ventilation station	DST component to be removed from service and transferred to SST; Part A in future revision
7	SST	200-E-111	N	Waste transfer line	SST system closure plan – ancillary equipment
8	SST	200-E-116	N	Waste transfer line	SST system closure plan – ancillary equipment
9	SST	200-W-7	N	Catch tank	To be added to SST Part A in future revision
10	SST	200-W-78	N	Waste transfer line	SST system closure plan – ancillary equipment
11	SST	200-W-97	Y	Waste transfer line	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
12	SST	200-W-98	Y	Waste transfer line	SST system closure plan – ancillary equipment
13	SST	200-W-99	Y	Waste transfer line	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
14	SST	200-W-100	Y	Waste transfer line	To be added to SST Part A in future revision
15	SST	200-W-105	Y	Waste transfer line	To be added to SST Part A in future revision
16	DST*	240-S-151	Y	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
17	SST	240-S-152	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
18	SST	240-S-302	N	Catch tank	To be added to SST Part A in future revision
19	DST*	241-A-151	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision

Table A-1. 200-IS-1 Operable Unit RCRA TSD Units and Components. (4 sheets)

Count	RCRA TSD Units	RCRA TSD Components Identified By Waste Site Name	Identified as TSD Unit or Component in WIDS (Y/N)	Component	Documentation and/or Comment
20	DST*	241-A-302A	N	Catch tank	DST component to be removed from service and transferred to SST; Part A in future revision
21	DST*	241-A-302B	N	Catch tank	DST component to be removed from service and transferred to SST; Part A in future revision
22	SST	241-B-154	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
23	DST*	241-B-302B	N	Catch tank	DST component to be removed from service and transferred to SST; Part A in future revision
24	SST	241-BX-154	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
25	SST	241-BX-155	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
26	SST	241-BX-302B	N	Catch tank	To be added to SST Part A in future revision
27	SST	241-BX-302C	N	Catch tank	To be added to SST Part A in future revision
28	SST	241-C-154	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
29	DST	241-ER-151	N	Diversion box	To be added to DST Part B when finalized (DOE/RL-90-39, Rev. 0, Volume 2)
30	DST	241-ER-152	N	Diversion box	To be added to DST Part B when finalized (DOE/RL-90-39, Rev. 0, Volume 2)
31	DST	241-ER-311	N	Catch tank	To be added to DST Part B when finalized (DOE/RL-90-39, Rev. 0, Volume 2)
32	SST	241-ER-311A	N	Catch tank	To be added to SST Part A in future revision
33	DST	241-EW-151	Y	Catch tank	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
34	SST	241-SX-302	N	Catch tank	To be added to SST Part A in future revision
35	DST*	241-TX-152	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
36	DST*	241-TX-154	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
37	SST	241-TX-155	Y	Diversion box	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
38	SST	241-TX-302B	N	Catch tank	To be added to SST Part A in future revision

Table A-1. 200-IS-1 Operable Unit RCRA TSD Units and Components. (4 sheets)

Count	RCRA TSD Units	RCRA TSD Components Identified By Waste Site Name	Identified as TSD Unit or Component in WIDS (Y/N)	Component	Documentation and/or Comment
39	SST	241-TX-302BR	N	Catch tank	To be added to SST Part A in future revision
40	DST*	241-TX-302C	N	Catch tank	DST component to be removed from service and transferred to SST; Part A in future revision
41	DST*	241-U-151	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
42	DST*	241-U-152	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
43	DST*	241-UX-154	N	Diversion box	DST component to be removed from service and transferred to SST; Part A in future revision
44	DST*	241-UX-302A	N	Catch tank	DST component to be removed from service and transferred to SST; Part A in future revision
45	DST	600-269	Y	Waste transfer line	Hanford Site Dangerous Waste Part A Permit Application (DOE/RL-88-21)
46	ND	UPR-200-E-25	N	Unplanned release	WIDS – associated with 241-A-151
47	ND	UPR-200-E-26	N	Unplanned release	WIDS – associated with 241-A-151
48	ND	UPR-200-E-31	N	Unplanned release	WIDS – associated with 241-A-151
49	ND	UPR-200-E-42	N	Unplanned release	WIDS – associated with 241-A-151
50	ND	UPR-200-E-45	N	Unplanned release	WIDS – associated with 241-B-154
51	ND	UPR-200-E-77	N	Unplanned release	WIDS – associated with 241-B-154
52	ND	UPR-200-E-78	N	Unplanned release	WIDS – associated with 241-BX-155
53	ND	UPR-200-E-84	N	Unplanned release	WIDS – associated with 241-ER-151
54	ND	UPR-200-W-5	N	Unplanned release	WIDS – associated with 241-TX-155
55	ND	UPR-200-W-6	N	Unplanned release	WIDS – associated with 241-U-151 and 241-U-152
56	ND	UPR-200-W-28	N	Unplanned release	WIDS – associated with 241-TX-155
57	ND	UPR-200-W-29	N	Unplanned release	WIDS – associated with 241-T-152
58	ND	UPR-200-W-38	N	Unplanned release	WIDS – associated with 241-TX-154 diversion box and 241-TX-302C catch tank
59	ND	UPR-200-W-49	N	Unplanned release	WIDS – associated with 241-SX Tank Farm

Table A-1. 200-IS-1 Operable Unit RCRA TSD Units and Components. (4 sheets)

Count	RCRA TSD Units	RCRA TSD Components Identified By Waste Site Name	Identified as TSD Unit or Component in WIDS (Y/N)	Component	Documentation and/or Comment
60	ND	UPR-200-W-64	N	Unplanned release	WIDS – associated with UPR-200-W-29 and UPR-200-W-97
61	ND	UPR-200-W-79	N	Unplanned release	WIDS – associated with 241-Z sump
62	ND	UPR-200-W-82	N	Unplanned release	WIDS – associated with 240-S-151
63	ND	UPR-200-W-97	N	Unplanned release	WIDS – associated with transfer lines connecting 241-T-152 and 241-TX-153
64	ND	UPR-200-W-113	N	Unplanned release	WID S– associated with 241-TX-155
65	ND	UPR-200-W-131	N	Unplanned release	WID S– associated with 241-TX-155
66	ND	UPR-200-W-135	N	Unplanned release	WIDS – associated with waste transfer line west of 241-TX-155
67	ND	UPR-200-W-160	N	Unplanned release	WID S– associated with 241-TX-155 diversion box and 241-TX-302 catch tank
68	ND	UPR-200-W-161	N	Unplanned release	WID S– associated with 241-U Tank Farm
69	ND	UPR-200-W-167	N	Unplanned release	WIDS – associated with 241-TY Tank Farm
70	ND	UPR-600-20	N	Unplanned release	WIDS – associated with 241-ER-151

DST = Double-shell tank system. Currently listed as "DST" components due to (1) being part of an active transfer route, such as BX Farm to AW Farm; (2) being a catch tank that has not been removed from service yet; or (3) supported transfers in the recent past (old cross-site transfer line and related components).
DST* = The items marked "DST*" will be transferred to the SST system after June 30, 2005. *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 2003) Milestone M-48-07 provided Ecology a listing of DST components to be removed from service by June 30, 2005. The DST* items are on that list, and as they are physically located with an SST, will transfer to the SST and be added to the SST Part A.
Ecology = Washington State Department of Ecology
ND = not defined
N = no
RCRA = *Resource Conservation and Recovery Act of 1976*
SST = Single-shell tank system. Some items are marked "SST" that are not in the SST Part A Permit at this time. They will be added at the next revision. SST TSD components, ancillary equipment, and/or miscellaneous structures are not currently fully defined and are pending revisions and/or additions.
TSD = treatment, storage, and disposal
WIDS = Waste Information Data System
Y = yes

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APPENDIX B

SAMPLING AND ANALYSIS PLAN
FOR 200-IS-1 AND 200-ST-1 WASTE GROUP OPERABLE UNITS

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CONCURRENCE PAGE

Title: *Sampling and Analysis Plan for 200-IS-1 and 200-ST-1 Waste Group Operable Units*

______________________________ ________________, DOE/RL Manager	________ Date
______________________________ ________________, Unit Manager Washington State Department of Ecology	________ Date
______________________________ ________________, Director Fluor Hanford Groundwater Remediation Project	________ Date
______________________________ ________________, Manager Fluor Hanford Groundwater Protection Engineering	________ Date
______________________________ ________________, Manager Fluor Hanford Waste Site Remedial Actions	________ Date
______________________________ ________________, Manager Fluor Hanford Operations Management	________ Date
______________________________ ________________, Manager Fluor Hanford Environmental/Science Assurance	________ Date
______________________________ ________________, QA Engineer Fluor Hanford Groundwater Remediation Project	________ Date
______________________________ ________________, Environmental Compliance Fluor Hanford Groundwater Remediation Project	________ Date

(NOTE: To be completed following regulatory review and during incorporation of regulatory comments into Rev. 1 of the sampling and analysis plan.)

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TERMS

AEA	alpha energy analysis
ASTM	American Society for Testing and Materials
bgs	below ground surface
CAS	Chemical Abstract Service
CLARC	Cleanup Levels and Risk Calculations
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	contaminant of potential concern
CVAA	cold vapor atomic absorption
DOE	U.S. Department of Energy
dpm	disintegrations per minute
DQO	data quality objective
DR	decision rile
EMI	electromagnetic induction
EPA	U.S. Environmental Protection Agency
FH	Fluor Hanford, Inc.
FS	feasibility study
GC	gas chromatograph
GEA	gamma energy analysis
GG/PN	gross gamma/passive neutron
GPR	ground-penetrating radar
GRP	Groundwater Remediation Project
GW	groundwater
HEIS	Hanford Environmental Information System
HPGe	high-purity germanium
HSTF	Hexone Storage and Treatment Facility
IC	ion chromatograph
ICP	inductively coupled plasma
IDW	investigation-derived waste
IMUST	inactive miscellaneous underground storage tank
MS	mass spectrometry
N/A	not applicable
NAD83	*North American Datum of 1983*
NaI	sodium iodide
NAVD88	*North American Vertical Datum of 1988*
NPH	normal paraffin hydrocarbon
NWTPH	northwest total petroleum hydrocarbons
ORP	U.S. Department of Energy, Office of River Protection
OU	operable unit
PCB	polychlorinated biphenyl
PUREX	plutonium-uranium extraction
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control

RCRA	*Resource Conservation and Recovery Act of 1976*
RCP	radiological control procedure
RCT	radiological control technician
REDOX	reduction-oxidation
RESRAD	RESidual RADioactivity Dose Model
RI	remedial investigation
RL	U.S. Department of Energy, Richland Operations Office
SAP	sampling and analysis plan
SGL	spectral gamma logging
SVOA	semi-volatile organic analyte
TBD	to be determined
TBP	tributyl phosphate
TOC	total organic carbon
TRU	transuranic
TSD	treatment, storage, and disposal
UPR	unplanned release
VOA	volatile organic analyte
VOC	volatile organic compound
WD	Waste Disposal (Project)
WDOH	Washington State Department of Health
WIDS	Waste Information Data System

APPENDIX B
SAMPLING AND ANALYSIS PLAN

B1.0 INTRODUCTION

This sampling and analysis plan (SAP) directs the activities performed to characterize the vadose zone associated with the *Resource Conservation and Recovery Act of 1976* (RCRA) treatment, storage, and disposal (TSD) units in the 200-IS-1 Operable Unit (OU) and the representative site selected for the 200-ST-1 OU: For 200-IS-1, this includes the 241-CX tank system and the 276-S Hexone Storage and Treatment Facility (HSTF). For 200-ST-1, field investigation activities for the representative site, the 2607-W-3 septic tank, are presented. As discussed in Part II of the work plan, confirmatory sampling and analyses requirements for pipeline and diversion box waste sites in the 200-IS-1 OU will be defined later in a remedial action work plan SAP.

The sampling and analyses described in this document will provide data to refine the conceptual contaminant distribution models, support an assessment of risk, and evaluate remedial alternatives for the waste sites. Characterization activities described in this plan are based on implementing the data quality objectives (DQO) process, as documented in CP-13196, *Remedial Investigation Data Quality Objectives Summary Report for the 200-IS-1 and 200-ST-1 Operable Units*.

The field activities described in this SAP include geophysical logging, soil sampling, and soil gas sampling to assess the integrity of the tanks in the 241-CX tank system and at the 276-S HSTF. Results of the investigation at the 2607-W-3 septic tank will be used to determine the nature and extent of contamination at analogous 200-ST-1 waste sites. Based on the results of the initial investigation, additional characterization via soil borings or test pits may be performed to collect soil samples for analyses of radiological and nonradiological contaminants of concern (COCs) and selected physical properties. Sampling for waste designation will be addressed through a waste designation DQO process before the field characterization activities begin.

B1.1 BACKGROUND

The 200-IS-1 Tanks/Lines/Pits/Boxes Waste Group OU consists of structures used to convey or control the conveyance of waste from source-generating facilities to tank farms for disposal or to other processing facilities. The category consists of facilities used to handle the high-level plant waste generated from separations or volume-reduction processes. In some cases, structures constructed to support a soil-column disposal waste site are considered as part of this group rather than the group in which the soil-column disposal waste site has been placed. Included in this OU are the 241-CX tank system and the 276-S HSTF. These are RCRA inactive miscellaneous underground storage tank (IMUST) TSD waste units.

The 200-ST-1 Septic Tanks and Drain Fields Group OU contains sites that have received or continue to receive largely nonradioactive, nonhazardous, sanitary sewer waste. Sewer waste includes human waste, shower water, janitorial and lunchroom water, and drinking water. Small amounts of radiological contamination were potentially discharged through the shower and janitorial sink sources, but contamination from this source is expected to be minimal. Chemical constituents such as soaps and detergents are expected in quantities that are small compared to the volume of wastewater discharged. While the total quantities of liquids discharged typically were not tracked, the flow rate into the sites was documented in a number of cases (DOE/RL-98-28, *200 Areas Remedial Investigation/Feasibility Study Implementation Plan – Environmental Restoration Program*).

B1.2 200-IS-1 AND 200-ST-1 OPERABLE UNIT AND WASTE SITE LOCATIONS

The 200-IS-1 and 200-ST-1 OUs are located on the Hanford Site in south-central Washington State, in the 200 East and 200 West Areas. All waste sites are located within the exclusive land-use boundary identified in DOE/EIS-0222-F, *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement.* Plates 1 and 2 in DOE/RL-2002-14, *Tanks/Lines/Pits/Boxes/ Septic Tank and Drain Fields Waste Group Operable Unit RI/FS/Work Plan and RCRA TSD Unit Sampling Plan,* show the specific locations of waste sites in the OUs.

B1.3 SITE DESCRIPTION AND HISTORY

The following subsections briefly describe the RCRA TSD units and the representative waste site that will be investigated. Additional detail is provided in Section 2.2 of DOE/RL-2002-14. Section 3.3 of DOE/RL-2002-14 contains information on the nature and extent of contamination and previous investigations.

B1.3.1 241-CX Tank System

The 241-CX tank system is located east of B Plant in the 200 East Area. The 241-CX tank system consists of three tanks: 241-CX-70, 241-CX-71, and 241-CX-72. Processes that were associated with these three tanks are as follows.

- <u>Tank 241-CX-70</u>: This tank was used for approximately 1 year in the early 1950s to store high-level process waste from the reduction-oxidation (REDOX) pilot studies. The term "REDOX" was used for the reduction-oxidation chemical process used to separate plutonium and uranium from irradiated reactor fuel. Waste removal activities for tank 241-CX-70 were initiated in the summer of 1987 with the construction of a sluicing/ pumping system. The sluicing/pumping system involved using large volumes of water to sluice the solid mixed waste to the bottom of tank 241-CX-70 and pump it to the double-shell tank system. Approximately 529,950 L (140,000 gal) of water were used to sluice the original waste volume of 38,986 L (10,300 gal) down to 2,839 L (750 gal). This amount of waste remained in tank 241-CX-70 until December 20, 1991, when it was placed in approved containers and transferred to the 224-T Transuranic Waste Storage and Assay Facility. The design capacity of tank 241-CX-70 is 113,550 L (30,000 gal).
- <u>Tank 241-CX-71</u>: This tank was used from 1952 through 1957 for neutralizing the 201-C process condensate and coil and condenser cooling water. Tank 241-CX-71 received process condensate from REDOX and plutonium-uranium extraction (PUREX) operations and also decontamination flushes following the completion of PUREX operations. The mixed waste remaining in tank 241-CX-71 contains liquid process effluents that were passed through the tank to be neutralized by contact with a bed of limestone aggregate placed in the tank for this purpose. After the June 1957 decontamination flushes, tank 241-CX-71 was taken out of service. The design capacity of tank 241-CX-71 is 3,785 L (1,000 gal).

- Tank 241-CX-72: This tank was used for approximately 1 year in 1956 when 8,725 L (2,305 gal) of Strontium Semi-Works complex mixed waste was transferred into the tank for storage. Tank 241-CX-72 also was used to study the concentration of waste generated from the Strontium Semi-Works complex pilot studies. Decontamination flushes from the Strontium Semi-Works complex also might have been sent to tank 241-CX-72. The waste in the tank was then heated until enough liquid evaporated that it was nearly dry. From 1960 through 1967, tank 241-CX-72 remained idle until it was taken out of service in 1967. In 1986, tank 241-CX-72 was filled with 7.3 m (24 ft) of grout over a 3.4 m (11 ft) heel of non-liquid mixed waste. The design capacity of tank 241-CX-72 is 8,860 L (2,340 gal).

The 241-CX tank system no longer receives waste and will be closed under interim status.

B1.3.2 Hexone Storage and Treatment Facility

The HSTF is located in the southeast corner of the Hanford Site's 200 West Area. The HSTF consisted of two 91,000-L (24,000-gal), below-grade, carbon-steel tanks (276-S-141 and 276-S-142), a distillation system, and railroad tank cars. The HSTF received liquid mixed waste from the REDOX Plant and, possibly, the Hot Semi-Works Facility. The HSTF was used from 1951 through 1967 to store reagent-grade methyl isobutyl ketone (hexone) for make-up as a solvent for the REDOX Plant. After 1967, the HSTF contained distilled hexone, part or all of which had been used in the REDOX Plant. Tank 276-S-142 also contained normal paraffin hydrocarbon (NPH) and tributyl phosphate (TBP) from a one-time campaign to separate americium, curium, and promethium from Shippingport reactor blanket fuel in 1966. Approximately 760 L (200 gal) of water were added to tank 276-S-141 in 1988.

Tank 276-S-142 received approximately 5,000 L (1,300 gal) of water in 1967; 1,900 L (500 gal) in the mid-1970s; and 760 L (200 gal) in the mid-1980s. The combined storage design capacity of tanks 276-S-141 and 276-S-142 is 182,000 L (48,000 gal). The treatment design capacity of the distillation system was 11,400 L (3,000 gal) of waste per day. The storage design capacity of the railroad tank cars was 152,000 L (40,000 gal). The mixed waste was pumped from tanks 276-S-141 and 276-S-142 through a distillation system to decrease the radioactivity of the waste. The distilled waste was sent to temporary storage in railroad tank cars located in the HSTF until transfers to an offsite incinerator were completed in June 1992. Three distillation vessels containing process residue have been sampled and are stored at the Hanford Site as mixed waste. Tanks 276-S-141 and 276-S-142 currently contain up to 19 to 114 L (5 to 30 gal) each of liquid mixed waste containing 93% NPH, 7% hexone, and up to 950 L (250 gal) of phosphate tar. The phosphate tar will be stored at the Hanford Site as mixed waste. The railroad tank cars have been emptied, cleaned, and moved to another location. The two 91,000-L (24,000-gal), below-grade, carbon-steel tanks are being closed under interim status.

B1.3.2.1 2607-W3 Septic Tank and Drain Field

The 2607-W3 is a sanitary sewage disposal site consisting of a reinforced-concrete tank extending 6 in. above grade (Hanford Site drawing W-71182) with a 54,428 L capacity, located northeast of the 241-T-361 settling tank, approximately 61 m (200 ft) north of 23rd Street and 244 m (800 ft) southwest of the 224-T Building. This site also includes a drain field that was expanded in the 1950s to 134 m by 61 m. The drain field's flow capacity was 18,685 L/day (WHC-SD-LL-ES-020, *200 Area Sanitary Waste Management Engineering Study*). The tank received sanitary effluent from the 221-T, 222-T, 224-T, and 271-T Buildings from 1944 until it was pumped, filled with sand, and abandoned in place in August 1996. Before being abandoned, the 2607-W3 septic system received 14,187 L/day of sanitary sewage. A contaminated process sewer line runs parallel to the sanitary sewer line in this area (Waste Information Data System [WIDS]).

B1.4 CONTAMINANTS OF CONCERN

The DQO process identifies the need to develop a list of contaminants of potential concern (COPCs) for the 200-IS-1 and 200-ST-1 OU waste sites. Development of the COPCs is an essential step towards refining the preliminary conceptual contaminant distribution models. From an investigation of historical sources including process documents, logbooks, original plant technical manuals, and interviews of plant operators, a list of potential contaminants was identified. Screening of this list was conducted during the DQO process to arrive at a final list of COCs for the 200-IS-1 and 200-ST-1 OUs. Development of these lists is described in the 200-IS-1 and 200-ST-1 DQO summary report (CP-13196) and is summarized in Section 3.6 of DOE/RL-2002-14, Rev. 1. In a follow-on DQO effort conducted as part of the assessment and integration of U.S. Department of Energy (DOE), Office of River Protection (ORP)-owned waste sites into the 200-IS-1 OU work plan, a more comprehensive list of COCs was developed. The revised list of COCs that were developed as part of the second DQO process for the 200-IS-1 and 200-ST-1 OU waste sites and are addressed in this SAP are identified in Table B-1.

If contaminants not identified as COCs are detected during laboratory analysis, the data will be evaluated against regulatory standards, or risk-based contamination levels if exposure data are available, and existing process knowledge in support of remedial action decision making.

B1.4.1 Data Quality Objectives

The U.S. Environmental Protection Agency (EPA) document, *Guidance for the Data Quality Objectives Process* (EPA 600/R-96/055, EPA QA/G-4), was used to support the development of this SAP. The DQO process is a strategic planning approach that provides a systematic process for defining the criteria that a data collection design should satisfy. Using the DQO process ensures that the type, quantity, and quality of environmental data used in decision making will be appropriate for the intended application.

This section summarizes the key outputs resulting from the implementation of the DQO process. Additional details are included in the DQO summary report (CP-13196).

B1.4.1.1 Statement of the Problem

The 200-IS-1 and 200-ST-1 OUs consist of waste sites that stored or transferred liquid waste containing low to high concentrations of radionuclides and nonradiological constituents. The sites include RCRA TSD units and RCRA past-practice waste sites. Vadose zone soils, and potentially the groundwater, may have been contaminated by releases from some of the 200-IS-1 and 200-ST-1 waste sites.

The objective of the DQO process for the waste sites addressed in this SAP was to determine the environmental measurements necessary to support the remedial investigation/feasibility study (RI/FS) process and remedial decision making, including refinement of the preliminary conceptual contaminant distribution models for the representative septic system waste site and RCRA TSD tank sites. The DQO process also supports development of this SAP.

Table B-1. 200-IS-1 and 200-ST-1 Operable Units Contaminants of Concern List. (2 sheets)

CAS Number	Compound Name	CAS Number	Compound Name
Radionuclides			
14596-10-2	Americium-241	13981-16-3	Plutonium-238
14234-35-6	Antimony-125	15117-48-3	Plutonium-239
14762-75-5	Carbon-14	14119-33-6	Plutonium-240
13967-70-9	Cesium-134	13982-63-3	Radium-226
10045-97-3	Cesium-137	15262-20-1	Radium-228
10198-40-0	Cobalt-60	10098-97-2	Strontium-90
14683-23-9	Europium-152	14133-76-7	Technetium-99
15585-10-1	Europium-154	7440-29-1	Thorium-232
14391-16-3	Europium-155	13968-55-3	Uranium-233
10028-17-8	Hydrogen-3 (tritium)	13966-29-5	Uranium-234
15046-84-1	Iodine-129	15117-96-1	Uranium-235
13994-20-2	Neptunium-237	13982-70-2	Uranium-236
13981-37-8	Nickel-63	7440-61-1	Uranium-238
Inorganics			
7429-90-5	Aluminum	7439-93-2	Lithium
7664-41-7	Ammonia/ammonium	7439-96-5	Manganese
7440-36-0	Antimony	7439-97-6	Mercury (inorganic)
7440-38-2	Arsenic	7439-98-7	Molybdenum
22569-72-8	Arsenic (III)	7440-02-0	Nickel
17428-41-0	Arsenic (V)	14797-55-8	Nitrate
7440-39-3	Barium	14797-65-0	Nitrite
7440-41-7	Beryllium	14265-44-2	Phosphate
7440-43-9	Cadmium	7782-49-2	Selenium
16887-00-6	Chloride	7440-22-4	Silver
7440-47-3	Chromium	7440-24-6	Strontium
18540-29-9	Chromium (VI)	14808-79-8	Sulfate
7440-48-4	Cobalt	14265-45-3	Sulfite
7440-50-8	Copper	7440-28-0	Thallium

Table B-1. 200-IS-1 and 200-ST-1 Operable Units Contaminants of Concern List. (2 sheets)

CAS Number	Compound Name	CAS Number	Compound Name
57-12-5	Cyanide	7440-31-5	Tin
16984-48-8	Fluoride	7440-61-1	Uranium
7553-56-2	Iodine	7440-62-2	Vanadium
7439-92-1	Lead	7440-66-6	Zinc
Organics			
75-34-3	1,1-dichloroethane (DCA)	156-59-2	Cis-1,2-dichlorothylene
75-35-4	1,1-dichloroethene	53-70-3	Dibenz[a,h]anthracene
71-55-6	1,1,1-trichloroethane (TCA)	75-09-2	Dichloromethane (methylene chloride)
79-00-5	1,1,2-trichloroethane	100-41-4	Ethyl benzene
79-34-5	1,1,2,2-tetrachloroethane	193-39-5	Indeno[1,2,3-cd]pyrene
95-50-1	1,2-dichlorobenzene	108-10-1	Methyl isobutyl ketone (MIBK, hexone)
107-06-2	1,2-dichloroethane (DCA)	91-20-3	Naphthalene
541-73-1	1,3-dichlorobenzene	104-51-8	n-butyl benzene
121-14-2	2,4-dinitrotoluene	127-18-4	Tetrachloroethylene (PCE)
78-93-3	2-butanone (methyl ethyl ketone/MEK)	108-88-3	Toluene
591-78-6	2-hexanone	156-60-5	Trans-1,2-dichloroethene
71-43-2	Benzene	79-01-6	Trichloroethylene (TCE)
56-55-3	Benzo[a]anthracene	1330-20-7	Xylene
50-32-8	Benzo[a]pyrene	68334-30-5	Total petroleum hydrocarbons
205-99-2	Benzo[b]fluoranthene	95-48-7	2-methylphenol (o-cresol)
207-08-9	Benzo[k] fluoranthene	106-44-5	4-methylphenol (p-cresol)
71-36-3	Butanol (n-butyl alcohol)	112-40-3	Normal paraffin hydrocarbons (NPH)
56-23-5	Carbon tetrachloride	108-95-2	Phenol
108-90-7	Chlorobenzene	1336-36-3	Polychlorinated biphenyls (PCBs)
67-66-3	Chloroform	N/A	Gasoline range organics
218-01-9	Chrysene	68334-30-5	Diesel range organics

CAS = Chemical Abstract Service
N/A = not applicable

B1.4.1.2 Decision Rules

Decision rules (DRs) are developed from results of the principal study questions, decision statements, remedial action alternatives, data needs, COC action levels, analytical requirements, and scale of the decisions. The DRs are generally structured as "IF…THEN" statements that indicate the action that will be taken when a prescribed condition is met. The DRs incorporate the parameters of interest (e.g., COCs), the scale of the decision (e.g., location), the preliminary action level (e.g., COC concentration), and the resulting actions. The decision statements for the 200-IS-1 OU RCRA TSD waste units and the 200-ST-1 OU waste sites are summarized in Table B-2.

Table B-2. Decision Rules.[a]

DR#	Decision Rule
1	If the true maximum (as estimated by the maximum detected sample values) activity of radionuclides within the soil samples in each of the applicable strata[b] is greater than or equal to 100 nCi/g (TRU waste definition) or the greater than Class C definition, evaluate special remedial alternatives in a FS; otherwise, evaluate conventional remedial alternatives in a FS.
2	If the true maximum (as estimated by the maximum detected sample value) activity of radionuclides dose greater than or equal to 15 to 100 mrem/yr above background, evaluate remedial alternatives in a FS; otherwise, evaluate the site for closure with no remedial action.
3	If the true maximum (as estimated by the maximum detected sample values) concentration of chemical constituents within the soil samples in each of the applicable strata[b] is greater than or equal to the preliminary action levels in DQO summary report Table 3-6, evaluate remedial alternatives in a FS; otherwise, evaluate the site for closure with no remedial action.

[a] From the data quality objectives summary report (CP-13196, Section 5.2, Table 10).
[b] The applicable strata include the highest potential contaminant concentration layers, the moderate-to-low potential contaminant concentration layers, and the low-potential contaminant concentration layers.

DQO = data quality objective
DR = decision rule
FS = feasibility study
TRU = transuranic

B1.4.1.3 Error Tolerance and Decision Consequences

The consequence of selecting an inadequate nonstatistical sampling design is not considered severe. Based on Section 6.0 of the DQO summary report (CP-13196), the sampling design rigor requirements are not significant because of the combination of low severity and accessibility after RI sampling. If the sampling design is determined to be inadequate, additional sampling can be performed because the sites still will be accessible. Section 5.0 of DOE/RL-2002-14 summarizes the sampling activities that are planned after the initial characterization efforts described in this SAP are evaluated.

B1.4.2 Sample Design Summary

A nonstatistical sampling design (professional judgment) was used to select sample locations at the waste sites. A biased (or focused) sampling approach was selected based on process knowledge, expected behavior of COCs, observed distribution of contamination, waste site configuration, and the preliminary conceptual contaminant distribution models developed for the waste sites. Using this approach, field screening measurements and/or soil sample locations are selected that increase the likelihood of encountering the worst-case conditions or maximum concentrations of contaminants.

The total number of samples for the waste sites is selected based on the conceptual contaminant distribution models and the physical setting of the waste sites. The models suggest that the highest potential for contamination should be near the bottom of the structures and decreases with depth; therefore, a greater number of field screening measurements and/or soil sample intervals are planned in the zone immediately below the potential release point of the contaminants. The number of field screening measurements and/or soil sample intervals generally will decrease with depth based on the expected distribution of contamination. Additional field screening measurements and/or soil samples can be collected at the discretion of the site geologist based on the field screening information and geological conditions encountered during the field investigation. All material excavated will be screened as described in Section B3.4.2 to reduce the potential of overlooking zones of significant contamination. The optimal sample design for this initial phase of characterization is presented in Tables B-7 through B-11.

Changes to the workscope detailed in the SAP may be required because of unexpected field conditions, new information, health and safety concerns, or other anomalies. Minor changes that have no adverse effect on the DQOs or schedule can be made in the field with the approval by the project manager or assigned task lead and then documented in the daily field logbook and/or field summary reports. Changes that affect the DQOs will require concurrence by the DOE Richland Operations Office (RL) and the lead regulatory agency and can be documented through unit managers' meetings. Alternatively, if substantial changes are required, the SAP can be revised and issued as a separate document requiring RL and regulator approval.

B2.0 QUALITY ASSURANCE PROJECT PLAN

The quality assurance project plan (QAPjP) establishes the quality requirements for environmental data collection, including sampling, field measurements, and laboratory analysis. The overall QAPjP for environmental restoration waste sites in the 200 Areas is included in Appendix A of the Implementation Plan (DOE/RL-98-28). The QAPjP complies with the requirements of the following:

- DOE Directive CRD 414.1A, *Quality Assurance*
- 10 *Code of Federal Regulations* (CFR) 830.120, "Quality Assurance Requirements"
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA 240/B-01/003, EPA QA/R-5)
- *Hanford Analytical Services Quality Assurance Requirements Document* (DOE/RL-96-68, Rev. 3).

The Implementation Plan (DOE/RL-98-28) provides the general framework of technical and administrative requirements that apply to OUs in the 200 Areas.

The following sections describe the supplemental waste group quality requirements and the procedural controls applicable to this investigation. The 200 Areas QAPjP (DOE/RL-98-28, Appendix A) and this section of the SAP will serve as the QAPjP for the 200-IS-1 and 200-ST-1 RI. Correlation between EPA 240/B-01/003 (EPA QA/R-5) requirements and information provided in the 200 Areas QAPjP and/or this SAP is provided in Table B-3.

B2.1 FIELD QUALITY CONTROL

Field quality control (QC) samples shall be collected to evaluate the potential for cross-contamination and laboratory performance. Field QC for sampling in the 200-IS-1 RCRA TSD units and 200-ST-1 representative waste site will require the collection of field duplicate, field split, equipment rinsate blank, and trip blank samples. If possible, field duplicate and field split samples should be collected from contaminated areas so valid comparisons between the samples can be made. However, the samples should not be collected from zones that are expected to contain high levels of transuranic-contaminated soils because of the high cost and added handling requirements associated with transuranic materials. The QC samples and the required frequency for collection are described in the following subsections.

B2.1.1 Field Duplicates

Each field duplicate shall be retrieved from the sample interval using the same equipment (collected from one split-spoon or bowl) and sampling technique as the original sample. Field duplicates for soil are collected and homogenized before being divided into two samples in the field. If volatile organic analyte (VOA) samples are required, they should be collected before homogenization. The duplicate samples shall be sent to the primary laboratory in the same manner as the routine site samples. Field duplicates provide information regarding the homogeneity of the sample matrix and also can be used to evaluate the precision of the analysis process.

At least 5% of the total collected soil samples will be duplicated (one field duplicate will be collected for every 20 samples). At least one field duplicate shall be collected from each representative waste site investigated. The duplicate samples shall be suitable for analysis by an offsite laboratory and shall be analyzed for all of the COCs listed in Table B-4.

B2.1.2 Field Splits

Field split samples will be collected at the same frequency as field duplicate samples from each representative site sampled in the RI. Each split sample shall be retrieved from the same sample interval using the same equipment (collected from one split-spoon sample) and sampling technique as the original sample. Samples shall be homogenized, split into two separate aliquots in the field, and sent to two independent laboratories. If VOA samples are required, they should be collected before homogenization. The splits will be used to verify the performance of the primary laboratory.

The split samples will be obtained from a sample medium that is expected to have some contamination and that is suitable for analysis in an offsite laboratory and shall be analyzed for all of the COCs listed in Table B-4.

Table B-3. Correlation Between EPA QA-5 Requirements and the Sampling and Analysis Plan.[a]

EPA QA/R-5 Criteria	EPA QA/R-5 Title	Reference Section
Project Management	Project/Task Organization	A2.1 (DOE/RL-98-28)[b], Figure 1 (HNF-20635)[c]
	Problem Definition and Background	B1.4.1.1, B1.1
	Project Task Description	B1.0, B2.0
	Quality Objectives and Criteria	B1.4.1, B2.2
	Special Training/Certification	B2.7; HNF-20635, Section 2.0
	Documents and Records	B2.7
Data Generation and Acquisition	Sample Process Design	B1.4.2, B3.0
	Sampling Methods	B2.7, Table B-7
	Sample Handling and Custody	B2.7.4, B2.7.5, B2.7.6, Table B-5
	Analytical Methods	B2.2, Table B-4
	Quality Control	B2.1, B2.2
	Instrument/Equipment Testing, Inspection and Maintenance	B2.7
	Instrument/Equipment Calibration and Frequency	B2.7
	Inspection and Acceptance of supplies and consumables	B2.7
	Non Direct Measurement	B1.1, B1.4
	Data Management	B2.5
Assessment and Oversight	Assessment and Response Actions	B2.7; HNF-20635, Section 3.0
	Reports to Management	B2.7
Data Validation and Usability	Data Review, Verification and Validation	B2.6
	Verification and Validation Methods	B2.6
	Reconciliation with User Requirements	B2.5, A6.0 (DOE/RL-98-28)

[a] EPA QA/G-4, *Guidance for the Data Quality Objectives Process* (EPA 600/R-96/055).
[b] DOE/RL-98-28, *200 Areas Remedial Investigation/Feasibility Study Implementation Plan – Environmental Restoration Program*.
[c] HNF-20635, *Groundwater Remediation Project Quality Assurance Project Plan*.

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		15 mrem/yr[b] (pCi/g)	500 mrem/yr[b] (pCi/g)	GW Protection[b] (pCi/g)		Water Low Activity (pCi/L)	Water High Activity (pCi/L)	Soil-Other Low Activity (pCi/g)	Soil-Other High Activity (pCi/g)				
Radionuclides													
Americium-241	14596-10-2	335	112,000	N/A	Americium isotopic – AEA	1	400	1	4,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Antimony-125	14234-35-6	32.4	1,080	N/A	GEA	50	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Carbon-14	14762-75-5	33,100	1,100,000	N/A	Chem. separation - liquid scintillation	15	400	15	4,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Cesium-134	13967-70-9	8.43	281	N/A	GEA	15	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Cesium-137	10045-97-3	23.4	780	N/A	GEA	15	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Cobalt-60	10198-40-0	4.90	164	N/A	GEA	25	200	0.05	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Europium-152	14683-23-9	11.4	388	N/A	GEA	50	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Europium-154	15585-10-1	10.3	345	N/A	GEA	50	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Europium-155	14391-16-3	426	14,200	N/A	GEA	50	200	0.1	2,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Iodine-129	15046-84-1	3,081	102,700	0.024	Chem. separation - low-energy photon spectroscopy	5	N/A	2	N/A	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Neptunium-237	13994-20-2	59.2	1,980	N/A	Neptunium-237 isotopic – AEA	1	130	1	1,300	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Nickel-63	13981-37-8	4,026	3,008,000	N/A	Chem. separation - liquid scintillation	15	400	15	4,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Plutonium-238	13981-16-3	470	15,700	N/A	Plutonium isotopic – AEA	1	130	1	1,300	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Plutonium-239/240	Pu-239/240	425	14,200	N/A	Plutonium isotopic – AEA	1	130	1	1,300	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Radium-226	13982-63-3	7.03	234	N/A	Chem. separation - liquid GEA - solid	1	200	0.1	2000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Radium-228	15262-20-1	8.15	272	N/A	Chem. separation - liquid GEA - solid	3	400	0.2	4000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Strontium-90	Rad-Sr	2,410	80,300	N/A	Chem. separation – GPC	2	80	1	800	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Technetium-99	14133-76-7	412,000	13,700,000	171	Chem. separation - liquid scintillation	15	400	15	4,000	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		15 mrem/yr[b] (pCi/g)	500 mrem/yr[b] (pCi/g)	GW Protection[b] (pCi/g)		Water Low Activity (pCi/L)	Water High Activity (pCi/L)	Soil-Other Low Activity (pCi/g)	Soil-Other High Activity (pCi/g)				
Thorium-232	7440-29-1	4.8	160	N/A	Thorium isotopic – AEA ICPMS (mg)	1	0.002 mg/L	1	0.02 mg/kg	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Tritium (H-3)	10028-17-8	66,900	2,230,000	4,100	Chem. separation - liquid scintillation	400	400	400	400	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Uranium-233/234	13966-29-5	2,660	88,800	39.5	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	0.002 mg/L	1	0.02 mg/kg	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Uranium-235/236	15117-96-1	101	3,370	3.92	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	0.002 mg/L	1	0.02 mg/kg	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
Uranium-238	U-238	504	16,800	38.1	Uranium isotopic – AEA (pCi) ICPMS (mg)	1	0.002 mg/L	1	0.02 mg/kg	±20%(e)	80-120%(e)	±35%(e)	65-135%(e)
COCs	**CAS #**	**Preliminary Action Level[a]**			**Name/Analytical Technology[f]**	**Required Target Quantitation Limits[d]**				**Precision Water**	**Accuracy Water**	**Precision Soil**	**Accuracy Soil**
		WAC 173-340-745 Method C[f] (mg/kg)	**GW Protection[g] (mg/kg)**	**Terrestrial Biota Protection[h] (mg/kg)**		**Water Low Conc. (mg/L)**	**Water High Conc. (mg/L)**	**Soil-Other Low Conc. (mg/kg)**	**Soil-Other High Conc. (mg/kg)**				
Metals													
Aluminum	7429-90-5	11,800 (i)	45	N/A	Metals – 6010 – ICP	0.05	0.1	5	10	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Antimony	7440-36-0	1,400	5.4	(k)	Metals – 6010 – ICP	0.06	0.1	6	10	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Arsenic	7440-38-2	87.5	20 (l)	20 (l)	Metals – 6010 – ICP	0.1	0.2	10	20	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Barium	7440-39-3	245,000	923	1,320	Metals – 6010 – ICP	0.05	0.1	2	10	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Beryllium	7440-41-7	7,000	63.2	(k)	Metals – 6010 – ICP	0.005	0.01	0.5	1	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Cadmium	7440-43-9	139 (m)	0.81 (n)	36	Metals – 6010 – ICP	0.005	0.01	0.5	1	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
					Metals – 6010i – ICP (trace)	0.002	N/A	0.2	N/A	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
Chromium (total)	7440-47-3	N/A	2,000	135	Metals – 6010 – ICP	0.01	0.01	1	2	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
					Metals – 6010 – ICP (trace)	0.002	N/A	0.2	N/A	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Chromium VI	18540-29-9	21 (m)	7.7 (o)	N/A	Chromium (hex) – 7196 – colorimetric	0.01	4	0.5	200	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Cobalt	7440-48-4	70,000 (p)	290 (p)	(k)	Metals – 6010 – ICP	0.02	0.04	2	4	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Copper	7440-50-8	130,000	22 (n)	550	Metals – 6010 – ICP	0.025	0.05	2.5	5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Lead	7439-92-1	1,000 (q)	840 (o)	220	Metals – 6010 – ICP	0.1	0.2	10	20	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
					Metals – 6010 – ICP (trace)	0.01	N/A	1	N/A	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Lithium	7439-93-2	70,000 (r)	1,930 (r)	N/A	Metals – 6010 – ICP	0.025	0.05	2.5	5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Manganese	7439-96-5	490,000	65.3	23,500	Metals – 6010 – ICP	0.005	0.01	0.5	1	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Mercury	7439-97-6	1,050	0.33 (n)	9	Mercury - 7470 – CVAA	0.0005	0.005	N/A	N/A	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
					Mercury - 7471 – CVAA	N/A	N/A	0.2	0.2	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Molybdenum	7439-98-7	17,500	32.3	71	Metals – 6010 – ICP	0.02	0.04	2	4	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Nickel	7440-02-0	70,000 (s)	130	1,850	Metals – 6010 – ICP	0.04	0.08	4	8	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Selenium	7782-49-2	17,500	5.2	0.8	Metals – 6010 – ICP	0.1	0.2	10	20	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Silver	7440-22-4	17,500	0.88 (t)	(k)	Metals – 6010 – ICP	0.02	0.04	2	4	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
					Metals – 6010 – ICP (trace)	0.005	N/A	0.5	N/A	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Strontium	7440-24-6	2,100,000	2,920	N/A	Metals – 6010 – ICP	0.01	0.02	1	2	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Thallium	7440-28-0	245	1.59	N/A	Metals – 6010 – ICP	0.05	0.1	5	10	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Tin	7440-31-5	2,100,000	25,000	(k)	Metals – 6010 – ICP	0.1	0.2	10	20	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Uranium (total)	7440-61-1	1,050	1.32	N/A	Uranium total – kinetic phosphorescence analysis	0.0001	0.02	0.001	0.2	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Vanadium	7440-62-2	24,500	2,240	(k)	Metals – 6010 – ICP	0.025	0.05	2.5	5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Zinc	7440-66-6	1,050,000	5,970	570	Metals – 6010 – ICP	1.01	0.02	1	2	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
Inorganics													
Ammonia/ ammonium	7664-41-7	N/A	N/A	N/A	Ammonia – 350.	0.05	0.5	0.5	5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Chloride	16887-00-6	N/A	1,000	N/A	Anions – 300.0 – IC	0.5	5	5	50	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Cyanide	57-12-5	70,000	0.80	N/A	Total cyanide - 9010 – colorimetric	0.005	0.005	0.5	0.5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Fluoride	16984-48-8	210,000	24.1	N/A	Anions – 300.0 – IC	0.5	5	5	5	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Iodine	7553-56-2	N/A	N/A	N/A	Iodide – 345.1	2	20	20	100	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Nitrate	14797-55-8	5,600,000	40	N/A	Anions – 300.0 – IC	0.25	10	2.5	40	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Nitrite	14797-65-0	350,000	4	N/A	Anions – 300.0 – IC	0.25	15	2.5	20	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Phosphate	14265-44-2	N/A	N/A	N/A	Anions – 300.0 – IC	0.5	15	5	40	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Sulfate	14808-79-8	N/A	1,030	N/A	Anions – 300.0 – IC	0.5	15	5	40	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Sulfite	14265-45-3	N/A	N/A	N/A	Sulfite – 377.1	2	20	20	100	±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Organics													
1,1-dichloroethylene	75-35-4	219	4.37	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
1,1,2-trichloroethane	79-00-5	2,3000	0.00427	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
1,1,2,2-tetrachloroethane	79-34-5	656	0.00123	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
1,2-dichlorobenzene	95-50-1	315,000	7.03	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
1,3-dichlorobenzene	541-73-1	105,000) (v)	3.09 (v)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
2,4-dinitrotoluene	121-14-2	7,000	0.189	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
2-hexone	591-78-6	140,000 (w)	2.73 (w)	N/A	Volatile organics – 8260 – GCMS	0.01	0.01	0.01	0.01	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
Benzene	71-43-2	2,390	0.00448	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Benzo[a]anthracene	56-55-3	180 (p)	0.856 (p)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Benzo[a]pyrene	50-32-8	18 (x)	0.232 (x)	300	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Benzo[b]fluoranthene	205-99-0	180 (p)	2.95 (p)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Benzo[k]fluoranthene	207-08-9	1,800 (p)	29.5 (p)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
n-butyl alcohol	71-36-3	350,000	6.62	N/A	GC organic - 8015	5	5	5	5	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Carbon tetrachloride	56-23-5	1,010	0.0031	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Chlorobenzene	108-90-7	70,000	0.874	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Chloroform	67-66-3	21,500	0.0381	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Chrysene	218-01-9	18,000 (p)	95.6 (p)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Butyl benzene; n	104-51-8	240 (y)	110 (y)	N/A	Volatile organics – 8260 – GCMS	0.005	N/A	0.005	N/A	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Dibenz[a,h]anthracene	53-70-3	18	0.429	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Dichloroethane; 1,1	75-34-3	350,000	4.37	N/A	Volatile organics – 8260 – GCMS	0.01	0.01	0.01	0.01	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Dichloroethane; 1,2	107-06-2	1,440	0.00232	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Dichloroethylene; 1,2-(trans)	156-60-5	31,500 (z)	0.36 (t)	N/A	Volatile organics – 8260 – GCMS	0.001	0.001	0.001	0.001	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
Dichloroethylene; 1,2-cis-	156-59-2	31,500 (z)	0.36 (t)	N/A	Volatile organics – 8260 – GCMS	0.001	0.001	0.001	0.001	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Ethylbenzene	100-41-4	350,000	6.05	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Indeno[1,2,3-cd]pyrene	193-39-5	180 (p)	8.33 (p)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Methyl ethyl ketone (MEK; 2-butanone)	78-93-3	2,100,000	19.6	N/A	Volatile organics – 8260 – GCMS	0.01	0.01	0.01	0.01	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Naphthalene	91-20-3	14,000 (aa)	2.03 (aa)	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Methyl isobutyl ketone (MIBK hexone)	108-10-1	280,000	2.71	N/A	Volatile organics – 8260 – GCMS	0.01	0.01	0.01	0.01	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Methylene chloride (dichloromethane)	75-09-2	17,500	0.0254	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
PCBs	1336-36-3	10 (q)	0.0021 (bb)	2	PCBs – 8082 – GC	0.0005	0.005	0.0165	0.1	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Tetrachloroethylene	127-18-4	2,570	0.0091	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Toluene	108-88-3	70,000	7.27	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Trichlorethane; 1,1,1	71-55-6	3,150,000	1.58	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Trichloroethylene	79-01-6	11,900	0.0263	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Xylene (total)	1330-20-7	700,000	14.6	N/A	Volatile organics – 8260 – GCMS	0.005	0.005	0.005	0.005	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Total petroleum hydrocarbons – diesel to oil range (kerosene)	68334-30-5	2,000 (q)	2,000 (q)	15,000	WTPH-D	0.5	0.5	5	5	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
2-methylphenol (o-cresol)	95-48-7	175,000	10.3	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
4-methylphenol (p-cresol)	106-44-5	17,500	1.01	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Total petroleum hydrocarbons – (gasoline range)	8006-61-9	30 (q)	30 (q)	12,000	WTPH-G	0.5	0.5	5	5	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Normal paraffin hydrocarbons (n-dodecane)	112-40-3	2,000 (q)	2,000 (q)	15,000	Nonhalogenated VOA – 8015M – GC modified for hydrocarbons	0.5	0.5	5	5	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Phenol	108-95-2	1,050,000	22	N/A	Semi-volatile organics – 8270 – GCMS	0.01	0.1	0.330	3.3	±20%(u)	50-150%(u)	±35%(u)	50-150%(u)
Field Screening Measurements													
pH	N/A	N/A	N/A	N/A	TBD	0.1 unit		0.1 unit		N/A	N/A	N/A	N/A
Americium-241	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		~25 nCi/g		N/A	N/A	70-130	+30
Cesium-137	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		0.3 pCi/g		N/A	N/A	70-130	+30
Cobalt-60	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		0.2 pCi/g		N/A	N/A	70-130	+30
Europium-152	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		2 pCi/g		N/A	N/A	70-130	+30
Europium-154	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		2 pCi/g		N/A	N/A	70-130	+30
Europium-155	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		5 pCi/g		N/A	N/A	70-130	+30
Neptunium-237	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		~100 pCi/g		N/A	N/A	70-130	+30
Plutonium-239/240	N/A	N/A	N/A	N/A	Spectral gamma logging	TBD		~50 nCi/g		N/A	N/A	70-130	+30

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

COCs	CAS #	Preliminary Action Level[a]			Name/Analytical Technology[c]	Required Target Quantitation Limits[d]				Precision Water	Accuracy Water	Precision Soil	Accuracy Soil
		WAC 173-340-745 Method C[f] (mg/kg)	GW Protection[g] (mg/kg)	Terrestrial Biota Protection[h] (mg/kg)		Water Low Conc. (mg/L)	Water High Conc. (mg/L)	Soil-Other Low Conc. (mg/kg)	Soil-Other High Conc. (mg/kg)				
Soil Physical Properties													
Alkalinity	N/A	N/A	N/A	N/A	TBD	N/A		TBD		N/A	N/A	±35%(j)	65-135%(j)
Gross alpha	14127-62-9	N/A	N/A	N/A	GPC	N/A		TBD		N/A	N/A	N/A	N/A
Gross beta	12587-47-2	N/A	N/A	N/A	GPC	N/A		TBD		N/A	N/A	N/A	N/A
Gross gamma	N/A	N/A	N/A	N/A	NaI or germanium detectors in scan mode	N/A		TBD		N/A	N/A	N/A	N/A
Moisture content	N/A	N/A	N/A	N/A	ASTM D2216	N/A		wt%		N/A	N/A	N/A	N/A
pH	N/A	N/A	N/A	N/A	TBD	0.1 unit		0.1 unit		N/A	N/A	N/A	N/A
Total Inorganic carbon	N/A	N/A	N/A	N/A	TOC – 415.1M	1		25		±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Total organic carbon	N/A	N/A	N/A	N/A	TOC – 415.1	1		25		±20%(j)	80-120%(j)	±35%(j)	65-135%(j)
Particle size distribution	N/A	N/A	N/A	N/A	ASTM D422	N/A		wt%		N/A	N/A	N/A	N/A

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

a The preliminary action level is the regulatory or risk-based value used to determine appropriate analytical requirements (e.g., detection limits). Remedial action levels will be proposed in the FS, will be finalized in the Record of Decision, and will drive remediation of the sites.

b 15 mrem/yr = nonrad worker industrial exposure scenario; 2,000 hrs/yr onsite, 60% indoors, 40% outdoors. 500 mrem/yr = rad-worker industrial scenario; 2,000 hrs/yr onsite, 60% indoors, 40% outdoors. GW = groundwater protection radionuclide values based on RESRAD modeling of drinking water exposure with the entire vadose zone presumed to be contaminated. Groundwater protection may be evaluated using STOMP code or another model to predict movement of contaminants through the vadose zone.

c All four-digit numbers refer to SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*.

d Water values for sampling quality control (e.g., equipment blanks/rinses) or drainable liquid (if recovered). For both water and soil media, matrix affects may impact on specific sample basis.

e Accuracy criteria for associated batch laboratory control sample percent recoveries. Except for GEA analysis, additional analysis specific evaluations also preformed for matrix spikes, tracers, carriers as appropriate to the method. Precision criteria for batch laboratory replicate sample analyses.

f WAC 173-340-745, "Soil Cleanup Standards for Industrial Properties," Method C industrial soil values for direct exposure from the CLARC Version 3.1 tables, updated November 2001.

g WAC 173-340-747, "Deriving Soil Concentrations for Ground Water Protection," soil concentrations protective of groundwater based on Method B values for groundwater from the CLARC Version 3.1 tables, updated August 2001, except as noted.

h Value is from Table 749-2 of WAC 173-340-900, amended February 12, 2001 and current as of November 3, 2004.

i Hanford Site background concentration for soil.

j Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples also performed. Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analysis.

k According to Footnote d of Table 749-2, *Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure*, referenced in WAC 173-340-7492, safe concentration has not yet been established for these constituents, see 173-340-7492 (2)(c).

l Statewide background value for arsenic.

m Calculated using air cleanup standards from WAC 173-340-750(3)(a)(ii)(B), page 210, equation 750-2, with WDOH mass loading of particulates in air of 10^{-4} g/m^3.

n Value is less than Hanford Site soil background. Therefore, the soil background concentration is used as the preliminary action level.

o Calculated using standards for surface water protection (40 CFR 131 and WAC 173-201A-040) as inputs to the 3-phase model for protection of drinking water [WAC 173-340-747(4), February 12, 2001].

p Calculated using RfD from ORNL, July 14, 2004.

q Based on WAC 173-340-900, Tables 740-1 and 745-1, amended February 12, 2001.

r Based on reference dose from Region 3; NCEA.

s Based on soluble salts value.

t Calculated using WAC 173-340-720 drinking water standards as inputs to the three-phase model for protection of drinking water [WAC 173-340-747(4), amended February 12, 2001], except as noted.

u Accuracy criteria is the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control if more stringent. Additional analyte specific evaluations also preformed for matrix spikes, and surrogates as appropriate to the method. Precision criteria for batch laboratory replicate matrix spike analyses.

v Calculated using RfD from Region 3.

w Calculated from EPA Region 3 toxicity values; NCEA.

x Values are from the IRIS database.

y WAC 173-340-747(4) fixed parameter three-phase partitioning model equation value for soil protection of groundwater calculated using drinking water standards from EPA Region 9.

z Values reported for mixed isomers rather than cis/trans-1,2-dichloroethylene as both are present and the mixed isomers value is more protective.

aa Calculated from Rfd in IRIS, which first appeared December 22, 2003.

bb Based on soil concentration that is protective of the River.

(p Calculated using RfD from ORNL 07/14/04. ∫ Calculated using RfD from Region 3.)

40 CFR 131, "Water Quality Standards."

ASTM, *1993 Annual Book of ASTM Standards*, Volume 04.08.

PNNL-11216, *STOMP – Subsurface Transport Over Multiple Phases: Application Guide*.

SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*.

WAC 173-201A, "Water Quality Standards for Surface Waters of the State of Washington."

WAC 173-340, "Model Toxics Control Act – Cleanup."

Table B-4. Analytical Performance Requirements – Shallow and Deep Zone Soils. (10 sheets).

AEA = alpha energy analysis
ASTM = American Society for Testing and Materials
CAS = Chemical Abstract Service
CLARC = Cleanup Levels and Risk Calculations
COC = contaminant of concern
CVAA = cold vapor atomic absorption
EPA = U.S. Environmental Protection Agency
GC = gas chromatography
GCMS = gas chromatography/mass spectrometry
GEA = gamma energy analysis
GW = groundwater
IC = ion chromatography
ICP = inductively coupled plasma
ICPMS = inductively coupled plasma/mass spectrometry
N/A = not applicable
NaI = sodium iodide
PCB = polychlorinated biphenyl
RESRAD = RESidual RADioactivity (dose model)
TBD = to be determined
TOC = total organic carbon
VOA = volatile organic analyte
WDOH = Washington State Department of Health

B2.1.3 Equipment Rinsate Blanks

Equipment rinsate blanks are used to verify the adequacy sampling equipment decontamination procedures and shall be collected for each sampling method or type of equipment used. The samples shall be collected from a minimum of 5% of the total collected soil samples. The field geologist can request that additional equipment blanks be taken. Equipment blanks shall consist of deionized water washed through decontaminated sampling equipment and placed in containers identified in the sampling authorization forms. Note that the bottle and preservation requirements for water may differ from the requirements for soil. Equipment rinsate blanks shall be analyzed for the following:

- Gross alpha
- Gross beta
- Metals (excluding hexavalent chromium and mercury)
- Anions (except cyanide)
- VOAs of interest.

These analytes are considered to be the best indicators of decontamination effectiveness.

B2.1.4 Trip Blanks

The volatile organic trip blanks will constitute at least approximately 5% of all volatile organic compound (VOC) samples. If applicable, at least one trip blank shall be collected from each representative waste site investigated. Trip blanks shall consist of laboratory-grade deionized water added to a clean sample container. The trip blanks shall travel to the field with the associated bottle sets and will be returned to the laboratory with the samples. They will remain unopened during their transport and handling. Trip blanks are prepared as a check for possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. The trip blank shall be analyzed for VOCs only.

B2.1.5 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:

- Improperly storing or transporting sampling equipment and sample containers
- Contaminating the equipment or sample bottles by setting them on or near potential contamination sources, such as uncovered ground
- Handling bottles or equipment with dirty hands
- Improperly decontaminating equipment before sampling or between sampling events.

B2.2 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Quality objectives and criteria for soil measurement data are presented in Table B-4 for radiological and nonradiological analytes, as well as physical properties of interest. Analyses of soil physical properties will be performed according to American Society for Testing and Materials (ASTM) procedures, if applicable.

In the event of a laboratory analytical failure, the laboratory is required to initiate corrective actions with the Sample Data Management team of the Environmental Information Systems group. As part of the data package transmittal procedure (CP-GPP-EE-01-2.6), a sample disposition record is generated to define the problem and to indicate the agreed-upon solution reached with discussions by the project manager or task lead. As part of the sample disposition process (CP-GPP-EE-01-2.7), quarterly trend reports containing quality statistics are compiled based on the sample disposition records in accordance with DOE/RL-96-68 and HNF-20635. This provides an insight into emerging problems and effectiveness of past responses to problems.

B2.3 SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES

Soil sample preservation, containers, and holding times for radiological and nonradiological analytes of interest and physical property test are presented in Table B-5. Final sample collection requirements will be identified on the sampling authorization form.

Table B-5. Sample Preservation, Container, and Holding Time Guidelines and Analytical Priorities. (2 sheets)

Analytes	Analytical Priority	Matrix	Bottle		Amount[a,b,c]	Preservation	Packing Requirements	Holding Time
			Number	Type				
Radionuclides								
Americium-241	10	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Cesium-137	1	Soil	1	G/P	100 to 1,500 g	None	None	6 months
Cobalt-60	1	Soil						
Europium-152	1	Soil						
Europium-154	1	Soil						
Europium-155	1	Soil						
Iodine-129	13	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Plutonium-238	1	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Plutonium-239/240	1	Soil						
Strontium-90	1	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Technetium-99	5	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Tritium (H-3)	13	Soil	1	G	100 to 500 g	None	None	6 months
Uranium-233/234	1	Soil	1	G/P	10 to 1,000 g	None	None	6 months
Uranium-235/236	1	Soil						
Uranium-238	1	Soil						
Chemicals								
Ammonia/ ammonium – 350.1	3	Soil	1	G/P	50 to 500 g	None	Cool 4°C	28 days
IC anions – 300.0	3	Soil	1	G/P	50 to 500 g	None	Cool 4°C	28 days/ 48 hours
IC anions – 353.1 for nitrate/nitrite	3	Soil	1	G/P	50 to 500 g	None	Cool 4°C	28 days/ 48 hours
ICP metals – 6010A	2	Soil	1	G/P	10 to 500 g	None	None	6 months

Table B-5. Sample Preservation, Container, and Holding Time Guidelines and Analytical Priorities. (2 sheets)

Analytes	Analytical Priority	Matrix	Bottle		Amount[a,b,c]	Preservation	Packing Requirements	Holding Time
			Number	Type				
Chromium hex – 7196	4	Soil	1	G/P	5 to 500 g	None	Cool 4°C	30 days
Mercury – 7471 – (CVAA)	2	Soil	1	G	5 to 125 g	None	None	28 days
Total cyanide – 9010	11	Soil	1	G	10 to 1,000 g	None	Cool 4°C	14 days
pH (soil) – 9045	14	Soil	1	G/P	10 to 250 g	None	None	ASAP
SVOA – 8270A	6	Soil	1	AG	125 to 1,000 g	None	Cool 4°C	14/40 days
VOA - 8260	7	Soil	1	AG	125 g	None	Cool 4°C	14 days
Nonhalogenated VOA – 8015M – GC modified for normal paraffin hydrocarbon	8	Soil	1	AG	125 to 250 g	None	Cool 4°C	14 days
NWTPH – diesel	8	Soil	1	G	50 to 150 g	None	Cool 4°C	14 days
NWTPH – gasoline	8	Soil	1	G	50 to 150 g	None	Cool 4°C	14 days
Oil and grease	9	Soil	1	G	200 g	None	Cool 4°C	28 days
PCBs – EPA 8082	12	Soil	1	G	10 to 50g	None	Cool 4°C	14 days
Physical Properties								
Bulk density – D2937	15	Soil	1	Liner	Liner	None	None	None established for analysis
Moisture content – ASTM D2216	16	Soil	1	Moisture tin[d]	250 g	None	None	None established for analysis
Particle size distribution – ASTM D422	17	Soil	1	G/P	100 to 4,000 g	None	None	None established for analysis

[a] Optimal volumes, which may be adjusted downward to accommodate the possibility of retrieval of small amount of sample. Minimum sample size will be defined in the sampling authorization form.

[b] Should samples be liquid rather than soils, the following volumes need to be collected:
<u>Radionuclides</u> – 4 L for all radionuclides (except carbon-14, tritium, and technetium-99; they require approximately 500 mL each sample).
<u>Chemicals</u> – All liquid samples require the amount as listed for soil samples. Preservation and holding times are also affected if liquid samples are collected. Consult Sample Management staff for details.

[c] Mixed soil samples may be obtained and submitted to the analytical laboratory for analyses for specific analytes, including the following:
<u>Radionuclides</u> – 100 g of soil for all radionuclides (except carbon-14, tritium, and technetium-99; they require approximately 10 g each sample).
<u>Chemicals</u> – A 10 g soil sample is required for all ICP analysis, 10 g soil sample is required for IC anion analysis, 5 g soil sample for hexavalent chromium analysis, 10 g soil sample for CA analysis, 10 g soil sample for 8015 analysis, and 125 g soil samples for each 8270 and TOC analyses.

[d] Vessel must be sealed.

ASTM, *1993 Annual Book of ASTM Standards*, Volume 04.08.

AG = amber glass
ASAP = as soon as possible
ASTM = American Society for Testing and Materials
CVAA = cold vapor atomic absorption
EPA = U.S. Environmental Protection Agency
G = glass
GC = gas chromatography
IC = ion chromatography
ICP = inductively coupled plasma
NWTPH = northwest total petroleum hydrocarbons
P = plastic
PCB = polychlorinated biphenyl
SVOA = semi-volatile organic analyte
TBD = to be determined
TOC = total organic carbon
VOA = volatile organic analyte

B2.4 ONSITE MEASUREMENTS QUALITY CONTROL

The collection of QC samples for onsite measurements does not apply to the field screening techniques described in this plan. The applicable field screening methods and performance requirements are presented in Table B-6, except for spectral gamma-logging analytical performance requirements, which are listed in Table B-4. Field screening instrumentation will be calibrated and controlled according to the procedures identified in Section B2.7. Special care should be taken to prevent cross-contamination of field screening equipment by properly storing and handling the equipment and performing proper decontamination between sampling events.

Table B-6. Field Screening Methods.

Measurement Type	Emission Type	Method/Instrument	Detection Limit
Exposure/dose rate	Beta/gamma	RO-20/RO-03 portable ionization chamber	0.5 mrem/hr
Contamination level	Alpha/beta-gamma	E-600 rate meter with a SHP380-A/B scintillation probe	100 dpm α/ 100 cm^2 1,921 dpm β–γ/100 cm^2
Vapor screening	VOCs	Photo ionization detector	2 ppm (may be higher for some compounds)
SGL	Gamma isotopic emissions	HPGe	~25 nCi/g for Am-241 and Pu-239. ~100 pCi/g for Np-237
Gross gamma logging	Gamma emissions	Bismuth-germanium detector	~25 nCi/g for Am-241 and Pu-239
Passive neutron logging	Neutron emissions	Helium-3 detector	~100 nCi/g for Am-241 and Pu-239
Vapor analysis	Carbon tetrachloride, chloroform	Bruel and Kjoer vapor analyzer, Miran SapphiRe analyzer	TBD

HPGe = high-purity germanium.
SGL = spectral gamma logging
TBD = to be determined
VOC = volatile organic compound

B2.5 DATA MANAGEMENT

Data resulting from the implementation of this QAPjP shall be managed and stored by the Fluor Hanford, Inc. (FH) Groundwater Remediation Project (GRP) organization responsible for sampling and characterization, in accordance with CP-GPP-EE-01-2.0, *Sample Event Coordination*, and CP-GPP-EE-01-2.1, *Sampling Documentation Processing*, or equivalent. At the direction of the task lead, all analytical data packages will be subject to final technical review by qualified personnel before submittal to regulatory agencies or inclusion in reports. Electronic data access, when appropriate, will be via a database (e.g., Hanford Environmental Information System [HEIS] or a project-specific database). Where electronic data are not available, hard copies will be provided in accordance with Section 9.6 of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 2003).

B2.6 VALIDATION AND VERIFICATION REQUIREMENT

A representative number of the completed soil sample analysis data packages will be validated by qualified Sample Management personnel or by a qualified independent contractor. Validation will consist of verifying required deliverables, requested versus reported analyses, and transcription errors. Validation also will include evaluation and qualification of results based on holding time, method blanks, matrix spikes, laboratory control samples, laboratory duplicates, and chemical and tracer recoveries, as appropriate to the methods used. No other validation or calculation checks will be performed. At least 5% of all data will be validated.

At least one data validation package shall be generated for each OU. Validation requirements identified in this section are consistent with Level C validation, as defined in CP-GPP-EE-01-2.5, *Environmental Information Systems – Data Package Validation Process,* or equivalent. No validation for soil gas measurements, geophysical logging, or physical property data will be performed.

The data collected during field sampling and analysis will be compiled in a report of investigation and the FS report for this OU. These and other documents will be available for future reference in the Records Management Information System.

B2.7 TECHNICAL PROCEDURES AND SPECIFICATIONS

Soil sampling and onsite environmental measurements will be performed according to FH procedures and the appropriate Waste Disposal (WD)/GRP procedures. Administrative, data management, personnel training, health and safety, and other applicable procedures also will be followed in conjunction with the acquisition of environmental data. The current version of GRP procedures and plans are posted on the GRP internal/Intranet home page. Procedures that will be used for guidance during performance of this SAP include, but are not limited to, the following:

- Training/certifications:
  - HNF-PRO-459, *Environmental Training*
  - HNF-RD-11061, *Training Requirements*
- Documents and records:
  - HNF-PRO-10863, *Notebooks and Logbooks*
  - HNF-RD-210, *Records Management Program*
- General sampling and sample management:
  - CP-GPP-EE-01-2.0, *Sample Event Coordination*
  - CP-GPP-EE-01-2.1, *Sampling Documentation Processing*
  - GRP-EE-01-3.0, *Chain of Custody*
  - GRP-EE-01-3.1, *Sample Packaging and Shipping*
  - GRP-EE-01-3.2, *Field Decontamination of Sampling Equipment*
  - GRP-EE-05-1.0, *Routine Field Screening*
  - GRP-EE-01-1.6, *Survey Requirements and Techniques*

- Soil and soil vapor sampling:
  - GRP-EE-01-4.0, *Soil and Sediment Sampling*
  - GRP-EE-01-4.2, *Sample Storage and Shipping Facility*
  - GRP-EE-01-4.5, *Sample Compositing*
  - GRP-EE-05-3.2, *Field Screening Tedlar Bag Sampling*
  - GRP-EE-05-4.0, *Analysis of Volatile Organic Compounds in Vapor Samples Using the Brüel and Kjær 1302 and Innova 1312 Multi-Gas Analyzers*
  - *Analysis of Volatile Organic Compounds in Vapor Samples Using the Miran SapphiRe Analyzer* (procedure in preparation)
- Instrument/equipment calibration and testing:
  - HNF-PRO-490, *Calibration Management Program*
  - GRP-PRO-8377, *Instrument Accuracy and Reliability (Calibration)*
- Supplies and consumables:
  - HNF-PRO-268, *Control of Purchased/Acquired Items and Services*
  - HNF-PRO-123, *Requesting Materials and Services*
- Excavation:
  - GRP-EE-01-5.2, *Test Pit Excavation in Contaminated Areas*
- Radiological surveys, protection, and control:
  - HNF-13536, *PHMC Radiological Control Procedures*
  - HNF-5173, *PHMC Radiological Control Manual*
  - HNF-IP-1277, *River Corridor Project Radiological Control Procedures*
  - HNF-5173, *PHMC Radiological Control Manual*
  - WD/GRP Radiological Control Procedure (RCP) 4.5.1, "Portable Environmental Survey Instrument Operation"
  - WD/GRP RCP 4.5.2, "Performance of Environmental Radiological Measurements"
  - WD/GRP RCP 4.5.3, "MDA and Scan Speed Determination for Environmental Radiological Surveys"
  - WD/GRP RCP 4.5.7, "Preparation of Environmental Radiological Survey Task Instructions (ERSTIs)"
  - WD/GRP RCP 4.5.8, "Background Measurements for Environmental Radiological Surveys"
  - WD/GRP RCP 4.5.9, "Documenting Environmental Radiological Measurements"
  - WD/GRP RCP 5.6.15, "Operation of Mobile Surface Contamination Monitor II"
  - HNF-13536, Procedure 3.1.2, "Evaluation of Outdoor Contamination Areas"

- Waste management:
  - HNF-PRO-15333, Section 5.82, "Environmental Protection Processes"
  - HNF-PRO-462, *Pollution Prevention*
  - HNF-PRO-15333, *Environmental Protection Processes*
  - HNF-PRO-15334, *Effluent and Environmental Monitoring*
  - HNF-PRO-15335, *Environmental Permitting and Documentation Preparation*
  - HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*
  - WCP-2002-0002, *Waste Control Plan for the 200-PW-1 Operable Unit.*

Work also shall be performed in accordance with the following:

- Quality assurance:
  - HNF-20635, *Groundwater Remediation Project Quality Assurance Project Plan*
  - HNF-12494, *Environmental Radiological Measurement Plan for the Central Plateau Remediation Project*
- Quality improvement:
  - HNF-PRO-052, *Corrective Action Management*
  - HNF-PRO-298, *Nonconforming Items*
- Management assessment:
  - HNF-PRO-246, *Management Assessment*
- Data management:
  - CP-GPP-EE-01-2.4, *Environmental Information Systems – Data Package Technical Verification*
  - CP-GPP-EE-01-2.5, *Environmental Information Systems – Data Package Validation Process*
- Health and safety:
  - CP-MD-017, *Safety Communications*
  - HNF-5173, *PHMC Radiological Control Manual*
  - HNF-PRO-121, *Heat Stress Control*
  - HNF-PRO-175, *Training Program Descriptions*
  - HNF-RD-10743, *Safety Communications*
  - HNF-RD-11812, *Occupational Noise Exposure and Hearing Conservation*
- Site-specific plans, as applicable:
  - Health and safety plans
  - Radiological evaluation and/or radiation work permits
  - Activity hazard analysis and/or job safety analysis.

B2.7.1 Sample Location

Sampling locations (e.g., soil probes, boreholes) will be identified in the field before starting the activity. Locations will be staked by the technical lead or field team leader assigned by the project manager. After the locations have been staked, minor adjustments to the location may be made to mitigate unsafe conditions, avoid structural interferences, or bypass utilities. Locations will be identified during or after sampling, in accordance with GRP-EE-01-1.6, or equivalent. Changes in sample locations that do not affect the DQOs will require approval of the project manager. Changes to sample locations that result in impacts to the DQOs will require concurrence by RL and the lead regulatory agency.

Surface geophysical and radiation surveys will be conducted at all sampling locations. The surface geophysical surveys will be conducted using ground-penetrating radar and/or electromagnetic imaging and will aid in verifying waste site construction and geometry and in selecting locations to avoid subsurface obstructions. The surface radiation surveys will identify areas of surface contamination that might affect the field activities and health and safety.

B2.7.2 Sample Identification

The sample and data-tracking database will be used to track the samples from the point of collection through the collection and laboratory analysis process. The HEIS database is the repository for the laboratory analytical results. The HEIS sample numbers will be issued to the sampling organization for this project in accordance with CP-GPP-EE-01-2.0, or equivalent. Each radiological/nonradiological and physical properties 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 sampler's field logbook.

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

- HEIS number
- Sample collection date and time
- Name or initials of person collecting the sample
- Analysis required
- Preservation method, if applicable.

Soil gas measurements will be assigned a unique HEIS sample number. The HEIS number, collection location, and depth will be documented in the sampler's field logbook.

B2.7.3 Field Sampling Logbook

All information pertinent to field sampling and analysis will be recorded in bound logbooks in accordance with HNF-PRO-10863, or equivalent. The sampling team will be responsible for recording all relevant sampling information including, but not limited to, the information listed in HNF-PRO-10863. Entries made in the logbook will be dated and signed by the individual making the entry.

B2.7.4 Sample Custody

A chain-of-custody record will be initiated in the field at the time of sampling and will accompany each set of samples shipped to any laboratory in accordance with GRP-EE-01-3.0, or equivalent. The analyses requested for each sample will be indicated on the accompanying chain-of-custody form. Chain-of-custody procedures will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained. Each time the responsibility for custody of the sample changes, the current and the new custodians shall both sign the record and note the date and time. The sampler will make a copy of the signed record before sample shipment and transmit it to Sample Management within 24 hours of shipping, as detailed in CP-GPP-EE-01-2.1, or equivalent.

A custody seal (i.e., evidence tape) shall be affixed to the lid of each sample jar. The container seal will be inscribed with the sampler's initials and the date sealed. Sample containers collected inside a glovebag or glovebox that are "bagged out" to control radiological contamination may have the evidence tape affixed to the seal of the bag to demonstrate that tampering has not occurred.

B2.7.5 Sample Containers and Preservatives

EPA pre-cleaned sample containers will be used for soil samples collected for radiological and nonradiological analysis. Container sizes could vary depending on laboratory-specific volumes/ requirements needed to meet analytical detection limits. If, however, the dose rate on the outside of a sample jar or the curie content exceeds levels acceptable by an offsite laboratory, the sampling lead and task lead may send smaller volumes to the laboratory after consulting with Sample Management to determine acceptable volumes. Preliminary container types and volumes are identified in Table B-5. Final types and volumes will be provided on the sampling authorization form.

B2.7.6 Sample Shipping

The outside of each sample jar will be surveyed by a radiological control technician (RCT) to verify that the container is free of smearable surface contamination. The RCT will also measure the radiological activity on the outside of the sample container (through the container) and will mark the container with the highest contact radiological reading in either disintegrations per minute (dpm) or millirem per hour (mrem/hr), as applicable. Unless pre-qualified, all samples will have total activity analysis performed by the Radiological Counting Facility, the 222-S Laboratory, or another suitable onsite laboratory will be used for determining U.S. Department of Transportation shipping criteria. This information, along with other data that could pre-qualify the samples, will be used to select proper packaging, marking, labeling, and shipping paperwork in accordance with U.S. Department of Transportation regulations (49 CFR, "Transportation") and to verify that the sample can be received by the offsite analytical laboratory in accordance with the laboratory's acceptance criteria.

As a general rule, samples with activities of less than 1 mrem/hr will be shipped to an offsite laboratory. Samples with activities greater than 1 mrem/hr could be shipped to an offsite laboratory; samples with activities in this range will be evaluated on a case-by-case basis by Sample Management. If an offsite laboratory cannot be identified for high-activity samples, the samples will be sent to an onsite laboratory arranged by sample management.

B3.0 FIELD SAMPLING PLAN

B3.1 SAMPLING OBJECTIVES

The primary objective of the field sampling plan is to identify and describe sampling and field measurement activities that will be conducted to resolve DRs identified in Section B1.4.1.2. The DR statements indicate that remedial action could be necessary if preliminary action levels and annual exposure protection limits are exceeded. The field sampling plan uses the sampling design proposed in the DQO summary report and describes pertinent elements of the sampling program. Sample methods, procedures, locations, and frequencies are identified in this section.

This plan will specify a variety of field sampling methods. The combination of methods used will be specific to each representative or TSD site covered in the plan. Each site investigation will be conducted using an observational approach. Initially, surface radiological surveys and surface geophysical surveys will be conducted at each site to assess the general condition of the site, locate underground piping and tanks, and determine the exact locations for subsurface sampling. Driven soil probes will be installed at/or near each tank site to facilitate in situ radiological measurements and collect discrete soil samples. For the 276-S hexone tanks, soil gas samples will be collected instead of taking in situ radiological measurements. Based on the initial in situ measurements obtained using the drive casings, a borehole or test pit could be installed at the site. The borehole activity will include collecting soil samples at specified depths from the vadose zone for full suite laboratory analysis (Table B-4). A split-spoon sampler will be the primary sampling device used to collect soil samples from the boreholes. The boreholes will be logged for gamma-emitting radionuclides and moisture content.

The following subsections describe the general methodologies available to be deployed. Later sections will describe the specific methodologies used at each site included in this plan. The planned sampling locations are shown in Figures B-1 through B-8.

Problems with well construction, sample collection, sample custody, or data acquisition that affect the quality of data or impair the ability to acquire data due to failure to meet contract requirements, or failure to follow procedures shall be documented in accordance with HNF-PRO-298, *Nonconforming Items,*. The project will implement HNF-PRO-052, *Corrective Action Management*, as appropriate.

B3.2 FIELD MEASUREMENTS

Planned field measurements include surface radiation surveys, surface geophysical surveys, and soil gas sampling.

Figure B-1. Sampling Locations for the 2607-W3 Septic Tank.

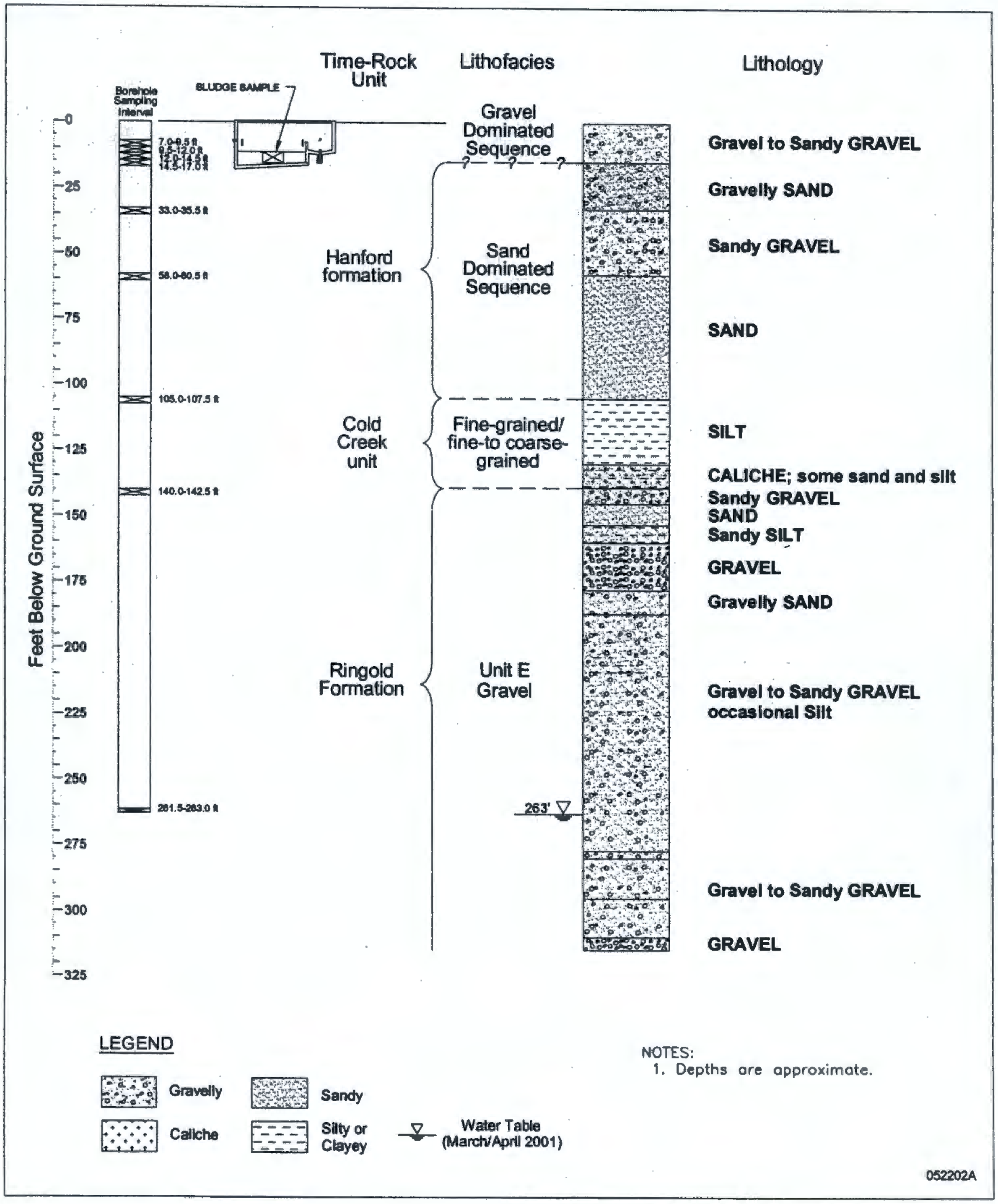


Figure B-2. Sampling Locations for Hexone Tanks 276-S-141 and 276-S-142.

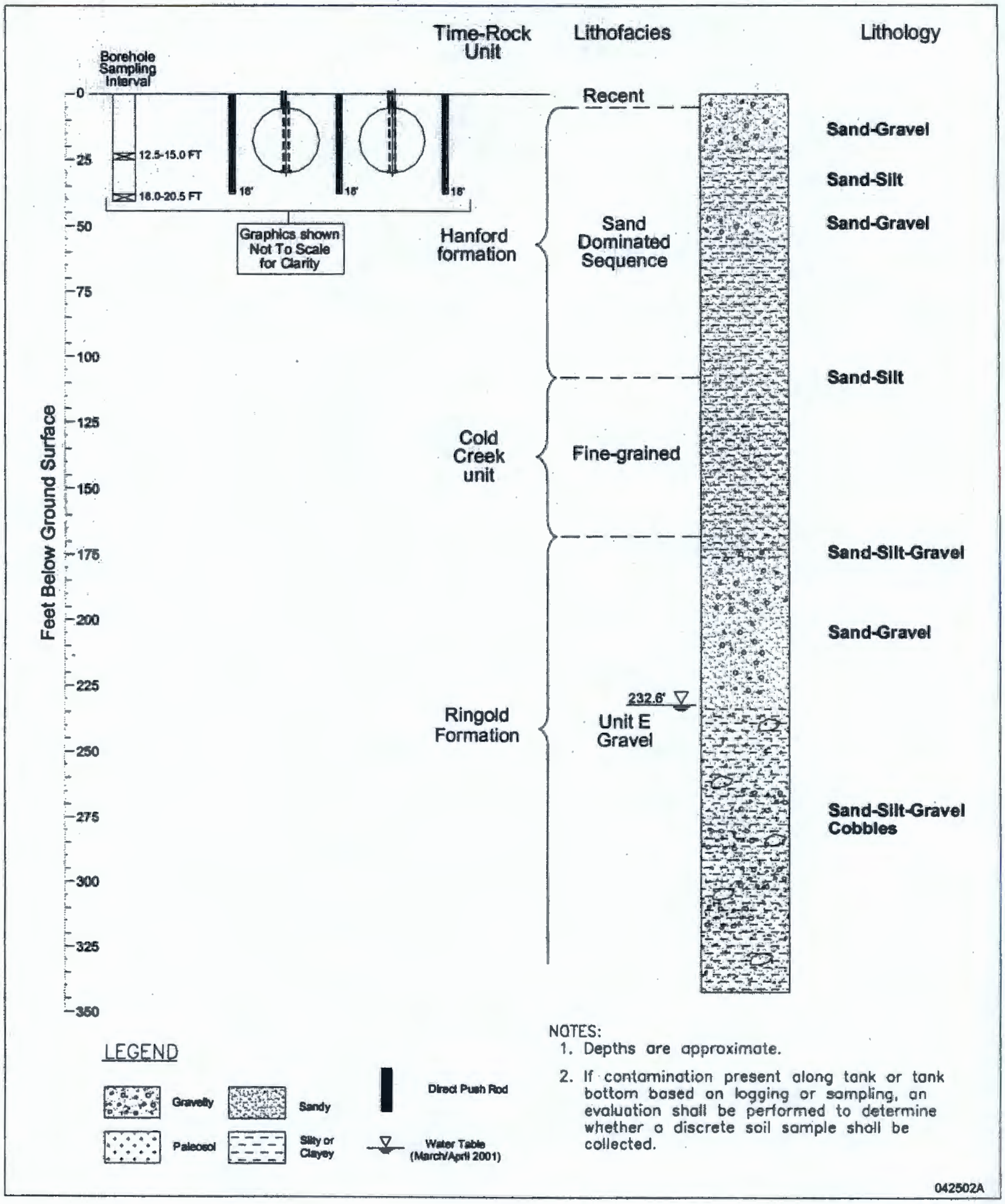


Figure B-3. Sampling Locations for the Tank 241-CX-70.

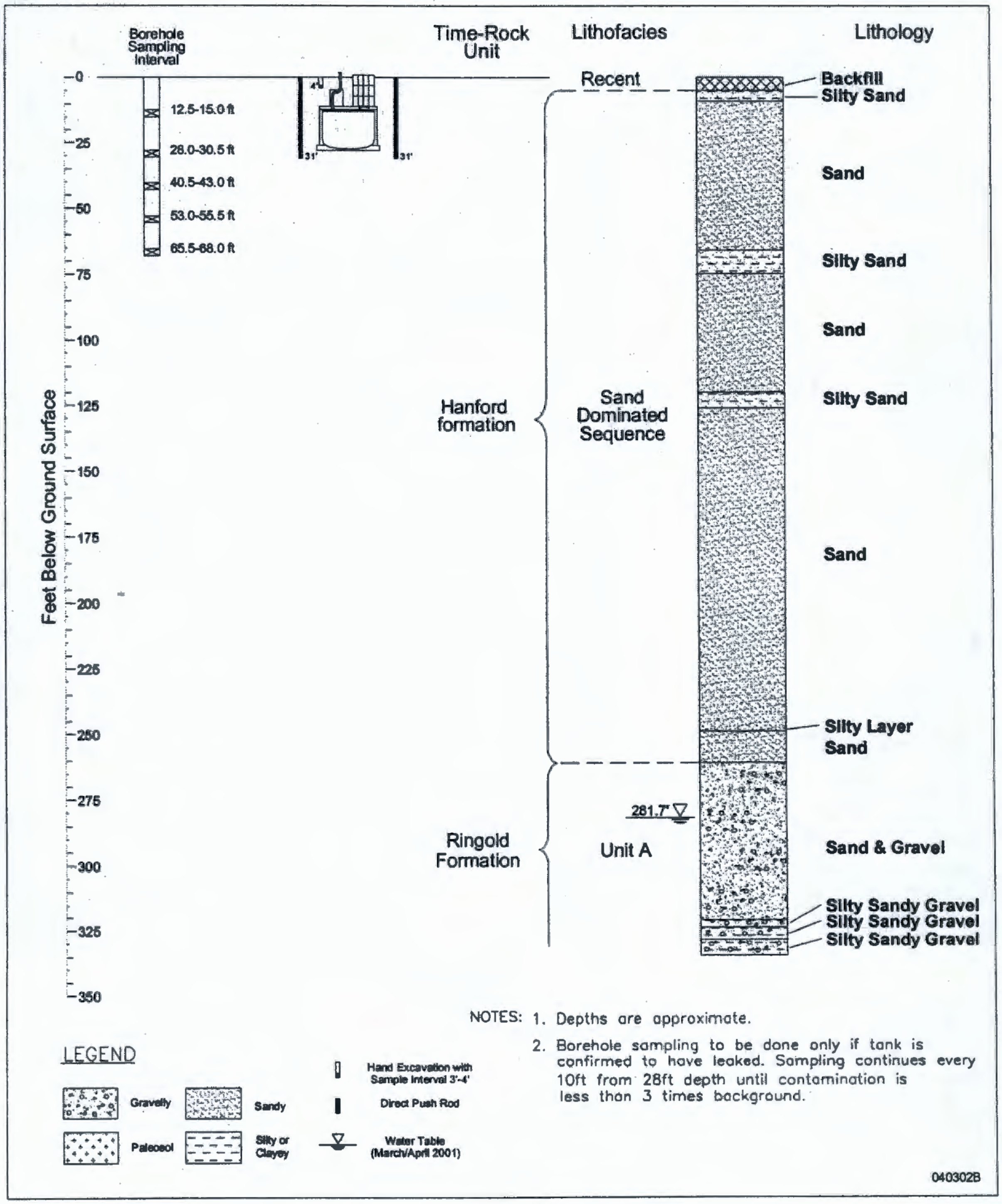


Figure B-4. Sampling Locations for the Tank 241-CX-71.

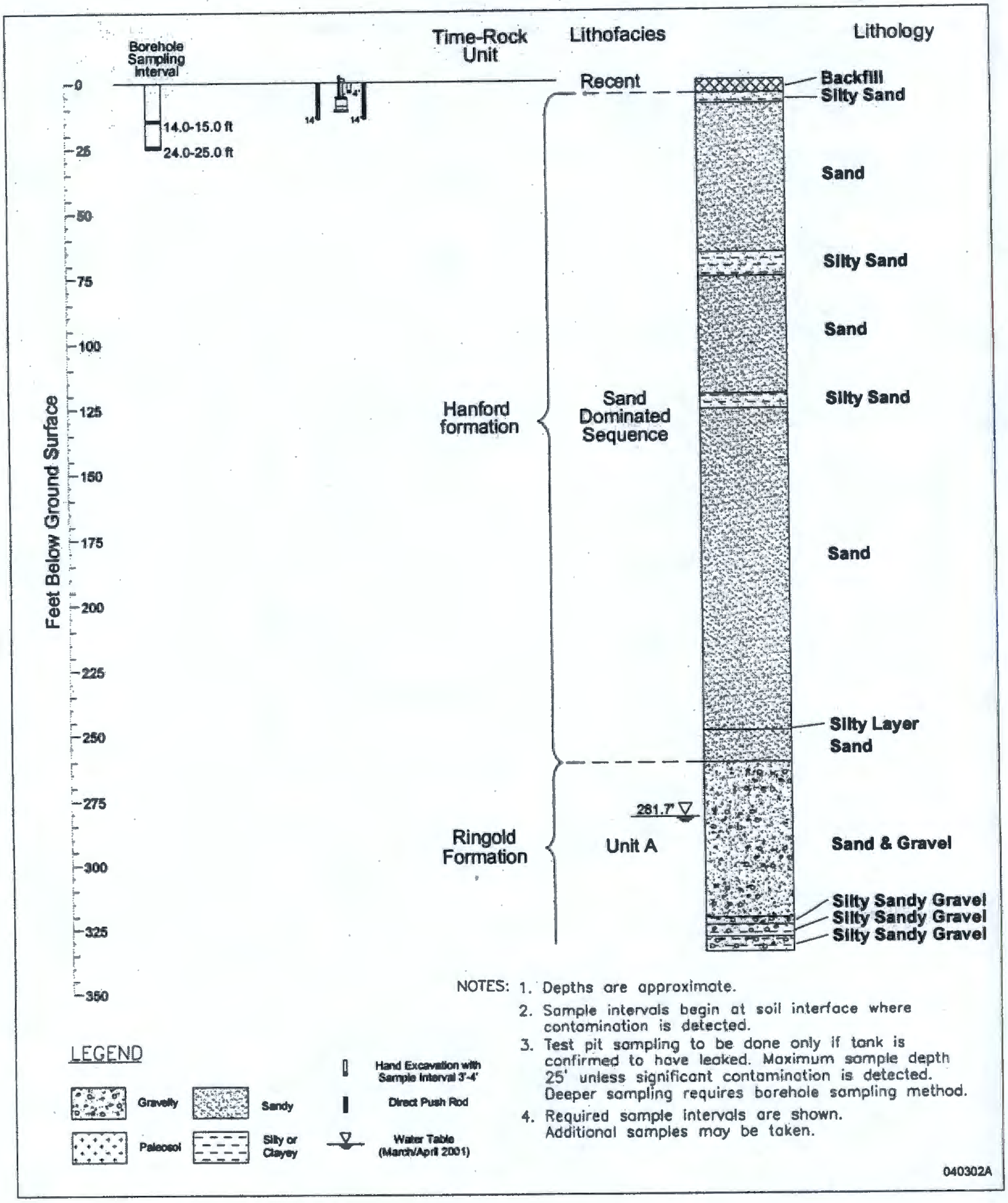


Figure B-5. Sampling Locations for the Tank 241-CX-72.

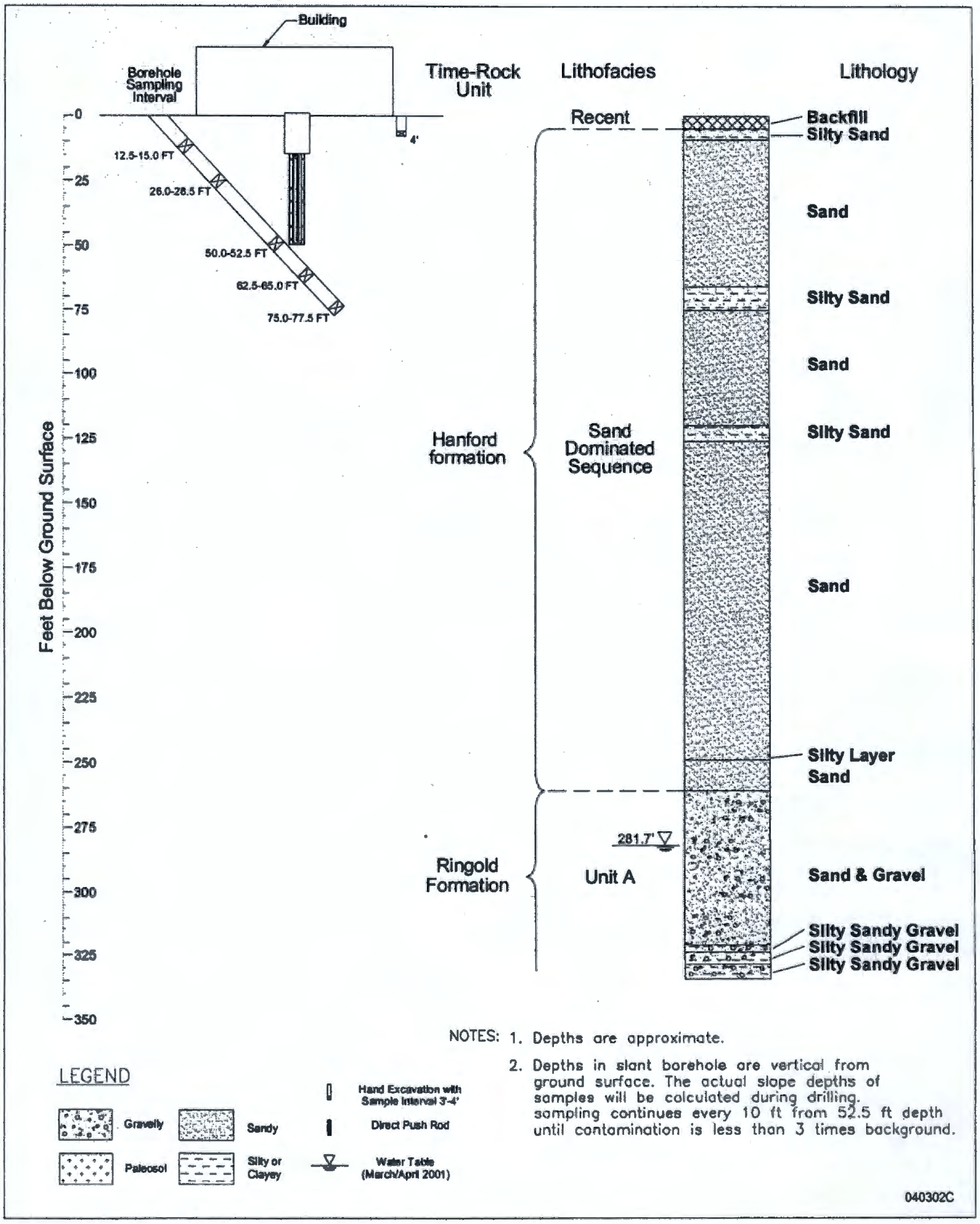


Figure B-6. Location of Planned and Existing Boreholes at the 2607-W3 Septic Tank.

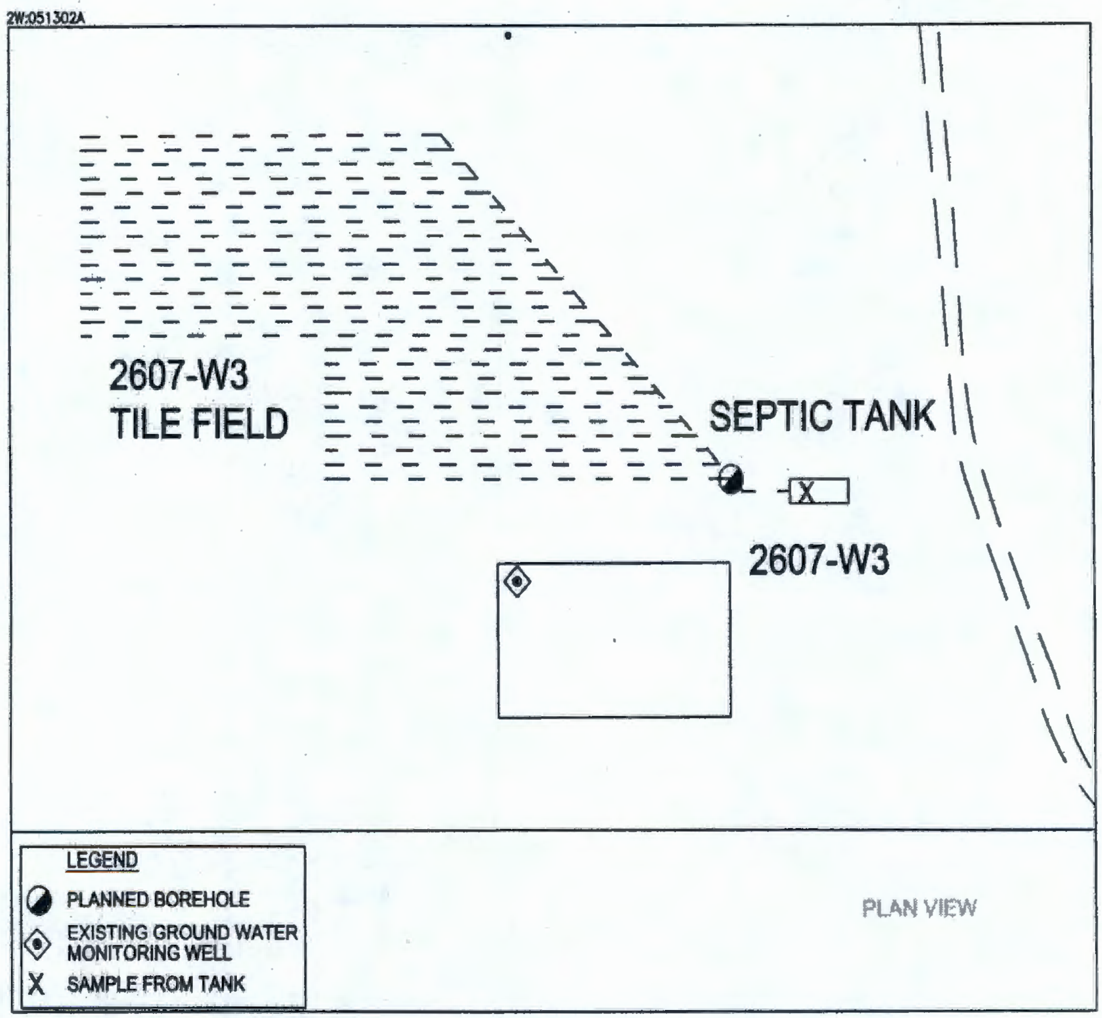


Figure B-7. Location of Planned and Existing Boreholes at the Hexone Storage and Treatment Facility.

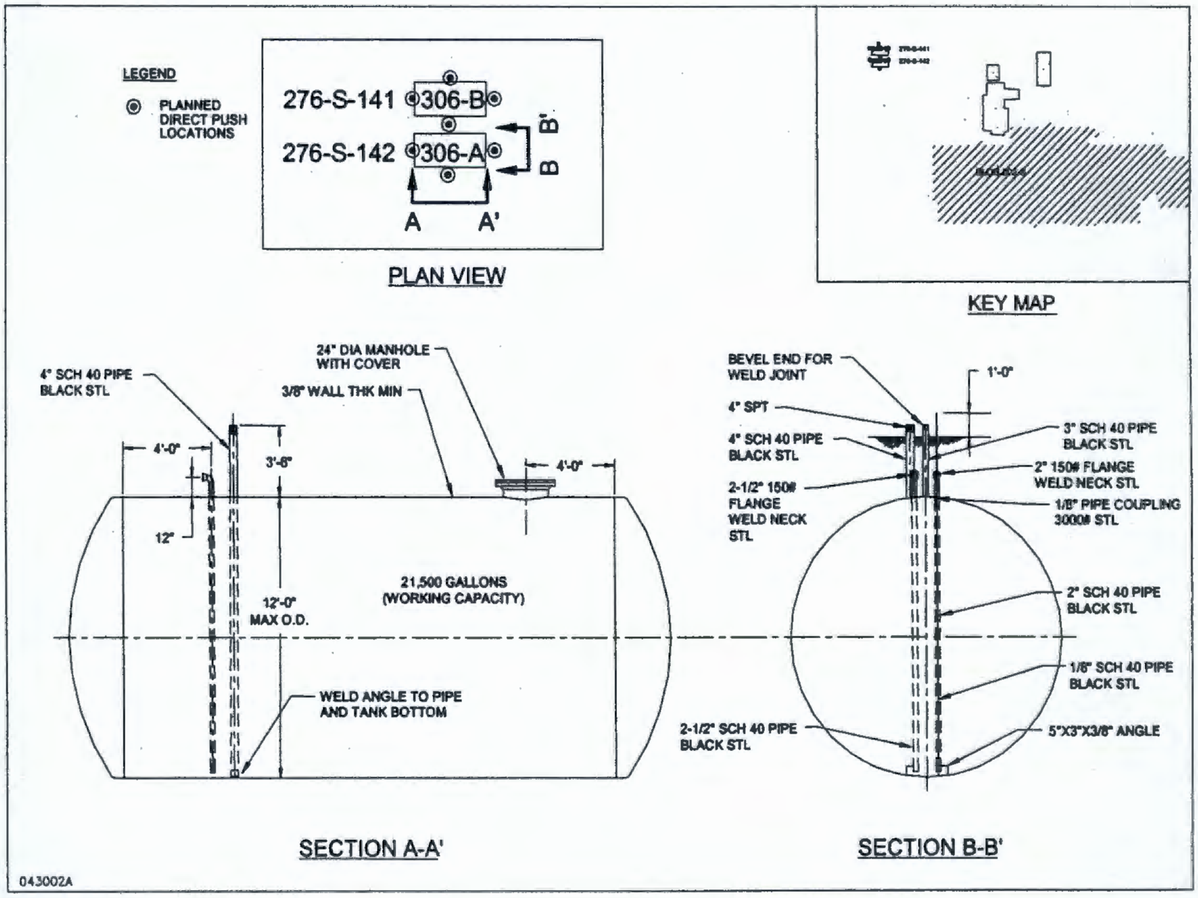
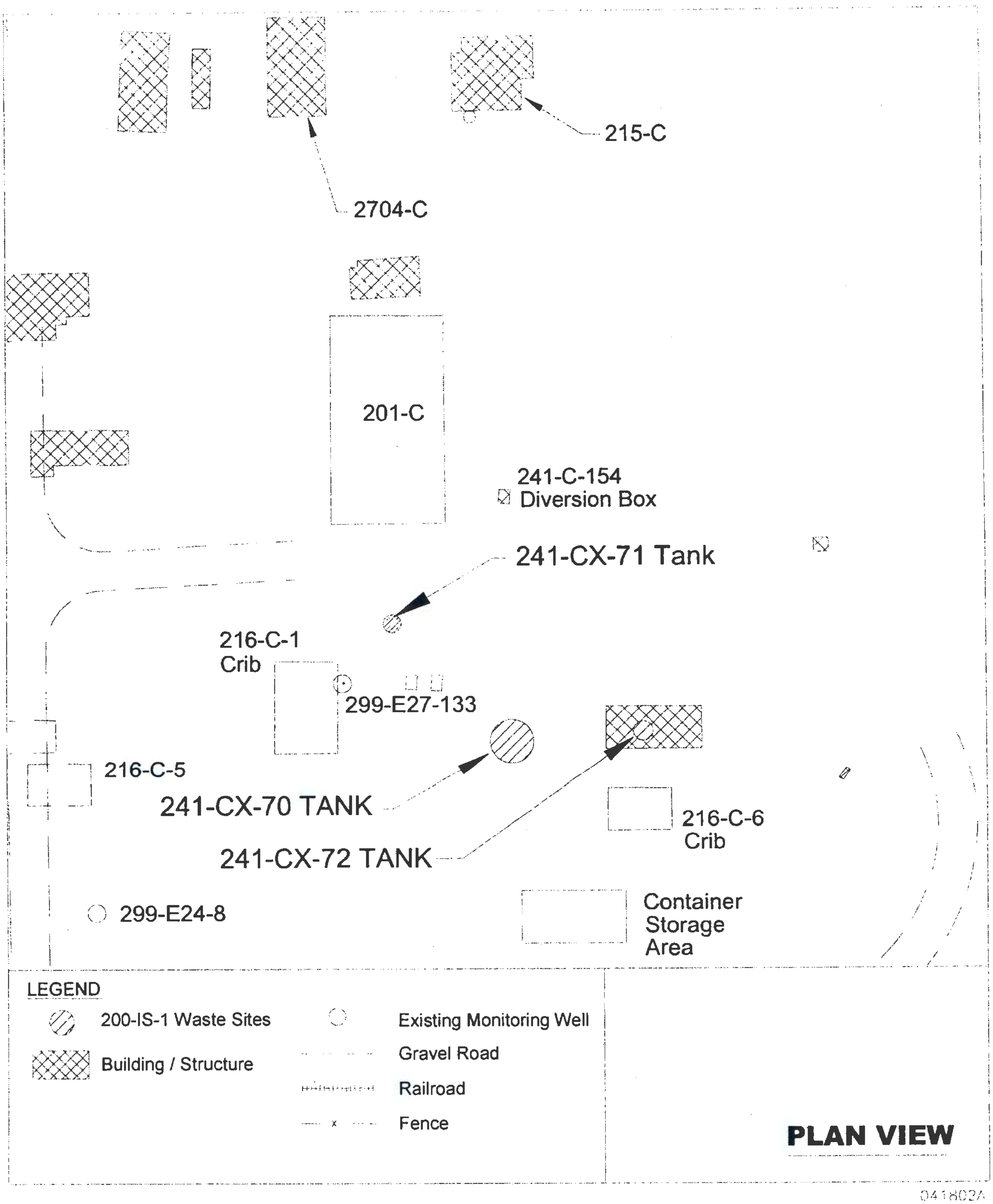


Figure B-8. Location of Planned and Existing Boreholes at the 241-CX Tank System.



B3.2.1 Surface Radiation Surveys

A surface radiation survey will be performed at each waste site investigated to document existing surface contamination. This information will be used in preparing the supporting health and safety documents. The surface radiation surveys will be conducted by qualified RCTs in accordance with applicable procedures. A survey report will be prepared for each site. Surveys will be performed in accordance with WD/GRP RCP 5.6.15, "Operation of Mobile Surface Contamination Monitor II," or equivalent/applicable approved procedures. A survey will be performed at the conclusion of field work at each sampling site to ensure that sampling activities have not contributed to surface contamination.

B3.3 SURFACE GEOPHYSICAL SURVEYS

Surface geophysical surveys will be used to determine the location of tanks and other underground features. The survey results also will be used to determine the detailed location for soil gas and soil sampling. Two different geophysical survey techniques will be used: ground-penetrating radar (GPR) and electromagnetic induction (EMI).

B3.4 SOIL GAS SAMPLING

A GeoProbe™ Model 5400 hydraulic ram system will be used to install soil gas sampling points near hexone storage tanks 276-S-141 and 246-S-142. The hydraulic ram will be operated in accordance with the manufacturer's instructions and GRP-EE-02-14.2, "GeoProbe, Driving and Push Technology Installations," or equivalent. The system is equipped with a 4.45-cm (1.75-in.)-diameter probe and a detachable steel tip. When the tip reaches the desired depth, a 16.5-cm (6.5-in.)-long, fine-mesh, stainless-steel sampling point connected to the surface with 0.79-cm (5/16-in.)-outside diameter Tygon tubing will be inserted down the center of the push rod. The push rod assembly then will be withdrawn approximately 30.5 cm (12 in.) to release the steel tip and allow the sampling point to extend into the void space below the push rod. Approximately 250 mL of 20/40 mesh silica sand then will be added around the sampling point through the center of the push rod. The push rod then will be removed and soil allowed to collapse around the Tygon tubing. At approximately 0.9 m (3 ft) below ground surface (bgs), granular bentonite will be added through the center of the push rod. The bentonite will not be hydrated.

After allowing each soil vapor point to equilibrate for at least 24 hours, approximately 500 mL soil vapor samples will be collected and analyzed for the volatile COCs specific to the 276-S-141/142 tank system. The soil gas samples will be collected and analyzed in accordance with GRP-EE-05-4.0, "Analysis of Volatile Organic Compounds in Vapor Samples Using the Brüel and Kjær 1302 and Innova 1312 Multi-Gas Analyzers," or equivalent.

B3.4.1 Driven Soil Probes Surveys

Driven soil probe casing will be installed using the GeoProbe 5400 hydraulic ram system (or other comparable equipment) in selected locations near each tank site to provide access for small-diameter geophysical logging probes. Small-diameter gross gamma/passive neutron

GeoProbe™ is a trademark of GeoProbe Systems, Salinas, Kansas.

(GG/PN) probes will be used to detect the presence of radiological contamination and support development of radiological contamination profiles. Soil samples will undergo laboratory analyses for COCs. Vertical casing will be installed up to 10.7 m (35 ft) bgs. Small-diameter GG/PN detectors will be lowered to the total depth of the push rods to detect in situ levels of potential radioactive contaminants including cobalt-60, cesium-137, amercium-241, plutonium-239, and neptunium-237. Radiological contaminant profiles will be plotted for each tank system and used to determine regions of potential contamination.

The GG/PN data and the results from the soil samples (see DOE/RL-2002-14, Section 3.5.1), will be used to determine the need and location for a subsequent borehole or test pit for additional sampling and analysis.

B3.4.2 Soil Screening

Using appropriate instrumentation, the RCT or other qualified personnel will field screen all soil samples and cuttings from driven core samplers, boreholes, and test pits for evidence of radioactive contamination. Potential screening instruments are listed in Table B-6 with their respective detection limits. The RCT will record all field measurements, noting the depth of the sample and the instrument reading.

Before driving casing, excavating, or drilling, a local area background reading will be taken using the field screening instruments at a site to be selected in the field. Field screening and interpretations of geologic features will be used to identify the bottom of the waste site, adjust vertical sampling points, assist in determining sample shipping requirements, and support worker health and safety monitoring.

The action level for field radionuclide screening is three times the background level. Soils with activity above the action level will be assessed for sampling by the field geologist. Samples exceeding 0.5 mrem/hr will be stored at a temporary radioactive material storage area at the field location until shipment to the laboratory. Samples with levels of less than 0.5 mrem/hr will be stored at an approved facility until shipment to the laboratory.

Field screening instruments will be used, maintained, and calibrated in accordance with the manufacturer's specifications and other approved procedures. The field geologist will record field screening results on the borehole logbook.

B3.5 SOIL SAMPLING AND ANALYSIS

The following subsections discuss the details of sampling soil from driven soil probes, boreholes, and test pits.

B3.5.1 Driven Soil Probe Sampling

Driven soil probe casing will be installed using the GeoProbe 5400 hydraulic ram system or other comparable equipment in selected locations near each tank site to facilitate (provide access for) the use of small-diameter, hollow core samplers.

A discrete soil sample will be collected at the location indicating the highest levels of contaminants detected by the GG/PN logging system. The soil sample will be collected using a hollow core sampler with a retractable tip that will be driven to the desired depth using the drive casing. The soil sample will be analyzed for the COCs prescribed for each tank system. Because the volume of soil obtained from the core samplers will be small, the analyses will be prioritized by the field team lead to ensure that critical COCs are analyzed.

The soil sample results and GG/PN will be used to determine need and location for a subsequent borehole or test pit for additional soil sampling and laboratory analysis if needed. If no contamination is detected by the GG/PN logging system, a driven soil sample will be collected from a location beneath the tank to verify the absence of contamination. The field team lead will determine the sample location.

B3.5.2 Borehole Sampling and Analysis

A borehole will be placed at the 2607-W3 septic tank waste sites. In addition, based on the extent of contamination detected by the driven soil probe casing sampling, boreholes could be installed to characterize the soil around and beneath the tank systems. Borehole sample collection will be guided by the sampling approaches and logic outlined in Tables B-7 through B-11. Actual sampling intervals can vary from the tables depending on the location of contamination detected by the field radiological instruments. Additional borehole samples could be collected and analyzed at the discretion of the field geologist, based on field conditions, measurements, or observations made during the conduct of RIs.

In general, the bottoms of the waste sites are considered critical sample points because the highest levels of contamination are expected at this location. Samples from 4.6 m (15 ft) bgs and 7.6 m (25 ft) bgs also are considered critical sampling points to evaluate exposure scenarios and remedial alternatives. Sample from depths greater than 7.6 m (25 ft) bgs will be used to verify the conceptual contaminant distribution models and to evaluate remedial action alternatives and potential groundwater impacts.

For waste sites requiring characterization boreholes, the drill depth and associated soil sampling will be based on site-specific conditions. When available information indicates deep vadose zone contamination, or that groundwater has been contaminated by a waste site, soil sampling to the water table could be performed. For waste sites where deep contamination has not been observed, the drilling and sampling depths will be determined based on the observational approach.

Sampling will be performed in accordance with GRP-EE-01-4.0, or equivalent, using a split-spoon sampler. The split-spoon samplers will be equipped with four separate stainless-steel liners. The drill crew will not overdrive the sampling device. Except for the VOA samples, soil will be transferred to a pre-cleaned, stainless-steel mixing bowl, homogenized, then containerized as required in the sampling procedure. The analytes of interest are presented in Table B-4. If sample volume requirements cannot be met, samples will be collected according to the priority presented in Table B-5. Radiological and nonradiological samples always will take precedence over physical property samples.

Physical-property samples will be collected from the boreholes to provide site-specific values to support RESidual RADioactivity (RESRAD) dose modeling and other modeling efforts. Soil properties of interest are moisture content, grain-size distribution, and soil density. Soil density samples shall be collected with a split-spoon sampler equipped with four separate stainless-steel or lexan liners. Physical property samples will be analyzed in accordance with the ASTM methods listed in Table B-4 (ASTM 1993), or in accordance with procedures identified in

Table B-5, or equivalent. The physical property samples will be collected from lithologies that represent the major facies in the vadose zone, as identified in Tables B-7 through B-11. The samples will be collected coincident with nonradiological and radiological split-spoon sample intervals, where possible.

Investigation-derived waste (IDW) generated during this activity will be handled according to the procedures listed in Section B5.0 and the waste control plan (to be prepared/approved before the start of field activities).

Table B-7. 2607-W3 Septic Tank Sampling Design.

Sampling Method	Key Features of Design	Basis for Sampling Design
Surface geophysical survey	Perform GPR and/or EMI over the general area of septic tank and head end of tile field.	Surface geophysical surveys used to locate pipelines.
Tank sludge sample	Collect sample from septic tank and submit to the laboratory for analyses of COCs.	Will be used to determine what contaminants entered the drain field.
Borehole sampling and characterization	Locate borehole at the head end of the tile field. Location will be based on facility drawings and the surface geophysical survey.	The maximum contamination potential is assumed to be present near the head end of the tile field.
Split-spoon soil samples	Soil samples will be collected continuously from 7 to 17 ft bgs (sampler length with shoe is about 2.5 ft). Below 17 ft, samples will be collected at the interface of lithologic changes including the Hanford formation, Cold Creek unit, Ringold Unit E, and just above the water table. All samples will be analyzed for COCs.	Soil samples will be collected continuously in the region of highest potential contamination. Additional soil samples will be collected in regions where contamination is likely to accumulate. The 12 to 14.5 ft bgs sample will be collected to support risk assessment.
Split-spoon soil samples	Collect bulk density and grain-size distribution, and moisture samples at major changes in lithology.	Soil physical properties will be used to support the site conceptual model.
Split-spoon soil samples	Collect field QC samples. Submit to laboratory for analyses of COCs.	Field QC samples are collected to evaluate the potential for cross-contamination and to evaluate laboratory performance.
Borehole geophysical survey	Perform borehole SGL and neutron moisture logging from the surface to the bottom of the borehole.	SGL will be performed to verify gamma-emitting contamination and to refine the conceptual contaminant distribution model. Cesium-137 will be the main target isotope for the SGL because of its prevalence and ease in identification. Soil moisture data will support the site conceptual model.

WAC 173-340, "Model Toxics Control Act – Cleanup."

bgs = below ground surface
COC = contaminant of concern
EMI = electromagnetic induction
GPR = ground-penetrating radar
SGL = spectral gamma logging
QC = quality control
WAC = *Washington Administrative Code*

Table B-8. 276-S-141/142 Hexone Tanks Sampling Design.

Sampling Method	Key Features of Design	Basis for Sampling Design
Surface geophysical survey	Perform GPR and/or EMI over the general area of tank.	Surface geophysical surveys used to locate tank and pipelines.
Soil gas samples	Install soil gas screens for soil gas sampling. Nominally, 6 deep soil gas screens will be installed outside the tank circumference on the east end, north side, and west end of each tank to a depth of 5.5 m (18 ft) bgs. Also, a 5.5 m (18-ft)-deep soil gas screen will be installed between the tanks. In addition, two shallow soil gas screens will be installed to a depth of 1.0 m (39 in.) near the underground piping on the east end of the tank.	Screen soil gas from all points for total VOCs. Collect at least two soil gas samples for confirmatory analysis of hexone concentrations with a GC or similar analytical instrument.
Driven soil core sampler	One soil sample collected from the region of highest contamination detected by soil gas samples. Use driven soil core sampler and submit sample for laboratory analysis of VOAs, GEA, gross alpha, gross beta, gross gamma, and ICP metals (in order of priority). If insufficient material is available for all analyses, prioritize analyses.	Discrete soil sample will be collected to confirm levels of contamination detected by soil gas samples. The subsurface soil sample will be collected even if no contamination is detected in the soil gas samples.
Supplemental Sampling Required if Subsurface Soil Sample Confirms Tank Leaked		
Borehole soil sampling and characterization (Based on subsurface soil sample results)	Drill borehole near the region of anticipated contamination directly beneath the tank at a depth of 5.5 m (18 ft) bgs. A slant drilling technique will be required because of the tank access limitations.	Characterize potential contamination directly beneath the tanks.
Split-spoon soil samples	Split-spoon soil samples will be collected at 12.5 ft bgs and 18 ft bgs. Submit samples for laboratory analyses of COCs.	The 12.5 ft bgs sample will be collected to support risk assessment. Soil samples collected at 18 ft bgs will be analyzed for COCs.
Split-spoon soil samples	Collect bulk density, grain-size distribution, and moisture samples at major changes in lithology.	Soil physical properties will be used to support the site conceptual model.
Split-spoon soil samples	Collect field QC samples.	Field QC samples will be used to evaluate the potential for cross-contamination and to evaluate laboratory performance.

WAC 173-340, "Model Toxics Control Act – Cleanup."

bgs = below ground surface
COC = contaminant of concern
EMI = electromagnetic induction
GC = gas chromatograph
GEA = gamma energy analysis
GPR = ground-penetrating radar
ICP = inductively coupled plasma
QC = quality control
VOA = volatile organic analyte
VOC = volatile organic compound
WAC = *Washington Administrative Code*

Table B-9. 241-CX-70 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Surface geophysical survey	Perform GPR and/or EMI over the general area of tank.	Surface geophysical surveys used to locate tank and pipelines.
Surface soil sample	Hand excavate to approximately 3 ft bgs or below soil stabilization area near a tank riser to collect soil sample. Alternatively, use a driven soil probe to penetrate the stabilization area and a core sampler to obtain the soil sample.	The location for the hand excavation is based on the assumption that soil contamination is more likely near entry points to the tank. Surface stabilization for the 216-C-1 Crib UPR in 1979, which included a 10-cm (4-in.) sand pad with ureabor (herbicide) at the rate of 450 kg/ha (500 lb/ac), a layer of plastic covered with30 cm (12 in.) of sand, and 10 cm (4 in.) of pit run gravel (WIDS), may have extended to the area around tank 241-CX-70.
	Collect one soil sample and QC samples between 3 and 4 ft and submit for laboratory analyses of COCs.	Potential contamination in surface soils from the 216-C-1 Crib overflow.
Vertical geophysical survey	Install direct-push rods to a depth of 9.4 m (31 ft) for GG/PN logging. Nominally, four pushes will be installed outside of the tank circumference; near the inlet line, near the riser opening, 180 degrees from the inlet line, and 180 degrees from the riser opening.	Vertical geophysical survey data will be used to determine if the tank leaked by evaluating the presence of plutonium and cesium-137 immediately adjacent to the tank in regions where leaks likely would have occurred. Cesium-137 is considered to be a good indicator of contamination because of its prevalence in the waste stream and ease of identification. High levels of plutonium may be detected by the PN detector.
Driven soil core sampler	A soil sample is collected from the region of highest contamination detected by vertical geophysical survey. Use driven soil core sampler and submit sample for laboratory analysis of gross alpha, gross beta, gross gamma, GEA, ICP metals, and VOAs (in order of priority). If insufficient material is available for all analyses, prioritize analyses.	A discrete soil sample will be collected to confirm levels of contamination detected by vertical geophysical logging. The subsurface soil sample will be collected even if no contamination is detected by the vertical geophysical survey.
Supplemental Sampling Required If Subsurface Soil Sample Confirms Tank Leaked		
Borehole soil sampling and characterization (based on subsurface soil sample results)	Drill borehole near the region of highest potential contamination. Location will be based on interpretation of the vertical geophysical logging data and subsurface soil sample. Submit sample for laboratory analyses of COCs.	Characterize extent of vertical contamination if subsurface soil sample indicates significant leakage from the tank.

Table B-9. 241-CX-70 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Split-spoon sample	Split-spoon soil samples will be collected at 12.5 ft bgs, 28 ft bgs, and at 10-ft intervals until contamination levels are less than three times background. Soil samples should also be collected at major changes in lithology.	The 12.5 ft bgs sample will be collected to support risk assessment. Soil samples collected at 28 ft bgs and deeper will be field screened for gross radionuclide contamination. If contamination levels are above three times background, drilling and sampling will resume to the next sample interval until contamination is less than three times background. A final sample will be collected at the interval where contamination is less than three times background.
Split-spoon sample	Collect bulk density, grain-size distribution, and moisture samples at major changes in lithology.	Soil physical properties will be used to support the site conceptual model.
Split-spoon sample	Collect field QC samples.	Field QC samples will be used to evaluate the potential for cross-contamination and to evaluate laboratory performance.
Borehole geophysical survey	Perform borehole SGL and neutron moisture logging from the surface to bottom of the borehole.	SGL will be performed to verify gamma-emitting contamination and to refine the conceptual contaminant distribution model. Cesium-137 will be the main target isotope for the SGL because of its prevalence and ease in identification. Soil moisture data will support the site conceptual model.

WAC 173-340, "Model Toxics Control Act – Cleanup."

bgs = below ground surface
COC = contaminant of concern
EMI = electromagnetic induction
GEA = gamma energy analysis
GG = gross gamma
GPR = ground-penetrating radar
ICP = inductively coupled plasma
PN = passive neutron
QC = quality control
SGL = spectral gamma logging
UPR = unplanned release
VOA = volatile organic analyte
WAC = *Washington Administrative Code*
WIDS = Waste Information Data System

Table B-10. 241-CX-71 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Surface geophysical survey	Perform GPR and/or EMI over the general area of tank.	Surface geophysical surveys used to locate tank and pipelines.
Surface soil sample	Hand excavate to approximately 3 ft bgs or below the soil stabilization area near a tank riser to collect the soil sample. Alternatively, use a direct push to penetrate the stabilization area and a core sampler to obtain the soil sample.	The location for the hand excavation is based on the assumption that soil contamination is more likely near entry points to the tank. Surface stabilization for the 216-C-1 Crib UPR in 1979, which included a 10-cm (4-in.) sand pad with ureabor (herbicide) at the rate of 450 kg/ha (500 lb/ac), a layer of plastic covered with 0.3 m (12 in.) of sand, and 10 cm (4 in.) of pit run gravel (WIDS), may have extended to the area around tank 241-CX-71.
	Collect one soil sample between 3 and 4 ft and submit for laboratory analyses of COCs.	Potential contamination in surface soils from 216-C-1 Crib overflow. Ecological sample.
Vertical geophysical survey	Install direct-push rods to a depth of 4.9 m (16 ft) for GG/PN logging. Nominally, four pushes will be installed outside the tank circumference; near the inlet line from 201-C, near the inlet line from the hot shop sinks, near the drywell, and near the outlet line to the 216-C-1 and 216-C-5 Cribs.	Vertical geophysical survey data will be used to determine if the tank leaked by evaluating the presence of plutonium and cesium-137 immediately adjacent to the tank in regions where leaks likely would have occurred. Cesium-137 is considered to be a good indicator of contamination because of its prevalence in the waste stream and ease of identification. High levels of plutonium may be detected by the PN detector.
Driven soil core sampler	A soil sample collected from the region of highest contamination detected by vertical geophysical survey. Use driven soil core sampler and submit sample for laboratory analysis of gross alpha, gross beta, gross gamma, GEA, ICP metals, and VOAs (in order of priority). If insufficient material is available for all analyses then prioritize analyses.	Discrete soil sample will be collected to confirm levels of contamination detected by vertical geophysical logging. The subsurface soil sample will be collected even if no contamination is detected by the vertical geophysical survey.
Supplemental Sampling Required if Deep Soil Sample Confirms Tank Leaked		
Test pit soil sampling and characterization	Dig test pit near the region of highest potential contamination. Location will be based on interpretation of the vertical geophysical logging data and subsurface soil sample.	Characterize extent of vertical contamination if subsurface soil sample indicates significant leakage from the tank.

Table B-10. 241-CX-71 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Soil grab sample	Collect samples from excavated test pit soil at 14 ft bgs, 25 ft bgs, and at contaminated areas between 14 and 25 ft bgs. Soil samples also should be collected at major changes in lithology. Submit sample for laboratory analyses of COCs.	The 14 ft bgs sample will be collected to support risk assessment. Soil samples collected between 14 and 25 ft bgs will be field screened for gross radionuclide contamination. If contamination levels are above three times background, a sample will be collected from that region. A final sample will be collected at 25 ft bgs.
Soil grab sample	Collect bulk-density, grain-size distribution, and moisture samples at 24 to 25 ft bgs.	Soil physical properties will be used to support the site conceptual model.

WAC 173-340, "Model Toxics Control Act – Cleanup."

bgs = below ground surface
COC = contaminant of concern
EMI = electromagnetic induction
GEA = gamma energy analysis
GG = gross gamma
GPR = ground-penetrating radar
ICP = inductively coupled plasma
PN = passive neutron
UPR = unplanned release
VOA = volatile organic analyte
WAC = *Washington Administrative Code*
WIDS = Waste Information Data System

Table B-11. 241-CX-72 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Surface geophysical survey	Perform GPR and/or EMI over the general area of the tank.	Surface geophysical surveys used to locate tank and pipelines.
Surface soil sample	Hand excavate to approximately 3 ft bgs or below soil stabilization area near the tank to collect soil sample. Alternatively, use a direct push to penetrate the stabilization area and a core sampler to obtain the soil sample. Collect soil sample between 3 and 4 ft and submit for laboratory analyses of COCs.	The location for the hand excavation is based on the assumption that soil contamination is more likely near entry points to the tank. Surface stabilization for the 216-C-1 Crib UPR in 1979, which included a 10-cm (4-in.) sand pad with ureabor (herbicide) at the rate of 450 kg/ha (500 lb/ac), a layer of plastic covered with 0.3 m (12 in.) of sand, and 10 cm (4 in.) of pit run gravel (WIDS), may have extended to the area around tank 241-CX-72. Potential contamination in surface soils from 216-C-1 Crib overflow.
Borehole soil sampling and characterization	Bore near the region of anticipated contamination directly beneath the tank at about 15.24 m (50 ft) bgs. A slant drilling technique will be required due to the building and concrete pad located directly over the tank.	Characterize potential contamination directly beneath the tank.
Split-spoon soil samples	Split-spoon soil samples will be collected at 12.5 ft bgs, 26 ft bgs, and 50 ft bgs. Submit for laboratory analyses of COCs.	The 12.5-ft bgs sample will be collected to support risk assessment. Soil samples collected at 26 and 50 ft bgs will be analyzed for COCs.

Table B-11. 241-CX-72 Tank Sampling Design. (2 sheets)

Sampling Method	Key Features of Design	Basis for Sample Design
Split-spoon soil samples	Collect bulk-density, grain-size distribution, and moisture samples at major changes in lithology.	Soil physical properties will be used to support the site conceptual model.
Split-spoon soil samples	Collect field QC samples.	Field QC samples will be used to evaluate the potential for cross-contamination and to evaluate laboratory performance.

WAC 173-340, "Model Toxics Control Act – Cleanup."

bgs = below ground surface
COC = contaminant of concern
EMI = electromagnetic induction
GEA = gamma energy analysis
GPR = ground-penetrating radar
QC = quality control
UPR = unplanned release
WAC = *Washington Administrative Code*
WIDS = Waste Information Data System

B3.5.3 Test Pit Sampling and Analysis

Based on the extent of contamination detected by the direct-push sampling, a test pit may be excavated to characterize the soil around and beneath tank 241-CX-71. Proposed sampling depths are shown in Figure B-4.

If field screening measurements show radiological contamination greater than twice background at the maximum reach of the excavating equipment (approximately 7.6 m [25 ft]), a direct push will be installed directly adjacent to the test pit and logged with the GG/PN logging system. The direct-push boring can be limited by subsurface conditions. The maximum depth of approximately 10.7 m (35 ft) bgs is anticipated.

The soil at the bottom of tank 241-CX-71 is considered a critical sample point because the highest levels of contamination are expected at this location. Samples from 4.6 m [15 ft] bgs and 7.6 m [25 ft] also are considered critical sampling points, and these data will be used for evaluating exposure scenarios and remedial alternatives.

Sampling from the excavator bucket will be performed in accordance with GRP-EE-01-4.0, or equivalent. Analytes of interest are presented in Table B-4. If sample volume requirements cannot be met, samples will be collected and analyzed in the sequence shown in Table B-5.

The test pit will be excavated in a manner that minimizes dust generation from the site boundary. To minimize dust during backhoe operations, water will be sprayed on the site before and during the activity. Samples will be collected from dry soils whenever possible. This contamination control measure is necessary to prevent the release of contamination to the air and stabilized areas within the site boundary. If visible emissions cannot be controlled, the activity will be postponed.

Waste generated during this activity will be handled according to procedures listed in Section B2.7 and in the waste control plan.

B3.5.4 Pre-Shipment Sample Screening

A representative portion of each sample will be shipped to an offsite laboratory, or will be submitted to the Radiological Counting Facility, 222-S Laboratory, or other suitable onsite laboratory for total activity analysis before shipment. Total radiological activities will be used for sample pre-shipment characterization. Samples that slightly exceed the offsite laboratory criterion discussed in Section B2.7.6 may be reduced in volume to allow offsite shipment. Onsite and offsite laboratories will be identified before initiating field activities and will be mutually acceptable to the FH Sample Management group and the Task Lead.

B3.5.5 Summary of Sampling Activities

Table B-12 summarizes the number and types of samples to be collected at all six waste sites.

B3.6 GEOPHYSICAL LOGGING

Boreholes will be geophysically logged with the high-resolution, spectral gamma logging system to determine the vertical distribution and concentration of gamma-emitting radionuclides. Soil moisture, may be measured using a neutron logging tool as determined by the field team leader. These methods are described in DOE/RL-2002-14, Rev. 1, Sections 7.3 and 10.3. The new boreholes will be logged before telescoping of the casing and before abandonment. The starting point for logging (usually the ground surface or top of the casing) will be recorded. The site geologist will witness logging runs and verify before and after field calibrations and repeat log intervals.

Table B-12 lists the number of boreholes that will be logged with the radionuclide logging system. These boreholes represent data collection points in the vicinity of the individual waste sites. Logging of these boreholes will provide additional, updated, site-specific information on contaminant distribution, both laterally and vertically in the area of the waste sites.

B3.7 SURVEYING

The location of all driven soil-probe boreholes, and the test pit will be surveyed after the sampling and abandonment activities are completed. Surveys will be performed in accordance with GRP-EE-01-1.6, or equivalent. Data will be recorded in the *North American Vertical Datum of 1988* (NAVD88) and the Washington State Plane (South Zone) *North American Datum of 1983* (NAD83), with the 1991 adjustment for horizontal coordinates. All survey data will be recorded in meters and feet.

B3.8 WASTE MANAGEMENT SAMPLING

A waste designation DQO effort will be performed immediately before the characterization activities to ensure that the proper information is collected during the field effort to support the designation of all project IDW. Any additional sampling requirements or analytes needed to support designation activities will be identified and implemented through the waste designation DQO summary report that will be prepared at that time.

In addition, the data needs of other core projects such as the RL Groundwater Protection Program, ORP, or the Science and Technology Project will be solicited at this time. If practicable, these data needs will be integrated into the IDW DQO as additional sampling requirements or analytes.

Table B-12. Summary of Projected Sample Collection Requirements.

Sample Type	2607-W3 Septic Tank	276-S-141/ 142 Hexone Tanks	241-CX Tank System
Driven probes for geophysical logging	N/A	N/A	8
Boreholes for sampling/geophysical logging	1	1[a]	1,2[a]
Samples for Radiological and/or Chemical COCs			
Soil gas samples	N/A	9	N/A
Internal sludge sample	1	N/A	N/A
Shallow soil samples	N/A	N/A	3
Driven core soil samples	N/A	1	2[a]
Borehole/test pit soil samples	7	2[a]	5,7[a]
Samples for Physical Properties			
Bulk-density, moisture content, particle size[a]	3	1[a]	3,2[a]
QC Samples			
Duplicates	1	1[a]	1,2[a]
Splits	1	1[a]	1,2[a]
Equipment blanks	1	1[a]	1,2[a]
Trip blank	1	1[a]	1,2[a]
Total number of QC samples	4	4[a]	4,8[a]

[a] Samples collected and geophysical logging (boreholes only) only if borehole or test pit is required based screening sample results.

COC = contaminant of concern
N/A = not applicable
QC = quality control

B4.0 HEALTH AND SAFETY

All field operations will be performed in accordance with FH health and safety requirements and the appropriate WD/GRP procedures. In addition, a work control package will be prepared in accordance with procedures that will further control site operations. This package will include an activity hazard analysis, a site-specific health and safety plan, and applicable radiological work permits. Work shall be performed in accordance with site-specific health and safety plans and applicable radiological work permits.

The sampling procedures and associated activities will take into consideration exposure reduction and contamination control techniques that will minimize the radiation exposure to the sampling team as required by the procedures identified in this SAP.

Health and safety personnel will use data collected during the response action as input to determine exposure levels to workers and to conduct health and safety assessments in accordance with the health and safety plan.

B5.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

The IDW generated by characterization activities will be managed in accordance with *Strategy for Management of Investigation Derived Waste* (Ecology et al. 1999); DOE/RL-98-28, Appendix E; and as directed in HNF-PRO-15333, Section 5.82, which identifies the requirements and responsibilities for containment, labeling, and tracking of IDW. These procedures have been prepared to implement the requirements found in Ecology et al. (1999). Management of IDW, minimization practices, and waste types applicable to 200-IS-1 and 200-ST-1 waste control are described in the waste control plan.

Unused samples and associated laboratory waste from offsite laboratory analysis will be dispositioned in accordance with the laboratory contract, which in most cases will allow the laboratory to dispose of this material. The approval of the Remedial Project Manager is required before unused samples or waste may be returned from offsite laboratories. Unused sample material from onsite laboratories will be returned to the project for disposal.

A waste designation DQO will be completed before the initiating characterization activities to ensure that information necessary to support designation of all project IDW is collected during the field effort. During the IDW DQO effort, any listed waste issues will be resolved. Additional sampling or analysis required to support designation activities will be identified in the waste designation DQO summary report.

B6.0 REFERENCES

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APPENDIX C

200-IS-1 OPERABLE UNIT PROCESS PIPELINES, DIVERSION BOXES, AND ASSOCIATED WASTE SITES REVIEW PROCESS

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Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
1	200-E-111	200-E-111, encased pipeline from 241-ER-151 diversion box to 241-C Tank Farm and 244-AR vault; 3-38 encasement	The site is an underground piping encasement that contains three 7.5-cm (3-in.)-diameter, stainless-steel waste transfer pipelines, numbered "V108," "8618," "8653," which run from the 241-ER-151 diversion box through a "Y" that branches to the C Tank Farm and the 244-AR vault. The section from the "Y" to the 244-AR vault contains two 7.5-cm (3-in.) pipelines numbered "809" and "818." A posted CA is on top of the line at the "Y" junction where the line branches to the C Tank Farm and the 244-AR vault. The entire length of the pipeline is marked with steel fence posts and is posted as a URM area. The ground surface above the pipeline is bare in spots; other sections are vegetated with crested wheatgrass, tumbleweeds, and native grass species.	The encased pipeline runs eastward from the 241-ER-151 diversion box, south of 7th Street, and branches off in two directions (forming a "Y") at a point southeast of the 216-C-10 Crib. From the "Y," it branches to the C Tank Farm and the 244-AR vault.
2	200-E-116	200-E-116, pipelines from 241-B-154 diversion box to 241-C-151 and 241-C-152 diversion boxes	The pipeline is posted as an "Underground Radioactive Pipeline" that extends from the 241-B-154 diversion box to the 241-C-151 and 241-C-152 diversion boxes. Vegetation over the pipeline has been crushed by vehicle traffic. An area located just north of the 241-B-154 diversion box was posted as an HCA in September 2000 but was covered with a bio-barrier and gravel in February 2001. It is now a rectangular posted URM area over a portion of the pipeline. Another area of contamination was found on this pipeline in June 2001. This area was covered with gravel and posted as a URM in August 2001.	The site is located north of and runs parallel to 7th Street, between B Plant and the C Tank Farm in the 200 East Area.
3	200-W-7	200-W-7, 246-L, 241-S-TK-1, 243S-TK-1, 243-S-TK1, 200-W personnel decontamination facility catch tank, IMUST	The underground tank is inside a chained area that measures approximately 3 m by 3 m (9 ft by 9 ft), with three risers extending to the surface. The tank is posted with IMUST signs and radiological postings.	The site is located northwest of 242-S evaporator and just north of the MO-326 trailer.
4	200-W-16	200-W-16, 292-T underground tanks, IMUST, Inactive Miscellaneous Underground Storage Tank, 292-TK-1, 292-TK-2	Two metal riser pipes extend approximately 0.5 m (1.5 ft) above grade near the southeast corner of the 292-T Building addition. Both are capped, and one appears to have a pressure-relief vent. These pipes extend from two buried tanks (292-TK-1 and 292-TK-2). A chain-link fence encloses the area where the tanks are located. The fence is posted with "Access Restricted" signs. The site is within a chained area posted as a CA.	The underground tanks are near the southeast corner of the 292-T Building addition. The 292-T Building is south of the 291-T stack and north of the 222-T Building.
5	200-W-58	200-W-58, Z Plant diversion box #1	The concrete lid of the diversion box is visible above ground. The Z Plant fenced exclusion area is covered with gravel.	Z Plant diversion box #1 is located south of the 234-5 Z Building, between the two fences that make up the double Z Plant exclusion area. It is directly south of the 361-Z settling tank. The diversion box is buried 2.7 m (9 ft) deep with its upper surface (a thick concrete lid) slightly above ground level.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
6	200-W-59	200-W-59, Z Plant diversion box #2	The diversion box is buried with its concrete lid slightly above ground level. The Z Plant fenced exclusion area is covered with gravel.	Z Plant diversion box #2 is located southwest of the 234-5 Z Building, between the two fences that make up the double Z Plant exclusion area. It is west of the 216-Z-361 settling tank and directly north of the 216-Z-12 Crib.
7	200-W-78	200-W-78; pipeline between TX, TY, and T Tank Farms	The site is an encased, underground pipeline that runs between the 241-TXR-151 diversion box (in the TX Tank Farm) and the 241-TR-153 diversion box (in the T Tank Farm). Outside the tank farm fence, the line is marked with "Radioactive Pipeline" signs. Several stabilized, individually radiologically posted areas are on top of or adjacent to this pipeline near the east side of the TY Tank Farm perimeter fence.	The underground line is located in the 200 West Area, between the T, TX, and TY Tank Farms, on the west side of Camden Avenue.
8	200-W-97	200-W-97, encased pipeline from 240-S-151 diversion box to 241-S-151 diversion box	The site is an underground concrete-encased pipeline. The surface is marked with "Underground Radioactive Material – Pipeline" signs. Yellow swab risers are located along the pipeline. One swab riser, near the 204-S Facility, has been surrounded with post-and-chain barricade and is posted with SCA signs.	The pipeline extends northwest from the REDOX Facility to the S and SX Tank Farms.
9	200-W-98	200-W-98, encased pipeline from 240-S-151 to 241-U-153 diversion box	The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs	The pipeline is located south of 16th Street, extending in a southeast direction from the 241-U-153 diversion box to 204-S and the REDOX Facility.
10	200-W-99	200-W-99, encased pipeline from 241-U-151 to 241-S-151 diversion boxes	The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs	The pipeline is located south of 16th Street, extending from the 241-U-151 diversion box to the 241-S-151 diversion box.
11	200-W-100	200-W-100, encased pipeline from 241-UX-154 to 241-SX-152 diversion box	The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs	The pipeline begins on the east side of the 221-U Building and extends southwest to terminate at the 241-SX-152 diversion box, located on the east side of S and SX Tank Farms.
12	200-W-105	200-W-105, encased transfer line between 214-UX-154 diversion box and 241-TX Tank Farm	The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs	The pipeline begins on the east side of the 221-U Building and extends in a northwest direction to terminate at the 241-TX-155 diversion box. The line continues through the diversion box to the 241-TX Tank Farm.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
13	200-W-125	200-W-125, 216-Z-1 ditch replacement pipeline	The site is an underground buried pipeline. The pipeline is an 18-in.-diameter vitrified clay pipe.	The pipeline extends east from the 231-Z Building and turns south to connect with the head end of the 216-Z-11 ditch.
14	216-TY-201	216-TY-201, supernatant disposal flush tank, IMUST	The 216-T-26, 216-T-27, and 216-T-28 Cribs and the 216-T-201 tank are enclosed in a common area with a steel post-and-chain barricade. The area is posted as URM. The 216-TY-201 flush tank is located in the northeast corner of the area. It has three risers protruding from a mound of earth. Tank 216-TY-201 is delineated with steel post-and-chain barricade and is marked with IMUST signs.	The unit is located in the 200 West Area. It is east of Camden Avenue and south of 23rd Street.
15	240-S-151	240-S-151, 240-S-151 diversion box	This unit is constructed of reinforced concrete and is rectangular in shape. The 240-S-151 diversion box has been weather covered.	The 240-S-151 diversion box is located north of the 202-S Canyon Building.
16	240-S-152	240-S-152, 240-S-152 diversion box	This unit is constructed of reinforced concrete and is rectangular in shape. The 240-S-152 diversion box has been weather covered.	The 240-S-152 diversion box is located north of the 202-S Canyon Building.
17	240-S-302	240-S-302, 240-S-302 catch tank, IMUST	This unit is a horizontally oriented cylindrical steel tank. The 240-S-302 catch tank is buried underground to provide shielding from radiation. The tank is surrounded with post-and-chain barricade and posted with radiological and IMUST signs.	This unit is located north of the 202-S Building and east of the 240-S-151 diversion box.
18	241-A-151	241-A-151, 241-A-151 diversion box	The site is a reinforced-concrete structure with cover blocks. Most of the structure is below grade. It is marked and radiologically posted.	The diversion box is located south of the east end of the 202-A Building.
19	241-A-302A	241-A-302A, 241-A-302-A catch tank	The unit is an underground cylinder made of carbon steel. It sits inside a pump pit with a riser extending to the surface. It is surrounded with post-and-chain barricade and marked with radiological and IMUST signs.	The catch tank is located south of the east end of the 202-A Building and west of the 241-A-151 diversion box. It is located inside the PUREX security fence.
20	241-A-302B	241-A-302B, 241-A-302-B catch tank, IMUST	The east slope of the A Tank Farm has been sprayed with shotcrete. The shotcrete surrounds the area where catch tank 241-A-302B is located. A riser and electrical box are visible. A staircase has been installed to provide access to the tank surface. The underground tank is positioned horizontally. The tank is marked and radiologically posted.	Catch tank 241-A-302B is buried outside the tank farm perimeter fence, east of the A Tank Farm, adjacent to Canton Avenue.
21	241-B-154	241-B-154, 241-B-154 diversion box	The site is a diversion box that connects diversion boxes 241-B-151 and 241-B-152 with the 221-B Building. The rectangular, reinforced-concrete structure has been sprayed with gray weatherizing foam.	The unit is located east of the 221-B Building, at the intersection of Baltimore Avenue and 7th Street.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
22	241-B-302B	241-B-302B, 241-B-302-B catch tank, 241-B-302, IMUST	This unit is an underground, horizontal carbon steel tank. The catch tank and the 241-B-154 diversion box are surrounded by a post-and-chain barrier. The surface of the area inside the chain has been covered with grave and sprayed with gray weatherizing material. The site is marked with radiological and IMUST signs.	This catch tank is located north of the 241-B-154 diversion box, adjacent to the corner of 7th Street and Baltimore Avenue.
23	241-BX-154	241-BX-154, 241-BX-154 diversion box	The 241-BX-154 diversion box is a reinforced-concrete structure.	This diversion box is located south of the 221-B Building and east of the 241-BX-302B catch tank.
24	241-BX-155	241-BX-155, 241-BX-155 diversion box	The 241-BX-155 diversion box is a reinforced-concrete structure that has been isolated and covered with waterproof gray grout. The area around the diversion box has been surface stabilized with gravel and posted with URM signs, except for the surface area above tank 241-B-302-C. This area does not have the additional layer of gravel and remains posted as a CA.	This diversion box is located northeast of B Plant on the south side of Atlanta Avenue.
25	241-BX-302B	241-BX-302B, 241-BX-302-B catch tank, IMUST	Catch tank 241-BX-302-B is buried and covered with gravel. It is surrounded with post-and-chain barricade. The tank is marked with radiological and IMUST signs.	Catch tank 241-B-302-B is located on the south side of the 221-B Building (near section 12), and northwest of 241-BX-154 diversion box.
26	241-BX-302C	241-BX-302C, 241-BX-302-C catch tank, IMUST	Catch tank 241-BX-302-C is a horizontal cylinder of direct-buried carbon steel inside a recently graveled URM area, related to the 241-BX-155 diversion box surface stabilization. The tank was not covered with extra gravel and is separately posted as a CA. The tank is marked with radiological and IMUST signs.	Catch tank 241-BX-302C is located southeast of the 241-BX--155 diversion box, between Atlanta and Baltimore Avenues.
27	241-C-154	241-C-154, 241-C-154 diversion box	The diversion box has been covered with clean backfill material (ash) and no longer is visible. It is located within the larger Hot Semi-Works surface stabilized area (200-E-41).	The diversion box is located south of 7th Street, southeast of the (demolished) 201-C Building and northeast of the 216-C-1 Crib.
28	241-ER-151	241-ER-151, 241-ER-151 diversion box	The diversion box is located inside a locked chain-link fence. The fence is posted with "Caution – Contact Radiological Control and Tank Farm Shift Office Prior to Entry" signs. The diversion box is surrounded with a metal safety barricade.	The site is located southwest of B Plant, near the corner of 7th Street and Atlanta Avenue.
29	241-ER-152	241-ER-152, 241-ER-152 diversion box	Most of the reinforced-concrete diversion box structure is underground. The floor and lower portions of the walls are lined with stainless steel. Cover blocks with lifting hooks are visible from the surface. The 241-ER-152 diversion box is surrounded with radiation rope and CA signs.	This 241-ER-152 diversion box is southeast of the 224-B Building, and east of 241-ER-151 diversion box, near the corner of Atlanta Avenue and 7th Street.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
30	241-ER-311	241-ER-311, 241-ER-311 catch tank, 241-ER-311A replacement tank	The underground tank is located inside the 241-ER-151 locked chain-link fence. The fence is posted as a CA and URM area and is labeled with IMUST signs. Catch tank 241-ER-311 is the furthest south, nearest to the chain-link fence. Catch tank 241-ER-311A is located adjacent to the north side of tank 241-ER-311 (in the middle of the three structures). The 241-ER-151 diversion box is north of catch tank 241-ER-311A.	The tank is located south of B Plant, and west of Atlanta Avenue, inside the 241-ER-151 diversion box fence.
31	241-ER-311A	241-ER-311A, 241-ER-311A catch tank, old 241-ER-311, original 241-ER-311 catch tank, IMUST	These tanks are located within a chain-link fence that is posted as a CA and URM area and is labeled with IMUST signs. The 241-ER-151 diversion box and catch tanks 241-ER-311 and 241-ER-311A are all located inside this chain-link fence. Catch tank 241-ER-311 is the farthest south, nearest the chain-link fence. Catch tank 241-ER-311A is adjacent to the north side of tank 241-ER-311 (in the middle of the three structures). The 241-ER-151 diversion box is north of catch tank 241-ER-311A.	This unit is below grade. The tank is located southwest of B Plant. It is south of 7th Street and west of Atlanta Avenue.
32	241-EW-151	241-EW-151, 241-EW-151 vent station catch tank, 241-EW-151 vent station, vent station, 200 Area East/West vent station	The vent station is surrounded by a chain-link fence with a locked gate. It consists of an underground concrete structure containing a stainless-steel tank in a vault with a jumper pit above the tank. The tank has two vent risers that extend above grade and a riser for the unit's leak detection system. At the bottom of the stairwell access is a floor drain that connects to a nearby french drain. Several hazard and radiological warning signs are posted on the fence. Two areas outside the fence, adjacent to the northeast side of the vent station are posted with URM signs.	The site is located south of Route 3, approximately halfway between the 200 East and West Areas. It is south of the 609-A Fire Station.
33	241-SX-302	241-SX-302, 241-SX-302 catch tank, SX-304, IMUST	Catch tank 241-SX-302 is a stainless-steel cylinder buried in a horizontal position. Three yellow risers are visible on the surface. It is surrounded with post-and-chain barricade and marked with radiological and IMUST signs.	Catch tank 241-SX-302 is located east of tank 241-SX-101, inside the tank farm fence.
34	241-TX-152	241-TX-152, 241-TX-152 diversion box	The diversion box is a rectangular, reinforced-concrete structure. Most of the structure is below ground. A few inches of the structure that extends above ground is covered with a gray weather coating. It is surrounded with light post-and-chain barricade and is posted with various radiological postings.	This unit is located east of the TX Tank Farm. It is east of Camden Avenue and south of 23rd Street. It is north of the 200 West Area Powerhouse pond.
35	241-TX-154	241-TX-154, 241-TX-154 diversion box	The diversion box is a rectangular, reinforced-concrete structure. Most of the structure is below ground. The diversion box is surrounded with post-and-chain barricade. It is labeled and radiologically posted. The adjacent area has been covered with shotcrete.	This unit is located on the east side of the 221-T Building.
36	241-TX-155	241-TX-155, 241-TX-155 diversion box	The diversion box is a rectangular, reinforced-concrete structure. Most of the structure is below ground. A few inches of the structure that extends above ground is covered with a gray weather coating. It is surrounded with light post-and-chain barricade and CA signs.	This unit is located east of the TX Tank Farm, south of 23rd Street and north of the 200 West Area Powerhouse pond.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
37	241-TX-302B	241-TX-302B, 241-TX-302-B catch tank, IMUST	This unit is an underground, cylindrical tank made of steel. The ground surface around the tank has been covered with gravel. The tank is surrounded with light post-and-chain barricade and posted with CA and IMUST signs.	This tank is located east of the TX Tank Farm, northeast of the 241-TX-155 diversion box.
38	241-TX-302BR	241-TX-302BR, 241-TX-302BR catch tank, 241-TXR-302BR, IMUST	This unit is an underground, horizontal, cylindrical tank made of steel. The ground surface around the tank has been covered with gravel. The tank is surrounded with post-and-chain barricade and labeled with IMUST signs.	Catch tank 241-TX-302BR is located east of the 241-TX-155 diversion box. It is located east of Camden Avenue and south of 23rd Street.
39	241-TX-302C	241-TX-302C, 241-TX-302-C catch tank	This unit is an underground horizontal, cylindrical tank made of carbon steel. The tank area has been sprayed with shotcrete to control surface contamination.	Catch tank 241-TX-302 is located southeast of the center of the 221-T Building.
40	241-U-151	241-U-151, 241-U-151 diversion box	The diversion box is marked and radiologically posted. This unit is constructed of reinforced concrete with multiple, encased liquid waste transfer lines. The diversion box structure is mostly below ground. It has three layers of cover blocks.	The 241-U-151 diversion box is located northeast of the intersection of Camden Avenue and 16th Street, east of the U Tank Farm.
41	241-U-152	241-U-152, 241-U-152 diversion box	The diversion box is marked and radiologically posted. The unit is constructed of reinforced concrete with multiple, encased liquid waste transfer lines. The diversion box structure is mostly below ground. It has three layers of cover blocks.	The 241-U-152 diversion box is located northeast of the intersection at Camden Avenue and 16th Street, east of the 241-U Tank Farm.
42	241-UX-154	241-UX-154, 241-UX-154 diversion box	The diversion box is marked and radiologically posted. The unit is mostly below grade, constructed of reinforced concrete. Multiple encased liquid waste transfer lines enter the box through its southeast wall.	The 241-UX-154 diversion box is located southeast of the 221-U Canyon Building.
43	241-UX-302A	241-UX-302A, 241-U-302 catch tank, 241-UX-302 catch tank, 241-UX-302	The catch tank is an underground tank. It is covered with gravel, marked, and radiologically posted.	The tank is located southeast of the 221-U Building and south of the 241-UX-154 diversion box.
44	241-WR VAULT	241-WR vault, 241-WR vault (tanks -001 through -009), 241-WR-01 thru -09, 241-WR diversion station vault, 244-WR vault, 296-U-6 stack, IMUST	The vault is a below grade, reinforced-concrete structure with nine compartments arranged in two rows with a 189,000-L (50,000-gal) tank in each compartment. A concrete wall separates the two rows of tanks. In addition to the tanks, the vault contains miscellaneous agitators, pumps, and valves. It is marked and posted with URM area signs. An exhaust stack just north of the vault is included in this site. See sub-site description.	This site is located northeast of the 221-U Building, west of Beloit Avenue.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
45	241-Z	241-Z, 241-Z treatment and storage tanks, 241-Z Tank Farm, 241-Z treatment and storage system, 241-Z-D-4, 241-Z-D-5, 241-Z-D-7, 241-Z-D-8, 241-Z sump, 241-Z tank pit	Site consists of an above ground, weather protected area (metal building) containing controls and monitoring systems for the below grade concrete vault containing four storage and treatment tanks. The operating capacity of the tank system is 65,000 L (17,000 gal). The site was activated on November 24, 1948. The RCRA TSD consists of the tanks (excluding D-6), the internal piping, the concrete vaults, ancillary equipment, and the soil directly below the tanks. Pipelines leading from buildings in 234-5 Z Building to the 241-Z Facility are not considered part of this site.	The site is located inside the Z Plant security fence, near the south end of the complex.
46	600-269	600-269, cross-site transfer line replacement, new cross-site transfer line	The site is an underground pipeline. It is marked on the surface with "Underground Radioactive Material – Pipeline" signs. The associated diversion box, 6241-A, is located east of Beloit Avenue in the 200 West Area. An associated vent station, vent station 6241-V, is located between 200 East and West Areas, northwest of the 241-EW-151 vent station.	The pipeline extends from the SY Tank Farm inside the 200 West Area to the 244-A lift station in 200 East Area. A large portion of the line is located between the 200 West and East Areas, south of Route 3.
47	HSVP	HSVP, Hot Semi-Works valve pit, 201-C diversion box, Semi-Works valve pit	The site is a sealed, concrete-filled, vertically configured, stainless-steel cylinder that is buried beneath the ash barrier that was placed over the decommissioned 201-C Process Building (see 200-E-41). The surface stabilized area is posted with URM signs. The valve pit is not separately marked or posted.	This valve pit is adjacent to the remains of the 201-C Building and southeast of the main canyon area. It is located within the surface stabilized area known as 200-E-41.
48	UPR-200-E-1	UPR-200-E-1, waste line failure on south side of 221-B	The UPR site is not separately marked or posted.	The release occurred on the south side of the 221-B Building.
49	UPR-200-E-3	UPR-200-E-3, line leak from 221-B to 241-BX-154, UN-200-E-3	The UPR site is not separately marked or posted.	The release occurred on the south side of the 221-B Building, between the 221-B Building and tank 241-BX-154.
50	UPR-200-E-25	UPR-200-E-25, contamination spread from the 241-A-151 diversion box, UN-200-E-25	The release is not separately marked or posted. The area south of PUREX, inside the facility fence, had been posted as a CA. In 1999, the large posted CA was covered with clean backfill and changed to a URM area (200-E-103). It is possible this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	The area of contamination extended southwest of PUREX, as far as 61 m (200 ft) beyond the 200 East Area fence.
51	UPR-200-E-26	UPR-200-E-26, 241-A-151 release, UN-200-E-26	The release is not separately marked or posted. The area south of PUREX, inside the facility fence had been posted as a CA. In 1999, the large posted CA on the south side of the PUREX Facility was covered with clean backfill and changed to a URM area (200-E-103). It is possible this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	Contamination from this release spread southwest of the 241-A-151 diversion box, outside of the 200 East Area perimeter fence and across Route 4S.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
52	UPR-200-E-31	UPR-200-E-31, 241-A-151 release, UN-200-E-31	The release is not separately marked or posted. The area south of the PUREX Facility, inside the facility fence had been posted as a CA. In 1999, the large posted CA, located on the south side of the PUREX Facility, was covered with clean backfill and changed to a URM area (200-E-103). It is possible this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	In 1961, the contamination spread from the 241-A-151 diversion box (located on the south side of 202-A), affected the PUREX exclusion area, areas northeast of PUREX and east of the 200 East Area fence.
53	UPR-200-E-41	UPR-200-E-41, UN-200-E-41 soil contamination in the vicinity of R-13 stairwell (221-B), UPR-200-E-85	*This is a duplicate of UPR-200-E-85.	The site is located in the vicinity of the R-13 stairwell at the 221-B Building.
54	UPR-200-E-42	UPR-200-E-42, 241-AX-151 release, UN-200-E-42	The UPR site currently in not marked or posted.	The 241-AX-151 diversion box is located near the corner of 4th Street and Buffalo Avenue, adjacent to the 204-AR unloading station. The UPR site included a dirt bank east of the 241-151-AX diversion box and weeds east of the established parking lot.
55	UPR-200-E-44	UPR-200-E-44, UN-200-E-44, BCS waste line leak south of 221-B	The UPR site is not separately marked or posted. There is no visual evidence of the area that caved in.	The UPR occurred south of 221-B, near the R-17 change house north of 7th Street. The change house no longer exists.
56	UPR-200-E-45	UPR-200-E-45, UN-200-E-45, contamination spread from the 241-B-154 diversion box	A large area on the northeast corner of 7th Street and Baltimore Avenue is surrounded with post-and-chain barricade and marked as a URM area. The URM surrounds the 241-B-154 diversion box that has been covered with a coating of gray grout. The original UPR is not separately marked or posted.	The 241-B-154 diversion box is located at the corner of 7th Street and Baltimore Avenue. The release involved loose contamination spreading in a southeasterly direction from the 241-B-154 diversion box.
57	UPR-200-E-65	UPR-200-E-65, UN-216-E-65, 241-A-151 diversion box radioactive contamination, UN-200-E-65	The release is not separately marked or posted. The area south of PUREX, including this UPR site, is posted as a URM area (site 200-E-103).	The release occurred south of the 202-A Building (PUREX), inside the facility fence and around diversion box 241-A-151.
58	UPR-200-E-67	UPR-200-E-67, UN-216-E-67, excavation of radioactively contaminated pipe encasement, UN-200-E-67	The 1984 excavation has been backfilled. The site is no longer marked or posted.	This site was located in an excavation site, north of the 272-AW parking lot, near the corner of 4th Street and Canton Avenue.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
59	UPR-200-E-77	UPR-200-E-77, UN-216-E-5, 241-B-154 diversion box ground contamination, UN-200-E-77	A large graveled area on the northeast corner of 7th Street and Baltimore Avenue is surrounded with post-and-chain barricade and marked as a URM area. The URM surrounds the 241-B-154 diversion box, which has been covered with a coating of gray grout. The area appears to have been posted in stages. A large, posted, oval area (URM) extends north and east from the diversion box. Another posted area (URM) extends west to Baltimore Avenue and turns northward. In January 2000, a separate CA was posted around a power pole (adjacent to a manhole) within the larger URM. In 2002, the posting around the power pole was removed and a "Fixed Contamination Area" sign was attached to the pole.	This site is located east of 221-B Building, at the northeast corner of Baltimore Avenue and 7th Street. It surrounds the 241-B-154 diversion box,
60	UPR-200-E-78	UPR-200-E-78, UN-216-E-6, 241-BX-155 diversion box ground contamination, UN-200-E-78	The diversion box has been isolated and covered with gray grout. The area around the diversion box and the surface area above Tank 241-B-302-C have been surface stabilized with gravel and posted with URM signs.	This site is located in the area around the 241-BX-155 diversion box, south of the 241-BX Tank Farm, northeast of B Plant between Atlanta and Baltimore Avenues.
61	UPR-200-E-80	UPR-200-E-80, UN-216-E-8, 221-B R-3 line break, R-3 radiation zone, UN-200-E-80	The UPR is not separately marked or posted.	The release occurred in an underground pipeline, located on the south side of the 221-B Canyon Building, near the R-3 stairwell. The leak resulted in a contaminated area measuring 30 m (100 ft) wide by 152 m (500 ft) long, along the south side of the 221-B Building.
62	UPR-200-E-84	UPR-200-E-84, 241-ER-151 catch tank leak, UN-200-E-84, UN-216-E-12	The 241-ER-151 diversion box and catch tank 241-ER-311 are located inside a chain-link fence that is radiologically posted. The release is not separately marked or posted.	The UPR occurred adjacent to the 241-ER-151 diversion box, southwest of the 221-B Building.
63	UPR-200-E-85	UPR-200-E-85, line leak at 221-B stairwell R-13, UN-216-E-13, UPR-200-E-41, UN-200-E-85, UN-200-E-41	The site was stabilized in 1984 and posted with URM signs. The release site is not labeled. The R-13 utility pit was covered with a steel lid.	UPR-200-E-85 occurred south of the center of the 221-B Building, near the R-13 utility pit.
64	UPR-200-E-87	UPR-200-E-87, UN-216-E-15, 224-B south side plutonium ground contamination, UN-200-E-87, 216-E-15	Some areas on the south side of 224-B are posted with URM signs. The release site is not specifically marked.	The UPR-200-E-87 site is located on the south side of the 224-B Building in the 200 East Area.
65	UPR-200-E-96	UPR-200-E-96, ground contamination southeast of PUREX, UN-216-E-24, UN-200-E-96	The site was described in 1980 as an area measuring approximately 1.0 ha (2.5 ac) located adjacent to the east and south sides of 202-A (PUREX). These areas are now covered with gravel and posted as URM areas.	The UPR site includes CAs on the south and east sides of PUREX.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
66	UPR-200-E-117	UPR-200-E-117, contaminated liquid spill, UN-200-E-117	The release was identified above an encased waste line on the south of PUREX and west of the railroad tunnel. The release site is no longer marked or posted. The release site is within a larger area that was surface stabilized in 1999, known as 200-E-103.	The spill occurred on the south side of the 202-A Building, west of the railroad tunnel.
67	UPR-200-W-2	UPR-200-W-2, UN-200-W-2, underground waste line leak	The area around stairwell R-19 at the 221-T Facility is currently paved with asphalt. A long, narrow URM area is posted around the R-19 area.	The cave-in occurred on the southeast side of the 221-T Facility, near stairwell R-19.
68	UPR-200-W-5	UPR-200-W-5, overflow at 241-TX-155, UN-200-W-5	The UPR no longer is marked or separately posted. In 2000 and 2001, multiple areas of soil and vegetation contamination were identified and all were posted. For consolidation purposes, all of the new CAs were recorded and mapped as UPR-200-W-113.	The site consists of the 241-TX-155 diversion box and the adjacent hillside to the west. The diversion box is located east of Camden Avenue, east of the TX Tank Farm.
69	UPR-200-W-6	UPR-200-W-6, UN-200-W-6, contamination spread from 241-U-151 and 241-U-152 diversion boxes	The ground around the 241-U-151 and the 241-U-152 diversion boxes has been covered with gravel. The diversion boxes are marked and posted, but the UPR is not separately identified. Proposed to consolidate with 200-W-95.	The contamination spread occurred at the 241-U-151 and 241-U-152 diversion boxes, located east of the U Tank Farm, near the corner of 16th Street and Camden Avenue.
70	UPR-200-W-21	UPR-200-W-21, UN-200-W-21, UN-216-W-36, process line cave-in at 241-TX-154 diversion box	The UPR affected an area between 221-T and 222-T. This area is currently covered with shotcrete and posted with URM signs. Proposed to consolidate with UPR-200-W-38.	The release occurred at the 241-TX-154 diversion box, located east of the 221-T Building.
71	UPR-200-W-27	UPR-200-W-27, transfer line leak at 23rd and Camden, UN-200-W-27, UN-216-W-5, duplicate of UPR-200-W-29	This is a duplicate of UPR-200-W-29, which occurred on November 15, 1954, at the corner of 23rd Street and Camden Avenue. This site code is scheduled to be reclassified to be rejected.	The site is located at the southeast corner of the intersection of Camden Avenue and 23rd Street.
72	UPR-200-W-28	UPR-200-W-28, release from 241-TX-155 diversion box, UN-200-W-28	The UPR site is not separately marked or posted. The documented contaminated area was found at the 241-TX-155 diversion box. There is a large posted URM area west of the diversion box and several smaller radiologically posted areas in this vicinity (see UPR-200-W-113 and UPR-200-W-135). The diversion box has been isolated and weather covered and is marked and posted with various radiological control signs.	The release site is located adjacent to the 241-TX-155 diversion box, approximately 244 m (800 ft) east of the TX Tank Farm and north of the 200 West Area Powerhouse pond.
73	UPR-200-W-29	UPR-200-W-29, transfer line leak, UN-200-W-29, UPR-200-W-27, UN-200-W-27, UN-216-W-5, 23rd and Camden line break	The area is currently surrounded with steel posts, covered with gravel, and posted as an URM area.	The site is located at the southeast corner of the intersection of Camden Avenue and 23rd Street.
74	UPR-200-W-32	UPR-200-W-32, UNH transfer line break, UN-200-W-32	The UPR site is not currently marked or posted. The above ground pipeline has been removed.	The release occurred near the northwest corner of the REDOX exclusion in 1954.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
75	UPR-200-W-35	UPR-200-W-35, ground contamination near UNH process line, UN-200-W-35, REDOX to 224-U UNH line leak	Much of the area north of REDOX has been surface stabilized. The UPR site is not marked or posted.	The site was located along the above ground UNH process line that ran from REDOX to U Plant, at a location just outside and to the north of the REDOX exclusion area.
76	UPR-200-W-38	UPR-200-W-38, line break at 241-TX-302C, UPR-200-W-160, UPR-200-W-40, UN-200-W-38, 216-T-30	The area around the 241-TX-154 diversion box and the catch tank has been stabilized with shotcrete. The area is posted with URM signs, but the UPR is not specifically marked.	The release occurred on the southeast side of T Plant (221-T), between the 241-TX-154 diversion box and the 241-TX-302 catch tank. The liquid release affected a large area between the 221-T and 222-T Buildings.
77	UPR-200-W-40	UPR-200-W-40, line break near 241-TX-154, UPR-200-W-38, UPR-200-W-160, 216-T-30, UN-200-W-40	This site code is recommended for deletion because it is a duplicate of UPR-200-W-38 and UPR-200-W-160. UPR-200-W-38 has been selected to be the "surviving" site code for this incident.	The spill occurred in the 200 West Area, southeast of the 221-T Building between the 241-TX-154 diversion box and catch tank 241-TX-302C.
78	UPR-200-W-49	UPR-200-W-49, contamination southeast of 241-SX, UN-200-W-49	The SX Tank Farm is surrounded by a chain-link fence posted with various radiological warning signs. The UPR located outside the tank farm fence, as described in 1958, is not marked or posted.	In 1958, contamination from inside the SX Tank Farm was spread by the wind, causing an area of approximately 464.5 m^2 (5,000 ft^2) outside of the southeast corner of SX Tank Farm to be contaminated.
79	UPR-200-W-62	UPR-200-W-62, UN-200-W-62, line leak at 23rd and Camden, UN-216-W-5, duplicate of UPR-200-W-97	The area has been stabilized with gravel. It is surrounded with URM signs.	The incident occurred at the corner of Camden Avenue and 23rd Street in 200 West Area.
80	UPR-200-W-64	UPR-200-W-64, road contamination at 23rd and Camden, UN-200-W-64	The corner of 23rd Street and Camden Avenue has been stabilized with clean gravel because of two waste line leak events. The stabilized area is surrounded with chain and posted with URM signs. The road shoulders are not posted. This UPR site is not separately marked or posted from the stabilized UPR-200-W-29 and UPR-200-W-97 release sites.	The release is located between the east shoulder of Camden Avenue and the posted URM area (UPR-200-W-29/ UPR-200-W-97), near the corner of 23rd Street and Camden Avenue.
81	UPR-200-W-79	UPR-200-W-79, contamination spread at 241-Z, UN-200-W-79	Alpha contamination was spread inside and outside of the 241-Z sump radiation zone fence. The area was decontaminated and is no longer marked or posted. It occurred in the graveled and concrete area around the 241-Z Building.	The release occurred at the 241-Z area, south of the 234-5 Z Building, and inside the 234-5 Z exclusion fence.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
82	UPR-200-W-82	UPR-200-W-82, contamination spread at 240-S-151	The 240-S-151 diversion box is posted with radiological warning signs. The contamination spread occurred in the soil adjacent to the diversion box. A WIDS sign has been placed at the approximate location of the release.	The contamination spread was located on the north and east sides of the 240-S-151 diversion box and the 240-S-302 catch tank, on the north side of the REDOX Facility (202-S).
83	UPR-200-W-97	UPR-200-W-97, transfer line leak, UN-216-W-5, UN-200-W-97	The site is located at the corner of 23rd Street and Camden Avenue. It is marked and posted as URM. The release site was stabilized with clean soil, sand, ureabore herbicide, and crushed rock.	The release occurred southeast of the T Tank Farm at the corner of 23rd Street and Camden Avenue.
84	UPR-200-W-98	UPR-200-W-98, UN-216-W-6, 221-T waste line break at R-19, UN-200-W-98	The area around door R-19 is paved with asphalt and posted as a URM area. The area is not specifically marked as an UPR site.	The release site is located near the southeast corner of the 221-T Canyon Building, at door R-19.
85	UPR-200-W-102	UPR-200-W-102, UN-216-W-12, UN-200-W-102, 224-T underground line leak	The east and south sides of the 224-T Building are covered with gravel. The area along the east side of the 224-T Building is posted as a URM area.	UPR-200-W-102 occurred adjacent to the south and east sides of the 224-T Building.
86	UPR-200-W-113	UPR-200-W-113, soil contamination east of 241-TX, UN-216-W-23, contamination areas around 241-TX-155 diversion box, UN-200-W-113	The original contaminated area was surface stabilized in 1990 and is surrounded with concrete marker posts and posted as a URM area. In 1998, 1999, and 2000, additional surface contamination was identified adjacent to the surface stabilized area and on the north, south, east, and west sides of the diversion boxes. CAs have also been identified on the surface of underground transfer lines associated with the 241-TX-155 diversion box. The additional CAs, also considered a part of this site, are marked with posts, chain, and CA and SCA signs. One small CA, southeast of 241-T (located on a transfer line to the diversion box) was recently stabilized with gravel and is now posted with URM signs.	The site is an area east of the TX Tank Farm, on the east side of Camden Avenue. Posted CAs are located west, south, north and east of the 241-TX-155 and 241-TX-152 diversion boxes.
87	UPR-200-W-114	UPR-200-W-114, UN-216-W-24, ground contamination east of 241-SX Tank Farm, UN-200-W-114	This site is no longer marked or posted. For many years, the release site had been a large area posted with a light chain barricade with "Surface Radiation Contamination" warning signs. The 216-S-8, 216-S-1, and 216-S-2 Cribs were located within the larger contamination zone. The surface contamination was scraped up and consolidated into other nearby waste sites. The other waste sites were individually surface stabilized and reposted with URM signs.	UPR-200-W-114 was located east of the SX Tank Farm.
88	UPR-200-W-115	UPR-200-W-115, UN-216-W-25, ground contamination above transfer line along Cooper Street	The site had been delineated with light chain barricade and "Surface Contamination" signs. A waste site inspection, made in February 1998, found the area has been covered with gravel and posted as an URM area.	UPR-200-W-115 is located above the encased transfer line that runs along the east side of Cooper Street. The pipeline extends between the 242-S evaporator facility and U Tank Farm.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
89	UPR-200-W-131	UPR-200-W-131, release from 241-TX-155	The 241-TX-155 diversion box and catch tank 241-TX-302B are surrounded with post-and-chain barricade and CA signs. Clean gravel has been placed around the diversion box and a sign has been added to the chain boundary identifying this to be the location of UPR-200-W-131.	The release occurred near the 241-TX-155 diversion box, located east of Camden Avenue and east of the TX Tank Farm.
90	UPR-200-W-135	UPR-200-W-135, release from 241-TX-155, UN-200-W-135	There are three major encased transfer lines associated with the 241-TX-155 diversion box. There have been many areas of contamination identified on these transfer lines during 1999, 2000, and 2001. This UPR is not separately marked or posted. UPR-200-W-113 is located on a transfer line directly west of the 241-TX-155 diversion box and is surrounded with concrete marker posts and URM signs.	The cave-in associated with UPR-200-W-135 was located approximately 46 m (150 ft) northwest of the 241-TX-155 diversion box. The diversion box is located east of Camden Avenue and east of the TX Tank Farm.
91	UPR-200-W-160	UPR-200-W-160, line break at 241-TX-302C, UPR-200-W-38, UPR-200-W-40, 216-T-30	The area around the 241-TX-154 diversion box has been stabilized with shotcrete. This UPR is a duplicate of UPR-200-W-40 and UPR-200-W-38. UPR-200-W-38 is the site that will remain.	The release location is the area around the 241-TX-154 diversion box and catch tank 241-TX-302, and between the 221-T Building and the 222-T Building, near section R-11 of 221-T.
92	UPR-200-W-161	UPR-200-W-161, UN-216-W-35, UN-200-W-161	The site is a large radiologically controlled area posted with URM signs.	The site is located east of U Tank Farm, on the east side of Camden Avenue. It extends northward from the corner of 16th Street and Camden Avenue and the 241-U-152 diversion box.
93	UPR-200-W-164	UPR-200-W-164, overhead UNH line leak, UN-216-W-29	The above ground UNH line has been removed. The "Radiation Area" signs that surrounded the pipeline were also removed. A portion of the site was interim stabilized in 1993. An area of contaminated soil found under the steam line, adjacent to the 216-S-9 Crib, was covered with clean soil and posted with URM signs.	UPR-200-W-164 affects the soil beneath the aboveground UNH pipeline that extended from 204-S to 224-U. The UNH line was attached to a steam line, located north of the 204-S Building.
94	UPR-200-W-167	UPR-200-W-167, contamination migration from 241-TY, UN-216-W-32	The original release site, identified in 1985, was a SCA located adjacent to the east side of the TY Tank Farm. After the contamination was scraped and removed in 1986, the site was no longer marked or posted. In 2000, three areas on the east and northeast sides of the TY Tank Farm (within the original boundaries of this UPR) were reposted as CAs. Contaminated anthills and growing contaminated vegetation was found on top of a tank farm transfer line located outside the eastern tank farm fence (also see WIDS site code 200-W-78). In November 2000, the contaminated areas were covered with bio-barrier material and gravel. These areas were reposted with URM signs. The underground radioactive pipeline is marked with posts and "Radioactive Pipeline" signs. The pipeline runs through the recently stabilized areas.	UPR-200-W-167 was located adjacent to the TY Tank Farm fence, extending east and north from the fence.

Table C-1. WIDS Process Pipelines, Diversion Boxes, and Associated Waste Sites Assigned to 200-IS-1 Operable Unit. (14 sheets)

Count	Code	Names	Description	Location Description
95	UPR-600-20	UPR-600-20, UN-216-E-41, cross-country transfer line contamination, cross-site transfer line	The underground transfer line extends from the U Plant in the 200 West Area to the 241-ER-151 diversion box in 200 East Area. The site includes the contaminated soil and vegetation located on the surface of the cross-site transfer line, as well as the pipeline itself. The surface of the underground line has been stabilized and is currently posted with URM signs. A large mound of soil, located south of the 241-EW-151 vent station, is associated with the original transfer line surface stabilization activities. The soil mound is posted with URM signs.	The site extends from the 241-ER-151 diversion box in the 200 East Area and to the 241-UX-154 diversion box in the 200 West Area. The majority of the transfer line is located in the 600 Area, between the 200 East and West Areas, south of Route 3. The pipeline is approximately 2.3 mi long.

Information for this table was obtained from the following sources:

ARH-780, *Chronological Record of Significant Events in Chemical Separations Operations.*
DOE/RL-92-05, Rev. 0, *B Plant Source Aggregate Area Management Study Report.*
HNF-SD-LL-SP-001, *200 and 600 Areas Sanitary Wastewater Master Plan.*
Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.
WAC 246-272, "Onsite Sewage Disposal."

CA = contamination area
HCA = high contamination area
IMUST = Inactive Miscellaneous Underground Storage Tank
PUREX = plutonium-uranium extraction
RCRA = *Resource Conservation and Recovery Act of 1976*
REDOX = reduction-oxidation
SCA = surface contamination area
TSD = treatment, storage, and disposal
UNH = uranyl nitrate hexahydrate
UPR = unplanned release
URM = underground radioactive material
WAC = *Washington Administrative Code*
WIDS = Waste Information Data System

Table C-2. WIDS Rejected and Proposed Rejected 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Not Considered in this Work Plan. (3 sheets)

Code	Names	Classification	Reclassification Status	Description	Location Description
UPR-200-E-25	UPR-200-E-25, contamination spread from the 241-A-151 diversion box, UN-200-E-25	Accepted	Proposed Reject (consolidate)	The release is not separately marked or posted. The area south of PUREX, inside the facility fence, had been posted as a CA. In 1999, the large posted CA was covered with clean backfill and changed to a URM area (200-E-103). It is possible that this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	The area of contamination extended southwest of PUREX, as far as 61 m (200 ft) beyond the 200 East Area fence.
UPR-200-E-26	UPR-200-E-26, 241-A-151 release, UN-200-E-26	Accepted	Proposed Reject (consolidate)	The release is not separately marked or posted. The area south of PUREX, inside the facility fence, had been posted as a CA. In 1999, the large posted CA on the south side of the PUREX Facility was covered with clean backfill and changed to a URM area (200-E-103). It is possible that this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	Contamination from this release spread southwest of the 241-A-151 diversion box, outside of the 200 East Area perimeter fence and across Route 4S.
UPR-200-E-31	UPR-200-E-31, 241-A-151 release, UN-200-E-31	Accepted	Proposed Reject (consolidate)	The release is not separately marked or posted. The area south of the PUREX Facility, inside the facility fence, had been posted as a CA. In 1999, the large posted CA, located on the south side of the PUREX Facility, was covered with clean backfill and changed to a URM Area (200-E-103). It is possible this release contributed to the contamination in the area. Proposed to consolidate with 200-E-103.	In 1961, the contamination spread from the 241-A-151 diversion box (located on the south side of 202-A), affected the PUREX exclusion area, areas northeast of PUREX and east of the 200 East Area fence.
UPR-200-E-41	UPR-200-E-41, UN-200-E-41 soil contamination in the vicinity of R-13 stairwell (221-B), UPR-200-E-85	Accepted	Proposed Rejected (consolidated)	This is a duplicate of the UPR-200-E-85 site.	The site is located in the vicinity of the R-13 stairwell at 221-B Building.
UPR-200-E-65	UPR-200-E-65, UN-216-E-65, 241-A-151 diversion box radioactive contamination, UN-200-E-65	Rejected		The release is not separately marked or posted. The area south of the PUREX Facility, including this release site, is posted as a URM (site 200-E-103).	The release occurred south of the 202-A Building (PUREX), inside the facility fence and around the 241-A-151 diversion box.

Table C-2. WIDS Rejected and Proposed Rejected 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Not Considered in this Work Plan. (3 sheets)

Code	Names	Classification	Reclassification Status	Description	Location Description
UPR-200-E-67	UPR-200-E-67, UN-216-E-67, excavation of radioactively contaminated pipe encasement, UN-200-E-67	Rejected (proposed)		The 1984 excavation has been backfilled. The site is no longer marked or posted.	This site was located in an excavation site, north of the 272-AW parking lot, near the corner of 4th Street and Canton Avenue.
UPR-200-E-117	UPR-200-E-117, contaminated liquid spill, UN-200-E-117	Accepted	Proposed Rejected (consolidated)	The release site is within a larger area, known as 200-E-103, which was surface stabilized in 1999 and should be consolidated.	The spill occurred on the south side of 202-A, west of the railroad tunnel.
UPR-200-W-21	UPR-200-W-21, UN-200-W-21, UN-216-W-36, process line cave-in at 241-TX-154 diversion box	Accepted	Proposed Reject (consolidate)	The release affected an area between 221-T and 222-T. This area is currently covered with shotcrete and posted with URM signs. Proposed to consolidate with UPR-200-W-38.	The release occurred at the 241-TX-154 diversion box, located east of the 221-T Building.
UPR-200-W-27	UPR-200-W-27, transfer line leak at 23rd and Camden, UN-200-W-27, UN-216-W-5, duplicate of UPR-200-W-29	Accepted	Rejected (consolidated)	This is a duplicate of UPR-200-W-29, which occurred on November 15, 1954, at the corner of 23rd Street and Camden Avenue. This site code is scheduled to be reclassified to be rejected.	The site is located at the southeast corner of the intersection of Camden Avenue and 23rd Street
UPR-200-W-40	UPR-200-W-40, line break near 241-TX-154, UPR-200-W-38, UPR-200-W-160, 216-T-30, UN-200-W-40	Rejected		This site code is recommended for deletion because it is a duplicate of UPR-200-W-38 and UPR-200-W-160. UPR-200-W-38 has been selected as the "surviving" site code for this incident.	The spill occurred in 200 West Area, southeast of the 221-T Building between the 241-TX-154 diversion box and the 241-TX-302C catch tank.

Table C-2. WIDS Rejected and Proposed Rejected 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Not Considered in this Work Plan. (3 sheets)

Code	Names	Classification	Reclassification Status	Description	Location Description
UPR-200-W-49	UPR-200-W-49, contamination southeast of 241-SX, UN-200-W-49	Accepted	Rejected (consolidated)	The SX Tank Farm is surrounded by a chain-link fence posted with various radiological warning signs. The unplanned release located outside the tank farm fence, as described in 1958, is not marked or posted.	In 1958, contamination from inside the SX Tank Farm was spread by the wind, causing an area of approximately 464.5 m^2 (5,000 ft^2) contaminating the area outside of the southeast corner of SX Tank Farm.
UPR-200-W-62	UPR-200-W-62, UN-200-W-62, line leak at 23rd and Camden, UN-216-W-5, duplicate of UPR-200-W-97	Accepted	Proposed Reject (duplicate)	The area has been stabilized with gravel. It is surrounded with URM signs. The site is a duplicate of UPR-200-W-97	The incident occurred at the corner of Camden Avenue and 23rd Street in the 200 West Area.
UPR-200-W-79	UPR-200-W-79, contamination spread at 241-Z, UN-200-W-79	Accepted	Rejected (consolidated)	Alpha contamination was spread inside and outside of the 241-Z sump radiation zone fence. The area was decontaminated and is no longer marked or posted. It occurred in the graveled and concrete area around the 241-Z Building.	The release occurred at the 241-Z area, south of the 234-5 Z Building, and inside the 234-5 Z exclusion fence.
UPR-200-W-115	UPR-200-W-115, UN-216-W-25, ground contamination above transfer line along Cooper Street	Rejected (proposed)		The site had been delineated with a light-duty chain barricade and SCA signs. A waste site inspection, made in February 1998, found that the area has been covered with gravel and posted as a URM area.	UPR-200-W-115 is located above the encased transfer line that runs along the east side of Cooper Street. The pipeline extends between the 242-S evaporator facility and the U Tank Farm.
UPR-200-W-160	UPR-200-W-160, line break at 241-TX-302C, UPR-200-W-38, UPR-200-W-40, 216-T-30	Rejected		The area around the 241-TX-154 diversion box has been stabilized with shotcrete. This UPR is a duplicate of UPR-200-W-40 and UPR-200-W-38. UPR-200-W-38 is the site that will remain.	The release location is the area around the 241-TX-154 diversion box and the 241-TX-302 catch tank, and between the 221-T and 222-T Buildings, near section R-11 of 221-T.

CA = contamination area
PUREX = plutonium-uranium extraction
SCA = surface contamination area
UPR = unplanned release
URM = underground radiation area
WIDS = Waste Information Data System

Table C-3. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Not Considered in this Work Plan. (2 sheets)

Code	Names	Classification	Description	Location Description	Reason for Exclusion
216-TY-201	216-TY-201, supernatant disposal flush tank, IMUST	Accepted	The 216-T-26, 216-T-27 and 216-T-28 Cribs and the 216-T-201 tank are enclosed in a common area with a steel post-and-chain barricade. The area is posted as URM. The 216-TY-201 flush tank is located in the northeast corner of the area. It has three risers protruding from a mound of earth. Tank 216-TY-201 is delineated with steel posts and chain and marked with IMUST signs.	The unit is located in the 200 West Area. It is east of Camden Avenue and south of 23rd Street.	Should be addressed with TW-1 and TW-1 OUs.
241-A-302B	241-A-302B, 241-A-302-B catch tank, IMUST	Accepted	The east slope of the A Tank Farm has been sprayed with shotcrete. The shotcrete surrounds the area where catch tank 241-A-302B is located. A riser and electrical box are visible. A staircase has been installed to provide access to the tank surface. The underground tank is positioned horizontally. The tank is marked and radiologically posted.	Catch tank 241-A-302B is buried outside the tank farm perimeter fence, east of the A Tank Farm, adjacent to Canton Avenue.	Included in WMA closure.
241-SX-302	241-SX-302, 241-SX-302 catch tank, SX-304, IMUST	Accepted	Catch tank 241-SX-302 is a stainless-steel cylinder buried in a horizontal position. Three yellow risers are visible on the surface. It is surrounded with post-and-chain barricade and marked with radiological and IMUST signs.	Catch tank 241-SX-302 is located east of tank 241-SX-101, inside the tank farm fence.	Included in WMA closure.
241-UX-154	241-UX-154, 241-UX-154 diversion box	Accepted	The diversion box is marked and radiologically posted. The unit is mostly below grade, constructed of reinforced concrete. Multiple, encased liquid waste transfer lines enter the box through its southeast wall.	The 241-UX-154 diversion box is located southeast of the 221-U Canyon Building.	To be addressed in UW-1 EE/CA for pipelines.
241-UX-302A	241-UX-302A, 241-U-302 catch tank, 241-UX-302 catch tank, 241-UX-302	Accepted	The catch tank is an underground tank. It is covered with gravel, marked, and radiologically posted.	The tank is located southeast of the 221-U Building and south of the 241-UX-154 diversion box.	To be addressed in UW-1 EE/CA for pipelines.
241-WR VAULT	241-WR vault, 241-WR vault (tanks -001 through -009), 241-WR-01 thru -09, 241-WR diversion station vault, 244-WR vault, 296-U-6 stack, IMUST	Accepted	The vault is a below grade, reinforced-concrete structure with nine compartments arranged in two rows with a 189,000-L (50,000-gal) tank in each compartment. A concrete wall separates the two rows of tanks. In addition to the tanks, the vault contains miscellaneous agitators, pumps, and valves. It is marked and posted with URM area signs. An exhaust stack just north of the vault is included in this site. See sub-site description.	This site is located northeast of the 221-U Building, west of Beloit Avenue.	Addressed in 200-UW-1

Table C-3. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Not Considered in this Work Plan. (2 sheets)

Code	Names	Classification	Description	Location Description	Reason for Exclusion
241-Z	241-Z, 241-Z treatment and storage tanks, 241-Z Tank Farm, 241-Z treatment and storage system, 241-Z-D-4, 241-Z-D-5, 241-Z-D-7, 241-Z-D-8, 241-Z sump, 241-Z tank pit	Accepted	Site consists of an above-ground, weather-protected area (metal building) containing controls and monitoring systems for the below-grade concrete vault containing four storage and treatment tanks. The operating capacity of the tank system is 65,000 L (17,000 gal). The site was activated on November 24, 1948. The RCRA TSD consists of the tanks (excluding D-6), internal piping, concrete vaults, ancillary equipment, and the soil directly below the tanks. Pipelines leading from buildings in 234-5 Z to the 241-Z Facility are not considered part of this site.	The site is located inside the Z Plant security fence, near the south end of the complex	In service supporting the PFP Nuclear Materials Stabilization Project and subsequent facility D&D until 2011.
600-269	600-269, cross-site transfer line replacement, new cross-site transfer line	Accepted	The site is an underground pipeline. It is marked on the surface with "Underground Radioactive Material – Pipeline" signs. An associated diversion box, diversion box 6241-A, is located east of Beloit Avenue in the 200 West Area. An associated vent station, vent station 6241-V, is located between 200 East and West Areas, northwest of the 241-EW-151 vent station.	The pipeline extends from the SY Tank Farm inside the 200 West Area to the 244-A lift station in 200 East Area. A large portion of the line is located between the 200 West and East Areas, south of Route 3.	Active cross-site transfer line.

The listing of waste sites is based on WIDS database report as of November 27, 2002.

D&D = decontamination and decommissioning
EE/CA = engineering evaluation/cost analysis
IMUST = Inactive Miscellaneous Underground Storage Tank
OU = operable unit
PFP = Plutonium Finishing Plant
RCRA = *Resource Conservation and Recovery Act of 1976*
TSD = treatment, storage, and disposal
URM = underground radioactive material
WIDS = Waste Information Data System
WMA = waste management area

Table C-4. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites with DOE-ORP Programmatic Responsibility Being Considered in This Work Plan. (4 sheets)

Code	Names	Classification	Previous Operable Unit
200-E-111	200-E-111, encased pipeline from 241-ER-151 diversion box to 241-C Tank Farm and 244-AR vault; 3-38 encasement	Accepted	N/A
200-E-116	200-E-116, pipelines from 241-B-154 diversion box to 241-C-151 and 241-C-152 diversion boxes	Accepted	N/A
200-W-7	200-W-7, 246-L, 241-S-TK-1, 243S-TK-1, 243-S-TK1, 200-W personnel decontamination facility catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	Accepted	200-UP-2
200-W-78	200-W-78; pipeline between 241-TX/TY and 241-T Tank Farms	Accepted	N/A
200-W-97	200-W-97, encased pipeline from 240-S-151 diversion box to 241-S-151 diversion box	Accepted	N/A
200-W-98	200-W-98, encased pipeline from 240-S-151 to 241-U-153 diversion box	Accepted	N/A
200-W-99	200-W-99, encased pipeline from 241-U-151 to 241-S-151 diversion boxes	Accepted	N/A
200-W-100	200-W-100, encased pipeline from 241-UX-154 to 241-SX-152 diversion box	Accepted	N/A
200-W-105	200-W-105, encased transfer line between 214-UX-154 diversion box and 241-TX Tank Farm.	Accepted	N/A
240-S-151	240-S-151, 240-S-151 diversion box	Accepted	200-RO-3
240-S-152	240-S-152, 240-S-152 diversion box	Accepted	200-RO-3
240-S-302	240-S-302, 240-S-302 catch tank, IMUST	Accepted	200-RO-3
241-A-151	241-A-151, 241-A-151 diversion box	Accepted	200-PO-2
241-A-302A	241-A-302A, 241-A-302-A catch tank	Accepted	200-PO-2
241-A-302B	241-A-302B, 241-A-302-B catch tank, IMUST	Accepted	200-PO-5
241-B-154	241-B-154, 241-B-154 diversion box	Accepted	200-BP-6
241-B-302B	241-B-302B, 241-B-302-B catch tank, 241-B-302, IMUST	Accepted	200-BP-6
241-BX-154	241-BX-154, 241-BX-154 diversion box	Accepted	200-BP-6
241-BX-155	241-BX-155, 241-BX-155 diversion box	Accepted	200-BP-6
241-BX-302B	241-BX-302B, 241-BX-302-B catch tank, IMUST	Accepted	200-BP-6
241-BX-302C	241-BX-302C, 241-BX-302-C catch tank, IMUST	Accepted	200-BP-6

Table C-4. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites with DOE-ORP Programmatic Responsibility Being Considered in This Work Plan. (4 sheets)

Code	Names	Classification	Previous Operable Unit
241-C-154	241-C-154, 241-C-154 diversion box	Accepted	200-SO-1
241-ER-151	241-ER-151, 241-ER-151 diversion box	Accepted	200-BP-9
241-ER-152	241-ER-152, 241-ER-152 diversion box	Accepted	200-BP-6
241-ER-311	241-ER-311, 241-ER-311 catch tank, 241-ER-311A replacement tank	Accepted	200-BP-9
241-ER-311A	241-ER-311A, 241-ER-311A catch tank, old 241-ER-311, original 241-ER-311 catch tank, IMUST	Accepted	200-BP-9
241-EW-151	241-EW-151, 241-EW-151 vent station catch tank, 241-EW-151 vent station, vent station, 200 Area East/West vent station	Accepted	200-IU-5
241-SX-302	241-SX-302, 241-SX-302 catch tank, SX-304, IMUST	Accepted	200-RO-2
241-TX-152	241-TX-152, 241-TX-152 diversion box	Accepted	200-TP-2
241-TX-154	241-TX-154, 241-TX-154 diversion box	Accepted	200-TP-4
241-TX-155	241-TX-155, 241-TX-155 diversion box	Accepted	200-TP-2
241-TX-302B	241-TX-302B, 241-TX-302-B catch tank, IMUST	Accepted	200-TP-2
241-TX-302BR	241-TX-302BR, 241-TX-302BR catch tank, 241-TXR-302BR, IMUST	Accepted	200-TP-2
241-TX-302C	241-TX-302C, 241-TX-302-C catch tank	Accepted	200-TP-4
241-U-151	241-U-151, 241-U-151 diversion box	Accepted	200-UP-2
241-U-152	241-U-152, 241-U-152 diversion box	Accepted	200-UP-2
241-UX-154	241-UX-154, 241-UX-154 diversion box	Accepted	200-UP-2
241-UX-302A	241-UX-302A, 241-U-302 catch tank, 241-UX-302 catch tank, 241-UX-302	Accepted	200-UP-2
600-269	600-269, cross-site transfer line replacement, new cross-site transfer line	Accepted	N/A
UPR-200-E-25	UPR-200-E-25, contamination spread from the 241-A-151 diversion box, UN-200-E-25	Accepted	200-PO-2
UPR-200-E-26	UPR-200-E-26, 241-A-151 release, UN-200-E-26	Accepted	200-PO-2
UPR-200-E-31	UPR-200-E-31, 241-A-151 release, UN-200-E-31	Accepted	200-PO-2
UPR-200-E-42	UPR-200-E-42, 241-AX-151 release, UN-200-E-42	Accepted	200-PO-2

Table C-4. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites with DOE-ORP Programmatic Responsibility Being Considered in This Work Plan. (4 sheets)

Code	Names	Classification	Previous Operable Unit
UPR-200-E-45	UPR-200-E-45, UN-200-E-45, contamination spread from the 241-B-154 diversion box	Accepted	200-BP-6
UPR-200-E-77	UPR-200-E-77, UN-216-E-5, 241-B-154 diversion box ground contamination, UN-200-E-77	Accepted	200-BP-6
UPR-200-E-78	UPR-200-E-78, UN-216-E-6, 241-BX-155 diversion box ground contamination, UN-200-E-78	Accepted	200-BP-6
UPR-200-E-84	UPR-200-E-84,241-ER-151 catch tank leak, UN-200-E-84, UN-216-E-12	Accepted	200-BP-9
UPR-200-W-5	UPR-200-W-5, overflow at 241-TX-155, UN-200-W-5	Accepted	200-TP-2
UPR-200-W-6	UPR-200-W-6, UN-200-W-6, contamination spread from 241-U-151 and 241-U-152 diversion boxes	Accepted	200-UP-2
UPR-200-W-21	UPR-200-W-21, UN-200-W-21, UN-216-W-36, process line cave-in at 241-TX-154 diversion box	Accepted	200-TP-4
UPR-200-W-27	UPR-200-W-27, transfer line leak at 23rd Street and Camden Avenue, UN-200-W-27, UN-216-W-5, duplicate of UPR-200-W-29	Accepted	200-TP-4
UPR-200-W-28	UPR-200-W-28, release from 241-TX-155 diversion box, UN-200-W-28	Accepted	200-TP-2
UPR-200-W-29	UPR-200-W-29, transfer line leak, UN-200-W-29, UPR-200-W-27, UN-200-W-27, UN-216-W-5, 23rd Street and Camden Avenue line break	Accepted	200-TP-2
UPR-200-W-38	UPR-200-W-38, line break at 241-TX-302C, UPR-200-W-160, UPR-200-W-40, UN-200-W-38, 216-T-30	Accepted	200-TP-4
UPR-200-W-40	UPR-200-W-40, line break near 241-TX-154, UPR-200-W-38, UPR-200-W-160, 216-T-30, UN-200-W-40,	Rejected	200-TP-4
UPR-200-W-49	UPR-200-W-49, contamination southeast of 241-SX, UN-200-W-49	Accepted	200-RO-2
UPR-200-W-62	UPR-200-W-62, UN-200-W-62, line leak at 23rd Avenue and Camden Avenue, UN-216-W-5, duplicate of UPR-200-W-97	Proposed Rejected (duplicate)	200-TP-6
UPR-200-W-64	UPR-200-W-64, road contamination at 23rd Avenue and Camden Avenue, UN-200-W-64	Accepted	200-TP-2
UPR-200-W-82	UPR-200-W-82, contamination spread at 240-S-151	Accepted	200-RO-4
UPR-200-W-97	UPR-200-W-97, transfer line leak, UN-216-W-5, UN-200-W-97	Accepted	200-TP-2
UPR-200-W-113	UPR-200-W-113, soil contamination east of 241-TX, UN-216-W-23, contamination areas around 241-TX-155 diversion box, UN-200-W-113	Accepted	200-TP-2

Table C-4. WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites with DOE-ORP Programmatic Responsibility Being Considered in This Work Plan. (4 sheets)

Code	Names	Classification	Previous Operable Unit
UPR-200-W-115	UPR-200-W-115, UN-216-W-25, ground contamination above transfer line along Cooper Street	Rejected (Proposed)	200-UP-2
UPR-200-W-131	UPR-200-W-131, release from 241-TX-155	Accepted	200-TP-2
UPR-200-W-135	UPR-200-W-135, release from 241-TX-155, UN-200-W-135	Accepted	200-TP-2
UPR-200-W-160	UPR-200-W-160, line break at 241-TX-302C, UPR-200-W-38, UPR-200-W-40, 216-T-30	Rejected (Proposed)	200-TP-4
UPR-200-W-161	UPR-200-W-161, UN-216-W-35, UN-200-W-161	Accepted	200-UP-2
UPR-200-W-167	UPR-200-W-167, contamination migration from 241-TY, UN-216-W-32	Accepted	200-TP-2
UPR-600-20	UPR-600-20, UN-216-E-41, cross-country transfer line contamination, cross-site transfer line	Accepted	200-IU-5

Information for this table was taken from the following sources: *Hanford Site Dangerous Waste Part A Permit for Single-Shell Tanks*, and *Resource Conservation and Recovery Act of 1976*.

IMUST = Inactive Miscellaneous Underground Storage Tank
N/A = not available
ORP = U.S. Department of Energy, Office of River Protection
UPR = unplanned release
WIDS = Waste Information Data System

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
1	200-E-111	200-E-111, encased pipeline from 241-ER-151 diversion box to 241-C Tank Farm and 244-AR vault, 3-38 encasement	The encased pipeline runs eastward from the 241-ER-151 diversion box, south of 7th Street, and branches off in two directions (forming a "Y") at a point southeast of the 216-C-10 Crib. From the "Y," it branches to the 241-C Tank Farm and the 244-AR vault.		Waste transfer encasement connected to the 241-ER-151 diversion box, 241-ER-152 diversion box, 241-C Tank Farm and the 244-AR vault. UPR-200-E-86 is associated with this pipeline.				The site is an underground piping encasement that contains three 7.5-cm (3 in.)-diameter, stainless-steel waste transfer pipelines, numbered "V108," "8618," and "8653," which run from the 241-ER-151 diversion box through a "Y," which branches to the 241-C Tank Farm and the 244-AR vault. The section from the "Y" junction to the 244-AR vault contains two 7.5-cm (3-in.) pipelines numbered "809" and "818." There is a posted CA on top of the line at the "Y" junction where the line branches to the 241-C Tank Farm and the 244-AR vault. The entire length of the pipeline is marked with steel fence posts and posted as a URM area. The ground surface above the pipeline is bare in spots; other sections are vegetated with crested wheatgrass, tumbleweeds, and native grass species.
2	200-E-116	200-E-116, pipelines from 241-B-154 diversion box to 241-C-151 and 241-C-152 diversion boxes, encased pipeline	The site is located north of and runs parallel to 7th Street, between B Plant and the 241-C Tank Farm in 200 East Area.		B Plant, 241-B-154 diversion box, 241-C-151 diversion box, 241-C-152 diversion box, and 241-C Tank Farm. Also UPR-200-E-82.	Radioactive mixed waste. In September 2000, contamination levels to 50,000 cpm.			The pipeline is posted as "Underground Radioactive Pipeline," which extends from the 241-B-154 diversion box to the 241-C-151 and 241-C-152 diversion boxes. Vegetation over the pipeline has been crushed due to vehicle traffic. An area located just north of the 241-B-154 diversion box was posted as an HCA in September 2000, but was covered with a bio-barrier and gravel in February 2001. It is now a rectangular posted URM area over a portion of the pipeline. Another area of contamination was found on this pipeline in June 2001. This area was covered with gravel and posted as a URM in August 2001.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
3	200-W-7	200-W-7, 246-L, 241-S-TK-1, 243S-TK-1, 243-S-TK1, 200-W personnel decontamination facility catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	The site is located northwest of 242-S evaporator and just north of the MO-326 trailer.	1978 to 1988	Associated with the MO-0326 trailer. It was the personnel decontamination facility for the 200 West Tank Farms.				The underground tank is inside a chained area that measures approximately 3 m by 3 m (9 ft by 9 ft), with three risers extending to the surface. The tank is posted with IMUST signs and radiological postings.
4	200-W-16	200-W-16, 292-T underground tanks, IMUST, Inactive Miscellaneous Underground Storage Tank, 292-TK-1, 292-TK-2	The underground tanks are near the southeast corner of the 292-T Building addition. The 292-T Building is south of the 291-T stack and north of the 222-T Building.	1944 to 1970	T Plant	Unknown quantity of material placed into tanks.	N/A	0.9 m by 0.6 m (3 ft by 2 ft)	Two metal risers. Two metal riser pipes extend about 0.5 m (1.5 ft) above grade near the southeast corner of the 292-T Building addition. Both are capped, and one appears to have a pressure relief vent. These pipes extend from two buried tanks (292-TK-1 and 292-TK-2). A chain-link fence encloses the area where the tanks are located. The fence is posted with "Access Restricted" signs. The site is within a chained area posted as a CA.
5	200-W-58	200-W-58, Z Plant diversion box #1	Z Plant diversion box #1 is located south of 234-5 Z, in between the two fences that make up the double Z Plant exclusion area. It is directly south of the 361-Z settling tank.	Unknown	The diversion box directed the flow of Z Plant process waste to cribs and tile fields located south of the Z Plant complex.	N/A	2.8 m (9.2 ft)	2.1 m by 2.1 m (6.9 ft by 6.9 ft)	The concrete lid of the diversion box is visible above ground. The Z Plant fenced exclusion area is covered with gravel. The diversion box is buried to a depth of 2.7 m (9 ft) with its upper surface (a thick concrete lid) being slightly above ground level.
6	200-W-59	200-W-59, Z Plant diversion box #2	Z Plant diversion box 2 is located southwest of the 234-5Z Building, between the two fences that make up the double Z Plant exclusion area. It is west of the 216-Z-361 settling tank and directly north of the 216-Z-12 Crib.	N/A	Z Plant. This diversion box directed the flow of process waste via the 241-Z-361 settling tank to the 216-Z-12 Crib.	N/A	5.2 m (17 ft)	2.1 m by 2.1 m (6.9 ft by 6.9 ft)	The diversion box is buried with its concrete lid slightly above ground level. The Z Plant fenced exclusion area is covered with gravel.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
7	200-W-78	200-W-78, pipeline between 241-TX/TY and 241-T Tank Farms, encased pipeline	The underground line is located in 200 West Area between the 241-Tand 241-TX/TY Tank Farms, on the west side of Camden Avenue.		Associated with 241-T and 241-TX Tank Farms. UPR-200-W-167 was also located in the vicinity of this pipeline.	Evidence of contaminated biological intrusion above the line. Difficult to determine which line is the source of the contamination.		3 m by 14 m	The site is an encased, underground pipeline that runs between the 241-TXR-151 diversion box (in the 241-TX Tank Farm) and the 241-TR-153 diversion box (in the 241-T Tank Farm). Outside the tank farm fence, the line is marked with "Radioactive Pipeline" signs. There are several stabilized, individually radiologically posted areas on top of (or adjacent to) this pipeline, near the east side of the 241-TY Tank Farm perimeter fence.
8	200-W-97	200-W-97, encased pipeline from 240-S-151 diversion box to 241-S-151 diversion box	The pipeline extends northwest from the REDOX facility to the 241-S/SX Tank Farm.		Associated with 202-S, 203-S, 204-S and 205-S and the 241-S-151 diversion box.	SCA located on the underground pipeline.		2.4 m by 2.4 m (8 ft by 8 ft)	The site is an underground, concrete encased pipeline. The surface is marked with "Underground Radioactive Material – Pipeline" signs. Yellow swab risers are located along the pipeline. One swab riser, near the 204-S Facility, has been surrounded with post-and-chain barricade and posted with SCA signs.
9	200-W-98	200-W-98, encased pipeline from 240-S-151 to 241-U-153 diversion box	The pipeline is located south of 16th Street, extending in a southeast direction from the 241-U-153 diversion box to 204-S and the REDOX Facility.		Associated with the 204-S Facility and the 241-U-153 diversion box.				The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs.
10	200-W-99	200-W-99, encased pipeline from 241-U-151 to 241-S-151 diversion boxes	The pipeline is located south of 16th Street, extending from the 241-U-151 diversion box to the 241-S-151 diversion box.						The site is a cement encased, underground pipeline. The pipeline is marked with Underground Radioactive Material - Pipeline signs
11	200-W-100	200-W-100, encased pipeline from 241-UX-154 to 241-SX-152 diversion box	The pipeline begins on the east side of the 221-U Building and extends in a southwest direction to terminate at the 241-SX-152 diversion box, located on the east side of 241-S/SX Tank Farm.						The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
12	200-W-105	200-W-105, encased transfer line between 241-UX-154 diversion box and 241-TX Tank Farm	The pipeline begins on the east side of the 221-U Building and extends in a northwest direction to terminate at the 241-TX-155 diversion box. The line continues through the diversion box to the 241-TX Tank Farm.		The encasement includes tank farm lines V-375, V-382, 4859/4703.				The site is a cement encased, underground pipeline. The pipeline is marked with "Underground Radioactive Material – Pipeline" signs.
13	200-W-125	200-W-125, 216-Z-1 ditch replacement pipeline	The pipeline extends east from the 231-Z Building and turns south to connect with the head end of the 216-Z-11 ditch.		Site associated with 216-Z-1 ditch, 216-Z-11 ditch, and 231-Z Building.				The site is an underground buried pipeline. The pipeline is an 18-in.-diameter vitrified clay pipe.
14	240-S-151	240-S-151, 240-S-151 diversion box	The 240-S-151 diversion box is located north of the 202-S Canyon Building.	1950 to 1987	Associated with 240-S-302 catch tank, UPR-200-W-82, and 241-S Tank Farm.				This unit is constructed of reinforced concrete and is rectangular in shape. The 240-S-151 diversion box has been weather covered.
15	240-S-152	240-S-152, 240-S-152 diversion box	The 240-S-152 diversion box is located north of the 202-S Canyon Building.	1977 to 1980	Associated with 240-S-302 catch tank and 241-S Tank Farm.				This unit is constructed of reinforced concrete and is rectangular in shape. The 240-S-152 diversion box has been weather covered.
16	240-S-302	240-S-302, 240-S-302 catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	This unit is located north of the 202-S Building and east of the 240-S-151 diversion box.	1950 to 1987	Associated with the 240-S-151 diversion box.	Tank received leakage, spillage, line flushes, and drainage associated with waste transfers. In 1985, the tank was confirmed to be a leaker. Approximately 600 gal of rainwater were released between June 1985 and January 1986.			This unit is a horizontal, cylindrical, steel tank. The 240-S-302 catch tank is buried underground to provide shielding from radiation. The tank is surrounded with post-and-chain barricade and posted with radiological and IMUST signs.
17	241-A-151	241-A-151, 241-A-151 diversion box	The diversion box is located south of the east end of the 202-A Building.	1956 to ?	Associated with 241-A-302-A catch tank, 241-A and 241-AX Tank Farms, UPR-200-E-25, UPR-200-E-26, and UPR-200-E-65.	Multiple unplanned releases. Highly concentrated process wastes have contaminated the inside of the diversion box.			The site is a reinforced concrete structure with cover blocks. Most of the structure is below grade. It is marked and radiologically posted.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
18	241-A-302A	241-A-302A, 241-A-302-A catch tank	The catch tank is located south of the east end of the 202-A Building and west of the 241-A-151 diversion box. It is located inside the PUREX security fence.	1956 to ?	Associated with the 241-A-151 diversion box.				The unit is an underground, cylindrical vessel made of carbon steel. It sits inside a pump pit with a riser extending to the surface. It is surrounded with post-and-chain barricade and marked with radiological signs.
19	241-B-154	241-B-154, 241-B-154 diversion box	The unit is located east of 221-B, at the intersection of Baltimore Avenue and 7th Street.	1945 to 1984	Associated with B Plant, 241-B-302 catch tank, 241-B-151, 241-B-152, 200-E-116, UPR-200-E-45 and UPR-200-E-77.				The site is a diversion box that interconnects diversion boxes 241-B-151 and 241-B-152 with the 221-B Building. The unit is a rectangular, reinforced-concrete structure sprayed with gray weatherizing foam. A layer of shotcrete was placed over the diversion box, extending beyond the structure to include the surrounding ground surface.
20	241-B-302B	241-B-302B, 241-B-302-B catch tank, 241-B-302, IMUST, Inactive Miscellaneous Underground Storage Tank	This catch tank is located north of the 241-B-154 diversion box, adjacent to the corner of 7th Street and Baltimore Avenue.	1945 to 1985	This catch tank is associated with 241-B Tank Farm and 241-B-154 diversion box.				This unit is an underground, horizontal carbon-steel tank. The catch tank and the 241-B-154 diversion box are surrounded with post-and-chain barricade. The surface of the area inside the chain has been covered with gravel and sprayed with gray weatherizing material. The site is marked with radiological and IMUST signs.
21	241-BX-154	241-BX-154, 241-BX-154 diversion box	This diversion box is located south of the 221-B Building and east of the 241-BX-302B catch tank.	1948 to 1985	Associated with the 241-BX-302-B catch tank and the 241-BX Tank Farm, it interconnects 241-B-252 and 241-BX-155 diversion boxes and the 221-B Building.				This diversion box is a reinforced-concrete structure.
22	241-BX-155	241-BX-155, 241-BX-155 diversion box	This diversion box is located northeast of B Plant on the south side of Atlanta Avenue.	1948 to 1984	Associated with the 241-BX-302-C catch tank and the 241-BX Tank Farm.				This diversion box is a reinforced-concrete structure. The diversion box has been isolated and covered with waterproof foam sealant. The area around the diversion box has been surface stabilized with gravel and posted with URM signs, except for the surface area above the 241-B-302-C tank. This area does not have the additional layer of gravel and remains posted as a CA.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
23	241-BX-302B	241-BX-302B, 241-BX-302-B catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	The 241-B-302B catch tank is located on the south side of the 221-B Building (near Section 12), and northwest of 241-BX-154 diversion box.	1948 to 1985	Associated with 241-BX-154 diversion box and 241-BX Tank Farm.				The buried tank is covered with gravel. It is surrounded with post-and-chain barricade. The tank is marked with radiological and IMUST signs.
24	241-BX-302C	241-BX-302C, 241-BX-302-C catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	The 241-BX-302C catch tank is located southeast of 241-BX -155 diversion box, between Atlanta Avenue and Baltimore Avenue.	1948 to 1985	Associated with the 241-BX-155 diversion box and 241-BX Tank Farm.				This catch tank is a horizontal cylinder of direct buried carbon steel. It is inside a recently graveled URM area, related to the 241-BX-155 diversion box surface stabilization. The tank was not covered with extra gravel and is separately posted as a CA. The tank is marked with radiological and IMUST signs.
25	241-C-154	241-C-154, 241-C-154 diversion box	The diversion box is located south of 7th Street, southeast of the (demolished) 201-C Building and northeast of the 216-C-1 Crib.	1946 to 1985	Associated with the 201-C C cell, the B Plant promethium transfer line (line V743) and 200-E-41 stabilized area.				The diversion box has been covered with clean backfill material (ash) and is no longer visible. It is located within the larger Hot Semi-Works surface stabilized area (200-E-41).
26	241-ER-151	241-ER-151, 241-ER-151 diversion box	The site is located southwest of the B Plant and near the corner of 7th Street and Atlanta Avenue.	1945 to ?	Associated with 241-ER-311 catch tank, cross-site transfer line, 241-EW-151 vent station, 241-BX double-contained receiver tank, 241-ER-152, 241-ER-153, and 241-UX-154 diversion boxes and 241-ER-311 catch tank.				The diversion box is located inside a locked chain-link fence. The fence is posted with "Caution - Contact Radiological Control and Tank Farm Shift Office Prior to Entry" signs. The diversion box is surrounded with a metal safety barricade.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
27	241-ER-152	241-ER-152, 241-ER-152 diversion box	This 241-ER-152 diversion box is southeast of the 224-B Building, and east of 241-ER-151 diversion box, near the corner of Atlanta Avenue and 7th Street.	1945 to ?	Associated with 241-ER-151 and 241-ER-153 diversion boxes, 241-ER-311 catch tank and transfer lines, and with stabilized contamination know as 200-E-29.	In 1996, contamination spread over an area measuring approximately 0.5 ha (1.2 ac).			Most of the reinforced-concrete diversion box structure is underground. The floor and lower portions of the walls are lined with stainless steel. Cover blocks with lifting hooks are visible from the surface. The 241-ER-152 diversion box is surrounded with radiation rope and CA signs.
28	241-ER-311	241-ER-311, 241-ER-311 catch tank, 241-ER-311A replacement tank	The tank is located south of the B Plant, and west of Atlanta Avenue, inside the 241-ER-151 diversion box fence.	1954 to 1991	Associated with 241-ER-311A catch tank, 241-ER-151, 241-ER-152, and 241-ER-153 diversion boxes, automatic liquid level sensors, leak detection, and a submersible pump.				The underground tank is located inside the 241-ER-151 locked chain-link fence. The fence is posted as a CA and URM area, and is labeled with IMUST signs. The placement of these structures within the fence is the 241-ER-311 catch tank is the furthest south, nearest the chain-link fence. The 241-ER-311A catch tank is located adjacent to the north side of the 241-ER-311 tank (in the middle of the three structures). The 241-ER-151 diversion box is north of the 241-ER-311A catch tank.
29	241-ER-311A	241-ER-311A, 241-ER-311A catch tank, old 241-ER-311, original 241-ER-311 catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	This unit is below grade. The tank is located southwest of the B Plant. It is south of 7th Street and west of Atlanta Avenue.	1950 to 1954	Associated with the 241-ER-151 diversion box.				It is located within a chain-link fence that is posted as a CA and URM area and is labeled with IMUST signs. The 241-ER-151 diversion box, the 241-ER-311 catch tank, and the 241-ER-311A catch tank are all located inside this chain-link fence. The placement of these structures within the fence is the 241-ER-311 catch tank is the furthest south, nearest to the chain-link fence. The 241-ER-311A catch tank is located adjacent to the north side of the 241-ER-311 tank (in the middle of the three structures). The 241-ER-151 diversion box is north of the 241-ER-311A catch tank.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
30	241-EW-151	241-EW-151, 241-EW-151 vent station catch tank, 241-EW-151 vent station, vent station, 200 Area East/West vent station	The site is located south of Route 3, approximately halfway between the 200 East and West Areas. It is south of the 609-A Fire Station.	1955 to ?	Part of cross-site waste transfer system & assoc. with UPR-600-20, diversion boxes 241-UX-154 (200 West Area) and 241-ER-151 (200 East Area). The vent station is associated with cross-site transfer line between diversion boxes 241-UX-154 and 241-ER-151.				The vent station is enclosed in a locked, chain-link fence. It consists of an underground concrete structure containing a stainless-steel tank in a vault with a jumper pit above the tank. The tank has two vent risers that extend above grade and a riser for the unit's leak detection system. At the bottom of the stairwell access is a floor drain that connects to a nearby french drain. Several hazard and radiological warning signs are posted on the fence. There are also two areas, outside the fence, adjacent to the northeast side of the vent station that are posted with URM signs.
31	241-TX-152	241-TX-152, 241-TX-152 diversion box	This unit is located east of the 241-TX Tank Farm. It is east of Camden Avenue and south of 23rd Street. It is north of the 200 West Area Powerhouse pond.	1949 to ?	Associated with T Plant, 241-SY Tank Farm, UPR-200-W-113, and 241-TX-154 diversion box.				The diversion box is a rectangular reinforced-concrete structure. Most of the structure is below ground. A few inches of the structure that extends above ground is covered with a gray weather coating. It is surrounded with light post-and-chain barricade and is posted with various radiological postings.
32	241-TX-154	241-TX-154, 241-TX-154 diversion box	This unit is located on the east side of the 221-T Building.	1949 to ?	Associated with T Plant operations, 241-TX-152 diversion box, 241-TX-302C catch tank, 241-SY Tank Farm, UPR-200-W-21, UPR-200-W-40, UPR-200-W-38, and UPR-200-W-160.				The diversion box is a rectangular reinforced-concrete structure. Most of the structure is below ground. The diversion box is surrounded with post-and-chain barricade. It is labeled and radiologically posted. The adjacent area has been covered with shotcrete.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
33	241-TX-155	241-TX-155, 241-TX-155 diversion box	This unit is located east of the 241-TX Tank Farm, south of 23rd Street and north of the 200 West Area Powerhouse pond.	1949 to 1980	Associated with 241-TX-302B and 241-TX-302BR catch tanks, 241-T, 241-TX, and 241-TY Tank Farms, UPR-200-W-113, UPR-200-W-5, UPR-200-W-28, and UPR-200-W-76.	Multiple releases documented, including contaminated nitric acid solution in 1952 and a contaminated area measuring 9 m by 30.5 m in 1954.			The diversion box is a rectangular reinforced-concrete structure. Most of the structure is below ground. A few inches of the structure that extends above ground is covered with a gray weather coating. It is surrounded with light post-and-chain barricade and CA signs.
34	241-TX-302B	241-TX-302B, 241-TX-302-B catch tank, IMUST, Inactive Miscellaneous Underground Storage Tank	This tank is located east of the 241-TX Tank Farm, northeast of the 241-TX-155 diversion box.	1949 to 1982	Associated with the 241-TX-155 diversion box, 241-TX-302BR catch tank, and UPR-200-W-131.				This unit is an underground, cylindrical tank made of steel. The ground surface around the tank has been covered with gravel. The tank is surrounded with light post-and-chain barricade and posted with CA and IMUST signs.
35	241-TX-302BR	241-TX-302BR, 241-TX-302BR catch tank, 241-TXR-302BR, IMUST, Inactive Miscellaneous Underground Storage Tank	The 241-TX-302BR catch tank is located east of the 241-TX-155 diversion box. It is located east of Camden Avenue and south of 23rd Street.	1950 to 1954	Associated with UPR-200-W-131, 241-TX-155 diversion box, 241-TX-302B catch tank, and 216-T-20 acid pit.				This unit is an underground, horizontal, cylindrical tank made of steel. The ground surface around the tank has been covered with gravel. The tank is surrounded with post-and-chain barricade and labeled with IMUST signs.
36	241-TX-302C	241-TX-302C, 241-TX-302-C catch tank	The 241-TX-302 catch tank is located southeast of the center of the 221-T Building.	1949 to ?	Associated with 241-TX-154 diversion box and UPR-200-W-38				This unit is an underground horizontal, cylindrical tank made of carbon steel. The tank area has been sprayed with shotcrete to control surface contamination
37	241-U-151	241-U-151, 241-U-151 diversion box	The 241-U-151 diversion box is located northeast of the intersection of Camden Avenue and 16th Street, east of the 241-U Tank Farm.	1946 to ?	Associated with 241-U-301 catch tank, 244-S and 244-TX double-contained receiver tanks and with diversion boxes 241-U-152, 241-TX-152, and UPR-200-W-6.				The diversion box is marked and radiologically posted. This unit is constructed of reinforced concrete with multiple, encased liquid waste transfer lines. The diversion box structure is mostly below ground. It has three layers of cover blocks.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
38	241-U-152	241-U-152, 241-U-152 diversion box	The 241-U-152 diversion box is located northeast of the intersection at Camden Avenue and 16th Street, east of the 241-U Tank Farm.	1946 to ?	Associated with 241-U-301 catch tank, 241-U-153 diversion box, and UPR-200-W-6.				The diversion box is marked and radiologically posted. The unit is constructed of reinforced concrete with multiple, encased liquid waste transfer lines. The diversion box structure is mostly below ground. It has three layers of cover blocks.
39	HSVP	HSVP, Hot Semi-Works valve pit, 201-C diversion box, Semi-Works valve pit	This valve pit is adjacent to the remains of the 201-C Building and southeast of the main canyon area. It is located within the 200-E-41 surface stabilized area.	1952 to 1963	201-C Facility	N/A	N/A	N/A	This site is a sealed, concrete-filled, vertically configured, stainless-steel cylinder buried beneath the asphalt barrier that was placed over the decommissioned 201-C Process Building. The surface stabilized area is posted with URM signs. The valve pit is not marked or posted separately.
40	UPR-200-E-1	UPR-200-E-1, waste line failure on south side of 221-B	The release occurred on the south side of the 221-B Building.	The release occurred in September 1946	B Plant	The original line break was waste from the metal waste line.	N/A	N/A	ARH-780 documents an underground waste line leak that occurred June 17, 1946 (UPR-200-E-80). In September 1946, additional contamination was found 24 m (80 ft) from the June 1946 leak location. The second contaminated area (documented in a September monthly report dated October 14, 1946) was assumed to migration from the leak reported in June 1946.
41	UPR-200-E-3	UPR-200-E-3, Line leak from 221-B to 241-BX-154, UN-200-E-3	The release occurred on the south side of 221-B, between the 221-B Building and 241-BX-154.	The exact date of the occurrence is unknown	B Plant	The release consisted of B Plant first cycle waste.	N/A	N/A	A failure of first cycle waste line from the 221-B building to 241-BX-154 diversion box was identified. Efforts to excavate and inspect for the cause were abandoned when readings of 120 rad/hr were found with 46 cm (18 in.) of soil still remaining over the pipe. The exact date of the occurrence in unknown, but the reference document, HW-22610, was written in November 1951.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
42	UPR-200-E-42	UPR-200-E-42, 241-AX-151 release, UN-200-E-42	The 241-AX-151 diversion box is located near the corner of 4th Street and Buffalo Avenue, adjacent to the 204-AR unloading station. The unplanned release site included a dirt bank east of the 241-AX-151 diversion box and weeds east of the established parking lot.	1972 to ?	Release associated with 241-AX-151 and 244-AR.	In 1972, contamination of to 300 mrad/hr with spots to 20 rad/hr. The blacktop east of the diversion box was contaminated up to 3,000 cpm. The dirt bank had contamination up to 2,000 cpm and weeds contaminated 300 to 800 cpm.			A WIDS sign has been placed near the diversion box structure to document the release.
43	UPR-200-E-44	UPR-200-E-44, UN-200-E-44, BCS waste line leak south of 221-B	The unplanned release occurred south of 221-B, near the R-17 change house, north of 7th Street. The change house no longer exists.	The release occurred in August 1972	B Plant	N/A	N/A	0.30 m (1.00 ft) in diameter	A small cave-in was discovered south of the R-17 change house, next to 7th Street. No radiological reading was identified in the cave-in at the time of discovery. An excavation was performed after that identified a leak in the 15 cm (6 in.) crib line. Soil removed from the excavation was contaminated from 10,000 to 20,000 cpm. The dose rate on the pipe was 20 mrad/hr. No contamination spread beyond the excavation.
44	UPR-200-E-45	UPR-200-E-45, UN-200-E-45, contamination spread from the 241-B-154 diversion box	The 241-B-154 diversion box is located at the corner of 7th Street and Baltimore Avenue. The release involved loose contamination spreading in a southeasterly direction from the 241-B-154 diversion box.	1974	Release related to the 241-B-154 diversion box and UPR-200-E-77.	Contamination ranged from 1,000 to 40,000 cpm.		Approximately 91.5 m (300 ft) by 30.5 m (100 ft)	A large area on the northeast corner of 7th Street and Baltimore Avenue is surrounded with post-and-chain barricade and marked as a URM area. The URM surrounds the 241-B-154 diversion box, which has been covered with a coating of gray grout. The original Unplanned Release is not separately marked or posted.

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45	UPR-200-E-77	UPR-200-E-77, UN-216-E-5, 241-B-154 diversion box ground contamination, UN-200-E-77	This site is located east of 221-B Building, at the northeast corner of Baltimore Avenue and 7th Street. It surrounds the 241-B-154 diversion box.	1946 to	Site associated with the 241-B-154 diversion box.	Metal waste solution.			A large graveled area on the northeast corner of 7th Street and Baltimore Avenue is surrounded with post-and-chain barricade and marked as a URM area. The URM surrounds the 241-B-154 diversion box, which has been covered with a coating of gray grout. The area appears to have been posted in stages. A large, posted, oval area (URM) extends north and east from the diversion box. Another posted area (URM) extends west to Baltimore Avenue and turns northward. In January 2000, a separate CA was posted around a power pole (adjacent to a manhole) within the larger URM. In 2002, the posting around the power pole was removed and a "Fixed Contamination Area" sign was attached to the pole.
46	UPR-200-E-78	UPR-200-E-78, UN-216-E-6, 241-BX-155 diversion box ground contamination, UN-200-E-78	This site is located in the area around the 241-BX-155 diversion box, south of the 241-BX Tank Farm, northeast of B Plant, between Atlanta and Baltimore Avenues.	1955 to		Contaminated ground affecting 18 sq. m area. At the time of the release, the maximum dose rate was 22.6 rad/hour.			The diversion box has been isolated and covered with gray grout. The area around the diversion box and the surface area above the 241-B-302-C tank have been surface stabilized with gravel and posted with URM signs.
47	UPR-200-E-80	UPR-200-E-80, UN-216-E-8, 221-B-R-3 line break, R-3 radiation zone, UN-200-E-80	The release occurred in and underground pipeline, located on the south side of the 221-B Canyon Building, near the R-3 stairwell.	The release occurred in June 1946	B Plant	N/A	N/A	30 m (100 ft) wide by 152 m (500 ft) in length	An underground metal waste line failure was detected near section R-3 on the south side of the 221-B Building. The dose rate at ground surface level was 400 rad/hr. The leak was confirmed by hydrostatic testing. Operations were halted for 6 days to change the waste routing and cover the area with several feet of gravel. A portion of the area had caved in. The excavated contaminated soil was taken to the dry waste burial ground. The excavation was backfilled. After covering the contamination, the dose rate was reduced to 100 mrad/hr.
48	UPR-200-E-84	UPR-200-E-84, 241-ER-151 catch tank leak, UN-200-E-84, UN-216-E-12	The release occurred adjacent to the 241-ER-151 diversion box, southwest of the 221-B Building.	1953	Associated with 241-ER-311 catch tank and 241-ER-151 diversion box.	Contaminated acid			The 241-ER-151 diversion box and the 241-ER-311 catch tank are located inside a chain-link fence that is radiologically posted. A WIDS sign has been placed at the approximate location of the release.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
50	UPR-200-E-85	UPR-200-E-85, line leak at 221-B stairwell R-13, UN-216-E-13, UPR-200-E-41, UN-200-E-85, UN-200-E-41	UPR-200-E-85 occurred south of the center of the 221-B Building, near the R-13 utility pit.	The release occurred in July 1972	The unencased transfer line from ion-exchange tank 18-1, in the 221-B Building, to the 241-BX-154 diversion box.	The waste line contained ion exchange waste from tank 18-1, located inside the B Plant canyon. Soil samples collected in 1972 identified the release as predominantly Cs-137. Approximately 30 Ci of cesium were released, but half of the release was removed with the soil excavated to expose the line leak.	4.57 m (5.00 ft)	15.24 m by 15.24 m (50 ft by 50 ft)	During a routine survey, an unencased transfer line from the ion exchange tank 18-1 in the 221-B building, to the 241-BX-154 diversion box was found to have leaked process waste near the R-13 utility pit. The contaminated waste apparently seeped through a wall joint and ran into the electric utility pit. Radiation measurements were taken near the bottom of the pit. The measurements read 15 rad/hr 5 cm (2 in.) from the source.
51	UPR-200-E-87	UPR-200-E-87, UN-216-E-15, 224-B south side plutonium ground contamination, UN-200-E-87, 216-E-15	The UPR-200-E-87 site is located on the south side of the 224-B Building in the 200 East Area.	No confirmed release occurred	Underground pipelines located on south side of the 224-B Building.	N/A	N/A	N/A	Suspected leak into the soil from underground pipelines located on south side of the 224-B Building based on discovery of a large amount of plutonium-contaminated soil during excavating near pipelines at 224-T in 1972.
52	UPR-200-E-96	UPR-200-E-96, ground contamination southeast of PUREX, UN-216-E-24, UN-200-E-96	The release site includes contaminated areas on the south and east sides of PUREX.	N/A	The release site is associated with 200-E-103, 200-E-107, the 291-A stack, and 241-A-151 diversion box.	N/A	N/A	Approximately 1 ha (2.5 acres)	From a conversation with Harold Maxfield on October 8, 1981, it was determined the area had became contaminated by residual specks from the 291-A stack operation and work activities in the 241-A-151 diversion box during PUREX Plant operations.

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53	UPR-200-W-2	UPR-200-W-2, UN-200-W-2, underground waste line leak	The cave-in occurred on the southeast side of the 221-T Facility, near stairwell R-19.	June 1947	This site is associated with 221-T and UPR-200-W-98.	N/A	3 to 3.3 m (10 to 11 ft)	N/A	On June 23, 1947, a minor ground cave-in occurred at the rear of the T Plant Canyon Building opposite the R-19 stairwell and directly over one of the underground waste transfer lines. Hydrostatic tests showed that the 9-1 "metal waste line" had failed and discharged liquid waste to ground. The 1947 survey was completed and the temporary "danger zone" status was eliminated. A permanent danger zone was established at stairwell R-19.
54	UPR-200-W-5	UPR-200-W-5, overflow at 241-TX-155, UN-200-W-5	The site consists of the 241-TX-155 diversion box and the adjacent hillside to the west. The diversion box is located east of Camden Avenue, east of the 241-TX Tank Farm.	1950	Site associated with 241-TX-155 diversion box, UPR-200-W-28, UPR-200-W-131, and UPR-200-W-113.	Contaminated soil			In 2000 and 2001, multiple areas of soil and vegetation contamination were identified and all were posted. For consolidation purposes, all of the new CAs were recorded and mapped as UPR-200-W-113. A WIDS sign has been placed at the approximate location of the release.
55	UPR-200-W-6	UPR-200-W-6, UN-200-W-6, contamination spread from 241-U-151 and 241-U-152 diversion boxes	The contamination spread occurred at the 241-U-151 and -152 diversion boxes, located east of the 241-U Tank Farm, near the corner of 16th Street and Camden Avenue.	1950 to ?	The release is associated with the 241-U-151 and 241-U-152 diversion boxes.	Ground contamination with a maximum dose rate of 20 mrad/hour on the surface of the soil.			The ground around the 241-U-151 and the 241-U-152 diversion boxes has been covered with gravel. The diversion boxes are marked and posted. A WIDS sign has been placed at the approximate location of the release.
56	UPR-200-W-28	UPR-200-W-28, release from 241-TX-155 diversion box, UN-200-W-28	The release site is located adjacent to the 241-TX-155 diversion box, approximately 244 m (800 ft) east of the 241-TX tank farm and north of the 200 West Area Powerhouse pond.	1954 to ?	Release associated with 241-TX-155 diversion box and UPR-200-W-5, UPR-200-W-113, UPR-200-W-131, and UPR-200-W-135.	Contaminated soil.			The documented contaminated area was found at the 241-TX-155 diversion box. There is a large posted URM area west of the diversion box and several smaller radiologically posted areas in this vicinity (see UPR-200-W-113 and UPR-200-W-135). The diversion box has been isolated and weather covered and is marked and posted with various radiological control signs. A WIDS sign has been placed at the approximate location of the release.

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57	UPR-200-W-29	UPR-200-W-29, transfer line leak, UN-200-W-29, UPR-200-W-27, UN-200-W-27, UN-216-W-5, 23rd and Camden line break	The release site is located adjacent to the 241-TX-155 diversion box, approximately 244 m (800 ft) east of the 241-TX tank farm and north of the 200 West Area Powerhouse pond.	1954 to ?	Release associated with 241-T-152 diversion box, UPR-200-W-64, and UPR-200-W-97.	Contaminated soil with a maximum dose rate of 11.5 rad/hour at a distance of 5 cm (2 in.).			The area is currently surrounded with steel posts, covered with gravel, and posted as a URM area.
58	UPR-200-W-32	UPR-200-W-32, UNH transfer line break, UN-200-W-32	The release occurred near the northwest corner of REDOX Plant.	The release occurred in 1954	204-S Facility	An unknown amount of UNH.	N/A	N/A	During the summer of 1954, the above-ground UNH transfer line connecting 224-U to REDOX broke, releasing an unknown amount of the UNH solution to the ground. The contaminated area was covered and marked as a radiation zone by use of magenta and yellow tape and radiation zone signs.
59	UPR-200-W-35	UPR-200-W-35, ground, UN-200-W-35, REDOX to 224-U UNH line leak	Located just outside and to the north of the REDOX exclusion area.	The release occurred in September 1955	204-S Facility	An unknown amount and concentration/ activity of UNH solution.	N/A	N/A	A leak occurred in the above-ground UNH line from REDOX to U Plant. The area of surface contamination and the quantity or activity of contaminants has not been reported.
60	UPR-200-W-38	UPR-200-W-38, line break at 241-TX-302C, UPR-200-W-160, UPR-200-W-40, UN-200-W-38, 216-T-30	The release site is located adjacent to the 241-TX-155 diversion box, approximately 244 m (800 ft) east of the 241-TX tank farm and north of the 200 West Area Powerhouse pond.	1955	Release associated with 241-TX-154 diversion box and 241-TX-302C catch tank. UPR-200-W-21 occurred in the same vicinity in 1953.	Approximately 139.35 sq. m contaminated with radioactive metal waste solution. Cleanup activities increased the contaminated area to approximately 371.6 sq. m.			The area around the 241-TX-154 diversion box and the catch tank has been stabilized with sprayed concrete (shotcrete). The area is posted with URM signs. A WIDS sign has been placed at this location.
61	UPR-200-W-64	UPR-200-W-64, road contamination at 23rd Street and Camden, UN-200-W-64	The release site is located adjacent to the 241-TX-155 diversion box, approximately 244 m (800 ft) east of the 241-TX tank farm and north of the 200 West Area Powerhouse pond.	1969 to ?	UPR-200-W-29 and UPR-200-W-97 are the apparent source of contamination for this release.	Contamination up to 600 cpm. Cs-137 was the only detectable radioactive isotope.			The corner of 23rd and Camden has been stabilized with clean gravel due to two waste line leak events. The stabilized area is surrounded with chain and posted with URM signs. The road shoulders are not posted. A WIDS sign has been placed at the approximate location of the release.

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62	UPR-200-W-82	UPR-200-W-82, contamination spread at 240-S-151	The contamination spread was located on the north and east sides of the 240-S-151 diversion box and the 240-S-302 catch tank, on the north side of the REDOX facility (202-S).	1980	UPR-200-W-82 was associated with the 240-S-151 diversion box and the 240-S-302 catch tank.			Approximately 186 sq. m (610 sq. ft)	The 240-S-151 diversion box is posted with radiological signs. The contamination spread occurred in the soil adjacent to the diversion box. A WIDS sign has been placed at the approximate location of the release.
63	UPR-200-W-97	UPR-200-W-97, transfer line leak, UN-216-W-5, UN-200-W-97	The release occurred southeast of the 241-T Tank Farm at the corner of 23rd Street and Camden Avenue.	1966	Associated with underground pipeline connecting 241-T-152 diversion box and 241-TX-153 diversion box. Occurred at same location as UPR-200-W-29 and adjacent to UPR-200-W-64.				The site is located at the corner of 23rd Street and Camden Avenue. It is marked and posted as URM. The release site was stabilized with clean soil, sand, ureabore herbicide, and crushed rock.
64	UPR-200-W-98	UPR-200-W-98, UN-216-W-6, 221-T waste line break at R-19, UN-200-W-98	The release site is located near the southeast corner of the 221-T Canyon Building, at door R-19.	1945	This site is associated with the 221-T Building and UPR-200-W-2.	Approximately 10 Ci of high-salt, neutral-to-basic fission products, with a maximum dose rate of 20 rad/hour (in 1945) at 5 cm (2 in.).	N/A	N/A	In the spring of 1945, a broken underground process transfer line caused contaminated liquid to surface near the R-19 stairwell at the 221-T Building. The liquid from the "metal waste line" surfaced and spread mixed fission contamination over a small ground area. Following the incident in 1945, the area was covered with approximately 1.2 m (4 ft) of clean soil. A blacktop road, in daily use, has since been constructed over the top of the site.
65	UPR-200-W-102	UPR-200-W-102, UN-216-W-12, UN-200-W-102, 224-T underground line leak	The UPR occurred adjacent to the south and east sides of the 224-T Building.	Early 1970s	The release is associated with the 224-T Building.	The release consisted of alpha-laden moisture from process tank lines that contaminated the soil around the pipeline. An estimated 72 g of plutonium were contained in the contaminated soil that was removed when the leak was discovered.	3.66 m (12.0 ft)	15.24 m by 3.66 m (50.0 ft by 12.0 ft)	The contaminated soil was discovered in February 1972. The leak is believed to have occurred several years earlier, when the building was used for processing plutonium. Contamination seeped into the ground on the rear of the 224-T Building. Most documents have assumed this to be the east side where a process line exits the cell portion of the building and goes to tank 241-T-361.

Table C-5. Summary of WIDS 200-IS-1 Operable Unit Process Pipelines, Diversion Boxes, and Associated Waste Sites Included in Work Plan. (20 sheets)

Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
66	UPR-200-W-113	UPR-200-W-113, soil contamination east of 241-TX, UN-216-W-23, contamination areas around 241-TX-155 diversion box, UN-200-W-113	The site is an area east of the 241-TX Tank Farm, on the east side of Camden Avenue. Posted CAs are located west, south, north, and east of the 241-TX-155 and 241-TX-152 diversion boxes.	1977 to ?	Associated with 241-TX-155 diversion box, 241-TX-152, UPR-200-W-28, UPR-200-W-76, UPR-200-W-135, and associated underground pipelines going into and out of the diversion box.	Multiple unplanned releases. Contaminated rabbit feces and low-level, beta/gamma surface contamination. Source of contamination was subsurface.			The original contaminated area was surface stabilized in 1990 and is surrounded with concrete marker posts and posted as a URM area. In 1998, 1999, and 2000, additional surface contamination was identified adjacent to the surface stabilized area and on the north, south, east, and west sides of the diversion boxes. CAs have also been identified on the surface of underground transfer lines associated with the 241-TX-155 diversion box. The additional CAs, also considered a part of this site (UPR-200-W-113), are marked with posts, chain, and CA and SCA signs. One small CA, southeast of 241-T (located on a transfer line to the diversion box) was recently stabilized with gravel and is now posted with URM signs.
67	UPR-200-W-114	UPR-200-W-114, UN-216-W-24, ground contamination east of 241-SX Tank Farm, UN-200-W-114	UPR-200-W-114 was located east of the 241-SX Tank Farm.	1980	The release is associated with the 241-SX Tank Farm and the 241-SX-151 and 241-S-151 diversion boxes.	N/A	N/A	106.68 m by 137.16 m (350.0 ft by 450.0 ft)	The release consisted of migrating radioactive particulate matter from operational activities at the SX Tank Farm and the 241-SX-151 and 241-S-151 diversion boxes over many years. The contamination spread to the ground surface east of the SX Tank Farm. The resulting large area was posted as a SCA and was assigned a UPR number in 1980.
68	UPR-200-W-131	UPR-200-W-131, release from 241-TX-155	The release occurred near the 241-TX-155 diversion box, located east of Camden Avenue and east of the 241-TX Tank Farm.	1953	Release associated with 241-TX-155 diversion box, 241-TX-302 catch tank, and UPR-200-W-113.	Many incidents of contaminated soil and vegetation. Ground contamination with readings of 25 rad/hour at a distance of 0.6 m (2 ft).			The 241-TX-155 diversion box and 241-TX-302B catch tank are surrounded with post-and-chain barricade and CA signs. Clean gravel has been placed around the diversion box and a sign has been added to the chain boundary identifying this to be the location of UPR-200-W-131.

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69	UPR-200-W-135	UPR-200-W-135, release from 241-TX-155, UN-200-W-135	The cave-in associated with UPR-200-W-135 was located approximately 46 m (150 ft) northwest of the 241-TX-155 diversion box. The diversion box is located east of Camden Avenue and east of the 241-TX Tank Farm.	1954	Associated with 241-TX-155 diversion box, UPR-200-W-28, and UPR-200-W-113.	Estimated 300 rad/hour at a distance of 10 cm (4 in.).			There are three major encased transfer lines associated with the 241-TX-155 diversion box. There have been many areas of contamination identified on these transfer lines during 1999, 2000, and 2001. UPR-200-W-113 is located on a transfer line directly west of the 241-TX-155 diversion box and is surrounded with concrete marker posts and URM signs. An extension of UPR-200-W-113 is located northwest of the original area, surrounded with metal post-and-chain barricade, and is posted with CA signs. A single metal post, labeled UPR-200-W-135, has been placed adjacent to the UPR-200-W-113 CA.
70	UPR-200-W-161	UPR-200-W-161, UN-216-W-35, UN-200-W-161	The site is located east of 241-U Tank Farm, on the east side of Camden Avenue. It extends northward from the corner of 16th Street and Camden Avenue and the 241-U-152 diversion box.	1990 to ?	Associated with 241-U Tank Farm. A tank farm pipeline is buried in this approximate location.	Area of approximately 1.9 ac (0.77 ha) contaminated. The general contamination was 250 to 450 cpm with spots to 800 cpm. One area, approximately 1.5 m (5 ft) by 1.5 m (5 ft), was contaminated up to 8,000 cpm.			The site is a large radiologically controlled area posted with URM signs. A WIDS number sign has been posted at this location.
71	UPR-200-W-164	UPR-200-W-164, overhead uranyl nitrate hexahydrate (UNH) line leak, UN-216-W-29	The release occurred beneath the above-ground UNH pipeline that extended from 204-S to 224-U.	The release occurred in 1952	204-S Facility	An unknown amount of UNH.	N/A	N/A	The above-ground UNH transfer line from the 204-S storage tanks to the 224-U Building (hung from an existing steam line) was posted as a radiation zone from 1952 to 1967. The zone was established because of a low-level gamma field (dose rate) emanating from the transfer line. In 1981 correspondence, Harold Maxfield states that he believes the area was incorrectly designated as a UPR, because the posting was necessary because of the dose rate, not a release. Later, a small area of soil contamination was identified under the steam line, adjacent to the 216-S-9 Crib.

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Count	Site Code Type	Site Names	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
72	UPR-200-W-167	UPR-200-W-167, contamination migration from 241-TY, UN-216-W-32	UPR-200-W-167 was located adjacent to the 241-TY Tank Farm fence, extending east and north from the fence.	1985 to ?	Associated with 241-TY Tank Farm operations and WIDS site code 200-W-78.	Approximately 8,400 sq. m (90,000 sq. ft) in an "L."		Approximately 192 m (630 ft) long and ranged from 42 m (140 ft) to 60 m (195 ft) wide	The original release site, identified in 1985, was a soil CA located adjacent to the east side of the 241-TY Tank Farm. After the contamination was scraped and removed in 1986, the site was no longer marked or posted. In 2000, three areas on the east and northeast sides of the 241-TY Tank Farm (within the original boundaries of this UPR) were reposted as CAs. Contaminated anthills and growing contaminated vegetation was found on top of a tank farm transfer line located outside the eastern tank farm fence (see WIDS site code 200-W-78). In November 2000, the CAs were covered with bio-barrier material and gravel. These areas were reposted with URM signs. The underground radioactive pipeline is marked with posts and "Radioactive Pipeline" signs. The pipeline runs through the recently stabilized areas.
73	UPR-600-20	UPR-600-20, UN-216-E-41, cross-country transfer line contamination, cross-site transfer line	The site extends from the 241-ER-151 diversion box in 200 East Area and to the 241-UX-154 diversion box in 200 West Area. The majority of the transfer line is located in the 600 Area, between 200 East and West Areas, south of Route 3. The pipeline is approximately 2.3 mi long.	1988 to ?	Associated with the 241-ER-151 diversion box (east end of the pipeline), 241-EW-151 vent station (along middle of pipeline), and the 241-UX-154 diversion box (west end of the pipeline).	Contaminated pipe, any subsurface leaks, and associated surface and vegetation contamination. Contamination levels to 750 mrem/hr.			The underground transfer line extends from U Plant in 200 West Area to the 241-ER-151 diversion box in 200 East Area. The site includes the contaminated soil and vegetation located on the surface of the cross-site transfer line, as well as the pipeline itself. The surface of the underground line has been stabilized and is currently posted with URM signs. There is also a large mound of soil, located south of the 241-EW-151 vent station that is associated with the original transfer line surface stabilization activities. The soil mound is posted with URM signs.

Information for this table was obtained from the following sources:

ARH-780, *Chronological Record of Significant Events in Chemical Separations Operations.*

DOE/RL-92-05, Rev. 0, *B Plant Source Aggregate Area Management Study Report.*

HNF-SD-LL-SP-001, *200 and 600 Areas Sanitary Wastewater Master Plan.*

Resource Conservation and Recovery Act of 1976.

WAC 246-272, "Onsite Sewage Disposal."

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CA = contamination area
cpm = counts per minute
HCA = high contamination area
IMUST = Inactive Miscellaneous Underground Storage Tank
N/A = not available
PUREX = plutonium-uranium extraction
REDOX = reduction-oxidation
SCA = surface contamination area
TBP = tributyl phosphate
UNH = uranyl nitrate hexahydrate
UPR = unplanned release
URM = underground radioactive material
WAC = *Washington Administrative Code*
WIDS = Waste Information Data System

REFERENCES

ARH-780, 1968, *Chronological Record of Significant Events in Chemical Separations Operations*, Atlantic Richfield Hanford Company, Richland, Washington.

DOE/RL-92-05, 1993, *B Plant Source Aggregate Area Management Study Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

HNF-SD-LL-SP-001, 1998, *200 and 600 Areas Sanitary Wastewater Master Plan*, Fluor Hanford, Inc., Richland, Washington.

HW-22610, 1951, *Hanford Works Report for October 1951*, General Electric Company, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

WAC 246-272, "Onsite Sewage Disposal," *Washington Administrative Code*, as amended.