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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

09-AMCP-0049

JAN 1 6 2009

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EDMC

Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton
Richland, Washington 99354

Dear Ms. Hedges:

200-SW-1 NONRADIOACTIVE LANDFILLS AND DUMPS GROUP OPERABLE UNIT AND 200-SW-2 RADIOACTIVE LANDFILLS AND DUMPS GROUP OPERABLE UNIT REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN, DOE/RL-2004-60, REVISION 0

The purpose of this letter is to transmit five updated sheets to the 200-SW-1 Nonradioactive Landfills and Dumps Group Operable Unit and 200-SW-2 Radioactive Landfills and Dumps Group Operable Unit Remedial Investigation/Feasibility Study Work Plan, DOE/RL-2004-60, Revision 0. These minor changes have been approved and signed off by the U.S. Department of Energy, Richland Operations Office and the State of Washington Department of Ecology. Each recipient should replace the corresponding pages in their volume of the report with these revised pages.

If you have any questions, please contact me, or your staff may contact Briant Charboneau, of my staff, on (509) 373-6137.

Sincerely,

Matthew S. McCormick, Assistant Manager
for the Central Plateau

AMCP:FMR

Attachment

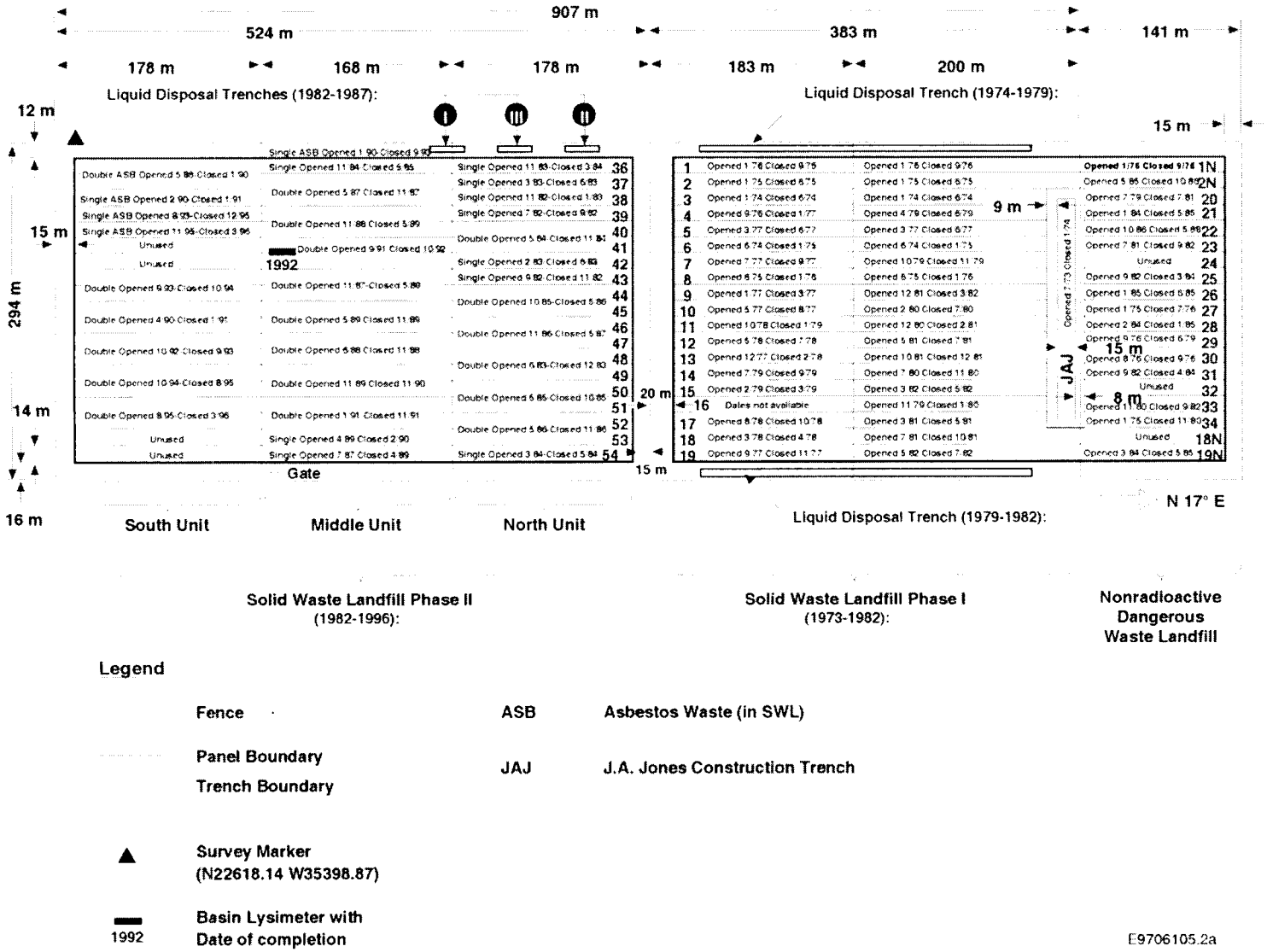
cc: See Page 2

JAN 1 6 2009

cc w/attach:
G. Bohnee, NPT
L. Buck, Wanapum
S. Harris, CTUIR
R. Jim, YN
S. L. Leckband, HAB
R. A. Lobos, EPA
K. Niles, ODOE
J. B. Price, Ecology
Administrative Record
Environmental Portal

cc w/o attach:
G. T. Berlin, CHPRC
R. E. Piippo, CHPRC
J. G. Vance, FFS

Figure 2-1. Nonradioactive Dangerous Waste Landfill and Solid Waste Landfill.



A geophysical survey of the NRDWL was conducted in 2000. It was noted that some of the trench centers vary significantly from previous documentation and, in some locations, the buried debris is covered by only 0.6 m (2 ft) of fill.

Trenches 18N, 24, and 32 were not used for disposal. Trenches 19N, 26, 28, 31, 33, and 34 received an unknown volume of liquid waste consisting of laboratory chemicals, bulk organic waste, solvent waste, paints, paint thinners, waste oils, and empty containers. The chemical trenches were constructed with an access ramp to the bottom of the trench to allow transfer vehicles to access the working face. A 20 to 30.5 cm (8- to 12-in.) layer of gravel and cobble was placed over the bottom of the trench to form a temporary roadbed. The containerized chemical waste was off-loaded from transport trucks that had backed down the access ramp and up to the working face of the trench. Placement of the waste was supervised by a landfill operator. Containers (the majority of which were 208 L [55-gal] lab packs) were arranged in rows, standing end-to-end in the bottom of the trenches. Containers normally were placed in a single layer along the bottom of the trench; however, when a large shipment of drums was received, drums were stacked two high. At the end of the day, a portion of the spoil pile was pushed over the waste containers with a crawler/tractor to form the operational cover. Typically, the operational cover for the chemical trenches was ~3 m (10 ft) thick. When drums were stacked two high, the cover was reduced to ~2 m (6 ft) (DOE/RL-90-17).

Trenches 2N, 20, 21, 22, 23, 25, 27, 29, and 30 received friable and nonfriable asbestos solid waste from building demolitions/renovations. Miscellaneous trash and debris from offices, lunchrooms, and construction/demolition activities were disposed of in Trench 1N, and ~5,300 L (1,400 gal) of nondangerous/nonradioactive septic tank sludge was disposed to Trench 34. Waste at the asbestos and sanitary waste trenches was unloaded at the base of the working face (as was done with the chemical trenches) or at the top edge of the working face. When waste was unloaded at the top edge, a tractor was used to push the waste into the trench to the desired height. In both cases, at the end of a day of operation, a portion of the spoil pile was pushed over the refuse to form an operational cover. The cover typically was 1.2 m (4 ft) thick, but varied from about 1.2 to 2 m (4 to 6 ft), depending on the thickness of the waste layer (DOE/RL-90-17).

Reportedly, no bulk liquids (other than lab packs packed with absorbents) have been allowed into this landfill. All dangerous wastes were containerized, with the exception of asbestos and sanitary solid wastes, before going to disposal (WIDS).

2.1.2 200-SW-2 Operable Unit Treatment, Storage, and/or Disposal Unit Landfills

The LLBGs comprise a landfill disposal unit and cover a total area of ~225 ha (556 a). The landfill is divided into eight burial grounds. Six burial grounds are in the 200 West Area, and two are in the 200 East Area, as depicted in Figures 1-3 and 1-4. This TSD unit includes the 218-E-10, 218-E-12B, 218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, 218-W-6, and 218-W-5 Burial Grounds in the 200-SW-2 OU. The unit is described in detail in the following sections. Copies of the most recently approved Part A Permit applications for the TSD unit are contained in DOE/RL-91-28, *Hanford Facility Dangerous Waste Permit Application*. Publicly

RSW retrieval from the LLBG has been performed in the past. A pilot retrieval program conducted in 1993–1994 recovered 23 waste drums and transferred them to the Central Waste Complex. The purpose of the pilot program was to measure drum corrosion rates and to develop other information for planning future retrieval operations. In 1996, an additional 306 suspect TRU waste drums were removed from storage in the LLBG and transferred to the Central Waste Complex. Additional retrieval campaigns were performed between 1999 and 2001 recovering 1,479 drums and sending them to the Central Waste Complex. The Tri-Party Agreement was renegotiated on October 13, 2003, accelerating and refocusing retrieval efforts. Now annual production milestones are established through December 31, 2010, with the expectation that ~15,000 m^3 will be retrieved from the 200 Area LLBG. In November 2003, the Waste Retrieval Project demonstrated readiness and began retrieval operations pursuant to the new Milestone M-091 change package requirements. Retrieval operations have been performed continuously since November 2003.

2.4.2 RCRA Waste

At the time that many of the Hanford Site's wastes were generated, there were no definitions or regulations governing the final disposition of chemical constituents. In the early 1980s, low-level liquid organic waste was banned from land disposal at the Hanford Site landfills (WHC-EP-0912). Although many of these constituents subsequently have been classified as hazardous or dangerous wastes by the EPA and Ecology, only waste disposed of after RCRA regulations went into effect is subject to active management as mixed, hazardous, or dangerous. Where regulated chemical and radioactive constituents are combined in a waste form, waste disposed of (after RCRA regulations went into effect) is subject to management as "mixed waste." Ecology has regulated mixed waste since August 19, 1987, the date that RCW 70.105.109, "Regulation of Wastes with Radioactive and Hazardous Components," went into effect.

In 1987, the DOE issued the so-called byproduct rule, which clarified its position on the hazardous components of mixed waste to be regulated by RCRA (10 CFR 962, "Radioactive Waste, Byproducts Material Final Rule," and 52 FR 15937, "Radioactive Waste, Byproducts Material Final Rule"). On November 23, 1987, the EPA authorized Ecology to regulate the hazardous constituents of mixed wastes at the Hanford Site (52 FR 35556, "Final Authorization of State Hazardous Waste Management Program; Washington").

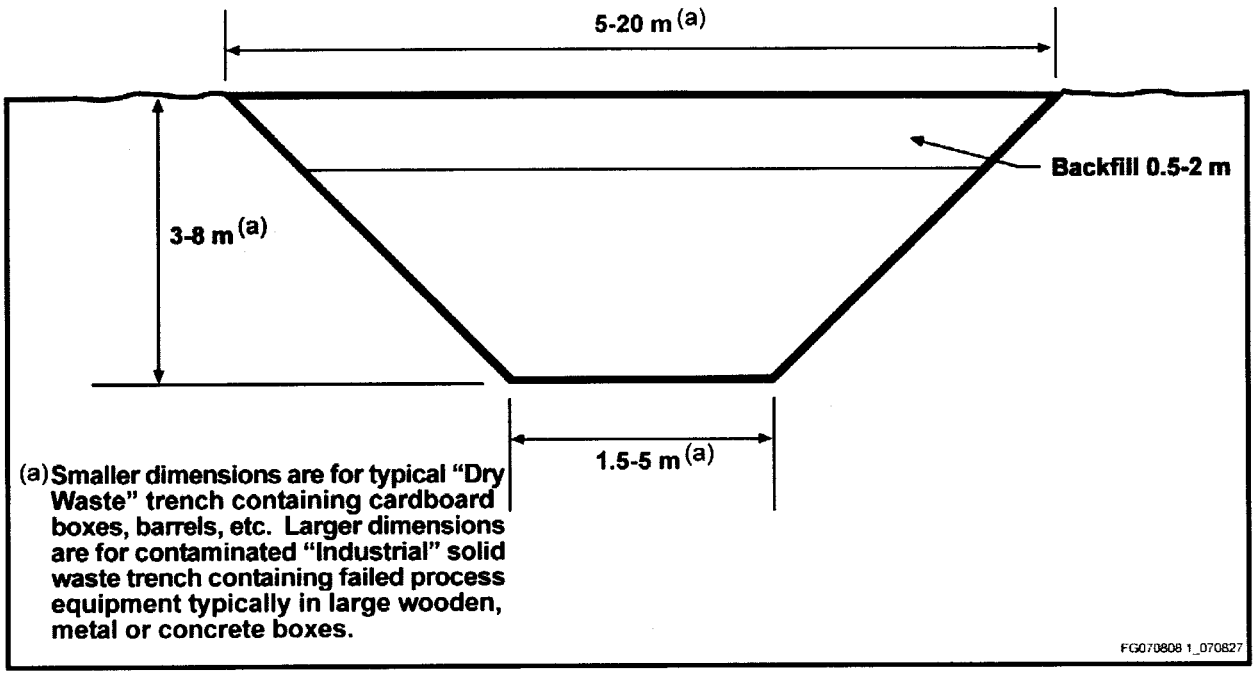
2.4.3 Historical Disposal Practices and Facilities

Landfills were used at the Hanford Site beginning in 1944. They generally consist of one or more types of burial trench(es) and/or solid-waste-disposal facilities such as caissons (discussed below). From 1944 to August 19, 1987 (the effective date of mixed waste regulation), it was common practice for solid LLW and waste containing components that currently are regulated under WAC 173-303 to be disposed of in burial trenches in the 200 Areas' landfills. In the mid-1990s, disposal of MLLW took place in the permitted trenches of the LLBG in the 200 West Area, while LLW (no RCRA component) continued to be disposed of in unpermitted burial trenches. Retrievable TRU wastes originally were (from 1970) stored in retrievable storage units

in trenches until 1998, when they began to be sent directly to the Waste Receiving and Processing Facility for repackaging to be sent to an offsite disposal facility.

Before construction of TSD unit landfills in the 1990s, most of the wastes sent to the 200 Areas' Landfills were disposed of, or retrievably stored, in trenches. A typical solid waste burial trench is shown in Figure 2-15. Non-TRU waste (LLW, waste containing components that currently are regulated under WAC 173-303, nonradioactive waste) typically was disposed in earthen trenches ~4 to 5 m (12 to 16 ft) deep; some TRU trenches are up to 7.6 m (25 ft) deep.

Figure 2-15. Diagram of a Typical Solid Waste Burial Trench.



Both unlined and lined trenches have been used at the Hanford Site. The purpose of a liner in a RCRA-permitted landfill is to catch water that may come into contact with uncovered waste during burial operations. This water is collected and appropriately treated. Once the landfill is filled and the waste is covered, the liner has no environmental effect or benefit for the performance of the landfill, and in most cases disintegrates after a number of years.

The Hanford Site soil, which consists largely of gravel and sand, sloughs off to an angle of repose of about 45 degrees during excavation. This required the movement of significant volumes of earth for the preparation and backfilling of waste trenches. The wide top and relatively narrow bottom of the resulting trench, coupled with the practice of covering all radioactive wastes by the end of the day when spreadable contamination was present, has resulted in a low ratio of waste volume to land area (BHI-00175). Volumes of radioactive buried waste (200-SW-2 OU) recorded in SWITS, compared with trench volumes, suggest that an average of 21 percent of the trench volume is waste packages; the remainder is backfill.

3.5.1 Overview of RCRA Monitoring

RCRA groundwater monitoring is required by WAC 173-303-400 and 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart F, "Groundwater Monitoring." Following are the current RCRA groundwater monitoring plans for the applicable 200-SW-1 and 200-SW-2 OU landfills:

- PNNL-14859-ICN-2, *Interim Status Groundwater Monitoring Plan for Low-Level Waste Management Areas 1 to 4, RCRA Facilities, Hanford, Washington*, Interim Change Notice
- PNNL-12227, *Groundwater Monitoring Plan for the Nonradioactive Dangerous Waste Landfill.*

In addition to the RCRA monitoring, DOE O 435.1 requires performance assessment monitoring at LLWMAs 1 through 4 (DOE/RL-2000-72). This program uses the same monitoring networks that the RCRA program does, but monitors for radionuclides, which are excluded under RCRA.

The SWL is adjacent to the NRDWL and is regulated under WAC 173-304. PNNL-13014, *Groundwater Monitoring Plan for the Solid Waste Landfill*, describes the monitoring program.

The LLBG RCRA Part B Permit Application first was submitted to Ecology in December 1989 (DOE/RL-88-20) to meet Tri-Party Agreement Milestone M-020-06. DOE submitted the most recent version of the Part B Permit Application to Ecology in June 2002 (Draft Revision 2). Chapter 5 of the Part B Permit Application contains groundwater monitoring requirements. Groundwater well installation priorities for the LLBG are established and agreed to annually under Tri-Party Agreement Milestone M-024. Notice of Deficiency workshops have been completed and all Notice of Deficiencies have been closed. The closed Notice of Deficiencies were transmitted to Ecology on December 19, 2007 (08-AMCP-0063, "Hanford Facility Dangerous Waste Part B Permit Application, Low-Level Burial Grounds (LLBG) DOE/RL-88-20, Revision 2"). Revision 2 of the LLBG RCRA Part B Permit Application will be revised for submittal to Ecology. The revision will incorporate the Notice of Deficiency resolutions and incorporate updates to make the information current.

DOE submitted the NRDWL closure/postclosure plan in August 1990 (DOE/RL-90-17) to meet Tri-Party Agreement Milestone M-020-07. The Notice of Deficiency process was not completed for this closure/postclosure plan. The closure/postclosure plan is being updated for submittal to Ecology. DOE will use activities under the 200-SW-1 OU CERCLA process to develop groundwater information data to support the NRDWL closure/postclosure plan.

DOE has prepared quarterly RCRA groundwater monitoring reports since 1986 (e.g., SGW-33492, *Quarterly Groundwater Monitoring Data for the Period October through December 2006*). RCRA annual reports commenced in 1988. The RCRA annual reports have been integrated with Hanford Site groundwater monitoring reports since 1997 (e.g., DOE/RL-2008-01).

The RCRA interim status regulations require semiannual comparisons of upgradient and downgradient groundwater results to determine whether the TSD units have adversely impacted

groundwater quality. The comparisons are conducted for four contaminant indicator parameters: pH, specific conductance, total organic carbon, and total organic halides. These comparisons are not presently conducted at LLWMA-3 because there are no upgradient wells at this site.

3.5.2 218-E-10 Burial Ground (LLWMA-1) Groundwater Monitoring

The 218-E-10 Burial Ground comprises LLWMA-1, located in the northwestern corner of the 200 East Area.

3.5.2.1 History

The monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site-specific parameters as required by WAC 173-303-400(3), "Interim Status Facility Standards," "Standards," which incorporates by reference 40 CFR 265, Subpart F.

3.5.2.2 Well Locations and Design

The original RCRA monitoring plan for LLWMA-1 (WHC-SD-EN-AP-015, *Revised Ground-Water Monitoring Plan for the 200 Areas Low-Level Burial Grounds*) included four upgradient wells and nine downgradient wells. Because the unconfined aquifer is thin in this region (see Section 2.1), all of the wells monitor the top of the unconfined aquifer, and several are screened across the entire aquifer thickness. Casings and screens are stainless steel, and annular spaces are sealed with bentonite.

The monitoring well network in 2007 includes what are currently believed to be 7 upgradient wells and 10 downgradient wells. However, the number of downgradient versus upgradient wells is indeterminate. DOE/RL-2008-01 indicates that the groundwater gradient in this part of the 200 East Area is almost flat, making determination of groundwater flow direction difficult. No new wells for LLWMA-1 are included in recent versions of Tri-Party Agreement Milestone M-024. Future Tri-Party Agreement Milestone M-024 negotiations and agreements will address groundwater monitoring well needs for LLWMA-1. The groundwater monitoring well network at this landfill is shown in Figure 3-3.

3.5.2.3 Results of Groundwater Monitoring

Specific conductance of groundwater has increased in some LLWMA-1 wells since 1998 and exceeded the upgradient/downgradient comparison value in downgradient well 299-E33-34 in FY 2006 (DOE/RL-2008-01). Specific conductance has exceeded the comparison value in another downgradient well, 299-E32-10, in the past. Other indicator parameters were below comparison values in FY 2006.

Table 5-5. Potential Focused Investigations. (7 Pages)

Activity	Description	Focus	Comments	Landfills
TSD unit geophysical surveys	Select up to 4 ha (10 a) of Bin 1 TSD landfill trenches to conduct geophysical surveys for the purposes of verifying burial records and "calibrating" the methods. Potential geophysical methods include ground penetrating radar, electromagnetic induction, and total magnetic flux.	Select areas of TSDs with good burial records, representing a variety of waste forms (soft waste to metals). Also, investigate Waste Retrieval Project experiences vis-à-vis burial records versus actual waste retrieved.	Approximately 147,000 burial records exist for the 200-SW-1/2 OU Landfills. The majority of these records are associated with TSD landfills. The quality of burial records is unknown in some cases and in need of verification. Once verified against geophysical methods, greater confidence in extrapolating and interpreting geophysical logs from burial trenches with little to no records can be achieved.	TBD
Investigation of existing groundwater well data	Review driller's logs, geologist logs, gross/spectral logs, and other information to prepare site-specific geological descriptions for the landfills.	Correlate geological information from existing wells to determine lateral continuity of soil layers beneath the landfills. Identify zones likely to concentrate contamination in support of Phase II intrusive investigations.	Better understanding of site-specific geology will help to focus intrusive investigation efforts and eventual evaluation and selection of remedial actions.	TBD
Surface topographic surveys	Conduct surface topographic surveys of the 200-SW-1/2 OU landfills to determine areas of topographic lows. Methods of interest include real-time kinematic surveys (with global positioning system), LiDAR laser-based techniques, and photogrammetry. Airborne methods are preferable due to waste subsidence concerns and areas of no-walk and no-drive zones.	Focus on airborne topographic surveys. The desired level of resolution is on the order of 0.3 m (1-ft) contour intervals. Methods such as LiDAR reportedly can achieve the desired vertical resolution.	Topographic lows create areas of potential concern because they tend to collect and concentrate meteoric water for infiltration during times of high precipitation (rain, snow melt). Furthermore, topographic lows over burial trenches are a potential indication of waste subsidence. LiDAR survey data were acquired in fiscal year 2008 for most of the Central Plateau and all of the 200-SW-2 OU landfills. This focused investigation will map and evaluate topography for all in-scope landfills.	All 200-SW-2 OU landfills

*The 300-FF-2 Operable Unit covers nine landfills that are located adjacent to the 300 Area. These landfills have a "618" designation (600 Area) in their name and include seven general content landfills (618-1,-2,-3,-5,-7,-8,-13) and two transuranic-contaminated landfills (618-10,-11).

Eurodrill is owned by Colcrete Eurodrill, Derbyshire, United Kingdom.
Geoprobe is a registered trademark of Kejr, Inc., Salina, Kansas.

DOE/RL-93-33, *Focused Feasibility Study of Engineered Barriers for Waste Management Units in the 200 Areas.*
EPA/ROD/R10-01/119, *EPA Superfund Record of Decision: Hanford 300-Area (USDOE).*

Table 5-5. Potential Focused Investigations. (7 Pages)

Activity	Description	Focus	Comments	Landfills

DOE = U.S. Department of Energy.
DRI = Desert Research Institute.
EPA = U.S. Environmental Protection Agency.
INL = Idaho National Laboratory.
LiDAR = light detection and ranging.
OU = operable unit.
PUREX = Plutonium-Uranium Extraction (Plant or process).
RCRA = *Resource Conservation and Recovery Act of 1976.*
ROD = record of decision.
TBD = to be determined.
TRU = transuranic.
TSD = treatment, storage, and/or disposal (unit).
VOC = volatile organic compound.
VPU = vertical pipe unit.

The focused investigations support collection of additional information to address specific items of interest that may affect decisions regarding site characterization needs, approaches, and associated activities. During the Phase I-A DQO workshops, a list of items of interest was developed for further investigation through historical records research and applicable nonintrusive survey methods. This list was included in the Phase I-A DQO summary report and was evaluated through a data-gap analysis to determine those items that could be located using nonintrusive survey methods. Section 4.4 of this RI/FS work plan provides a detailed discussion of the items of interest and the data-gap analysis. Table 5-5 provides a summary-level description of currently proposed focused investigations. As site characterization information is obtained through the RI, the list of proposed focused investigations may be expanded in response to newly identified information needs and there may be a need for additional pre- and/or post-ROD technology-based treatability studies. The need for additional focused investigations and/or treatability studies will be captured in future revisions to RI/FS work plan and other supporting documents (i.e., SGW-34463).

5.10 INFORMATION AND DATA MANAGEMENT

SGW-35016, *Information and Data Management Plan for the 200-SW-2 Operable Unit* (Information Management Plan), has been prepared to compile and manage information specific to the 200-SW-1 and 200-SW-2 OUs. Data generated as a result of the Phase I-A and Phase I-B investigations will form the basis for the Phase II DQO process. Implementation of this plan will establish a project record in support of the RI/FS and/or RCRA closure process for remediating the landfills in these two OUs. Data management also is discussed in the Implementation Plan (DOE/RL-98-28, Appendix C).

The Information Management Plan describes how the RL prime contractor will manage data and other documentation for remedial projects under the 200-SW-1 and 200-SW-2 OUs. The scope of these projects includes collection and interpretation of historical records, as well as collection of data through sampling, surveying, and other techniques. The objective of the management of this information is to provide a technical and defensible basis for the remedial actions chosen for each landfill in these OUs, support implementation of those remedial actions, facilitate availability of project history, and facilitate the flow of information into information systems in accordance with RL and its supporting contractor(s) requirements and procedures, which ultimately are driven by DOE orders, other Federal and state requirements, and the Tri-Party Agreement.

APPROVAL PAGE

Title: Phase I-B Sampling and Analysis Plan for the 200-SW-2 Operable Unit Landfills

Approval: U.S. Department of Energy, Richland Operations Office

Signature _____ Date 12/22/08

Lead Regulatory Agency:

- ☐ U.S. Environmental Protection Agency
- ☒ Washington State Department of Ecology

Signature _____ Date 12/22/2008

U.S. Environmental Protection Agency, Region X

Signature _____ Date _____

The approval signatures on this page indicate that this document has been authorized for information release to the public through appropriate channels. No other forms or signatures are required to document this information release.

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