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200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan

Volume 1: Facility Investigation and Sampling Strategy

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ACRONYMS AND ABBREVIATIONS

AAMS	Aggregate Area Management Study
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirements
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CMI	corrective measures implementation
CMP	corrective measures plan
CMR	corrective measures requirement
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
DW	dangerous waste
Ecology	Washington State Department of Ecology
EHW	extremely hazardous waste
EII	Environmental Investigations Instruction
EIP	Environmental Investigations Procedure
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
ERA	expedited response action
GM	Geiger-Mueller
HASQAP	Hanford Analytical Services Quality Assurance Plan
HDPE	high-density polyethylene
HEIS	Hanford Environmental Information System
HSRAM	Hanford Site Risk Assessment Methodology
HSWA	Hazardous and Solid Waste Amendments
ICM	interim corrective measure
ITS	In-Tank Solidification
LERF	Liquid Effluent Retention Facility
LFI	limited field investigation
MSCM-II	Mobile Service Contamination Monitor II
MTCA	Model Toxics Control Act
OEMP	Operational Environmental Monitoring Program
PCB	polychlorinated biphenyl
PUREX	Plutonium/Uranium Extraction
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	*Resource Conservation and Recovery Act*
RFI	RCRA facility investigation
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
RI/FS	remedial investigation/feasibility study
RLS	radionuclide logging system
ROD	record of decision
TEDF	Treated Effluent Disposal Facility
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal

ACRONYMS AND ABBREVIATIONS (cont.)

USRADS	Ultrasonic Ranging and Data System
VCP	vitrified clay pipe
WAC	Washington Administrative Code
WESF	Waste Encapsulation and Separations Facility
WHC	Westinghouse Hanford Company
WIDS	Waste Information Data Sheets

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1.0 INTRODUCTION

This document coordinates a *Resource Conservation and Recovery Act* (RCRA) facility investigation and corrective measures study (RFI/CMS) work plan for the 200-BP-11 Operable Unit and a RCRA closure/postclosure plan for the 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch treatment, storage, and/or disposal (TSD) units. The 200-BP-11 Operable Unit, which includes these three TSD units, is a source operable unit located on the east side of the B Plant Source Aggregate Area in the 200 East Area of the Hanford Site (Figures 1-1 and 1-2). The operable unit lies just east of the 200 East Area perimeter fence and encompasses approximately 507 hectares (1,252 acres).

Source operable units include waste management units that are potential sources of radioactive and/or dangerous substance contamination. Source waste management units are categorized in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement, Ecology et al. 1994) as either RCRA TSD, RCRA past-practice, or *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) past-practice. Section 3.2 of the Tri-Party Agreement defines a TSD unit as "those units which will be permitted (for operation and/or postclosure care) and/or closed, to include interim status postclosure care, under the Washington State Dangerous Waste Regulations (Washington Administrative Code [WAC] Chapter 173-303) and the applicable provisions of the Hazardous Solid Waste Amendment (HSWA)." Section 3.3 of the Tri-Party Agreement defines a past-practice unit as "a waste management unit where wastes or substances (intentionally or unintentionally) have been disposed and that is not subject to regulation as a TSD unit." As listed below and in the Tri-Party Agreement (Appendix C), the 200-BP-11 Operable Unit contains eight RCRA past-practice and seven RCRA TSD waste management units. Furthermore, the RCRA TSD waste management units are grouped into four individual RCRA TSD units via the Hanford Facility Part A Permit as shown below.

RCRA Past-Practice Waste Management Units	RCRA TSD Units and Waste Management Units
216-B-2-1 Ditch	*216-B-63 Trench TSD Unit*
216-B-2-2 Ditch	216-B-63 Trench
216-B-2-3 Ditch	
216-B-3-1 Ditch	*216-A-29 Ditch TSD Unit*
216-B-3-2 Ditch	216-A-29 Ditch
216-E-28 Contingency Pond	
UN-200-E-14 Unplanned Release	*216-B-3 Main Pond TSD Unit*
UN-200-E-92 Unplanned Release	216-B-3 Main Pond
	216-B-3-3 Ditch
	216-B-3 Expansion Ponds TSD Unit
	216-B-3A Expansion Pond
	216-B-3B Expansion Pond
	216-B-3C Expansion Pond

As discussed in Section 5.5 of the Tri-Party Agreement, "in some cases, TSD units are closely associated with past-practice units at the Hanford Site, either geographically or through similar processes and waste streams. A procedure to coordinate the TSD units closure or permitting activity with the past-practice investigation and remediation activity is necessary to prevent overlap and

duplication of work, thereby economically and efficiently addressing the contamination." This is exactly the driving force behind this work/closure plan because the past-practice units are directly related to the TSD units based on geographical location and the waste streams received.

The primary purpose of the 200-BP-11 Operable Unit facility investigation will be to assess the extent of radionuclide and dangerous waste constituents in the soil beneath these units. However, because the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are anticipated to be clean closed (i.e., no dangerous waste) in 1995 per the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a), these units will be assessed for radionuclide contamination only. Additionally, the groundwater beneath the operable unit is currently planned to be addressed by the 200-BP-5 and 200-PO-1 groundwater operable unit (Figure 1-2) work plans and therefore will not be covered under this work/closure plan.

All work conducted under this work/closure plan will conform to the conditions set forth in the Tri-Party Agreement and its amendments, signed by the State of Washington Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE). Section 7.4.2 of the Tri-Party Agreement states that for RCRA past-practice units, "each RFI will address all units within a specific operable unit, as identified in the RFI/CMS work plan. The RFI/CMS work plan will be functionally equivalent to a RI/FS (remedial investigation/feasibility study under CERCLA) work plan." In accordance with the Tri-Party Agreement, the RFI/CMS portions of this work/closure plan will be "functionally equivalent" to a remedial investigation/feasibility study (RI/FS) work plan. The major difference between the RFI/CMS process and the RI/FS process is the terminology used to describe the steps leading to remedial/corrective actions, and these differences will be discussed further in the following section.

The relevant guidance documents that have been consulted to ensure fulfillment of the RFI/CMS requirements of this work/closure plan include those listed below. Additionally, WAC 173-303 has been consulted to ensure fulfillment of the RCRA requirements for closure/postclosure of the TSD units.

- *Interim Final RCRA Facility Investigation Guidance*, Volume 1 of IV, "Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations" (EPA 1989a)

- *Data Quality Objectives for Remedial Response Activities—Development Process* (EPA 1987)

- *Hanford Facility RCRA Permit*, Dangerous Waste Portion and HSWA Portion of the RCRA Permit for the Treatment, Storage, and Disposal of Dangerous Waste, Permit Number: WA7890008967 (Ecology 1994b)

- *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (EPA 1983a)

- *RCRA Corrective Action Plan (Final)* (EPA 1994a)

- *RCRA Corrective Action and CERCLA Remedial Action Reference Guide* (DOE-EH 1994)

- *Data Quality Objectives Process for Superfund, Interim Final Guidance* (EPA 1993)

- *Hanford Site Risk Assessment Methodology* (DOE-RL 1995).

The remainder of this chapter discusses issues influencing the coordination of a RCRA TSD closure/postclosure plan with a RCRA past-practice work plan, supporting documents, objectives, and organization of the work/closure plan.

1.1 RCRA PAST-PRACTICE WORK PLAN AND RCRA TSD CLOSURE/POSTCLOSURE PLAN COORDINATION

As mentioned above, the Tri-Party Agreement requires a procedure to coordinate TSD unit closure or permitting activities with the past-practice investigation and remediation activity to prevent overlap and duplication of work, thereby economically and efficiently addressing the contamination. This work/closure plan will achieve this coordination; however, the process involves resolving several issues prior to formulating the strategy for the corrective measures study (CMS). These issues include terminology, document format, and sampling strategy, and are discussed further in the following sections.

1.1.1 Terminology

Table 1-1 lists the terminology related to corrective/remedial actions for RCRA past-practice, RCRA TSD, and CERCLA past-practice waste management units. This document will employ the terminology for RCRA past-practice waste management units. It should be recognized that RCRA closure/postclosure plans do not currently utilize nomenclature for the many phases of the corrective investigation process. For example, closure/postclosure plans do not refer to the characterization activities as a RCRA facility investigation (RFI). Additionally, RCRA closure/postclosure plans do not currently employ terminology such as CMS, interim corrective measures (ICMs), or corrective measures implementation (CMI).

The terminology and acronyms listed in the RCRA past-practice column of Table 1-1 will be used frequently throughout this document and therefore should be well understood with respect to their applicability to a closure/postclosure plan.

1.1.2 Document Format

The document formats for a 200-BP-11 Operable Unit RFI/CMS work plan and a 216-B-3 Main Pond, 216-B-63 Trench, or 216-A-29 Ditch RCRA TSD closure/postclosure plan would be considerably different, and it is the purpose of this section to discuss these differences and how they will be resolved.

A 216-B-3 Main Pond, 216-B-63 Trench, or 216-A-29 Ditch RCRA TSD closure/postclosure plan would be a single document describinb all the anticipated closure/postclosure activities (e.g., sampling and analysis, excavations, removal, decontamination, and administrative clean closure) for the TSD unit based on process knowledge. The closure/postclosure plan would also include closure/postclosure contingencies in case the anticipated closure scenario could not be fully implemented. The major dilemma with this type of format is that the document is written prior to soil sampling and data evaluation, presumes closure activities in the absence of data, and must be revised after the analytical data have been evaluated. In the revision, comparisons are made between the

concentrations of the potential constituents of concern and their respective cleanup standards, and the document is modified to fit a closure/postclosure scenario based on the real data.

On the other hand, the RFI/CMS process for RCRA past-practice units utilizes multiple documents to plan sampling and analysis, evaluate data, study alternatives, and finally reach corrective measure implementation for the operable unit. The documents of the RFI/CMS process include a work plan, facility investigation report, CMS, and an ICM plan. A dilemma with this format is that the many documents have different numbers and must therefore be cross referenced throughout the RFI/CMS process.

This work/closure plan will employ a format similar to the past-practice format, but will utilize a "volumed" approach. That is, future related documents (e.g., facility investigation report) will maintain the same document number but will have a different volume number. This format will fulfill the current requirements for both the RCRA past-practice RFI/CMS work plan and the RCRA TSD closure/postclosure plan. Table 1-1 provides a correlation between the sections of a closure/postclosure plan and the RCRA past-practice documents. Also, because the CERCLA (RI/FS) process is widely used at the Hanford Site, a correlation to CERCLA past-practice documents is provided in Table 1-1. Additionally, Table 1-1 provides the volume of this document for which the coinciding part(s) of a closure/postclosure plan will appear. Following is the proposed method for assembling the volumes of this document.

- *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*, Volume 1, "Facility Investigation and Sampling Strategy"

- *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*, Volume 2, "Facility Investigation Report"

- *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*, Volume 3, "Corrective Measures Study Report and Corrective Measures Plan"

- *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*, Volume 4, "Corrective Measures Design Report."

The schedule in Chapter 6 provides the timeline for the above volumes. Draft A of Volume 1 was submitted to the regulators in September 1994 in accordance with Tri-Party Agreement Milestone M-13-07. Draft B of Volume 1 will be submitted to the regulators by June 1995 in accordance with Tri-Party Agreement Milestone M-20-36. After regulator comments are resolved, Volume 1 will be issued to the public for a 30-day review and comment period. Following implementation of Volume 1 (i.e., sampling, analysis, and validation), Volumes 2 and 3 will be prepared and submitted to Ecology and EPA, but will not be issued to the public for review. After approval of the CMS and Corrective Measures Proposed Plan (Volume 3), the Hanford Facility RCRA Permit will be modified to incorporate or reference the pertinent material provided in Volumes 1, 2, and 3. The public review cycle for Volumes 2 and 3 will be achieved during the 60-day review and comment period of the draft Hanford Facility RCRA Permit modification. The approval of the draft Hanford Facility RCRA Permit modification by the public will be regarded as the completion of the closure/postclosure plans for the 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch TSD units. The corrective measures design report (Volume 4) will be included with

this work/closure plan to retain the grouping of relevant corrective measures information for the operable unit and TSD units.

1.1.3 Sampling Strategy

There is a major difference between the sampling approach used at RCRA past-practice and RCRA TSD waste management units. Past-practice waste management units utilize an analogous site concept to characterize units. This concept is discussed in the *Hanford Past-Practice Strategy* (DOE-RL 1991a) and Section 8.3 of the *B Plant Source Aggregate Area Management Study Report* (DOE-RL 1993b). The basis of the concept is to locate the highest levels of contamination and apply those levels to analogous (i.e., similar structure and disposal practices) waste sites and evaluate the feasibility of ICMs for the units, to provide data to support the CMS, and to revise and optimize the conceptual model as discussed in Section 4.2.

RCRA TSD unit sampling strategies do not employ the analogous site concept. The objective of RCRA TSD sampling and analysis is to make final, not interim, corrective action decisions. Therefore, RCRA TSD sampling and analysis is designed to be more extensive to support these final decisions.

This work/closure plan proposes a sampling strategy that will fulfill both the past-practice and TSD unit sampling needs. The sampling approach will provide a fairly rigorous sampling design on the TSD portions of the operable unit and a somewhat less-stringent ~~facility~~ field investigation on the past-practice waste units. In both cases, the sampling events are targeted towards finding the highest levels of contamination based on process knowledge and field-screening instruments. However, the sampling approach for TSD units will strive to provide a more complete representation of site conditions, not just contaminant maximums. Additionally, the data quality objectives (DQOs) and sampling strategy discussed in Chapters 4 and 5, respectively, are targeted towards making final corrective measure decisions for the 200-BP-11 Operable Unit, including the 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 TSD units.

1.2 SUPPORTING DOCUMENTS

The primary supporting documents for this work/closure plan are the *B Plant Source Aggregate Area Management Study Report* (DOE-RL 1993b) and the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). Additionally, the *PUREX Source Aggregate Area Management Study Report* (DOE-RL 1993d) was utilized to acquire information regarding the 216-A-29 Ditch and to further assess potential contaminants of concern for the operable unit. Detailed information regarding source data, background information, physical setting, known and suspected contamination, conceptual models, and past-practice strategies is provided in these documents and will be summarized in the following chapters. A health and safety plan is provided in Appendix A, and a project management plan is provided in Appendix B. These five supporting documents are referenced throughout this document to moderate text and create a concise work/closure plan.

The B Plant Source Aggregate Area Management Study (AAMS) Report compiled and evaluated existing data and information to support the *Hanford Past-Practice Strategy* (DOE-RL 1991a) decision-making process. A primary task in this process was to assess each waste management unit and unplanned release within the aggregate area to determine the most expeditious path for corrective

action within the statutory requirements of CERCLA (of course, this work/closure plan must ensure that these statutory requirements also fall within the requirements of WAC 173-303 for RCRA TSD units and RCRA corrective action for RCRA past-practice units). A data evaluation process has been established that uses the existing data to develop preliminary recommendations on the appropriate remediation process path for each waste management unit. This data evaluation process is a refinement of the *Hanford Past-Practice Strategy* (Figure 1-3) and establishes criteria for selecting appropriate Hanford past-practice strategy paths (expedited response actions [ERAs], ICMs, limited field investigations (LFIs), and final remedy selection) for individual waste management units and unplanned releases within the 200 Areas.

The *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a) provides the closure strategy for the 216-B-3 Expansion Ponds TSD unit, which includes the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. In support of closure of the expansion ponds, a significant number of surface and subsurface samples were taken from these waste management units. The samples were analyzed for both dangerous waste and radionuclide contaminants. However, it should be noted that these ponds were assessed for dangerous waste contamination under the authority of RCRA, and that the radionuclide contamination assessment will not be totally fulfilled until the 200-BP-11 Operable Unit investigation is complete. The expansion ponds closure plan (DOE-RL 1994a, Appendices C, D, and E) provides the analytical results from the samples. It is anticipated that clean closure of the expansion ponds will result from the activities and evaluation associated with the expansion ponds closure plan.

The Tri-Party Agreement is also a key supporting document. The document was referred to previously in this chapter with respect to its urgency for coordination of the operable unit RFI/CMS and TSD investigations. The Tri-Party Agreement also provides the Community Relations Plan for the Hanford Site.

The EPA maintains authority for CERCLA, and Ecology implements RCRA under the authority of the state's dangerous waste program (WAC 173-303). Additionally, Ecology has been granted authority to implement the most recent amendments to RCRA, the HSWA. However, Ecology does not have authorization to implement the EPA's radioactive mixed waste program. Pursuant to the Tri-Party Agreement, the 200-BP-11 Operable Unit is subject to RCRA corrective action authority with Ecology as the lead agency.

1.3 OBJECTIVES AND SCOPE

The purpose of this work/closure plan and attached or referenced supporting project plans is to establish the objectives, tasks, and schedule for conducting the RFI/CMS for the 200-BP-11 Operable Unit. The operable unit RFI/CMS will include the facility investigations and closure/postclosure strategies for the 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 RCRA TSD units. The 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are anticipated to be clean closed via the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a) and therefore will not be evaluated for dangerous waste constituents under the operable unit investigation. However, the expansion ponds will be further assessed for radionuclide contamination with the operable unit.

The objective of the work/closure plan is to develop a program to investigate the extent of dangerous and radioactive constituents in the surface and subsurface soils in the 200-BP-11 Operable Unit. The analytical results provide data to evaluate and implement corrective actions as needed to ensure the

protection of human health and the environment in the operable unit. These preliminary corrective actions are discussed in Chapter 7 of the B Plant AAMS Report (DOE-RL 1993b) and will be further developed and discussed in Volume 3 of this document. The analytical results from the facility investigation will also provide data to refine the conceptual model (Section 4.2) and will be the basis for the CMS.

The predominant areas to be evaluated for dangerous and radionuclide constituents are the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches; the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches; the 216-B-63 Trench; the 216-A-29 Ditch; and the 216-B-3 Main Pond. As mentioned above, the expansion ponds are expected to be clean closed for dangerous waste and will not be further evaluated for dangerous waste constituents. However, the 216-B-3A Expansion Pond will be evaluated for radionuclide contamination and considered analogous to the 216-B-3B and 216-B-3C Expansion Ponds.

Note that there are an additional three TSD units in the operable unit that will not be addressed by this work/closure plan: the Liquid Effluent Retention Facility (LERF), Effluent Treatment Facility (ETF), and Purgewater Storage Tanks (see Plate 1). These units operate individually under the Hanford RCRA Facility Part A permit and will be closed at a later date. The Dangerous Waste Permit Application (Form 3) for each of these units is provided in Appendix C.

The remediation and closure goals for the 200-BP-11 Operable Unit are as follows.

- Clean close the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds via the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a) in accordance with WAC 173-303.

- To support closure of the 216-B-3-3 Ditch and 216-B-3 Main Pond TSD unit, discontinue effluent discharge to the 216-B-3-3 Ditch and 216-B-3 Main Pond. (This action was accomplished in the spring of 1994; see BHI 1995a.)

- As an interim measure, stabilize (cover with clean soil) the inactive 216-B-63 Trench, 216-B-3-3 Ditch, and 216-B-3 Main Pond to prevent dispersal of potential radionuclide contamination from the surface soil and sediments. (This action was accomplished in 1994; see BHI 1995a.)

- Obtain samples from surface soil, boreholes, and test pits (or auger holes), as discussed in Chapters 4 and 5, and analyze the samples to characterize the operable unit (including TSD units under investigation) surface and vadose zone for radiological and chemical contaminants.

- Assess the 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch TSD units for RCRA clean closure (WAC 173-303) after the facility investigation analytical results are evaluated. (Clean closure as used in this context means that no dangerous waste or dangerous waste-contaminated soil, structures, or equipment will remain onsite that pose a threat to human health or the environment. Clean closure does not include radioactive contamination.)

- Determine RCRA past-practice and RCRA TSD corrective measure requirements (CMRs).

- Perform a risk assessment and prepare a CMS report.

- Propose and implement corrective actions for the operable unit (including the TSD units under investigation).

1.4 200-BP-11 OPERABLE UNIT WORK/CLOSURE PLAN AND LATER ACTIVITIES

Figure 1-4 depicts the steps that will lead toward corrective action of the waste management units at the Hanford Site according to the *Hanford Past-Practice Strategy* (DOE-RL 1991a). The process is shown commencing with the AAMS report and finishing with the implementation of corrective actions. The following discussion describes each step.

(1) The remediation process is shown beginning with the AAMS report. The AAMS report includes the analysis of existing data, a preliminary conceptual model, identification of data needs, and evaluation of data adequacy. Therefore, the AAMS report fulfills the historical search (RCRA facility assessment) needed for the operable unit. From the data collection and evaluation, the AAMS report makes recommendations for ERAs, ICMs (or interim remedial measures), and final remedy selection paths. In cases where there are inadequate data, a facility investigation is recommended so that a determination for an ICM or final corrective measure (final remedy) selection can be made. This is the pathway identified for the 200-BP-11 Operable Unit.

Figure 1-4 shows the decision point where the determination is made of the sufficiency of data for a corrective measure (or ICM). In the AAMS report process, this determination was made for certain waste management units. Obtaining the necessary information to make this determination is the subject of this *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*, Volume 1.

(2) RFI/CMS Work/Closure Plan

The purpose of the RFI/CMS work/closure plan is to provide the rationale and direction for collecting information at waste management units designated for characterization of dangerous and radioactive waste. As will be described in later sections of this work/closure plan, strategies are developed for acquiring data at representative (analogous) waste management units that are suspected to contain higher levels of contamination than other waste management units. These strategies will support the refinement of the conceptual model (Section 4.2) for the operable unit and the CMS, which should lead to corrective measure and closure activity decisions for the entire operable unit

A DQO process was performed for the operable unit (see Section 4.2) including the 216-B-3-3 Ditch/216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch RCRA TSD units. During the process, several agreements were reached among Ecology, EPA, the DOE, Richland Operations Office (DOE-RL), and the Environmental Restoration Contractor (ERC) with respect to the facility investigation, and these agreements are provided in Appendix D. These agreements are incorporated into this work/closure plan and are intended to provide sufficient data to make interim and/or final corrective measure decisions for the operable unit.

(3) Facility Investigation

The primary goals of the facility investigation described in this work/closure plan are to sufficiently define and quantify the conceptual model with respect to the dangerous and radioactive waste distribution throughout the operable unit, and to provide data sufficiency such that a CMS can be performed and implemented for both the RCRA past-practice and

RCRA TSD waste management units. This will involve identifying maximum chemical and radioactive contaminant concentrations, vertical distributions and, to a lesser extent, horizontal distributions.

(4) Risk-Based Cleanup Standards

The RCRA past-practice RFI/CMS and RCRA TSD closure processes employ risk-based cleanup standards for the CMS and closure evaluation, respectively. The risk-based cleanup standards for RCRA dangerous waste are discussed in WAC 173-340, "The Model Toxics Control Act Cleanup Regulation" (Ecology 1994c). Radionuclide risk-based cleanup standards are discussed in the *Hanford Site Risk Assessment Methodology* (DOE-RL 1995).

There are two cleanup standards to consider for the 200-BP-11 Operable Unit waste management units: residential and industrial. Both residential and industrial cleanup standards are listed in Appendix D (DQO Agreements) for the 200-BP-11 potential dangerous and radioactive contaminants of concern. Since the future land use of the operable unit is assumed to be "industrial" (see assumptions in Appendix D), dangerous and radioactive contaminant concentrations below industrial cleanup standards may lead to a "no action" corrective measure decision. If dangerous waste concentrations are below residential cleanup standards, clean closure of the RCRA TSD units may be pursued. In any case, these types of decisions will be further developed and explained during the CMS.

(5) Corrective Measures Study and Corrective Measures Plan

After the evaluation of analytical data from the facility investigation, a CMS will be conducted to identify suitable corrective measure alternatives for each waste management unit or group of similar waste management units. The CMS is conducted to provide a comprehensive evaluation of the corrective measure/closure alternatives. The CMS concludes with a report describing the feasibility of the alternatives and a Corrective Measures Plan (CMP) that will outline the corrective actions to be taken at the 200-BP-11 Operable Unit. These corrective actions will include closure and postclosure actions for the RCRA TSD units. The CMS report and CMP will progress through a DOE and regulator review and comment cycle, after which it will be incorporated into the Hanford Facility RCRA Permit.

(6) Hanford Facility RCRA Permit Modification

The Hanford Facility RCRA Permit (Ecology 1994b) is the legal document describing the context and plan for implementing the corrective measure(s), closure, and postclosure actions to be taken at the RCRA past-practice and RCRA TSD units within the 200-BP-11 Operable Unit. A draft permit modification will be prepared to incorporate the "agreed-to" corrective measure, closure, and postclosure actions outlined within the CMS report and CMP. The permit will be officially revised after review, comment, and acceptance of the draft permit modification by the public.

(7) Corrective Measures Implementation

The purpose of the corrective measures implementation (CMI) portion of the RCRA corrective action process is to design, construct, operate, maintain, and monitor the performance of the corrective measure(s) indicated in the Hanford Facility RCRA Permit

(Ecology 1994b). The implementation process will include preparation of preliminary and final design documents and other supporting plans. The scope of work necessary to implement the 200-BP-11 Operable Unit corrective measures will be further developed during the CMS and CMP.

1.5 ORGANIZATION OF THE WORK/CLOSURE PLAN

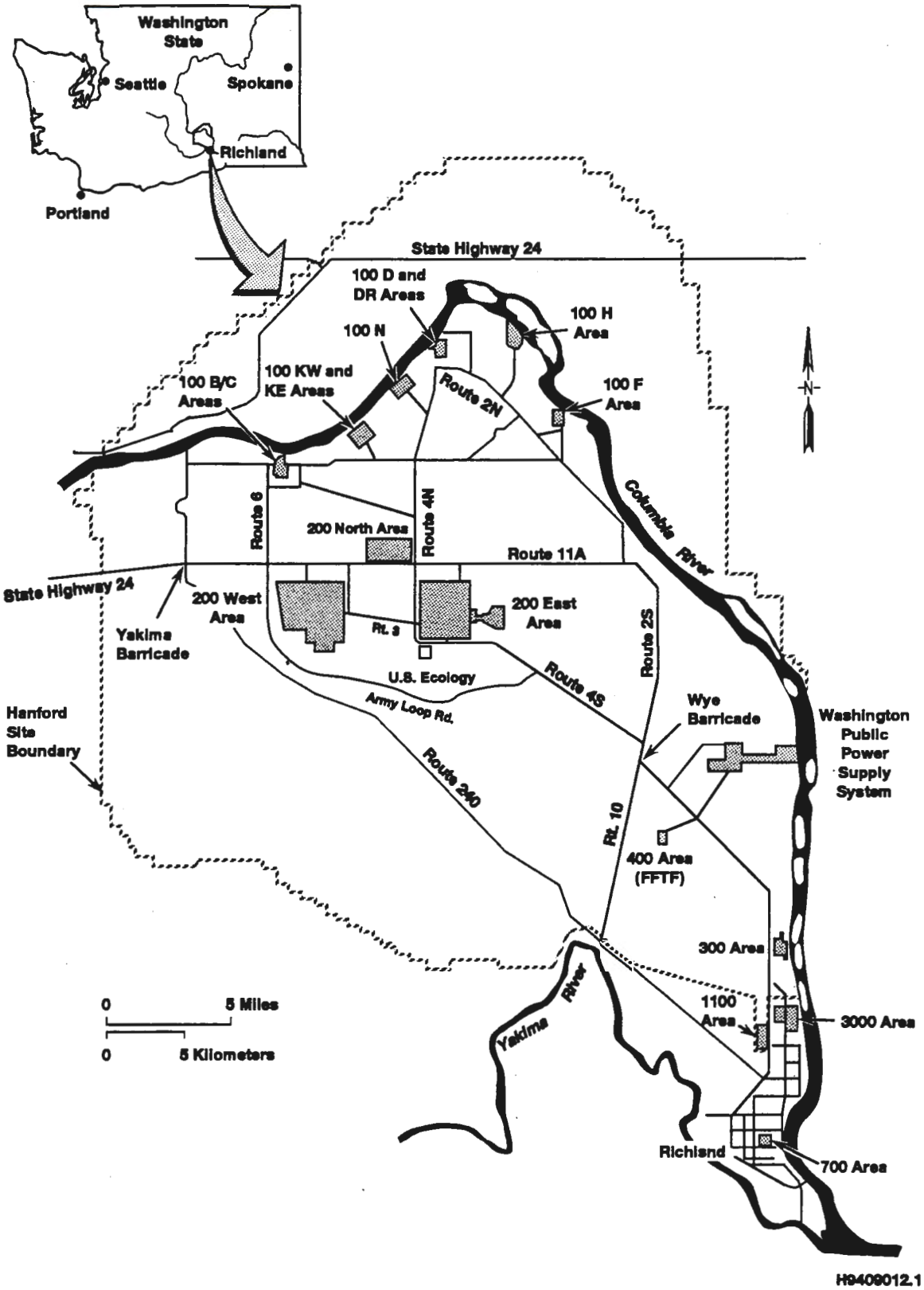
Volume 1 of this work/closure plan is composed of seven chapters, including this introduction.

Chapters 2 and 3 predominately summarize, or refer to, information provided in the B Plant AAMS Report (DOE-RL 1993b) and the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). Chapter 2 provides the 200-BP-11 Operable Unit history and description, including topics such as physical characteristics, clean closure of expansion ponds, and interim stabilization activities. Chapter 3 provides an initial evaluation (which primarily discusses known and suspected contamination) and potential CMRs and identifies preliminary corrective measure objectives. Chapter 4 provides the work plan rationale including DQOs. Chapter 5 provides the RFI/CMS tasks. Key topics include the ~~facility~~ field investigation, the work breakdown structure, ICMs and implementation, and the CMS report. Chapter 6 presents the project schedule for the work/closure plan activities, and Chapter 7 lists the references. Appendix A contains the Health and Safety Plan, Appendix B contains the Program Management Plan, and Appendix C contains the RCRA TSD Form 3's for the Hanford Site Part A Permit. Appendix D contains the DQO agreements, Appendix E contains the Quality Assurance Project Plan (QAPjP), and Appendix F contains the Information Management Overview.

1.6 QUALITY ASSURANCE

The *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan* and its supporting project plans have been developed to meet specific EPA and Washington State guidelines for format and structure, within the overall quality assurance (QA) program structure mandated by DOE-RL for all activities at the Hanford Site. These DOE mandates include DOE Order 5700.6C, *Quality Assurance* (DOE 1991), and other QA guidance documents as applicable, e.g., the *Hanford Analytical Services Quality Assurance Plan* (HASQAP) (DOE-RL 1994b). The 200-BP-11 Operable Unit QAPjP (Appendix E) supports the field sampling program described in the RFI/CMS Tasks (Chapter 5). It defines the specific means that will be used to ensure that the sampling and analytical data obtained as part of the facility investigation will effectively support the purposes of the investigation. As required by the Bechtel Hanford, Inc. (BHI) *Quality Management Plan* (BHI 1994b) for RFI/CMS activities and the Tri-Party Agreement (Ecology et al. 1994), the structure and content of the QAPjP are based on *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (EPA 1983a). Where required, the QAPjP invokes appropriate procedural controls selected from those listed in the BHI *Quality Management Plan* (BHI 1994b) for RFI/CMS activities or developed to accommodate the unique needs of this investigation.

Figure 1-1. Hanford Site Map.



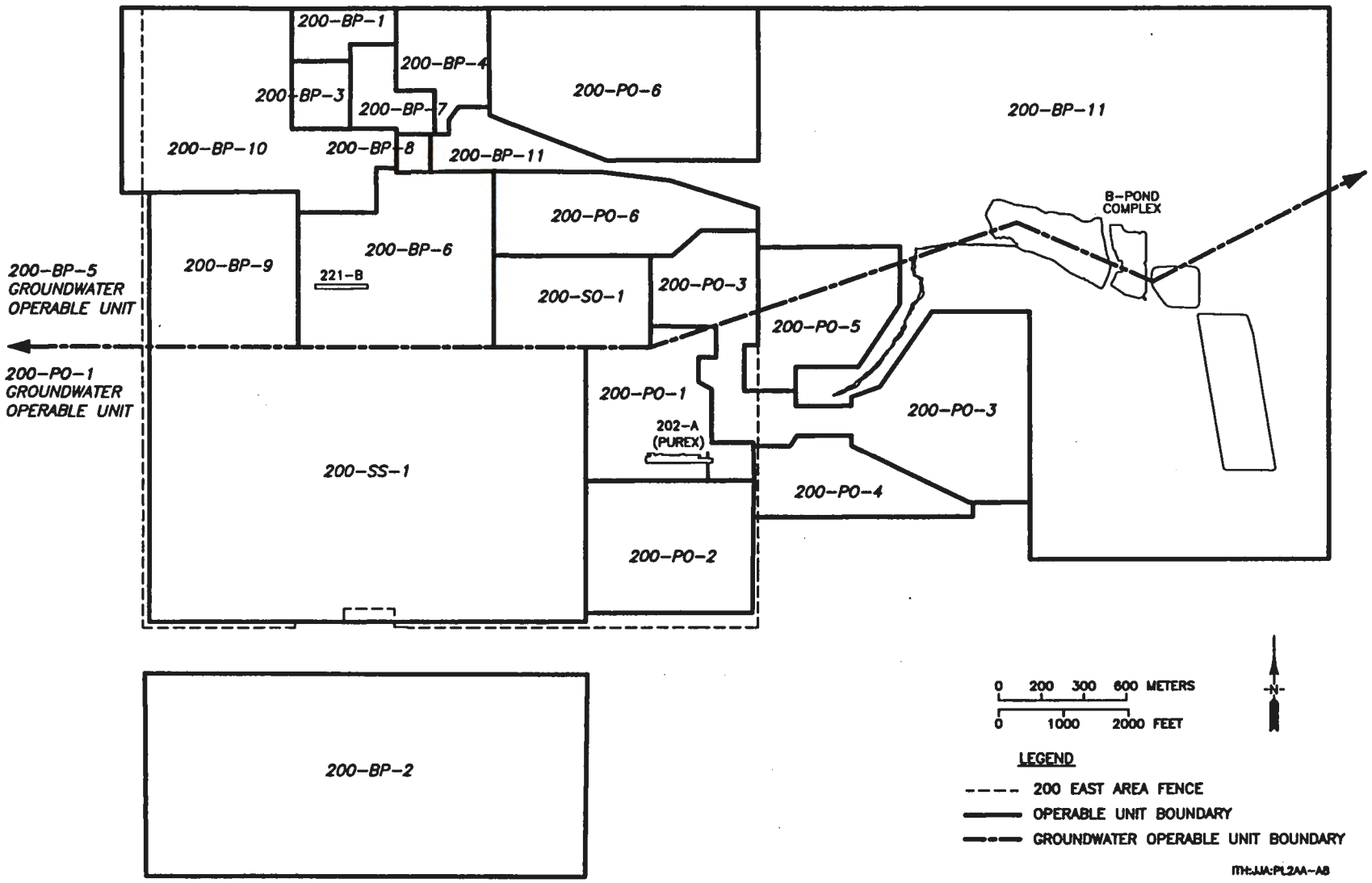
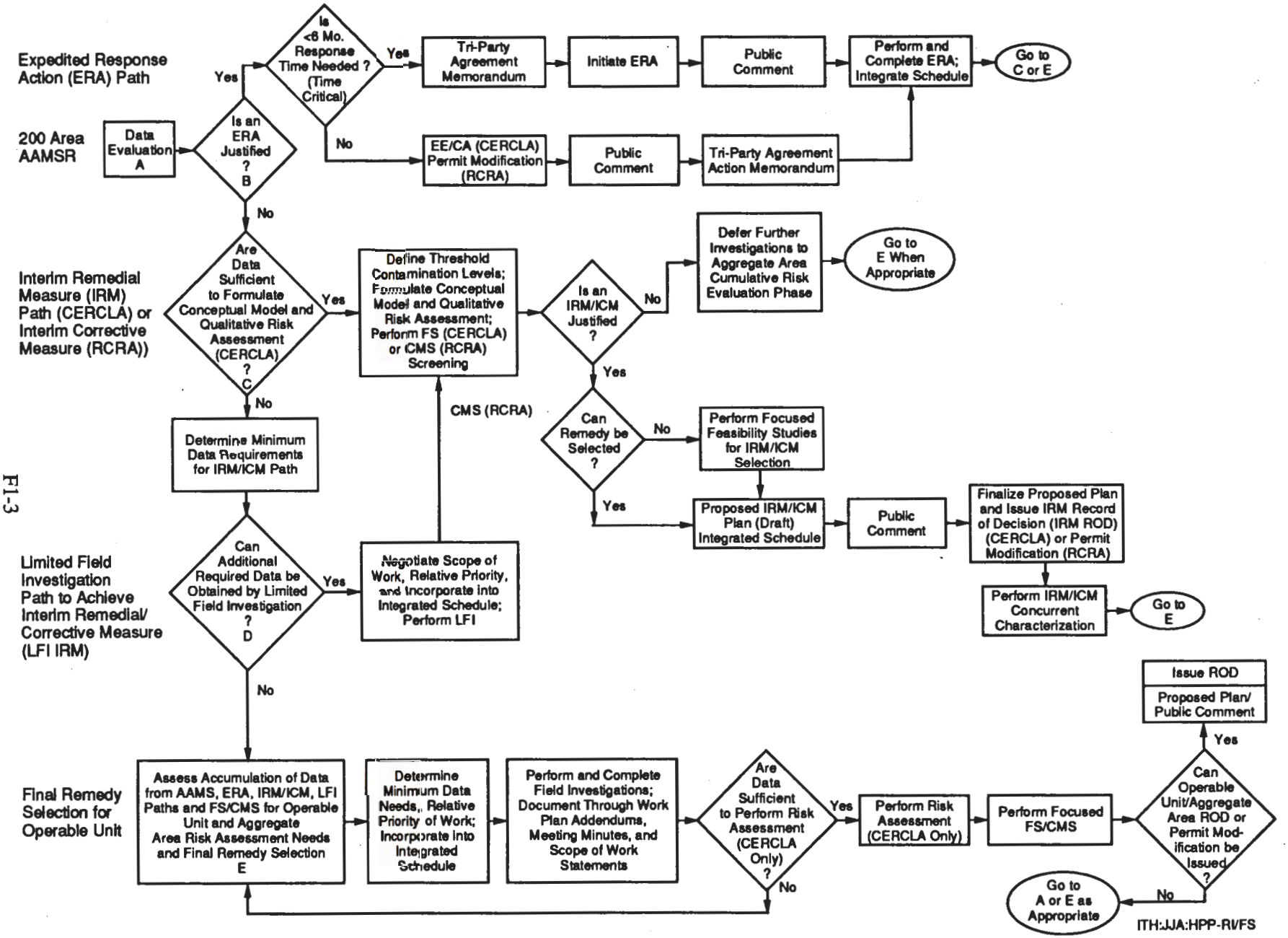


Figure 1-2. Source Operable Units in the 200 East Area.

Figure 1-3. Hanford Past-Practice Strategy Flowchart (DOE-RL 1991b).



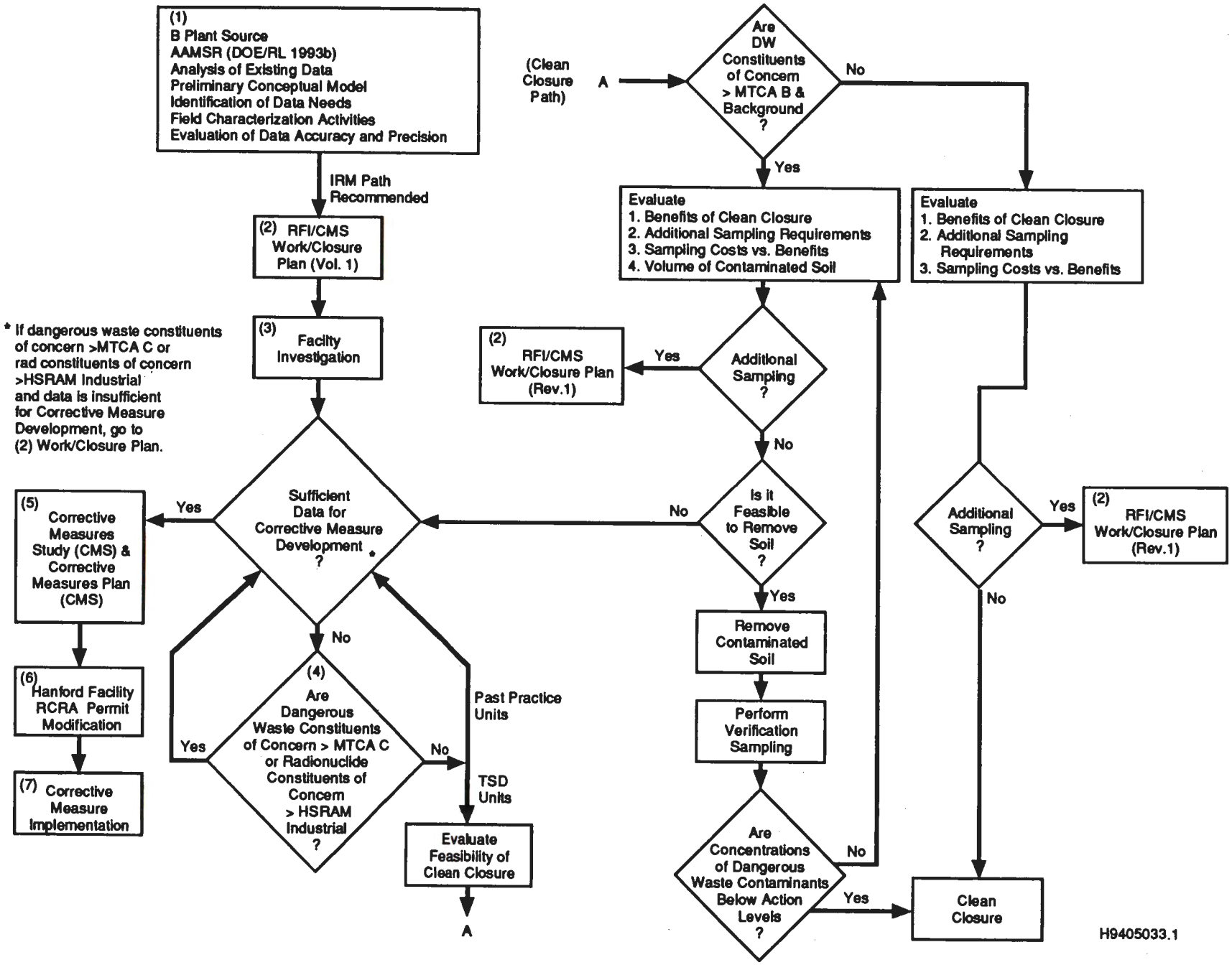


Figure 1-4. 200-BP-11 Operable Unit Work/Closure Plan Interrelationships.

Table 1-1. The Correlation Between RCRA TSD, RCRA Past-Practice, and CERCLA Past-Practice Processes and Terminology. (sheet 1 of 2)

Objective	RCRA TSD Closure/ Postclosure Plan Sections and Titles[a]	RCRA Past-Practice Work Plan	CERCLA Past-Practice Work Plan
1. Identify Releases Needing Further Investigation[b]	Hanford RCRA Facility Part A Permit (Form 3's)	RCRA Facility Assessment (RFA)[b]	Preliminary Assessment/Site Investigation (PA/SI)[b]
2. Characterize Nature, Extent, and Rate of Release[b]	Section 2.0, "Facility Description and Location Information;" Section 3.0, "Process Information;" Section 4.0, "Waste Characteristics"	RCRA Facility Investigation (RFI)[b]	Remedial Investigation (RI)[b]
3. Further Characterize Contaminant Constituents and Concentrations	Section 3.0, "Process Information;" Section 4.0, "Waste Characteristics"	Facility Investigation and Sampling Strategy Work Plan (Volume 1)	Limited Field Investigation (LFI) and Sampling Strategy Work Plan
4. Report Extent and Risk of Contamination	Appendices Containing Analytical Results and Conclusions	Facility Investigation Report (Volume 2)	Field Investigation and Risk Assessment Report
5. Evaluate Alternatives and Identify Preferred Remedy[b]	Section 6.0, "Closure Performance Standards;" Section 7.0, "Closure Activities;" Section 7.4, "Closure Requirements for Landfills"	Corrective Measures Study (CMS)[b] and Corrective Measures Proposed Plan (Volume 3)	Feasibility Study (FS)[b]
6. Determine Potential Government, State, and/or Local Regulations and Requirements	Section 6.0, "Closure Performance Standards;" Section 7.4, "Closure Requirements for Landfills"	Corrective Measure Requirements (CMRs) (Volume 3)	Applicable and/or Relevant and Appropriate Requirements (ARAR)
7. Extensive Evaluation of Selected Remedy	Section 6.0, "Closure Performance Standards;" Section 7.4, "Closure Requirements for Landfills"	Focused or Final Corrective Measures Study (CMS) (Volume 3)	Focused or Final Feasibility Study (FS)
8. Expedite Stabilization and/or Cleanup of Contamination	Section 7.0, "Closure Activities" Interim Stabilization Activities	Expedited Response Action (ERA)	Expedited Response Action (ERA)
9. Interim Stabilize and/or Cleanup Contamination	Section 7.0, "Closure Activities"	Interim Corrective Measure (ICM)	Interim Remedial Measure (IRM)

Table 1-1. The Correlation Between RCRA TSD, RCRA Past-Practice, and CERCLA Past-Practice Processes and Terminology. (sheet 2 of 2)

Objective	RCRA TSD Closure/ Postclosure Plan Sections and Titles[a]	RCRA Past-Practice Work Plan	CERCLA Past-Practice Work Plan
10. Propose Method for Stabilization and/or Cleanup of Contamination	Section 7.0, "Closure Activities"	Proposed ICM Plan	Proposed IRM Plan
11. Approve Stabilization and/or Cleanup Method	Notice of Deficiency (NOD) Cycle	Hanford Facility RCRA Permit Modification	Record of Decision (ROD)
12. Design Approved Stabilization and/or Cleanup Method	Section 7.0, "Closure Activities"	ICM Design Report	IRM Design Report
13. Realize Stabilization and/or Cleanup Method	Section 7.0, "Closure Activities;" Section 8.0, "Postclosure Plans"	ICM Implementation	IRM Implementation
14. Propose Final Remedy Selection (FRS)[b]	Section 5.0, "Groundwater Monitoring;" Section 7.0, "Closure Activities;" Section 8.0, "Postclosure Plan" Draft RCRA Site-Wide Permit Modification	Draft Hanford Facility RCRA Permit Modification[b]	Remedial Action Plan[b]
15. Public Participation[b]	Public Comment	Public Comment[b]	Public Comment[b]
16. Authorize Selected Remedy[b]	Modify RCRA Site-Wide Permit	Hanford Facility RCRA Permit Modification[b]	Remedial Action (or operable unit) ROD[b]
17. Design Chosen Remedy[b]	N/A	Corrective Measures Design Report (Volume 4)	Remedial Action Design (RD) Report[b]
18. Implement Chosen Remedy[b]	Site Clean Closure (withdraw Form 3 from the Hanford Facility Part A Permit); Close as Landfill (Postclosure Permit Required)	Corrective Measures Implementation (CMI)[b] (Corrective Action)	Remedial Action (RA) Implementation[b]

[a]Sections and titles acquired from the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a).
[b]Tri-Party Agreement, Table 7-2 (Ecology et al. 1994).

2.0 200-BP-11 OPERABLE UNIT DESCRIPTION AND HISTORY

Section 2.1 of this chapter provides the descriptions and histories of the RCRA past-practice and RCRA TSD waste management units in the 200-BP-11 Operable Unit. These descriptions and histories include current information regarding the waste management units and summaries from the *B Plant Source Aggregate Area Management Study Report* (DOE-RL 1993b), *PUREX Source Aggregate Area Management Study Report* (DOE-RL 1993d), and the *Waste Information Data System* (WHC 1991c). Section 2.2 discusses the RCRA TSD permitting history in the operable unit, and Sections 2.3, 2.4, and 2.5 discuss the pipelines, structures and fixtures, and piezometers, respectively. Lastly, Section 2.6 describes the physical setting of the operable unit, including meteorology, geology, and hydrogeology.

2.1 WASTE MANAGEMENT UNIT DESCRIPTION AND HISTORY

The waste management units within the 200-BP-11 Operable Unit were all surface impoundments (except unplanned releases) designed to receive effluents generated by 200 East Area operations, most of which originated from the Plutonium/Uranium Extraction (PUREX) Plant and B Plant. The waste management units are grouped as follows for discussion based on their being either a RCRA past-practice unit or a RCRA TSD unit: 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches; 216-B-63 Trench; 216-A-29 Ditch; 216-B-3-1 and 216-B-3-2 Ditches; 216-B-3-3 Ditch and 216-B-3 Main Pond; 216-B-3A, 216-B-3B, and 216-B-cO Expansion Ponds; 216-E-28 Contingency Pond; and Unplanned Releases (UN-200-E-14, UPR-200-E-32, UPR-200-E-34, UPR-200-E-138, UPR-200-E-51, and UN-200-E-92). Figure 2-1 summarizes the operational history and key events for the waste management units, Table 2-1 summarizes the dimensions for each waste management unit, and Plate 1 shows the location of each waste management unit. Additional information regarding the waste management unit descriptions and history may be found in Sections 2.3 and 4.1 of the B Plant Aggregate Area Management Study (AAMS) Report (DOE-RL 1993b) and PUREX Plant AAMS Report (DOE-RL 1993d).

2.1.1 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches

The 216-B-2-1 Ditch, a RCRA past-practice waste management unit, was operational from April 1945 to November 1963. It was an open, unlined earthen ditch approximately 4.6 m (15 ft) wide at ground level, 1.8 m (6 ft) deep, and 1,067 m (3,500 ft) long. The ditch conveyed B Plant (221-B Building) steam condensate, process cooling water, and chemical sewer effluents and water from the 284-E Powerhouse. After March 1952 until its closing, it also conveyed 241-CR Vault cooling water (WHC 1991c). The ditch discharged into a 53-cm (21-in.) vitrified clay pipe (VCP) that released to the 216-B-3-1 Ditch.

The 216-B-2-1 Ditch was decommissioned in November 1963 as a result of Unplanned Release UPR-200-E-32 (an estimated 30 Ci of cerium-144 and 0.05 Ci of strontium-90). The release caused gross contamination of the 207-B Retention Basin and the head end of this ditch. After damming the ditch 300 m (1,000 ft) from its head end, the contaminated retention basin water was flushed into the ditch. In 1964, after flushing the retention basin, the first 305 m (1,000 ft) of the ditch was backfilled. In the fall of 1973, further action was completed to cover the unit with a plastic root barrier, which included leveling the ground surface, spreading a 10-cm (4-in.) sand cushion on which

10-mil-thick plastic sheeting was laid, and spreading a 46-cm (18-in.) cover of sand and a 10-cm (4-in.) topping of gravel to prevent erosion by wind (WHC 1991c). In 1986, because of the recurrence of contaminated vegetation, the ditch was covered with an additional 61 cm (24 in.) of soil. Currently, the 216-B-2-1 Ditch surface area is classified as an area of underground contamination.

The 216-B-2-2 Ditch, a RCRA past-practice waste management unit, was excavated to replace the 216-B-2-1 Ditch and was active from November 1963 to May 1970. It was an open, unlined earthen ditch approximately 4.6 m (15 ft) wide at ground level, 1.8 to 2.4 m (6 to 8 ft) deep, and 1,067 m (3,500 ft) long. The 216-B-2-2 Ditch converged with the abandoned 216-B-2-1 Ditch about 488 m (1,600 ft) downstream. The 216-B-2-2 Ditch transported B Plant cooling water, steam condensate, and chemical sewer effluent; 284-E Powerhouse waste and steam condensate; and 241-CR Vault cooling water until January 1965. From January 1965 to November 1967, the 216-B-2-2 Ditch also carried 241-BY In-Tank Solidification (ITS) Unit cooling water. From November 1967 to February 1968, the 216-B-2-2 Ditch did not carry 284-E Powerhouse waste or B Plant steam condensate. From February 1968 to April 1970, the 216-B-2-2 Ditch also carried 241-BY Tank Farm ITS Unit 2 cooling water. After April 1970, the 216-B-2-2 Ditch also received cleanup waste (UPR-200-E-138) from the 207-B Retention Basin (WHC 1991c). The 216-B-2-2 Ditch discharged into a 53-cm (21-in.) VCP that released to the 216-B-3-1 until July 1964, then to the 216-B-3-2 Ditch until September 1970.

The 216-B-2-2 Ditch was decommissioned and backfilled in 1970 as a result of Unplanned Release UPR-200-E-138, which released approximately 1,000 Ci of strontium-90 to the 216-B-2-2 Ditch on March 22, 1970. On March 23, 1970, earthen dams were built to keep as much contamination out of the 216-B-3 Main Pond as possible (DOE-RL 1993b). The exact locations of these dams are not known. In 1970, the 216-B-2-2 Ditch was backfilled to grade with 2.4 m (8 ft) of clean fill material. In 1973, the first 731 m (2,400 ft) of the 216-B-2-2 Ditch was covered with sand and plastic root liners because Russian thistles and willow trees growing on the backfilled area showed internal beta-gamma contamination up to a maximum of 3,000 ct/min. Since that time no contaminated vegetation has been found on the first 731 m (2,400 ft), but Russian thistles growing on the uncovered section of the 216-B-2-2 Ditch showed readings up to 1,500 ct/min beta-gamma contamination (DOE-RL 1993b). Because of this occurrence of contaminated vegetation, the 216-B-2-2 Ditch was restabilized with 61 cm (24 in.) of soil in 1986. Currently, the 216-B-2-2 Ditch surface area is classified as an area of underground contamination.

The 216-B-2-3 Ditch, a RCRA past-practice waste management unit, was excavated to replace the 216-B-2-2 Ditch as a result of UPR-200-E-138 and was operational from May 1970 to 1987. It was an open, unlined earthen ditch approximately 6 m (20 ft) wide at ground level, 1.8 to 2.4 m (6 to 8 ft) deep, and 1,220 m (4,000 ft) long. The 216-B-2-3 Ditch carried and percolated 241-CR Vault cooling water, B Plant cooling water, and 241-BY Tank Farm ITS-1 and ITS-2 unit condenser cooling water. In 1987, the 216-B-2-3 Ditch was decommissioned and backfilled with 26 m (8 ft) of clean soil. The 216-B-2-3 Ditch was replaced with a 56-cm (22-in.) high-density polyethylene (HDPE) pipeline commonly referred to as the 216-B-2 Pipeline or B Plant cooling water pipeline. The 216-B-2 Pipeline is located mostly south of and parallel to the 216-B-2-3 Ditch and is approximately 1,220 m (4,000 ft) long. The pipeline discharged to the 53-cm (21-in.) VCP and 216-B-3-3 Ditch until 1994, at which time the VCP was decommissioned, valved out, and isolated. The effluent from the 216-B-2 Pipeline is currently routed to the 61-cm (24-in.) corrugated metal pipe that discharges exclusively to the 216-B-3C Expansion Pond. The 216-B-2-3 Ditch and 216-B-2 Pipeline surface areas are currently classified as an area of underground contamination.

2.1.2 216-B-63 Trench

The 216-B-63 Trench, a RCRA TSD unit, was constructed in 1970 to receive chemical sewer wastes from B Plant (221-B Building). The 216-B-63 Trench is directly north of the 216-B-2-1 Ditch. It is an open, unlined earthen trench approximately 1.2 m (4 ft) wide at the bottom, 3 m (10 ft) deep, and 427 m (1,400 ft) long with a side slope of 1.5:1. There is a 5.1-cm (2-in.) rockfill for the first 3.1 m (10 ft) of the 216-B-63 Trench, and a 40.6-cm (16-in.) carbon steel, schedule 10 inlet pipe about 1.5 m (5 ft) long enters the 216-B-63 Trench 1 m (3 ft) below grade. The trench received effluents from the B Plant floor drains and chemical sewers, 225-B [Waste Encapsulation and Separations Facility (WESF)], and 271-B Buildings via the 207-B Retention Basin (DOE-RL 1991b). Average discharge into the 216-B-63 Trench ranged from 378,000 to 1,408,000 L/day (100,000 to 400,000 gal/day) during normal operations. Routine discharge to the 216-B-63 Trench was discontinued in February 1992. The trench was isolated and interim stabilized in December 1994 and January 1995 by Westinghouse Hanford Company (WHC) Operations. The weir box at the head end of the trench was filled with concrete, the valve stems at the 207-B Retention Basin were cut off, a pre-stabilization civil survey was performed, the trench was covered with clean soil and marked with concrete posts, and a post-stabilization civil survey performed.

In August 1970, the 216-B-63 Trench was dredged as a result of Unplanned Release UPR-200-E-138. The dredgings had readings of approximately 3,000 ct/min of beta-gamma activity and were buried in the 218-E-12B Burial Ground north of the 216-B-63 Trench in the 200-PO-6 Operable Unit.

2.1.3 216-A-29 Ditch

The 216-A-29 Ditch, a RCRA TSD unit, was in operation from November 1955 to July 1991. The unit was an earthen ditch that varied in width from 1.8 m to 24 m (6 ft to 80 ft) and was about 1,098 m (3,600 ft) long. For the first 213 m (700 ft), the 216-A-29 Ditch was relatively level and shallow. The lower 884 m (2,900 ft) was confined within a steep-sided canyon averaging 24 m (80 ft) in width and dropping nearly 30 m (100 ft) in elevation. The banks varied from about 1 m (2 to 3 ft) high at the head end to 4.6 m (15 ft) at the lower end of the 216-A-29 Ditch (WHC 1990).

The 216-A-29 Ditch received the PUREX Plant (202-A Building) chemical sewer and cooling water effluents, acid fractionator condensate, and seal cooling water from air-sampler vacuum pumps. In December 1957, the cooling water effluent was rerouted to the 216-A-25 Gable Mountain Pond via the new PUREX cooling water pipeline. In May 1977, an unplanned release (UPR-200-E-51) of 15 kg of cadmium nitrate was released to the 216-A-29 Ditch via the PUREX chemical sewer (WHC 1991c). The decommissioning of the 216-A-29 Ditch was realized in 1991 when the PUREX Plant chemical sewer line was directed to the PUREX cooling water line.

The 216-A-29 Ditch released to the 216-B-3-1 Ditch until July 1964, then to the 216-B-3-2 Ditch until September 1970, and then to the 216-B-3-3 Ditch until the decommissioning of the 216-A-29 Ditch in 1991. Because the ditch is a TSD unit, its decommissioning was necessary to support Tri-Party Agreement Milestone M-17-10, "Cease all liquid discharges to hazardous waste land disposal units unless such units have been clean closed in accordance with RCRA." After decommissioning of the 216-A-29 Ditch in 1991, it was interim stabilized as discussed in the *216-A-29 Interim Stabilization Final Report* (WHC 1992a). A summary of pertinent information from this report is provided in the remainder of this section.

Trees around the 216-A-29 Ditch were sampled and analyzed for gross alpha, beta, and gamma radiation, and the analytical results established concentrations at less than background. Therefore, the trees were handled as nonradioactive and nonhazardous. Trees more than 1.6 cm (4 in.) in diameter were removed to minimize potential voids in the backfill soil and burned in an area near the ditch. Smaller trees and other vegetation were incorporated into the soil by the mechanical action of the earthmoving equipment. Tree stumps were left in place to reduce the disturbance of potential radioactive material. Tree ash from the burn pile was surveyed, sampled, and analyzed, and results showed no evidence of radiation.

The PUREX Plant chemical sewer effluent was routed to the PUREX cooling water pipeline by opening and closing slide gates in a control box located upstream of the outfall. The 38-cm (15-in.) vitrified clay outfall pipe was excavated to within 3 m (10 ft) of the control box. The top of the pipe was broken with a sledgehammer, and the pipe was effectively isolated by pouring concrete into it.

A wood platform and slide gate were located at the upstream side of each earthen dam. After the slide gates were lowered, the wood platform and associated hardware were demolished and disposed of in the 216-A-29 Ditch. Both ends of the culvert that passes under the 200 East Area perimeter fence were sealed with concrete.

Stabilization of the 216-A-29 Ditch was performed in three phases from July to October 1991. In the first phase, bulldozers were used to push the top layers of soil from within the surface contamination zone and the ditch spoil piles into the bottom of the 216-A-29 Ditch. By taking large amounts of soil from the 216-A-29 Ditch banks, not only were the stream sediments safely covered, but the surrounding banks were likely to be uncontaminated.

In the second phase, the consolidated soils were covered with clean material. In the section of 216-A-29 Ditch inside the 200 East Area perimeter fence, the fill was brought up to the surrounding grade. Approximately half of the fill was brought from the Grout Project spoil pile and the other half from the 216-B-3 Main Pond spoil pile. Along the portion of the 216-A-29 Ditch outside of the 200 East Area fence, all clean fill came from the upper banks of the 216-A-29 Ditch. The fill was placed in a series of terraces progressing down the ditch. A terrace was placed for every 1.8-m (6-ft) decrease in streambed elevation. The face of each terrace and earth dam was armored with 15 to 25 cm (6 to 10 in.) of gravel. A total of 11 terraces were constructed.

The third phase consisted of revegetating and reposting the area disturbed by stabilization activities. A high-nitrogen fertilizer was spread over the area at a rate of 140 kg/hectare (125 lb/acre). Siberian wheatgrass and Thickspike wheatgrass were then planted followed by the placement of straw mulch. The area was reposted as an underground radioactive material zone after surface radiological surveys were completed and soil samples taken and analyzed. The underground radioactive material zone encompasses 2.6 hectares (6.4 acres).

2.1.4 216-B-3-1 and 216-B-3-2 Ditches

The 216-B-3-1 Ditch, a RCRA past-practice waste management unit, was in service from April 1945 to July 1964. It was an open, unlined earthen ditch approximately 1.8 m (6 ft) wide, 1.8 m (6 ft) deep, and 457 m (1,500 ft) long. Note that other documents such as DOE-RL (1993b) and WHC (1991c) list the ditch as being about 975 m (3,200 ft) long. However, drawings show the 216-B-3-1 Ditch to terminate at a shorter distance. A shorter ditch supports the fact that the 216-B-3 Main Pond

varied in size from 7.6 to 18.4 hectares (19 to 46 acres). The waste streams transported by the 216-B-3-1 Ditch came from the 216-B-2-1 Ditch from April 1945 to November 1963, the 216-B-2-2 Ditch from November 1963 to July 1964, and the 216-A-29 Ditch from November 1955 to July 1964. The 216-B-3-1 Ditch effluent terminated at the 216-B-3 Main Pond.

The 216-B-3-1 Ditch was decommissioned and backfilled in July 1964 as a result of Unplanned Release UPR-200-E-34. The release occurred in June 1964 when an estimated 2,500 Ci of short- and long-lived fission products was released to the 216-B-3-1 Ditch (and 216-B-3 Main Pond) via the PUREX cooling water line. Unknown corrective measures were taken to kill the algae and precipitate the fission products in the 216-B-3-1 Ditch. However, it is known that bentonite was added to the 216-B-3 Main Pond as a result of this release, and it is possible that bentonite was also added to the 216-B-3-1 Ditch at the same time.

In 1971, the backfill soils at the 216-B-3-1 Ditch were leveled and cleaned of all foreign objects, and 10-mil plastic sheets were placed over a new 10-cm (4-in.) cushion of sand. The sheets were overlapped 0.6 m (2 ft) to provide an effective root barrier. The plastic sheeting was then covered with 46 cm (18 in.) of sand and topped with 10 cm (4 in.) of gravel to prevent erosion by the wind. The entire 216-B-3-1 Ditch was treated in this manner, except for the 30 m (100 ft) nearest the headwall of the ditch. This treated area of the 216-B-3-1 Ditch is about 9.8 m (32 ft) wide. At the eastern end of the 216-B-3-1 Ditch, where the 216-B-3-1 Ditch widened into a swamp, the treated area is about 30 m (100 ft) wide. This 30-m-wide area would coincide with the area where the 216-A-29 Ditch had intersected the 216-B-3-1 Ditch. The area at the intersection of the 216-B-3-1 and 216-A-29 Ditch widened into a swamp about 24 m (80 ft) wide before entering the 216-B-3 Main Pond. The plastic barrier has been effective in limiting radioactive contaminated weed growth (WHC 1991c).

The 216-B-3-2 Ditch, a RCRA past-practice waste management unit, was excavated as a result of Unplanned Release UPR-200-E-34 and the decommissioning of the 216-B-3-1 Ditch. The 216-B-3-2 Ditch was operational from July 1964 to September 1970 and had dimensions of about 4.6 m (15 ft) wide at ground level, 1.2 to 2.4 m (4 to 8 ft) deep, and 1,128 m (3,700 ft) long. The 216-B-3-2 Ditch was decommissioned and backfilled in July 1970 as a result UPR-200-E-138, a release of about 1,000 Ci of strontium-90 from B Plant in March 1970 (WHC 1991c). (Additional information regarding this release is provided in Sections 2.1.8 and 3.2.5.)

The 216-B-3-2 Ditch conveyed 216-B-2-2 Ditch effluents from July 1964 to May 1970, 216-B-2-3 Ditch effluents from May 1970 to September 1970, and 216-A-29 Ditch effluents from July 1964 to September 1970. The 216-B-3-2 Ditch effluent terminated at the 216-B-3 Main Pond.

2.1.5 216-B-3-3 Ditch and 216-B-3 Main Pond

The 216-B-3-3 Ditch and 216-B-3 Main Pond are permitted under RCRA as a single TSD unit.

The 216-B-3-3 Ditch was an open, unlined earthen ditch that was excavated and put into service in September 1970 to replace the decommissioned 216-B-3-2 Ditch. At the same time, the 216-A-29 Ditch was rerouted to discharge into the 216-B-3-3 Ditch approximately 457 m (1,500 ft) west of the inlet to the 216-B-3 Main Pond. A fiberglass-reinforced polyester flume and flowmeter were installed in the ditch downstream from the 216-A-29 Ditch. The dimensions of the 216-B-3-3 Ditch are approximately 6 m (20 ft) wide at ground level, 1.6 m (6 ft) deep, and 1,128 m (3,700 ft)

long. The 216-B-3-3 Ditch conveyed the 216-B-2-3 Ditch effluent from September 1970 to 1987, the 216-A-29 Ditch effluent from September 1970 to 1991, and the 216-B-2 Pipeline effluent from 1987 to 1991.

The 216-B-3-3 Ditch (and 216-B-3 Main Pond) was decommissioned and backfilled in the summer of 1994 to support Tri-Party Agreement Milestone M-17-10. The effluent received by the 216-B-3-3 Ditch was routed to the 216-B-3C Expansion Pond.

The 216-B-3 Main Pond was active from July 1945 to 1994. The 216-B-3 Main Pond received 216-B-3-1 Ditch effluent from April 1945 to July 1964, 216-B-3-2 Ditch effluent from July 1964 to September 1970, and 216-B-3-3 Ditch effluent from September 1970 to 1994. These ditch effluents included the 216-A-29 Ditch effluent from November 1955 to July 1991. The 216-B-3 Main Pond began discharging to the 216-B-3A Expansion Pond in October 1983.

Until Unplanned Release UPR-200-E-34 occurred in 1964, the 216-B-3 Main Pond and terminal portion of the 216-B-3-1 Ditch formed a swampy surface area that varied in size from about 7.6 to 18.4 hectares (19 to 46 acres). This variation in size was due to the 216-B-3 Main Pond being located in a natural topographic depression (i.e., minimal slope) and fluctuations in effluent discharges from the various facilities. As a result of Unplanned Release UPR-200-E-34, bentonite was placed in the 216-B-3 Main Pond to diminish the transport of contamination. The method of placement and amount of bentonite used is not known.

The 216-B-3 Main Pond was affected by Unplanned Release UPR-200-E-138, which discharged to the 216-B-2-2 Ditch in 1970. Approximately 1,000 Ci of strontium-90 was released, with most of the contamination contained in the ditches. However, radioactive contamination reaching the 216-B-3 Main Pond was estimated to be 13 Ci of cesium-137, 50 Ci of strontium-90, and 54 Ci of cerium-144. As a result of this contamination, bulldozers pushed soil over the north, south, and west shorelines of the 21-B-3 Main Pond, reducing radioactivity from a maximum of 650 mR/h to 10 mR/h at the 216-B-2-2 Ditch inlet. Other measurements around the pond ranged from 1,000 ct/min to 25,000 ct/min (DOE-RL 1993b).

An area of approximately 1.7 hectares (4.1 acres) immediately west of the 216-B-3 Main Pond was diked during the 1970's to provide an overflow area for the 216-B-3 Main Pond. This overflow area, referred to as the overflow pond (see Plate 1), was decommissioned and backfilled in 1985.

The 216-B-3 Main Pond and 216-B-3-3 Ditch (and 216-B-3A Expansion Pond) were decommissioned and interim stabilized in 1994 to support Tri-Party Agreement Milestone M-17-10. The 216-B-3 Main Pond, just before decommissioning, covered a surface area of approximately 14 hectares (35 acres) and was between 0.6 m (2 ft) and 4 m (14 ft) deep. The major objective of interim stabilization (backfilling) was to fill the pond and ditch with clean soil to prevent the spread of potential radioactive contamination as the pond and ditch sediments became exposed. The procedure for these activities is documented as DWP-R-026-00022, *Decommissioning and Interim Stabilization of the 216-B-3 Pond System* (WHC 1993). The interim stabilization activities include radiation surveys, geodetic surveys, backfilling of the 216-B-3 Main Pond and 216-B-3-3 Ditch, removal of the flowmeter from the ditch, burial of the ditch headwall, abandonment of the piezometers, and the excavation of five trenches in the eastern portion of the pond to aid in percolation. The *216-B-3 Pond Interim Stabilization Final Report* (BHI 1995a) provides a description of the activities performed to interim stabilize the 216-B-3 Main Pond, 216-B-3-3 Ditch, and 216-B-3A Expansion Pond.

2.1.6 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds

The 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are permitted under RCRA as a single TSD unit.

The 216-B-3A and 216-B-3B Expansion Ponds were constructed in 1983 to receive increased discharges that would result from restart of the PUREX Plant. The 216-B-3A and 216-B-3B Expansion Ponds were constructed using a cut-and-fill construction method over a 9-hectare (22-acre) surface area [4 hectares (11 acres) each]. Eight-millimeter polyethylene plastic was placed along the slope of the pond banks and covered with approximately 8 cm (3 in.) of pit run gravel. The plastic was extended approximately 0.9 m (3 ft) out onto the pond bottom and 0.6 m (2 ft) back from the top of the dike (DOE-RL 1994a).

The 216-B-3A Expansion Pond was placed into service in October 1983. The pond was operated until January 1984, when the dike between the 216-B-3A and 216-B-3B Expansion Ponds failed at the connecting spillway. All discharge from the dike failure was contained in the 216-B-3B Pond, which had remained unused until this time. In response to this incident, flow to the 216-B-3 Main Pond was reduced and the 216-B-3A and 216-B-3B Expansion Ponds were isolated. A trench, oriented north-south and approximately 182 m (600 ft) long, 9 m (30 ft) wide, and 2 m (5 ft) deep, was excavated into a permeable sand and gravel layer beneath the 216-B-3A Expansion Pond bottom to provide an area of increased infiltration. Discharge to the 216-B-3A Expansion Pond was resumed, but at a reduced rate, to contain flow and infiltration to the newly constructed trench. The debris from the dike failure was removed from the 216-B-3B Expansion Pond, and a series of trenches were excavated in the pond bottom to increase the infiltration rate. The excavated material was placed along the shores of the 216-B-3 Main Pond as diking. The 216-B-3A and 216-B-3B Expansion Ponds were fully operational by June 1984.

The 216-B-3B Expansion Pond was taken out of service in May 1985, and up to 2 m (7 ft) of material was excavated from the pond bottom, to a depth below the bottom of the trenches. The excavated material was placed as diking on the north shore of the 216-B-3 Main Pond. Although still active, the 216-B-3B Expansion Pond has not been used since it was taken out of service in May 1985 and is not anticipated to be used again. The 216-B-3A Expansion Pond was decommissioned and isolated in 1994 by removing the handle and valve stem from the flow control structure slide gate. A description of the decommissioning activities performed at the 216-B-3A Expansion Pond is provided in the *216-B-3 Pond Interim Stabilization Final Report* (BHI 1995a).

The 216-B-3C Expansion Pond was constructed in 1985 to accommodate increased flow resulting from the decommissioning of 216-A-25 Pond (Gable Mountain Pond, 200-IU-6 Operable Unit). The 216-B-3C Pond was constructed by excavating 2 m (6 ft) of soil over a 17-hectare (41-acre) surface area. Eight parallel north-south trenches, approximately 2 to 4 m (8 to 14 ft) wide and 1 m (4 ft) deep, were constructed in the pond bottom to increase infiltration. An east-west trench in the 216-B-3C Expansion Pond bottom connects the 216-B-354 spillway with the eight north-south trenches. The excavated material was placed in a spoil mound along the east and part of the north and south sides of the pond. The slopes of the pond were stabilized with 8 cm (3 in.) of 3- to 15-cm-(1- to 6-in.) size gravel. A gravel maintenance road was constructed along the edge of the pond (DOE-RL 1994a).

The 216-B-3C Expansion Pond received effluent from the 216-B-3A Expansion Pond from 1985 to 1994. In 1994, the effluent originating at the 216-B-3-3 Ditch was rerouted directly to the 216-B-3C Expansion Pond. The 216-B-3C Expansion Pond currently receives non-RCRA effluent and will remain active for an unknown duration.

2.1.7 216-E-28 Contingency Pond

The 216-E-28 Contingency Pond was constructed in 1987 north of the 216-B-3 Main Pond to provide emergency overflow capability for the 216-B-3 Main Pond. This unit has never been used and therefore does not pose a threat to human health or the environment.

2.1.8 Unplanned Releases

Unplanned releases fall into two categories: unplanned releases that did not directly contaminate another waste management unit and unplanned releases that did contaminate a waste management unit(s). Unplanned releases that did not contaminate a waste management unit are considered an individual waste management unit and are labeled with a "UN" before their number. These unplanned releases are listed in the Tri-Party Agreement with the operable unit in which they occurred. Unplanned releases that occurred within and contaminated another waste management unit(s) are labeled with a "UPR" before their number. These unplanned releases are not listed in the Tri-Party Agreement because the contamination that they released will be addressed with the waste management unit(s) in which they occurred.

Six known unplanned releases have affected the 200-BP-11 Operable Unit and are discussed below in order of occurrence. Two of the six unplanned releases, UN-200-E-14 and UN-200-E-92, are waste management units listed in the Tri-Party Agreement. Their locations are shown on Plate 1. The other four unplanned releases are considered a part of the waste management unit(s) in which they released and will therefore be effectively addressed as part of their respective waste management unit(s). The locations of their point of release are also shown on Plate 1. Known and suspect contamination resulting from these releases is further addressed in Section 3.2.5.

- Unplanned Release UN-200-E-14 occurred in 1958 when a dike failed on the east side of the 216-B-3 Main Pond. This release would contain the same potential contamination associated with the 216-B-3 Main Pond and therefore does not present additional contaminants of concern to the operable unit. Because this release occurred on the east side of the 216-B-3 Main Pond, it was incorporated into the 216-B-3A Expansion Pond and was thus characterized as part of the Phase 1, 2, and 3 studies (Section 3.2.8).

- Unplanned Release UPR-200-E-32 occurred in November 1963 when a coil leak developed in the B Plant (221-B Building) 6-1 tank, which stored the cesium-rare earth fraction of the fission product stream. The leak caused gross contamination of the 207-B Water Retention Basin and the head end of the 216-B-2-1 Ditch. About 5,000,000 L of water contaminated with about 30 Ci of cerium-144 and 0.05 Ci of strontium-90 was released to the ditch (WHC 1991c). This release is likely to have affected the 216-B-3-1 Ditch and the 216-B-3 Main Pond (and overflow pond), but the extent of contamination that reached these units is not known.

- Unplanned Release UPR-200-E-34 occurred in June 1964 when a coil leak in the F-15 tank in the PUREX Plant contaminated the 216-B-3-1 Ditch and 216-B-3 Main Pond (and overflow pond) with approximately 2,500 Ci of mixed fission products. This release was the most severe unplanned release in the operable unit and resulted in the decommissioning and backfilling of the ditch. Also as a result of this release, bentonite was placed in the 216-B-3 Main Pond to diminish the transport of contamination. The method of placement and amount of bentonite used are not known.

- Unplanned Release UPR-200-E-138 occurred on March 22, 1970. An estimated 1,000 Ci of strontium-90 was released while attempting to measure the liquid level of product in the 8-1 storage tank. The waste was sprayed with several small water hoses down the B Plant floor drain and chemical sewer that led to the 216-B-2-2 Ditch and the 216-B-3-2 Ditch (Maxfield 1979). The 207-B Retention Basin was bypassed and was not contaminated as a result of this unplanned release. On March 23, 1970, earthen dams were built to keep as much contamination as possible out of the 216-B-3 Main Pond, but the exact locations of these dams are not known. The amount of radioactive contamination estimated to reach the 216-B-3 Main Pond was 13 Ci of cesium-137, 50 Ci of strontium-90, and 54 Ci of cerium-144. As a result of this contamination, bulldozers pushed soil over the north, south, and west shorelines of the 216-B-3 Main Pond, reducing radioactivity from a maximum of 650 mR/h to 10 mR/h at the ditch inlet. Other measurements around the pond ranged from 1,000 ct/min to 25,000 ct/min (DOE-RL 1993b). The amount of released to the 216-B-3-2 Ditch is not known. The 216-B-2-2 and 216-B-3-2 Ditches were decommissioned as a result of this release.

- Unplanned Release UPR-200-E-51 occurred in May 1977 when 15 kg of cadmium nitrate was released from the PUREX Plant to the chemical sewer, which dispersed to the 216-A-29 Ditch, and may have also reached the 216-B-3-3 Ditch and 216-B-3 Main Pond (and overflow pond).

- Unplanned Release UN-200-E-92 occurred in September 1980 as a result of the detection of radioactively contaminated Russian thistle along the eastern most perimeter fence in the 200 East Area. The contaminated thistle and soil was removed and disposed of at an excavation pit north of the 216-A-24 Crib.

2.2 RCRA TSD PERMITTING HISTORY IN THE 200-BP-11 OPERABLE UNIT

The EPA and Ecology issued the *Hanford Site Dangerous Waste Part A Permit* (Part A Permit) (DOE-RL 1994c) under a single identification number, WA7890008967. The Part A Permit contains the Dangerous Waste Permit Applications, or Form 3's, for each RCRA TSD at the Hanford Site as described in WAC 173-303-805. The purpose of the Part A permit is to permit RCRA TSD units for closure under "interim status" prior to designating them for full-time or continued operation. If a RCRA TSD unit is to remain operational or will become operational, it must also be permitted under WAC 173-303-806, "Final Facility Permits," which requires a Part B permit.

The four RCRA TSD units (216-A-29 Ditch, 216-B-63 Trench, 216-B-3 Main Pond, and 216-B-3 Expansion Ponds) under investigation in the 200-BP-11 Operable Unit are all currently permitted under "interim status," per WAC 173-303-805, and are not required to have a Part B permit because they have been decommissioned. Note that the 216-B-3 Expansion Pond TSD unit is expected to be

clean closed (WAC 173-303-610) by June 1995 as documented in the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). The clean closure of the 216-B-3 Expansion Ponds means that the 216-B-3 Expansion Ponds will no longer be regulated as a RCRA TSD unit, and therefore any remaining corrective action issues, such as radioactive contamination, will be regulated under RCRA past-practice authority. Additionally, when clean closure is attained, the 216-B-3 Expansion Pond TSD unit will continue to receive non-RCRA effluent at the 216-B-3C Expansion Pond in accordance with Tri-Party Agreement Milestone M-17-10.

There are currently seven RCRA TSD units in the 200-BP-11 Operable Unit. These units are shown on Plate 1 and listed below:

- 216-B-63 Trench
- 216-A-29 Ditch
- 216-B-3 Main Pond (the 216-B-3 Main Pond and 216-B-3-3 Ditch)
- 216-B-3 Expansion Ponds (the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds)
- Liquid Effluent Retention Facility
- Effluent Treatment Facility
- Purgewater Storage Tanks.

The first four RCRA TSD units are included in the 200-BP-11 Operable Unit RFI/CMS, and their TSD permitting histories are provided in the following sections. Their descriptions and history were provided in Sections 2.1.2, 2.1.3, 2.1.5, and 2.1.6, respectively. The latter three units and their ancillary equipment (piping, structures, fixtures, etc.) are not part of the operable unit RFI/CMS, and their TSD permitting history is discussed briefly in Section 2.2.4.

RCRA TSD units are permitted to receive waste as described in Section IV of their individual Form 3's, which are provided in Appendix C. The wastes are usually not specifically called out, but instead are given a dangerous waste number. A combined total of five dangerous waste numbers are listed on the Form 3's of the TSD units under investigation as part of the 200-BP-11 Operable Unit, and brief descriptions of each are provided below. Further descriptions of specific wastes received at each TSD unit are provided in Section 3.2.

- D002 = Corrosive waste based on WAC 173-303-090(6) and 40 CFR 261.22(a)(1) and (2).

- D006 = Cadmium (toxicity characterized waste), based on WAC 173-303-090(8) and 40 CFR 261.24, Table 1.

- U133 = Hydrazine; acutely dangerous waste per WAC 173-303-9903, "Discarded chemical products list," and 40 CFR 261.33, "Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof."

- WT01 = A Washington State-only designation for an extremely hazardous waste (EHW) based on the mass of a given toxic waste released, e.g., ammonium nitrate. The guidelines for making this determination are provided in WAC 173-303-100.

- WT02 = A Washington State-only designation for a dangerous waste (DW) based on the mass of a given toxic waste released, e.g., potassium hydroxide. The guidelines for making this determination are provided in WAC 173-303-100.

2.2.1 RCRA TSD Permitting History of the 216-B-63 Trench

The 216-B-63 Trench was first permitted for interim status (WAC 173-303-805) under RCRA per Revision 0 of the Form 3, which became part of the Hanford Site Part A Permit Application (DOE-RL 1994c) in August 1986. The 216-B-63 Trench, although inactive, is permitted to receive waste in accordance with dangerous waste number D002.

As discussed in Section 2.1.2 and the Form 3, the 216-B-63 Trench received nonregulated wastewater from the B Plant chemical sewer and corrosive dangerous waste from the demineralizer columns in B Plant. For this reason, the 216-B-63 Trench was permitted for D002. Approximately 68,100,000 kg/yr (150,000,000 lb/yr) of corrosive wastes was managed in the 216-B-63 Trench. The corrosive discharges constituted a major part of this flow until 1985. Treatment of these wastes occurred by the successive addition of acidic and caustic wastes to the 216-B-63 Trench.

The current Form 3, Rev. 2, for the 216-B-63 Trench is provided in Appendix C. As discussed in the Form 3, the unit has not received dangerous waste since September 1985. However, the unit continued to receive nondangerous waste until 1992. The ditch will be closed under interim status and therefore will not require a Part B permit.

The 216-B-63 Trench is currently operated by WHC Operations and will be transferred to BHI for closure after permanent isolation of the pipe feeding the ditch and interim stabilization of the trench surface soil. The WHC Operations activities are anticipated to be completed by April 1995. The official transfer of the 216-B-63 Trench to BHI will be documented via Revision 3 of the Form 3.

2.2.2 RCRA TSD Permitting History of the 216-A-29 Ditch

The 216-A-29 Ditch was first permitted for interim status (WAC 173-303-805) under RCRA per Revision 0 of the Form 3, which became part of the Hanford Site Part A Permit Application (DOE-RL 1994c) in August 1986. The 216-A-29 Ditch was permitted to receive waste in accordance with dangerous waste numbers D002, D006, U133, and WT02.

As discussed in Section 2.1.3 and the Form 3, the 216-A-29 Ditch received nonregulated process and cooling water from the PUREX Plant and also received corrosive dangerous waste from regeneration of demineralizer columns in the PUREX Plant. These wastes were treated with successive additions of acidic and caustic waste. For this reason, the 216-A-29 Ditch was permitted for D002. Additionally, the 216-A-29 Ditch received spills from the PUREX Plant that resulted in the waste designations D006 (toxicity characteristic waste), U133 (acutely dangerous discarded chemical products, i.e., hydrazine), and WT02 (state-only dangerous waste).

Revision 2 of the 216-A-29 Ditch Form 3 was issued in November 1987 due to transfer the TSD operations from the Atlantic Richfield Hanford Company to WHC. The current revision, Revision 3, is provided in Appendix C and was issued in July 1994 as a result of the transition of Hanford environmental restoration activities from WHC to BHI. As discussed in Revision 3, the unit has not received dangerous waste since February 1986. However, the unit continued to receive nondangerous waste until 1991, at which time it was decommissioned and backfilled. The 216-A-29 Ditch will be closed under interim status and will therefore not require a Part B permit.

2.2.3 RCRA TSD Permitting History of the 216-B-3-3 Ditch, 216-B-3 Main Pond, and 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds

The 216-B-3 Main Pond, 216-B-3-3 Ditch, and 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds were previously combined into a single RCRA TSD unit referred to as the 216-B-3 Pond System. Revision 0 of the Form 3 for the 216-B-3 Pond System was submitted to Ecology in 1986 because of dangerous waste discharges to the 216-B-3-3 Ditch, which fed the 216-B-3 Pond System.

As discussed in Sections 2.1.5 and 2.1.6 and the Form 3's, the 216-B-3 Pond System received dangerous waste from two main sources: (1) corrosive and toxic dangerous waste resulting from the regeneration of demineralizer columns at the PUREX Plant and (2) spills of dangerous or mixed waste at the PUREX Plant. These discharges were received by the 216-B-3-3 Ditch either from the 216-A-29 Ditch or the PUREX cooling water line and resulted in the 216-B-3 Pond System being permitted to receive wastes per dangerous waste numbers D002, D006, U133, WT01, and WT02. Specific information regarding the waste associated with these dangerous waste numbers is provided in Section 3.2.

Revision 1 of the Form 3 was submitted in August 1987, and Revision 2 was submitted in November 1987. These permit applications designated the 216-B-3 Pond System TSD unit as a surface impoundment subject to RCRA regulations and transferred the TSD operations from Atlantic Richfield Hanford Company to WHC, respectively.

Revision 3 of the Form 3 was issued for two reasons. First, new information was obtained that allowed for the development of a detailed chemical discharge history for the years 1983 to 1987. The last known reportable chemical discharge occurred in April 1987. Second, the chemical discharges were evaluated at the point of discharge into the environment. The chemical discharge history, on which this Revision 3 was based, was from the PUREX Plant. Other facilities that discharged to the 216-B-3-3 Ditch and 216-B-3 Main Pond either did not have the potential to discharge dangerous waste or a record search [documented in the B Plant AAMS Report (DOE-RL 1993b)] did not reveal documentation of dangerous waste discharges. A summary of the potential chemical discharges to the waste management units is provided in Section 3.2.

In December 1993, the 216-B-3 Pond System TSD unit was divided into two separate TSD units: (1) the 216-B-3-3 Ditch and 216-B-3-3 Pond, which is called the 216-B-3 Main Pond TSD unit; and (2) the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds, which is called the 216-B-3 Expansion Ponds TSD unit. As a result of this division, Revision 4 and Revision 0 of the Form 3's were issued for the 216-B-3 Main Pond and 216-B-3 Expansion Ponds, respectively. The purpose for the division was to allow for clean closure of the expansion ponds while coordinating closure activities for the 216-B-3 Main Pond TSD unit with the RFI/CMS of the 200-BP-11 Operable Unit. Clean closure of the expansion ponds is being initiated to meet the Tri-Party Agreement Milestone M-17-10 (Ecology et al. 1992). The date associated with this milestone is June 1995.

Revision 5 and Revision 1 of the Form 3's were issued in July 1994 for the 216-B-3 Main Pond and 216-B-3 Expansion Ponds, respectively. These revisions are provided in Appendix C and resulted because of the transition of Hanford environmental restoration activities from WHC to BHI.

2.2.4 Liquid Effluent Retention Facility, Effluent Treatment Facility, and Purgewater Storage Tanks

The LERF, ETF, and Purgewater Storage Tanks are not under investigation as part of the 200-BP-11 Operable Unit RFI/CMS because each unit operates under an individual Form 3 in the *Hanford Site Dangerous Waste Part A Permit Application* (DOE-RL 1994c) and will therefore be closed as separate entities within the 200-BP-11 Operable Unit. Short descriptions of the LERF, ETF, and Purgewater Storage Tanks are presented below and in their respective Form 3's provided in Appendix C.

The LERF is classified as a surface impoundment and is permitted in accordance with WAC 173-303-805, "Interim Status Permits." The Part B Permit Application is documented as DOE/RL-90-43, *Liquid Effluent Retention Facility Dangerous Waste Permit Application* (DOE-RL 1991b), and provides a complete description of the unit.

Construction began on the LERF in May 1990 and was completed in 1992. It was constructed under interim status expansion. The LERF is a retention basin consisting of four identical cells with primary and secondary composite liners, a leachate collection and removal system between the liners, and a floating cover. Each retention basin cell has a design capacity of 24,600 m^3 (6,500,000 gal) with a total capacity of 98,400 m^3 (26,000,000 gal). Currently, it is planned to use only three basins; the fourth basin will serve as a contingency basin.

The ETF is classified as a treatment unit and is permitted in accordance with WAC 173-303-805, "Interim Status Permits." The Part B Permit Application, DOE/RL-93-03, *Hanford Facility Dangerous Waste Permit Application, 200 Area Effluent Disposal Facility* (DOE-RL 1993c), provides a complete description of the unit.

Construction began on the ETF in March 1993, and the unit is expected to come online in 1995. The unit will treat and store process condensate from the 242-A Evaporator via the LERF and, possibly, other Hanford Facility waste that falls within the envelope of acceptable waste at the ETF. The treatment process includes filtration, pH adjustment, ultraviolet oxidation, hydrogen peroxide decomposition, degasification, reverse osmosis, ion exchange, effluent quality verification in tanks, evaporation, concentration, and thin film drying.

The Purgewater Storage Tanks are classified as a storage and treatment unit and are permitted in accordance with WAC 173-303-805, "Interim Status Permits." The Part A Permit Application is documented as DOE/RL-88-21, *600 Area Purgewater Storage and Treatment Facility* (DOE-RL 1990). There is not a Part B permit application for the facility because it will continue to operate under interim status.

The Purgewater Storage Tanks unit is composed of two 3,790-m^3 (1,000,000-gal) aboveground storage tanks, although it is permitted for six tanks. The purgewater tanks are used for interim storage and treatment of purgewater generated from the groundwater monitoring wells located throughout the Hanford Site. The purgewater from a groundwater monitoring well is transported by tank truck and pumped directly into the purgewater tanks. No external piping is associated with the unit. Treatment of the purgewater in the two 3,790-m^3 tanks is by solar evaporation.

2.3 PIPELINES

The pipelines within the 200-BP-11 Operable Unit are depicted in Figure 3-1 and Plate 1. The pipelines of concern for the operable unit RFI/CMS are the inactive portion of the PUREX cooling water line; the inactive PUREX chemical sewer pipeline that fed the 216-A-29 Ditch; the inactive portion of 216-B-3-2 Pipeline; the pipeline feeding the 216-B-63 Trench; and the two inactive pipelines serving the 241-C Single-Shell Tank Farm, 241-BY Single-Shell Tank Farm, 216-BY Cribs, 216-B-51 Crib, and 216-B Cribs. All other known pipelines within the operable unit are active and will be addressed during decommissioning of their respective facilities. These active pipelines include the 1.2-m (48-in.) corrugated metal pipe running to the 216-E-28 Contingency Pond, the 91-cm (36-in.) HDPE pipe running to the 216-B-3A Expansion Pond, the 76-cm (30-in.) HDPE pipe running to the 216-B-3B and 216-B-3C Expansion Ponds, and the pipeline feeding the Treated Effluent Disposal Facility (TEDF).

2.3.1 PUREX Cooling Water Line

The PUREX cooling water line runs south to north just outside of the 200 East Area perimeter fence (see Plate 2). The segment of line to be assessed under the operable unit investigation is the inactive section of pipeline beginning about 80 m (260 ft) south of the LERF. This segment of pipeline is 1-m (42-in.) corrugated metal pipe and was capped during the decommissioning of the 216-A-25 Gable Mountain Pond. The active portion of the pipe running south towards the PUREX Plant is 91-cm (36-in.) corrugated metal pipe and will not be considered as part of the 200-BP-11 pipeline integrity assessment because it is scheduled to remain active until 1997, at which time all discharges will be routed to the TEDF basins. However, the pipeline will be considered during the 200-BP-11 Operable Unit CMS.

2.3.2 PUREX Chemical Sewer Pipeline

The PUREX chemical sewer pipeline originates at the PUREX Plant and discharges at the head end of the 216-A-29 Ditch (see Plate 2). The section of the PUREX chemical sewer pipeline to be evaluated with the 200-BP-11 Operable Unit is the approximately 7.6-m (25-ft) segment of outfall pipe extending to the first control box (216-A-42E Diversion Box). Section 4.2.1 of the *216-A-29 Interim Stabilization Final Report* (WHC 1992a) states that the outfall pipe was excavated to within 3 m (10 ft) of the control box. Excavation any closer to the box would have endangered other pipelines buried in the vicinity. A sledgehammer was used to break open the top of the 38-cm (15-in.) segment VCP, and concrete was then poured into the pipe. Therefore, the only segment of pipe to be evaluated will be the 3-m (10-ft) segment of pipe leading to the control box.

2.3.3 216-B-2 Pipeline

The 216-B-3-2 Pipeline originates at B Plant and enters the westernmost side of the 200-BP-11 Operable Unit at the 207-B Retention Basin (see Plate 2). The pipeline runs parallel to and over the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches before separating into two lines about 400 m (1,310 ft) inside the 200 East Area perimeter fence. The southern segment of separated pipe [53-cm (21-in.) VCP] actively discharged to the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches from 1945 until 1994. In the summer of 1994, it was valved out to support decommissioning of the

216-B-3-3 Ditch, and the effluent was routed into the northern segment of pipe and out to the 216-B-3C Expansion Pond. This northern section of pipe is a 60-cm (24-in.) VCP and, along with the rest of the 216-B-3-2 Pipeline, will not be considered as part of the 200-BP-11 pipeline integrity assessment because it is scheduled to remain active until 1997, at which time all discharges will be routed to the TEDF basins. However, the pipeline will be considered during the 200-BP-11 Operable Unit CMS.

The southern section of pipe is the only inactive portion of the 216-B-3-2 Pipeline and thus the only segment of the pipeline to be evaluated with the 200-BP-11 Operable Unit.

2.3.4 216-B-63 Trench Pipeline

The 216-B-63 Trench pipeline originates near the 207-B Retention Basin. The segment of pipe to be evaluated with the 200-BP-11 Operable Unit is the segment of pipe from the trench to the first diversion box near the 207-B Retention Basin. This segment of pipe will be isolated by WHC during interim stabilization activities for the trench. The isolation of the pipe is anticipated to be accomplished by April 1995, but the exact nature of the isolation is not known. The extent of activities associated with the pipeline evaluation will be further developed after the stabilization activities are complete.

2.3.5 Single-Shell Tank Farm Pipelines

Two inactive 8.9-cm (3.5-in.) stainless steel pipelines traverse the western portion of the 200-BP-11 Operable Unit in a north/south direction approximately 137 m (450 ft) east of the 207-B Retention Basin. These pipelines conveyed process waste between the 241-BY Single-Shell Tank Farm, 241-C Single-Shell Tank Farm, 216-BY Cribs, 216-B-51 Crib, and 216-B Cribs, and therefore need to be evaluated for radioactive contamination and potential leakage.

2.4 STRUCTURES AND FIXTURES

The locations of the structures and fixtures associated with 216-B-3 Main Pond and 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are depicted on Plate 2. These decommissioned structures and fixtures include the 216-B-351, 216-B-352, 216-B-353, and 216-B-354 overflow structures (spillways); the flume and flowmeter in the 216-B-3-3 Ditch; and the headwall of the 216-B-3-3 Ditch. The disposition of the structures and fixtures will be addressed in the CMS after evaluation of the field investigation report (Volume 2). The final disposition of the structures and fixtures will be provided in the corrective action plan of this document (Volume 4). During the 216-B-3-3 interim stabilization activities (see Section 2.5), the headwall was pushed into the ditch and covered with clean soil, and the flume and flowmeter from the 216-B-3-3 Ditch were removed and set aside.

The 216-B-351 spillway, in the dike between the 216-B-3 Main Pond and 216-B-3A Expansion Pond, was modified in 1983 to accommodate anticipated flow rates. The 60-cm- (24-in.) diameter culvert was replaced by a 91-cm- (36-in.) diameter, 12-gauge, spiral-corrugated, galvanized steel pipe. The fiberglass flume liner was removed, the concrete support walls were recast to widen the water flow area, and the flowmeter was removed. A steel-reinforced concrete overflow control structure

was constructed at the inlet to the pipe. The following structures were installed on the overflow control structure:

- Manually operated 3-m by 91-cm (42-in. by 36-in.) downward-opening slide gate
- Trash guard constructed of 5-cm (2-in.) woven, diamond-mesh, galvanized wire
- Staff gauge to measure water surface elevation
- Metal grating over the surface to allow personnel access.

The 216-B-353 spillway was designed and constructed to replace the open ditch between the 216-B-3A and 216-B-3B Expansion Ponds. Shortly afterwards, the 216-B-352 spillway was constructed in the dike between the 216-B-3 Main Pond and 216-B-3A Expansion Pond. This spillway was constructed to handle the increased water flow resulting from the decommissioning of 216-A-25 Gable Mountain Pond. Both new spillways were constructed to the same design: two 76-cm- (30-in.) diameter corrugated metal pipes through the existing dikes, a steel-reinforced concrete overflow control structure, and a stilling basin. The following structures were installed on the overflow control structure:

- Control weir and manually operated, downward-opening slide gate for each 76-cm- (30-in.) diameter pipe

- Trash guard constructed of 5-cm (2-in.) diamond-mesh, 9-gauge, galvanized wire supported by a 5-cm- (2-in.) diameter pipe

- Staff gauge to measure water surface elevation

- Continuous 15-cm (6-in.) rubber dumbbell-type water stop

- Metal grating over the surface to allow personnel access.

Stilling basins were constructed at the spillway outfalls in the bottom of the ponds to control erosion. The basins were lined with erosion-control fabric and filled with riprap. The riprap extended beyond the basins and was placed over the pipes on the lower dike slopes.

The 216-B-354 spillway is similar in design to the 216-B-352 and 216-B-353 spillways and was constructed to convey water from the 216-B-3A Expansion Pond to the 216-B-3C Expansion Pond. The spillway consists of two 76-cm- (30-in.) diameter corrugated metal pipes, a steel-reinforced concrete overflow control structure, and a stilling basin, and was designed for a maximum flow capacity of 75,708 L/min (20,000 gal/min). The two 76-cm- (30-in.) diameter pipes were installed by excavating a ditch approximately 290 m (950 ft) in length from the 216-B-3A Expansion Pond to the 216-B-3C Expansion Pond. A 10-cm- (4-in.) thick cushion of sand was placed under the pipe, and backfill was placed over the pipe to the existing grade.

Structures in the 216-A-29 Ditch include a concrete spillway for the first 3 m (10 ft) from the point of inflow, a culvert under the 200 East Area perimeter road, and a wood platform and slide gate for flow control at the two earthen dams. The location of these structures is depicted on Plate 2. During interim stabilization activities at the 216-A-29 Ditch in 1991, the concrete spillway was covered with clean soil and the ends of the culvert under the 200 East Area perimeter fence were filled with concrete. The slide gate structure at the two earthen dams was lowered, and the wood platform and associated hardware were demolished and disposed of in the ditch.

2.5 PIEZOMETERS

In 1984, 22 piezometers were installed in a total of 10 boreholes in the earthen dikes impounding the 216-B-3 Main Pond and 216-B-3A Expansion Pond. The piezometer coordinates and depths are provided in Table 2-1 of the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a), and construction detail is provided in Figure 2-13 of that document. The piezometers were installed in response to the dike failure that occurred between the 216-B-3A and 216-B-3B Expansion Ponds. By design, the 3- to 6-m- (10- to 20-ft) thick earthen dikes permitted a certain amount of saturated flow through and beneath the fill material from which they are constructed. The function of the piezometers was to monitor this saturated flow. Water level measurements were made at least once a month with an electric water level tape, but measurements have not been taken since decommissioning of the ponds in February 1994.

The piezometers are no longer needed and will be abandoned. The final disposition of the piezometers will be deferred until the CMS report is complete for the operable unit.

2.6 200-BP-11 PHYSICAL SETTING

This section briefly describes the meteorology, geology, and hydrogeology of the 200-BP-11 Operable Unit and contains site-specific information not included in the B Plant AAMS Report (DOE-RL 1993b). Detailed descriptions of the physiography, surface hydrology, and environmental and human resources of the 200-BP-11 Operable Unit are discussed in Sections 3.1, 3.3, 3.6, and 3.7 of the B Plant AAMS Report. The meteorology, geology, and hydrogeology of the 200-BP-11 Operable Unit are discussed in Sections 3.2, 3.4, and 3.5 of that same document.

The Hanford Site has a semiarid climate with annual average precipitation of 16 cm (6.3 in.). Average annual temperature maximum and minimum are 18.4 °C (65.2 °F) and 5.3 °C (41.5 °F), respectively. Prevailing winds are from the northwest and west-northwest as shown in Figure 2-2.

The 200-BP-11 Operable Unit is underlain by a sequence of sedimentary deposits of late Tertiary and Quaternary age. Figures 2-3 and 2-4 represent conceptual stratigraphy beneath the northwestern and southeastern portions of the operable unit, respectively.

Thickness of the sedimentary section varies from roughly 90 m (300 ft) thick in the southeastern part of the operable unit to approximately 60 m (200 ft) in the northern portion. Vadose zone thickness varies from approximately 60 m (200 ft) in the northwest corner of the operable unit, to 30 m (100 ft) in the southeast. The most prominent aquitard/semiconfining layer is the lower mud sequence of the Ringold Formation. The lower mud acts as a perching horizon locally and as a semiconfining layer in the extreme southeast part of the operable unit.

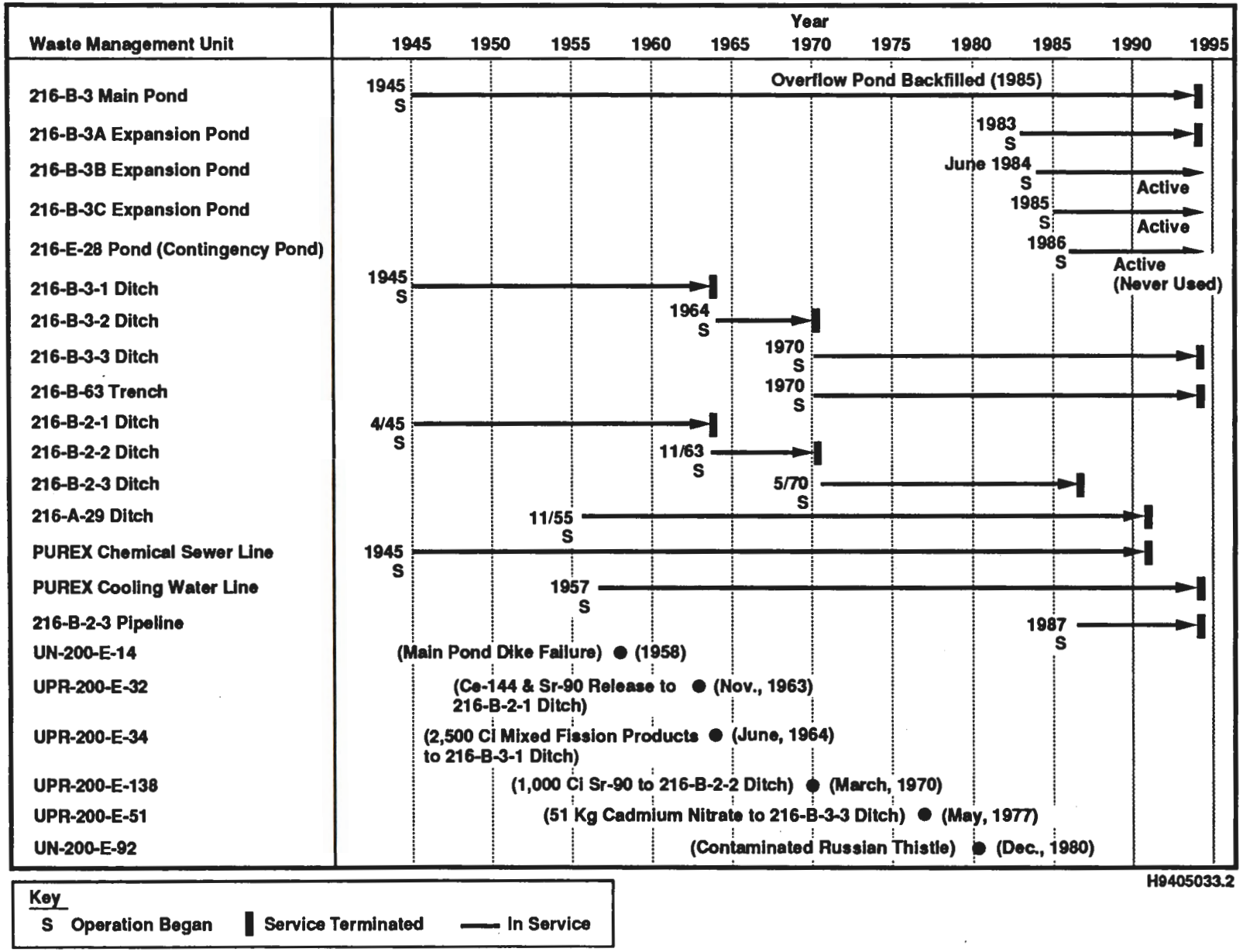
The uppermost aquifer occurs mostly within the Hanford formation in the northern half of the operable unit and within Unit A gravels of the Ringold Formation in the south.

Figures 2-5 through 2-10 are isopach and structure maps of the Ringold and Hanford sediments, as well as the surface of the underlying Elephant Mountain Member basalt, within and near the 200-BP-11 Operable Unit. As shown by Figures 2-6 through 2-9, the Ringold Formation is discontinuous over the northern portions of the operable unit. The Ringold lower mud sequence thins

northward and is absent in the vicinity of the main pond. The surfaces of contact between the Elephant Mountain Member basalt and the Ringold Unit A, and contacts between all the succeeding units above, generally dip to the south within the operable unit.

Stratigraphic columns representing stratigraphy near specific waste management units are shown in Figures 2-11 through 2-17. These columns are derived from one or two representative wells in the immediate vicinity of the waste management unit as shown in Figure 2-20 and Plate 2. Although most groundwater monitoring wells in the operable unit have been logged for gross gamma, only one well (699-40-40B) was logged for specific radionuclides with the spectral gamma method. No manmade radionuclides were detected in this well.

Wells used to construct cross sections and stratigraphic columns are shown in Figure 2-18. Most of the wells used in construction of these diagrams are RCRA groundwater monitoring wells of recent construction. Geologic data from these wells are more reliable than data from logs of older wells. Geologic cross sections representative of areas hosting waste management units are shown in Figures 2-19 through 2-23. Recent investigations for the 200 Areas TEDF (Davis et al. 1993) have enhanced understanding of the subsurface in the southeast portion of the operable unit.



Source: WHC 1991b

Figure 2-1. Operational History of the 200-BP-11 Waste Management Units.

Figure 2-2. Hanford Site Wind Roses, 1979 Through 1982.

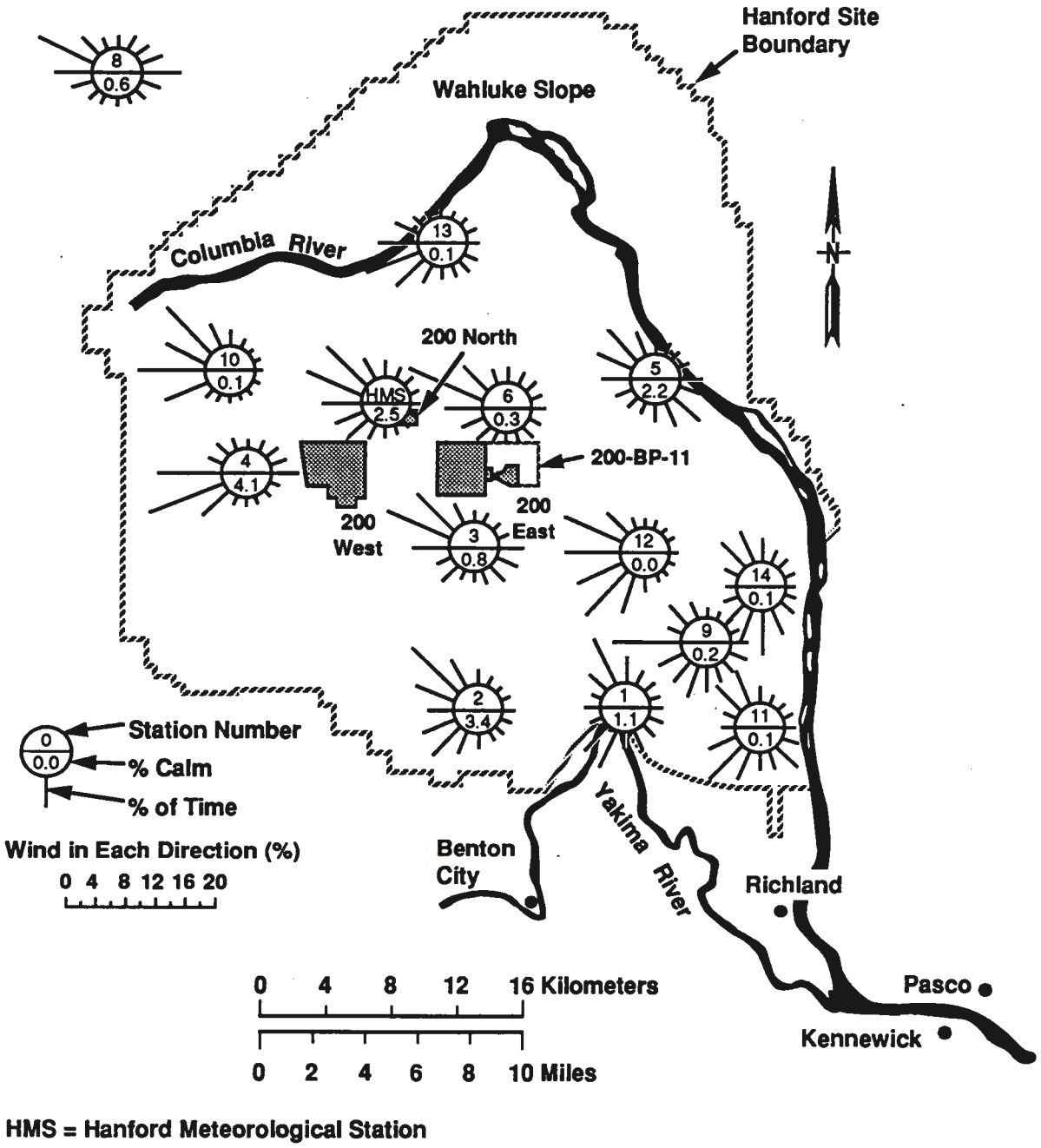


Figure 2-3. Conceptual Stratigraphic Column for the 200-BP-11 Operable Unit (northwest portion).

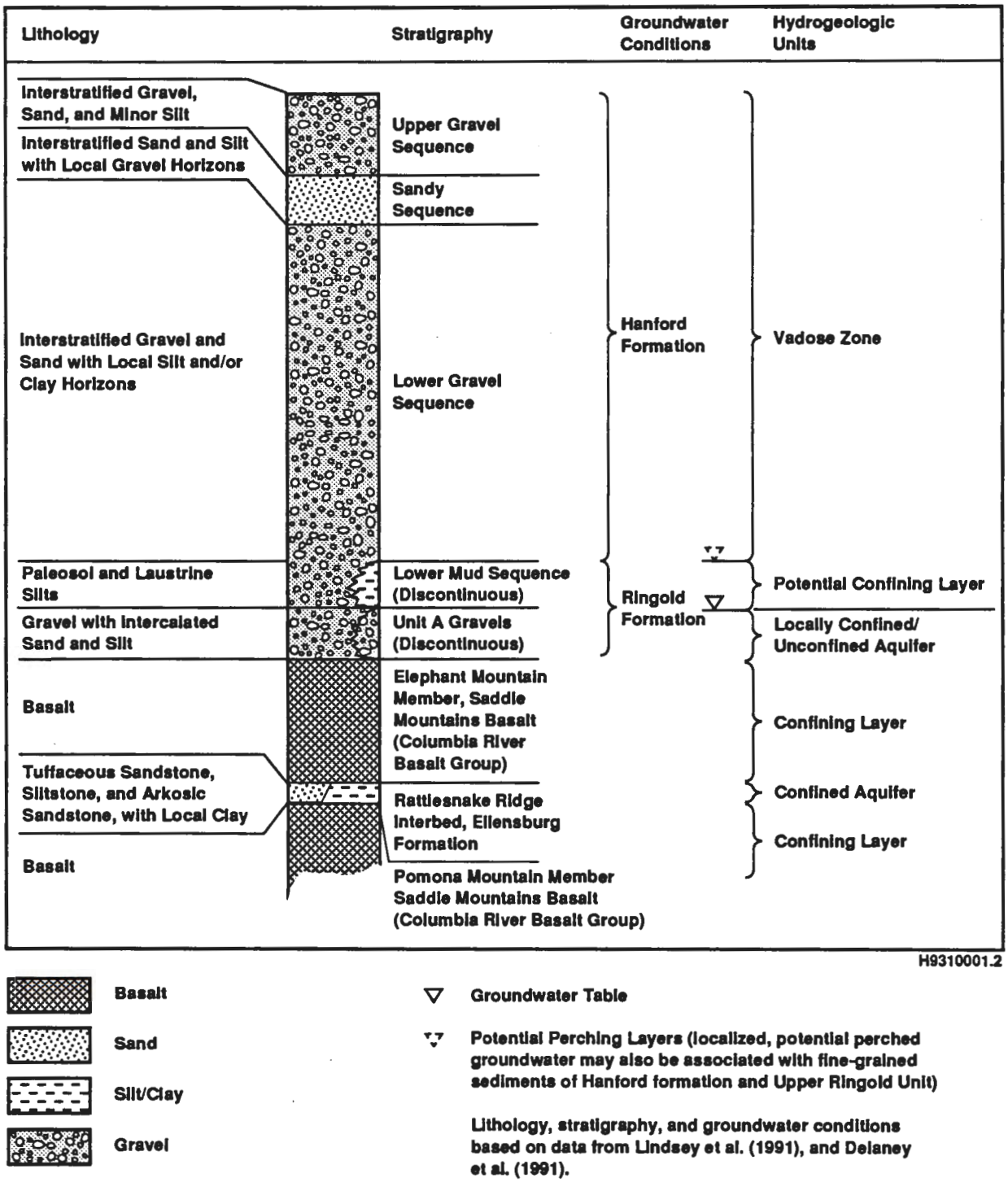
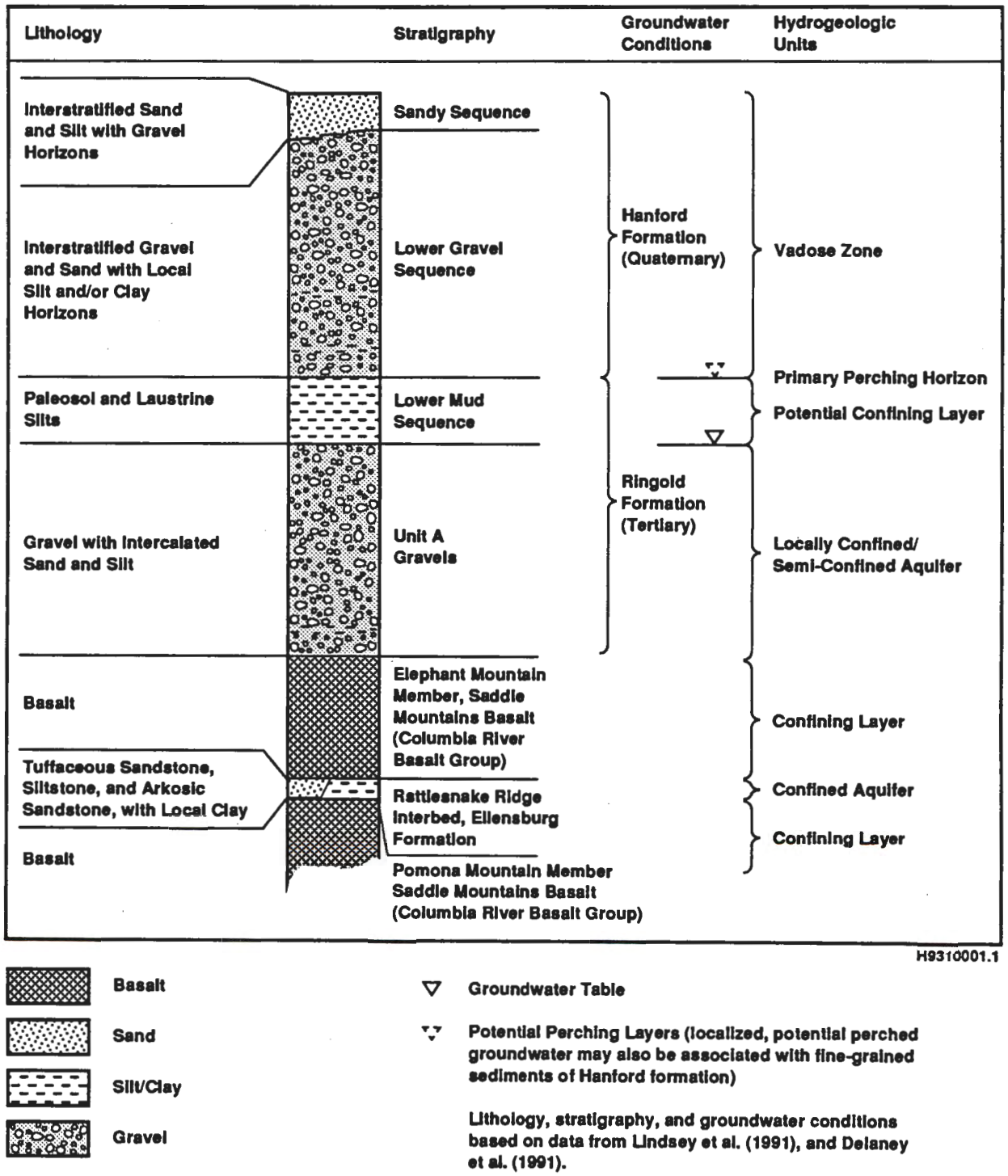
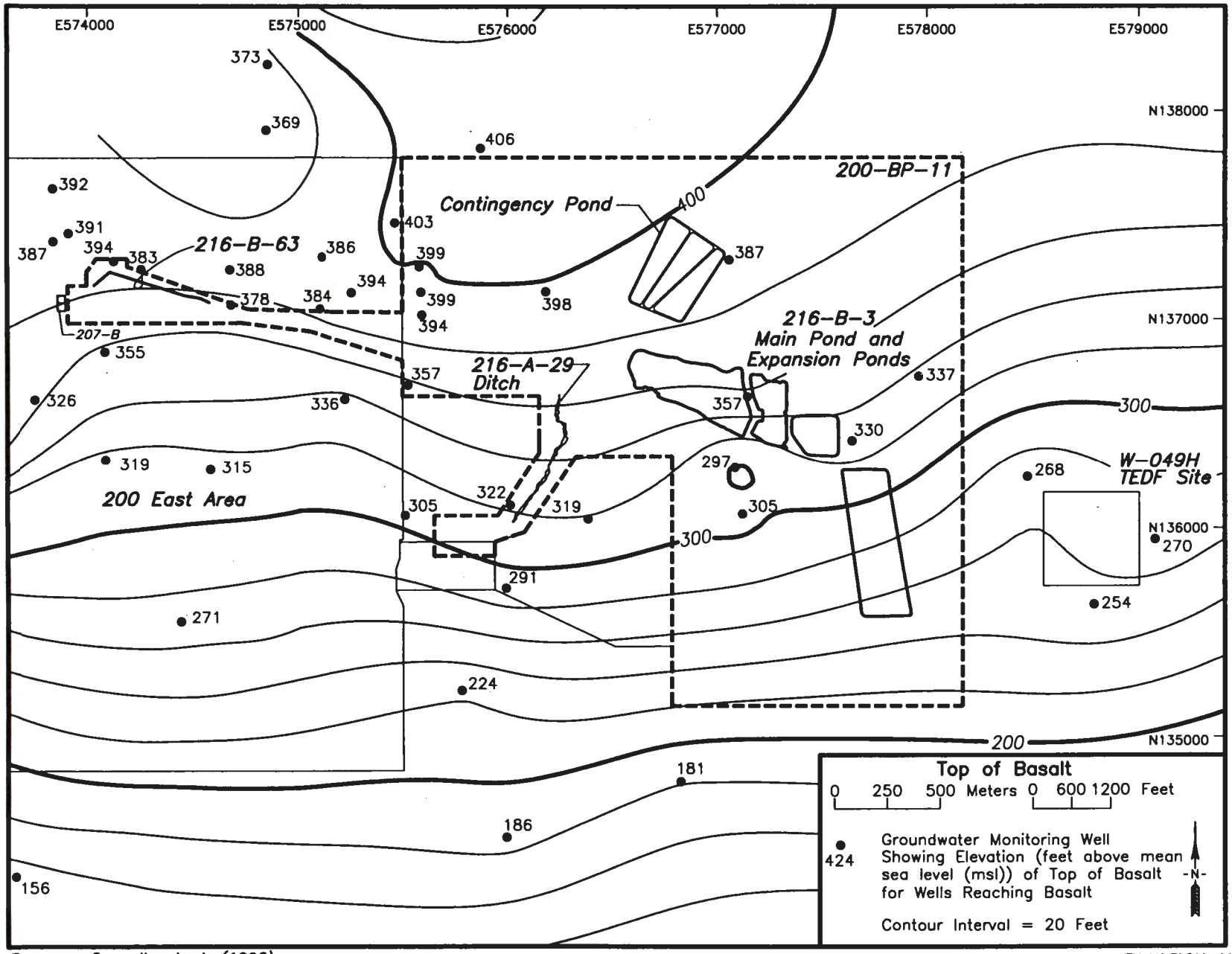


Figure 2-4. Conceptual Stratigraphic Column for the 200-BP-11 Operable Unit (southeast portion).

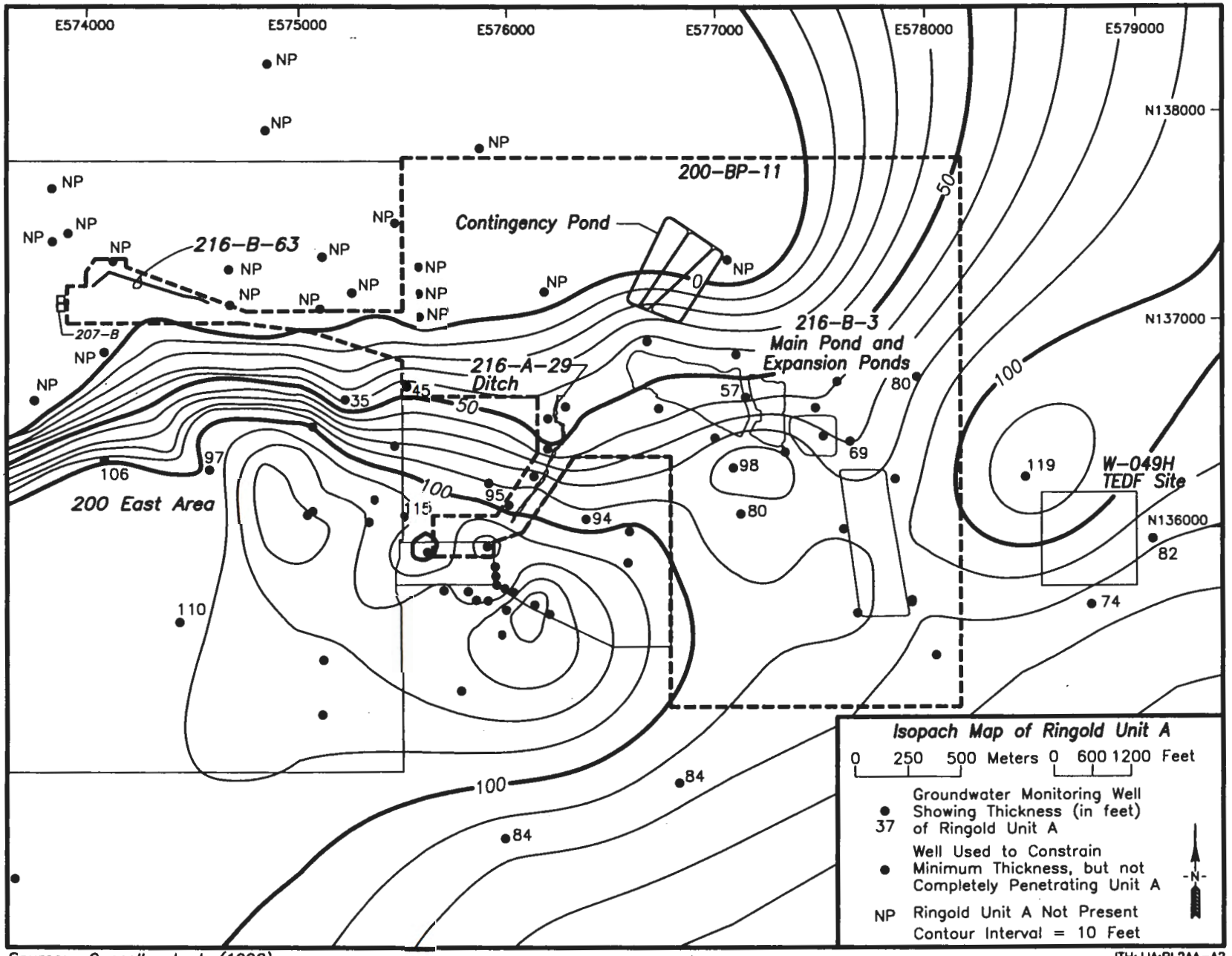




Source: Connelly et al. (1992)

ITH:JJA:PL2AA-A1

Figure 2-5. Structure Contour Map of the Top of Basalt for the 200-BP-11 Operable Unit.

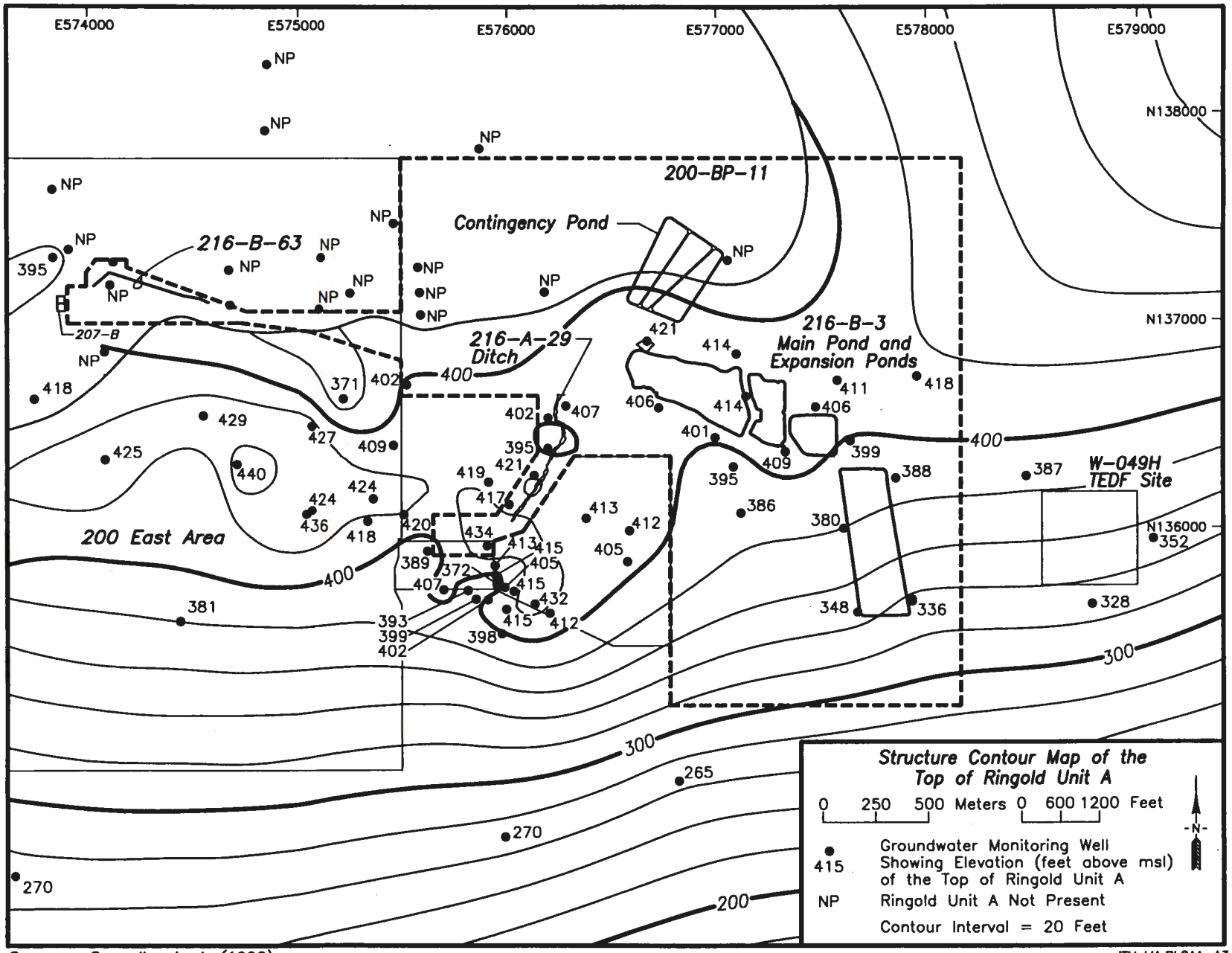


Source: Connelly et al. (1992)

ITH:JJA:PL2AA-A2

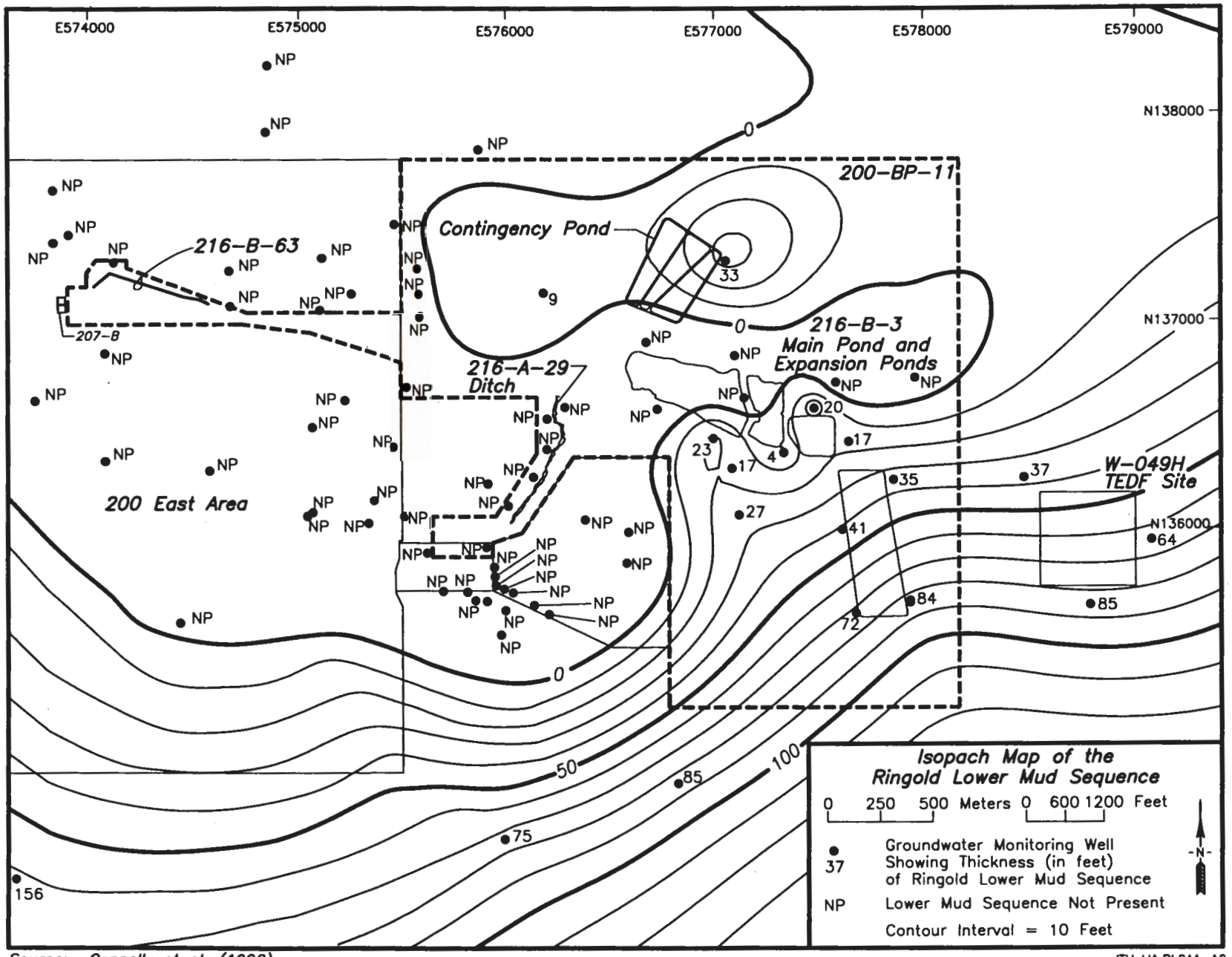
Figure 2-6. Isopach Map of Ringold Unit A for the 200-BP-11 Operable Unit.

Figure 2-7. Structure Contour Map of the Top of Ringold Unit A for the 200-BP-11 Operable Unit.



Source: Connelly et al. (1992)

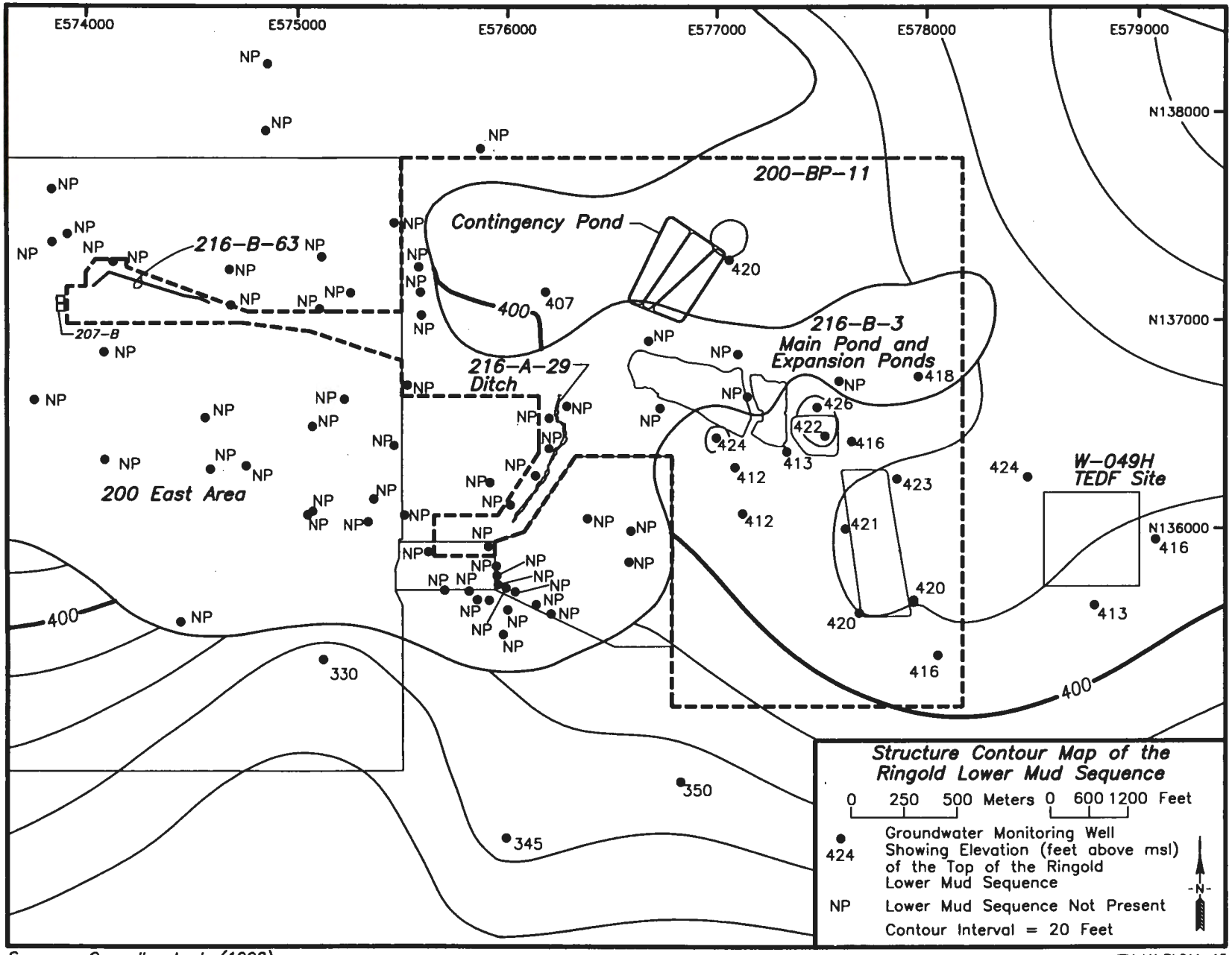
ITH:JJA:PL2AA-A3



Source: Connelly et al. (1992)

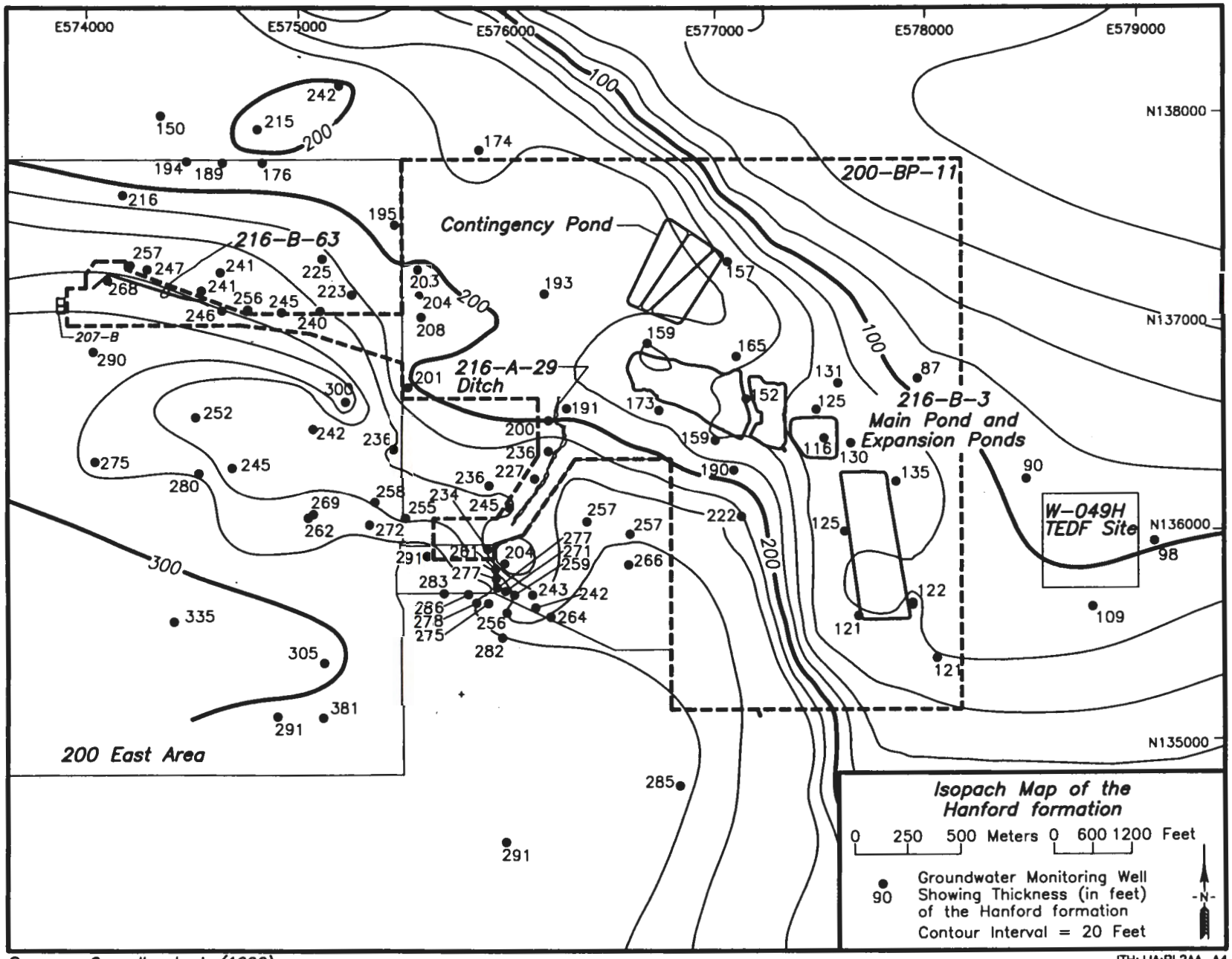
Figure 2-8. Isopach Map of the Ringold Lower Mud Sequence for the 200-BP-11 Operable Unit.

Figure 2-9. Structure Contour Map of the Ringold Lower Mud Sequence for the 200-BP-11 Operable Unit.



Source: Connelly et al. (1992)

ITH:JJA:PL2AA-A5



Source: Connelly et al. (1992)

Figure 2-10. Isopach Map of the Hanford Formation for the 200-BP-11 Operable Unit.

Figure 2-11. Representative Stratigraphy Immediately North of the Liquid Effluent Retention Facility.

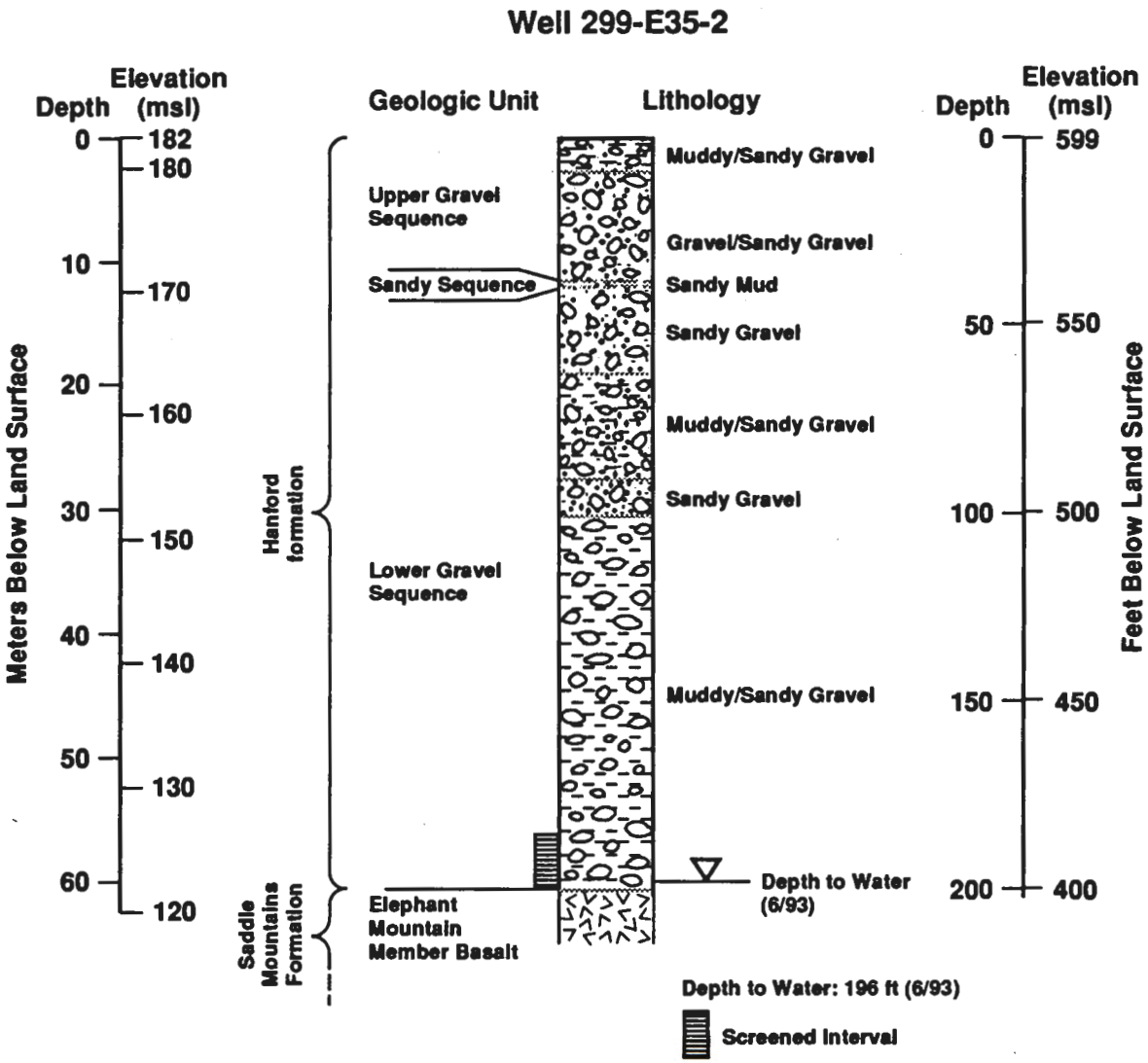
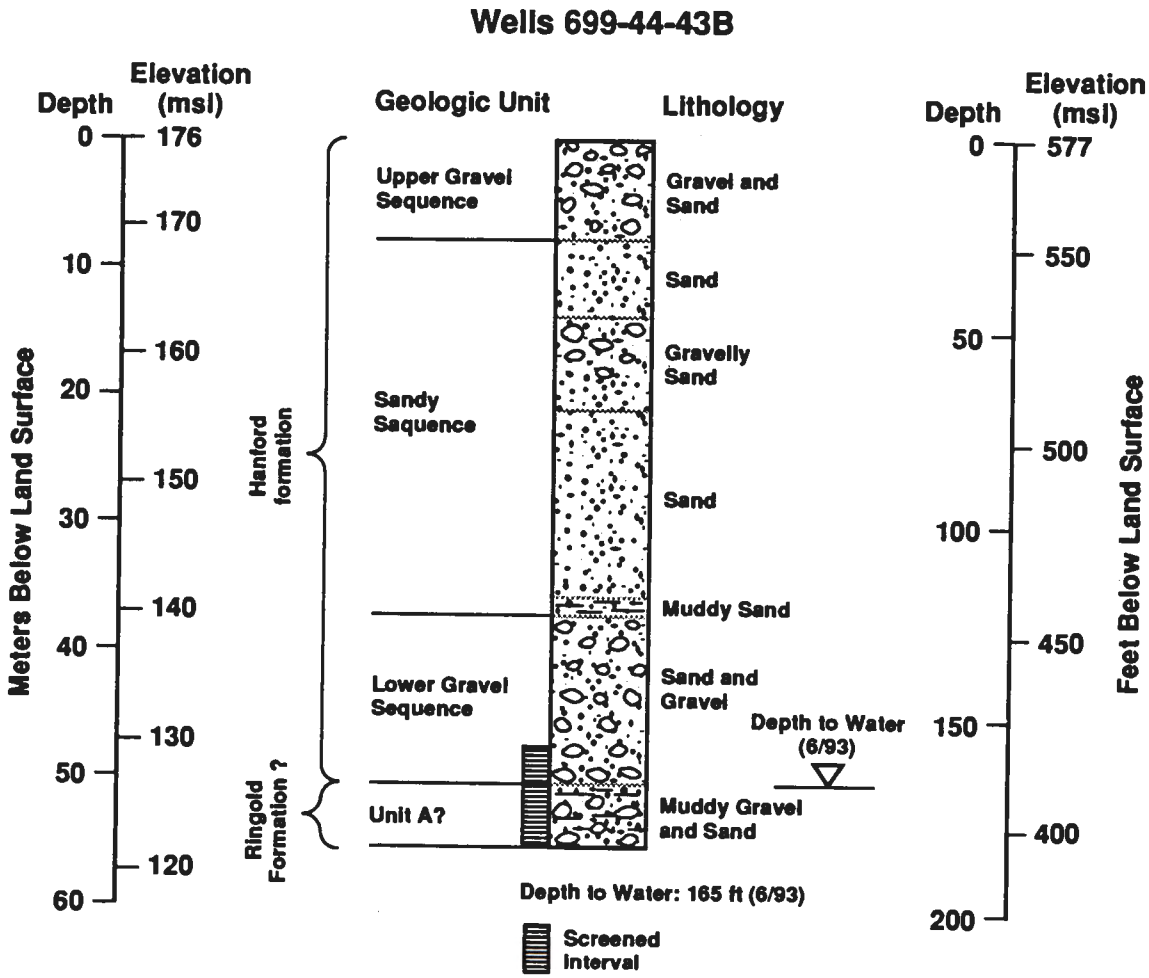


Figure 2-12. Representative Stratigraphy Between the 216-B-3 Main Pond and the 216-E-28 Contingency Pond.



Source: ERC Geosciences

H9310002.6

Figure 2-13. Representative Stratigraphy for the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches near the 216-B-3 Main Pond.

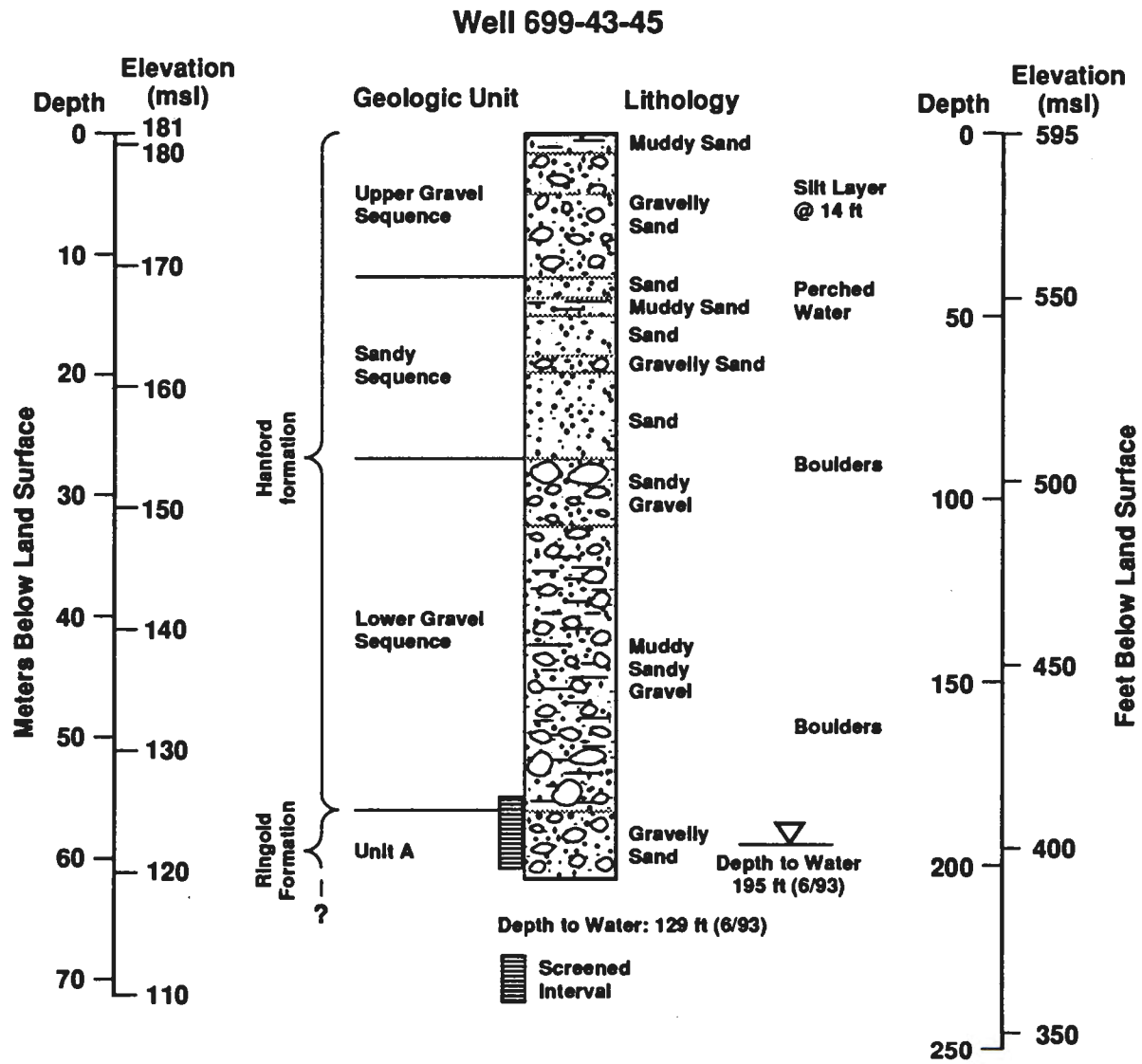


Figure 2-14. Composite Representative Stratigraphy for the 216-B-3 Main Pond (southern part).

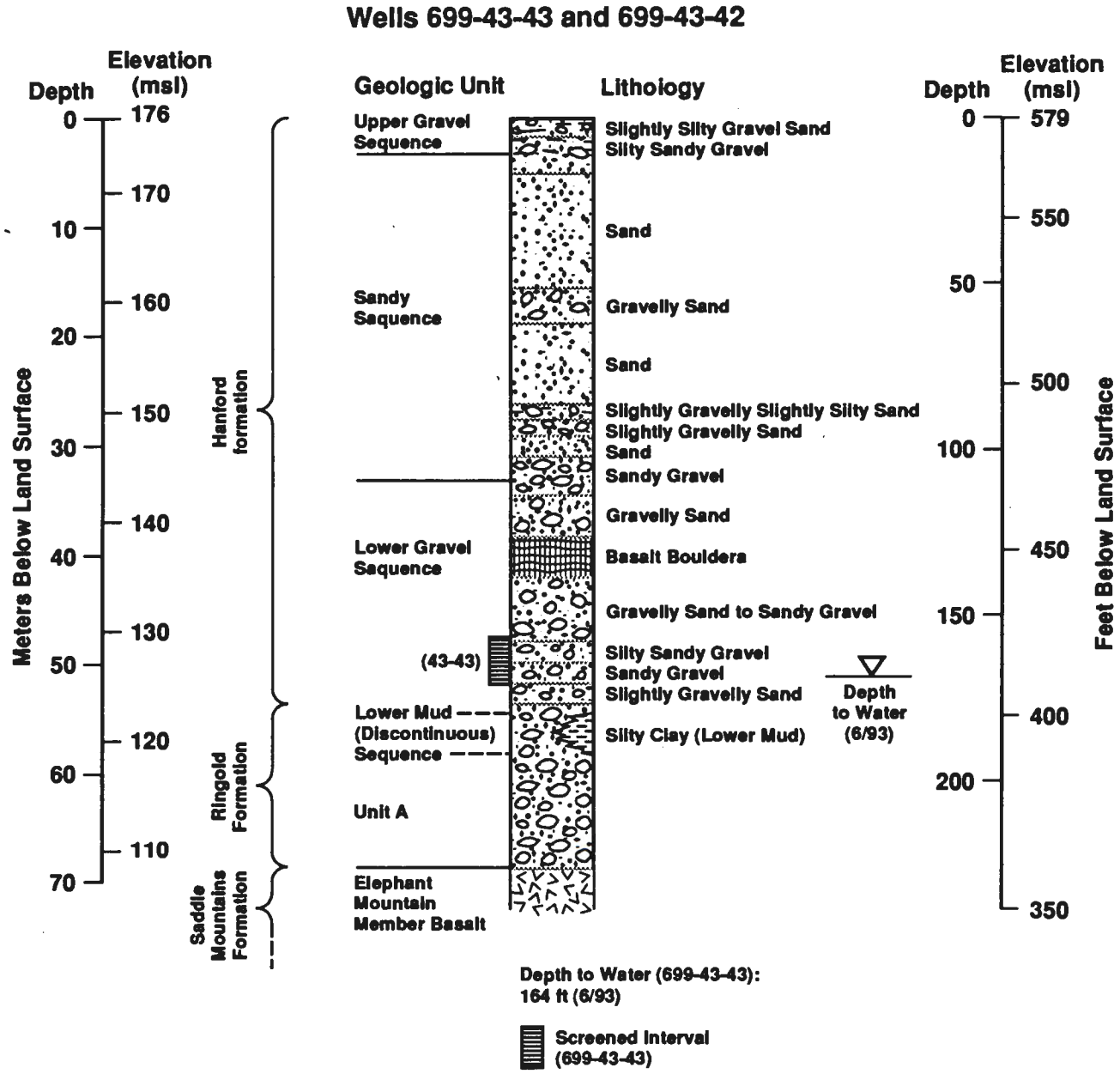


Figure 2-15. Composite Representative Stratigraphy Between the 216-B-3A and 216-B-3B Expansion Ponds.

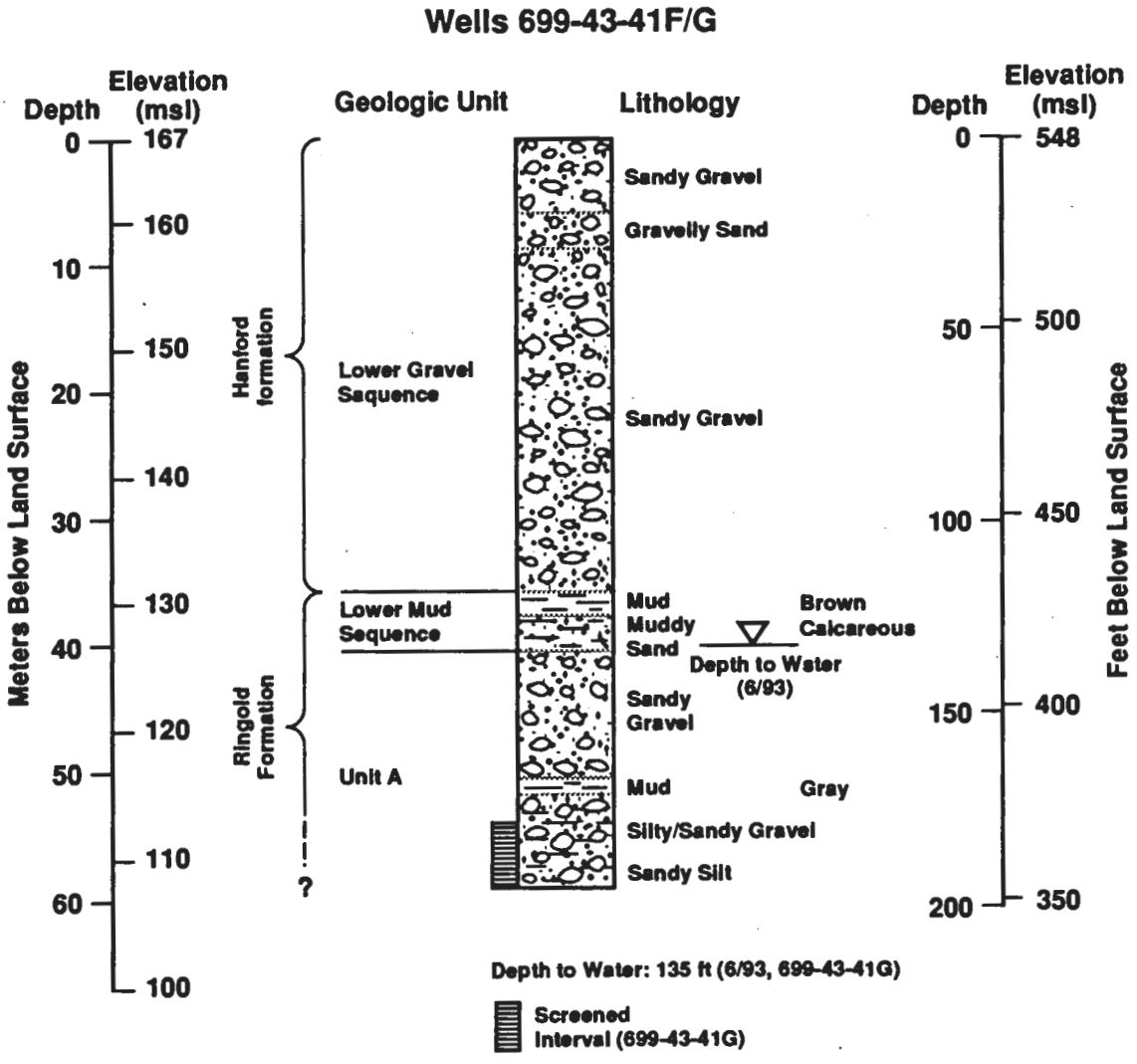


Figure 2-16. Composite Representative Stratigraphy Between the 216-B-3B and 216-B-3C Expansion Ponds.

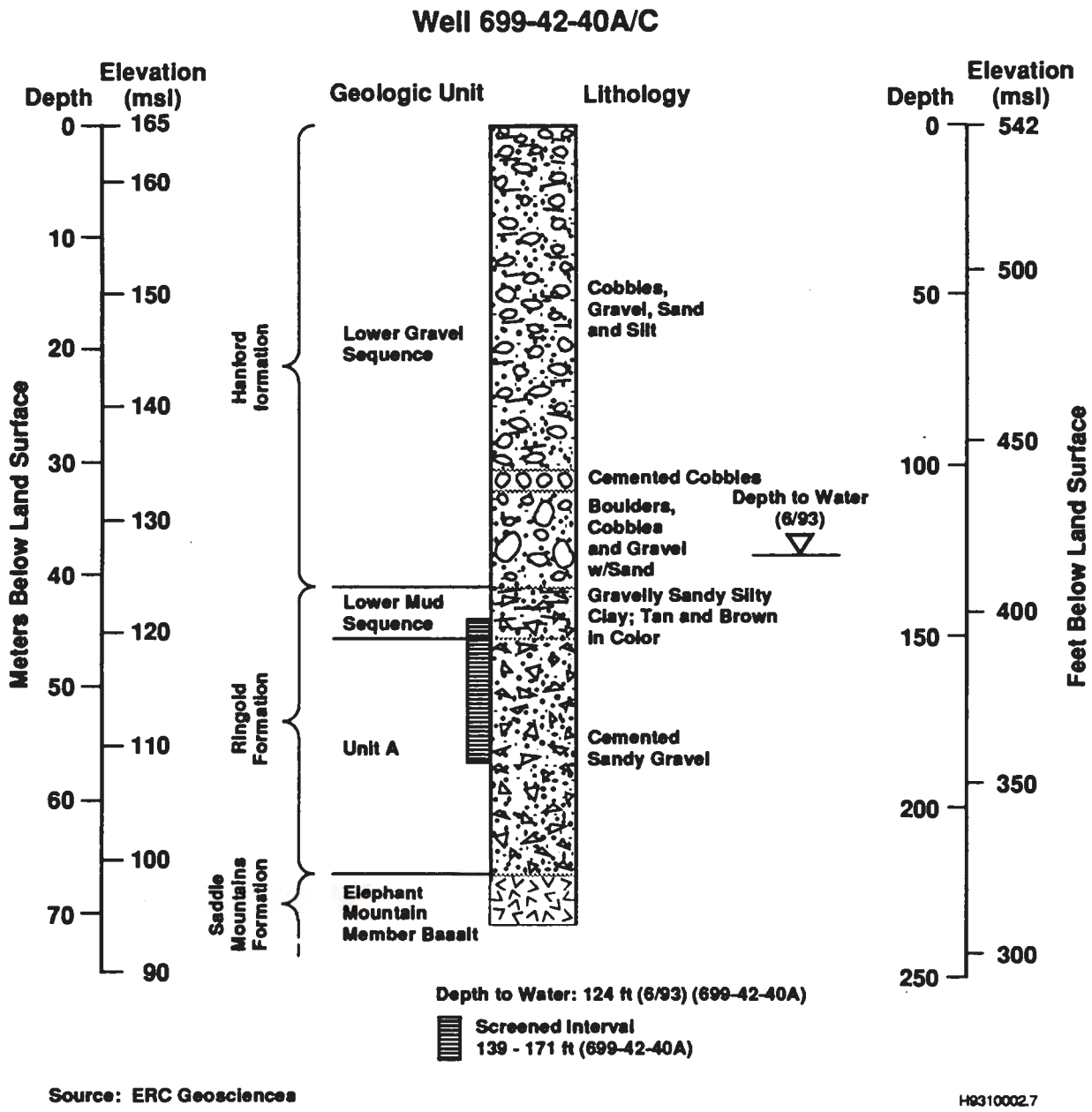
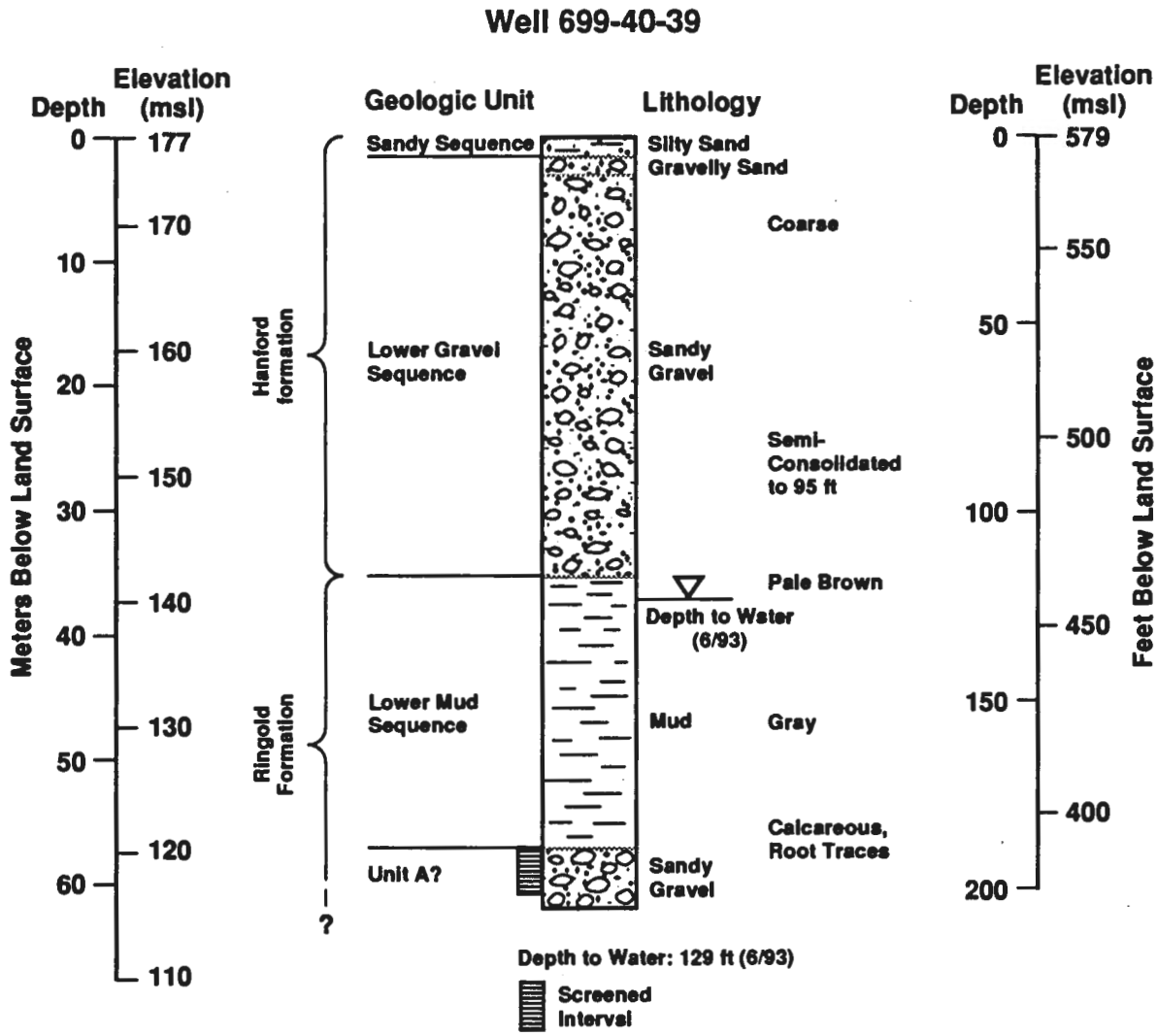
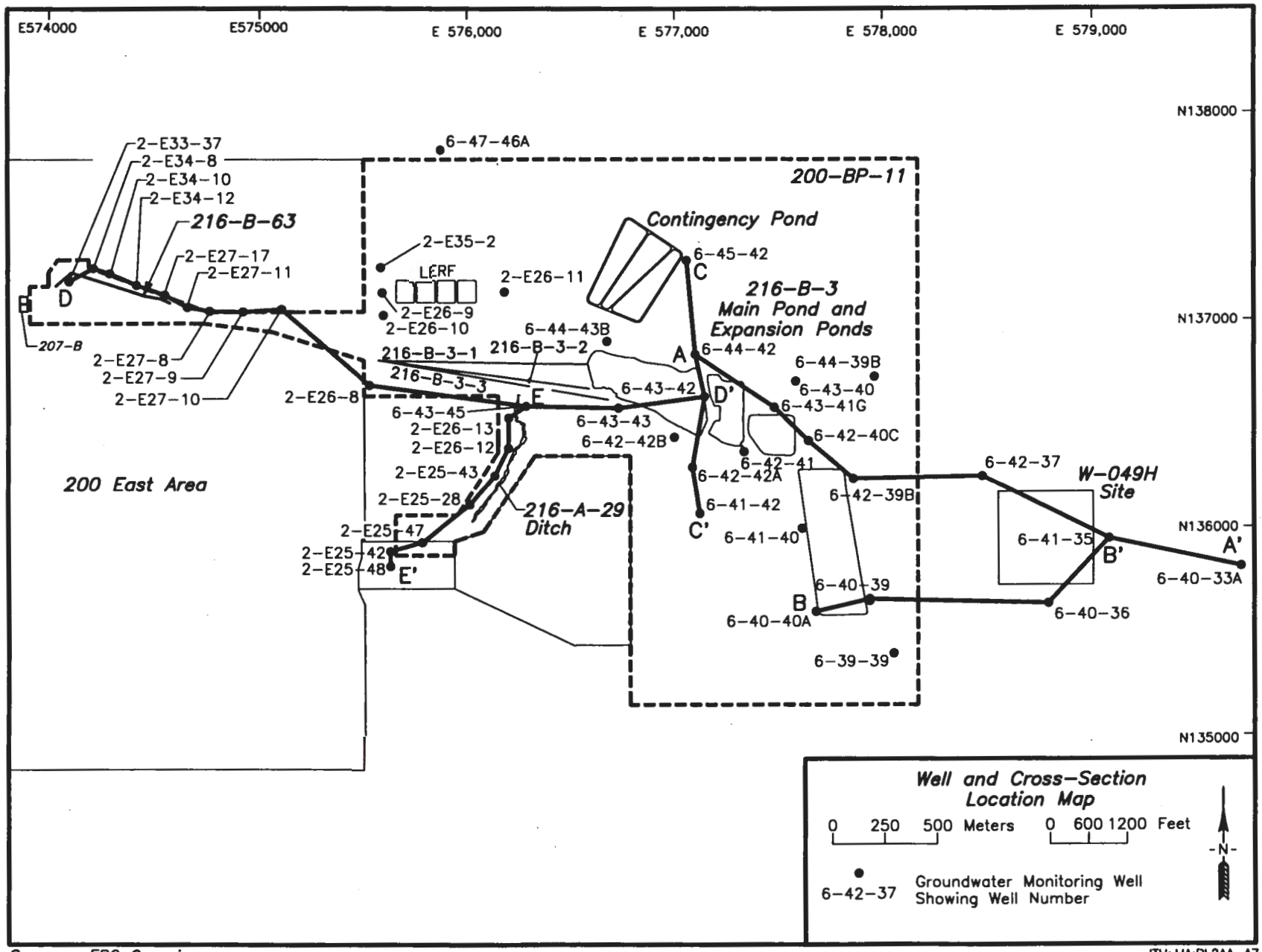


Figure 2-17. Representative Stratigraphy near the South End of the 216-B-3C Expansion Pond.

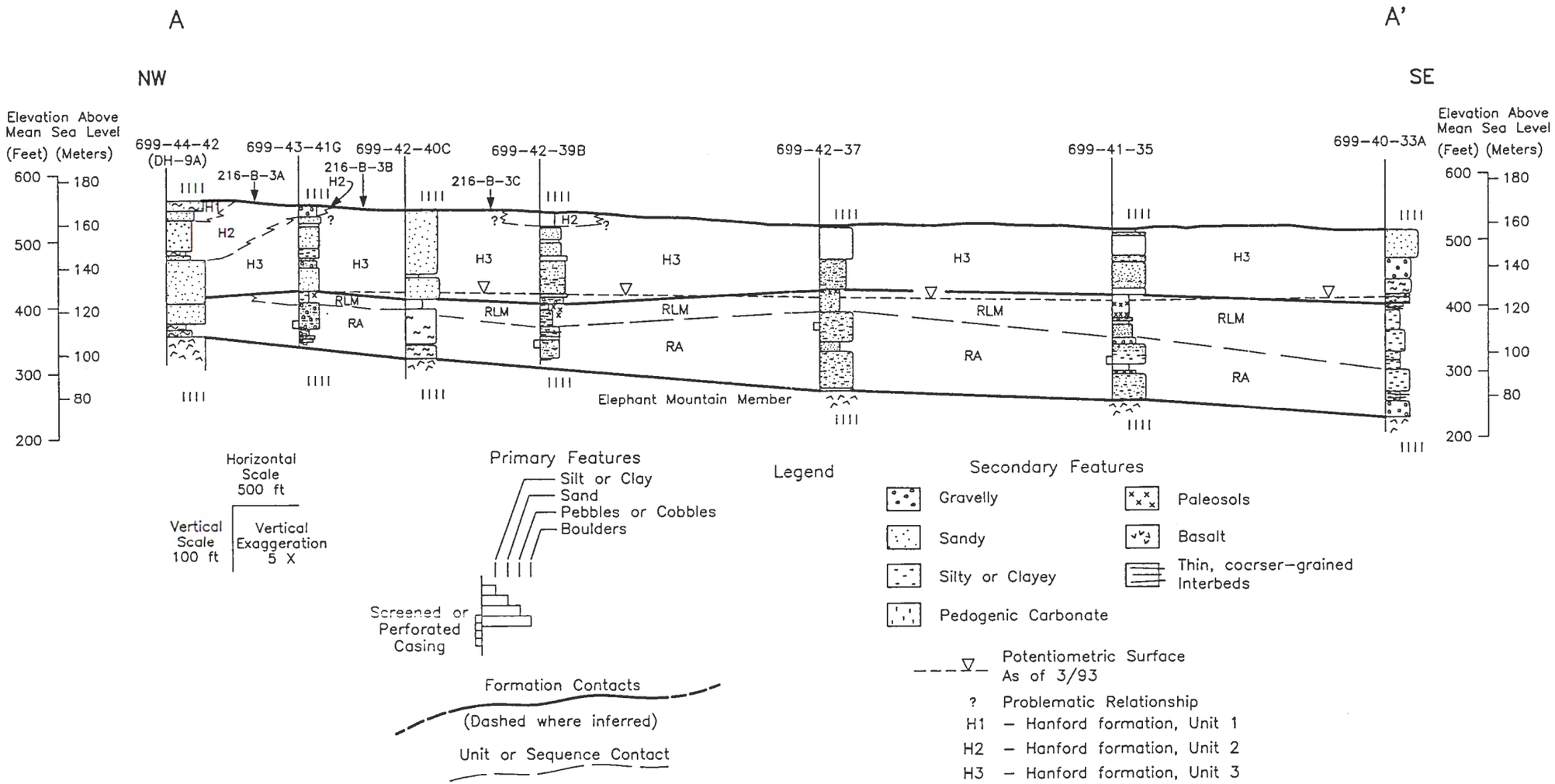


Source: ERC Geosciences



Source: ERC Geosciences

Figure 2-18. Well and Cross-Section Location Map for the 200-BP-11 Operable Unit.



Source: ERC Geosciences

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Figure 2-19. Cross Section A-A' for the 200-BP-11 Operable Unit.

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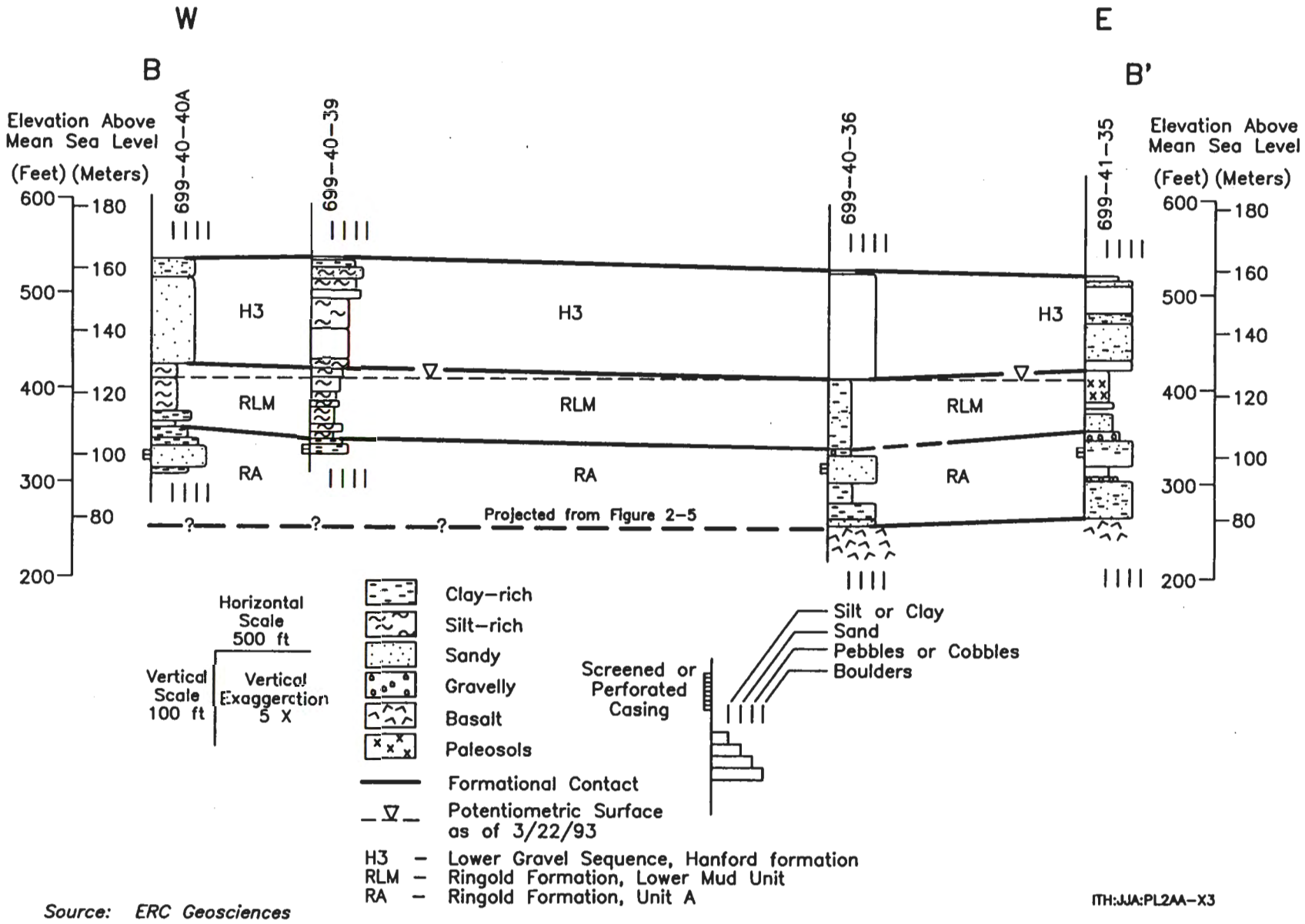

Source: ERC Geosciences

Figure 2-20. Cross Section B-B' for the 200-BP-11 Operable Unit.

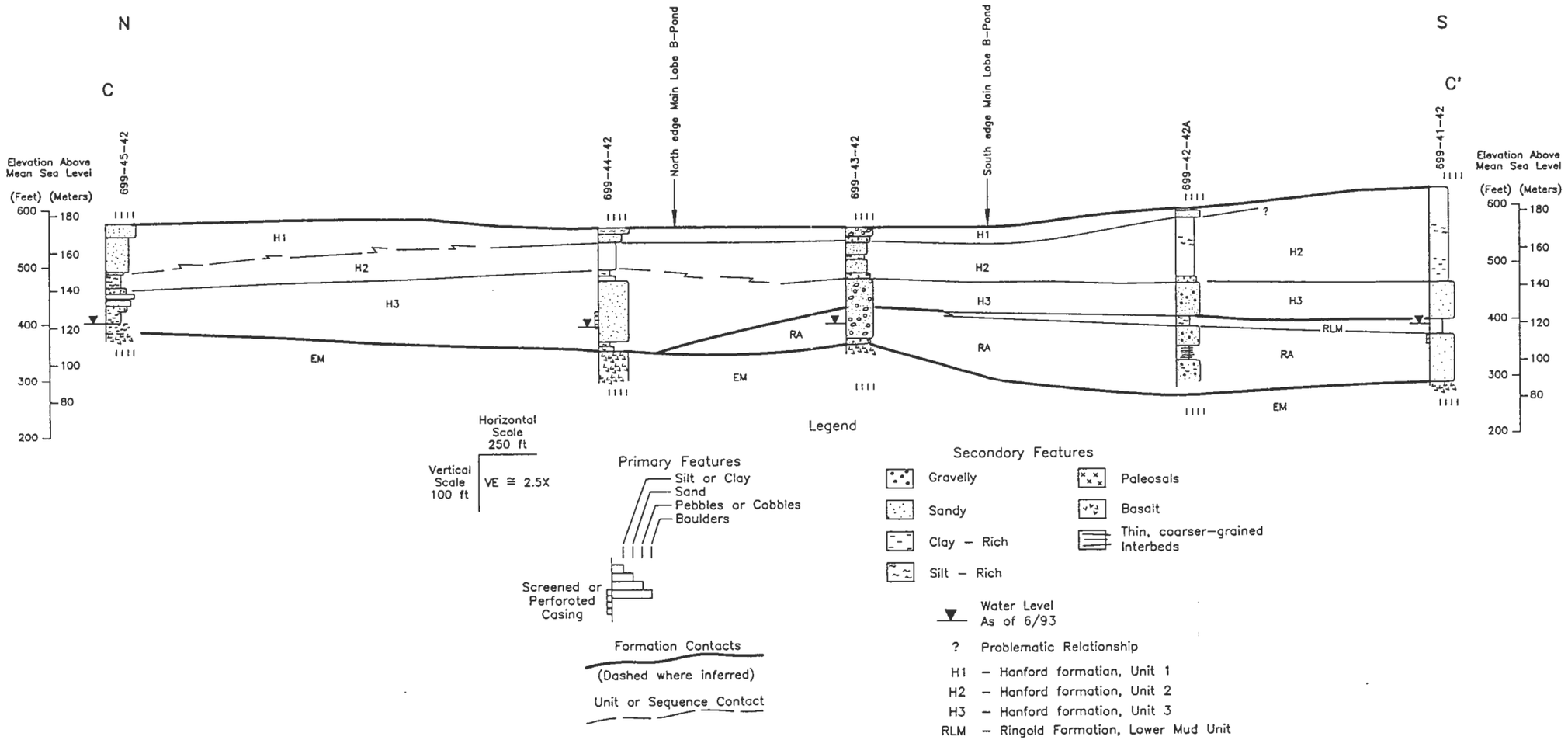

Figure 2-21. Cross Section C-C' for the 200-BP-11 Operable Unit.

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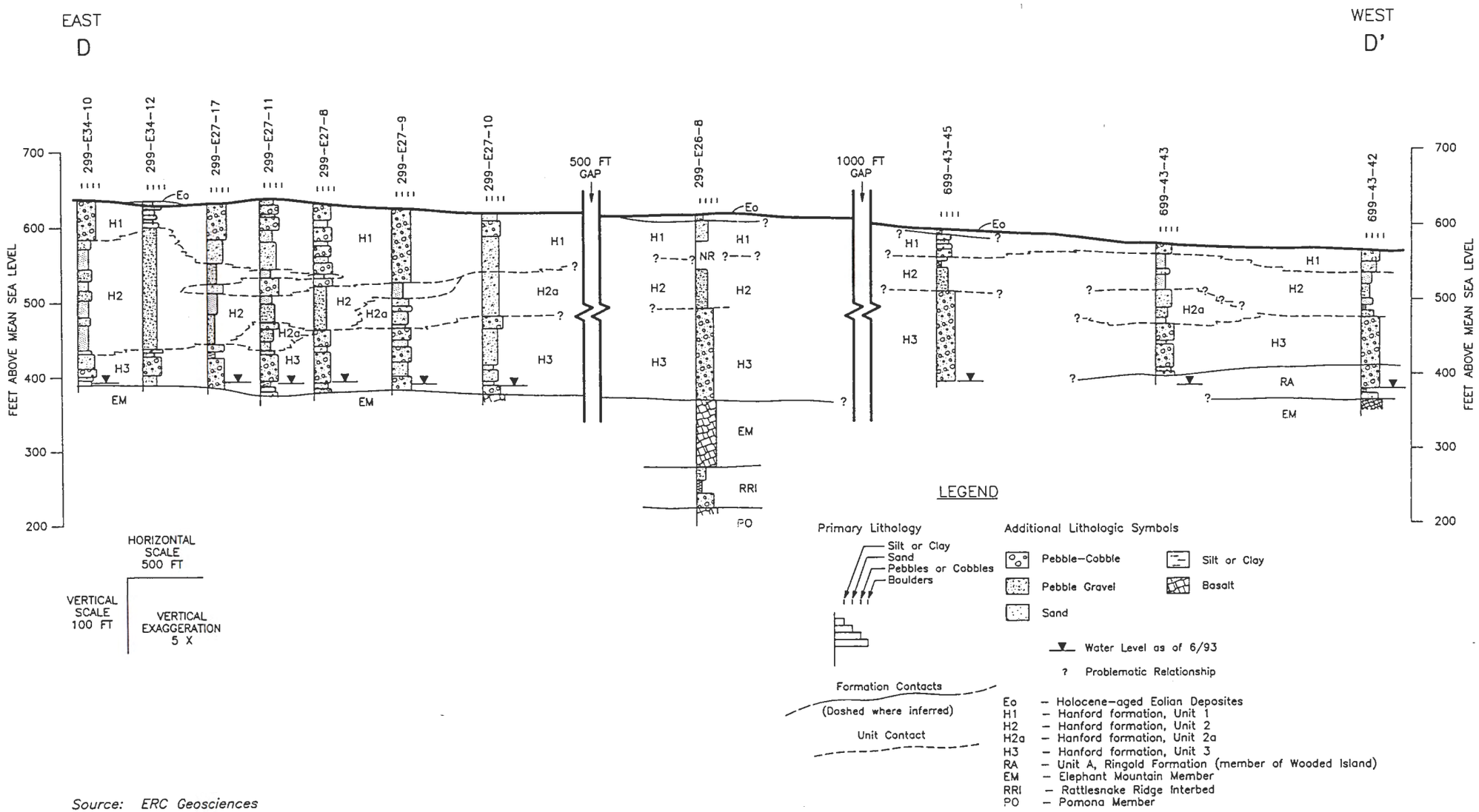

Source: ERC Geosciences

JJA:PL2AA–X7

Figure 2-22. Cross Section D-D' for the 200-BP-11 Operable Unit.

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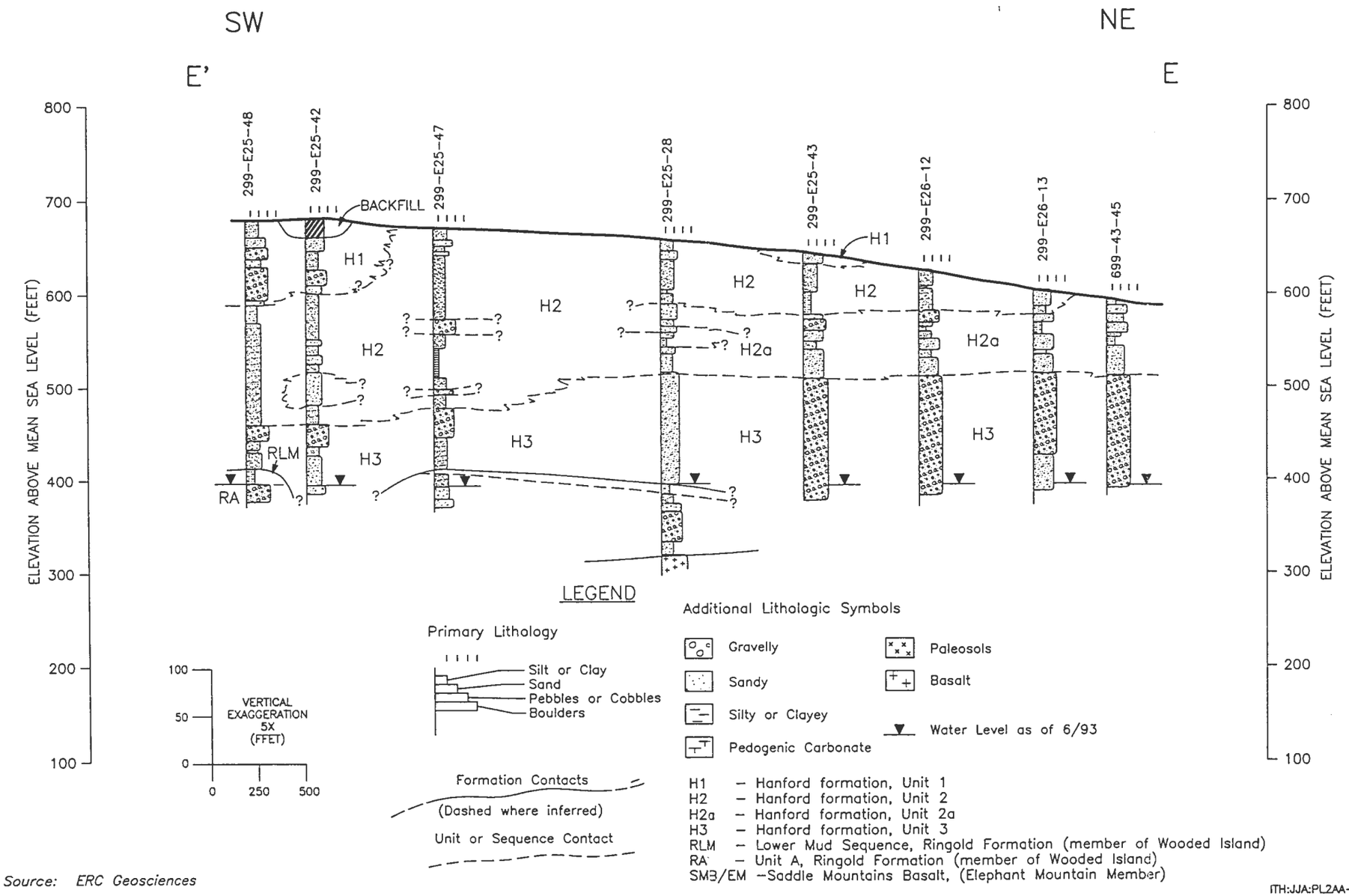

Source: ERC Geosciences

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Figure 2-23. Cross Section E'-E for the 200-BP-11 Operable Unit.

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Table 2-1. Physical Characteristics of Waste Management Units, 200-BP-11 Operable Unit.

Waste Management Unit	Depth	Ground Level Plan Dimensions and Area	Comments
216-B-2-1 Ditch	1.8 m (6 ft)	4.6 m (15 ft) wide by 1,067 m (3,500 ft) long = 4,908 m^2 or 0.49 hectares (52,500 ft^2 or 1.2 acres)	Decommissioned and backfilled in November 1963 as a result of UPR-200-E-32.
216-B-2-2 Ditch	1.8 to 2.4 m (6 to 8 ft)	4.6 m (15 ft) wide by 1,067 m (3,500 ft) long = 4,908 m^2 or 0.49 hectares (52,500 ft^2 or 1.2 acres)	Decommissioned and backfilled in 1970 as a result of UPR-200-E-138.
216-B-2-3 Ditch	1.8 to 2.4 m (6 to 8 ft)	6.1 m (20 ft) wide by 1,220 m (4,000 ft) long = 7,442 m^2 or 0.74 hectares (80,000 ft^2 or 1.8 acres)	Decommissioned and backfilled in 1987.
216-B-63 Trench	3 m (10 ft)	5.5 m (18 ft) by 427 m (1,400 ft) = 2,349 m^2 or 0.23 hectares (25,200 ft^2 or .57 acres)	Open and potentially active.
216-A-29 Ditch	0.6 first to 4.6 m (2 to 15 ft)	[estimated average width] 13.1 m (43 ft) by 1,098 m (3,600 ft) = 14,383 m^2 or 1.44 hectares (154,800 ft^2 or 3.6 acres)	Upper 213 m (700 ft) of the ditch was shallow; lower 884 m (2,900 ft) steep. Decommissioned and backfilled in 1991.
216-B-3 Main Pond	0.6 m to 6 m (2 to 20 ft)	14 hectares (35 acres)	Adjoined at the western end by a 1.7-hectare (4-acre) backfilled "overflow pond." Bentonite added in 1964. Decommissioned and backfilled in 1994.
216-B-3A Expansion Pond	Approx. 1 m (3.3 ft)	4 hectares (10 acres)	Decommissioned and isolated in 1994.
216-B-3B Expansion Pond	Approx. 1 m (3.3 ft)	4 hectares (10 acres)	Has not been used since 1984.
216-B-3C Expansion Pond	2.0 m to 3.0 m (6.6 to 10 ft)	17 hectares (41 acres)	Currently receives non-RCRA effluent.
216-E-28 Contingency Pond	1.2 m (4 ft)	12 hectares (30 acres)	Three ponds, built for emergency use in 1986--never used but remains potentially active.
216-B-3-1 Ditch	1.8 m (6 ft)	975 m (3,200 ft) long	Decommissioned and backfilled in 1964.
216-B-3-2 Ditch	1.2 m to 2.4 m (4 to 8 ft)	1,128 m (3,700 ft) long	Decommissioned and backfilled in 1970.
216-B-3-3 Ditch	1.8 m (6 ft)	1,128 m (3,700 ft) long	Decommissioned and backfilled in 1994.

3.0 INITIAL EVALUATION

This chapter briefly describes the process information associated with the 200-BP-11 Operable Unit, known and suspected contamination, potential impacts to human health and the environment, potential CMRs, and the preliminary corrective measure objectives and alternatives for the operable unit. Section 3.1 summarizes the past and current effluent discharges to the operable unit. Section 3.2 summarizes the types of contamination data available for the operable unit and what they indicate of the distribution and character of the contamination. These data include a summary of Section 4.1 (Known and Suspected Contamination) of the *B Plant Source Aggregate Area Management Study Report* (DOE-RL 1993b) and *PUREX Plant Source Aggregate Area Management Study Report* (DOE-RL 1993d), and a summary of Phase 1, 2, and 3 sampling results in the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). Section 3.3 discusses the conceptual model and potential concerns to human health and the environment as developed in Section 4.2 and Chapter 5 of the B Plant Aggregate Area Management Study (AAMS) Report (DOE-RL 1993b). Physical conceptual models for individual waste management units are provided in Chapter 4 of this work/closure plan. Section 3.4 is a summary of the CMRs from Chapter 6 of the B Plant AAMS Report, and Section 3.5 discusses the possible interim remedial measures presented in Chapter 7 of the B Plant AAMS Report.

3.1 PROCESS INFORMATION

Currently, the 216-B-3C Expansion Pond is the only waste management unit in the 200-BP-11 Operable Unit that receives effluents. These nondangerous discharges are the cooling water from B Plant (221 Building), 242-A Evaporator, 241-A Aging Waste Ventilation System Complex, and 244-AR Vault. In addition, the operable unit receives discharges from the B Plant and PUREX Plant chemical sewers, 283-E Water Treatment Facility, and the 284-E Powerhouse. In the past, the operable unit received wastewater from PUREX Plant cooling water, 244-CR Vault, 242-B Evaporator, 244-BXR Vault, and 241-BY Tank Farm. The operable unit has also received wastewater from several miscellaneous sources, such as construction activities and the LERF. Other nondangerous discharge streams may be conveyed to the operable unit in the future. Figure 3-1 depicts the current flow routes to the operable unit. A complete description of the current discharge streams is provided in the *216-B-3 Expansion Ponds Closure Plan* (Chapter 3, DOE-RL 1994a). Table 3-1 provides a summary of candidate potential contaminants of concern resulting from all discharges to the operable unit, and the final list of potential contaminants of concern is presented in Table 3-2.

3.2 KNOWN AND SUSPECTED CONTAMINATION

This section summarizes the known and suspected contamination data for the 200-BP-11 Operable Unit. A thorough search was performed to assess the known and suspected contamination from each of the process streams discussed in Section 3.1 and is documented in the B Plant and PUREX Plant AAMS Reports (Tables 4-22 and 4-32, respectively; DOE-RL 1993b, 1993d) and the *216-B-3 Expansion Ponds Closure Plan* (Section 4 Tables) (DOE-RL 1994a). Additionally, the Form 3's (individual TSD unit Dangerous Waste Permit Applications for the Hanford Site Dangerous Waste Part A Permit Application) for the 216-B-63 Trench, 216-A-29 Ditch, and the 216-B-3 Main Pond RCRA TSD units were reviewed to ensure that the contaminants listed on the form were considered in the evaluation of potential contaminants of concern. The Form 3's are provided in Appendix C.

All contaminants identified in this search are listed in Table 3-1. It should be noted that Table 3-1 includes all candidate potential contaminants of concern to the entire B Plant Aggregate Area and is therefore considered a conservative list with respect to the 200-BP-11 Operable Unit.

3.2.1 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditch Past-Practice Units

3.2.1.1 216-B-2-1 Ditch. The 216-B-2-1 Ditch was operational from April 1945 to November 1963. The ditch conveyed B Plant (221-B Building) steam condensate, process cooling water, and chemical sewer effluents and water from the 284-E Powerhouse. After March 1952 until its closing, it also conveyed 241-CR Vault cooling water. The 216-B-2-1 Ditch released to the 216-B-3-1 Ditch.

There is no record of dangerous waste contamination associated with these effluent streams during the operational period of the 216-B-2-1 Ditch. The only documented release to the ditch is Unplanned Release UPR-200-E-32, which occurred in November 1963. The leak caused gross contamination of the 207-B Water Retention Basin and the head end of this 216-B-2-1 Ditch. After damming the 216-B-2-1 Ditch 300 m (1,000 ft) from its head, the contaminated basin water was flushed into the ditch. The total volume of liquid to be discharged to the ditch during this incident was estimated to be 4,900,000 L (1,300,000 gal), 4,200,000 L (1,100,000 gal) of which was low-activity-level cooling water. The amount of activity released was estimated from sample analyses and estimated retention basin volume prior to discharge. The cerium-141 content was determined insignificant. Only 30 Ci of cerium-144 and 0.05 Ci of strontium-90 were considered pertinent (Maxfield 1979). It was also estimated that less than half a liter of highly contaminated waste from the B Plant 6-1 tank contents was discharged to the retention basin (Maxfield 1979).

As a result of breakthrough by contaminated vegetation in the fall of 1973, further action was completed to cover the unit with a plastic weed root barrier. This work included leveling the ground surface, spreading a 10-cm (4-in.) sand cushion on which 10-mil-thick plastic sheeting was laid, spreading a 46-cm (18-in.) cover of sand, and finishing with a 10-cm (4-in.) topping of gravel to prevent erosion by wind (Maxfield 1979). In 1986 because of the recurrence of contaminated vegetation near the ditch, the 216-B-2-1 Ditch was restabilized with 61 cm (24 in.) of best available soil. The ditch surface area is currently classified as an area of underground radioactive material.

A comparison of the estimated pore volume beneath the ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.1.2 216-B-2-2 Ditch. The 216-B-2-2 Ditch was excavated to replace the 216-B-2-1 Ditch and was active from November 1963 to May 1970. The 216-B-2-2 Ditch converged with the abandoned 216-B-2-1 Ditch about 488 m (1,600 ft) downstream. The 216-B-2-2 Ditch transported B Plant cooling water, steam condensate, and chemical sewer effluent; 284-E Powerhouse waste and steam condensate; and 241-CR Vault cooling water until January 1965. From January 1965 to November 1967, the 216-B-2-2 Ditch also carried 241-BY In-Tank Solidification (ITS) Unit cooling water. From November 1967 to February 1968, the 216-B-2-2 Ditch did not carry 284-E Powerhouse waste or B Plant steam condensate. From February 1968 to April 1970, the 216-B-2-2 Ditch also carried 241-BY Tank Farm ITS Unit 2 cooling water. Until April 1970, the 216-B-2-2 Ditch also received cleanup waste from the 207-B Retention Basin (DOE-RL 1993b). The 216-B-2-2 Ditch discharged to the 216-B-3-1 Ditch until July 1964, then to the 216-B-3-2 Ditch until September 1970.

There is no record of dangerous waste contamination associated with the effluent streams during the operational period of the 216-B-2-2 Ditch. The only documented release to the 216-B-2-2 Ditch is Unplanned Release UPR-200-E-138 on March 22, 1970, which released approximately 1,000 Ci of strontium-90 to the 216-B-2-2 Ditch. The radionuclides reported to be released to the ditch include cesium-137, strontium-90, plutonium-239, and plutonium-240. Radionuclide data obtained from waste inventory data sheets (WIDS), dated March 2, 1992, indicate the 216-B-2-2 Ditch contains 0.314 Ci of cesium-137, 147 Ci of strontium-90, and 0.042 g of plutonium-239/240 (DOE-RL 1993b).

As a result of this release, the 216-B-2-2 Ditch was decommissioned and backfilled to grade with 2.4 m (8 ft) of clean fill material. In 1973, Russian thistles and willow trees growing on the backfilled area showed internal beta-gamma contamination up to a maximum of 3,000 ct/min. Because of the contaminated vegetation, the first 731 m (2,400 ft) of the 216-B-2-2 Ditch was covered with sand and plastic root liners. Since that time no contaminated vegetation has been found on the first 731 m (2,400 ft); however, Russian thistles growing on the uncovered section of the 216-B-2-2 Ditch showed readings up to 1,500 ct/min beta-gamma contamination (DOE-RL 1993b). Because of this contaminated vegetation, the 216-B-2-2 Ditch was restabilized with 61 cm (24 in.) of soil in 1986. Currently, the 216-B-2-2 Ditch is classified as an underground radioactive material zone.

A comparison of the estimated pore volume beneath the 216-B-2-2 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.1.3 216-B-2-3 Ditch. The 216-B-2-3 Ditch was operational from May 1970 to 1987 and was excavated to replace the 216-B-2-2 Ditch as a result of Unplanned Release UPR-200-E-138. The 216-B-2-3 Ditch conveyed and percolated 241-CR Vault cooling water, B Plant cooling water, and 241-BY Tank Farm ITS-1 and ITS-2 unit condenser cooling water. The 216-B-2-3 Ditch discharged to the 216-B-3-2 Ditch until September 1970 and then to the 216-B-3-3 Ditch until its closing.

There is no record of dangerous waste contamination associated with these effluent streams during the operational period of the 216-B-2-3 Ditch. Additionally, no radionuclide data are presented for this site in the WIDS (WHC 1991c).

In 1987, the 216-B-2-3 Ditch was decommissioned and backfilled with 26 m (8 ft) of clean soil. The 216-B-2-3 Ditch was replaced with a 56-cm (22-in.) HDPE pipeline commonly referred to as the 216-B-2-3 Pipeline or B Plant cooling water pipeline. The 216-B-2-3 Ditch and 216-B-2-3 Pipeline surface areas are currently classified as an area of underground radioactive material.

A comparison of the estimated pore volume beneath the 216-B-2-3 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

The 216-B-2-3 Ditch is surveyed semiannually. During the April 1991 survey, vegetation was found with beta contamination up to 20,000 dis/min. This was an increase from the previous year. The site is considered one of low-level radioactivity with readings that are generally less than 200 ct/min by a Geiger-Mueller (GM) probe (Maxfield 1979). In 1986, the 216-B-2-3 Ditch was restabilized with 61 cm (24 in.) of best available soil because of the recurrence of contaminated vegetation in the area.

3.2.2 216-B-63 Trench TSD Unit

The 216-B-63 Trench was operational from March 1970 to February 1992. The Form 3 for the 216-B-63 Trench TSD unit states that the 216-B-63 Trench received nonregulated wastewater from the B Plant chemical sewer, which includes corrosive dangerous waste from the generation of demineralizer columns at B Plant. Treatment of these wastes occurred by successive addition of acidic and caustic wastes to the 216-B-63 Trench. Approximately 473,175 L/day (125,000 gal/day) total flow reached the 216-B-63 Trench. The corrosive discharges were a major part of this flow; however, no accurate estimates are available regarding the total volume of corrosive wastes. Approximately 68,100,000 kg/yr (150,000,000 lb/yr) of corrosive wastes was managed in the 216-B-63 Trench. The 216-B-63 Trench has not received dangerous waste since September 1985; however, the unit did receive nondangerous waste until 1992.

The B Plant AAMS Report (DOE-RL 1993b) states that the only documented dangerous effluent discharged to the 216-B-63 Trench consisted of demineralizer recharge effluent and compressor cooling water from the B Plant (221-B Building). From 1970 to 1985, the demineralizer recharge effluent contained aqueous sulfuric acid and sodium hydroxide solutions; after 1985, the cation column effluent was treated with sodium carbonate and the anion column effluent was treated with monosodium phosphate to maintain a combined pH between 4 and 10. As of 1987, the waste discharged to the 216-B-63 Trench was no longer considered to be "Dangerous Waste" under WAC 173-303. According to a study done by Meinhardt and Frostensen (1979), radiological discharges to the 216-B-63 Trench were relatively low with a total beta discharge of 8.7 Ci and approximately 7.6 kg (16.7 lb) of uranium.

A comparison of the estimated pore volume beneath the 216-B-63 Trench with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.3 216-A-29 Ditch TSD Unit

The 216-A-29 Ditch was operational from November 1955 to October 1991. The Form 3 for the 216-A-29 Ditch TSD unit states that the 216-A-29 Ditch received nonregulated process and cooling waters from the PUREX Plant and historically received corrosive dangerous wastes from regeneration of demineralizer columns in the PUREX Plant. Treatment of these wastes occurred by the successive addition of acidic and caustic wastes that served to neutralize the wastes while in the ditch. Any acidic or caustic wastes that did reach the soil were subsequently neutralized by the calcareous nature of the soil. Approximately 22,710,000 L/day (6,000,000 gal/day) of total flow reached this ditch; however, no accurate estimates are available regarding the total volume of corrosive wastes this unit received. The 216-A-29 Ditch also historically received spills from the PUREX Plant. When accurate information as to the nature and quantity of these spills was available, this information was listed on the annual waste quantity. This unit has not received dangerous wastes since February 1986 and will be closed under interim status.

The PUREX Plant AAMS Report (DOE-RL 1993d) states that discharges of sodium hydroxide and sulfuric acid solution from the chemical sewer occurred on a daily basis until February 1986. Other known and potential discharges include demineralizer regenerant, oxalic acid, nitric acid, hydrogen peroxide, calcium nitrate, potassium permanganate, sodium carbonate solution, hydrate solution, potassium hydroxide, sodium nitrate, sodium hydroxide, cadmium nitrate, and hydrazine. The majority of these discharges were CERCLA reportable releases. The PUREX Plant AAMS Report

(DOE-RL 1993d) has a table of a single sampling period of organics and inorganics in the PUREX chemical sewer; these could possibly have been in the effluent discharged to the 216-A-29 Ditch.

To support interim stabilization of the 216-A-29 Ditch in 1991, samples were taken of soil and trees to determine the possible radionuclide uptake. Samples were collected of the surrounding surface soils, new growth limbs and leaves, and cores taken from the trunks of trees. Six sample points were chosen, three from each side: two at the north end of the ditch, two from the midsection, and two from the south end. Soil had a maximum value of 2.3 pCi/g of cesium-137, less than 0.28 pCi/g of plutonium-239/240, 0.65 pCi/g of strontium-90, and 5.5 x 10^{-7} g/g of uranium (WHC 1992b).

Water samples were also collected in 1991 from the 216-A-29 Ditch. The average pH value was 7.7. Aquatic vegetation samples collected in 1991 indicated the presence of uranium at 2.9 x 10^{-7} g/g and strontium-90 at 0.44 pCi/g. Sediment samples collected indicated uranium at 1.1 x 10^{-6} g/g, cesium-137 at 3.3 pCi/g, strontium-90 at 0.65, and plutonium below the detection limit.

A comparison of the estimated pore volume beneath the 216-A-29 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.4 216-B-3-1 and 216-B-3-2 RCRA Past-Practice Units

3.2.4.1 216-B-3-1 Ditch. The 216-B-3-1 Ditch was operational from April 1945 to July 1964. The 216-B-3-1 Ditch received the effluent from the 216-B-2-1 Ditch from April 1945 through November 1963 and effluent from the 216-B-2-2 Ditch from November 1963 until July 1964. The 216-B-3-1 Ditch also received the effluent from the PUREX cooling water line from 1957 through July 1964. Therefore, as with the 216-B-2-1 Ditch, there is no record of dangerous waste contamination associated with these effluent streams during the operational period of the 216-B-3-1 Ditch.

The first potential release to the 216-B-3-1 Ditch was Unplanned Release UPR-200-E-32, which occurred at the 216-B-2-1 Ditch in November 1963. This release caused gross contamination of the 207-B Retention Basin and the head end of the 216-B-2-1 Ditch. However, because the 216-B-2-1 Ditch was immediately dammed after the release occurred, the release is not documented as reaching the 216-B-3-1 Ditch.

The second and most dangerous release to the 216-B-3-1 Ditch is Unplanned Release UPR-200-E-34, which occurred in June 1964 when an estimated 2,500 Ci of mixed fission products was released to the head end of the 216-B-3-1 Ditch (DOE-RL 1993b) via the PUREX cooling water line. This release caused the decommissioning and stabilization of the 216-B-3-1 Ditch with clean soil. Prior to the second stabilization activity at the ditch in 1971, Russian thistle was found growing profusely over areas of the covered ditch. Radiation measurements of up to 40 mrad/h were observed on surfaces of the thistle (Maxfield 1979). During a routine surveillance in 1984, contamination was found as follows: spotty contamination of soil up to 50,000 ct/min, vegetation up to 100,000 ct/min, coyote feces up to 2,000 ct/min, and animal burrows up to 12,000 ct/min (DOE-RL 1993b).

Radionuclide data for the 216-B-3-1 Ditch are not available in the WIDS (WHC 1991c); however, Maxfield (1979) states that 3 Ci of mixed waste was discharged to the ditch during its operational lifetime.

A comparison of the estimated pore volume beneath the 216-B-3-1 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.4.2 216-B-3-2 Ditch. The 216-B-3-2 Ditch was active from July 1964 to September 1970. The 216-B-3-2 Ditch received the effluent from the 216-B-2-2 Ditch from July 1964 through May 1970 and effluent from the 216-B-2-3 Ditch from May 1970 to September 1970. The 216-B-3-2 Ditch also received the effluent from the PUREX cooling water line from 1957 through July 1964 and effluent from the 216-A-29 Ditch from November 1955 through September 1970.

The 216-A-29 Ditch Dangerous Waste Permit Application (Form 3) documents the ditch as receiving corrosive dangerous wastes that were treated by the successive addition of acidic and caustic wastes that served to neutralize the wastes while in the ditch. Approximately 22,710,000 L/day (6,000,000 gal/day) of total flow reached this ditch; however, no accurate estimates are available regarding the total volume of corrosive wastes the 216-A-29 Ditch received. The 216-A-29 Ditch also historically received spills from the PUREX Plant.

The PUREX Plant AAMS Report (DOE-RL 1993d) states that discharges of sodium hydroxide and sulfuric acid solution from the chemical sewer occurred on a daily basis until February 1986. Other known and potential discharges include demineralizer regenerant, oxalic acid, nitric acid, hydrogen peroxide, calcium nitrate, potassium permanganate, sodium carbonate solution, hydrate solution, potassium hydroxide, sodium nitrate, sodium hydroxide, cadmium nitrate, and hydrazine. The majority of these discharges were CERCLA reportable releases. The PUREX Plant AAMS Report (DOE-RL 1993d) has a table of a single sampling period of organics and inorganics in the PUREX chemical sewer; these possibly could have been in the effluent discharged to the 216-A-29 Ditch. Because the 216-B-3-2 Ditch received the 216-A-29 Ditch effluent, it is assumed that the 216-B-3-2 Ditch also received these potential wastes, but in a much more diluted state.

The most dangerous documented release to the 216-B-3-2 Ditch resulted from Unplanned Release UPR-200-E-138, which occurred in March 1970 when approximately 1,000 Ci of strontium-90 was released to the 216-B-2-2 Ditch. This release led to readings at the head of the ditch of 450 mR/h and general activity along the ditch averaging 10,000 ct/min. After the bottom was covered with 0.3 m (1 ft) of soil, readings were reduced to 20 mR/h at the head of the 216-B-3-2 Ditch and 200 ct/min of general activity along the 216-B-3-2 Ditch (Maxfield 1979). As a result of this release, the ditch was decommissioned and stabilized in September 1970.

A comparison of the estimated pore volume beneath the 216-B-3-2 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.5 216-B-3 Main Pond/Ditch TSD Unit

3.2.5.1 216-B-3-3 Ditch. The 216-B-3-3 Ditch was active from September 1970 through 1994. The 216-B-3-3 Ditch received its dangerous waste from the 216-A-29 Ditch, which drained the PUREX Plant chemical sewer line until July 1991. The 216-B-3-3 Ditch also received the nondangerous effluents from the PUREX Plant and B Plant cooling water lines at the head end of the 216-B-3-3 Ditch.

The 216-B-3-3 Ditch, like the 216-B-3-2 Ditch, received a diluted form of the 216-A-29 Ditch sodium hydroxide and sulfuric acid solutions from the chemical sewer until February 1986. Other known and

potential discharges include demineralizer regenerant, oxalic acid, nitric acid, hydrogen peroxide, calcium nitrate, potassium permanganate, sodium carbonate solution, hydrate solution, potassium hydroxide, sodium nitrate, sodium hydroxide, cadmium nitrate, and hydrazine. From February 1986 through July 1991, because of the decommissioning of the 216-A-29 Ditch, the 216-B-3-3 Ditch (and main pond and expansion ponds) received approximately 5,678 to 22,712 L/min (1,500 to 6,000 gal/min) of nondangerous liquid effluent.

One Unplanned Release, UPR-200-E-51, occurred at the 216-B-3-3 Ditch in May 1977 when about 15 kg (33 lb) of cadmium nitrate was released to the 216-B-3-3 Ditch via the PUREX chemical sewer (i.e., 216-A-29 Ditch) (WHC 1991c). There is no estimate of the cadmium nitrate distribution between the 216-B-3-3 Ditch and main pond resulting from this release.

A comparison of the estimated pore volume beneath the 216-B-3-3 Ditch with the quantity of effluent disposed to the ditch suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.5.2 216-B-3 Main Pond. The 216-B-3 Main Pond was active from 1945 through 1994. The 216-B-3 Main Pond received the effluent, consecutively, from the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches over its entire operational period. The records indicate that the Main Pond received effluent only from these sources.

Because the 216-B-3 Main Pond received the effluent from the 216-B-3-1, 216-B-3-2, and 216-B-3 Ditches, it also received the effluents from the 216-B-2-1, 216-B-2-2, 216-B-2-3, and 216-A-29 Ditches and the PUREX and B Plant cooling water lines. The potential contamination that may have been received from these sources is described in the previous sections and will therefore not be repeated.

However, unplanned releases that occurred at other waste management units within the 200-BP-11 Operable Unit have resulted in documented contamination at the 216-B-3 Main Pond. In June 1964, Unplanned Release UPR-200-E-34 occurred when a coil leak in the F-15 tank in the PUREX Plant released 10,000 Ci of short- and long-lived fission products to the PUREX cooling water line. It is estimated that 2,500 Ci of the contamination went to the 216-B-3-1 Ditch and the 216-B-3 Main Pond (and overflow pond), and the remainder went to the 216-A-25 Gable Mountain Pond. This release was the most severe unplanned release reported for the operable unit and resulted in the decommissioning and stabilization of the 216-B-3-1 Ditch. Also as a result of this release, bentonite was placed in the 216-B-3 Main Pond to diminish the transport of contamination. The method of placement and amount of bentonite used is not known.

In March 1970, Unplanned Release UPR-200-E-138 occurred when approximately 1,000 Ci of strontium-90 was released to the 216-B-2-2 Ditch. Although earthen dams were built to keep as much contamination out of the 216-B-3-2 Ditch and 216-B-3 Main Pond as possible, radionuclides reaching the 216-B-3 Main Pond included approximately 13 Ci of cesium-137, 50 Ci of strontium-90, and 54 Ci of cerium-144. Bulldozers pushed soil over the north, south, and west shorelines of the 216-B-3 Main Pond, reducing radioactivity from a maximum of 650 mR/h to 10 mR/h at the ditch inlet. Other measurements around the pond ranged from 1,000 ct/min to 25,000 ct/min (DOE-RL 1993b).

In May 1977, Unplanned Release UPR-200-E-51 occurred when about 15 kg (33 lb) of cadmium nitrate was released to the 216-B-3-3 Ditch and 216-B-3 Main Pond via the 216-A-29 Ditch. There is no estimate of the cadmium nitrate distribution between the 216-B-3-3 Ditch and 216-B-3 Main Pond.

A comparison of the estimated pore volume beneath the 216-B-3 Main Pond with the quantity of effluent disposed to the pond suggests that the effluent had potential to reach groundwater (DOE-RL 1993b).

3.2.6 Summary of Known Unplanned Release Data

Six known unplanned releases have occurred in the 200-BP-11 Operable Unit as discussed in Section 2.1.5. These unplanned releases are, in order of occurrence, UN-200-E-14, UPR-200-E-32, UPR-200-E-34, UPR-200-E-138, UPR-200-E-51, and UN-200-E-92. These releases and the resultant contamination within the waste management unit within which they occurred are also discussed in the applicable section above.

Unplanned Release UN-200-E-14 occurred in 1958 when a dike failed on the east side of the 216-B-3 Main Pond. This release would contain the same potential contamination associated with the 216-B-3 Main Pond up to 1958 and therefore does not present additional contaminants of concern to the operable unit. Because this release occurred on the east side of the 216-B-3 Main Pond, it was incorporated into the 216-B-3A Expansion Pond and was thus characterized as part of the Phase 1, 2, and 3 studies (Section 3.6).

In November 1963, Unplanned Release UPR-200-E-32 occurred when a coil leak developed in the B Plant (221-B Building) 6-1 tank, which stored the cesium-rare earth fraction of the fission product stream. The leak caused gross contamination of the 207-B Water Retention Basin and the head end of this ditch. After damming the 216-B-2-1 Ditch 300 m (1,000 ft) from its head, the contaminated basin water was flushed into the ditch. The total volume of liquid discharged to the ditch during this incident was estimated to be 4,900,000 L (1,300,000 gal), 4,200,000 L (1,100,000 gal) of which was low-activity-level cooling water. The amount of activity released was estimated from sample analyses and estimated retention basin volume prior to discharge. The cerium-141 content was determined insignificant. Only 30 Ci of cerium-144 and 0.05 Ci of strontium-90 were considered pertinent. It was also estimated that less than half a liter of highly contaminated waste from the B Plant 6-1 tank contents was discharged to the retention basin (Maxfield 1979).

In June 1964, Unplanned Release UPR-200-E-34 occurred when a coil leak in the F-15 tank in the PUREX Plant released 10,000 Ci of short- and long-lived fission products to the PUREX cooling water line. It is estimated that 2,500 Ci of the contamination went to the 216-B-3-1 Ditch and the 216-B-3 Main Pond (and overflow pond), and the remainder went to the 216-A-25 Gable Mountain Pond. This release was the most severe unplanned release reported for the operable unit and resulted in the decommissioning and backfilling of the ditch. Also as a result of this release, bentonite was placed in the 216-B-3 Main pond to diminish the transport of contamination. The method of placement and amount of bentonite used is not known.

On March 20, 1977, Unplanned Release UPR-200-E-138 occurred when an estimated 1,000 Ci of strontium-90 escaped from the 8-1 storage tank at B Plant while attempting to measure the liquid level of product. The release was sprayed with several small water hoses down the B Plant floor drain and chemical sewer that led to the 216-B-2-2 and 216-B-3-2 Ditches (Maxfield 1979). After this release

the piping from B Plant was flushed to the 216-B-2-2 Ditch. The 207-B Retention Basin was bypassed and was not contaminated as a result of this unplanned release. On March 23, 1970, earthen dams were built to keep as much contamination as possible out of the 216-B-3 Main Pond, but the exact locations of these dams are not known. The amount of radioactive contamination estimated to reach the 216-B-3 Main Pond was 13 Ci of cesium-137, 50 Ci of strontium-90, and 54 Ci of cerium-144. Water samples from the 216-B-3 Main Pond reached a maximum strontium-90 concentration of $1.7 \times 10^{+6}$ pCi/L (1.7×10^{-3} μCi/mL) (Maxfield 1979). As a result of this contamination, bulldozers pushed soil over the north, south, and west shorelines of the 216-B-3 Main Pond, reducing radioactivity from a maximum of 650 mR/h to 10 mR/h at the ditch inlet. Other measurements around the pond ranged from 1,000 ct/min to 25,000 ct/min (DOE-RL 1993b). An estimated amount of contamination remaining in the 216-B-2-2 and 216-B-3-2 Ditches is not available. The 216-B-2-2 and 216-B-3-2 Ditches were decommissioned as a result of this release.

In May 1977, Unplanned Release UPR-200-E-51 occurred when 15 kg of cadmium nitrate was released to the 216-A-29 Ditch via the PUREX Plant chemical sewer. This release may have reached the 216-B-3-3 Ditch and 216-B-3 Main Pond.

Unplanned Release UN-200-E-92 occurred in September 1980 as a result of the detection of radioactively contaminated Russian thistle along the easternmost perimeter fence in the 200 East Area. The contaminated thistle and soil were removed and disposed of at an excavation pit north of 216-A-24 Crib and are therefore no longer a concern for the 200-BP-11 Operable Unit.

3.2.7 216-E-28 Contingency Pond

There is no dangerous waste or radioactive contamination associated with the 216-E-28 Contingency Pond.

3.2.8 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds

The 216-B-3A and 216-B-3B Expansion Ponds were constructed in 1983 to receive increased discharges that would result from restart of the PUREX Plant. The 216-B-3A Expansion Pond was placed into service in October 1983 by receiving overflow from the 216-B-3 Main Pond. The pond was operated until January 1984, when the dike between the 216-B-3A and 216-B-3B Expansion Ponds failed at the connecting spillway. All discharge from the dike failure was contained in the 216-B-3B Pond, which had remained unused until this time. The 216-B-3A and 216-B-3B Expansion Ponds were fully operational by June 1984.

The 216-B-3B Expansion Pond was taken out of service in May 1985, and up to 2 m (7 ft) of material was excavated from the pond bottom, to a depth below the bottom of the trenches. The excavated material was placed as diking on the north shore of the 216-B-3 Main Pond. The 216-B-3B Expansion Pond has not been used since it was taken out of service in May 1985 and is not anticipated to be used again. The 216-B-3A Expansion Pond was decommissioned in June 1994.

The 216-B-3C Expansion Pond was constructed in 1985 to accommodate increased flow resulting from the decommissioning of 216-A-25 Gable Mountain Pond. The 216-B-3C Expansion Pond received effluent from the 216-B-3A Expansion Pond from 1985 to 1994. In the spring of 1994, the effluent originating at the 216-B-3-3 Ditch was rerouted directly to the 216-B-3C Expansion Pond,

thus making the pond the only active unit in the entire 200-BP-11 Operable Unit. This effluent is non-RCRA and poses no threat to contaminate the 200-BP-11 Operable Unit with either dangerous or radioactive waste. The 216-B-3C Expansion Pond is expected to remain operational for an unspecified duration.

The 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are collectively referred to as the 216-B-3 Expansion Ponds TSD unit and are permitted under RCRA interim status. The Dangerous Waste Permit Application (Form 3) for the expansion ponds is provided in Appendix C. However, three major sampling events have taken place in the 200-BP-11 Operable Unit in support of closure of the expansion ponds via the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a).

In August and September 1989, Phase 1 (WHC 1991b) sediment/surface soil samples were taken from the main pond (excluding the overflow pond); the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds; and the 216-B-3-3 Ditch. In 1992, Phase 2 surface/sediment soil samples were taken to provide confirmation of Phase 1 data in the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. In 1989 and 1990, Phase 3 sampling explored the extent of contamination in the vadose zone beneath the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. These three phases of sampling effectively characterized dangerous waste in the surface and subsurface (vadose zone) soils in the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. The laboratory results from these three sampling phases are provided in Appendices C, D, and E of the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). Note that Phase 1, 2, and 3 analytical results were not used to eliminate potential contaminants of concern for the 200-BP-11 Operable Unit because the expansion ponds were not in service until 1983, which was well after the majority of potential contamination would have been discharged to the operable unit. As a result of Phase 1, 2, and 3 sampling, it has been concluded by WHC, BHI, DOE, and Ecology that the expansion ponds do not contain dangerous waste, as defined by WAC 173-303-040, at levels that pose a substantial hazard to human health or the environment. Therefore, the expansion ponds will not be further evaluated for dangerous waste. However, the expansion ponds will be further evaluated for radionuclide contamination as part of the 200-BP-11 Operable Unit RFI/CMS as discussed in Chapters 4 and 5.

3.2.9 WHC Operational Environmental Monitoring

Wastewater from chemical processing plants and other facilities is sampled by the WHC Operational Environmental Monitoring Program (OEMP) at the point of discharge into a waste management unit to ensure compliance with WHC internal standards and applicable DOE standards. As an additional operational check, the WHC OEMP also collects surface water, vegetation, and sediment samples from the active ditches and ponds, which included the ditches and ponds from the 200-BP-11 Operable Unit. The majority of the data collected for the 200-BP-11 Operable Unit is summarized in the B Plant AAMS Report (DOE-RL 1993b). Currently, the 216-B-3C Expansion Pond is the only active waste management unit in the 200-BP-11 Operable Unit being sampled under the WHC OEMP.

The surface water samples collected from the OEMP were composited and analyzed monthly for gross alpha, gross beta, gamma-emitting radionuclides, and strontium-90. Additionally, the surface water was analyzed for pH, nitrate, and tritium. Samples of aquatic vegetation were collected from the ponds and ditches yearly to determine root uptake of radionuclides from potentially contaminated sediments. Along with vegetation samples, sediment samples were collected to measure the accumulation of radionuclides. The sediment samples consist of a composite of five plugs, each

900 cm^2 by 2.5 cm deep. The vegetation and sediment samples were analyzed for gamma-emitting radionuclides, strontium-90, plutonium-239, and uranium.

The results from the WHC OEMP analyses confirm that radionuclides have been disposed to the operable unit. However, the WHC OEMP analyses do not provide information regarding the extent of contamination in the soils and therefore will not be considered further in the RFI for the 200-BP-11 Operable Unit.

3.3 POTENTIAL IMPACTS TO HUMAN HEALTH AND THE ENVIRONMENT

This section summarizes the information needed to support a qualitative and quantitative evaluation of the human health and environmental hazards as provided in Section 4.2 of the B Plant AAMS Report (DOE-RL 1993b). The AAMS report assessment includes a discussion of release mechanisms and potential transport pathways; develops a conceptual model of human exposure based on these pathways; and presents the physical, radiological, and toxicological characteristics of the known or suspected contaminants. The AAMS report assessment of environmental risks was severely constrained by the relative lack of data regarding potentially exposed biotic populations and exposure pathways. The most important data for this work/closure plan are the conceptual model and potential contaminants of concern to the operable unit.

3.3.1 Conceptual Model

Contaminants were intentionally and unintentionally released to the environment in the 200-BP-11 Operable Unit. The release mechanisms and transport pathways are discussed in Sections 4.2.1 and 4.2.2 of the B Plant AAMS Report (DOE-RL 1993b).

Figure 3-2 presents a graphical summary of the physical characteristics and mechanisms at the Hanford Site that could potentially affect the generation, transport, and impact of contamination in the 200-BP-11 Operable Unit on humans and biota (conceptual model).

There are four exposure routes by which humans (offsite and onsite) and other biota (plants and animals) can be exposed to contaminants released in the operable unit.

- Inhalation of airborne volatiles or fugitive dust with adsorbed contamination
- Ingestion of fugitive dust, surface soils, biota (either directly or through the food chain), or groundwater
- Direct contact with the waste materials (such as those exhumed by burrowing animals), contaminated surface soils, sediment, or plants
- Direct radiation from waste materials, surface soils and sediment, or fugitive dust.

The conceptual model is discussed in more detail in Sections 4.2.3 and 5.2 of the B Plant AAMS Report (DOE-RL 1993b).

3.3.2 Potential Contaminants of Concern

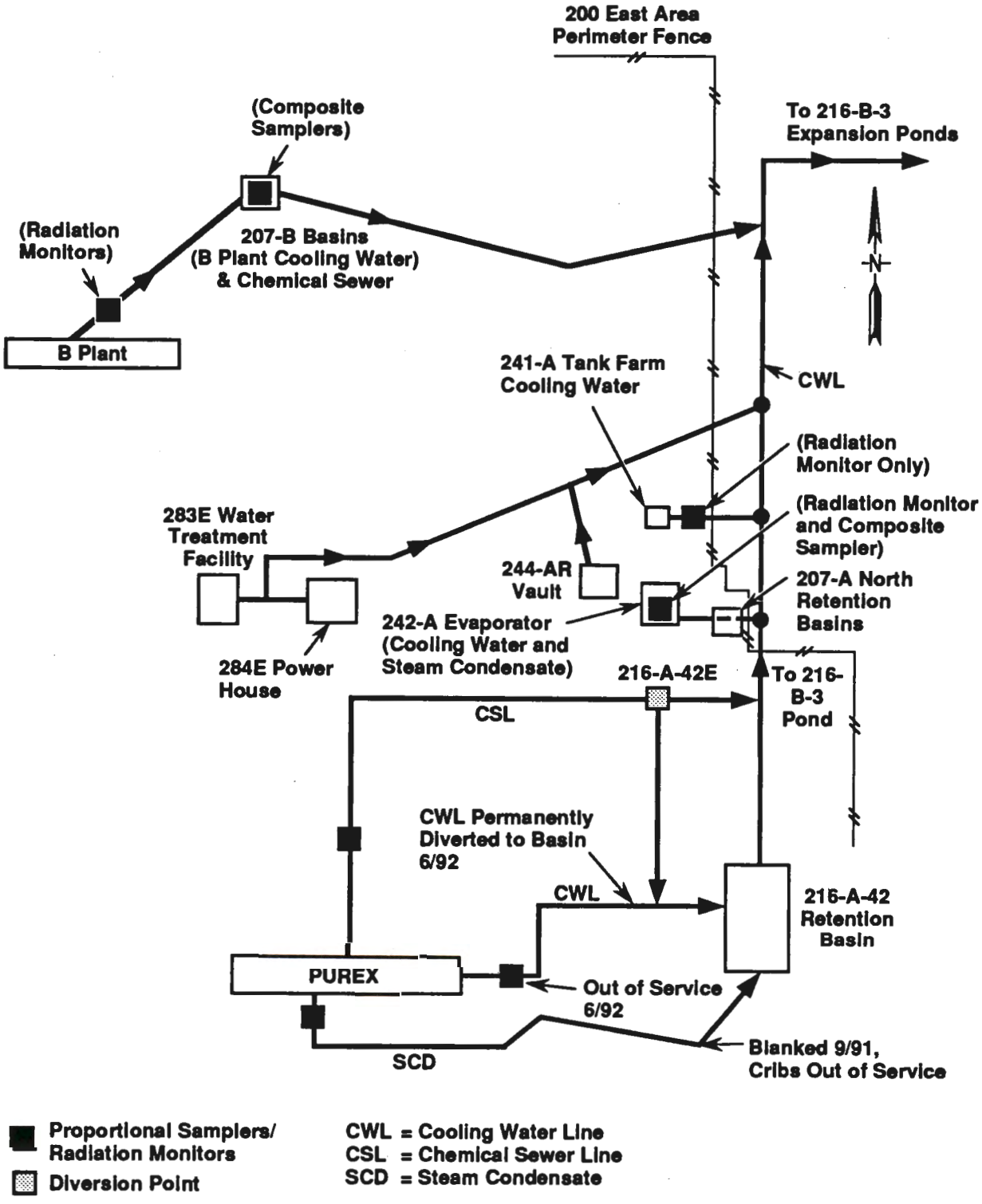
Candidate potential contaminants of concern for the 200-BP-11 Operable Unit are identified in Table 3-1. This list is a compilation of contaminants listed in the B Plant AAMS Report (DOE-RL 1993b). Note that this list also includes all the contaminants identified in the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). Additionally, as a conservative measure, candidate potential contaminants of concern listed in the PUREX Plant AAMS Report (DOE-RL 1993d) that were not listed in the B Plant AAMS Report were added to Table 3-1. The chemicals and radionuclides listed in Table 3-1 were selected based on their known usage in process streams, presence in waste, disposal in waste management units, historical association, or detection in environmental media at the B Plant Aggregate Area. Thus, for the 200-BP-11 Operable Unit, the list of candidate contaminants is considered a conservative list because most of these contaminants would not have been disposed to the operable unit in any appreciable quantity.

As discussed in the B Plant AAMS Report (DOE-RL 1993b, p. 4-62), the list of candidate contaminants was shortened by removing short-lived radionuclides, chemicals with no known carcinogenic or toxic effects, and progeny radionuclides that will not build to more than 1% of the parent activity within 50 years. However, during the DQO process discussed in Section 4.2.1 of this work/closure plan, Ecology expressed uncertainty regarding discharges to the operable unit and requested that the candidate contaminants be compared to the Discarded Chemical Products List in WAC 173-303-9903 (Ecology 1994a) and the Groundwater Monitoring List (Appendix IX) of 40 CFR 264 (EPA 1989b). At the request of Ecology, candidate contaminants found in both Table 3-1 and the Discarded Chemical Products List and/or the Groundwater Monitoring List were included as potential contaminants of concern for the 200-BP-11 Operable Unit. The contaminants reinstated as a potential concern are potassium, selenium, acetic acid (acetate), formaldehyde, naphthalene, and 1,1,2-trichloroethane.

The final list of potential contaminants of concern for the 200-BP-11 Operable Unit is provided in Table 3-2 under the "Recommended by AAMS Report" column. Thorium-228 has been added to Table 3-2 because it is the parent of the lead-212 isotope and is easily analyzed. Tin-126 has also been added because it is the parent of the antimony-126 and -126m isotopes. The radionuclide list in the "Recommended by AAMS Report" column in Table 3-2 was shortened based on decay chains, their correlation to other radionuclides, and/or known concentrations in Hanford Site processing streams. These decay chains and correlations are provided in the footnotes of Table 3-2. The shortened list of potential contaminants of concern is listed in the "Selected for 200-BP-11" column in Table 3-2.

The majority of the potential contaminants of concern selected by this work/closure plan will be analyzed directly. However, many radionuclides will be excluded from analyses because their concentrations can be assessed from other short-lived parent or daughter concentrations. These radionuclides are listed in the "Indirect Analysis" column of Table 3-2. The final target analyte list presented in Table 5-7 is derived from the "Direct Analysis" column of Table 3-2.

Figure 3-1. Current Flow Routes from Facilities Discharging to the 200-BP-11 Operable Unit.



Source: DOE/RL-1994a

Figure 3-2. Conceptual Model Flowchart of the 200-BP-11 Operable Unit.

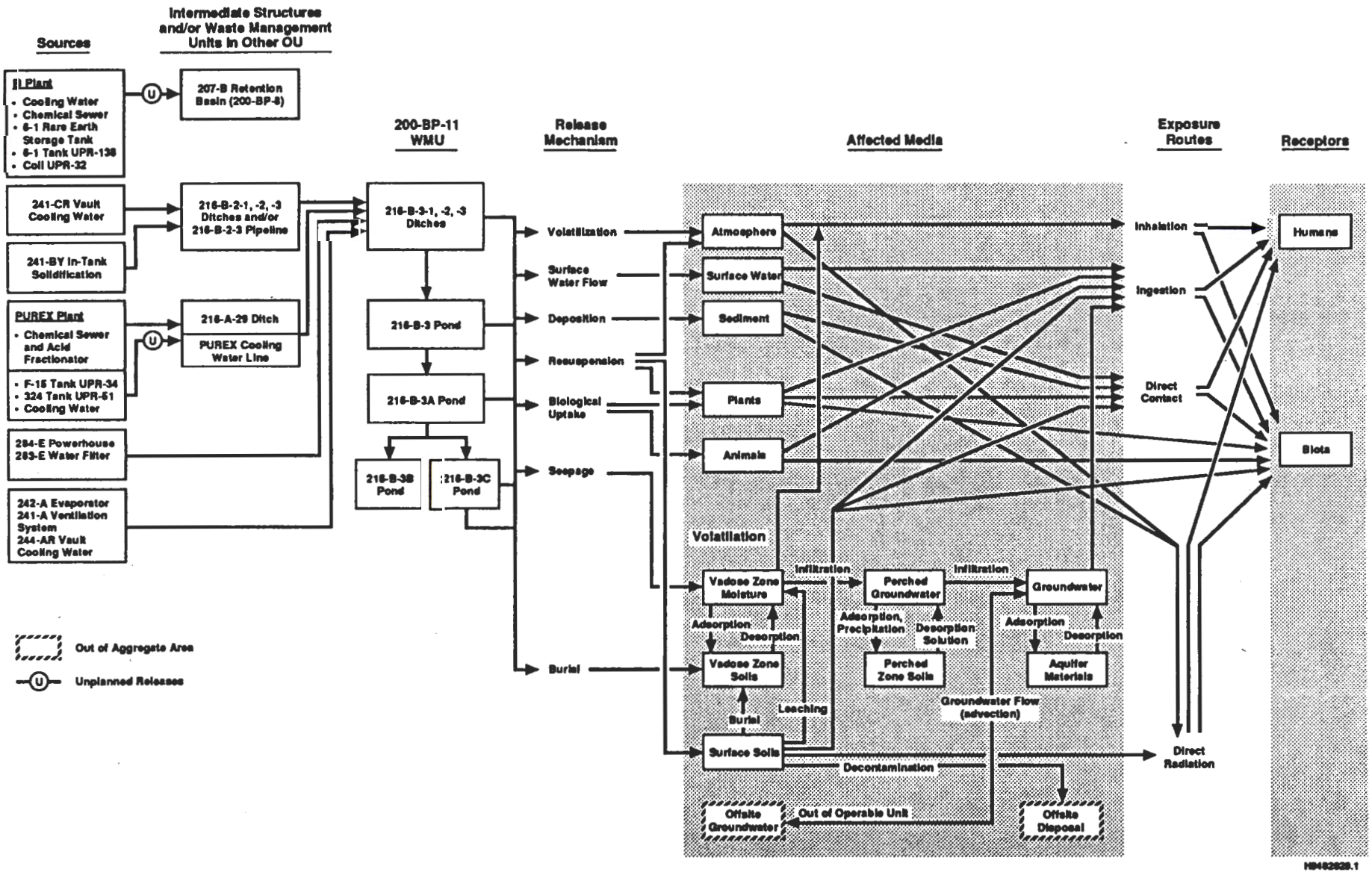


Table 3-1. Candidate Potential Contaminants of Concern for the 200-BP-11 Operable Unit. (sheet 1 of 3)

RADIONUCLIDES

Gross Alpha
Gross Beta

TRANSURANICS

Americium-241
Americium-242
Americium-242m
Americium-243
Curium-242[a]
Curium-244
Curium-245
Neptunium-237
Neptunium-238[a]
Neptunium-239[a]
Plutonium-238
Plutonium-239/240
Plutonium-241
Plutonium-242

URANIUM

Uranium-233
Uranium-234
Uranium-235
Uranium-236
Uranium-238

FISSION PRODUCTS

Actinium-225
Actinium-227
Actinium-228[a]
Antimony-126[a]
Antimony-126m[a]
Astitine-217
Barium-135m[a]
Barium-137m
Barium-140[a]
Beryllium-7
Bismuth-210
Bismuth-211
Bismuth-212[a]
Bismuth-213
Bismuth-214
Carbon-14
Cerium-141[a]
Cerium-144[a]
Cesium-134
Cesium-135
Cesium-137
Cobalt-57[a]
Cobalt-58[a]
Cobalt-60
Europium-152
Europium-154
Europium-155
Francium-221
Francium-223[a]
Gadolinium-152
Iodine-129
Iron-59[a]
Lanthanum-140[a]
Lead-209
Lead-210
Lead-211
Lead-212[a]
Lead-214
Manganese-54[a]
Nickel-59
Nickel-63
Niobium-93m
Niobium-95[a]
Niobium-95m[a]
Palladium-107
Polonium-210
Polonium-211[a]
Polonium-212[a]
Polonium-213
Polonium-214
Polonium-215
Polonium-216[a]
Polonium-218
Potassium-40
Praeseodymium-144[a]
Praeseodymium-144m[a]
Promethium-147
Protactinium-231
Protactinium-233[a]
Protactinium-234[a]
Protactinium-234m
Radium
Radium-223
Radium-224[a]
Radium-225
Radium-226
Radium-228
Radon-219
Radon-220[a]
Radon-222
Rhodium-103[a]
Rhodium-103m[a]
Rhodium-106[a]
Ruthenium-103
Ruthenium-106
Samarium-147
Samarium-151
Selenium-79
Silver-110[a]
Silver-110m[a]
Sodium-22
Strontium-85[a]
Strontium-89[a]
Strontium-90
Technetium-99
Tellurium-129
Thallium-207
Thallium-208[a]
Thallium-209
Thorium-227
Thorium-228
Thorium-229
Thorium-230
Thorium-231
Thorium-232
Thorium-233[a]
Thorium-234
Tin-113
Tin-126[a]
Tritium
Yttrium-90
Yttrium-91[a]
Zinc-65[a]
Zirconium-93
Zirconium-95[a]

INORGANIC CHEMICALS

Acetic acid
Alkaline liquids
Aluminum
Aluminum nitrate (mono basic)
Aluminum nitrate nonahydrate
Ammonia (anhydrous)
Ammonium carbonate
Ammonium fluoride
Ammonium hydroxide
Ammonium ion

Table 3-1. Candidate Potential Contaminants of Concern for the 200-BP-11 Operable Unit. (sheet 2 of 3)

INORGANIC CHEMICALS (cont.)

Ammonium nitrate
Ammonium oxalate
Ammonium silicofluoride
Ammonium sulfate
Ammonium oxalate
Ammonium silicofluoride
Ammonium sulfate
Ammonium sulfite
Antifreeze
(Ethylene Glycol)
Arsenic
Barium
Barium nitrate
Beryllium
Bismuth
Bismuth nitrate
Bismuth phosphate
Boric acid
Boron
Cadmium
Cadmium nitrate
Calcium
Calcium carbonate
Calcium chloride
Carbon dioxide
Carbonate
Ceric fluoride
Ceric iodate
Ceric nitrate
Ceric sulfate
Cerium
Cesium carbonate
Cesium chloride
Chloride
Chromium
Chromium nitrate
Chromous sulfate
Copper
Cyanide
Dow Anti-Foam B
Duolite ARC-359 (IX Resin)
(sulfonated phenolic)
Ferric cyanide
Ferric nitrate
Ferrous sulfamate
Ferrous sulfate
Fluoride
Hydrobromic acid
Hydrochloric acid
Hydrofluoric acid
Hydrogen
Hydrogen fluoride
Hydrogen peroxide
Hydroiodic acid
Hydroxide
Hydroxyacetic acid
Hydroxylamine hydrochloride
Hyflo-Super-Cel
(contains silica)
Iron
Lanthanum fluoride
Lanthanum hydroxide
Lanthanum nitrate
Lanthanum-neodynium nitrate
Lead
Lead nitrate
Lithium
Magnesium
Magnesium carbonate
Magnesium nitrate
Manganese
Mercuric nitrate
Mercury
Misc. toxic process chemicals
Nickel
Nickel nitrate
Niobium
Nitrate
Nitric acid
Nitrite
Normal paraffin hydrocarbon
Oxalic acid
Periodic acid
Phosphate
Phosphoric acid
Phosphorous pentoxide
Phosphotungetic acid
Plutonium fluoride
Plutonium nitrate
Plutonium peroxide
Potassium
Potassium carbonate
Potassium ferrocyanide
Potassium fluoride
Potassium hydroxide
Potassium oxalate
Potassium permanganate
Plutonium-lanthanum fluoride
Plutonium-lanthanum oxide
Rubidium
Selenium
Silica
Silicon
Silicon trioxide
Silver
Silver nitrate
Sodium
Sodium aluminate
Sodium bismuthate
Sodium bisulfate
Sodium bromate
Sodium carbonate
Sodium citrate
Sodium dichromate
Sodium ferrocyanide
Sodium fluoride
Sodium gluconate
Sodium hydroxide
Sodium nitrate
Sodium nitrite
Sodium persulfate
Sodium phosphate
Sodium sulfate
Sodium thiosulfate
Strontium
Strontium carbonate
Strontium fluoride
Strontium sulfate
Sulfamic acid
Sulfate
Sulfuric acid
Tartaric acid
Thorium
Tin
Titanium
Tungsten
Uranium
Uranium oxide
Uranyl nitrate hexahydrate
Vanadium
Various acids
Yttrium
Zeolon
Zinc

Table 3-1. Candidate Potential Contaminants of Concern for the 200-BP-11 Operable Unit. (sheet 3 of 3)

INORGANIC CHEMICALS (cont.)

Zirconium
Zirconium oxide
Zirconyl nitrate

ORGANIC CHEMICALS

1-Butanol
2-Butanone
Acetone
Bismuth phosphate
Butanoic acid
Butyl alcohol
Butylated hydroxy toluene
Carbon tetrachloride
Cesium phosphotungetic salts
Chloroform
Chloroplatinic acid
Citric acid
Decane
Di-2-ethyl hexyl phosphoric acid
Dibutyl butyl phosphonate
Dibutyl phosphate
Dichloromethane
Diesel fuel
Dowex 21 K/Amberlite XE-270 (IX Resin)
Ethanol
Ethyl ether
Flammable solvents
Formaldehyde (solution)
Glycolate
Grease
Halogenated hydrocarbons
Hydrazine
Hydroxy acetic acid-Trisodium hydroxy ethylene-Diamine triacetic acid
Hydroxylamine nitrate
Ionac A-580/Pemutit SK (IX Resin)
Isopropyl alcohol
Kerosene
Methyl ethyl ketone
Methylene chloride
Misc. toxic process chemicals
Molybdate-citrate reagent
Monobutyl phosphate
Normal paraffin hydrocarbon
Oxalate
Paraffin hydrocarbons
PCBs
Propanol
Shell E-2342 (Napthalene and paraffin)
Sodium acetate
Soltrol-170 ($ClOH_{22}$ to Cl_6H_{34}; purified kerosene)
Sugar (sucrose)
Tartaric acid
Tetrasodium ethylene diamine tetra-acetate (EDTA)
Thenoyltrifluoroacetone
Toluene
Tri-n-dodecylamine
Tributyl phosphate
Trichloroethane
Trichloromethane
Trisodium hydroxyethyl ethylene-diamine triacetate (HEDTA)
Waste paint and thinners
Zeolite AW-500 (IX Resin)

Source: B Plant and PUREX Plant AAMS Reports, Tables 4-22 and 4-32, respectively (DOE-RL 1993b, 1993d).

[a]The radionuclide has a half-life of <1 year and, if it is a daughter product, the parent has a half-life of <1 year, or the buildup of the short-lived daughter would result in an activity of <1% of the parent radionuclide's initial activity.

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 1 of 6)

Recommended by AAMS Report	Selected for 200-BP-11	Direct Analysis	Indirect Analysis
Gross alpha	X	X	
Gross beta	X	X	
THORIUM/URANIUM			
Thorium-227	X		NOTE 1
Thorium-228 (see Note 5)		X	
Thorium-229	X		NOTE 2
Thorium-230	X	X	
Thorium-231	X		NOTE 1
Thorium-232	X	X	
Thorium-234	X		NOTE 3
Uranium-233	X	NOTE 6	NOTE 2
Uranium-234	X	NOTE 6	NOTE 4
Uranium-235	X	NOTE 6	NOTE 1
Uranium-236	X	NOTE 6	NOTE 5
Uranium-238	X	NOTE 8	
TRANSURANICS			
Neptunium-237	X	X	
Neptunium-239	X		NOTE 7
Plutonium-238	X	X	
Plutonium-239/240	X	X	
Plutonium-241	X	X	
Plutonium-242	X		NOTE 8
Americium-241	X	X	
Americium-242	X		NOTE 8
Americium-242m	X		NOTE 8
Americium-243	X		NOTE 7
Curium-242	X		NOTE 8
Curium-244	X	X	
Curium-245	X		NOTE 9

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 2 of 6)

Recommended by AAMS Report	Selected for 200-BP-11	Direct Analysis	Indirect Analysis
ACTIVATION PRODUCTS			
Hydrogen-3 (Water Only)	X	X	
Carbon-14	X		NOTE 10
Sodium-22	X		NOTE 11
Potassium-40	X		NOTE 12
Nickel-59	X		NOTE 13
Nickel-63	X		NOTE 13
Cobalt-60	X	X	
FISSION PRODUCTS			
Selenium-79	X		NOTE 10
Strontium-90	X	NOTE 14	
Yttrium-90	X		NOTE 14
Zirconium-93	X		NOTE 10
Niobium-93m	X		NOTE 10
Technetium-99	X	X	
Ruthenium-106	X		NOTE 11
Palladium-107	X		NOTE 10
Tin-126 (see NOTE 10)			NOTE 10
Antimony-126	X		NOTE 15
Antimony-126m	X		NOTE 15
Iodine-129	X		NOTE 10
Cesium-134	X		NOTE 11
Cesium-135	X		NOTE 10
Cesium-137	X	NOTE 16	
Barium-137m	X		NOTE 16
Promethium-143	X		NOTE 11
Samarium-147	X		NOTE 10
Samarium-151	X	NOTE 17	
Europium-152	X	X	
Europium-154	X	X	

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 3 of 6)

Recommended by AAMS Report	Selected for 200-BP-11	Direct Analysis	Indirect Analysis
Europium-155	X	X	
Gadolinium-152	X		NOTE 12
DAUGHTER PRODUCTS			
Thallium-207	X		NOTE 1
Lead-209	X		NOTE 2
Lead-210	X		NOTE 4
Lead-211	X		NOTE 1
Lead-212	X		NOTE 5
Lead-214	X		NOTE 4
Bismuth-210	X		NOTE 4
Bismuth-211	X		NOTE 1
Bismuth-213	X		NOTE 2
Bismuth-214	X		NOTE 4
Polonium-210	X		NOTE 4
Polonium-213	X		NOTE 2
Polonium-214	X		NOTE 4
Polonium-215	X		NOTE 1
Polonium-218	X		NOTE 4
Astatine-217	X		NOTE 2
Radon-219	X		NOTE 1
Radon-222	X		NOTE 4
Francium-221	X		NOTE 2
Radium-223	X		NOTE 1
Radium-225	X		NOTE 2
Radium-226	X		NOTE 4
Radium-228	X		NOTE 5
Actinium-225	X		NOTE 2
Actinium-227	X		NOTE 1
Protactinium-231	X		NOTE 1
Protactinium-234m	X		NOTE 3

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 4 of 6)

Recommended by AAMS Report	Selected for 200-BP-11	Direct Analysis	Indirect Analysis
HEAVY METALS			
Arsenic	X	X	
Barium	X	X	
Beryllium	X	X	
Bismuth		NOTE 18	
Cadmium	X	X	
Chromium	X	X	
Copper	X	X	
Iron	X	X	
Lead	X	X	
Manganese	X	X	
Mercury	X	X	
Nickel	X	X	
Potassium	NOTE 19	X	
Selenium	NOTE 19	X	
Silver	X	X	
Tin	X	X	
Uranium	NOTE 6	X	
Vanadium	X	X	
Zinc	X	X	
OTHER INORGANICS			
Acetic acid	NOTE 19		
Ammonia	X		X
Boron	X	X	
Cyanide	X	X	
Fluoride	X	X	
Nitrate/nitrite	X	X	
Sulfuric acid	X		X
VOLATILE ORGANICS			
Acetone	X	X	
1-Butanol (Butyl alcohol)	X	X	

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 5 of 6)

Recommended by AAMS Report	Selected for 200-BP-11	Direct Analysis	Indirect Analysis
VOLATILE ORGANICS (cont.)			
2-Butanone (MEK, methyl ethyl ketone)	X	X	
Carbon tetrachloride	X	X	
Chloroform	X	X	
Ethyl ether	X	X	
Methylene chloride	X	X	
Toluene	X	X	
1,1,1-Trichloroethane	X	X	
1,1,2-Trichloroethane	NOTE 19	X	
SEMIVOLATILE ORGANICS			
Hydrazine	X		NOTE 20
Formaldehyde	NOTE 19		
Kerosene	X	X	
Napthalene	NOTE 19	X	
Polychlorinated biphenyls	X	X	
Tributyl phosphate	X	X	

NOTES:

1. Uranium-235, thorium-231, protactinium-231, actinium-227, thorium-227, radium-223, radon-219, polonium-215, lead-211, bismuth-211, and thallium-207 are decay products of the plutonium-239. The activities of uranium-235 and the daughter products will never be greater than 3.5×10^{-5} times the base activity of plutonium-239.

2. Protactinium-233, uranium-233, thorium-229, radium-225, actinium-225, francium-221, astitine-217, bismuth-213, thallium-209, polonium-213, and lead-209 are decay products of neptunium-237. The activities of protactinium-233 and daughter products will never be greater than 8.2×10^{-1} times the base activity of neptunium-237.

3. Thorium-234 and protactinium-234m are decay products of uranium-238. The activities of thorium-234 and daughter products will never be greater than 1.0×10^{-1} times the base activity of uranium-238. Additionally, the half-life of protactinium-234m is only 1.2 minutes.

4. Uranium-234, thorium-230, radium-226, radon-222, polonium-218, lead-214, astitine-218, bismuth-214, polonium-214, thallium-210, lead-210, bismuth-210, thallium-206, and polonium-210 are the decay products of plutonium-238. The activities of uranium-234 and daughter products will never be greater than 3.8×10^{-4} times the base activity of plutonium-238.

Table 3-2. Selection Process for 200-BP-11 Potential Contaminants of Concern. (sheet 6 of 6)

5. Uranium-236, thorium-232, radium-228, actinium-228, thorium-228, radium-224, radon-220, polonium-216. astitine-216, lead-212, bismuth-212, thallium-208, and polonium-212 are decay products of curium-244 and plutonium-240 decay chain. The activities of uranium-236 and daughter products will never be greater than 2.0 x 10^{-3} times plutonium-240 base activity. The activities of thorium-232 and daughter products will never be greater than 2.5 x 10^{-4} times the base activity of uranium-236. Thorium-228 is added to the list of potential contaminants of concern because it is a parent to lead-212 and is readily analyzed.

6. Initially, total chemical uranium will be analyzed. If total uranium exceeds 10 μg/mg, the individual isotopes will be analyzed. Uranium-238 is the primary 99+% isotope in natural uranium and still represents 98+% of the isotope in Hanford reactor fuels. The 10 μg/mg value for total uranium will yield the 3.8 pCi/g industrial value for uranium-238 as shown in Appendix B.

7. Americium-243 decays to neptunium-239, which decays to plutonium-239. Plutonium-239 will be analyzed.

8. Plutonium-238, uranium-238, americium-242, plutonium-242, and curium-242 are decay products of americium-242m. Plutonium-238 will be analyzed. Uranium-238 will be analyzed if total uranium is found in a concentration greater than or equal to 10 μg/mg.

9. Curium-245 decays to plutonium-241, which will be analyzed.

10. Carbon-14, cesium-135, iodine-129, niobium-93m, palladium-107, samarium-147, selenium-79, tin-126, and zirconium-93 will each have an activity of less than 5.0 x 10^{-5} times cesium-137 or strontium-90 in a normal fission product mixture. Tin-126 is added to the potential contaminants of concern because it is the parent of antimony-126 and -126m.

11. Sodium-22, cesium-134, ruthenium-106, and promethium-143 each have a half-life of less than 3 years, thus no parent is present to "feed" continuing ingrowth.

12. Potassium-40 and gadolinium-152 are natural occurring radioactive elements with minimal production in fission reactors.

13. Nickel-59 and -63. Nickel-59 activity is less than 5.0 x 10^{-6} times cesium-137 or strontium-90 activity in Hanford reprocessing streams. Nickel-63 activity is less than 5.0 x 10^{-4} times cesium-137 or strontium-90 activity in Hanford reprocessing streams.

14. Yttrium-90 is a daughter product of strontium-90 and is the isotope actually measured in the strontium-90 analysis.

15. Antimony-126 and -126m are daughter products of tin-126. Additionally, antimony-126m has a half-life of only 19 minutes.

16. Barium-137m is a daughter product of cesium-137.

17. There are currently no routine commercial analytical methods for detecting samarium-151.

18. Bismuth is not a contaminant of concern and is added only as an indicator per the request of the EPA.

19. Potassium, selenium, acetic acid, 1,1,2-trichlorethane, formaldehyde, and naphthalene are included because they are listed in both Table 3-1, "Candidate Contaminants of Concern for 200-BP-11 Operable Unit," and Table 173-303-9903 WAC, "Discarded Chemical Products List" (Ecology 1994a), and/or 40 CFR 264, Appendix IX, "Groundwater Monitoring List" (EPA 1989b).

20. Hydrazine will not be analyzed due to its rapid degradation to nonhazardous constituents.

4.0 WORK PLAN APPROACH AND RATIONALE

The general approach to the *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan* investigation is based on the process set forth in the *Hanford Past-Practice Strategy* (DOE-RL 1991a) and recommendations made in the *B Plant Source Aggregate Area Management Study Report* (DOE-RL 1993b). The Hanford Past-Practice Strategy identifies the need to accelerate the cleanup process by favoring interim cleanup activities for high-priority contaminated zones. While the 200-BP-11 Operable Unit is not a high-priority contaminated zone based on concentrations identified to date, it does retain a high prioritization for investigation to address the active RCRA TSD units scheduled for closure under the Tri-Party Agreement. The B Plant Aggregate Area Management Study (AAMS) Report (DOE-RL 1993b) initiated the implementation of the *Hanford Past-Practice Strategy* (DOE-RL 1991a) by identifying the 200-BP-11 Operable Unit for additional characterization under an LFI, as identified in Chapter 1 of this work/closure plan. Also described in Chapter 1 is the integration of the past-practice work plan with the RCRA TSD unit closure/postclosure plan. As a result, the near-term strategy for the 200-BP-11 Operable Unit is to conduct a field investigation and a CMS. The CMS will lead to decisions on corrective actions for both the RCRA TSD and RCRA past-practice units. The strategy for conducting the field investigation will be to conduct characterization of potential contaminants where existing data are considered insufficient to make decisions for determining the need for a corrective action.

This chapter develops the rationale used to design the field program for the 200-BP-11 Operable Unit field investigation and to support characterization of the RCRA TSD units that may undergo closure/postclosure (i.e., the 216-B-3 Main Pond/Ditch, 216-B-63 Trench, and 216-A-29 Ditch). The 216-B-3 Expansion Ponds RCRA TSD unit (216-B-3A, 216-B-3B, and 216-B-3C Expansions Ponds) is expected to be clean closed under the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a), and therefore this chapter will address only the radionuclide contamination within these units. Because the operable unit contains both RCRA past-practice and RCRA TSD waste management units, different approaches to the investigation are required for the different types of units. Data are needed to refine the existing conceptual model and to conduct a CMS for past-practice units to support corrective measure determinations, as applicable, following the Hanford past-practice strategy decision-making process. Data will be evaluated following completion of the proposed investigation program to determine whether additional data are necessary to determine contaminant nature and extent and whether it is appropriate to pursue clean closure of the RCRA TSD units.

Section 4.1 of this work/closure plan describes the data uses defined by the Hanford past-practice strategy, data needs described in Chapter 8 of the B Plant AAMS Report (DOE-RL 1993b), and data required to support closure of RCRA TSD units. Section 4.2 discusses the rationale for selecting specific field investigation activities to fill data gaps.

4.1 FIELD INVESTIGATION DATA USES AND DATA NEEDS

The field investigation will address past-practice issues for the operable unit while, at the same time, establish data that support the closure of the RCRA TSD units. The field investigation, as defined in the *Hanford Past-Practice Strategy* (DOE-RL 1991a), addresses two primary data uses: refinement of the operable unit conceptual model and support of the performance of a qualitative risk assessment. As discussed in Chapter 1, the RFI/CMS process employs risk-based cleanup standards, and thus a

qualitative risk assessment is not anticipated. The other primary facility investigation data use for the 200-BP-11 Operable Unit will be to support the CMS. The primary areas for refinement of the conceptual model are indicated in Chapter 8 of the B Plant AAMS Report (DOE-RL 1993b). The data needs for refinement of the conceptual model can be expressed in the following categories:

- Hydrostratigraphy
- Vadose zone properties
- Source contributions
- Nature and extent of contamination.

The data uses for the field investigation (refinement of the conceptual model and completion of a CMS) and corresponding general data needs for the 200-BP-11 Operable Unit are shown in Figure 4-1, along with specific data needs for each general category. Figure 4-1 also indicates the activities planned to address these needs, which are discussed in Section 4.2. All of these data needs are considered essential to fill field investigation data gaps previously identified in the B Plant AAMS Report (DOE-RL 1993b). The most important need for the corrective measures decision process is to further define the nature and extent of contamination. This need is supported by the need to further define vadose zone properties. Further definition of hydrostratigraphy and source contributions are important gaps to fill, but are not the main drivers of field activities proposed in this work/closure plan.

The B Plant AAMS Report developed specific data needs for the data uses in source operable units, as presented in Section 8.2.2 of the B Plant AAMS Report (DOE-RL 1993b). During the AAMS report process, the available data were compiled and reviewed to determine usefulness and to identify data gaps. These data gaps are derived from information presented in Chapters 2, 3, and 4 of the B Plant AAMS Report and are described in detail in Chapter 8 of the B Plant AAMS Report. General data needs identified in the B Plant AAMS Report fall into the categories shown in Figure 4-1. The general data needs are divided into two or more specific data needs that describe individual parameters or groups of parameters to be obtained in this field program. Figure 4-1 identifies the relationship between the data uses and data needs and illustrates the field activities required to obtain specific parameters necessary to fill those needs.

The relationship between data uses and general and specific data needs described herein and outlined in Figure 4-1 forms the basis for planning field and other activities to collect required data from the field investigation, as presented in Section 4.2. The data collection program is developed using a DQO process consistent with EPA guidance (EPA 1993) and with DQOs discussed in the B Plant AAMS Report (DOE-RL 1993b). The most recent EPA guidance (EPA 1993) was utilized during several DQO meetings among DOE-RL, Ecology, and EPA. Agreements reached are discussed in Section 4.2.1.

4.2 FIELD INVESTIGATION DATA COLLECTION PROGRAM

This section presents the approach and rationale used in selecting the types of field investigation data collection programs for the *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan*. The field programs and other data collection activities are derived from Chapter 8 of the B Plant AAMS Report (DOE-RL 1993b) using the DQO process discussed in Section 4.2.1. As discussed in Section 4.1, data needs for the work plan were

identified as the primary information necessary to further develop and refine the operable unit conceptual model and to complete a CMS.

To address general data needs, Chapter 8 of the B Plant AAMS Report (DOE-RL 1993b) presents a data collection strategy that is applicable to the 200-BP-11 Operable Unit. The general investigation strategies presented in the B Plant AAMS Report include contaminant nature and extent investigation, source release investigation, and geologic investigation. This section builds on these strategies by providing the rationale and specific DQOs for the data collection program presented in Chapter 5 of this work/closure plan. As part of the overall work plan rationale, the data collection program also focuses on providing information needed to address current data gaps associated with the conceptual model. In this way, the data collection program is designed to address work plan data needs by resolving data gap issues using the current understanding of existing physical conditions and contaminant distribution.

Section 4.2.1 summarizes the rationale for developing specific DQOs for the field and other data collection activities. Sections 4.2.2 through 4.2.4 describe the rationale associated with the DQO process for each of the data collection activities.

4.2.1 General Rationale for Developing Data Quality Objectives

The DQO process is used as a planning tool to develop a data collection strategy that is compatible with intended operable unit data needs and uses. The DQO process helps ensure that the right type and quality of data are collected to fulfill informational requirements for refining the conceptual model and ultimately for determining the status of the contaminants identified in the operable unit in accordance with the *Hanford Past-Practice Strategy* (DOE-RL 1991a) path alternatives, or in accordance with RCRA closure requirements for TSD units (WAC 173-303-610). Within this context, DQOs represent qualitative and quantitative statements and criteria used to develop the strategy for data collection and to determine the specific data parameters to be measured or collected. The DQO process was used to optimize the number and location of samples, measurements, chemical analyses, etc., necessary to satisfy the operable unit data needs, and to obtain these data at an acceptable level of uncertainty. The DQO process also helps to make data collection activities more efficient and more cost effective.

The DQO process for the *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan* involved two sets of meetings held among representatives of the ERC, DOE, Ecology, and EPA. The first DQO process spanned from October 1993 to March 1994 and included the DQOs for preparation of Draft A of this work/closure plan. The operable unit at the time of the first DQO process consisted of the 216-B-3 Main Pond; the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds; the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches; the 216-E-28 Contingency Pond; and Unplanned Releases UN-200-E-14 and UN-200-E-92. The second DQO process was finalized in October 1994 and took about one month to complete. This process occurred as a result of the addition of the 216-A-29 Ditch, 216-B-63 Trench, and the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches to the operable unit. The DQO processes resulted in an agreement amongst the parties that identified specific data collection activities (Appendix D). The outcome of this process is the specific activities identified in Sections 4.2.2 through 4.2.4 that are agreed to in common but subject to further review. In general, it was determined that data needs for the current evaluation will address RCRA past-practice related issues while broadening the characterization of the operable unit in support of resolving RCRA TSD related issues. The scope of

the proposed field activities is designed to assess whether potential contaminants occur within the operable unit at maximum concentrations greater than Model Toxics Control Act (MTCA) Method C Soil Cleanup Levels for chemical contaminants (WAC 173-340-745) or radionuclide activities greater than Hanford Site Risk Assessment Methodology (HSRAM) industrial guidelines (DOE-RL 1995). The proposed sampling scheme is a biased approach that targets locations with the highest potential for contaminant accumulations based upon the conceptual model, thereby identifying maximum concentrations through implementation of a limited field program.

Additional investigations may be conducted to gain more knowledge on the distribution of contaminants, as necessary. For example, if contaminant concentrations are observed to be between residential MTCA Method B and industrial MTCA Method C cleanup levels and/or radionuclides at HSRAM industrial levels, further sampling may be required to determine with statistical confidence whether contaminants exceed Method C industrial cleanup or HSRAM industrial cleanup standards. In addition, clean closure of a RCRA TSD unit may be pursued if chemical contaminants are below residential cleanup levels. Clean closure may be assessed through a statistical analysis of contaminants using existing data along with data from proposed activities herein. The statistical analysis may identify data gaps that should be filled in order to pursue clean closure of RCRA TSD units.

Criteria used to define DQOs for each of the field activities listed in Figure 4-1 are detailed in Tables 4-1 through 4-4. Each table lists the investigation objectives for addressing operable unit data needs. Based on these objectives, the prioritized use of the information obtained is described in terms of site characterization issues related to refinement of the conceptual model and completion of a CMS based on the refined model. Parameters to be obtained are listed in Tables 4-1 through 4-4, along with appropriate DQO guidelines for implementing the testing method or gathering the data. Implementation guidelines for many of the field activities are expected to rely heavily on existing Environmental Investigations Procedure (EIPs) (BHI 1994a), which discuss in detail common testing methods and procedures used at the Hanford Site. Implementation guidelines for some field activities presented in the DQO tables also include reference to follow-on description of work documents that are planned to provide supplementary detail to the work plan field investigation once specific decisions have been made regarding drilling methods and other procedures.

Tables 4-1 through 4-4 also describe or reference the required parameter measurement limits and quality criteria. The DQO tables list critical values or samples for data parameters to identify in general terms the geographic areas, stratigraphic horizons, or other requirements where data are needed to address data needs or other specific data gaps in the conceptual model. Critical samples or other parameters for some field activities such as chemical analyses are prioritized with regard to the importance of the data. Constraints that may limit the data collection activity also are identified in Tables 4-1 through 4-4.

4.2.1.1 Investigation Activities and Analyses. This section summarizes the rationale for general field investigation activities and analyses developed for this work/closure plan.

4.2.1.1.1 Field Activities. Each data need has certain requirements best fulfilled by specific field activities. In addition, Figure 4-1 illustrates how each field activity generally addresses more than one data need. The proposed field activities described in Sections 4.2.2 to 4.2.4 are summarized as follows.

- Surface radiological surveys that have been conducted for normal operable unit operations or are planned to be conducted for intrusive data collection activities will be evaluated to determine if "hot spots" (radioactivity greater than twice background levels) may be identified that exhibit radionuclide activities above background values. If hot spots are identified, they may be used for refining locations of soil boring locations and determining the need for surficial soil sampling.

- Subsurface geophysical surveys of the shallow (to 50-ft depth) vadose zone will be run in temporary probe holes installed by cone penetrometer push technology. Survey data will be utilized to refine borehole locations and sample collection depths.

- Borehole geologic logging and soil sampling for laboratory analyses of physical properties will provide more data to assess operable unit stratigraphy and hydrologic properties. Selected samples will be collected to characterize, if needed, subsurface soil particle density, particle size distribution, bulk density, moisture content, pH, calcium carbonate content, saturated hydraulic conductivity, unsaturated hydraulic conductivity, matric potential and soil moisture retention curves (for unsaturated samples only), cation exchange capacity, organic carbon content, if possible, Eh (soil oxidation/reduction potential), and mineralogy.

- Soil sample collection and laboratory analysis for chemical concentrations and radionuclide activities will provide data to assess the nature and extent of contaminants in the vadose zone.

- Subsurface geophysical surveys (e.g., radionuclide logging of existing wells), especially those to obtain spectral gamma data, will support the evaluation of contamination nature and extent.

4.2.1.1.2 Analyses. Soil samples will be collected in conjunction with the activities listed above. These samples will be analyzed to assess contaminant concentration and/or to characterize physical properties. The list of analyses for these samples is derived from the potential contaminants of concern listed in Section 3.1 (Table 3-2). Chemical analytical suites that include the potential contaminants of concern are radionuclides, metals, other inorganic compounds, volatile organic compounds, and semivolatile organic compounds. The properties to be measured in the physical sample suites include grain size distribution, bulk density, pH, moisture content, and unsaturated hydraulic properties. Analytes and analyses are discussed in Section 5.1.5 and the QAPjP (Appendix E).

4.2.1.2 Conceptual Model of Contaminant Distribution. A model of contaminant distribution can be used to design an effective sampling program at each unit. Based on this model, sampling efforts will be concentrated at locations and depths where contamination is expected, and fewer "confirmatory" samples need to be collected in areas where little or no contamination is expected. Previous studies at the 216-B-3 Main Pond and 216-B-3 Expansion Ponds TSD units provided an important source of information for the models. Additional data are available from studies conducted at similar waste management units.

4.2.1.2.1 Data from Previous Studies. A large body of data describing near-surface and vadose zone contaminant distribution at the 216-B-3 Expansion Ponds has already been collected (Section 3.2). In addition, several studies of horizontal and vertical contaminant distribution have been conducted at the 216-U-10 Pond Complex and BY Cribs. These studies will be used to support the 200-BP-11 conceptual model of contaminant distribution.

216-B-3 Main Pond and Expansion Ponds. An extensive sampling program has already been conducted at the 216-B-3 Expansion Ponds as part of the RCRA closure characterization process. During the first 2 phases of the program, surface soil samples were collected from approximately 60 locations within the 216-B-3 Main Pond/Ditch and 216-B-3 Expansion Ponds TSD units. Several surface soil samples were also collected outside of the ditch and ponds to establish background levels for some contaminants. During Phase 3 of the program, one boring was made through the vadose zone to groundwater at each of the 216-B-3 Expansion Ponds. The samples were analyzed for an extensive suite of organic and inorganic contaminants, and for strontium-90, gross alpha, gross beta, and gamma scan.

The results of these analyses are summarized in Section 3.2.8 of this report. Organic and radionuclide analytes were undetected in the samples or were identified at concentrations that were below levels of concern. Inorganic analytes also generally were below levels of concern, with the exception of lead, mercury, and cadmium, which were identified at levels slightly above naturally occurring background concentrations are the 216-B-3 Expansion Ponds.

Detected concentrations were observed at only near-background or near-detection-limit levels. Even with these low-level detections, some general conclusions can be made about contaminant distributions. Contaminant concentrations are higher in the 216-B-3 Main Pond than in the expansion ponds or the 216-B-3-3 Ditch. Within the 216-B-3 Main Pond the highest levels of mercury, lead, and cadmium are found in the central part of the pond, while the margins of the pond tend to exhibit lower contaminant concentrations. The vadose zone beneath the expansion ponds does not appear to be contaminated.

Furthermore, there are 2 upgradient and 18 downgradient groundwater monitoring wells around the 216-B-3 Main Pond and 216-B-3 Expansion Ponds. The sampling results from these wells are summarized in Chapter 4 of the 200 East Groundwater AAMS Report (DOE-RL 1993a). Tritium is the only groundwater contaminant plume associated with these ponds. Scintillation probe profiles are available for approximately 30 wells in and around the 216-B-3 Main Pond and 216-B-3 Expansion Ponds. These data were analyzed in the B Plant AAMS Report, and no elevated gamma activity was noted within the vadose zone soils of the area (DOE-RL 1993b).

216-U-10 Pond, 216-U-14 Ditch, and 216-Z-19 Ditch. Several large-scale liquid release sites have been studied in the 200 West Area. These data can be used to model expected contaminant distributions beneath comparable sites in the 200-BP-11 Operable Unit. Vertical and horizontal contaminant distributions have been studied at the 216-U-10 Pond, the 216-U-14 Ditch, and the 216-Z-19 Ditch (the 216-U-10 Pond System).

These units are comparable to the 200-BP-11 Operable Unit ditches and ponds in several ways.

- The design and purpose of the ditches and ponds at each location are the same.

- The units both received large volumes of dilute liquid waste (1.65×10^{11} L for the 216-U-10 Pond System and 2.4×10^{11} L for the 216-B-3 Main Pond and expansion ponds).

- Each unit received a diverse waste inventory with the same primary constituents. The most important differences in inventory are that the 216-U-10 Pond received more than an order of magnitude more plutonium than the 216-B-3 Main Pond, and the 216-B-3 Main Pond received almost an order of magnitude more strontium-90 and cesium-137 than the 216-U-10 Pond.

- Both pond complexes are underlain by the Hanford formation. The vadose zone stratigraphy for the first 30 m (100 ft) beneath both areas is dominated by interbedded gravels and sands with minor silt interbeds, although some variability in the formation exists between the 200 West Area and the 200-BP-11 Operable Unit.

Last and Duncan (1980) and Last (1983) conducted an extensive drilling and surface sampling program at the 216-U-10 Pond, the 216-U-14 Ditch, and the 216-Z-19 Ditch. Surface samples and near-surface core samples were collected throughout the 216-U-10 Pond and 216-U-11 Overflow Basin area. In situ measurements, surface samples, and near-surface [30-cm- (12-in.) deep] core samples were collected at each grid point.

Nine sampling transects, each consisting of seven sampling stations to obtain 30-cm- (12-in.) deep core samples, were established across the 216-Z-19 Ditch. In the ditch center, undisturbed cores were collected to an average depth of 76 cm (30 in.). A similar sampling scheme was used along the 214-U-14 Ditch, where 12 transects were established with 5 sampling stations each. In addition, three 3-m (10-ft) test pits were recently completed across the ditch as part of an assessment of potential impacts to groundwater.

Other surface and near-surface soil samples were also collected. These were either preliminary samples taken prior to the main sampling program or supplementary samples collected after the main sampling efforts to provide refinement of the sampling results. A total of 494 surface and near-surface samples were collected from the 216-U-10 Pond and 216-U-11 Basin area, 262 samples from 216-Z-19 Ditch area and 215 samples from the 216-U-14 Ditch area.

Two vadose zone wells were drilled along 216-Z-19 Ditch to a depth of approximately 24 m (80 ft). A third monitoring well was drilled near the 216-U-10 Pond to a depth of 73 m (240 ft) for groundwater monitoring purposes. Sediment samples were collected at 0.3-m (1-ft) intervals in the upper portion and at 2-m (5-ft) intervals in the lower portions of each boring. Seventeen shallow exploration borings were drilled to locate the buried 216-Z-1 and 216-Z-11 Ditches (adjacent to the 216-Z-19 Ditch), and one well was drilled in the 216-U-10 Pond delta area. The shallow borings were approximately 4 m (13 ft) deep, and samples were collected approximately every 0.3 to 0.6 m (1 to 2 ft). Soil samples collected from these borings totaled 322.

The soil samples were analyzed in the laboratory for gamma-emitting radionuclides, plutonium, americium, strontium-90, uranium, moisture content, and texture. Neutron well logging and in situ gamma energy analyses also were conducted.

The most significant radionuclides detected in the pond and ditch soil samples were cesium-137, strontium-90, americium-241, plutonium, and uranium. Contamination was localized in the upper 0.1 m (0.3 ft) of the pond sediments and dropped off rapidly with depth. Contaminant concentrations are highest in the center of the 216-U-10 Pond and in the delta region and decrease towards the old

pond margins. Plutonium concentrations below the 216-Z-19 Ditch were highest in the first 30 cm (12 in.) below the ditch and were two to three orders of magnitude less at the 1-m (3-ft) depth. No plutonium was detected deeper than 14 m (46 ft) below the ditch. The highest concentrations were found immediately below inflow points into the ditch. The americium distribution beneath the ditch was similar to the plutonium distribution. Contaminant concentrations were highest at the bottom of the ditches and decreased towards the sides. The sampling results from these units were presented in Last and Duncan (1980) and Last (1983) and summarized in Section 4.1.2 of the B Plant AAMS Report (DOE-RL 1993b).

Initial results from three of the 3-m (10-ft) test pits on the 216-U-14 Ditch, located about 183 m (600 ft) east of the 216-U-10 Pond, indicate that cesium-137 and total uranium are the most common radionuclides and that the concentrations are the highest in the first 0.3 m (1 ft) below the ditch bottom.

BY Cribs. A detailed study of the vertical distribution of contaminants beneath the BY Cribs has recently been completed. The BY Cribs design consists of four vertical concrete pipes set below grade in a square pattern. The vertical pipes are 1.2 m (4 ft) in diameter and 1.2 m (4 ft) long, placed 2 m (7 ft) below grade, and set on a 1.5-m- (5-ft) thick bed of gravel. The pipes are arranged in a square with the centers spaced 4.6 m (15 m) apart in a 4.6- by 4.6- by 9-m- (15- by 15- by 30-ft) deep excavation. Although the BY Cribs are very different in design from the ditches and ponds of the 200-BP-11 Operable Unit, there are many similarities between the two units. Both units received large volumes of dilute liquid waste, and the vadose zone stratigraphy is similar for the first 30 m (100 ft) beneath both units. They are both underlain by interbedded gravels and sands with minor silt interbeds of the Hanford formation. The most common radionuclides detected below the cribs were strontium-90 and cesium-137, which are two of the dominant waste constituents associated with the waste management units in the 200-BP-11 Operable Unit.

Drilling of the BY Cribs occurred between 1991 and 1993 with up to three borings at each crib. The preliminary field results generally indicate that contamination is concentrated directly beneath the crib infiltration gravels and decreases rapidly with depth. Radionuclide concentrations are usually less than detectable at more than 9 m (30 ft) beneath the crib. Some samples from greater depths did contain detectable radionuclide concentrations, but such samples were relatively uncommon and all were at least two or three orders of magnitude less than concentrations detected immediately beneath the cribs.

The highest activities for specific radionuclides were always measured in samples collected from directly beneath the cribs. The highest gross alpha reading was 9,279 pCi/g, and gross beta readings of more than 10,000,000 pCi/g were commonly encountered. The most common radionuclides were strontium-90 (maximum activities of more than 1,000,000 pCi/g) and cesium-137 (activities of up to 6,360,000 pCi/g). Maximum plutonium-239/240 activities seldom exceeded 1,000 pCi/g, and total uranium activities seldom exceeded 100 pCi/g in the borings.

Cyanide was the most commonly detected nonradionuclide contaminant. Cyanide was found in over half of the borings, with concentrations ranging from 1.6 to 248.5 ppm. Most of the detections occurred between 5 and 11 m (16 and 35 ft) below the ground surface and closely mimicked radionuclide distributions.

Volatile organic, semivolatile organic, and pesticide detections were much less frequent and generally occurred at concentrations near the detection limit. Inorganic concentrations were generally consistent with background soil levels reported in Hoover and LeGore (1991).

Conclusions from Previous Studies. Several general conclusions about contaminant distributions in the 200-BP-11 Operable Unit can be drawn from these previous studies. Many of the following observations are associated with the tendency of most of these contaminants to sorb to fine-grained material.

- Because most of the radionuclide and much of the inorganic contaminants tend to adsorb to particulates (sediment) rather than be dissolved in water, maximum radionuclide activities and inorganic contaminant concentrations should be concentrated at the inflow points to the ponds and in the deepest parts of the ponds. The coarse particles tend to settle out at the inflow point because the effluent stream velocity has slowed, but the finer particles remain in suspension until they settle in the quieter, deeper parts of the pond. Similarly, maximum contaminant concentrations should exist at the inflow points to ditches and should decrease toward the distal end of the ditches. Mobile contaminants, such as tritium and nitrate, are not sorbed to the sediment and are transported with percolating water to the uppermost aquifer underlying the respective waste management unit.

- Because of the length of use, disposal history, and contaminant transport characteristics, contaminant concentrations should be higher in the 216-B-3 Main Pond than in the 216-B-3 Expansion Ponds. While wastewater is held in the 216-B-3 Main Pond, most suspended particles will settle out, and some dissolved contaminants will be adsorbed onto sediments at the pond bottom. Water that is discharged to the 216-B-3 Expansion Ponds will thus contain lower contaminant concentrations.

- Radionuclide contamination decreases rapidly with depth as filtering of particulates and sorption to fine-grained soil particles occurs readily. The highest concentrations should occur within 2 to 3 m (7 to 10 ft) of the bottom of the pond or ditch, and concentrations should be near background levels by 20-m (65-ft) depth.

- Radionuclide contaminants should be concentrated in fine-grained horizons compared to surrounding coarse-grained horizons because they are adsorbed by fine-grained sediments.

- The maximum lateral radionuclide contaminant movement tends to occur immediately above relatively impermeable horizons.

- Inorganic and organic contaminant distribution tends to mimic radionuclide distribution.

4.2.1.2.2 General Model of Contaminant Distribution for Ditches and Trenches. Figure 4-2 is a generalized schematic diagram of contaminant distribution at the ditches or trench. Although a trench does not flow to a pond, the conceptual model should hold true. Again, the majority of contaminants should be held in soils immediately beneath the bottom of each ditch or trench, except for mobile contaminants that are transported directly to the aquifer. The highest contaminant concentrations within a ditch or trench will tend to occur near the outfall point at the

head end of the unit. This general concept should hold true for all the ditches in the 200-BP-11 Operable Unit. However, in the case of the 216-B-3-1 Ditch, because it opened into a wide, swampy, vegetated area at its termination into the 216-B-3 Main Pond, the majority of contaminants are conceptualized to have concentrated in the swampy area of the 216-B-3-1 Ditch. The swampy area of the 216-B-3-1 Ditch would coincide with the area west of the overflow pond. In the following subsections, additional unit-specific information is provided for the 200-BP-11 Operable Unit ditches and trench, in descending order from anticipated most contamination. See Sections 2.1 and 3.2 for waste management unit history and known and suspected contamination, respectively.

216-B-3-1 Ditch. One of the three original waste management units in the operable unit, the 216-B-3-1 Ditch operated from 1945 to 1964 and was decommissioned after an unplanned release (UPR-200-E-34) of an estimated 2,500 Ci of short- and long-lived fission products; therefore, the sediment and shallow soil underlying the ditch, extending to the overflow pond, is likely to contain the highest radionuclide contaminant concentrations.

216-B-2-2 and 216-B-3-2 Ditches. The 216-B-2-2 Ditch discharged to the 216-B-3-2 Ditch from 1964 to 1970. Both ditches were decommissioned after an unplanned release (UPR-200-E-138) of 1,000 Ci of strontium-90. Also, the lower half of the 216-B-3-2 Ditch received the 216-A-29 Ditch effluent from 1964 to 1970.

216-B-2-1 Ditch. One of the three original waste management units in the operable unit, the 216-B-2-1 Ditch operated from 1945 to 1964 and was decommissioned after an unplanned release (UPR-200-E-32) of 30 Ci of cesium-134 and 0.05 Ci of strontium-90.

216-A-29 Ditch and 216-B-3-3 Ditch (Lower Half). The 216-A-29 and 216-B-3-3 Ditches were operational from 1955 to 1991 and 1970 to 1994, respectively. There are known dangerous waste and radioactive discharges to the 216-A-29 Ditch that flowed to the lower half of the 216-B-3-3 Ditch. The only unplanned release associated with the 216-A-29 Ditch and the lower half of the 216-B-3-3 Ditch involved the discharge of 15 kg of cadmium nitrate (UPR-200-E-51).

216-B-63 Trench. The 216-B-63 Trench was operational from 1970 to 1992. Although the trench is known to have received dangerous and radioactive waste, it is expected to be relatively clean because the first foot of its surface was excavated and removed.

216-B-2-3 Ditch and 216-B-3-3 Ditch (Upper Half). The 216-B-2-3 and 216-B-3-3 Ditches were operational from 1970 to 1987 and 1970 to 1994, respectively. Neither the 216-B-2-3 Ditch nor the upper half of the 216-B-3-3 Ditch (above 216-A-29 Ditch confluence) is associated with any known dangerous waste or radioactive releases.

4.2.1.2.3 General Model of Contaminant Distribution for Ponds. Figure 4-3 is a generalized schematic diagram of contaminant distribution at the 216-B-3 Main Pond and the 216-B-3 Expansion Ponds. The majority of contaminants should be held in soils immediately beneath the bottom of the ponds. Localized, much lower contaminant concentrations may occur in deeper fine-grained horizons. Near the surface, the highest contaminant concentrations would tend to occur near the outfall to each pond and at the center of each pond. Additional specific information about each pond is given in the following subsections.

216-B-3 Main Pond. One of the three original waste management units in the operable unit, the 216-B-3 Main Pond was active from 1945 to 1994. Therefore, its underlying soils may have been

impacted by every major waste release to upstream waste management units, i.e., all releases. Therefore, sediments and soils below the 216-B-3 Main Pond are anticipated to be some of the most heavily contaminated within the entire 200-BP-11 Operable Unit. Furthermore, the overflow pond, which is part of the 216-B-3 Main Pond, is targeted as an area of potential high contamination.

After Unplanned Release UPR-200-E-34 in 1964, a layer of bentonite clay was placed onto the bottom of the pond. The sediments below this bentonite layer may have different contaminant constituents and concentrations than those above it because of changes in waste stream inputs over time.

The surface area of the 216-B-3 Main Pond has varied between 8 and 19 hectares (19 and 46 acres) during its operational life, and it covered 14 hectares (35 acres) prior to deactivation and interim stabilization in 1994. Those areas on the margins of the 216-B-3 Main Pond that are rarely covered with water will tend to be less contaminated than the permanently inundated areas. Additionally, the 216-B-3 Main Pond typically widened in surface area to the west encompassing the overflow pond and terminal portion of the 216-B-3-1 Ditch. These areas are also targeted as high-contaminant areas.

216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. None of these ponds were in service before 1983, so they have had a relatively short operational life and were not impacted by the unplanned releases during the 1960's and 1970's. Because the 216-B-3 Main Pond also acts as a settling pond, most of the particulate contaminants are removed from the water before it is discharged to these ponds. For these reasons, contaminant concentrations in the sediments and soils underlying these ponds will tend to be much lower than those observed in the 216-B-3 Main Pond. This appears to be in agreement with results of previous studies (Section 3.2.8).

216-E-28 Contingency Pond. The 216-E-28 Contingency Pond was excavated as a contingency to the 216-B-3 Main Pond but was never used, and therefore no contamination is associated with it.

4.2.1.2.4 Previous Studies Summary. Data reported in previous studies indicate that the highest potential for contaminant accumulation occurs in the following areas:

- Heads of ditches and inlets to ponds
- Sediment accumulated in ditches and ponds
- Shallow soil, with most contaminant accumulation occurring in the top few feet and generally not extending past 20 m (65 ft).

4.2.2 200-BP-11 Waste Management Unit Sampling

The soil sampling scheme proposed for the trench, ditches, and ponds considers the existing data (Chapter 3) and the conceptual model (Section 4.2.1.2) to fill data gaps in the locations of highest potential for contaminant accumulations. As indicated above, the most probable areas of contamination include the heads of ditches (closest to the effluent source), sediments, and generally the depth extending past 15 m (50 ft) below unit bottoms. Therefore, the majority of sample collection activities are designed to target shallow (6 m below unit bottoms) and intermediate (15 m below unit bottoms) intervals in the vadose zone. The deeper vadose zone interval will be addressed

by the boreholes to groundwater. Sample depths will be about 6 m (20 ft) below unit bottoms for test pits/auger holes and about 15 m (50 ft) and 61 m (200 ft) below unit bottoms for intermediate boreholes and groundwater boreholes, respectively. Sampling through the vadose zone is weighted heavily towards the shallow interval based on contaminant distributions predicted by the conceptual model. Borehole siting for at least one location near the head end of the 216-B-2 Ditches will be defined through the use of a subsurface radiological survey conducted in temporary cone penetrometer probe holes.

4.2.2.1 Surface and Near-Surface Soil Samples. Surface soil samples will be collected, as necessary, to support refinement of the conceptual model and a CMS (Figure 4-1). If field instruments measure a "hot spot" at a test pit/auger hole or borehole location (see Plate 2), a surface sample will be collected. A hot spot was defined during the 200-BP-11 DQO process (see Appendix D) as an area with surface radioactivity at or above twice background and/or sustained organic vapor readings of 5 ppm or more. Additional surface samples may be taken if surface radiation surveys over pipelines, or elsewhere in the operable unit, indicate radioactivity at or above twice background.

All test pit/auger hole or borehole locations must have either a surface sample collected or a sample collected from the interval between 0.6 and 2 m (2 and 6 ft) from the ground surface. If the original ditch, trench, or pond bottom is within this 0.6- to 2-m interval, a bottom/sediment sample will be collected and used to support characterization. Sampling at depths below the unit bottom is described in Section 4.2.2.2 (test pit/auger hole) or Section 4.2.2.3 (borehole).

Surface and near-surface samples will be analyzed for the total list of constituents as presented in Table 3-2 plus the modified Appendix IX list discussed in Appendix D (DQO agreements).

4.2.2.2 Test Pit/Auger Hole Locations and Sampling Depths. To address shallow soil data needs, a total of 15 test pits (or auger holes) will be advanced in the 200-BP-11 Operable Unit. The general locations of the test pits/auger holes are depicted on Plate 2. Test pits are expected to be the shallow soil sampling method in 200-BP-11; however, auger holes may be substituted for test pits as discussed in Chapter 5. The test pit or auger hole locations support the field investigation of all the waste management units in the 200-BP-11 Operable Unit except the 216-E-28 Contingency Pond and Unplanned Releases UN-200-E-14 and UN-200-E-92. The 216-E-28 Contingency Pond was never used and thus does not need to be sampled, Unplanned Release UN-200-E-14 (dike failure) is considered part of the 216-B-3A Expansion Pond, and Unplanned Release UN-200-E-92 (contaminated tumbleweeds) has been removed. Descriptions and general information about test pit/auger hole placement at each waste management unit are provided in the following subsections.

4.2.2.2.1 216-B-63 Trench. One test pit will be located in the middle one-third of the 216-B-63 Trench. Placement of an intermediate [15 m (50 ft)] or groundwater borehole at the head end of the trench will be coordinated with placement of this test pit and will also address shallow soil conditions.

4.2.2.2.2 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches. One test pit will be located at the intersection of the three ditches where they discharged to the inactive portion of the 216-B-2-3 Pipeline. The information realized by this test pit will be used to assess the contamination concentration gradient along the length of the ditches.

4.2.2.2.3 216-B-3-1 Ditch. This ditch is considered to have the highest potential soil contamination and will therefore be investigated thoroughly. Two test pit locations are planned for the unit, one about one-third and one about two-thirds of the way between the headwall and the west end of the 216-B-3 Main Pond. Two intermediate [15 m (50 ft)] boreholes will be coordinated with placement of these test pits and will also address shallow soil conditions.

4.2.2.2.4 216-B-3-2 Ditch. One test pit will be located in the 216-B-3-2 Ditch about midway between the headwall and the 216-A-29 Ditch. The placement of this test pit will be coordinated with the placement of an intermediate [15 m (50 ft)] borehole at each end of the ditch, which will also address shallow soil conditions.

4.2.2.2.5 216-B-3-3 Ditch. Three test pits will be located in the 216-B-3-3 Ditch. These are located midway between the headwall and 216-A-29 Ditch, at the confluence of the 216-B-3-3 Ditch and 216-A-29 Ditch, and about midway between the 216-A-29 Ditch and the point of discharge into the 216-B-3 Main Pond. The test pit at the 216-A-29 Ditch confluence will aid in characterization of both the 216-B-3-3 and 216-A-29 Ditches.

4.2.2.2.6 216-A-29 Ditch. One test pit will be located in the middle of the 216-A-29 Ditch. Also, the test pit discussed with the 216-B-3-3 Ditch at the confluence of the 216-A-29 Ditch will aid in the characterization of both ditches. A groundwater borehole at the head end of the ditch will also address shallow soil conditions.

4.2.2.2.7 216-B-3 Main Pond. Four test pits will be located within the 216-B-3 Main Pond and one within the overflow pond. Test pit placement in the 216-B-3 Main Pond will be coordinated with placement of the intermediate [15 m (50 ft)] and groundwater boreholes, which will also address shallow soil conditions. Furthermore, test pit placement in the 216-B-3 Main Pond is biased towards topographically low areas of the pond bottom, the "delta" area where the 216-B-3-3 Ditch entered the pond, and in areas where radioactivity from Phase 1 sampling of the 216-B-3 Expansion Ponds (Section 3.2.8) was highest. General placement of the test pits will occur near the southwest corner of the 216-B-3 Main Pond; near the inflow point of the 216-B-3-3 Ditch; on the north side of the pond directly north of the inflow point of the 216-B-3-3 Ditch; at the southeast portion of the pond; and, lastly, in the approximate center of the overflow pond.

4.2.2.2.8 216-B-3A Expansion Pond. To assess radionuclide contamination (dangerous waste will not be further evaluated--see Section 3.2.8 and Appendix D), a test pit will be placed in the topographic low (the trench excavated in the pond bottom) of the 216-B-3A Pond. This location in the pond is expected to contain the highest radioactivity levels and will be considered analogous to the 216-B-3B and 216-B-3C Expansion Ponds.

The test pits or auger holes will be advanced to a depth of 6 m (20 ft) below the original ditch, trench, and pond bottoms to address shallow vadose zone data needs. However, the depth may be extended if contamination persists.

The general sampling scheme for a test pit (or auger hole) is to obtain a surface or near-surface (.6 to 2.0 m) sample as described in Section 4.2.2.1 and then collect soil/sediment samples at the original ditch, trench, or pond bottom and at depths (below the original bottom) of 0.6 m (2 ft), 2 m (5 ft), 3 m (10 ft), 5 m (15 ft), and 6 m (20 ft).

The pre-established sampling depth locations may be replaced by samples taken at lithologic interfaces (as determined by the field geologist) and/or at depths where field screening reveals radioactivity of at least twice background or organic vapor readings of at least 5 ppm.

All samples will be analyzed for the total list of constituents as presented in Table 3-2 plus the modified Appendix IX list discussed in Appendix D (DQO agreements).

4.2.2.3 Boreholes Locations and Sampling Depths. To address shallow, intermediate, and deep vadose zone data needs, a total of eight boreholes will be advanced in the 200-BP-11 Operable Unit. Five of these boreholes will be to the intermediate depth of 15 m below unit bottoms and three will be to groundwater. The general locations of the boreholes are depicted on Plate 2. As with the test pits, the borehole locations also support the field investigation of all the waste management units in the 200-BP-11 Operable Unit except the 216-E-28 Contingency Pond and Unplanned Releases UN-200-E-14 and UN-200-E-92. These latter units do not need to be investigated. Descriptions and general information about borehole placement at each waste management unit are provided in the following subsections.

4.2.2.3.1 216-B-63 Trench. Because of the proximity of the 216-B-63 Trench and the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches, a cone penetrometer survey will be performed across the head end of the units to assess radiation levels. The area with the highest radiation level will be selected for a borehole to groundwater. If this area is within the 216-B-63 Trench, the groundwater borehole will be placed at that location in the trench. Otherwise, a borehole will be advanced to an intermediate depth of 15 m (50 ft) below the trench bottom. This latter scenario is anticipated based on the known history of unplanned releases.

4.2.2.3.2 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches. Because of the proximity of the 216-B-63 Trench and the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches, a cone penetrometer survey will be performed across the head end of the units to assess radiation levels. The area with the highest radiation level will be selected for a borehole to groundwater. If this area is within one of the ditches, the groundwater borehole will be placed at that location. Otherwise, in another location of highest radiation levels, the borehole will be advanced to an intermediate depth of 15 m (50 ft) below a ditch bottom. The former scenario is anticipated based on the history of unplanned releases.

4.2.2.3.3 216-B-3-1 Ditch. This unit is expected to be the most contaminated ditch in the operable unit and therefore will be thoroughly characterized. The 216-B-3-1 Ditch will contain two intermediate boreholes, one at the head end of this ditch (and the 216-B-3-2 Ditch) and another about midway between the head end and the west side of the 216-B-3 Main Pond. Note that the borehole at the head end of this 216-B-3-1 Ditch will be placed in an area that is likely to have been influenced by the 216-B-3-2 and 216-B-3-3 Ditches and is therefore considered as characterization of all three units.

4.2.2.3.4 216-B-3-2 Ditch. Boreholes in this unit will be placed in locations such that other units are also characterized. The first intermediate borehole was discussed with the 216-B-3-1 Ditch and will be placed at the head end of both units. This borehole location is also likely to have been affected by the 216-B-3-3 Ditch. The second intermediate borehole will be placed at the confluence of the 216-B-3-2 and 216-B-3-3 Ditches downstream from the 216-A-29 Ditch. Therefore, this second borehole will be considered as characterizing both the 216-B-3-2 and 216-B-3-3 Ditches with potential influence by the 216-A-29 Ditch.

4.2.2.3.5 216-B-3-3 Ditch. No boreholes are specifically assigned to this unit because boreholes from other units are considered as characterization of this unit's ditches as well. The intermediate borehole at the head end of the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches is considered as characterizing all three units. The intermediate borehole at the confluence of the 216-B-3-2 Ditch is considered as characterizing both the 216-B-3-2 and 216-B-3-3 Ditches with potential influence by the 216-A-29 Ditch.

4.2.2.3.6 216-A-29 Ditch. The wide, shallow portion at the head end of the 216-A-29 Ditch should have percolated the greatest amount of contamination, and therefore a borehole to groundwater is planned at this location.

4.2.2.3.7 216-B-3 Main Pond. Two boreholes will be advanced in the 216-B-3 Main Pond to address data needs for the intermediate and deep vadose zone. The deep borehole to groundwater will be placed in the western midline of the 216-B-3 Main Pond, which is conceptualized to contain the deepest, most concentrated potential contaminants of concern. The intermediate borehole will be placed at the deepest part of the pond near the 216-B-352 spillway. The placement of these boreholes, when combined with the shallow test pits, should adequately support the evaluation of contaminant distributions throughout the pond.

The intermediate boreholes will be advanced to a depth of 15 m (50 ft) below the original unit bottoms and the deep boreholes will advance to groundwater, which is estimated to be about 58 to 61 m (190 to 200 ft) below the unit bottoms. However, the depth may be extended in intermediate boreholes if contamination persists.

The general sampling scheme for intermediate boreholes is to obtain a surface and/or near-surface sample as described in Section 4.2.2.1, then sediment/soil samples at the original ditch, trench, or pond bottom, and continued soil sampling at depths (below the original bottom) of 0.6 m (2 ft), 2 m (5 ft), 3 m (10 ft), 6 m (20 ft), 9 m (30 ft), 12 m (40 ft), and 15 m (50 ft) below the original unit bottom. Note that if the original ditch, trench, or pond bottom is within the interval between 0.6 and 2 m (2 and 6 ft) from the ground surface, the bottom/sediment sample will also serve as the required near-surface sample.

The general sampling scheme for the deep boreholes to groundwater is the same as that of intermediate boreholes, but soil samples will continue to be collected at depths of 23 m (75 ft), 30 m (100 ft), and 46 m (150 ft) below the original unit bottom. An additional sample will be taken at the groundwater level if possible.

The pre-established sampling depth location for the intermediate and groundwater boreholes may be replaced by samples taken at lithologic interfaces (as determined by the field geologist) and/or at depths where field screening reveals radioactivity of at least twice background or organic vapor readings of at least 5 ppm.

All samples will be analyzed for the total list of constituents as presented in Table 3-2 plus the modified Appendix IX list discussed in Appendix D (DQO agreements).

4.2.3 Other Field Activities

Other field activities to support data needs include air sampling, perched water sampling, and pipeline integrity monitoring.

4.2.3.1 Air Sampling. Air samples will be taken during characterization activities for health and safety monitoring and to confirm that contaminants are not being spread by wind. Air monitoring is discussed in more detail in Sections 5.1.1.6, 5.1.3.3.2, and 5.1.4.11.

4.2.3.2 Perched Water Sampling. Samples will be taken of perched water encountered during soil borings. Samples will be taken from each zone of perched water identified and analyzed for target analytes as presented in Table 3-2, plus additional analyses for fluoride, carbon-14, and tritium. As agreed to in the DQO process, the additional analytes are potential contaminants of concern but are not analyzed for in soil samples because of their high mobility and low likelihood of detection in soil. Analyses for anions and metals will be conducted both for unfiltered samples and samples passed through a 0.45-micron filter in the field during collection. If perched water is encountered during borehole drilling in sufficient quantity for sampling and continued monitoring, a well will be installed in the perched water zone to monitor potential contamination in this zone. Up to one perched water well will be installed per waste management unit, as necessary.

4.2.3.3 Pipeline Integrity Monitoring. The process effluent pipelines within the 200-BP-11 Operable Unit are depicted on Plate 2. The inactive pipelines of interest to the operable unit investigation include the PUREX cooling water line, the 216-B-3-2 Pipeline, and the pipelines that fed the 216-B-63 Trench and 216-B-2-1, 216-B-2-2, 216-B-2-3, and 216-A-29 Ditches. All other pipelines within the operable unit are active or associated with other facilities. A surface radiation survey will be performed over these pipelines to be investigated consisting of approximately 800 m (2,600 ft).

Two sections of pipe may have an internal camera and radiation survey performed if technically and economically feasible. These sections of pipe are the capped PUREX cooling water line leading to the Gable Mountain Pond and the southern segment of the 216-B-3-2 Pipeline. The emphasis of these surveys will be to assess pipeline integrity, identify potential leak points, and attempt to correlate the leak points to potential surface contamination. An assessment of potential sediment/sludge contamination within the pipelines and the need for soil sampling outside the pipelines will be made after these surveys are complete. If areas of probable leaks are detected, an assessment of potential contamination will be performed, and additional soil samples may be taken and analyzed for constituents listed in Table 3-2.

Figure 4-1. Relationships Between Data Uses, Data Needs, and Field Activities for the LFI.

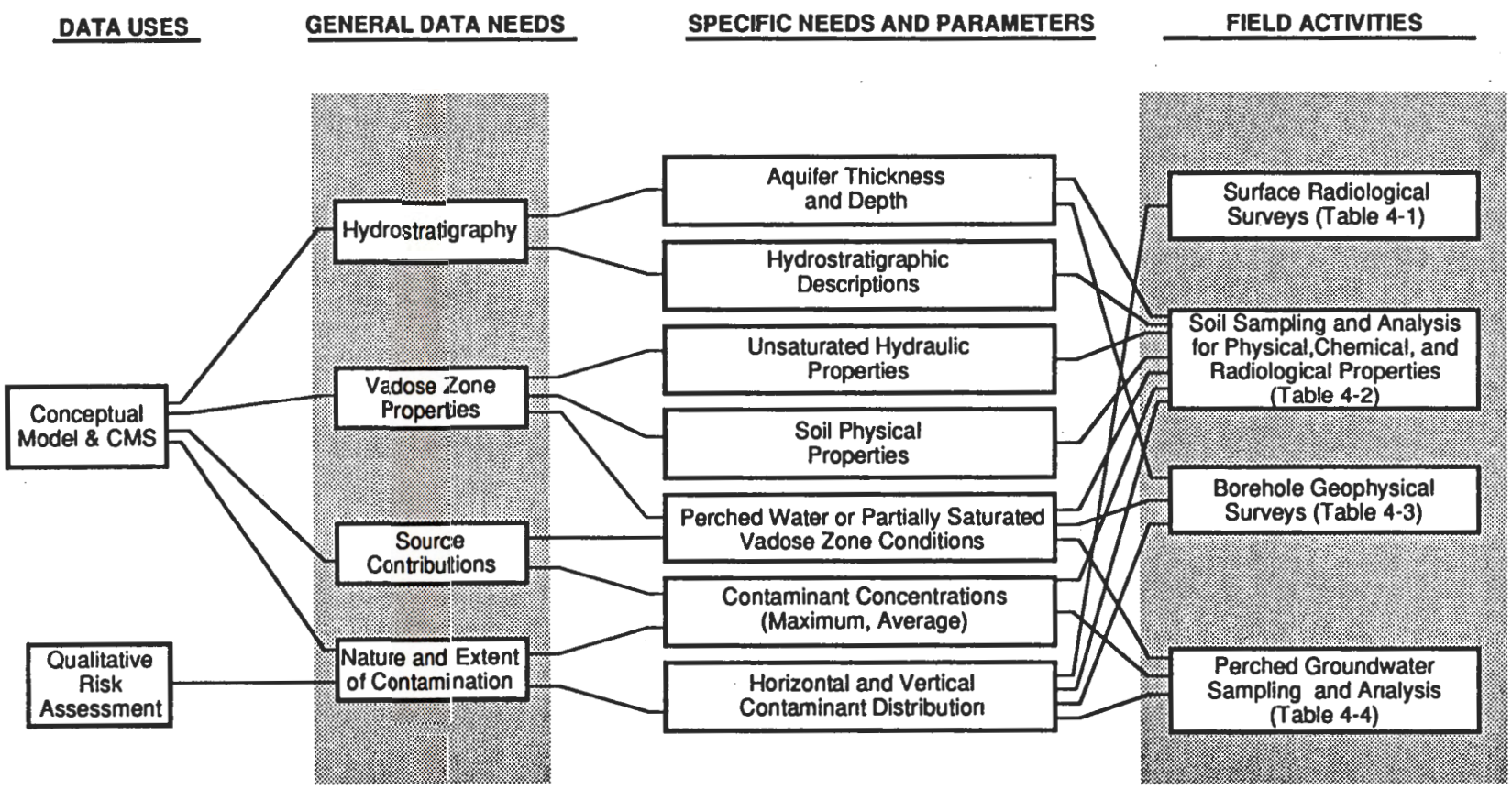
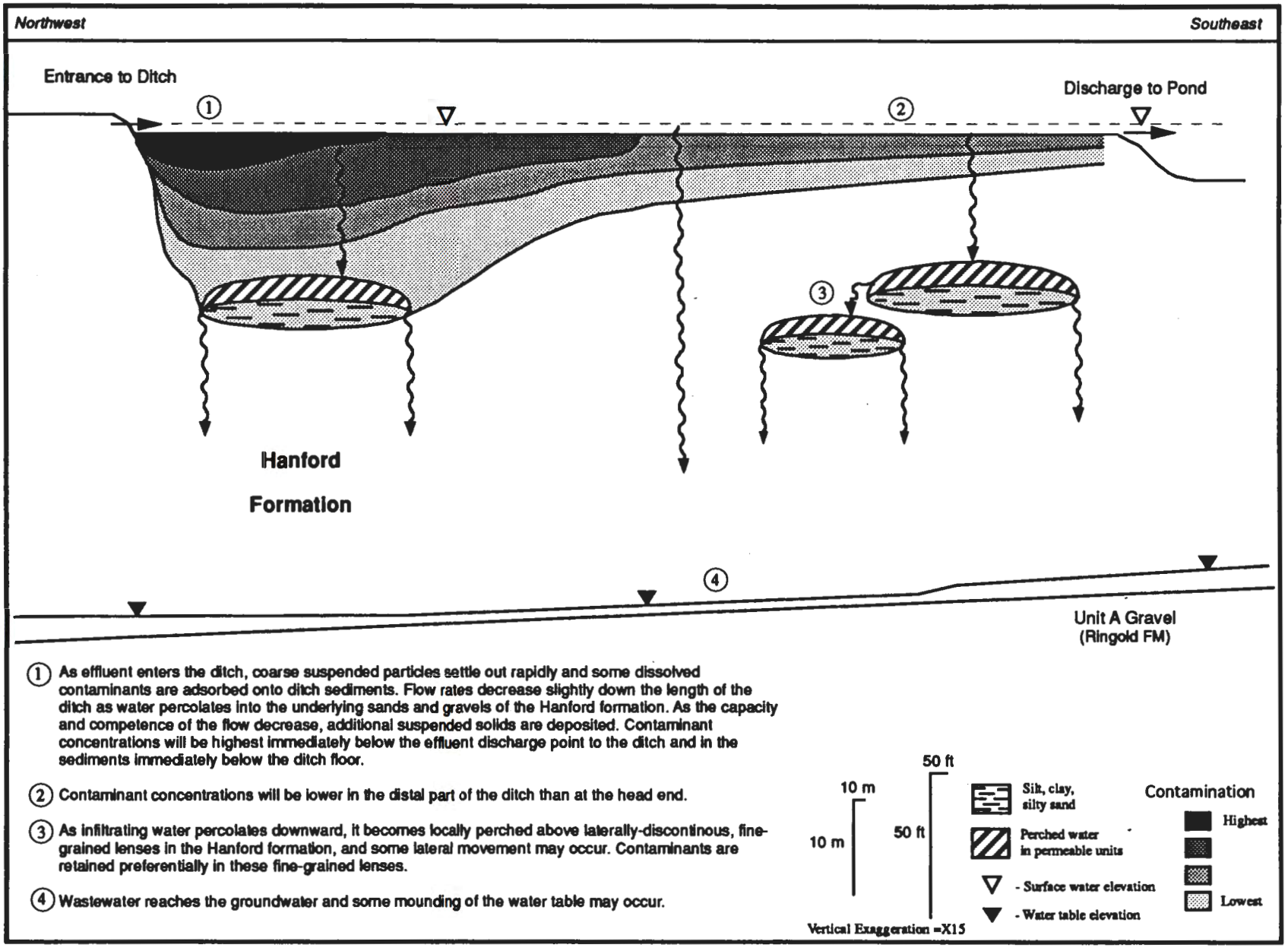


Figure 4-2. Schematic Conceptual Model of Contaminant Fate and Transport in Ditches.



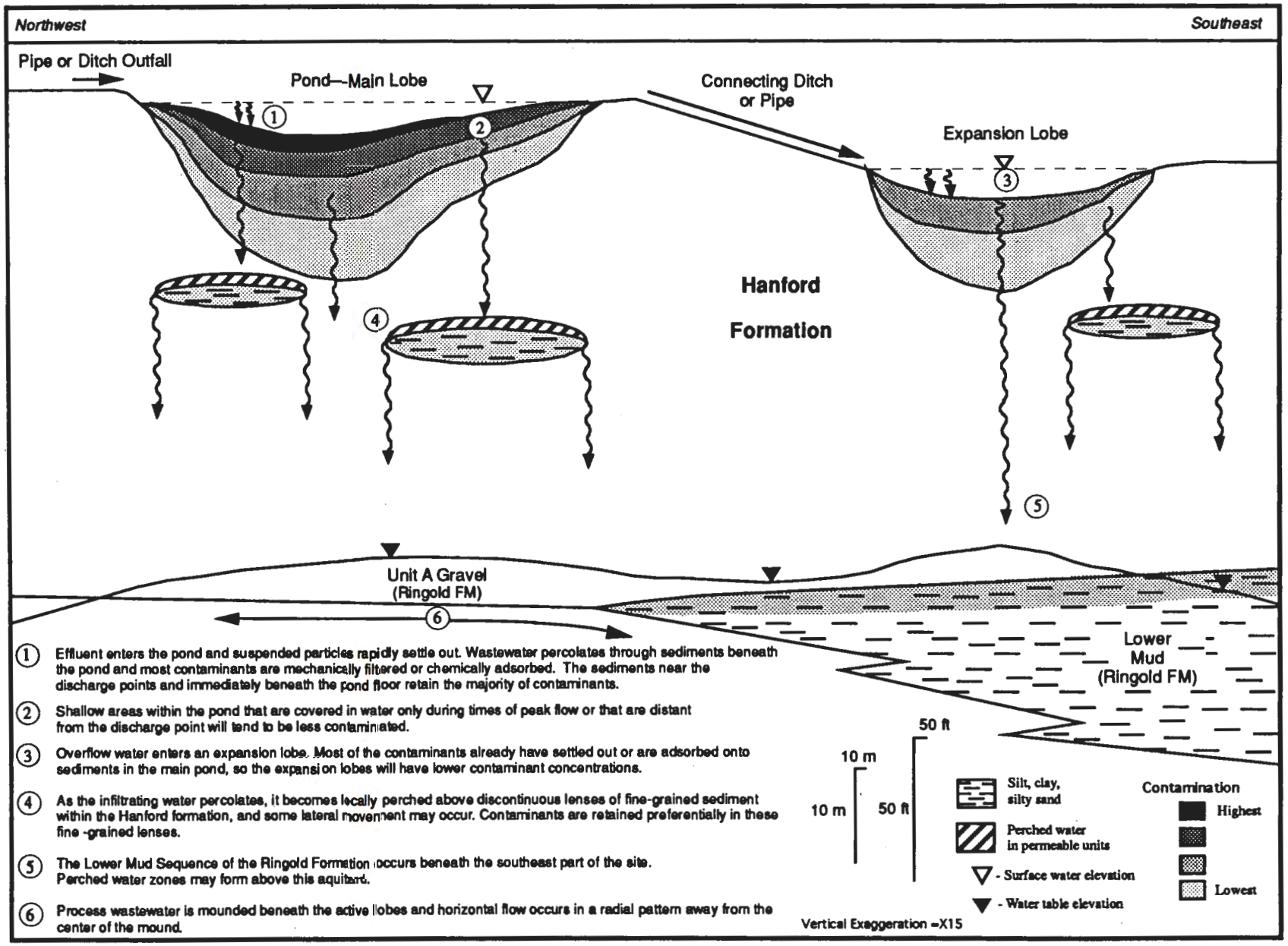


Figure 4-3. Schematic Conceptual Model of Contaminant Fate and Transport in Ponds.

Table 4-1. Data Quality Objectives for Surface Radiological Surveys.

Activity	Screen potential sampling sites for background and elevated levels of radioactivity. Screening is conducted both as normal operating procedures for the operable unit and as health and safety monitoring during intrusive field activities.
Objectives	Locate "hot spots" where radiation levels are twice background readings.
Prioritized Data Use(s)	Refine sampling locations to target potential zones of maximum contamination.
Appropriate Analytical Level or Implementation Guidelines	Surface radiation surveys will be carried out according to descriptions of work.
Parameters to be Obtained	Location, date, time, calibration data, and radiation level reading.
Required Detection or Measurement Limits	Surveys will follow standard operating procedures as outlined in descriptions of work.
Critical Samples or Values	N/A
Constraints	• Background readings must be taken in an uncontaminated area. • Instruments must be properly calibrated.

Table 4-2. Data Quality Objectives for Soil Sampling and Analysis for Physical, Chemical, and Radiological Sampling.

Activity	Collect soil samples during test pit/auger and borehole drilling and analyze samples for physical, chemical, and radiological properties.
Objectives	Soil sampling will address data needs of vertical and horizontal distribution of contaminants through chemical and radiological analysis and data needs of geologic/hydrologic characterization through physical analysis.
Prioritized Data Use(s)	The priority data uses are to support characterization of geology and hydrostratigraphy, and contaminant characteristics and transport for refining the conceptual model, as well as support the conduct of the qualitative risk assessment.
Appropriate Analytical Level or Implementation Guidelines	Samples will be collected according to procedures outlined in EIP 4.0 (BHI 1994a) and descriptions of work.
Parameters to be Obtained	Bulk density, particle size distribution, moisture content, pH, unsaturated hydraulic conductivity, metals, volatile organics, semivolatile organics, and radionuclides.
Required Detection or Measurement Limits	Analytical detection limits and data quality objective requirements are identified in the Quality Assurance Project Plan (Appendix E).
Critical Samples or Values	One sample from each lithologic unit encountered at a given sample location.
Constraints	Single samples can be assessed statistically only with comparison to data from previous investigations or other boreholes, or where field duplicates are collected.

Table 4-3. Data Quality Objectives for Borehole Geophysical Surveys.

Activity	Perform radionuclide logging system spectral gamma and gross gamma logging on all boreholes and on selected existing wells.
Objectives	Geophysical logging of boreholes will help define hydrostratigraphy, source contributions, and nature and extent of contamination.
Prioritized Data Use(s)	The priority data uses are to support characterization of contaminant distribution and hydrostratigraphy in support of refining the conceptual model.
Appropriate Analytical Level or Implementation Guidelines	Boreholes will be logged according to EII 11.1 (WHC 1988) and descriptions of work.
Parameters to be Obtained	Depth of logging, logging speed, base calibration date, date and time of logging, gross gamma activity, and gamma spectrum.
Required Detection or Measurement Limits	Surveys will follow standard operating procedures, as identified in EII 11.1 (WHC 1988).
Critical Samples or Values	All boreholes drilled to 50 ft or more should be logged with radionuclide logging system spectral gamma and gross gamma. Existing wells in the operable unit that lack these data also should be surveyed.
Constraints	Existing well borehole construction may affect results. Improper sealing of old wells may yield misleading data where flow of contaminated water along well casings may have deposited radionuclides.

Table 4-4. Data Quality Objectives for Perched Water Sampling.

Activity	Sample perched water encountered in boreholes during ongoing sampling activities for physical, chemical, and radiological properties. Install wells in perched water zones after sampling.
Objectives	Perched water sampling and analysis will support data needs for the evaluation of the vertical and horizontal extent of contamination and refinement of the conceptual and hydrostratigraphic model.
Prioritized Data Use(s)	The priority data uses are to support characterization of the vertical and horizontal extent of contamination and refine the conceptual model.
Appropriate Analytical Level or Implementation Guidelines	Perched water sampling will be carried out under the guidance of EIP 4.1 (BHI 1994a) and descriptions of work. Perched water well installation will be carried out according to procedures outlined in EIP 1.9, WAC 173-160, and descriptions of work.
Parameters to be Obtained	Volatile organics, semivolatile organics, metals, and radionuclides.
Required Detection or Measurement Limits	Analytical detection limits and data quality objective requirements are identified in the Quality Assurance Project Plan (Appendix E).
Critical Samples or Values	One sample from each perched water zone encountered, including one unfiltered and one field filtered for metals.
Constraints	Inadequate supply of water in perched zone may limit the kinds of analyses performed and the representativeness of the sample.

5.0 RCRA FACILITY INVESTIGATION AND CORRECTIVE MEASURES STUDY

This chapter describes the RCRA facility investigation (RFI) activities and corrective measures study (CMS) that will support corrective action decisions for the past-practice and TSD units within the 200-BP-11 Operable Unit. The activities are designed to provide information to meet the DQOs identified among the DOE, Ecology, and EPA as discussed in Section 4.2.1 and listed in Appendix D. After the facility investigation and CMS are complete, corrective measures will be identified for the operable unit.

Section 5.1 discusses the facility investigation process and describes the project framework of tasks recommended to be implemented during the facility investigation. These tasks are designed to provide information needed to meet the DQOs identified in Section 4.1. The final determination of field activities and detailed information needed to carry out these tasks will be presented in descriptions of work for the operable unit. The results of the facility investigation will be provided in Volume 2 of this work/closure plan.

Section 5.2 describes the process that will lead to future corrective measures. It includes discussion regarding the CMS that will ultimately lead to a corrective action plan and Hanford Facility Site-Wide Permit modification. A detailed analysis of a limited number of remedial alternatives for corrective measures will be conducted as part of the CMS. The CMS will utilize the analysis of remedial alternatives completed as part of the B Plant Aggregate Area Management Study (AAMS) Report (Sections 9.4 and 9.5, DOE-RL 1993b) and current alternatives that have become available since completion of the AAMS report.

5.1 FACILITY INVESTIGATION PROCESS

The necessary activities and program framework required to accomplish the facility investigation goals are presented in Section 5.1.1. The activities are designed to provide information necessary to meet the DQOs identified among the DOE, Ecology, and EPA as discussed in Section 4.2.1 and listed in Appendix D.

Section 5.1.1 describes the work breakdown structure by which the facility investigation activities will be implemented. The tasks designated by the work breakdown structure will be used to manage the budget and schedule the facility investigation activities. Section 5.1.2, "Project Management (Task 1)," summarizes the management activities associated with implementing the data gathering and interpreting tasks of this work/closure plan. Section 5.1.3, "Field Investigation Activities (Tasks 2 to 6)," describes the proposed field data-gathering activities. These field activities identify specific activities recommended to be conducted for the field investigation. Final determination of the major field investigation activities will be made through one or more description of work for the operable unit. The field investigation procedures and protocols are provided in Section 5.1.4 and the laboratory analyses in Section 5.1.5. Sections 5.1.6 through 5.1.9 describe the data interpretation tasks leading to the production of the facility investigation report. These tasks include data evaluation (Section 5.1.6); risk-based cleanup standards (Section 5.1.7); identification and/or verification of potential action-, contaminant-, and location-specific CMRs (Section 5.1.8); and production of the facility investigation report (Section 5.1.9).

5.1.1 Work Breakdown Structure

This section summarizes the tasks to be implemented during the facility investigation studies at the 200-BP-11 Operable Unit. Tasks are the primary controlling framework within which the facility investigation is conducted. Each task describes a primary need or goal of the facility investigation. The tasks are controlled and implemented by a series of associated subtasks and activities. Ten distinct tasks are described in this section: project management (Task 1); source characterization (Task 2); geologic investigation (Task 3); surface water sediment investigation (Task 4); vadose zone investigation (Task 5); air investigation (Task 6); data evaluation (Task 7); risk-based cleanup standards (Task 8); identification and/or verification of action-, contaminant-, and location-specific CMRs (Task 9); and completion of the facility investigation report (Task 10). Information is provided on each task to help estimate project schedules and costs.

Tasks 2 through 6 control data collection and field activities. Each of these field-related tasks is broken down into four subtasks: data compilation and review, field investigation, laboratory analysis, and data evaluation.

Data compilation and review for each of the field-related tasks was largely completed during the production of the B Plant Source AAMS Report (DOE-RL 1993b). The AAMS report presents a compilation of the historical, physical, chemical, and radiological data for the 200-BP-11 Operable unit. Additionally, Appendices C, D, and E of the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a) provide sampling results from the surface and vadose zone investigation at the expansion ponds. Chapters 2 and 3 of this work/closure plan summarize much of the data presented in these two documents. Data collected during facility investigation activities will be integrated with existing data and evaluated. Data collected during preliminary field activities, such as surface radiation surveys, radionuclide logging of existing wells, cone penetrometer logging, and geophysic surveys (ground-penetrating radar), will be evaluated immediately to help optimize locations for surface samples, test pits (or auger holes), and boreholes. The overall data evaluation strategy is outlined in Section 5.1.6.

The relationship between the field-related tasks and field activities is summarized in Table 5-1. Many of the field activities are associated with more than one task. For example, borehole drilling activities will yield data for the source characterization, geologic investigation, and vadose zone investigation tasks.

The following sections briefly outline the nature of each task and subtask and the activities with which they are associated.

5.1.1.1 Project Management (Task 1). The objectives of project management during the implementation of this facility investigation work/closure plan are to direct and document project activities, to ensure that data and evaluations generated meet the goals and objectives of this work/closure plan, and to administer the facility investigation and CMS within budget and schedule. The initial project management activities will be to assign individuals to roles established in the project management plan outlined in Appendix B. The project management task is detailed in Section 5.1.2.

5.1.1.2 Source Characterization (Task 2). The purpose of the source characterization is to (1) determine the most logical, definable boundaries of the waste management units, unplanned releases, and operable unit; (2) conduct document reviews, surveys, and sampling of source material to verify

the presence and content of dangerous, radioactive, or mixed waste; and (3) collect surface and near-surface chemical and radiological data for use in a CMS.

The subtasks and field activities that are associated with the source characterization at each waste management unit are summarized in Table 5-2. The majority of source characterization data will be collected during radiation surveys and borehole, test pit, and auger hole sampling activities. The source characterization activities are included with the field investigation activities described in Section 5.1.3.

5.1.1.3 Geologic Investigation (Task 3). The primary purpose of the geologic investigation is to characterize the stratigraphy of the vadose zone and to collect geologic data that can be used to estimate conditions that influence the occurrence, distribution, and contaminant migration through the vadose zone. The subtasks and field activities associated with the geologic investigation at each waste management unit are summarized in Table 5-3. The geologic investigation activities are included with the field investigation activities discussed in Section 5.1.3.

The majority of geologic data will be collected from the boreholes within the operable unit. This activity will produce information on the lateral extent, vertical extent, and surface geometry of aquitards in the vadose zone. These aquitards are significant because they may retard the downward movement of water and form zones of perched water that allow the lateral movement of contaminants. Physical samples collected during the boring activities will be used to characterize the hydraulic properties of various vadose zone media.

5.1.1.4 Surface Water Sediment Investigation (Task 4). The primary goal of this task is to evaluate the impact of facility operations on surface water sediments in the 200-BP-11 Operable Unit. Surface water sediments have been previously sampled in the 216-B-3 Main Pond; 216-B-3-3 Ditch; and 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds during Phase 1 and 2 sampling activities as discussed in Chapter 3. Also, during the spring of 1994, all water was routed to the 216-B-3C Expansion Pond, and the surface water sediments in the 216-B-3 Main Pond and 216-B-3-3 Ditch have since been covered as discussed in BHI (1995a). Therefore, additional sediment samples will be obtained indirectly during borehole, test pit, and auger hole sampling activities.

5.1.1.5 Vadose Zone Investigation (Task 5). The primary objective of this task is to define the nature and vertical extent of contamination in the vadose zone. This includes characterizing contamination in vadose zone soils and in perched water. The subtasks and field activities associated with the vadose zone investigation are summarized in Table 5-4. The vadose zone data will be collected during borehole, test pit, and auger hole sampling activities.

The vadose zone beneath the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds was previously characterized during the Phase 3 sampling activity discussed in Chapter 3. Additional vadose zone characterization activities in these units will be limited with efforts concentrated on the 216-B-3A Expansion Pond. The 216-B-3A Expansion Pond will serve as the analog unit for the other two ponds.

Vadose zone activities are further discussed with the field investigation activities in Section 5.1.3.2.

5.1.1.6 Air Investigation (Task 6). The scope of this task is to establish background concentrations of airborne contaminants, evaluate the potential impact of contaminated air inhalation to workers during intrusive field activities, and monitor the impacts of field activities on area-wide air quality.

The subtasks and field activities associated with the air investigation are summarized in Table 5-5. The background and area-wide air data will be collected from existing air sampling networks (see Plate 1) established by WHC. The potential impacts of contaminated air inhalation to workers during intrusive field activities will be evaluated utilizing portable air monitors. The air investigation activities are further discussed in Section 5.1.3.3 (nonsite-specific field investigation activities) and Section 5.1.4 (protocols and procedures). Note that additional air monitoring activities for personal safety and health may be required in future safety documentation (e.g., Safety Analysis Documents and Hazardous Waste Operations Plans).

5.1.1.7 Data Evaluation (Task 7). Data generated during the facility investigation will be evaluated and integrated with existing data in an ongoing manner. Data from some facility investigation activities will be used to define later activities. The data evaluation task is described in detail in Section 5.1.6.

5.1.1.8 Risk-Based Cleanup Standards Evaluation (Task 8). Analytical results from sampling activities will be evaluated against the risk-based cleanup standards presented in Appendix D (DQO Agreements). The results of these evaluations will be used to help determine the need for an interim or final corrective measure. The use of risk-based cleanup standards is further discussed in Section 5.1.7.

5.1.1.9 Identification of Potential Action-, Contaminant-, and Location-Specific Corrective Measure Requirements (Task 9). The identification of potential operable unit-specific CMRs will be an ongoing effort during the facility investigation and corrective measure study and is described further in Section 5.1.8.

5.1.1.10 Facility Investigation Report (Task 10). A report will be prepared that presents the results of the 200-BP-11 Operable Unit facility investigation. The facility investigation report is described in more detail in Section 5.1.9.

5.1.1.11 Other Tasks (Task 11). This task has been reserved in the event that additional tasks are identified during the course of the project.

5.1.2 Project Management (Task 1)

This section presents a summary overview of the project management subtask activities that will occur throughout the facility investigation process and includes the following:

- Subtask 1a, Project Management (Section 5.1.2.1)
- Subtask 1b, Meetings (Section 5.1.2.2)
- Subtask 1c, Cost and Schedule Control (Section 5.1.2.3)
- Subtask 1d, Data Management (Section 5.1.2.4)
- Subtask 1e, Progress Reports (Section 5.1.2.5)
- Subtask 1f, Quality Assurance (Section 5.1.2.6)
- Subtask 1g, Health and Safety (Section 5.1.2.7)
- Subtask 1h, Community Relations (Section 5.1.2.8).

5.1.2.1 Project Management (Subtask 1a). Project management includes the day-to-day supervision of, and communication with, project staff and subcontractors. Throughout the project, daily communication between office and field personnel will be attempted, along with periodic communication with subcontractors. This constant and continual exchange of information will be necessary to assess progress, identify potential problems quickly enough to make necessary corrections, and keep the project within the budget and focused on the objectives and schedule. Details of the project management plan are provided in Appendix B.

5.1.2.2 Meetings (Subtask 1b). Meetings will be held, as necessary, with members of the project staff, subcontractors, regulatory agencies, and other appropriate groups to communicate information, assess project status, and resolve problems. A kickoff meeting will be held with designated project personnel, and project staff meetings will be held weekly. The 200-BP-11 Operable Unit project coordinators will meet on a weekly basis to share information and to discuss progress and problems. The frequency of other meetings will be determined based on need and schedules in the Tri-Party Agreement (Ecology et al. 1994).

5.1.2.3 Cost and Schedule Control (Subtask 1c). Project costs, including labor, other direct costs, and subcontractor expenses, will be tracked monthly using an earned-value approach. The budget for tracking activities will be computerized and will provide the basis for invoice preparation and review and for preparation of progress reports. Scheduled milestones will be tracked monthly for each task of each project phase. This will be done in conjunction with cost tracking.

5.1.2.4 Data Management (Subtask 1d). The work activity file for the 200-BP-11 Operable Unit will be kept organized, secured, and accessible to project personnel. The project file will be maintained to comply with the Information Management Overview, which is included in Appendix F. All field reports, field logs, health and safety documents, QA/quality control (QC) documents, laboratory data, memoranda, correspondence, and reports will be logged into the file upon receipt or transmittal. This task is also the mechanism for ensuring that data management procedures are carried out as documented in the Information Management Overview (Appendix F).

5.1.2.5 Progress Reports (Subtask 1e). Progress reports prepared at quarterly intervals are believed to be sufficient for purposes of the facility investigation and CMS. The reports will be prepared, distributed to project personnel (project and unit managers, coordinators, contractors, subcontractors, etc.), and entered into the 200-BP-11 Operable Unit project file. The reports will summarize the work completed, present data generated, and provide evaluations of the data as they become available. Progress, anticipated problems, recommended solutions, upcoming activities, key personnel changes, status of deliverables, and budget and schedule information will be included in the reports.

5.1.2.6 Quality Assurance (Subtask 1f). All work on the Hanford Site is subject to the requirements of DOE Order 5700.6C, *Quality Assurance* (DOE 1991), and other QA guidance documents as applicable, e.g., the Hanford Analytical Services Quality Assurance Plan (HASQAP) (DOE-RL 1994b). Such documents establish broadly applicable QA program requirements for all types of project activities. To ensure that the objectives of this facility investigation are met in a manner consistent with the DOE order, all work conducted by BHI will be performed in compliance with existing QA manuals and the BHI *Quality Management Plan* (BHI 1994b) that specifically describes the application of manual requirements to environmental investigations. The 200-BP-11 Operable Unit QAPjP (Appendix E) details the QA/QC protocols to be followed during the 200-BP-11 Operable Unit RFI/CMS process. The QAPjP defines the specific means that will be used

to ensure that the sampling and analytical data are defensible and will effectively support the purposes of the investigation.

5.1.2.7 Health and Safety (Subtask 1g). The Health and Safety Plan (Appendix A) will be used to implement standard health and safety procedures for BHI employees and contractors engaged in facility investigation and CMS activities in the 200-BP-11 Operable Unit.

Activities associated with field sampling and sample transport may involve both external and internal exposure to ionizing radiation from adjacent tanks, piping, and contaminated soils. Sample collection activities may also involve exposure to hazardous chemicals. Review by BHI Occupational Health and Safety and issuance of any Radiation Work Permits and Hazardous Waste Operations Plans (BHI 1994c) will be performed prior to the start of any sampling activity. All personnel entering the job site will fulfill the minimum requirements for entry as discussed in BHI-SH-01, Section 8.0, "Environmental Safety and Health Training" (BHI 1995d), and BHI-SH-02, Volume 1, "General Safety and Health Implementing Procedures" (BHI 1994c).

An as low as reasonably achievable (ALARA) plan that addresses the potential radiation exposure of task personnel during field tasks will be completed prior to the commencement of field operations. Guidance on such assessments is found in BHI-EE-02, *Environmental Requirements* (BHI 1995b). A radiation dose assessment evaluation will be performed for the anticipated soil samples and on its completion will be used in conjunction with estimates of sample size and duration of exposure to prepare an ALARA plan.

5.1.2.8 Community Relations (Subtask 1h). Community relations activities will be conducted in accordance with the Community Relations Plan for the Hanford Site (Ecology et al. 1994). All community relations activities associated with the 200-BP-11 Operable Unit will be conducted under this overall Hanford Site Community Relations Plan.

5.1.3 Field Investigation Activities (Tasks 2 to 6)

The field investigation activities are designed to accomplish the following tasks: source characterization (Task 2), geologic investigation (Task 3), surface water sediment investigation (Task 4), vadose zone investigation (Task 5), and air investigation (Task 6). These tasks are described briefly in Section 5.1.1. This section recommends specific activities to be conducted for the field investigation, although final determination of the major field activities will be made through issuance of descriptions of work.

Table 5-6 summarizes the field activities that are planned at each waste management unit and unplanned release site. Several activities that are not associated with individual waste management units are listed in the table under their own headings. In addition, the table has been divided between primary field activities and supporting field activities. Supporting field activities must generally be conducted along with each of the primary field activities. The subsections of this work/closure plan describing each field activity and waste management unit are also listed in the table.

Section 5.1.3.1 discusses the overall approach to the field investigation. Section 5.1.3.2 discusses the locations and frequencies of each activity and is subdivided into groups of units that are close in proximity or directly related. The protocols and procedures for each type of field activity are

described in Section 5.1.4. Section 5.1.5 describes the laboratory analyses that each sample will undergo.

5.1.3.1 General Approach. The general sequence of activities for each waste management unit is as follows:

(1) Surface radiation surveys (Sections 5.1.4.1 and 5.1.4.2)
(2) Geophysical surveys (e.g., ground-penetrating radar and electromagnetic) (Section 5.1.4.3)
(3) Subsurface spectral geophysics on existing wells (Section 5.1.4.6)
(4) Cone penetrometer surveys
(5) Surface soil sampling
(6) Test pits and auger holes
(7) Boreholes
(8) Perched water sampling.

Activities one through four aid in the refinement of sampling points for activities five through seven. Surface radiation surveys are run for health and safety reasons; to identify potential surface soil sampling locations; and to refine borehole, test pit, and auger hole locations. If no surface contamination is detected during the surface radiation survey, no surface soil sampling will occur at that waste management unit. Subsurface investigations (boreholes, test pits, and auger hole) will proceed regardless of whether surface contamination is detected. Surface geophysics surveys (ground-penetrating radar and electromagnetic) may be used to better identify the boundaries of the 216-B-2-1, 216-B-2-2, 216-B-2-3, 216-B-3-1, 216-B-3-2, and 216-A-29 Ditches and existing pipelines. Subsurface spectral gamma logging may be used to identify radioactivity within the vadose zone thus identifying potential sampling points in nearby proposed boreholes. Subsurface radiation surveys in cone penetrometer installed probe holes (cone penetrometer survey) may be used to identify the areas of highest radiation levels in the shallow vadose zone and the lateral extent of migration. These surveys may also be used to optimize the locations of boreholes, test pits, and auger holes.

Plate 2 depicts the sampling design for the operable unit. This design has been previously agreed to by DOE-RL and the regulators as a result of DQO meetings (see Section 4.1) held for the operable unit. It was also agreed that additional sampling efforts would be defined after the evaluation of data obtained from this sampling scheme. The intent of the sampling design is to locate the areas of highest contamination in the operable unit and to provide sufficient data to make final corrective measure decisions. The remainder of this section discusses the sampling approach for the proposed sampling scheme shown on Plate 2.

5.1.3.1.1 Field Screening and Action Levels. All samples and cuttings will be field screened for evidence of volatile organics and radionuclides. Volatiles will be screened by the field geologist or other qualified personnel using an organic vapor monitor. Radionuclides will be screened by alpha- and gamma-counting instruments. The protocols and procedures for field screening are discussed further in Section 5.1.4.1.

The action level for radionuclide screening is twice background. Readings of less than twice the average background are considered to be within the normal background variability for the site and therefore are not indicative of the presence of anthropogenic radionuclides. The action level for volatile organic screening is 5 ppm. Areas above the prescribed action levels will be referred to as "hot spots."

Prior to initiating drilling, a local area background reading will be determined at a background site to be determined in the field (e.g., the 216-E-28 Contingency Pond).

5.1.3.1.2 Surface and Risk Assessment Sampling. The purpose of this section is to ensure that samples are obtained from borehole, test pit, and auger hole sites to support risk assessments. To support a risk assessment evaluation of the external exposure pathway for humans and exposure to burrowing animals, a sample should be taken in the upper 0.6 to 2 m (2 to 6 ft) of soil. Additional sampling for risk assessment is desired at a depth of 5 to 6 m (15 to 20 ft) to evaluate the potential exposure to humans or wildlife through plant uptake. This additional sampling will be fulfilled as part of the vadose zone sampling investigation discussed in the next section.

If surface radioactivity is less than twice background, and continues to be less than twice background at depth, a sample is needed only to support a risk assessment, i.e., from between 0.6 to 2 m (2 to 6 ft). After a risk assessment sample has been taken, another sample at depth is not required until the sediments (i.e., the pond/ditch/trench bottoms) are encountered. However, if radioactivity (or other field screening) warrants, additional samples may be obtained at the discretion of the field geologist in consultation with the operable unit task lead. Sampling from below the original pond, ditch, and trench bottoms will be taken in accordance with Section 5.1.3.1.3.

If surface radioactivity is above twice background, a surface sample may be taken. However, if activity continues to increase below the surface, a sample of greater radioactivity may be taken instead of a surface sample. In either case, a sample must be taken from 0.6 to 2 m (2 to 6 ft) to support a risk assessment. After a risk assessment sample has been taken, another sample does not need to be obtained until the sediments are reached. However, if radioactivity (or other field screening) warrants, additional samples may be obtained at the discretion of the field geologist. Sampling from below the pond, ditch, and trench bottoms will be taken in accordance with Section 5.1.3.1.3.

5.1.3.1.3 Vadose Zone Sampling. This section describes the soil sampling points for deeper vadose zone sampling in boreholes, test pits, and auger holes. Vadose zone samples will be taken at predetermined depths, lithological interfaces, and/or hot spots (Section 5.1.3.1.1, areas above twice background for radioactivity and/or 5 ppm for organic vapors).

Pre-established default sampling depths for chemical/radiological and physical samples are described below and will be used in conjunction with lithologic changes and hot spot sampling. These depths are approximate, and excavated material will be screened in the field to ensure that the most contaminated soils are sampled. The sampling depths listed below are based on a zero datum at pond, ditch, and trench bottoms (sediments).

- Deep groundwater borehole -- 0, 0.6, 2, 3, 6, 9, 12, 15, 23, 30, and 46 m (0, 2, 5, 10, 20, 30, 40, 50, 75, 100, and 150 ft), with an additional sample, if possible, above the water table [about 72 m (235 ft)]

- Intermediate boreholes [15 m (50 ft)] -- 0, 0.6, 2, 3, 6, 9, 12, and 15 m (0, 2, 5, 10, 20, 30, 40, and 50 ft)

- Shallow test pits and auger holes -- 0, 0.6, 2, 3, 6, and 9 m (0, 2, 5, 10, 15, and 20 ft).

Chemical/radiological and physical samples will be taken at major lithologic changes. Estimates of these lithologic changes will be made prior to drilling using current stratigraphy maps. However, the field geologist will make the final determination of the actual sampling location. Additionally, the field geologist will make the decision as to when to sample a hot spot. Typically, the first indication of a hot spot will trigger sampling.

5.1.3.2 Sampling Locations and Frequencies. As discussed in Section 5.1.3.1, surface radiation surveys, surface geophysics surveys, spectral gamma logging, and/or cone penetrometer surveys will be used to refine sampling locations and frequencies of surface samples, boreholes, test pits, and auger holes. The general approach to the frequency of sampling at depth was discussed in the previous section.

The approximate locations for the boreholes, test pits, and auger holes are depicted on Plate 2 and described in the following sections.

5.1.3.2.1 216-B-63 Trench and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches. Surface sampling activities are not specifically planned for the trench and ditches because they have been interim stabilized. However, surface samples may be taken if warranted by radiation surveys. Also, the general sampling scheme (Section 5.1.3.1.2) ensures that the near surface [0.6 to 2 m (2 to 6 ft)] is sampled during subsurface characterization activities.

A cone penetrometer survey will be performed across the head end of the 216-B-63 Trench and the three ditches to locate the highest radiation concentrations in the vadose zone and evaluate the vertical and lateral extent of contaminant migration. The location with the highest radiation concentrations will be selected for a deep borehole to groundwater. If this borehole is within the ditches, an intermediate 15-m (50-ft) borehole will be placed in the first third of the trench. If the borehole to groundwater is within the trench, an intermediate 15-m (50-ft) borehole will be placed at the area of highest radiation concentrations within the ditches. With respect to Plate 2, it is anticipated that the highest level of radiation will be within the ditches.

To assist in the evaluation of the lateral (for unit boundaries) and vertical (for potential sampling locations) extent of radionuclide migration within the vadose zone of the 216-B-63 Trench and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches, the following nearby monitoring wells will be logged for radionuclides [radionuclide logging system (RLS) logging] (see Plate 2): 299-E27-18, 299-E33-37, and 299-E34-8. Additional wells may be identified for logging if needed.

One test pit will be located within the middle third of the 216-B-63 Trench and another near the termination point of the three ditches. Auger holes will be used instead of the test pits if high radiation or other health- and safety-related conditions warrant. The exact location of these test pits may be optimized from radiation, geodetic, and/or cone penetrometer surveys.

5.1.3.2.2 216-B-3-1 and 216-B-3-2 Ditches. Surface sampling activities are not specifically planned for these ditches because they have been interim stabilized. However, surface samples may be taken if warranted by radiation surveys. Also, the general sampling scheme (Section 5.1.3.1.2) ensures that the near surface [0.6 to 2 m (2 to 6 ft)] is sampled during subsurface characterization activities.

A geodetic survey was performed at the 216-B-3-1 Ditch in 1994. A geophysics survey (ground-penetrating radar and electromagnetic induction) was performed at the 216-B-3-1 and 216-B-3-2

Ditches in 1994 with nonconclusive results (WHC 1994). The geophysical survey was intended to conclusively locate the original boundaries of the ditches. Therefore, radiation, geodetic, and/or cone penetrometer surveys may be used to optimize the locations for intrusive activities.

To assist in the evaluation of the lateral (for unit boundaries) and vertical (for potential sampling locations) extent of radionuclide migration within the vadose zone of the 216-B-3-1 and 216-B-3-2 Ditches, the 699-43-45 monitoring well will be logged for radionuclides (RLS logging) (see Plate 2).

Two boreholes and three test pits are planned at the 216-B-3-1 and 216-B-3-2 Ditches. (The borehole at the east end of the 216-B-3-2 Ditch will be discussed with the 216-B-3-3 Ditch.) Auger holes will be used instead of the test pits if high radiation or other health- and safety-related conditions warrant. One 15-m (50-ft) borehole will be located at the east end (headwall) of the ditches, and another 15-m (50-ft) borehole will be established in the 216-B-3-1 Ditch midway between the headwall and west end of 216-B-3 Main Pond (not the overflow portion). Two test pits will be established in the 216-B-3-1 Ditch: one midway between the two boreholes and one at the western end of the ditch approximately midway between the borehole and west end of the 216-B-Main Pond (not the overflow portion). The third test pit will be located in the 216-B-3-2 Ditch about midway between the headwall and 216-A-29 Ditch.

5.1.3.2.3 216-A-29 Ditch. Surface sampling activities are not specifically planned for the 216-A-29 Ditch because it has been interim stabilized. However, surface samples may be taken if warranted by radiation surveys. Also, the general sampling scheme (Section 5.1.3.1.2) ensures that the near surface [0.6 to 2 m (2 to 6 ft)] is sampled during subsurface characterization activities.

The boundaries of the 216-A-29 Ditch were well established with concrete markers as a result of interim stabilization activities, and thus geodetic and geophysic surveys are not planned. Therefore, radiation and/or cone penetrometer surveys may be used to optimize the locations of the intrusive activities.

To assist in the evaluation of the lateral (for unit boundaries) and vertical (for potential sampling locations) extent of radionuclide migration within the vadose zone of the 216-A-29 Ditch, the 299-E43-45 and 299-E25-35 monitoring wells will be logged for radionuclides (RLS logging) (see Plate 2). Additional wells may be identified for logging if needed.

One borehole and one test pit are planned at the 216-A-29 Ditch. An auger hole will be used instead of the test pit if high radiation or other health- and safety-related conditions warrant. (The test pit at the bottom of the 216-A-29 Ditch will be discussed with the 216-B-3-3 Ditch.) A deep borehole to groundwater will be located at the head end of the ditch, and the test pit will be located about midway down the ditch.

5.1.3.2.4 216-B-3 Main Pond, Overflow Pond, and 216-B-3-3 Ditch. Surface sampling activities are not specifically planned for the 216-B-Main Pond, Overflow Pond, and 216-B-3-3 Ditch because they have been interim stabilized. However, surface samples may be taken if warranted by radiation surveys. Also, the general sampling scheme (Section 5.1.3.1.2) ensures that the near surface [0.6 to 2 m (2 to 6 ft)] is sampled during subsurface characterization activities.

A surface radiation survey was performed at the 216-B-3 Main Pond and 216-B-3-3 Ditch during interim stabilization activities in 1994. A report summarizing the radiation survey results is expected in the first quarter of 1995, and these results will be used to optimize the locations of intrusive

activities in areas of highest contamination. Additionally, the boundaries of the 216-B-3 Main Pond and 216-B-3-3 Ditch were well established with concrete markers as a result of the interim stabilization activities, and thus geodetic and geophysic surveys are not planned. Cone penetrometer surveys may be used in the pond and ditch to evaluate the lateral extent of radionuclide migration.

To assist in the evaluation of the lateral (for unit boundaries) and vertical (for potential sampling locations) extent of radionuclide migration within the vadose zone of the main pond and 216-B-3-3 Ditch, the 699-43-42, 699-43-45, and 699-44-43B monitoring wells will be logged for radionuclides (RLS logging) (see Plate 2). Additional wells may be identified for logging if needed.

Two boreholes and four test pits are planned at the 216-B-3 Main Pond. Auger holes will be used instead of test pits if high radiation or other health- and safety-related conditions warrant. One 15-m (50-ft) borehole will be placed at the eastern midline (deepest section near the 216-B-352 spillway) of the pond and one borehole to groundwater at the western midline of the pond. The test pits will be generally located as follows: one in the southwest corner of the pond; one in the inflow (delta) area of the 216-B-3-3 Ditch (south side of the pond); on the north side of the pond directly north of the 216-B-3-3 Ditch delta area; and one in the southeast region of the pond.

Only one intrusive characterization activity is planned for the overflow pond. One test pit will be established in the location of highest radioactive levels identified by surface and/or cone penetrometer survey. If no surface radiation is detected, the test pit will be placed in the approximate center of the overflow pond.

One borehole and three test pits are planned at the 216-B-3-3 Ditch. (Another borehole will be located near the head end of the ditch but is identified with the 216-B-3-1 and 216-B-3-2 Ditches.) Auger holes will be used instead of test pits if high radiation or other health- and safety-related conditions warrant. A 15-m (50-ft) borehole will be placed at the confluence of the 216-B-3-2 and 216-B-3-3 Ditches. The test pits will be placed as follows: one midway between the west end of the ditch and the 216-A-29 Ditch; one just east of the 216-A-29 Ditch confluence; and one midway between the borehole (at the 216-B-3-2 Ditch) and termination point of the 216-B-3-3 Ditch at the 216-B-3 Main Pond.

5.1.3.2.5 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds. The 216-B-3A Expansion Pond is considered the analog unit for the 216-B-3B and 216-B-3C Expansion Ponds because all liquid received by the 216-B-3B and 216-B-3C Ponds passed through the 216-B-3A Pond. Additionally, these three ponds were characterized during Phase 1, 2, and 3 activities (Section 3.2.8), and are currently being assessed for clean closure in the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). However, Phase 1, 2, and 3 activities did not fully characterize the ponds for the potential radionuclides of concern to the operable unit, and therefore will be further assessed for radionuclides.

A surface radiation survey will be performed at all three ponds. Radiation surveys were previously performed at the 216-B-3A Pond as part of the interim stabilization activities in 1994. The results of these surveys will be evaluated to determine if additional surveys are needed at the 216-B-3A Pond.

Surface sampling activities are not specifically planned for the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds because of surface characterization previously performed during Phases 1 and 2 (Section 3.2.8). However, surface samples may be taken if warranted by radiation surveys.

One test pit will be located in the 216-B-3A Expansion Pond. An auger hole will be used instead of the test pit if high radiation or other health- and safety-related conditions warrant. The test pit will be established at the center of the trench dredged in the middle of the pond unless radiation surveys indicate a better location.

5.1.3.2.6 216-E-28 Contingency Pond. The 216-E-28 Contingency Pond has never been used, and therefore no sampling activities are planned.

5.1.3.2.7 Unplanned Releases. Unplanned Releases UN-200-E-14 and UN-200-E-92 were discussed in Section 2.1.8 and do not have an impact on the sampling design for the operable unit. Unplanned Release UN-200-E-14 was a dike failure on the east side of the 216-B-3 Main Pond and is now part of the 216-B-3A Expansion Pond. Unplanned Release UN-200-E-92 consisted of contaminated tumbleweeds that have been removed and disposed. Other unplanned releases associated with the operable unit (e.g., UPR-200-E-34 and UPR-200-E-138) resulted in direct discharges to the waste management units and will therefore be characterized as part of the waste management units.

5.1.3.3 Nonsite-Specific Activities. Nonsite-specific activities include perched water sampling, air sampling, and pipeline integrity assessment.

5.1.3.3.1 Perched Water Sampling. Eight boreholes are planned for the 200-BP-11 Operable Unit investigation, five to 15 m (50 ft) and three to groundwater [about 72 m (235 ft)]. The proposed locations of these boreholes are shown on Plate 2. If perched water is encountered in a borehole, a perched water monitoring well will be installed that is screened against the water-bearing interval. Further discussion regarding the installation and sampling of a perched water well is provided in Section 5.1.4.10.

5.1.3.3.2 Air Sampling. Five permanent air samplers are stationed within the 200-BP-11 Operable Unit (see Plate 2). The samplers contain filters that collect particles entrained in the air. The sample filters are exchanged weekly and saved to be analyzed quarterly. The analyses from these filters will be used to establish a baseline for the air in the operable unit prior to commencing field activities and to assess the overall impacts of field activities to area-wide air quality. This air sampling effort is an ongoing activity, currently managed by WHC, that is independent of the other activities described in this work/closure plan.

During the intrusive field work (e.g., test pits and boreholes) within the 200-BP-11 Operable Unit, the air will be monitored more closely to assess the potential impact of contaminated air inhalation to workers. This will require the usage of portable air samplers to measure potential contamination downwind of the sites. In general, two air samplers will be stationed downwind (based on windroses, Figure 2-2) within 500 m (1,650 ft) of the intrusive sites. The sample(s) at each station will be collected at a height of 2 m (6.6 ft) above ground level and in a location free from unusual localized effects (e.g., near a large building, vehicular traffic, or trees) that could result in artificially high or low concentrations. Additionally, to minimize the need to relocate the air samplers, the air samplers should be strategically located with respect to borehole and test pit locations.

In addition, fugitive dust and volatile organic compound monitoring may be conducted as part of the health and safety program of each work site.

5.1.3.3.3 Pipeline Integrity Assessment. The process effluent pipelines within the 200-BP-11 Operable Unit are depicted on Plate 2. The inactive portion of the PUREX cooling water line and the two inactive pipelines to the 241-BY and 241-C Tank Farms are the only major pipelines of interest to the operable unit investigation. Other pipes are either relatively short (e.g., the pipelines that fed the 216-B-63 Trench and 216-B-2-1, 216-B-2-2, and 216-A-29 Ditches) and isolated or active and/or associated with other facilities (e.g., the 216-B-3 Bypass and TEDF basin pipelines).

Initially, only a radiation survey will be performed over the short pipelines because they have been isolated and should not contain potential contaminants of concern other than those found in the soil. The pipelines that are active and/or associated with other facilities (e.g., the 216-B-3 Bypass and TEDF pipelines) convey only clean water as regulated per WAC 173-303 and therefore pose virtually no threat of contaminating the operable unit.

A surface radiation survey will be performed over approximately 800 m (2,600 ft) of the inactive segment of the PUREX cooling water line extending through the northern part of the operable unit. A surface radiation survey will also be performed over about 300 m (990 ft) of the two inactive 8.8-cm (3.5-in.) pipes extending through the western end of the operable unit. An internal camera and radiation survey may be performed on these segments of pipe if technically and economically feasible. The emphasis of these surveys will be to assess pipeline integrity, identify potential leak points, and attempt to correlate the leak points to potential surface contamination. An assessment for potential soil sampling will be made after these surveys are complete. If areas of probable leaks are detected, an assessment of potential contamination will be performed, and additional soil samples may be taken and analyzed for constituents listed in Table 3-2.

5.1.4 Field Investigation Protocols and Procedures

5.1.4.1 Field Screening. All samples and cuttings will be field screened for evidence of radionuclides and volatile organics.

Radionuclides will be screened using gamma (NaI) radiation detectors and low-level alpha and beta detectors. All instruments will be used, maintained, and calibrated consistent with BHI-SH-05, *Industrial Hygiene Desk Instructions* (BHI 1995e).

Prior to initiating drilling, a one-time background reading will be taken using the above instruments at a background site to be determined in the field (e.g., the contingency pond). Instrument background will be measured on freshly disturbed surface soil, holding the instruments less than 2.5 cm (1 in.) from the soil. The field geologist will record the background levels in the borehole log according to EIP 7.0, "Geologic Logging" (BHI 1994a), prior to the start of drilling.

The field geologist will record screening results in the borehole log [EIP 7.0, "Geologic Logging" (BHI 1994a)]. The action level for radionuclide screening is twice background. Readings of less than twice the average background are within the normal background variability for the site and so are not indicative of the presence of anthropogenic radionuclides. Readings over twice background will be assessed as potential surface samples.

The field geologist or other qualified personnel will screen samples and cuttings for volatile organics using either a flame ionization detector or photoionization detector. The relative response ratios of the chlorine-based compounds for either the flame ionization detector or photoionization detector

range from 10% for carbon tetrachloride (flame ionization detector) to 105% for 1,1,1-trichloroethane (flame ionization detector). To detect the chlorinated compounds using survey-type instruments under ambient, uncontrolled conditions, the 5-ppm action level provides reasonable confidence in detection of these compounds. The action level for volatile organic screening is 5 ppm. The 5-ppm limit is based on the total volatile organic compounds detected as either benzene or methane equivalents.

5.1.4.2 Surface Radiological Surveys. Surface radiological surveys will be conducted on the waste management units within the 200-BP-11 Operable Unit using gamma (NaI) radiation detectors and beta detectors. Table 5-6 also specifies the units that will receive surface radiological surveys. Surveys will also be run as part of the pipeline integrity assessment task. Unified surveys should be run on units that are historically and geographically related to one another. These unit groupings include the following:

- 216-B-63 Trench and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches
- 216-A-29 Ditch
- 216-B-3 Main Pond
- 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches, and the overflow pond
- 216-B-3A Expansion Pond
- 216-B-3B Expansion Pond
- 216-B-3C Expansion Pond.

The approximate limits of each survey can be assessed from the waste management unit boundaries shown on Plates 1 and 2. Survey boundaries will be extended until no further contamination is found along the survey boundaries. The smallest area covered (Table 5-2) by the surveys is about 40,500 m^2 (435,600 ft^2), and therefore radiation surveys will be conducted with the Ultrasonic Ranging and Data System (USRADS) or Mobile Service Contamination Monitor II (MSCM-II) (BHI 1995f). The USRADS or MSCM-II will automatically correlate and record count rate, dose rate, and position information during the survey. The pipeline integrity surveys will also utilize the USRADS or MSCM-II.

These surveys will be done primarily to locate areas of elevated surface radiation (above twice background) for potential sampling (Section 5.1.3.1) and to optimize sampling locations for boreholes, test pits, and auger holes. Locations of elevated radiation will be marked in the field and evaluated as sampling locations for subsurface characterization and also as potential surface samples. Prior to the initial surveys, a one-time instrument background will be determined at a background site to be determined in the field. Instrument background will be measured on a freshly disturbed surface soil, holding the instrument less than 2.5 cm (1 in.) from the soil.

Surveys will be conducted by a health physics technician, and a survey report will be prepared that will include a description of the survey methods used and the survey results.

5.1.4.3 Surface Geophysical Surveys. Surface geophysical surveys are a useful tool because they are nonintrusive and can be used to locate disturbed ground boundaries, buried objects such as pipes, and backfill depths in stabilized ditches. Specific survey grid coordinates will be established from a minimum of three recoverable reference points, staked and located during a later geodetic survey. Each data point will be designated with a unique number associated with the facility and its grid location. All geophysical surveys will be conducted according to EIP 1.6, "Surveying" (BHI 1994a).

Ground-penetrating radar surveys will generate a continuous profile of shallow subsurface features by transmitting and then receiving reflected high-frequency radio waves. The ground-penetrating radar may also be used to detect buried objects and voids and to delineate the limits of disturbed ground.

If needed, an electromagnetic survey may be utilized to provide supporting evidence of ditch and pipeline boundaries. An electromagnetic survey will use a transmitter coil to induce eddy currents in the subsurface. The eddy currents generate a secondary electromagnetic field that is measured with a receiver coil. The intensity of these currents is a function of ground conductivity.

Ground-penetrating radar and electromagnetic induction surveys were performed at the 216-B-3-1 and 216-B-3-2 Ditches in 1994 with nonconclusive results (WHC 1994). Other surface geophysical surveys are not planned in the operable unit at this time. However, surface geophysical surveys may be needed to confirm geodetic surveys for the pipeline integrity assessment.

5.1.4.4 Cone Penetrometer Surveys. A subsurface radiation survey (cone penetrometer survey) of the vadose zone (<50-ft depth) is planned for the area near the head end of the 216-B-63 Trench and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches and potentially for other areas. The purpose of the survey will be to locate the highest concentrations of radioactive contamination within the vadose zone under these units. The locations of the borehole and test pit sampling sites will then be optimized based on the results of the cone penetrometer survey. Temporary access will be created by hollow probe rods pushed into the vadose zone using a truck-mounted cone penetrometer rig. The vadose zone surrounding the probe hole will be logged for contamination by lowering a slim-tool cesium-iodide detector into the rod. Depth, thickness, and intensity of the contaminant concentration will be recorded by instrumentation located at the surface. After the probe holes have been logged, the probe rods will be removed and decontaminated, and the holes will be abandoned and backfilled to comply with WAC 173-160. All cone penetrometer work will be conducted in accordance with EIP 5.0, "Cone Penetrometer" (BHI 1994a).

5.1.4.5 Source Area Boreholes. Eight boreholes [three to groundwater, five to 15 m (50 ft)] will be made during the 200-BP-11 Operable Unit field investigations (Table 5-6). Additional shallow boreholes may be required if conditions prevent the use of test pits and/or auger hole sampling, e.g., radiation may be too high for a test pit, or a test pit/auger hole may reach its maximum depth and still be in contaminated soil. Criteria for the sampling locations and frequencies within boreholes are provided in Section 5.1.3.2.

5.1.4.5.1 Borehole Drilling. The boreholes will be sited to avoid buried obstructions and, if hot spots persist, in areas that appear most contaminated. Before drilling commences, an offsite utility check will be performed. In all cases, drilling will also be preceded by a surface radiation survey of the area and, at some locations (Table 5-1), surface geophysics and/or cone penetrometer surveys. If a boring encounters contamination at such high levels that it cannot be continued as determined by health physics personnel, it should be abandoned according to the procedures outlined in EII 6.10, "Decommissioning Wells" (WHC 1988), and a new boring located per the direction of the operable unit task lead and field team leader.

The drilling technique used on the boreholes will be the cable-tool method or other acceptable drilling technique. Drilling operations will be conducted according to BHI-SPEC-00008, *Technical Specification for Environmental Drilling Services* (BHI 1994d), and EIP 6.2, "Field Decontamination" (BHI 1994a). A short drive barrel sampler [0.6 m (2 ft) maximum length] will be used to remove soils (slough and/or undisturbed material) from the borehole between sampling intervals. Hard-tool

drilling will be initiated only as a last resort when drilling conditions are not conducive to the use of the drive barrel. The decision to drill with the hard tool will be made by the drilling field team leader only after consultation with the field geologist and/or the project coordinator.

As drilling proceeds, the field geologist will be responsible for completing the borehole geologic log. The borehole geologic log will be completed according to EIP 7.0, "Geologic Logging" (BHI 1994a). The geologic log will contain sample type and depth, lithologic description, and any other geologic information the field geologist believes is pertinent to the characterization of the subsurface stratigraphy.

If perched water is encountered in a boring, a perched water well will be installed that is screened against the water-bearing interval. Any of the five 15-m (50-ft) boreholes that do not encounter perched water will be abandoned. The three boreholes to groundwater will also be abandoned unless it is assessed for use as a groundwater monitoring well. Holes will be abandoned according to the procedures outlined in EII 6.10, "Decommissioning Wells" (WHC 1988). Perched water wells will be installed after the boreholes have been advanced to the proper depth. The design and specification of these wells will be according to the information presented in BHI-SPEC-00008 (BHI 1994d). In general, the wells will be constructed of 0.1-m- (4-in.) inner diameter 304 stainless steel, joint-threaded casing, and wire-wrapped well screen. The screen slot and pack sand size will be determined from the results of sieve analyses in the screened interval. The wells will be installed in accordance with BHI-SPEC-00008 (BHI 1994d).

5.1.4.5.2 Borehole Sampling. Chemical/radiological, physical, and archive samples will be collected from each borehole. The split-spoon sampler will be the primary device for collecting these samples. All split-spoon sampling depths will be recorded to the nearest 0.025 m (0.10 of a foot). All depths will be recorded to the nearest 0.025 m (0.10 of a foot). The chemical/radiological, physical, and archive sampling intervals are unit- and depth-specific and are described along with the individual boreholes in Section 5.1.3.2. The sampling intervals are approximate depths only and may be modified at the discretion of the onsite geologist based on observed lithologic changes and/or hot spots. If perched water is encountered in a boring, the sampling interval should be modified such that at least one chemical/radiological and physical sample is collected in the saturated zone. Sample intervals may be extended by driving the split-spoon sampler a second time if an insufficient sample volume is collected during the first attempt.

All samples and cuttings will be field screened for evidence of volatile organics and radionuclides per Section 5.1.4.1. The action level for radionuclide and volatile organic screening is twice background and 5 ppm, respectively (Section 5.1.4.1). These action levels will typically trigger a readiness for sampling.

Chemical/radiological samples will be collected in accordance with EIP 4.0, "Soil and Sediment Sampling" (BHI 1994a). Sample container types, preservation requirements, and special handling requirements are also defined in EIP 4.0. Sample Management may require the use of sample authorization forms to further define their requirements. Chemical/radiological samples will be collected with a split-spoon sampler with stainless steel liners. To ensure that the sample is not compressed, drilling personnel will not overdrive the sampling device. The split-spoon and liners will be decontaminated before use according to EII 5.5, "Laboratory Cleaning of RCRA/CERCLA Sampling Equipment" (WHC 1988). Prior to sampling, slough in the borehole will be removed to the greatest extent possible. Sampling personnel will preserve the samples in accordance with the EPA guidelines set forth in *Test Methods for Evaluating Solid Wastes* (EPA 1994b). All

chemical/radiological samples will be geologically logged by the field geologist. Chemical/radiological samples will be labeled with the appropriate Hanford Environmental Information System (HEIS) number to accommodate sample tracking and data entry into the HEIS system. Quality assurance requirements are discussed in Appendix E.

Physical samples will be collected from boreholes only and by the same procedures as for chemical/radiological samples. All of the physical samples will undergo a Type A set of physical analyses, but a sample from each major lithology (as determined by the field geologist) will also undergo a Type B set of physical analyses. Both suites of physical analyses are described in Section 5.1.5.2.

The samples must be collected and transported in a manner that preserves the original moisture content and soil structure. Type A samples will be collected in sample sleeves. Samples for moisture content will be collected in moisture tins or mason jars. Every effort should be made to maintain the sample in the sleeve in an undisturbed state, and the sleeve must be as full as possible.

Portions of physical samples that have been unconditionally radiologically released will be sent to an existing storage facility to be archived. Radiologically contaminated samples will be sent to a long-term storage facility if one is available. If no long-term storage facility is available for radiologically contaminated samples, no contaminated samples will be taken for archive. The unconditionally radiologically released samples will be archived according to EII 5.7A, "Hanford Geotechnical Sample Library Control" (WHC 1988).

5.1.4.5.3 Borehole Analytical Priorities. Physical and chemical/radiological samples are generally grouped together so that the two sets of data may be compared. Chemical/radiological samples will always take precedence over physical samples, which take precedence over archive samples. Additionally, if there is insufficient sample size, the priority for sample analyses is as follows:

RCRA Past-Practice and TSD units	Perched Water
Radionuclides	Radionuclides
Metals	Metals
Semivolatile organics analysis	Volatile organics analysis
Volatile organics analysis	Semivolatile organics analysis
General chemistry	General chemistry
Physical	Physical

Note that these priorities are the same for both RCRA past-practice and RCRA TSD waste management units.

5.1.4.6 Backhoe Test Pits and Auger Hole. Backhoe test pits are planned at all waste management units in the 200-BP-11 Operable Unit, except the 216-E-28 Contingency Pond, 216-B-3B and 216-B-3C Expansion Ponds, and Unplanned Releases UN-200-E14 and UN-200E-92. Auger holes will be used instead of the test pits if high radiation or other health- and safety-related conditions warrant. The depth of these test pits/auger holes is planned to be 6 m (20 ft) below the pond/ditch/trench bottoms (sediments). Fill material (stabilization soil) is anticipated to be 3 m (10 ft) deep, making the total depth of a test pit about 9 m (30 ft). The maximum depth that can be reached in a test pit is generally about 12 m (39 ft).

The excavation field work for test pits will be conducted using a crawler-mounted backhoe on a full revolving base or other appropriate equipment. The excavations will be in locations depicted on Plate 2 and discussed in Section 5.1.3.2.

An area designed specifically for taking samples from the backhoe bucket will be designated at least 9 m (30 ft) away from the excavation pit within reach of the bucket. Samples will be collected from the backhoe bucket using hand tools and standard soil sampling techniques identified in EIP 4.0, "Soil and Sediment Sampling, Appendix I Test Pit/Trench Sampling" (BHI 1994a). Samples will be logged by a geologist. After the test pit has been completed, it will be backfilled with the excavated material. This action will require regulator approval and will be discussed in more detail in descriptions of work. Such approval has been granted at other Hanford Site study areas in the past.

5.1.4.7 Subsurface Geophysics. Subsurface borehole geophysical logging will be run in the new boreholes as each casing string reaches its maximum depth to provide an in situ spectral analysis. Boreholes will be logged according to subcontractor procedure and reported to the ERC. A description of the typical equipment configuration, calibration, and acquisition parameters for this technique is presented in the QAPjP (Appendix E).

Spectral gamma logs (RLS) will also be performed on the following seven existing monitoring wells:

- 299-E25-35
- 299-E27-18
- 299-E33-37
- 299-E34-8
- 699-43-42
- 699-43-45
- 699-44-43B.

These wells were selected for logging because they are located within or adjacent to waste management units associated within the 200-BP-11 Operable Unit. Although most groundwater monitoring wells in the operable unit have been logged for gross gamma, only one well (699-40-40B) was logged for specific activities with the spectral gamma method. No anthropogenic radionuclides were detected (WHC 1991c). If analysis of data from these seven wells indicate that spectral gamma logging provides useful information, a second round of spectral logging may be instituted. The extent of the second round of spectral logging will be assessed and scheduled after evaluation of the initial loggings. Data from these existing wells may also be used to refine the sampling intervals at nearby proposed wells.

Gamma-gamma and neutron-epithermal-neutron logs will also be run if the technology is available at the time of the field work. These two techniques can give valuable information on the stratigraphy and water content of the units adjacent to the borehole.

5.1.4.8 Surface Soil Sampling. Surface soil samples may be collected at the waste management units indicated in Table 5-6. The actual number and locations of samples collected at the waste management units will depend on the results of surface radiation surveys (Section 5.1.3.1). Samples will be collected from the most contaminated areas exceeding action levels (twice background) as identified by the radiation surveys. If two or more separate and distinct contaminated areas are identified during a given survey, more than one sample may be collected. At waste management units that have been surface stabilized, samples should not be collected unless radionuclide contamination is

indicated above action levels by surface radiation surveys. At waste management units that have not been surface stabilized (216-B-3A Expansion Pond only), at least one sample should be collected even if the surface radiation survey does not identify contamination. Such a sample should be collected at the approximate center of the unit. If contamination is detected, the determination of the sampling locations should be made during the surface radiation surveys and is described in more detail in Section 5.1.3.1.

Samples will be collected with a stainless-steel shovel. Surface soil samples will be collected according to EIP 4.0, "Soil and Sediment Sampling" (BHI 1994a). The analyses that each sample will undergo are described further in Section 5.1.5. Each sample will be sent to the appropriate controlled facility (i.e., 222-S Laboratory) for classifications before being sent to a laboratory for analysis. Quality assurance requirements are discussed in Appendix E.

5.1.4.9 Pond and Ditch Bottom (Sediment) Sampling. Sampling of the 216-B-3-3 Ditch, 216-B-3 Main Pond, and expansion pond bottoms was performed during Phase 1 and 2 activities in support of the *216-B-3 Expansion Ponds Closure Plan* (DOE-RL 1994a). The results of these sampling events are summarized in Section 3.1 and more completely in Appendices C, D, and E of the 216-B-3 Expansion Pond Closure Plan (DOE-RL 1994a). Currently, surface water remains only in the 216-B-3C Expansion Pond, and only the "bottoms" of the 216-B-3A and 216-B-3B Expansion Ponds are exposed. Therefore, since the expansion ponds are being clean closed, no direct pond and ditch bottom sampling will occur in the operable unit. However, the buried pond and ditch bottoms (sediments) will be sampled in conjunction with borehole, test pit, and auger hole sampling.

5.1.4.10 Perched Water Sampling. If perched water is encountered in sufficient quantity during borehole drilling, a well will be installed in the perched water zone and the perched water sampled. Perched water sampling will be conducted according to the protocols listed in EIP 4.1, "Groundwater Sampling" (BHI 1994a). Temperature, pH, turbidity, and electrical conductivity will be monitored during the purging of each well. Turbidity is normally not required per EIP 4.1, but will be required to evaluate if the perched water is derived from the aquifer. Wells will be purged until a minimum of three well and sand pack pore space volumes have been removed, all parameters have stabilized, or the well is dry. Purged groundwater will be collected and disposed as described in EIP 1.11, "Purgewater Management" (BHI 1994a). Normally, one perched water sample will be taken. However, for inorganics, two samples will be collected per well instead of one; one will be unfiltered, and a second will be filtered through a 0.45-micron filter onsite before being bottled and preserved. Only an unfiltered sample will be required for organic analyses. Samples will be labeled with the well designation, an indication of the filtration, and the date of collection.

Perched water level measurements will be taken monthly and before the wells are purged and sampled. These data will be used to evaluate water level fluctuations and establish horizontal perched water gradients. The vertical gradients within the perched water zone will not be studied. Horizontal gradients will be measured if possible. These data will also be used to determine the amount of water that needs to be purged from each well before it is sampled. All measurements will be conducted according to EIP 7.1, "Aquifer Testing" (BHI 1994a).

5.1.4.11 Air Sampling. Five permanent air samplers (see Plate 1) currently managed by WHC will be utilized for the 200-BP-11 air sampling program. The air samples are collected by drawing ambient air through a 47-mm (2 in.) open-face filter at a flowrate of 0.056 m^3/min (2 ft^3/min) about 1 m (3 ft) above the ground. Throughout the 200 Areas, air samplers are operated on a continuous basis. Sample filters are exchanged weekly, held 1 week to allow for decay of short-lived natural

radioactivity, and sent for initial laboratory analyses of gross alpha and beta activity. After the initial analysis, the filters are stored until the end of the calendar quarter, at which time they are composited by sample location (or deemed as appropriate according to the annual reports) and sent for laboratory analyses of specific radionuclides. In 1994, the radionuclides reported were beryllium-7, cerium/praseodymium-144, cobalt-60, cesium-134, cesium-137, europium-154, europium-155, potassium-40, plutonium-238, plutonium-239/240, ruthenium-106, antimony-125, strontium-90, uranium-234, uranium-235, uranium-238, zinc-65, and zirconium/niobium-95. Compositing of the filters by sample location provides a larger sample size and thus a more accurate measurement of the concentration of airborne radionuclides resulting from operations in the 200 Areas. The most recent yearly composite analysis of air filters from the permanent air monitoring stations from the 200-BP-11 Operable Unit area will be used as the baseline for the air sampling program.

Portable air monitors will maintain the same protocols and procedures as the permanent air monitors, except final compositing of the samples will occur prior to relocating the samplers, with analyses to be performed as soon as possible thereafter.

If further air monitoring is required for personal health and safety, the monitoring equipment procedures and protocols will be specified or referenced in future safety documentation (e.g., Safety Analysis Documents and Hazardous Waste Operations Plans).

5.1.4.12 Pipeline Integrity Assessment. The major pipelines of interest for this assessment are about 800 m (2,600 ft) of the PUREX cooling water line and about 300 m (990 ft) of pipeline that used to convey process waste between the 241-BY and 241-C Tank Farms (Plate 2). All other pipelines are relatively short and isolated, or active and transport only clean water. A surface radiation survey will be run over the top of and 5 m (17 ft) to each side of the pipelines. The width of the survey will be increased if contamination is noted on the survey boundaries. The surface radiation survey will be conducted with USRADS or MSCM-II. The radiation survey will be conducted according to the protocols described in Section 5.1.4.2. If radioactivity is encountered, surface soil samples may be collected from the most contaminated areas.

Camera and radiation surveys will be performed inside of the inactive portion of the pipelines, unless determined technically or economically unfeasible. The emphasis of these surveys will be to identify major leak points in the lines, attempt to correlate leak points to surface contamination, and aid in the selection of potential test pit locations.

Depending on the extent of contamination, test pits (or auger hole) may be excavated along the most significant leak points identified by the previous surveys. However, test pits are not anticipated around the pipelines. If a test pit is utilized, the test pit(s) will be dug to a depth of approximately 6 m (20 ft), and between one and three samples may be collected from each pit. The excavation and sampling procedures for the test pits are the same as those described in Section 5.1.4.6.

5.1.4.13 Sample Designation and Handling. Field logs will be maintained to record all field observations and activities according to EIP 1.5, "Field Logbooks" (BHI 1994a). Samples for laboratory analysis are planned to be taken from 10 of the 15 waste management units and potentially along 1 pipeline within the 200-BP-11 Operable Unit as indicated in Tables 5-2 and 5-6. These samples will be placed in appropriate containers and properly preserved. All samples for laboratory analysis will be transported under chain of custody in accordance with EIP 3.0, "Chain of Custody"

(BHI 1994a), and EIP 3.1, "Sample Packaging and Shipping" (BHI 1994a). The analysis of the soil and source samples will include determination of radiological, chemical, and physical characteristics.

The HEIS is used to track the sample and laboratory data obtained during these investigations. Each sample will be identified and labeled with a unique HEIS sample number in the field. The HEIS numbers will be assigned in the field according to EIP 2.0, "Sample Event Coordination" (BHI 1994a). The sample location and corresponding HEIS numbers will be documented in the field logbook.

5.1.4.14 Decontamination Equipment and Procedures. Decontamination procedures have been established for the Hanford Site by BHI and are provided in the *Environmental Investigations Procedures* (BHI 1994a), which includes decontamination requirements and specific methods for radiological and nonradiological contamination. EIP 6.2, "Field Decontamination" (BHI 1994a), establishes methods for cleaning and/or decontaminating tools and equipment used in site characterization and monitoring activities. Equipment that is used to collect samples for physical testing is cleaned in accordance with EIP 6.2.

Equipment decontamination will occur in conjunction with most of the sampling activities planned at the 200-BP-11 Operable Unit. The methods will generally consist of washing or steam cleaning with a detergent/water or other decontamination solution. Field decontamination of drilling equipment, where applicable, shall be performed within impoundments in the decontamination zone to ensure that all wash liquids are captured. All wash liquids used for decontamination purposes must be properly disposed of according to applicable state/federal regulations. Drilling and backhoe equipment will be decontaminated before use on another borehole as required to ensure the safety of personnel and prevent cross-contamination of samples.

5.1.4.15 Investigation Derived Waste. Investigation derived waste generated by field investigation activities will be managed according to Section 8.0 of BHI-FS-01, *Field Support Administration* (BHI 1995c), or as agreed upon by the cognizant regulators (DOE, EPA, Ecology). If investigation derived waste is managed according to BHI (1995c), the following exception to the procedure applies: because of excessive turnaround times between sample submittal to the laboratories and receipt of sample analysis, if the 90-day clock (waste generation to disposal) is determined by the cognizant regulators to be appropriate for the RFI/CMS, the clock will not begin until generator receipt of the sample analyses results used for waste designation purposes. The samples collected for the facility investigation study will be sufficient for waste designation and waste management unit characterization.

5.1.4.16 Geodetic Surveys. Geodetic surveys will apply to almost all the tasks required to complete the operable unit characterization and will occur at most of the waste management units within the operable unit (see Table 5-6). Surveys are to be completed by a licensed surveyor, registered in Washington State. Surveyors will be accompanied, at least initially, by the field team leader (or designee) to familiarize the surveyors with specific locations. At least two controls will be referenced to a National Geodetic Survey datum obtained from a permanent benchmark. The North American Datum (NAD) 1983 (Lambert Projection) will be used for horizontal control, and the North American Vertical Datum (NAVD) will be used for vertical control.

Horizontal (x,y coordinates) locations of surface soil samples and the corners of surface geophysical surveys, and surface radiation surveys will be professionally surveyed. Horizontal and vertical locations (x, y, z coordinates) will also be professionally surveyed for those soil boreholes that have a well screen installed. Abandoned boreholes, test pits, and auger holes will also be surveyed.

5.1.5 Laboratory Analysis

Surface soil samples, vadose zone soil samples (from boreholes, test pits, and auger holes), and perched water samples will be sent for chemical/radiological analysis. Air monitoring samples collected from the air samplers are controlled under a separate program and are typically analyzed for cesium-60, strontium-90, plutonium-238, plutonium-239, plutonium-240, uranium, gross alpha, and gross beta. Only borehole soil samples will be sent to the laboratory for physical analyses. Table 5-7 summarizes the types of samples that will be collected from each of the waste management units and the general chemical/radiological analyses. The analyses are described in greater detail in Sections 5.1.5.1 and 5.1.5.2.

5.1.5.1 Chemical/Radiological Analyses. Table 5-7 lists the contaminants of concern for the 200-BP-11 Operable Unit, practical quantitation limits (nonradioactive) and minimum detection limits (radioactive), and the suggested analytical method. For some of the analytes, the contract laboratory may have to use a different analytical method than the suggested one, which is acceptable as long as the alternate method is approved by Ecology and EPA. For radionuclide analyses, laboratory-specific methods based on standard industry methodologies, reviewed and accepted by BHI personnel, will be utilized. However, these laboratory-specific methodologies must coincide with the analytical technology (e.g., gamma spectrometry) specified in Table 5-7 to ensure fulfillment of DQOs (Appendix D).

If an insufficient sample exists to perform all of the analyses, the analyses must be prioritized in the order they are listed on the table (Table 5-7, footnotes b,e). The concentrations of many of the radionuclide contaminants of concern (Table 3-2) will be calculated from parent or daughter relationships. The radionuclides whose concentrations will be calculated in this way are listed in Table 3-2 and in footnote a of Table 5-7.

For the following reasons, the list of contaminants of concern may be modified for some samples.

(1) Surface soil samples will not be analyzed for volatile organics. These compounds are unlikely to persist in near-surface conditions.

(2) To facilitate Ecology's concerns regarding known and suspect contamination (Section 3.1), all samples will be analyzed for a "modified" 40 CFR 264 Appendix IX groundwater monitoring list. The modified Appendix IX list is defined as the Appendix IX analytes minus phosphorous pesticides (method 8140), herbicides (method 8150), dioxins (method 8280), and nonhalogenated volatile organics (method 8015).

(3) Perched water samples will be analyzed for the contaminants of concern listed in Table 5-7, the Modified Appendix IX list, and three additional analytes: fluoride, carbon-14, and tritium. In addition, each water sample will undergo radionuclide and inorganic analyses on both filtered and unfiltered samples.

5.1.5.2 Physical Property Analyses. Samples will be collected from boreholes and/or test pits to analyze physical properties in support of computer modeling and calculations of contaminant transport. The specific locations for soil sampling for physical soil properties will be further developed in descriptions of work. For the purpose of this work/closure plan, physical properties are defined as the environmental and soil properties needed to evaluate the "physics" of contaminant transport, which include pH, moisture content, calcium carbonate content, organic carbon content, and mineralogy. Samples for physical analyses will be divided into two suites: Type A and Type B. Type A analyses will be performed on all samples from the boreholes and involve a limited number of analyses. Type B analyses will be collected from each major lithology (field geologist's decision) within the borehole and require a comprehensive set of analyses. The samples will be analyzed using American Society for Testing and Materials methods, Soil Science Society of America Standards, and/or DOE approved procedures such as WHC-IP-0635, *Geotechnical Engineering Procedures Manual* (WHC 1991a).

The following physical analyses will be run on Type A samples:

- Particle density
- Particle size distribution
- Bulk density
- Moisture content
- pH
- Calcium carbonate content.

The following physical analyses will be run on Type B samples:

- The six Type A analyses listed above
- Saturated hydraulic conductivity
- Unsaturated hydraulic conductivity
- Matric potential and soil moisture retention curves (for unsaturated samples only)
- Cation exchange capacity
- Organic carbon content
- If possible, Eh (soil oxidation/reduction potential)
- Mineralogy.

5.1.6 Data Evaluation (Task 7)

Data generated during the facility investigation will be integrated, evaluated, and coordinated with other corrective measure activities. The results of certain field activities will be evaluated immediately because they will influence the later facility investigation activities. These include data from surface radiological, surface geophysics, subsurface geophysics, cone penetrometer, and pipeline camera surveys. Data from other facility investigation activities will undergo an initial review as they become available. All information generated during the facility investigation will be integrated and evaluated for the facility investigation report. An important part of this review will be the comparison of analytical results with risk-based cleanup standards. The results of these evaluations will be provided in Volume 2 of this document.

5.1.7 Risk-Based Cleanup Standards (Task 8)

For RCRA past-practice units, the field investigation premise is that it is not necessary in most cases to extensively characterize a site before cleanup decisions can be made. However, RCRA TSD units tend toward a more extensive site characterization to justify final corrective measure decisions. Also, RCRA TSD and RCRA past-practice investigations do not currently implement risk assessments in their corrective action logic. Instead, risk-based cleanup standards are utilized to support corrective measure decisions. The risk-based cleanup standards for the 200-BP-11 Operable Unit RFI/CMS are provided in Appendix D (DQO Agreements).

5.1.8 Identification of Potential Action-, Contaminant-, and Location-Specific Corrective Measure Requirements (Task 9)

The formulation of operable unit-specific CMRs is an ongoing process throughout the operable unit facility investigation and CMS. CMRs were identified (as ARARs) in the B Plant AAMS Report (DOE-RL 1993b) and are summarized in Section 3.4. In addition, potential CMRs for the 200 East Area are currently being developed. Following the evaluation of analytical data under Task 7, potential contaminant-specific and location-specific CMRs will be reviewed based on the new knowledge of contamination at the site and the site setting. Once the potential CMRs for the 200-BP-11 Operable Unit have been properly identified, EPA and Ecology will be asked to verify the potential action-, contaminant-, and location-specific CMRs.

5.1.9 Facility Investigation Report (Task 10)

An interim facility investigation report will be prepared upon completion of the field investigation (i.e., sampling, analysis, and evaluation). This report will consist of a preliminary summary of the characterization activities described in Tasks 1 through 9 and will be provided in Volume 2 of this document. Information pertinent to the operable unit conceptual model will be refined, as necessary. The report will include the results of source investigations; identify the nature and vertical extent of contamination at the liquid waste disposal facilities; identify the potential action-, contaminant-, and location-specific CMRs; and provide the comparison of analytical results to the risk-based cleanup standards . The report will include an assessment of the need for corrective measures at each site and will make recommendations on the corrective measures that should be implemented.

5.2 CORRECTIVE MEASURE REQUIREMENTS

Section 7.5 of the Tri-Party Agreement (Ecology et al. 1994) states that "In accordance with Section 121(d) of CERCLA, the DOE will comply with all ARARS when hazardous substances, pollutants, or contaminants are to remain onsite as part of remedial actions. These requirements include cleanup standards, standards of control, and other substantive environmental protection requirements and criteria for hazardous substances as specified under Federal or State laws and regulations. The parties intend that ARARs, as appropriate, will apply at units being managed under the RCRA past-practice program at the Hanford Site to ensure continuity between the RCRA and CERCLA authorities."

Because RCRA corrective action does not specifically recognize ARARs, this work/closure plan employs the term Corrective Measure Requirements (CMRs). The strategy for the CMRs is that only

the applicable CMRs be employed. That is, the relevant and appropriate requirements are not applicable to RCRA corrective actions. The CMRs will focus on federal and state statutes and regulations. The B Plant AAMS Report (DOE-RL 1993b) provides the initial evaluation of the contaminant-, location-, and action-specific CMRs.

Contaminant-specific CMRs are usually health- or risk-based numerical values or methodologies that, when applied to unit-specific conditions, result in the establishment of numerical contaminant values that are generally recognized by the regulatory agencies as reasonable to protect human health and the environment. In the case of the 200-BP-11 Operable Unit, contaminant-specific CMRs address chemical constituents and/or radionuclides. The potential contaminant-specific CMRs that were evaluated for the 200-BP-11 Operable Unit are discussed in Section 6.2 of the B Plant AAMS Report (DOE-RL 1993b).

The potential location-specific CMRs that were evaluated for the 200-BP-11 Operable Unit are discussed in Section 6.3 of the B Plant AAMS Report (DOE-RL 1993b). The potential action-specific CMRs that were evaluated are discussed in Section 6.4 of the B Plant AAMS Report (DOE-RL 1993b).

A full assessment of CMRs will be provided in Volume 3 of this document after the facility investigation has been completed and evaluated.

5.3 CORRECTIVE MEASURES STUDY

Based on the *Hanford Past-Practice Strategy* (DOE-RL 1991a), as outlined in Chapter 1, several paths exist that lead to a CMS. The CMS will be conducted based on final EPA guidance for RCRA Corrective Action Plans (EPA 1994a) and/or other applicable guidance documents as depicted in the schedule (Chapter 6).

As outlined in Chapter 1, candidate waste management units for ICMs have been selected. All the waste management units within the 200-BP-11 Operable Unit are ICM candidates except for the unplanned releases and the 216-E-28 Contingency Pond (which are remedial investigation candidates). The intent of this work/closure plan is to implement ICMs if needed and then proceed directly to the final corrective measures for the units. The data required to select corrective measures for the RCRA past-practice and RCRA TSD units within the 200-BP-11 Operable Unit will be gathered during the facility investigation. The data obtained from the facility investigation will then be used for identification, screening, and development of corrective measure alternatives.

The comprehensive strategy and development of the CMS will be provided in Volume 3 of this document as well as a proposed CMP.

Table 5-1. Relationship Between Tasks and Field Activities.

Field Sampling Plan Activities	Source Characterization (Task 2)	Geologic Investigation (Task 3)	Surface Water Sediment Investigation (Task 4)	Vadose Zone Investigation (Task 5)	Air Investigation (Task 6)
Primary Field Activities					
Surface Radiological Surveys	X	–	–	–	–
Surface Geophysics Surveys	X	–	–	–	–
Subsurface Geophysics	X	X	–	X	–
Boreholes	X	X	–	X	–
Test Pits	X	X	–	X	–
Augers	X	X	–	X	–
Surface Soil Sampling	X	–	–	–	–
Surface Water Sediment Sampling	X	–	X	–	–
Source Sampling	X	–	–	–	–
Perched Water Sampling	–	–	–	X	–
Air Monitoring	–	–	–	–	X
Pipeline Integrity Assessment	X	–	–	–	–
Supporting Field Activities					
Geodesic Surveys	X	X	X	X	X
Cone Penetrometer	X	X	X	X	
Sample Designation and Handling	X	X	X	X	X
Decontamination	X	X	X	X	X
Waste Disposal	X	X	X	X	X

Table 5-2. Field Activities Associated with Source Characterization (Task 2). (sheet 1 of 3)

Location	Data Compilation and Review (Subtask 2a)	Field Activities (Subtask 2b)					
		Surface Radiological Surveys (Section 5.1.4.2)	Surface Geophysics Surveys (Section 5.1.4.3)	Boreholes (Section 5.1.4.4)		Test Pits and Augers (Section 5.1.4.5)	
Waste Management Unit(s)		Approximate Area	Types/Approximate Area/Grid Spacing	Estimated Total Depth	Estimated Number of Chemical Samples	Estimated Total Depth	Estimated Number of Chemical Samples
216-B-3 Main Pond and Overflow Pond (Section 5.1.3.2.1)	Completed	141,700 m^2 (1,524,600 ft^2)	--	72.0 m (235 ft) 18.3 m (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8 8 8
216-B-3-3 Ditch (Section 5.1.3.2.1)	Completed	6,900 m^2 (74,000 ft^2)	--	18.3 m (60 ft)	10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8
216-B-3-1 and -3-2 Ditches, and Overflow Pond (Section 5.1.3.2.2)	Completed	121,950 m^2 (1,312,000 ft^2) This includes the area between the ditches	GPR/122,000 m^2/10 m (147,000 ft^2/33 ft)	18.3 m (60 ft) 18.3 m (60 ft)	10 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8
216-B-3A, -3B, and -3C Expansion Ponds (Section 5.1.3.2.3)	Completed	247,000 m^2 (2,657,200 ft^2)	--	--	--	9.2 m (30 ft)	8
216-B-63 Trench, and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches	Completed	2,400 m^2 (25,782 ft^2)	--	72.0 m (235 ft) 18.3 m (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft)	8 8
216-A-29 Ditch	Completed	1,250 m^2 (13,390 ft^2)	--	72.0 m (235 ft)	13	9.2 m (30 ft)	8
216-E-28 Contingency Pond (Section 5.1.3.2.4)	Completed	49,800 m^2 (1,306,800 ft^2)	--	--	--	--	--
Unplanned Releases UN-200-E-14 & -92 (Section 5.1.3.2.5)	Completed	-- --	--	--	--	--	--
Pipeline(s) (Section 5.1.3.3.3)	Completed	6,900 m^2 (74,000 ft^2)	GPR/6,900m^2/10 m (74,000 ft^2/33 ft^2)	--	--	1	3

Table 5-2. Field Activities Associated with Source Characterization (Task 2). (sheet 2 of 3)

Location	Field Activities (Subtask 2b)					Laboratory Analysis (Subtask 2c)	Data Evaluation (Subtask 2d)
	Subsurface Geophysics (Section 5.3.2.5)		Surface Soil Sampling[a/] (Section 5.1.3.2)	Sediment Sampling[b/] (Section 5.1.3.2)	Pipeline Integrity Assessment (Section 5.1.3.3.3)	(Section 5.1.5)	(Section 5.1.6)
Waste Management Unit(s)	Wells	Estimated Depths	Estimated Number of Samples	Estimated Number of Samples			
216-B-3 Main Pond and Overflow Pond (Section 5.1.3.2.1)	new new 699-43-42 699-43-45 699-44-43B	72.0 m (235 ft) 18.3 m (60 ft) 67.1 m (220 ft) 62.5 m (205 ft) 54.9 m (180 ft)	2	7	--	65 soil (COC and modified Appendix IX)	Yes
216-B-3-3 Ditch (Section 5.1.3.2.1)	new 699-43-45	18.3 m (60 ft) 62.5 m (205 ft)	--	4	--	34 soil (COC and modified Appendix IX)	Yes
216-B-3-1 and 216-B-3-2 Ditches (Section 5.1.3.2.2)	new new	18.3 m (60 ft) 18.3 m (60 ft)	4	4	--	48 soil (COC and modified Appendix IX)	Yes
216-B-3A, -3B, and -3C Expansion Ponds (Section 5.1.3.2.3)			2	1	--	10 (Radionuclides)	Yes
216-B-63 Trench, and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches	new new 299-E27-18 299-E33-37 299-E34-8	18.3 m (60 ft) 72.0 m (235 ft) 79.3 m (260 ft) 79.3 m (260 ft) 76.2 m (250 ft)	4	3	--	43 (COC and modified Appendix IX)	Yes
216-A-29 Ditch	new 299-E25-35	72.0 m (235 ft) 85.4 m (280 ft)	3	2	--	24 (COC and modified Appendix IX)	Yes
216-E-28 Contingency Pond (Section 5.1.3.2.4)	--	--	--	--	--	--	No
Unplanned Releases UN-200-E-14 and -92 (Section 5.1.3.2.4)	--	--	--	--	--	--	No

Table 5-2. Field Activities Associated with Source Characterization (Task 2). (sheet 3 of 3)

Location	Field Activities (Subtask 2b)					Laboratory Analysis (Subtask 2c)	Data Evaluation (Subtask 2d)
	Subsurface Geophysics (Section 5.3.2.5)		Surface Soil Sampling[a] (Section 5.1.3.2)	Sediment Sampling[b] (Section 5.1.3.2)	Pipeline Integrity Assessment (Section 5.1.3.3.3)	(Section 5.1.5)	(Section 5.1.6)
Pipeline(s) (Section 5.1.3.3.3)	--	--	--	--	About 1,000 m of camera and surface radiation survey (inside pipe)	--	Yes

[a]Surface samples are not planned in the operable unit, but may be taken if surface radiation surveys indicate elevated radioactivity.
[b]Sediment samples will be taken during borehole, test pit, and auger sampling.
COC = potential contaminants of concern
GPR = ground-penetrating radar

Table 5-3. Activities Associated with Geological Investigations (Task 3).

Location	Data Compilation and Review (Subtask 3a)	Field Activities (Subtask 3b)						Laboratory Analysis (Subtask 3c)	Data Evaluation (Subtask 3d)
		Boreholes (Section 5.1.3.2)		Test Pits and Augers (Section 5.1.3.2)		Subsurface Geophysics (Section 5.1.4.6)			
Waste Management Unit(s)		Estimated Depth	Estimated number of Physical Samples	Estimated Depth	Estimated Number of Physical Samples	Wells	Estimated Depth	Number/type of Physical Analysis[b] (Section 5.1.5.2)	
216-B-3 Main Pond and Overflow Pond (Sec. 5.1.3.2.1)	Completed	72.0 m (235 ft) 18.3 m (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8 8 8	new new 699-43-42 699-43-45 699-44-43B	72.0 m (235 ft) 18.3 m (60 ft) 67.1 m (220 ft) 62.5 m (205 ft) 54.9 m (180 ft)	23-Type A 6-Type B	Yes
216-B-3-3 Ditch (Sec. 5.1.3.2.1)	Completed	18.3 m (60 ft)	10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	-- -- --	new 699-43-45	18.3 m (60 ft) 62.5 m (205 ft)	10-Type A 3-Type B	Yes
216-B-3-1 and -3-2 Ditches (Sec. 5.1.3.2.3)	Completed	18.3 m (60 ft) 18.3 m (60 ft)	10 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	-- -- --	new new	18.3 m (60 ft) 18.3 m (60 ft)	20-Type A 3-Type B	Yes
216-B-3A, -3B, and -3C Expansion Ponds (Sec. 5.1.3.2.3)	Completed	--	--	9.2 m (30 ft)	8			0	Yes
216-B-63 Trench and 216-B-2-1, -2, and -3 Ditches	Completed	72.0 m (235 ft) 18.3 m (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft)	8 8	new new 299-E27-18 299-E33-37 299-E34-8	72.0 m (235 ft) 18.3 m (60 ft) 79.3 m (260 ft) 79.3 m (260 ft) 76.2 m (250 ft)	23-Type A 6-Type B	Yes
216-A-29 Ditch	Completed	72.0 m (235 ft)	13	9.2 m (30 ft)	8	new 299-E25-35	72.0 m (235 ft) 85.4 m (280 ft)	13-Type A 3-Type B	Yes
216-E-28 Contingency Pond (Sec. 5.1.3.2.4)	Completed	--	--	--	--	--	--	--	Yes
Unplanned Releases UN-200-E-14 and -92 (Sec. 5.1.3.2.5)	Completed	--	--	--	--	--	--	--	Yes

[a]These activities are related to other tasks as well (see Table 5-1).
[b]See Section 5.1.5.2 for descriptions of Type A and Type B physical samples.

Table 5-4. Activities Associated with Vadoze Zone Investigations (Task 5).[a] (sheet 1 of 2)

Location	Data Compilation and Review (Subtask 5a)	Field Activities (Subtask 5b)					
		Boreholes (Section 5.1.3.2)[a]		Test Pits and Augers (Section 5.1.3.2)[a]		Subsurface Geophysics (Section 5.1.4.6)[a]	
Waste Management Units		Estimated Depth	Estimated number of Chemical Samples	Estimated Depth	Estimated number of Chemical Samples	Wells	Estimated Depth
216-B-3 Main Pond and Overflow Pond (Section 5.1.3.2.1)	Completed	72.0 m (235 ft) 18.3 m (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8 8 8	new new 699-43-42 699-43-45 699-44-43B	72.0 m (2235ft) 18.3 m (60 ft) 67.1 m (220 ft) 62.5 m (205 ft) 54.9 m (180 ft)
216-B-3-3 Ditch (Section 5.1.3.2.1)	Completed	18.3 m (60 ft)	10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8	new 699-43-45	18.3 m (60 ft) 62.5 m (205 ft)
216-B-3-1 and -2 Ditches (Section 5.1.3.2.2)	Completed	18.3 m (60 ft) 18.3 m (60 ft)	10 10	9.2 m (30 ft) 9.2 m (30 ft) 9.2 m (30 ft)	8 8 8	new new	18.3 m (60 ft) 18.3 m (60 ft)
216-B-3A, -3B, and -3C Expansion Ponds (Section 5.1.3.2.3)	Completed	--	--	9.2 m (30 ft)	8		
216-B-63 Trench and 216-B-2-1, -2, and -3 Ditches	Completed	72.0 m (235 ft) 18.3 (60 ft)	13 10	9.2 m (30 ft) 9.2 m (30 ft)	8 8	new new 299-E27-18 299-E33-37 299-E34-8	72.0 m (235 ft) 18.3 (60 ft) 79.3 m (260 ft) 79.3 m (260 ft) 76.2 m (250 ft)
216-A-29 Ditch	Completed	18.3 (60 ft)	10	9.2 m (30 ft)	8	new 299-E25-35	72.0 m (235 ft) 85.4 m (280 ft)
216-E-28 Contingency Pond (Section 5.1.3.2.4)	Completed	--	--	--	--	--	--
Unplanned Releases UN-200-E-14 and -92 (Section 5.1.3.2.5)	Completed	--	--	--	--	--	--

Table 5-4. Activities Associated with Vadoze Zone Investigations (Task 5).[a] (sheet 2 of 2)

Location	Field Activities (Subtask 5b)	Laboratory Analysis (Subtask 5c)		Data Evaluation (Subtask 5d)
	Potential Perched Water Sampling (Section 5.1.3.3)	(Section 5.1.5)		
Waste Management Units	Wells	Estimated Number of Physical Analyses[b]	Estimated Number of Chemical Analyses[c]	
216-B-3 Main Pond Overflow Pond (Section 5.1.3.2.1)	new new	23 Type A 6 Type B	65 soil (COC and modified Appendix IX)	Yes
216-B-3-3 Ditch (Section 5.1.3.2.1)	new	10 Type A 3 Type B	34 soil (COC and modified Appendix IX)	Yes
216-B-3-1 and -2 Ditches (Section 5.1.3.2.2)	new new	20 Type A 3 Type B	48 soil (COC and modified Appendix IX)	Yes
216-B-3A, -3B, and -3C Expansion Ponds (Section 5.1.3.2.3)	--	0	10 (Radionuclides)	Yes
216-B-63 Trench and 216-B-2-1, -2, and -3 Ditches	new new	23 Type A 6 Type B	43 (COC and modified Appendix IX)	Yes
216-A-29 Ditch	new	13 Type A 3 Type B	24 (COC and modified Appendix IX)	Yes
216-E-28 Contingency Pond (Section 5.1.3.2.4)	--	--	--	Yes
Unplanned Releases UN-200-E-14 and -92 (Section 5.1.3.2.5)	--	--	--	Yes

[a] These activities are related to other tasks as well (see Table 5-1).
[b] See Section 5.1.5.2 for descriptions of Type A and Type B physical samples.
[c] Additional chemical analyses will be required if perched water is encountered.
COC = contaminants of concern

Table 5-5. Activities Associated with Air Investigations (Task 6).

Air Samplers N-158 N-991[a] N-992[a] N-977 (See Plate 2 for locations)	Data Compilation and Review (Subtask 6a)	Field Activities (Subtask 6b) Air Sampling (Section 5.1.3.3)	Laboratory Analysis (Section 5.1.4.10) (Subtask 6c)	Data Evaluation (Subtask 6d)
		Estimated Number of Samples	Number/Type of Chemical Analyses	
	Completed	Quarterly during field activities	Five samples each quarter for Co-90, Sr-137, Pu-238, Pu-239, Pu-240, U, gross beta, and gross alpha	Yes
All locations where borings or test pits are planned	Completed	Daily during field activities	Gross beta, gross alpha, and portable volatile organic analyzer	Yes

[a] These air samples were deactivated in 1992, but can be easily reactivated by request.

Table 5-6. Summary of Site-Specific Field Activities for Each Waste Management Unit and Unplanned Release.

Waste Management Unit	Primary Field Activities										Supporting Field Activities			
	Surface Radiological Surveys	Surface Geophysics Surveys	Boreholes	Test Pits[a]	Augers[a]	Subsurface Geophysics	Surface Soil Sampling[b]	Surface Water Sediment Sampling[c]	Perched Water Sampling[d]	Air Monitoring[e]	Geodetic Surveys	Sample Designation & Handling	Decontamination	Investigation Derived Waste Disposal
216-B-3 Main Pond and Overflow Pond	X	--	2	5	--	X	--	--	X	X	X	X	X	X
216-B-3-1 Ditch	X	X	2[f]	2	--	X	--	--	--	X	X	X	X	X
216-B-3-2 Ditch	X	X	--	1	--	--	--	--	--	X	X	X	X	X
216-B-3-3 Ditch	X	--	1[g]	3	--	X	--	--	--	X	X	X	X	X
216-B-3A Pond	X	--	--	1	--	--	--	--	--	X	X	X	X	X
216-B-3B Pond	X	--	--	--	--	--	--	--	--	--	--	--	--	--
216-B-3C Pond	X	--	--	--	--	X	--	--	--	--	--	--	--	--
216-B-63 Trench, and 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches	X	--	2	2	--	X	--	--	X	X	X	X	X	X
216-A-29 Ditch	X	--	1	1	--	X	--	--	X	X	X	X	X	X
216-E-28 Contingency Pond	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unplanned Release UN-200-E-14	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unplanned Release UN-200-E-92	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[a] Augers may be substituted for test pits.
[b] Surface samples are not planned but may be taken depending on surface radiation.
[c] Surface water sediments were covered during stabilization activities, but will be taken during borehole, test pit, and auger sampling activities.
[d] Perched water sampling is assumed for only the deep boreholes to groundwater.
[e] Air monitoring will be at permanent air monitoring stations and during field activities.
[f] One borehole allocated to the 216-B-3-1 Ditch is located at the headwall of the 216-B-3-1, -3-2, and -3-3 Ditches.
[g] The borehole allocated to the 216-B-3-3 Ditch is located at the confluence of the 216-B-3-2 and -3-3 Ditches.

Table 5-7. Analytical Methods for Target Analytes. (sheet 1 of 4)

Analyte[a]	Analytical technique/method[b]	Practical quantitation limits (nonrad) or minimum detection limits (rad)[c]	Comments
METALS			
Arsenic	GFAA/7060	0.3	
Barium	ICP/6010	1	
Beryllium	ICP/6010	1	
Bismuth	ICP/6010	TBD	
Boron	ICP/6010	10	
Cadmium	ICP/6010	2	
Chromium-VI	ICP/6010	2	
Copper	ICP/6010	2	
Iron	ICP/6010	10	
Lead	ICP/6010 (or 7421)	10 (or 0.3)	
Manganese	ICP/6010	1	
Mercury	AA/7471	0.1	
Nickel	ICP/6010	4	
Potassium	ICP/6010	500	
Selenium	GFAA/6010 (or 7740)	25 (or 0.3)	
Silver	ICP/6010	20	
Tin	ICP/7870	50	
Vanadium	ICP/6010	2	
Zinc	ICP/6010	2	
IONS			
Acetate	Semi-VOA/8270	TBD	Analyzed as a TIC
Ammonia (ammonium)	IC/350.2	30	
Cyanide	Colorimetric/CLP Metals/9010	0.8	
Nitrate	IC/300 and 353	6	
Nitrite	IC/300 and 353	100	
Sulfate	IC/300	150	

Table 5-7. Analytical Methods for Target Analytes. (sheet 2 of 4)

Analyte[a]	Analytical technique/method[b]	Practical quantitation limits (nonrad) or minimum detection limits (rad)[c]	Comments
ORGANICS			
Acetone	VOA/8240	10	
Butanol, 1-	VOA/8240	TBD	Analyzed as a TIC
Butanone, 2- (MEK)	VOA/8240	10	
Carbon Tetrachloride	VOA/8240	5	
Chloroform	VOA/8240	5	
Ethyl Ether	VOA/8240	TBD	Analyzed as a TIC
Methylene Chloride	VOA/8240	5	
Trichloroethane, 1,1,1-	VOA/8240	5	
Trichloroethane, 1,1,2-	VOA/8240	5	
Toluene	VOA/8240	5	
Formaldehyde	Semi-VOA/8270	TBD	Analyzed as a TIC
Kerosene	Semi-VOA/8270	5,000	
PCBs	Semi-VOA/8080	33	
Tributyl Phosphate	Semi-VOA/8270	TBD	
Napthalene	Semi-VOA/8270	660	Special calibration required
RADIONUCLIDES			
Gross Alpha	Gas Proportional	–	
Gross Beta	Gas Proportional	–	
Cesium-137	Gamma Spectrometry/ D3649M	0.1	Measured by counting Ba-137m
Cobalt-60	Gamma Spectrometry/ D3649M	0.05	
Europium-152	Gamma Spectrometry/ D3649M	0.1	
Europium-154	Gamma Spectrometry/ D3649M	0.1	

Table 5-7. Analytical Methods for Target Analytes. (sheet 3 of 4)

Analyte[a]	Analytical technique/method[b]	Practical quantitation limits (nonrad) or minimum detection limits (rad)[c]	Comments
RADIONUCLIDES (cont.)			
Europium-155	Gamma Spectrometry/ D3649M	0.1	
Uranium-235 (Pa-231)	Gamma Spectrometry/ D3649M	1.0	Most samples measured by counting Pa-231
Americium-241	Alpha Spectrometry/Am-01	1.0	
Curium-244	Alpha Spectrometry/907.0M	1.0	May also use gamma spectrometry
Neptunium-237	Alpha Spectrometry/907.0M	1.0	
Plutonium-238	Alpha Spectrometry/Pu-02	1.0	
Plutonium-239/240	Alpha Spectrometry/Pu-02	1.0	
Plutonium-241	Alpha Spectrometry/Pu-02	15.0	
Thorium-228	Alpha Spectrometry/	TBD	
Thorium-230	Alpha Spectrometry/	1.0	
Thorium-232	Alpha Spectrometry/	1.0	
Uranium-233/234	Alpha Spectrometry/U	TBD	Most U-233/234 samples counted by measuring Pa-231m
Uranium-235	Alpha Spectrometry/U	1.0	Most U-235 samples measured by counting Pa-231
Uranium-236	Alpha Spectrometry/	TBD	
Uranium-238	Alpha Spectrometry/U	TBD	
Iodine-129	Beta Counting/902.0M	2.0	
Strontium-90 (Y-90)	Beta Counting/SR-02	1.0	
Technetium-99	Beta Counting/TC-01M	15.0	Measured by counting Y-90
Selenium-79	Beta Counting/	5.0	
Samarium-151	Beta Counting/	TBD	

Table 5-7. Analytical Methods for Target Analytes. (sheet 4 of 4)

Analyte[a]	Analytical technique/method[b]	Practical quantitation limits (nonrad) or minimum detection limits (rad)[c]	Comments
Additional Analytes for Water Samples Only			
Fluoride	IC/300	51	Water only
Carbon-14	Liquid Scintillation/C-01	50	Water only
Tritium (H-3)	Liquid Scintillation/906.0	400	Water only

GFAA = Graphite Furnace Atomic Adsorption
ICP = Inductively Coupled Plasma
AA = Atomic Adsorption
VOA = Volatile Organics Analysis
TIC = Tentatively Identified Compound
IC = Ion Chromatography
CLP = Contract Laboratory Program
TBD = To be determined
M = method modified to include extraction from the solid medium; extraction method is matrix and laboratory specific

"Prescribed Procedures for Measurement of Radioactivity in Drinking Water" (EPA 1980a)
"Test Methods for Evaluating Solid Waste" (SW 846) Third Edition (EPA 1994b)
"Methods for Chemical Analysis of Water and Waste" (EPA 1983b)
"Radionuclide Method for the Determination of Uranium in Soil and Air" (EPA 1980b)
"EML Procedures Manual" (DOE/EML 1990)
"Eastern Environmental Radiation Facility RadioChemistry Procedures Manual" (EPA 1984)
"High-Resolution Gamma-Ray Spectrometry of Water" (ASTM 1985)

[a]See Chapter 3 for discussion on progeny isotopes whose concentrations may be derived from known parent concentrations. Radionuclides related to U-238 include Th-230, Bi-210, Bi-214, Po-214, and Po-218. Radionuclides related to U-235 include Th-231, Tl-207, Pb-211, Pb-214, and Bi-211. Nb-93m is related to Zr-93. Pu-241 concentrations are inferred from Pu-238, Pu-239, and Pu-240. The radionuclides listed in parentheses under the analyte column are measured as part of the analysis of the adjacent radionuclide.

[b]These analytical methods should be considered examples of possible analytical techniques to use. Individual laboratories may have other techniques developed for some analytes. Analytical priorities are discussed in Section 5.1.5.

[c]Units for metals are mg/kg (ppm), μg/L for ions, μg/kg (ppb) for organics, and pCi/g for radionuclides

[d]The uranium analyses will be conducted periodically to confirm the uranium concentrations calculated from the Pa-234m or Pa-231 analyses. Two samples from each boring and one sample from each test pit/auger will undergo this confirmatory analysis. No uranium analyses will be done on surface soil or sediment samples.

[e]Analytes that will be studied by beta counting are listed in the order that they should be analyzed (e.g., the Sr-90 analysis should be made first, followed by the Tc-99 analysis).

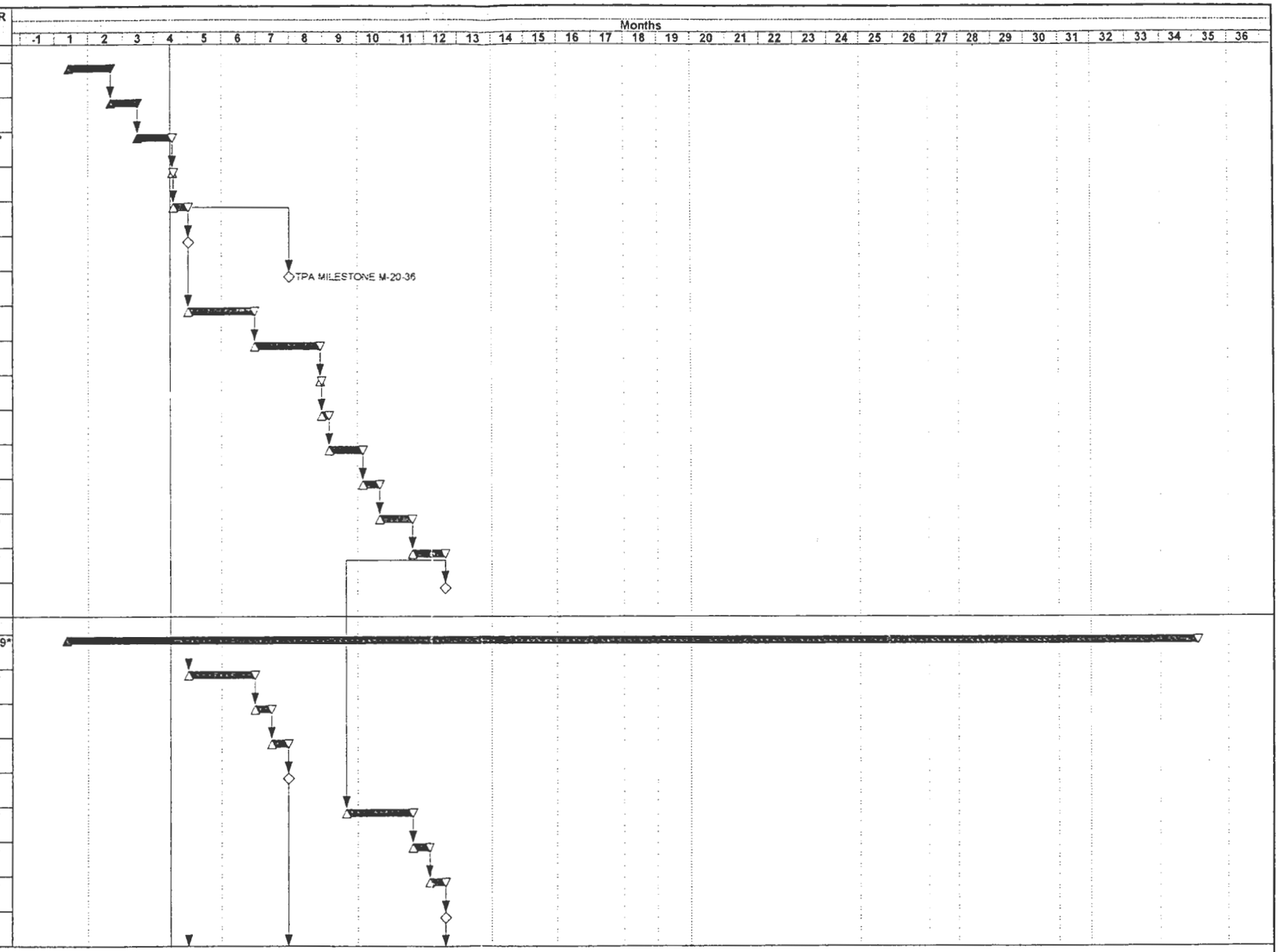
6.0 200-BP-11 OPERABLE UNIT PROJECT SCHEDULE

The schedule for the facility investigation activities described in Chapter 5 is shown in Figure 6-1. Also provided in the schedule, as discussed in Section 1.1.2, are completion dates and review cycles for Volumes 2, 3, and 4 of this work/closure plan. This schedule will serve as the baseline for the 200-BP-11 Operable Unit RFI/CMS and will be utilized to measure the progress of this work/closure plan implementation. Note that the schedule shows no supplementary sampling efforts beyond those discussed in Chapter 5; therefore, if supplementary sampling is needed, the schedule may need to be revised. A formal change control process has been established in the Tri-Party Agreement Action Plan and will be used to modify milestones if necessary. Additional assumptions built into the operable unit schedule include:

- Nonintrusive field activities may commence upon submittal of this work/closure plan to the DOE (Tri-Party Agreement, Figure 7-4)
- Near-surface vadose zone sampling (e.g., surface soil sampling, test pit sampling, and pipeline integrity assessment) of waste management units may commence 15 days after receipt of regulator comments (Tri-Party Agreement, Figure 7-4)
- Test pit excavation, sampling, and backfilling will require four working days per pit
- All remaining field activities (e.g., borehole sampling) may commence upon public approval of the work/closure plan (Tri-Party Agreement, Figure 7-4)
- Borehole drilling and sampling will progress at 4.5 m/day (15 ft/day)
- No treatability test will be required.

The last volume of this document, the corrective measures design report (Volume 4), is not shown on the schedule because it is not part of a closure/postclosure plan. However, a schedule for preparation, review, and implementation of the corrective measures design report will be provided in the Hanford Facility RCRA Permit modification, if applicable.

Activity Description	DUR
WORK/CLOSURE PLAN PREPARATION	
BHI/DOE CONCURRENT REVIEW OF REVISED WORK PLAN	38
DISPOSITION/INCORPORATION OF BHI/DOE COMMENTS	24
PREPARE WORK/CLOSURE PLAN, DRAFT B.	31*
TRANSMIT WORK/CLOSURE PLAN DRAFT B. TO DOE-RL	1
DOE-RL DOCUMENT PROCESSING/TURN-AROUND	14
DOE-RL SUBMITS DRAFT B. TO REGULATORS FOR REVIEW	0
TPA COMMITMENT: MILESTONE M-20-36	0
60-DAY REGULATOR REVIEW OF DRAFT B.	60
RECEIVE REG. COMNTS. - DISPOSITION - PREP REV. 0	60
TRANSMITTAL OF REV. 0 TO DOE-RL	1
DOE-RL TO SUBMIT REV. 0 TO REGULATORS	7
30-DAY REGULATOR REVIEW OF REV. 0	30
REGULATORS PREPARE REV. 0 FOR PUBLIC REVIEW	15
PUBLIC REVIEW/COMMENT PERIOD	30
RESPONSE BY REGULATORS / FINALIZE WORK PLAN	30
WORK PLAN APPROVAL	0
DOW PREPARATION	
PROJECT MANAGEMENT (TASK 1)	1,029*
PREPARE TEST PIT EXCAVATION DOW	60
REGULATOR REVIEW AND COMMENT OF DOW	15
INCORPORATE COMMENTS AND REVISE DOW	15
DOW APPROVED	0
PREPARE VADOSE ZONE BOREHOLE DRILLING DOW	60
REGULATOR REVIEW AND COMMENT OF DOW	15
INCORPORATE COMMENTS AND REVISE DOW	15
DOW APPROVED	0



Project Start 12DEC94
Project Finish 29OCT97
Data Date 15MAR95
Plot Date 15MAR95

(c) Primavera Systems, Inc.

Early Bar
Progress Bar
Critical Activity

BP11

Sheet 1 of 2

BECHTEL HANFORD, INC.

200-BP-11 WORK/CLOSURE PLAN

Figure 6-1. 200-BP-11 Operable Unit Schedule. (sheet 1 of 2)

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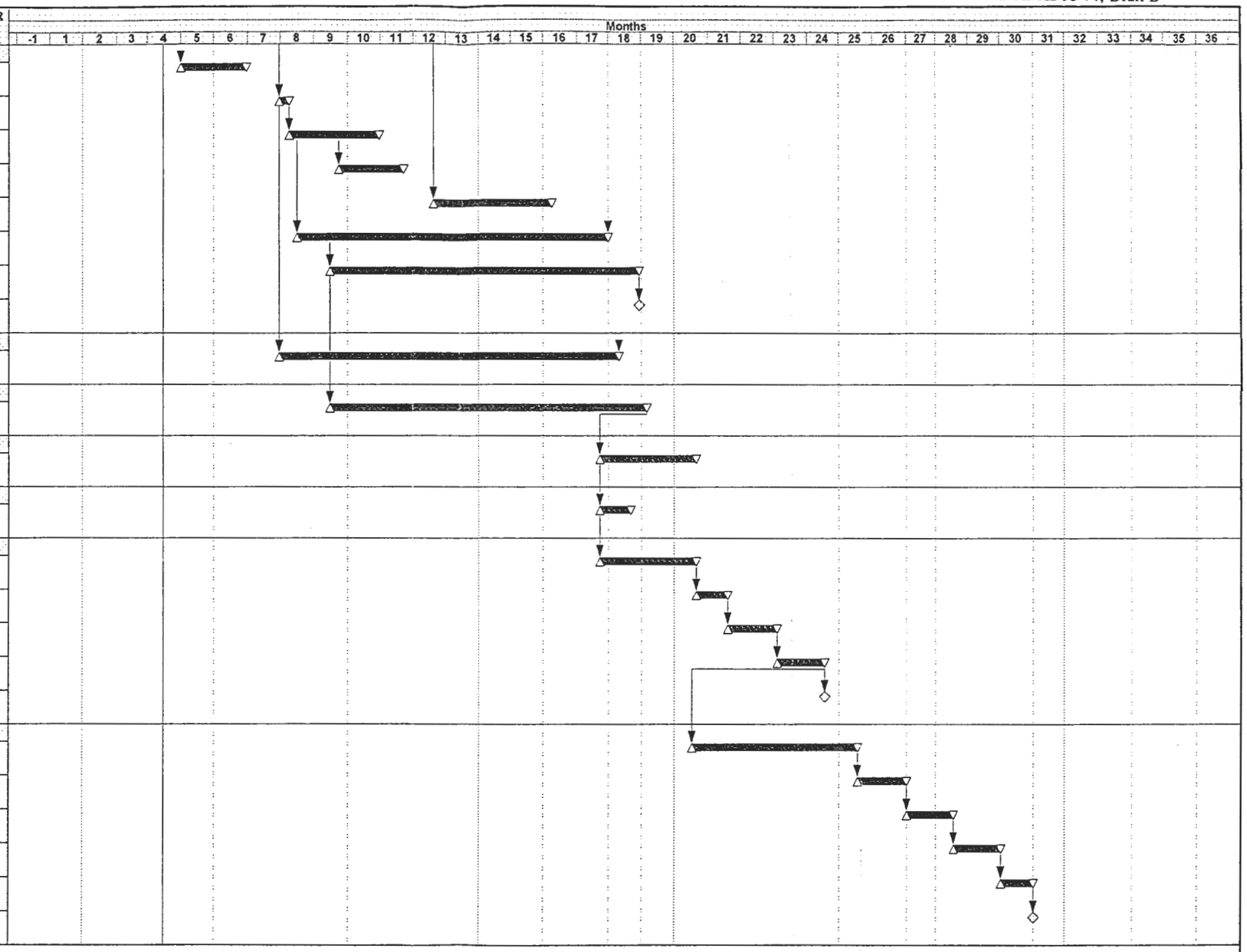
Activity Description	DUR
TASKS 2, 3, 4 AND 5	
NON-INTRUSIVE ACTIVITIES	60
MOBILIZATION	10
15 TEST PIT EXCAVATIONS/SAMPLING	82
PIPELINE INTEGRITY ASSESSMENT	60
8 BOREHOLE DRILLINGS/SAMPLING	110
LABORATORY ANALYSIS	289
DATA VALIDATION	288
SUBMIT VALIDATED DATA TO REGULATORS	0
TASK 6	
AIR SAMPLING	316
TASK 7	
DATA EVALUATION	295
TASK 8	
RISK-BASED CLEAN-UP STANDARD EVALUATION	90
TASK 9	
CORRECTIVE MEASURE REQUIREMENTS EVAL.	30
TASK 10 - FACILITY INVESTIGATION RPT. {VOLUME 2}	
PREPARE FACILITY INVESTIGATION REPORT	90
ERC REVIEW AND COMMENT	30
45-DAY DOE-RL REVIEW AND COMMENT	45
DISPOSITON OF DOE-RL COMMENTS/DOCUMENT REVISION	45
FACILITY INVESTIGATION REPORT TO REGULATORS	0
CORRECTIVE MSRS. STUDY RPT. & PROP. PLAN{VOL. 3}	
PERFORM CORRECTIVE MEASURES STUDY (CMS)	154
PREP CMS RPT./CORRECTIVE MEASURES PROPOSED PLAN	45
ERC REVIEW, DISPOSITION AND COMMENT INCORP.	45
45-DAY DOE-RL REVIEW AND COMMENT DISPOSITION	45
INCORPORATION OF DOE-RL COMMENTS/DOCUMENT REV.	30
CMS REPORT & PROPOSED PLAN TO THE REGULATORS	0



Project Start	12DEC94	Early Bar
Project Finish	29OCT97	Progress Bar
Data Date	16MAR95	Critical Activity
Plot Date	16MAR95	

(c) Primavera Systems, Inc.

BP11

Sheet 2 of 2

BECHTEL HANFORD, INC.

200-BP-11 WORK/CLOSURE PLAN

Figure 6-1. 200-BP-11 Operable Unit Schedule. (sheet 2 of 2)

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APPENDIX A

HEALTH AND SAFETY PLAN

ACRONYMS AND ABBREVIATIONS

AAMS	aggregate area management study
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EIP	Environmental Investigations Procedure
HEHF	Hanford Environmental Health Foundation
HSP	health and safety plan
JSA	Job Safety Analysis
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
RCRA	*Resource Conservation and Recovery Act*
RWP	Radiation Work Permit
SCBA	self-contained breathing apparatus
WHC	Westinghouse Hanford Company
WISHA	Washington Industrial Safety and Health Act/Administration

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1.0 GENERAL CONSIDERATIONS AND REQUIREMENTS

1.1 INTRODUCTION

The purpose of this Health and Safety Plan (HSP) is to outline standard health and safety requirements for Bechtel Hanford, Inc. (BHI) employees and contractors engaged in investigation activities in the 200-BP-11 Operable Unit. These activities will include the excavation and sampling of test pits and the drilling and sampling of boreholes in areas of known chemical and radiological contamination. Appropriate site-specific safety documents (e.g., Site-Specific Safety Plan or Job Safety Analysis [JSA]) will be written for each task or group of tasks. A more complete discussion of BHI and Westinghouse Hanford Company (WHC) environmental safety procedures is presented in the WHC manual *Health and Safety for Hazardous Waste Field Operations*, WHC-CM-4-3, Vol. 4 (WHC 1992).

All employees of BHI or any other contractors who are participating in onsite activities in the 200-BP-11 Operable Unit shall read the site-specific safety document and attend a pre-job safety or tailgate meeting to review and discuss the task.

1.2 DESIGNATED SAFETY PERSONNEL

The field team leader and site safety officer are responsible for site safety and health. Specific individuals will be assigned on a task-by-task basis by project management, and their names will be properly recorded before the task is initiated.

All activities onsite must be cleared through the field team leader. The field team leader has responsibility for the following:

- Allocating and administering resources to successfully comply with all technical and health and safety requirements
- Verifying that all permits, supporting documentation, and clearances are in place (e.g., electrical outage requests, welding permits, excavation permits, Site-Specific Safety Plan or JSA, sampling plan, radiation work permits [RWP], and onsite/offsite radiation shipping records)
- Providing technical advice during routine operations and emergencies
- Informing the appropriate site management and safety personnel of the activities to be performed each day
- Coordinating resolution of any conflicts that may arise between RWPs and the implementation of the Site-Specific Safety Plan or JSA with health physics
- Handling emergency response situations as may be required
- Conducting pre-job and daily tailgate safety meetings
- Interacting with adjacent building occupants and/or inquisitive public.

The site safety officer is responsible for implementing the Site-Specific Safety Plan at the site. The site safety officer shall do the following.

- Monitor chemical, physical, and (in conjunction with the health physics technician) radiation hazards to assess the degree of hazard present; monitoring shall specifically include organic vapor detection, radiation screening, and confined space evaluation where appropriate.

- Determine protection levels, clothing, and equipment needed to ensure the safety of personnel in conjunction with the health physics department.

- Monitor the performance of all personnel to ensure that the required safety procedures are followed.

- Halt operations immediately, if necessary, due to safety or health concerns.

- Conduct safety briefings as necessary.

- Assist the field team leader in conducting safety briefings as necessary.

The health physics technician is responsible for ensuring that all radiological monitoring and protection procedures are being followed as specified in the Radiation Protection Manual and in the appropriate RWP. BHI Safety and Health personnel will provide safety overview during drilling operations consistent with DOE and BHI policy and will provide technical advice, as requested. Downwind sampling for dangerous materials and radiological or other contaminants may be requested from appropriate contractor personnel as required.

The ultimate responsibility and authority for employee's health and safety lies with the employee and the employee's colleagues. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her personal health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel, as designated previously. In the event of an immediately dangerous or life-threatening situation, the employee automatically has temporary "stop work" authority and the responsibility to immediately notify the field team leader or site safety officer. When work is temporarily halted because of a safety or health concern, personnel will exit the exclusion zone and meet at a predetermined place in the support zone. The field team leader, site safety officer, and health physics technician will determine the next course of action.

1.3 MEDICAL SURVEILLANCE

All field team members engaged in operable unit activities at sites governed by a Site-Specific Safety Plan must have baseline physical examinations and be participants in the BHI (or an equivalent) hazardous waste worker medical surveillance program.

Medical examinations will be designed to identify any pre-existing conditions that may place an employee at high risk, and will verify that each worker is physically able to perform the work required by this plan without undue risk to personal health. The physician shall determine the existence of conditions that may reduce the effectiveness or prevent the employee's use of respiratory protection. The physician shall also determine the presence of conditions that may pose undue risk to

the employee while performing the physical tasks of this work/closure plan using personal protection equipment including level B. This would include any condition that increases the employee's susceptibility to heat stress.

The examining physician's report will not include any nonoccupational diagnoses unless directly applicable to the employee's fitness for the work required.

1.4 TRAINING

Before engaging in any onsite activities, each team member is required to have received 40 hours of health and safety training related to hazardous waste site operations and at least 8 hours of refresher training each year thereafter as specified in Title 29, Code of Federal Regulations (CFR), Part 1910.120. In addition, each inexperienced employee (never having performed site characterization) will be directly supervised by a trained/experienced person for a minimum of 24 hours of field experience.

The field team leader and the site safety officer shall receive an additional 8 hours of training (in addition to the refresher training previously discussed). As required by WHC-CM-4-3, Standard A-12 (effective September 1, 1994), the field team leader is required to ensure that at least one employee per shift has a valid first aid certificate at all construction sites and when emergency response is more than 3 minutes away.

1.5 TRAINING FOR VISITORS

For the purposes of this plan, a visitor is defined as any person visiting the Hanford Site, who is not a Hanford Site contractor employee directly involved in the *Resource Conservation and Recovery Act* (RCRA)/*Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) facility investigation activities, including but not limited to those engaged in surveillance, inspection, or observation activities.

Visitors who must, for whatever reason, enter a controlled (either contamination reduction or exclusion) zone, shall be subject to all of the applicable training, respirator fit testing, and medical surveillance requirements discussed in Section 8.0 of BHI-SH-01, *Hanford ERC Environmental Safety and Health Program* (BHI 1995), and Volume 1 of BHI-SH-02, *Safety and Health Procedures* (BHI 1994b).

All visitors shall be informed of potential hazards and emergency procedures by their escorts and shall conform to Section 8.0 of BHI-SH-01, *Hanford ERC Environmental Safety and Health Program* (BHI 1995), and Volume 1 of BHI-SH-02, *Safety and Health Procedures* (BHI 1994b).

1.6 RADIATION DOSIMETRY

All personnel engaged in onsite activities shall be assigned dosimeters according to the requirements of the RWP applicable to that activity. All visitors shall be assigned basic dosimeters, as a minimum, that will be exchanged annually.

1.7 REQUIREMENTS FOR THE USE OF RESPIRATORY PROTECTION

All employees of BHI and subcontractors who may be required to use air-purifying or air-supplied respirators must be included in the medical surveillance program and be approved for the use of respiratory protection by the Hanford Environmental Health Foundation (HEHF) or other licensed physician. Each team member must be trained in the selection, limitations, and proper use and maintenance of respiratory protection (existing respiratory protection training may be applicable towards the 40-hour training requirement).

Before using a negative pressure respirator, each employee must have been fit-tested (within the previous year) for the specific make, model, and size according to Westinghouse Hanford fit-testing procedures. Beards (including a few days' growth), large sideburns, or moustaches that may interfere with a proper respirator seal are not permitted.

Subcontractors must provide evidence to BHI that personnel are participants in a medical surveillance and respiratory protection program that complies with 29 CFR 1910.120 and 29 CFR 1910.134, respectively.

2.0 GENERAL PROCEDURES

The following personal hygiene and work practice guidelines are intended to prevent injuries and adverse health effects. A hazardous waste site poses a multitude of health and safety concerns because of the variety and number of hazardous substances present. These guidelines represent the minimum standard procedures for reducing potential risks associated with this project and are to be followed by all job-site employees <u>at all times</u>.

2.1 GENERAL WORK SAFETY PRACTICES

2.1.1 Work Practices

The following work practices must be observed.

- Eating, drinking, smoking, taking medications, chewing gum, and similar actions are prohibited within the exclusion zone. Allowances for water may be authorized by the RWP during heat stress conditions. All sanitation facilities shall be located outside the exclusion zone; decontamination is required before using such facilities.

- Personnel shall avoid direct contact with contaminated materials unless necessary for sample collecting or required observation. Remote handling of such things as casings and auger flights will be practiced whenever practical.

- While operating in the controlled zone, personnel shall use the "buddy system" where appropriate, or be in visual contact with someone outside of the controlled zone.

- The buddy system will be used where appropriate for manual lifting. Mechanical lifting devices are to be used in lieu of manual lifting even with the buddy system for excessively heavy items.

- Requirements of WHC radiation protection and RWP manuals shall be followed for all work involving radioactive materials or conducted within a radiologically controlled area.

- Onsite work operations shall only be carried out during daylight hours, unless the entire control zone is adequately illuminated with artificial lighting. A new tour (shift) will operate the drilling rig after completion of each shift.

- Do not handle soil, waste samples, or any other potentially contaminated items unless wearing the protective equipment specified in the Site-Specific Safety Plan or JSA.

- Whenever possible, stand upwind of excavations, boreholes, well casings, drilling spoils, and the like, as indicated by an onsite windsock.

- Stand clear of trenches during excavation. Always approach an excavation from upwind.

- Be alert to potentially changing exposure conditions as evidenced by such indications as perceptible odors, unusual appearance of excavated soils, or oily sheen on water.

- Do not enter any test pit or trench deeper than 1.2 m (4 ft) unless in accordance with procedures specified in the Site-Specific Safety Plan.

- Do not <u>under any circumstances</u> enter or ride in or on any backhoe bucket, materials hoist, or any other similar device not specifically designed for carrying passengers.

- All excavation and drilling team members must make a conscientious effort to remain aware of their own and others' positions in regards to rotating equipment, cat heads, or u-joints. Drilling operations members must be extremely careful when assembling, lifting, and carrying flights or pipe to avoid pinch-point injuries and collisions.

- Tools and equipment will be kept off the ground whenever possible to avoid tripping hazards and the spread of contamination.

- Personnel not involved in operation of the drill rig or monitoring activities shall remain a safe distance from the rig as indicated by the field team leader.

- Follow all provisions of each site-specific hazardous work permit as addressed in the Site-Specific Safety Plan, including cutting and welding, confined space entry, and excavation.

- Catalytic converters on the underside of vehicles are sufficiently hot to ignite dry prairie grass. Team members should not drive over dry grass that is higher than the ground clearance of the vehicle and should be aware of the potential fire hazard posed by catalytic converters at all times. <u>Never</u> allow a running or hot vehicle to sit in a stationary location over dry grass or other combustible materials.

- Follow all provisions of each site-specific RWP.

- Team members will attempt to minimize truck tire disturbance of all stabilized sites.

2.1.2 Personal Protective Equipment

- Personal protective equipment will be selected specifically for the hazards identified in the Site-Specific Safety Plan. The site safety officer in conjunction with BHI Health Physics and Safety and Health organizations is responsible for choosing the appropriate type and level of protection required for different activities at the job site.

- Levels of protection shall be appropriate to the hazard to avoid either excessive exposure or additional hazards imposed by excessive levels of protection. The Site-Specific Safety Plan will contain provisions for adjusting the level of protection as necessary. These personal protective equipment specifications must be followed at all times, as directed by the field team leader, health physics technician, and site safety officer.

- Each employee must have a hard hat, safety glasses, and substantial protective footwear available to wear as specified in the Site-Specific Safety Plan or JSA.

- The exclusion zone around drilling or other noisy operations will be posted "Hearing Protection Required" and team members will have had noise control training.

- Personnel should maintain a high level of awareness of the limitations in mobility, dexterity, and visual impairment inherent in the use of level B and level C personal protective equipment.

- Personnel should be alert to the symptoms of fatigue, heat stress, and cold stress and their effects on the normal caution and judgment of personnel.

- Rescue equipment as required by Occupational Safety and Health Administration (OSHA), Washington Industrial Safety and Health Act (WISHA), or standards for working over water will be available and used when applicable.

2.1.3 Personal Decontamination

- The Site-Specific Safety Plan will describe in detail methods of personnel decontamination, including the use of contamination control corridors and step-off pads when appropriate.

- Thoroughly wash hands and face before eating or putting anything in the mouth to avoid hand-to-mouth contamination.

- At the end of each work day or each job, disposable clothing shall be removed and placed in (chemical contamination) drums, plastic-lined boxes, or other containers as appropriate. Clothing that can be cleaned may be sent to the Hanford Site laundry.

- Individuals are expected to thoroughly shower before leaving the work site or Hanford Site if directed to do so by the health physics technician, site safety officer, or field team leader.

2.1.4 Emergency Preparation

- A certified first aid provider and equipment shall be at all construction sites and work locations where emergency medical service is longer than three minutes away. This requirement is per Standard A-12 (effective 9/1/94) of WHC-CM-4-3.

- A multipurpose dry chemical fire extinguisher, a fire shovel, a complete field first-aid kit, and a portable pressurized spray wash unit shall be available at every site where there is potential for personnel contamination.

- Prearranged hand signals or other means of emergency communication will be established when respiratory protection equipment is to be worn, because this equipment seriously impairs speech.

- The Hanford Fire Department shall be initially notified before the start of the site investigation project. This notification shall include the location and nature of the various types of field work activities as described in the work/closure plan. A site location map shall be included in this notification.

2.2 CONFINED SPACE/TEST PIT ENTRY PROCEDURES

The following procedures apply to the entry of any confined space, which for the purpose of this document shall be defined as any space having limited egress (access to an exit) and the potential for the presence or accumulation of a toxic or explosive atmosphere. This includes manholes, certain trenches (particularly those through waste disposal areas), and all test pits greater than 1 m (4 ft) deep. If confined spaces are to be entered as part of the work operations, a job hazard analysis or equivalent plan will be developed per the requirement of WHC-CM-4-3, Standard A-3.

The identified remedial investigation activities on the 200-BP-11 Operable Unit should not require confined space entry. Nevertheless, the hazards associated with confined spaces are of such severity that all employees should be familiar with the safe work practices discussed in the following paragraphs.

No employee shall enter any test pit or trench deeper than 1.2 m (4 ft) unless the sides are shored or laid back to a stable slope as specified in OSHA 29 CFR 1926.652 or equivalent state occupational health and safety regulations.

When an employee is required to enter a pit or trench 1 m (4 ft) deep or more, an adequate means of access and egress, such as a slope of at least 2:1 to the bottom of the pit or a secure ladder or steps shall be provided.

Before entering any confined space, <u>including any test pit</u>, the atmosphere will be tested for flammable gases, oxygen deficiency, and organic vapors. If other specific contamination, such as radioactive materials or other gases and vapors, may be present, additional testing for those substances shall be conducted. Depending on the situation, the space may require ventilation and retesting before entry. All "permit required confined spaces" as defined by OSHA in 29 CFR 1910.146 require, at a minimum, continuous ventilation prior to and during entry. WHC-CM-4-40 requires, at a minimum, prior authorization to enter, pre-entry briefing, atmospheric testing, and an

attendant. In every case, specific entry procedures shall be set forth in the Site-Specific Safety Plan or JSA.

An employee entering a confined or partially confined space must be equipped with an appropriate level of respiratory protection in keeping with the monitoring procedures discussed previously and the action levels for airborne contaminants (see "Warnings and Action Levels" in Site-Specific Safety Plan).

No employee shall enter any test pit requiring the use of level B protection, unless a backup person (attendant) also equipped with a pressure-demand self-contained breathing apparatus (SCBA) is present. No backup person shall attempt any emergency rescue involving entry into the confined space unless a second backup person equipped with an SCBA is present, or the appropriate emergency response authorities have been notified. A second backup person with SCBA training may make an emergency entry but an attendant (not necessarily equipped with an SCBA) must be in place.

3.0 SITE BACKGROUND

Specific details on the 200-BP-11 Operable Unit location, background, and known and suspected contamination are described in Chapters 1.0, 2.0 and 3.0 of the work/closure plan. 200-BP-11 is located on the eastern most side of the 200 East Area of the Hanford Site and encompasses 15 waste management units. The 200-BP-11 Operable Unit includes five ponds, seven ditches, one trench and two unplanned releases and all are mainly associated with the B Plant and PUREX Plant effluents streams. The 200-BP-11 Operable Unit is a source operable unit only. The groundwater is currently planned to be addressed by the 200-BP-5 and 200-PO-1 groundwater operable units.

4.0 SCOPE OF WORK AND POTENTIAL HAZARDS

While the information presented in Section 3.1 of the work/closure plan is believed to be representative of the constituents and quantities of wastes at the time of discharge, the present chemical nature, location, extent, and ultimate fate of these wastes in and around the liquid disposal facilities are largely unknown.

4.1 WORK TASKS

Work tasks are described in Chapter 5.0 of the plan.

4.2 POTENTIAL HAZARDS

Onsite tasks will involve nonintrusive surface sampling procedures and intrusive soil sampling either directly in or immediately adjacent to areas known or suspected to contain potentially dangerous chemical substances, toxic metals, and radioactive materials.

Surface radiological contamination and fugitive dust will be the potential hazards of primary concern during noninvasive mapping and sampling activities.

Existing data indicate that hazardous substances may be encountered during invasive sampling; these include radionuclides, heavy metals, and corrosives. In addition, volatile organics may also be associated with certain facilities such as the solvent storage buildings or underground storage tanks.

Potential hazards include the following:

- External radiation (gamma and to a lesser extract, beta) from radioactive materials in the soil
- Internal radiation resulting from radionuclides present in contaminated soil entering the body by ingestion or through open cuts and scratches
- Internal radiation resulting from inhalation of particulate (dust) contaminated with radioactive materials
- Inhalation of toxic vapors or gases such as volatile organics or ammonia
- Inhalation or ingestion of particulate (dust) contaminated with inorganic or organic chemicals, and toxic metals
- Dermal exposure to soil or groundwater contaminated with radionuclides
- Dermal exposure to soil or groundwater contaminated with inorganic or organic chemicals, and toxic metals
- Physical hazards such as noise, heat stress, and cold stress
- Slips, trips, falls, bumps, cuts, pinch points, falling objects, other overhead hazards, crushing injuries, and other hazards typical of a construction-related job site
- Unknown or unexpected underground utilities
- Biological hazards; snakes, spiders, etc.

4.3 ASSESSMENT AND MITIGATION OF POTENTIAL HAZARDS

The likelihood of significant exposure (100 mR/h or greater) to external radiation is remote and can be readily monitored and controlled by limiting exposure time, increasing distance, and employing shielding as required.

Internal radiation by inhalation or inadvertent ingestion of contaminated dust is a realistic concern and must be continuously evaluated by the health physics technician. Appropriate respiratory protection, protective clothing, and decontamination procedures will be implemented as necessary to reduce potential inhalation, ingestion, and dermal exposure to acceptable levels.

Dermal exposure to toxic chemical substances is not expected to pose a significant problem for the identified tasks given the use of the designated protective clothing. The appropriate level of personal protective clothing and respiratory protection will vary from work site to work site.

5.0 HEALTH AND SAFETY MONITORING

The site safety officer or authorized delegate shall be present at all times during work activities which require a Site-Specific Safety Plan, and shall be in charge of all health and safety monitoring equipment. Safety and Health personnel shall review all activities involving or potentially involving radiological exposure or contamination control and shall prescribe the appropriate level of technical support and/or monitoring requirements. Other equipment deemed necessary by the site safety officer or Safety and Health personnel shall be obtained at their direction; no work will be initiated or continued until such equipment is in place. These instruments are to be used only by persons who are trained in their usage and who understand their limitations. No work shall be done unless instrumentation is available and in proper working order.

Air sampling may be required downwind of the referenced waste sites to monitor particulates and vapors before job startup. Siting of such sampling devices will be determined by Health Physics, the site safety officer, and HEHF, if appropriate. Any time personnel exposure monitoring, other than radiological, is required to determine exposure levels, it must be done by HEHF. Discrete sampling of ambient air within the work zone and breathing zones will be conducted using a direct-reading instrument, as specified in the site-specific safety document, and other methods as deemed appropriate (e.g., pumps with tubes, O_2 meters). The following standards will be used in determining critical levels:

- "Radionuclide Concentrations in Air," in Chapter XI, DOE Order 5480.1B (DOE 1986)
- "Air Contaminants - Permissible Exposure Limits," in 29 CFR 1910.1000
- *Threshold Limit Values and Biological Exposure Indices for 1990-1991* (ACGIH 1991)
- *Occupational Safety and Health Standards*, 29 CFR 1910.1000
- *Pocket Guide to Chemical Hazards* (NIOSH 1991), which provides National Institute for Occupational Safety and Health (NIOSH)-recommended exposure limits for substances that do not have either a threshold limit value or a permissible exposure limit.

5.1 AIRBORNE RADIOACTIVE AND RADIATION MONITORING

An onsite health physics technician will monitor airborne radioactive contamination levels and external radiation levels. Action levels will be consistent with derived air concentrations and applicable guidelines as specified in the radiation protection manual WHC-CM-4-10 (WHC 1988).

Appropriate respiratory protection shall be required when conditions are such that the airborne contamination levels may exceed an 8-hour derived air concentration (e.g., the presence of high levels of uncontained, loose contamination on exposed surfaces or operations that may raise excessive levels

of dust contaminated with airborne radioactive materials, such as excavation or drilling under extremely dry conditions).

Specific conditions requiring the use of respiratory protection because of radioactive materials in air will be incorporated into the RWP. If, in the judgement of the health physics technician, any of these conditions arise, work shall cease until appropriate respiratory protection is provided.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The level of personal protective equipment required initially at a site will be specified in the site-specific safety document for each task or group of tasks. Personal protective clothing and respiratory protection shall be selected to limit exposure to anticipated chemical and radiological hazards. Work practices and engineering controls may be used to control exposure.

7.0 SITE CONTROL

The field team leader, site safety officer, and health physics technician are designated to coordinate access control and security on the site. Special site control measures will be necessary to restrict public access. The zones will be clearly marked with rope and/or appropriate signs. The size and shape of the control zone will be dictated by the types of hazards expected, the climatic conditions, and specific operations required.

Control zone boundaries may be increased or decreased based on results of field monitoring, environmental changes, or work technique changes. The site RWP and the contractor's standard operating procedures for radiation protection may also dictate the boundary size and shape. All team members must be surveyed for radioactive contamination when leaving the controlled zone if in a radiation zone.

The onsite command post and staging area will be established near the upwind side of the control zone as determined by an onsite windsock. Exact location for the command post is to be determined just before start of work. Vehicle access, availability of utilities (power and telephone), wind direction, and proximity to sample locations should be considered in establishing a command post location.

8.0 DECONTAMINATION PROCEDURES

Remedial investigation activities will require entry into areas of known chemical and radiological contamination. Consequently, it is possible that personnel and equipment could be contaminated with hazardous chemical and radiological substances.

During site activities, potential sources of contamination may include airborne vapors, gases, dust, mists, and aerosols; splashes and spills; walking through contaminated areas; and handling contaminated equipment. Personnel who enter the exclusion zone will be required to go through the appropriate decontamination procedures on leaving the zone. Decontamination procedures shall be consistent with EIP 6.2, "Field Decontamination" (BHI 1994a), or other approved decontamination procedures.

9.0 CONTINGENCY AND EMERGENCY RESPONSE PLANS

As a general rule, in the event of an unanticipated, potentially hazardous situation indicated by instrument readings, visible contamination, unusual or excessive odors, or other indications, team members shall temporarily cease operations and move upwind to a predesignated safe area as specified in the site-specific safety documentation. The Site-Specific Safety Plan or JSA shall designate specific emergency response procedures for reasonably anticipated site-specific emergency situations/scenarios.

10.0 REFERENCES

ACGIH, 1991, *Threshold Limit Values and Biological Exposure Indices for 1990-1991*, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.

BHI, 1994a, *Environmental Investigations Procedures*, BHI-EE-01, Vol. 1, Bechtel Hanford, Inc., Richland, Washington.

BHI, 1994b, *Safety and Health Procedures*, BHI-SH-02, Vol. 1, Bechtel Hanford, Inc., Richland, Washington.

BHI, 1995, *Hanford ERC Environmental Safety and Health Program*, BHI-SH-01, Bechtel Hanford, Inc., Richland, Washington.

DOE, 1986, *Environment, Safety & Health Program for DOE Operations*, DOE Order 5480.1B, U.S. Department of Energy, Washington, D.C.

NIOSH, 1991, *Pocket Guide to Chemical Hazards, National Institute for Occupational Safety and Health*, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Washington, D.C.

WHC, 1988, *Radiation Protection*, WHC-CM-4-10, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Health and Safety for Hazardous Waste Field Operations*, WHC-CM-4-3 Vol. 4, Westinghouse Hanford Company, Richland, Washington.

APPENDIX B

PROJECT MANAGEMENT PLAN

ACRONYMS AND ABBREVIATIONS

BHI	Bechtel Hanford, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CMS	Corrective Measures Study
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
MCS	Management Control System
PMP	Project Management Plan
PNL	Pacific Northwest Laboratory
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
Tri-Party Agreement	Hanford Federal Facility Agreement and Consent Order

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1.0 INTRODUCTION

This Project Management Plan (PMP) defines the administrative and institutional tasks necessary to support remediation of the 200-BP-11 Operable Unit at the Hanford Site. Also, this PMP defines the responsibilities of the various participants, the organizational structure, and the project tracking and reporting procedures. This PMP conforms to the provisions of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)(Ecology et al. 1994). Any revisions to the Tri-Party Agreement that result in changes to the project management requirements would supersede the provisions of this chapter.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 INTERFACE OF REGULATORY AUTHORITIES AND THE U.S. DEPARTMENT OF ENERGY

The 200-BP-11 Operable Unit consists of active and inactive waste management units to be remedied in accordance with the Tri-Party Agreement. The State of Washington Department of Ecology (Ecology) has been designated as the lead regulatory agency, as defined in the Tri-Party Agreement. Accordingly, Ecology is responsible for overseeing corrective action activity at this operable unit and ensuring that the applicable authorities of both the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) are applied. The specific responsibilities of Ecology, EPA, and DOE are detailed in the Tri-Party Agreement.

2.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization for implementing remedial activities at the 200-BP-11 Operable Unit is shown in Figure B-1. The following sections describe the responsibilities of the individuals shown in Figure B-1.

2.2.1 Project Managers

The Ecology, EPA, and DOE have each designated one individual as project manager for corrective action activities at the Hanford Site. These project managers will serve as the primary point of contact for all activities to be carried out under the Tri-Party Agreement. The responsibilities of the project managers are given in Section 4.1 of the Tri-Party Agreement.

2.2.2 Unit Managers

As shown in Figure B-1, Ecology, EPA, and DOE will each designate an individual as a unit manager for the 200-BP-11 Operable Unit.

The unit manager from Ecology will serve as the lead unit manager. The Ecology unit manager will be responsible for regulatory oversight of all activities required for the 200-BP-11 Operable Unit.

The unit manager from EPA will be responsible for making decisions related to issues for which the supporting regulatory agency maintains authority. All such decisions will be made in consideration of recommendations made by the Ecology unit manager.

The unit manager from DOE will be responsible for maintaining and controlling the schedule and budget and keeping the Ecology and EPA unit managers informed as to the status of the activities at the 200-BP-11 Operable Unit, particularly the status of agreements and commitments.

2.2.3 Quality Assurance Lead

The quality assurance lead will be a designated person within the Bechtel Hanford, Inc. (BHI) Quality Assurance Organization. This designated person will be responsible for monitoring overall environmental restoration activities for this project. The designated personnel shall have the necessary independence and authority to identify conditions adverse to quality and to systematically seek corrective action.

This individual is responsible for the preplanned surveillance and audit activities for this project. A quality assurance report shall be provided by the 200 Area Project Manager for inclusion in the project final report generated by the technical organization. The quality assurance report shall summarize the surveillance and audit activities as well as any associated corrective actions that may have been taken during the interval.

2.2.4 Health and Safety Officer

The health and safety officer will be a designated individual within the BHI Safety and Health organization responsible for implementing an effective hazardous waste operations health and safety program. The health and safety officer is responsible for monitoring all potential health and safety hazards during sample handling and sampling decontamination activities, including those associated with radioactive and hazardous compounds, including volatile, reactive, ignitable, corrosive and/or toxic materials. The health and safety officer has the responsibility and authority to halt field activities resulting from unacceptable health and safety hazards.

2.2.5 200 Area Project Manager

The responsibilities of the 200 Area Project Manager will be to plan, authorize, and control work so that it can be completed on schedule and within budget, and to ensure that all planning and work performance activities are technically sound.

2.2.6 RCRA Facility Investigation/Corrective Measures Study Coordinators

The RCRA facility investigation (RFI) and corrective measures study (CMS) coordinators will be responsible for coordinating all activities related to the RFI and CMS, respectively, including data collection, analysis, and reporting. The RFI and CMS coordinators will be responsible for keeping the 200 Area Project Manager informed as to the RFI and CMS work status and any problems that may arise.

Figure B-1 shows the organizational relationship of an offsite contractor. Assuming a contractor is used to perform some or all of the RFI/CMS for the 200-BP-11 Operable Unit, the contractor would assume responsibilities of the RFI and CMS coordinators, as described above. In this instance, the contractor will be directly responsible for planning data collection activities and for analyzing and reporting the results of the data-gathering in the RFI and CMS reports. However, the 200 Area Project Manager retains the responsibility for securing and providing technical support for the field sampling efforts of the Hanford Site technical resource teams, described below. Figure B-2 shows a sample organizational structure for an RFI/CMS contractor team.

2.2.7 Hanford Site Technical Resources

Numerous technical resources are available on the Hanford Site for performing the field studies identified in the work plan. These resources as authorized by the 200 Area Project Manager will be responsible for performing data collection activities and analyses, and for reporting the results of specific technical activities. Internal and external work orders and subcontractor task orders are authorized by the 200 Area Project Manager. Statements of work will be provided to the technical teams and will include a discussion of authority and responsibility, a schedule with clearly defined milestones, and a task description including specific requirements. Each technical team will keep the coordinator informed of the work status performed by that group and any problems that may arise.

3.0 DOCUMENTATION AND RECORDS

The Tri-Party Agreement specifies documentation and records management requirements for remediation activities at the Hanford Site. The Tri-Party Agreement categorizes all supporting documents based on importance of documenting final data or use in decision-making to support remediation. Under the Tri-Party Agreement, documents are categorized as either primary or secondary documents. Tables 9-1 and 9-2 of the Tri-Party Agreement provide a listing of primary and secondary documents, respectively.

The Tri-Party Agreement describes the process for review, comment and revision of documents supporting cleanup of the operable unit. The Information Management Overview, Appendix E of the 200-BP-11 Operable Unit work/closure plan details ER and Hanford Site programs for records management. As noted in Section 2.2.2, the 200-BP-11 Operable Unit Managers are responsible for implementing Tri-Party Agreement requirements for remediation of the 200-BP-11 operable unit. Revisions, should they become necessary after finalization of any document, will be in accordance with Section 9.3 of the Tri-Party Agreement. Changes in the work schedule, as well as minor field changes, can be made without having to process a formal revision. The process for making these changes will be as stated in Section 12.0 of the Tri-Party Agreement. The Administrative Record will be maintained to support 200-BP-11 operable unit remediation activities in accordance with Section 9.4 of the Tri-Party Agreement.

4.0 FINANCIAL AND PROJECT TRACKING REQUIREMENTS

4.1 MANAGEMENT CONTROL

The primary goals of the Management Control System (MCS) are to provide methods for planning, authorizing, and controlling work so that it can be completed on schedule and within budget. The MCS is to ensure that all planning and work performance activities are technically sound and in conformance with management and quality requirements. BHI will have the overall responsibility for planning and controlling the investigation activities, and providing effective technical, cost, and schedule baseline management. If a contractor is used, BHI will maintain project management responsibilities, however the contractor may be allowed to assume direct day-to-day responsibilities for some management functions. The management control system used for this project must meet the requirements of DOE-RL Order 4700.1A, "Project Management System," (DOE-RL 1993). The BHI *Project Control Management System* (in development) and WHC MCS (WHC 1994) were developed to meet these requirements.

The schedule developed for the 200-BP-11 Operable Unit will be updated at least annually, to expand the new current fiscal year and the follow-on year. In addition, any approved schedule changes (see Section 12.0 of the Tri-Party Agreement for the formal change control system) would be incorporated at this time, if not previously incorporated. This update will be performed in the fourth quarter of the previous fiscal year (e.g., July to September) for the upcoming current fiscal year. The work schedule can be revised at any time during the year if the need arises, but the changes would be restricted to major changes that would not be suitable for the change control process.

4.2 MEETINGS AND PROGRESS REPORTS

Both project and unit managers must meet periodically to discuss progress, review plans, and address any issues that have arisen. The project managers' meeting will take place at least quarterly, and is discussed in Section 8.1 of the Tri-Party Agreement.

Unit managers shall meet monthly to discuss progress, address issues, and review near-term plans pertaining to their respective operable units and/or treatment, storage, and disposal groups/units. The meetings shall be technical in nature, with emphasis on technical issues and work progress. The assigned DOE unit manager for the 200-BP-11 Operable Unit will be responsible for preparing revisions to the schedule prior to the meeting. The schedule shall address all ongoing activities associated with the 200-BP-11 Operable Unit, including actions on specific source units (e.g., sampling). This schedule will be provided to all parties and reviewed at the meeting. Any agreements and commitments (within the unit manager's level of authority) resulting from the meeting will be prepared and signed by all parties as soon as possible after the meeting. Meeting minutes will be issued by the DOE unit manager and will summarize the discussion at the meeting, with information copies given to the project managers. The minutes will be issued within five working days following the meeting. The minutes will include, at a minimum, the following information:

- Status of previous agreements and commitments

- Any new agreements and commitments

- Schedules (with current status noted)

- Any approved changes signed off at the meeting in accordance with Section 12.1 of the Tri-Party Agreement.

Project coordinators for each operable unit also will meet on a monthly basis to share information and to discuss progress and problems.

The DOE shall issue a quarterly progress report for the Hanford Site within 45 days following the end of each quarter. Quarters end on March 31, June 30, September 30, and December 31. The quarterly progress reports will be placed in the public information repositories as discussed in Section 10.2 of the Tri-Party Agreement. The report shall include the following:

- Highlights of significant progress and problems.

- Technical progress with supporting information, as appropriate.

- Problem areas with recommended solutions. This will include any anticipated delays in meeting schedules, the reason(s) for the potential delay, and actions to prevent or minimize the delay.

- Significant activities planned for the next quarter.

- Work schedules (with current status noted).

5.0 REFERENCES

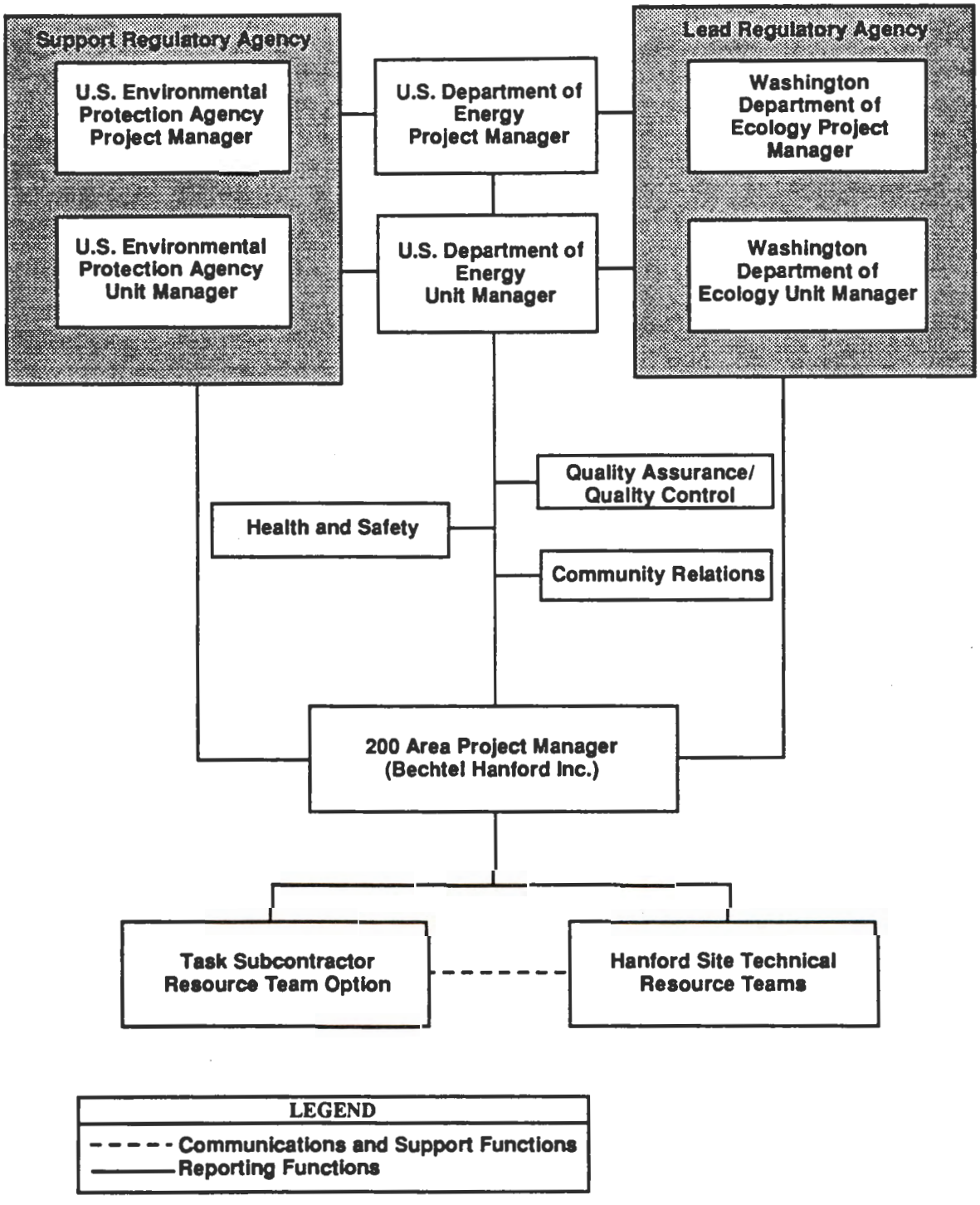
BHI, 1995 (anticipated), *Project Control Management System,* BHI-PC-01, Bechtel Hanford, Inc., Planning and Control Organization, Richland, Washington.

DOE-RL, 1993, *Project Management System*, RLIP 4700.1A, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Ecology, EPA, and DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, (Fourth Amendment), 89-10, Olympia, Washington.

WHC, 1994, *Management Control System*, WHC-CM-2-5, Westinghouse Hanford Company, Richland, Washington.

Figure B-1. Project Organization for the 200-BP-11 Operable Unit RFI/CMS.



JJA:PL2AA-Mc2

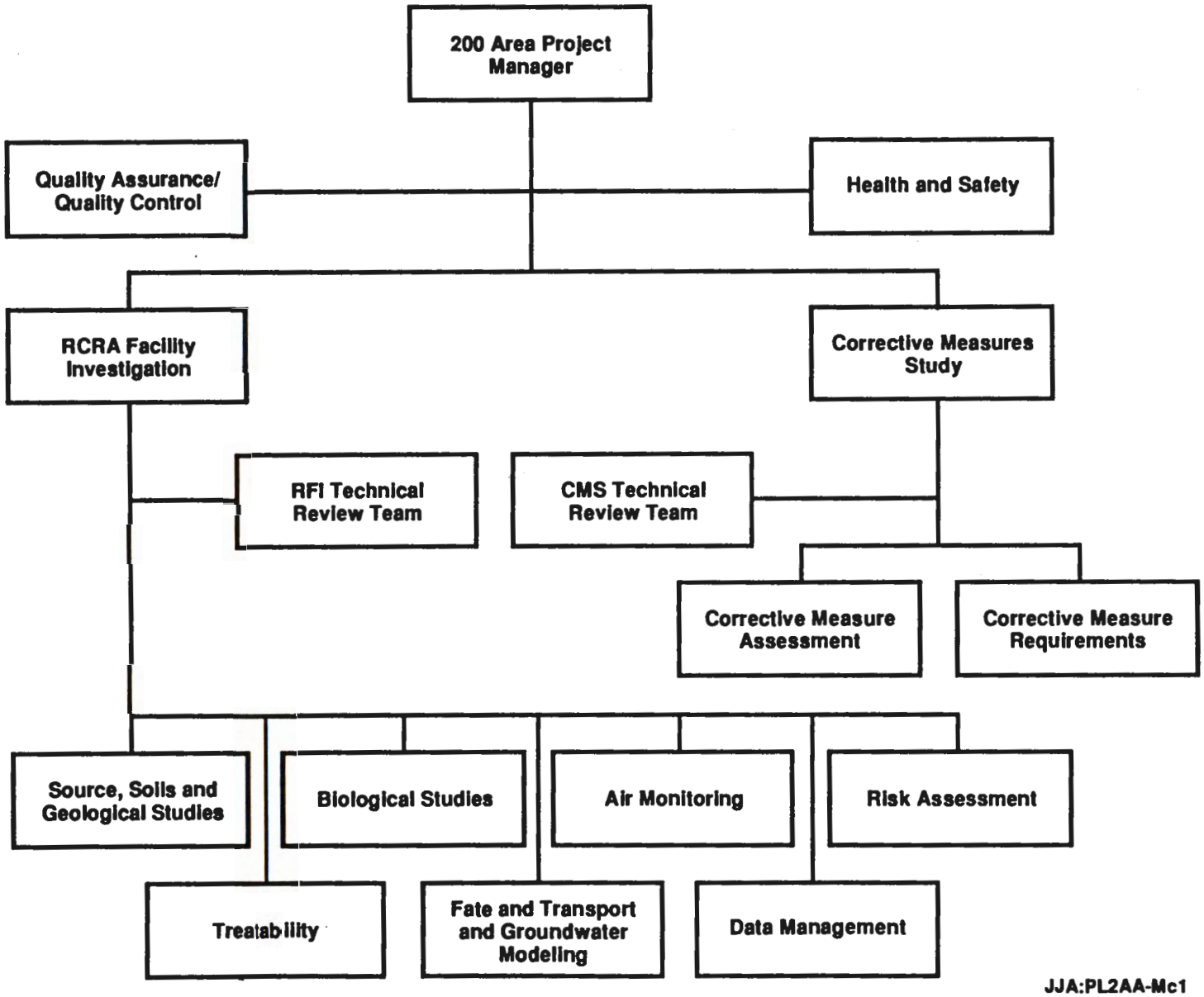


Figure B-2. Example Project Organization for the 200-BP-11 Operable Unit.

APPENDIX C

200-BP-11 RCRA TSD UNIT FORM 3'S FOR THE HANFORD SITE PART A PERMIT APPLICATION

CONTENTS

216-B-63 TRENCH FORM 3 . . . . . C-1

216-A-29 DITCH FORM 3 . . . . . C-11

216-B-3 MAIN POND FORM 3 . . . . . C-21

216-B-3 EXPANSION PONDS FORM 3 . . . . . C-31

LIQUID EFFLUENT RETENTION FACILITY FORM 3 . . . . . C-41

EFFLUENT TREATMENT FACILITY FORM 3 . . . . . C-51

PURGEWATER TANKS FORM 3 . . . . . C-63

216-B-63 TRENCH FORM 3

Please print or type in the unshaded areas only.
(Elite — 12 CPI — is preferred for this form, i.e., 12 characters/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION (place an "X" below and provide the appropriate date)

☐ 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)

MO 0 3 | DAY | YR 7 0 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

☐ 2. NEW FACILITY (Complete item below.)

MO | DAY | YR — FOR NEW FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION (place an "X" below and complete Section I above)

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET (the volume that would cover one acre to a depth of one foot) OR HECTARE-METER
LAND APPLICATION	D82	ACRES OR HECTARES
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	T 0 4	200,000	U		7				
2	D 8 4	200,000	G		8				
3					9				
4					10		C-3		

Continued from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPAC

T04, D84

The 216-B-63 Trench receives nonregulated waste water from the B Plant Chemical Sewer. The trench also historically received corrosive dangerous waste from the generation of demineralizer columns in B Plant. Treatment of these wastes occurred by the successive addition to the trench of acidic and caustic wastes. This served to neutralize the wastes while in the trench. Any acidic or caustic waste which did reach the soil were subsequently neutralized by the calcareous nature of the soil. Approximately 125,000 gallons per day total flow reached the trench. The corrosive discharges constituted a major part of this flow. This unit has not received dangerous waste since September 1985 and will be closed under interim status. The process design capacity reflects the maximum volume of water discharged to the facility on a daily basis rather than the physical capacity of the unit.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non—listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non—listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER — Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
X-1	K054	900	P	T03	D80			
X-2	D002	400	P	T03	D80			
X-3	D001	100	P	T03	D80			
X-4	D002			T03	D80	C-4		included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE No.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D 0 0 2	75,000,000	P	T 0 4	D 8 4			Percolation/Neutralization
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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15								
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24								
25								
26								

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

E USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

Historically, the 216-B-63 Trench received discharges of corrosive, dangerous wastes from B Plant. These discharges consisted of acidic and caustic backwashed from the regeneration of demineralizer columns in B Plant. Approximately 150,000,000 pounds of corrosive wastes were managed in the trench on an annual basis.

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground—level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION *This information appears on the attached drawing and photograph

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
Michael J. Lawrence Manager, Richland Operations United States Department of Energy	Michael J. Lawrence	November 16, 1987

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

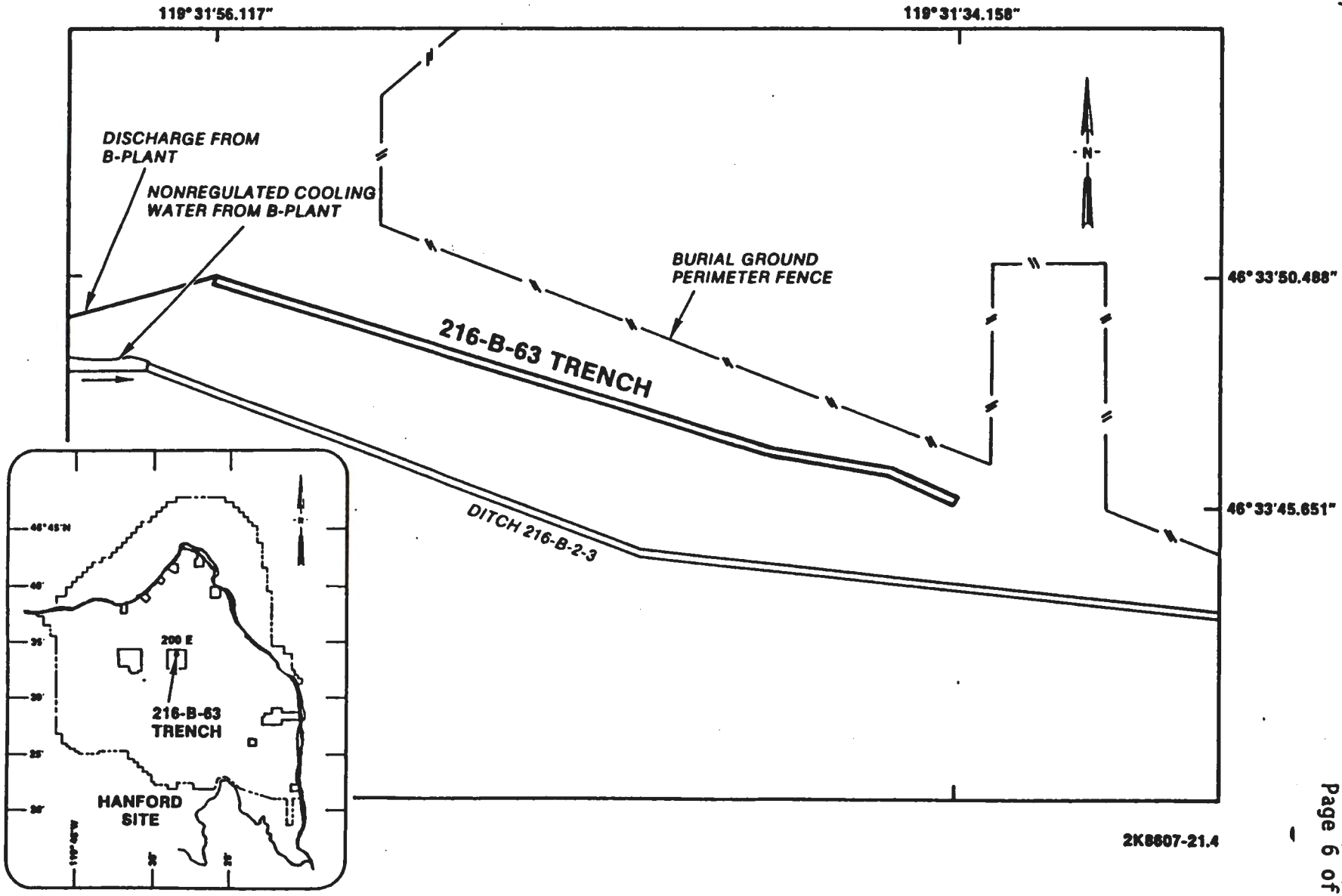
X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

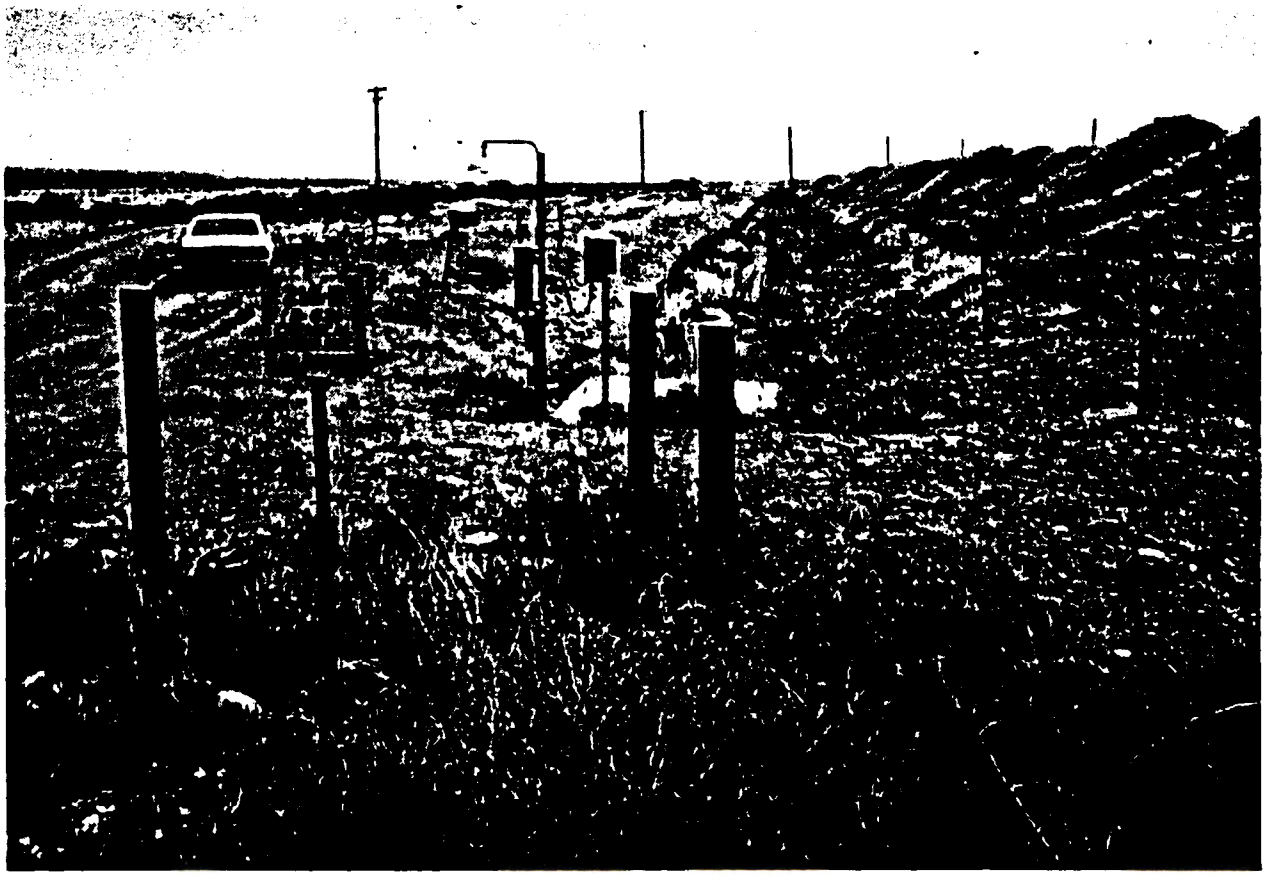
Michael J. Lawrence — 11-16-87
Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy
Date

W. M. Jacobi — 11/16/87
William M. Jacobi
President
Westinghouse Hanford Company
Date

216-B-63 TRENCH



216-B-63 TRENCH



46°33'50.488"
46°33'45.651"
119°31'56.117"
119°31'34.158"

8603045-31CN

(PHOTO TAKEN 1985)

2B8707-13.31

216-A-29 DITCH FORM 3

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. 1 1 | DAY | YR. 5 6 — FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. | DAY | YR. — FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		6				
X-2	T 0 3	20	E		6				
	8 4	6,000,000	G		7				
	0 4	6,000,000	U		8				
3					9				
4					10				

CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES (continued)

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T04, D84

The 216-A-29 Ditch received nonregulated process and cooling water from the Plutonium-Uranium Extraction (PUREX) Plant, and also received corrosive dangerous waste from regeneration of demineralizer columns in the PUREX Plant. The ditch also received spills from the PUREX Plant. Treatment of this waste occurred by the successive addition of acidic and caustic waste, which served to neutralize the waste in the ditch. Any acidic and caustic waste that did reach the soil were subsequently neutralized by the calcareous nature of the soil. Approximately 6,000,000 gallons (22,712,400 liters) a day of waste flow reached the ditch. No accurate records are available concerning the total volume of waste treated in this unit. The 216-A-29 Ditch has not received dangerous waste since February 1986 and will be closed under interim status. The process design capacity for this unit reflects the maximum volume of waste discharged to the unit daily rather than the physical design capacity.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	*included with above*

CONTINUE ON PAGE 3

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

D. NUMBER *(entered from page 1)*: WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D002	3,300,000,000	P	T04	D84			Neutralization/Percolation
2	D006	35						
3	U133	310						
4	WT02	50,000						Included With Above
5								
6								
7								
8								
9								
10								
11								
12								
13								
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18								
19								
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25								
26								

ECL30 - 271 - ECY 030-31 Form 3

PAGE 3 _____ OF 5

(enter "A", "B", "C", etc. behind the "3" to identify photo copied pages)

CONTINUE ON REVERSE

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The 216-A-29 Ditch received corrosive waste (D002) from the PUREX Plant. The discharges consisted of acidic and caustic backwashes from the regeneration of demineralizer columns in the PUREX Plant. The ditch also received spills from the PUREX Plant. The dangerous waste consists of toxicity characteristic waste (D006), acutely dangerous discarded chemical products (U133), and state-only waste (WT02).

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[x] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Land Operations Office	John D. Wagoner	6/30/94

OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

John D. Wagoner — 6/30/94

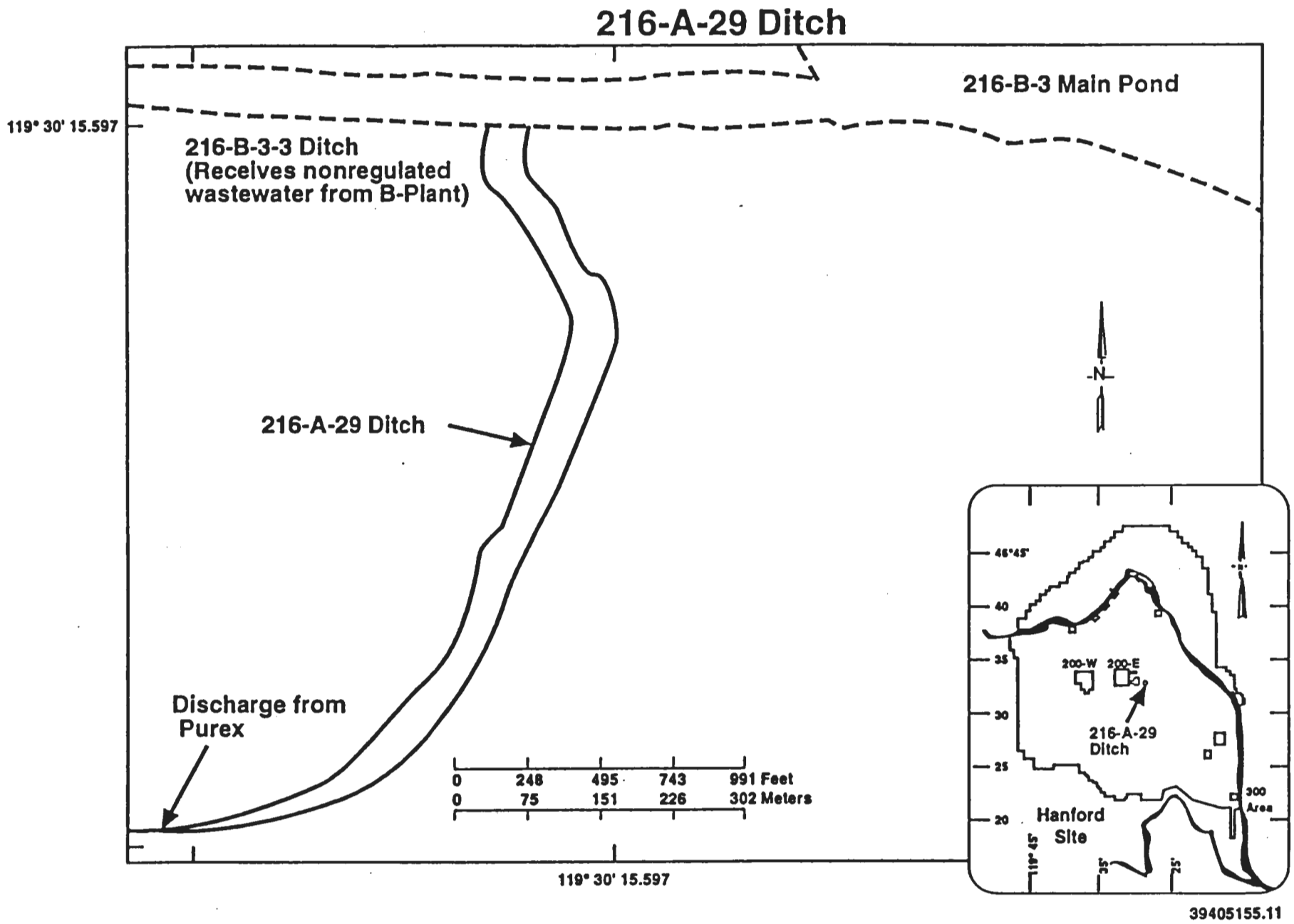
Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

Date

Edward S. Keen — 6/30/94

Co-operator
Edward S. Keen, President
Bechtel Hanford, Inc.

Date


216-A-29 Ditch
216-B-3 Main Pond
119° 30' 15.597
216-B-3-3 Ditch
(Receives nonregulated
wastewater from B-Plant)
216-A-29 Ditch
Discharge from
Purex
0 248 495 743 991 Feet
0 75 151 226 302 Meters
119° 30' 15.597
N
200-W
200-E
216-A-29
Ditch
300
Area
Hanford
Site
39405155.11

216-A-29 DITCH

46°33'07.301"
46°33'30.947"
119°33'11.592"
119°30'15.597"

93080116-34CN
(PHOTO TAKEN 1993)

216-B-3 MAIN POND FORM 3

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. 0 4 | DAY | YR. 4 5

FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. | DAY | YR.

FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
orage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
	T 0 2	840,000	U		7				
2	D 8 4	840,000	G		8				
3					9				
4					10				

CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES (continued)

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN

T02, D84

The 216-B-3 Main Pond (Main Pond) consists of the 216-B-3 Pond and the 216-B-3-3 Ditch. The 216-B-3 Pond, which began service in 1945, currently covers an area of 35 acres (14 hectares) to a depth of 2 to 8 feet (.71 to 2.4 meters). The 216-B-3 Pond receives effluent from the 216-B-3-3 Ditch, which was excavated in 1970 to replace an earlier ditch. The 216-B-3-3 Ditch is approximately 3,700 feet (1,128 meters) long, 30 feet (9.1 meters) wide at ground level, 6 feet (1.8 meters) wide at the bottom, and 4 to 8 feet (1.2 to 2.4 meters) deep. The 216-B-3-3 Ditch received most of its dangerous waste from the 216-A-29 Ditch, which drained the Plutonium Uranium Extraction (PUREX) Plant chemical sewer line. The 216-A-29 Ditch discharged into the 216-B-3-3 Ditch approximately 1,500 feet (460 meters) west of the 216-B-3 Pond. The 216-A-29 Ditch was shut down and interim stabilized in July 1991.

The Main Pond receives waste water (primarily process and cooling water) from the PUREX Plant, the B Plant Complex, the 242-A Evaporator, and other 200 East Area units. The Main Pond received corrosive waste as a result of the regeneration of the PUREX Plant demineralizer columns (D84). Treatment of the waste occurred by the successive discharge of acidic and caustic waste, which served to neutralize the corrosivity of the waste before and upon reaching the Main Pond. Residual corrosivity was neutralized by the calcareous nature of the Main Pond soil (T02).

The process design capacities given for waste process codes T02 [840,000 gallons (3,180,000 liters) per day] and D84 [840,000 gallons (3,180,000 liters)] represent Main Pond's proportional share (based on percolation capacity) of the process design capacity of the entire B Pond System (which includes the 216-B-3 Expansion Ponds, a separate dangerous waste treatment and disposal unit). At the peak of operations, approximately 22,000,000 gallons (83,280,000 liters) per day of liquid were discharged to the entire 216-B-3 Pond System. Interim stabilization of the 216-B-3 Main Pond began in February 1994. The 216-B-3 Main Pond has been permanently isolated from all liquid effluent sources and will be closed under interim status.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
	K054	900	P	T03 D80	
X-2	D002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002			T03 D80	Included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER *(entered from page 1)*

A	7	B	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D002	3,500,000	P	T02	D84			Neutralized/Percolation
2	WT02	77,000	↓	↓	↓			Included with Above
3	U133	77,000	P	T02	D84			Neutralization/Percolation
4	WT01	19,000	P	T02	D84			Neutralization/Percolation
5	D006	169,000	↓	↓	↓			Included with Above
6								
7								
8								
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Continued from the front.

DESCRIPTION OF DANGEROUS WASTES (continued)

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The Main Pond received dangerous waste from two primary sources: (1) corrosive and toxic dangerous waste resulting from the regeneration of demineralizer columns at the PUREX Plant, and (2) spills of dangerous or mixed waste at the PUREX Plant. Backwash from the regeneration of the demineralizer columns was frequently corrosive (D002) and sometimes contained toxic concentrations of chemicals used in the regeneration process, including nitric acid, sulfuric acid, sodium hydroxide, and potassium hydroxide (WT02). Spills at the PUREX Plant included hydrazine (U133), cadmium nitrate (WT01/D006), and ammonium fluoride/ammonium nitrate (WT01). Since 1984, administrative and engineering barriers have been put in place at the PUREX Plant to prevent dangerous waste from being discharged into the Main Pond.

The quantity of waste listed for D002/WT02 is an estimated annual quantity based on the Main Pond's proportional share (based on percolation capacity) of the amount of corrosive and toxic waste received by the entire 216-B-3 Pond System (which includes the 216-B-3 Expansion Ponds, a separate dangerous waste treatment and disposal unit). The quantities of waste listed for U133 and WT01/D006 represent the Main Pond's proportional share (based on percolation capacity) of the total recorded amount of hydrazine, cadmium, and ammonium fluoride/ammonium nitrate received by the entire 216-B-3 Pond System from the time the PUREX Plant resumed operations in 1983 until the last known chemical discharge occurred in 1987.

The quantities of waste listed for U133 and WT01/D006 include the water in which the chemicals were discharged. Water makes up most of the weight of these discharges.

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[x] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy and Operations Office	John D. Wagoner	6/30/94

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

John D. Wagoner — 6/30/94

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

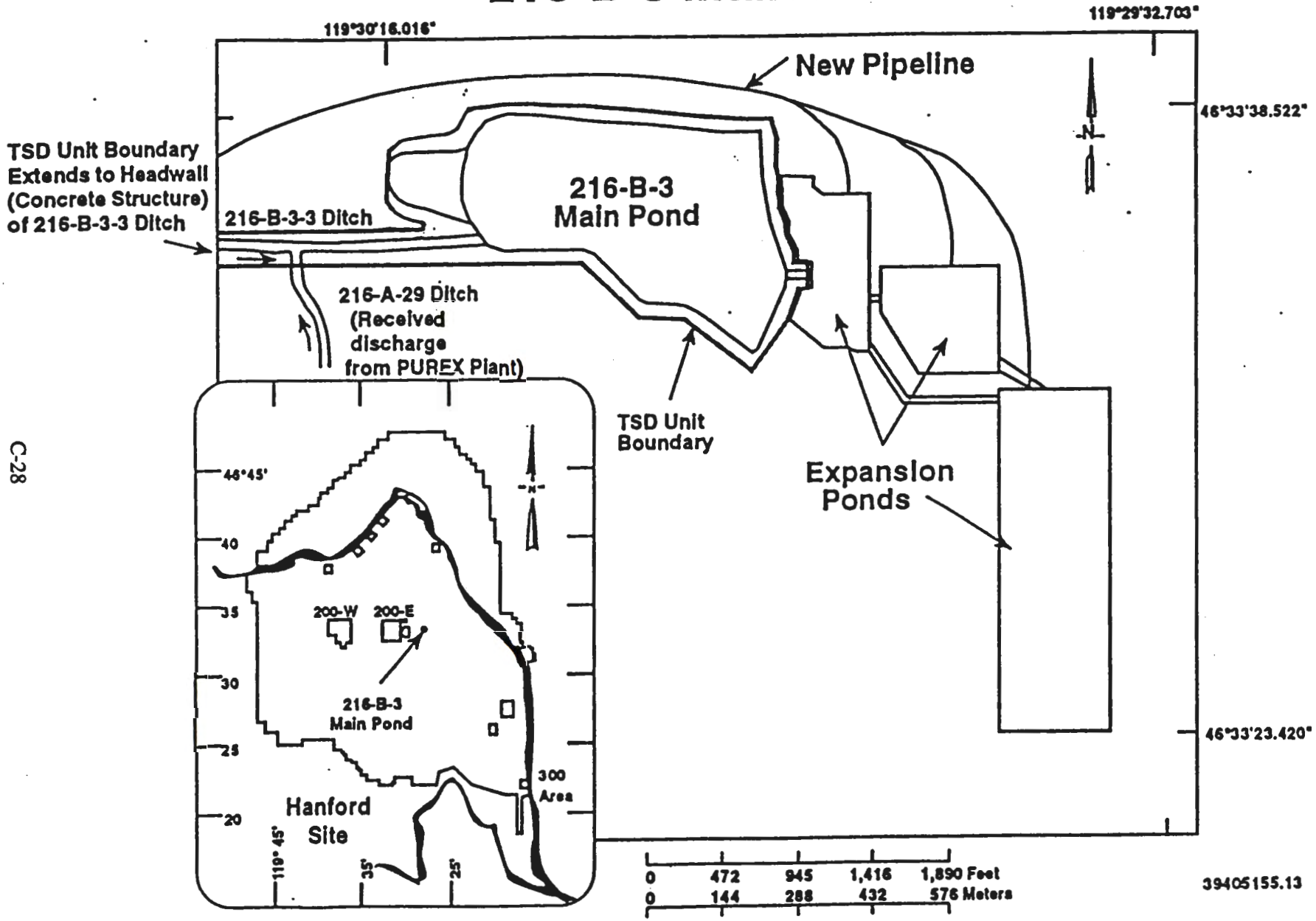
Date

Edward S. Keen — 6/30/94

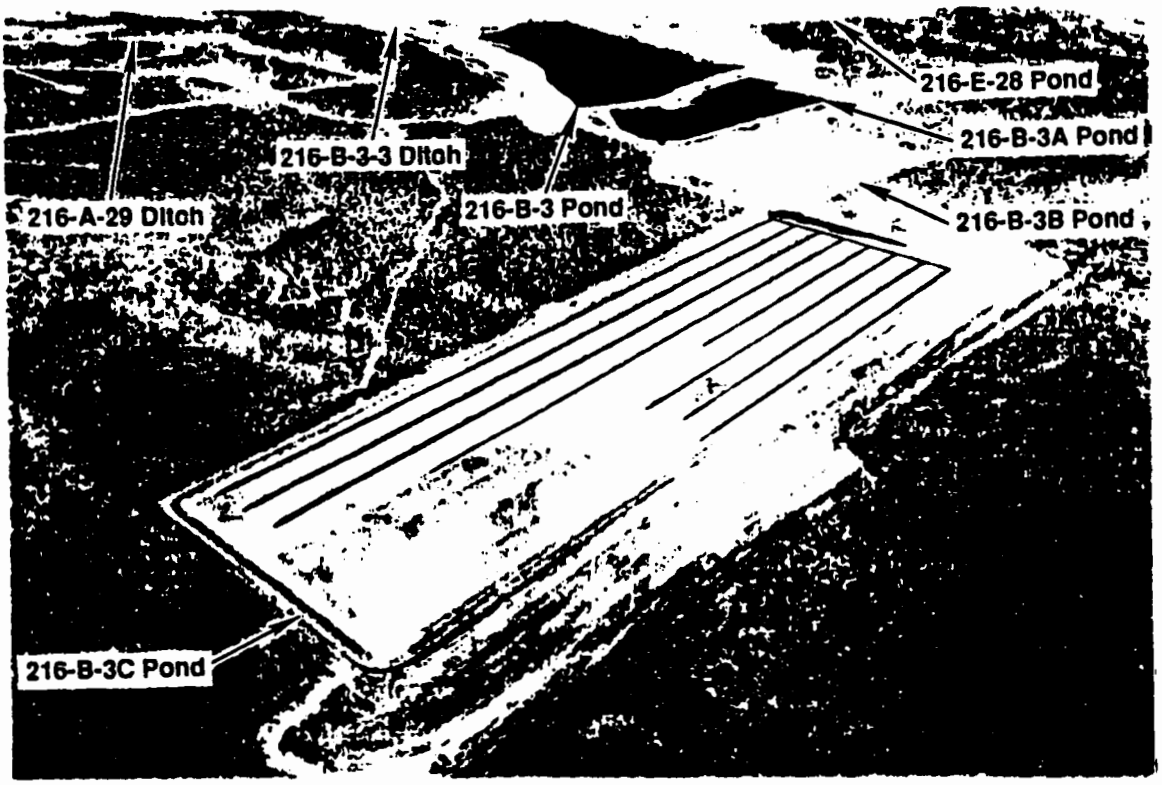
Co-operator
Edward S. Keen, President
Bechtel Hanford, Inc.

Date

216-B-3 Main Pond



216-B-3 MAIN POND



46°33'38.522"
46°33'23.420"
119°30'16.016"
119°29'32.703"

93110825-1CN
(PHOTO TAKEN 1993)

216-B-3 EXPANSION PONDS FORM 3

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED *(mo., day, & yr.)*	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. 1 0 | DAY | YR. 8 3 — FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. | DAY | YR. — FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	S 0 2	500	G		5				
X-2	T 0 3	20	E		6				
1	T 0 2	27,960,000	U		7				
	) 8 4	27,960,000	G		8				
3					9				
4					10				

Continued from the front.

PROCESSES (continued)

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY

T02, D84

The 216-B-3 Expansion Ponds (Expansion Ponds) consist of three interconnected ponds called the 216-B-3A (3A) Pond, the 216-B-3B (3B) Pond, and the 216-B-3C (3C) Pond. These ponds were constructed to receive the increased discharges to the 216-B-3 Pond System, which includes the 216-B-3 Main Pond (Main Pond), a separate dangerous waste treatment and disposal unit as a result of the restart of the Plutonium Uranium Extraction (PUREX) Plant in 1983 and the decommissioning of the Gable Mountain Pond in 1987. The 3A Pond was placed into service in October 1983 and remains in service today. The 3A Pond receives effluent from the Main Pond through a spillway in the dike separating the two ponds. A similar spillway allowed the 3B Pond, which was operational from June 1984 to May 1985, to receive effluent from the 3A Pond. The 3A and 3B Ponds each cover an area of approximately 11 acres (4.4 hectares). The 3C Pond began operation in 1985 and is still in service today. The 3C Pond was constructed by excavating 6 feet (1.8 meters) of soil over a 41-acre (16-hectare) surface area. A spillway similar to the ones used for the 3A and 3B Ponds conveys effluent from the 3A Pond to the 3C Pond.

Waste water (primarily process and cooling water) from the PUREX Plant, the B Plant Complex, the 242-A Evaporator, and other 200 East Area units is received by the expansion ponds through the Main Pond. The Expansion Ponds received corrosive waste as a result of the regeneration of the PUREX Plant demineralizer columns (D84). Treatment of the waste occurred by the successive discharge of acidic and caustic waste, which served to neutralize the corrosivity of the waste before and upon reaching the Expansion Ponds. Residual corrosivity was neutralized by the calcareous nature of the Expansion Ponds soil (T02).

The process design capacities given for the waste process codes T02 [27,960,000 gallons (105,840,000 liters) per day] and D84 [27,960,000 gallons (105,840,000 liters)] represent the Expansion Ponds proportional share (based on percolation capacity) of the process design capacity of the entire B Pond System. At the peak of operations, approximately 22,000,000 gallons (83,280,000 liters) per day of liquid was discharged to the entire 216-B-3 Pond System. Presently, approximately 1,500 gallons (5,678 liters) to 6,000 gallons (22,712 liters) per minute of nondangerous liquid effluent are being sent to the 216-B-3 Pond System.

Construction was begun on a new pipeline in 1990 that will allow waste water to bypass the 216-B-3 Main Pond and discharge directly to the Expansion Ponds.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	K 0 6 4	900	P	T 0 3 D 8 0	
	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	*included with above*

CONTINUE ON PAGE 3

Continued from page 2,
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

"UMBER *(entered from page 1)* 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D002	117,200,000	P	T02	D84			Neutralization/Percolation
2	WT02	2,573,000	↓	↓	↓			included with above
3	U133	1,478,000	P	T02	D84			Neutralization/Percolation
4	WT01	484,000	P	T02	D84			Neutralization/Percolation
5	D006	149,000	↓	↓	↓			included with above
6								
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Continued from the front.

DESCRIPTION OF DANGEROUS WASTES (continued)

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The 216-B-3 Expansion Ponds (Expansion Ponds) received dangerous waste from two main sources: (1) corrosive and toxic dangerous waste resulting from the regeneration of demineralizer columns at the PUREX Plant, and (2) spills of dangerous or mixed waste at the PUREX Plant. Backwash from the regeneration of the demineralizer columns was frequently corrosive (D002) and sometimes contained toxic concentrations of chemicals used in the regeneration process, including nitric acid, sulfuric acid, sodium hydroxide, and potassium hydroxide (WT02). Spills at the PUREX Plant included hydrazine (U133), cadmium nitrate (WT01/D006), and ammonium fluoride/ammonium nitrate (WT01). Since 1984, administrative and engineering barriers have been put in place at the PUREX Plant to prevent dangerous waste from being discharged into the Expansion Ponds.

The quantity of waste listed for D002/WT02 is an estimated annual quantity based on the Expansion Ponds proportional share (based on percolation capacity) of the amount of corrosive and toxic dangerous waste received by the entire 216-B-3 Pond System (which includes the 216-B-3 Main Pond, a separate dangerous waste treatment and disposal unit). The quantities of waste listed for U133 and WT01/D006 represent the Expansion Ponds' proportional share (based on percolation capacity) of the total recorded amount of hydrazine, cadmium, and ammonium fluoride/ammonium nitrate received by the entire B Pond System from the time the PUREX Plant resumed operations in 1983 until the last known chemical discharge occurred in 1987.

The quantities of waste listed for U133 and WT01/D006 include the water in which the chemicals were discharged. Water makes up most of the weight of these discharges.

FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	12/16/93

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

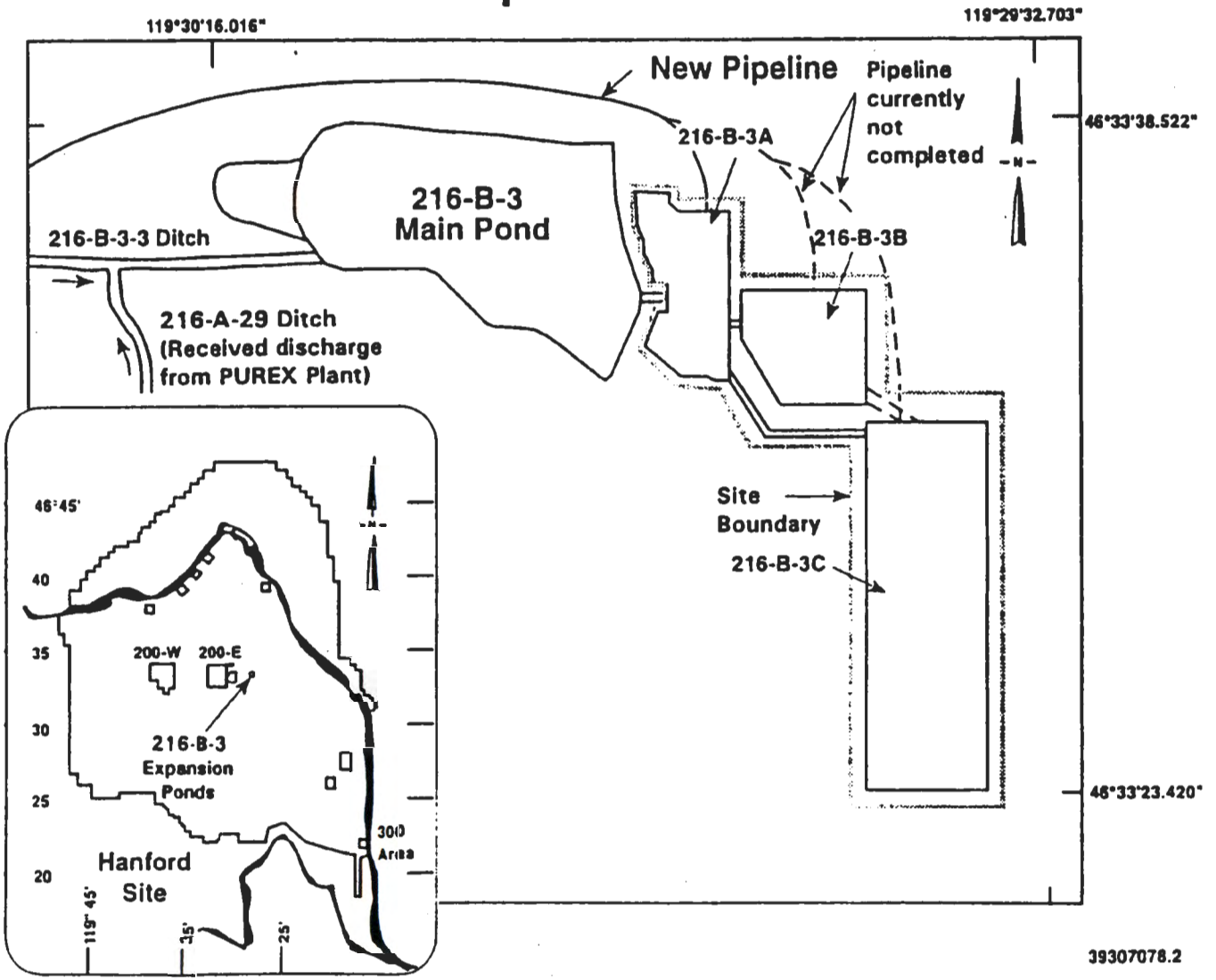
Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

Date 12/16/93

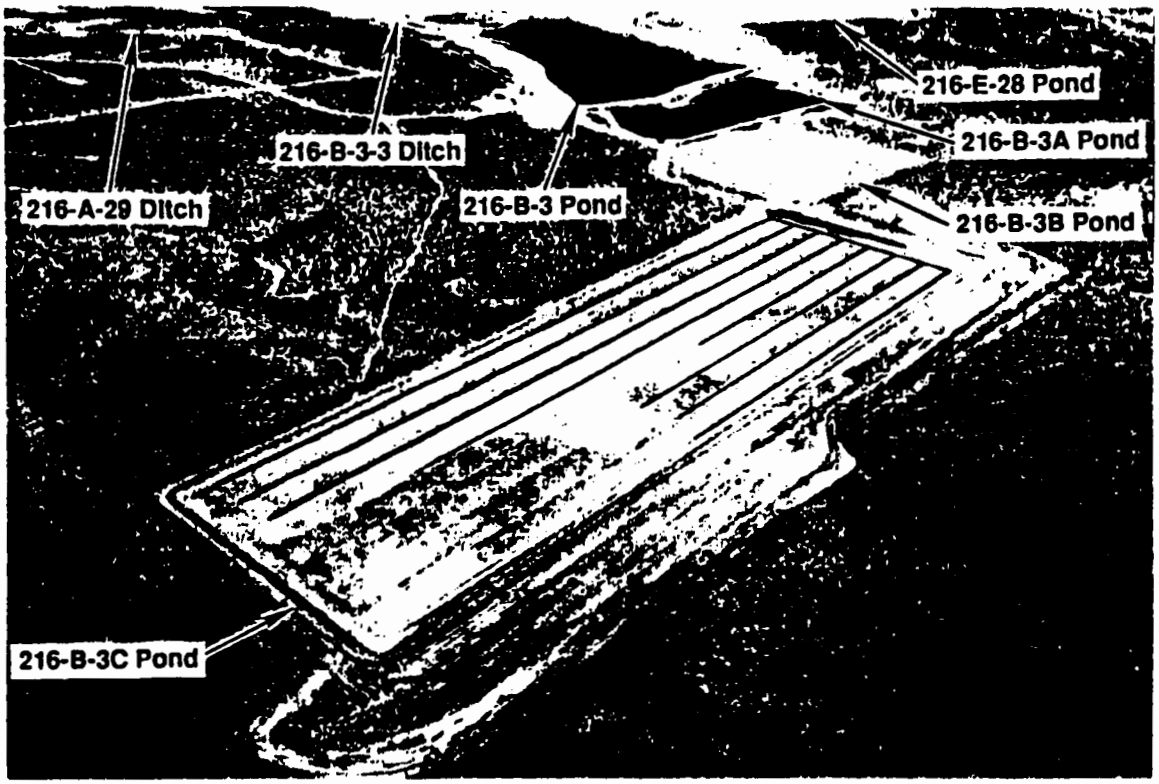
Co-operator
Thomas M. Anderson, President
Westinghouse Hanford Company

Date 12/1/93

216-B-3 Expansion Ponds



216-B-3 Expansion Ponds



46°33'38.522"
46°33'23.420"
119°30'16.016"
119°29'32.703"

93110825-1CN
(PHOTO TAKEN 1993)

LIQUID EFFLUENT RETENTION FACILITY
FORM 3

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

M

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. | DAY | YR.
FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. 0 6 | DAY 2 8 | YR. 9 3
FOR NEW FACILITIES, PROVIDE THE DATE *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occuring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
	S 0 4	19,500,000	G		7				
2					8				
3					9				
4					10				

C-43

CONTINUE ON REVERSE

Continued from the front.

II. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

S04

The Liquid Effluent Retention Facility (LERF) was constructed under interim status in accordance with the Washington Administrative Code (WAC) 173-303. The LERF will provide interim storage of the 242-A Evaporator process condensate until treatment capability for the process condensate is available.

The LERF is a retention basin consisting of three cells (surface impoundments) (S04). Each cell has a design capacity of 6,500,000 gallons (24,605,000 liters) with a total capacity of 19,500,000 gallons (73,815,000 liters).

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of these dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	Included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

NUMBER *(entered from page 1)* A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(If a code is not entered in D(1))*
1	F001	162,728,000	P	S04	Storage - Surface Impoundment
2	F002				
3	F003				
4	F004				
5	F005				
6	WT02				Included With Above
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front.

V. DESCRIPTION OF DANGEROUS WASTES (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The LERF will receive and store the 242-A Evaporator process condensate until treatment capability for the process condensate is available. A description of the dangerous waste stored at LERF is as follows.

The 242-A Evaporator process condensate will be regulated as a mixed waste due to the presence of spent halogenated and nonhalogenated solvents (F001, F002, F003, F004, and F005) and for the toxicity of ammonia (WT02, toxic state-only dangerous waste).

The Estimated Annual Quantity of Dangerous Waste (item III.B.1) of 162,728,000 pounds (73,812,000 kilograms) per year is based on approximately 19,500,000 gallons (73,815,000 liters) of waste, or the total capacity of the the LERF.

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	5/19/93

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

CONTINUE ON PAGE 5

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

John D. Wagoner

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

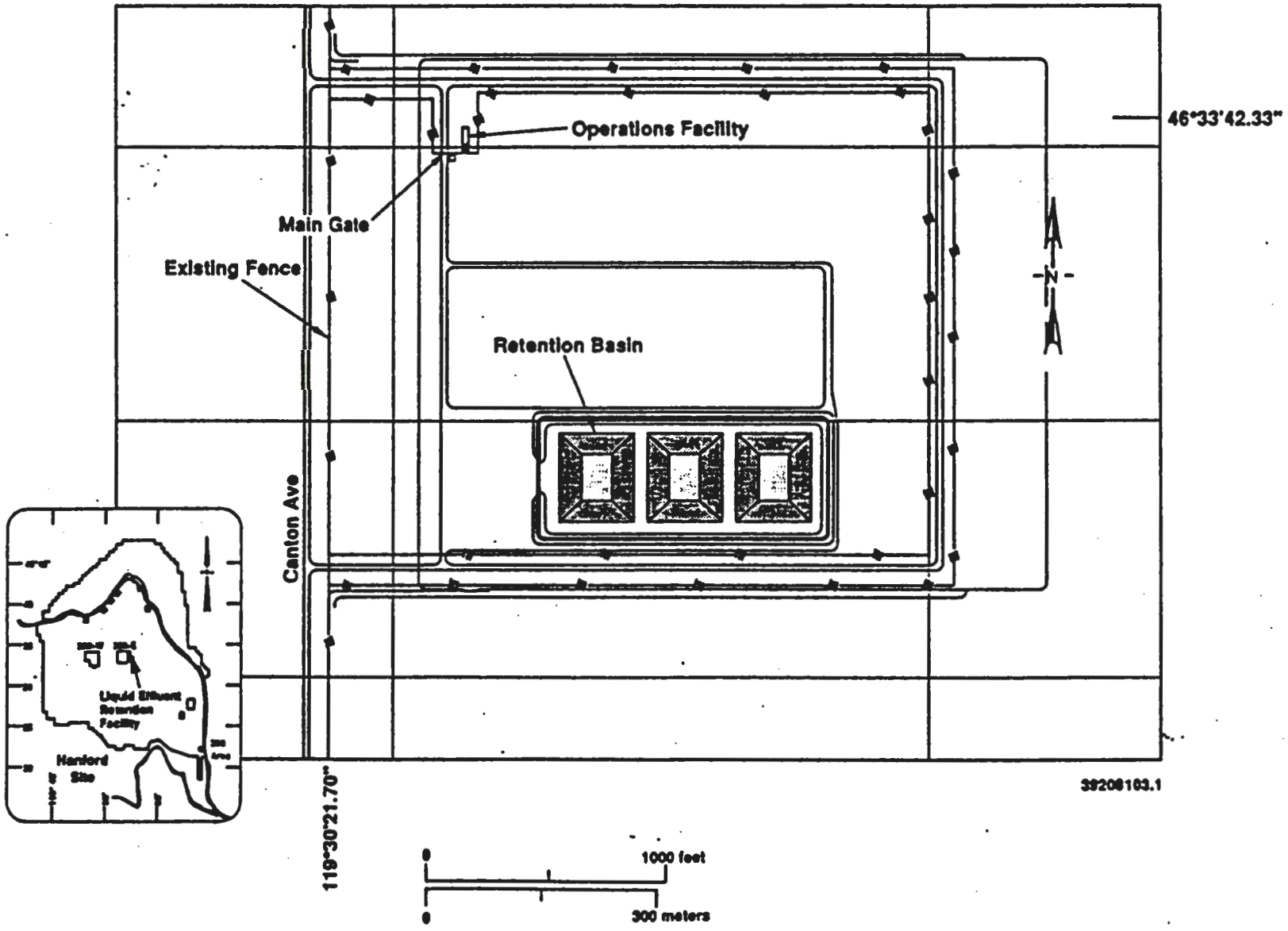
Date 5/19/93

Thomas M. Anderson

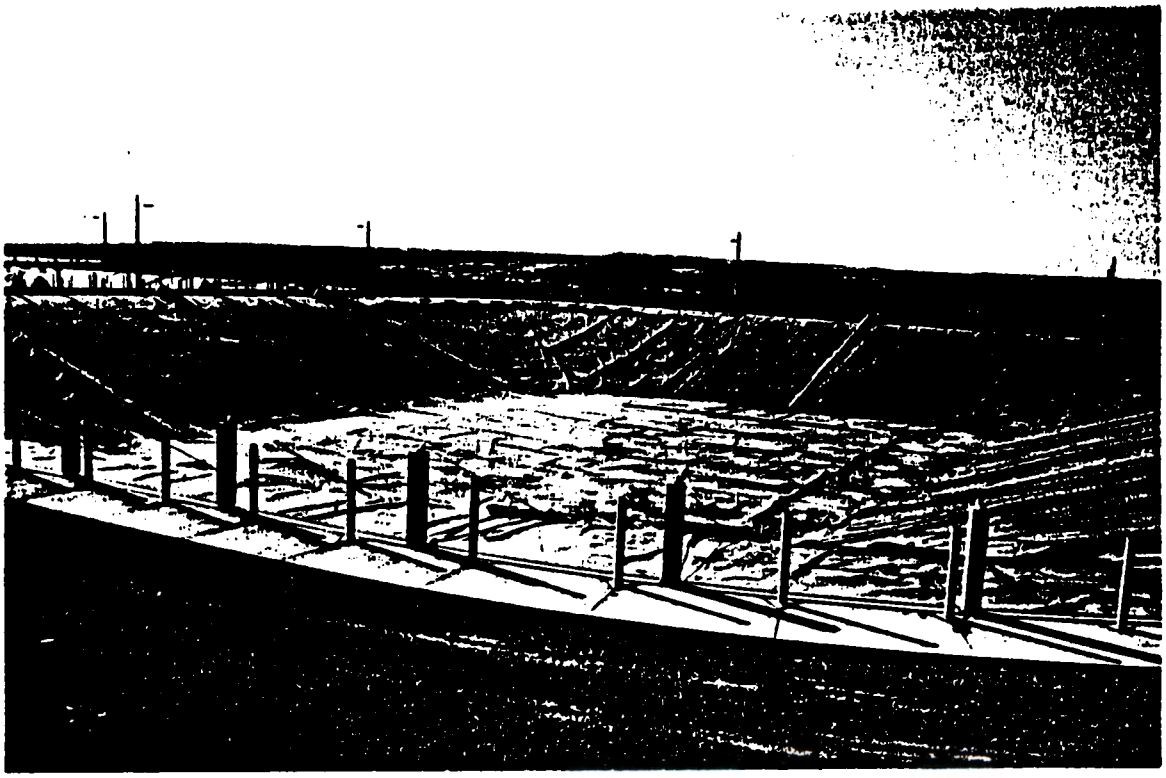
Co-operator
Thomas M. Anderson, President
Westinghouse Hanford Company

Date 4/7/93

Liquid Effluent Retention Facility Site Plan



LIQUID EFFLUENT RETENTION FACILITY



TYPICAL BASIN

46°33'42.33"
119°30'21.70"

92081260-9CN
(PHOTO TAKEN 1992)

EFFLUENT TREATMENT FACILITY
FORM 3

Pl
/ t or type in the unshaded areas only
t are spaced for elite type, i.e., 12 character/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. | DAY | YR. — FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. 0 3 | DAY | YR. 9 3 — FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.*

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
	0 1	216,000	U		7				
2	S 0 2	2,010,000	G		8				
3	S 0 1	39,600	G		9				
4					10				

ed from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T01, S02

The 200 Area Effluent Treatment Facility (ETF) is being constructed to treat and store process condensate from the 242-A Evaporator, and the Liquid Effluent Retention Facility, and possibly other Hanford Facility waste that falls within the envelope of acceptable waste at the ETF. The ETF is located in the northeast corner of the 200 East Area. The treatment process includes filtration, pH adjustment, ultraviolet oxidation, hydrogen peroxide decomposition, degasification, reverse osmosis, ion exchange, effluent quality verification in tanks, evaporation, concentration, and thin film drying (T01). The treated effluent is stored in three verification tanks (S02) and sampled to determine if the effluent meets required discharge standards. When the effluent meets the discharge standards as established by the regulations, the effluent will be discharged to the soil. If the sample analysis of the effluent in the verification tanks does not meet the discharge standards, the effluent will be sent back through the system for further treatment.

The treatment process is designed to treat a maximum of 150 gallons (568 liters) per minute or 216,000 gallons (817,650 liters) per day. The tank storage is designed to store a maximum of 2,010,000 gallons (7,610,000 liters).

S01

A secondary waste stream is generated during operation of the ETF. This secondary waste is concentrated into a powder, containerized, and transferred to the Central Waste Complex for storage while disposal options are evaluated. Other mixed waste generated and containerized during the operation of the ETF includes dewatered spent bead resin, spent membranes, spent high-efficiency particulate air cartridges, spent filter elements, spent activated carbon cartridges, and spent ultraviolet lamps. Nonradioactive dangerous waste includes chemicals used in the various processes. This nonradioactive dangerous waste is containerized and transferred to the 616 Nonradioactive Dangerous Waste Storage Facility.

The container storage area is designed to store a maximum of 39,600 gallons (150,000 liters).

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173 303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.

2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.

3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
)	0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 0 2			T 0 3 D 8 0	Included with above

...d from page 2.
Photocopy this page before completing if you have more than 26 wastes to list.

...ABER *(entered from page 1)*

W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(If a code is not entered in D(1))*
1	F001	657,935,000	P	T01	Treatment - Tank
2	F002				
3	F003				
4	F004				
5	F005				
6	WT02				Included With Above
7	F001	67,094,000	P	S02	Storage - Tank
8	F002				
9	F003				
	004				
11	F005				
12	WT02				Included With Above
13	D001	4,380,000	P	S01	Storage - Container
14	D002				
15	D003				
16	D004				
17	D005				
18	D006				
19	D007				
20	D008				
21	D009				
22	D010				
23	D011				
	018				
25	D019				
26	D022				

Continued from page 2.
Photocopy this page before completing if you have more than 26 wastes to list.

I. NUMBER *(entered from page 1)*

W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D028	4,380,000	P	S01	Storage - Container (cont.)
2	D029	(cont.)			
3	D030				
4	D033				
5	D034				
6	D035				
7	D036				
8	D038				
9	D039				
10	D040				
11	D041				
12	D043				
13	F001				
14	F002				
15	F003				
16	F004				
17	F005				
18	WT01				Included With Above
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front.

DESCRIPTION OF DANGEROUS WASTES (continued)

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The ETF treats and stores process condensate from the 242-A Evaporator, and the Liquid Effluent Retention Facility, and possibly other dilute aqueous waste streams generated on the Hanford Facility. The effluent stored in the verification tanks for sampling is regulated as a dangerous waste because of the possible presence of spent halogenated and nonhalogenated solvents (F001 through F005) and for the toxicity of ammonia (WT02, toxic state-only dangerous waste). The secondary waste stream is regulated as a dangerous waste because of the presence of characteristic waste (D001, D002, and D003), toxic constituents (D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D030, D033, D034, D035, D036, D038, D039, D040, D041, and D043), spent halogenated and nonhalogenated solvents (F001 through F005), and toxic state-only extremely hazardous waste (WT01).

The annual quantity of waste listed under item IV.B was calculated using an operating schedule of 365 days per year. This calculation was done to provide a maximum annual estimated quantity of waste that might be treated and stored by the ETF.

ACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[x] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information. I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	8/25/93

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information. I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

John D. Wagoner — 8/25/93

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

Date

Thomas M. Anderson — 7/29/93

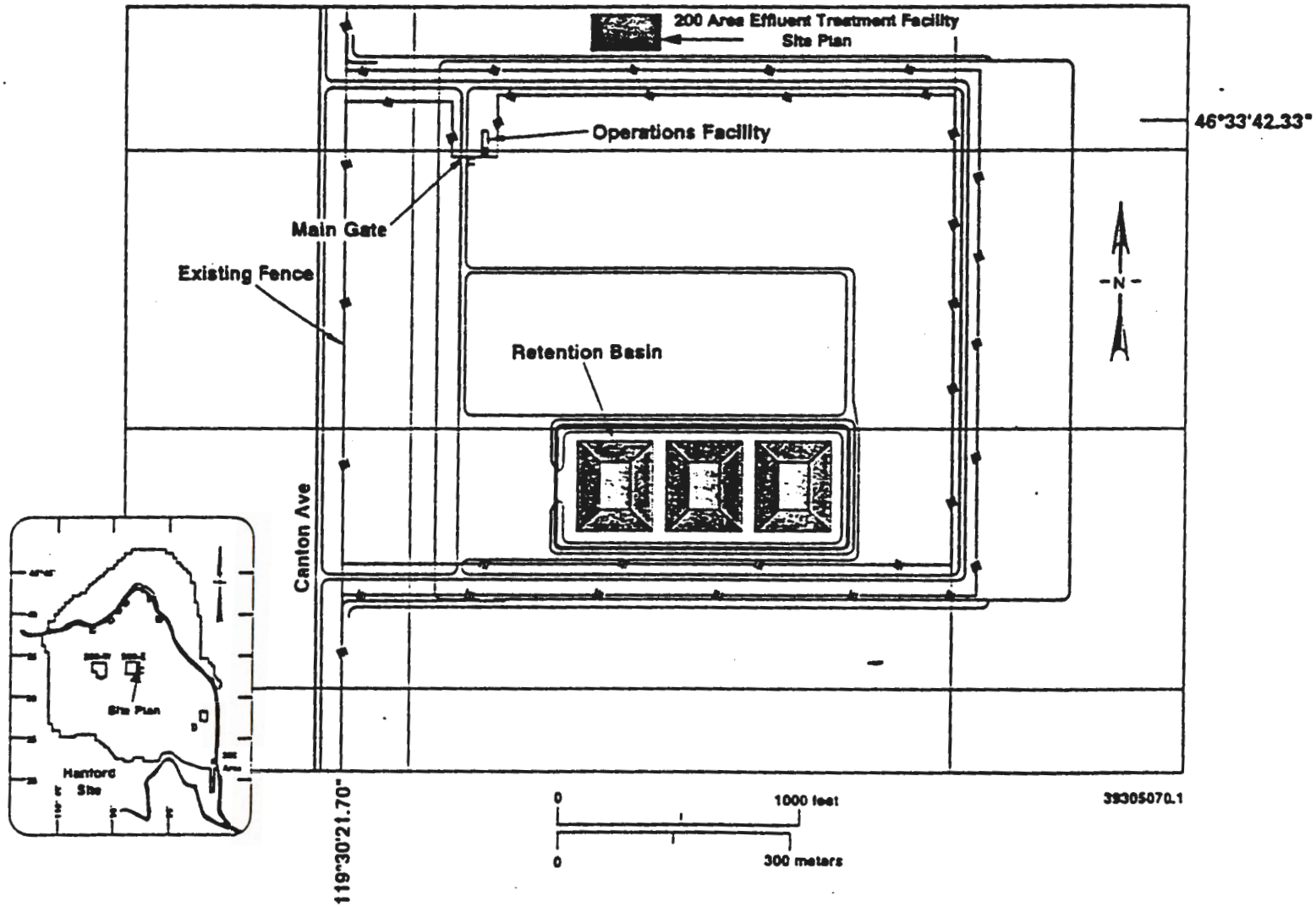
Co-operator
Thomas M. Anderson, President
Westinghouse Hanford Company

Date

9513337.1423

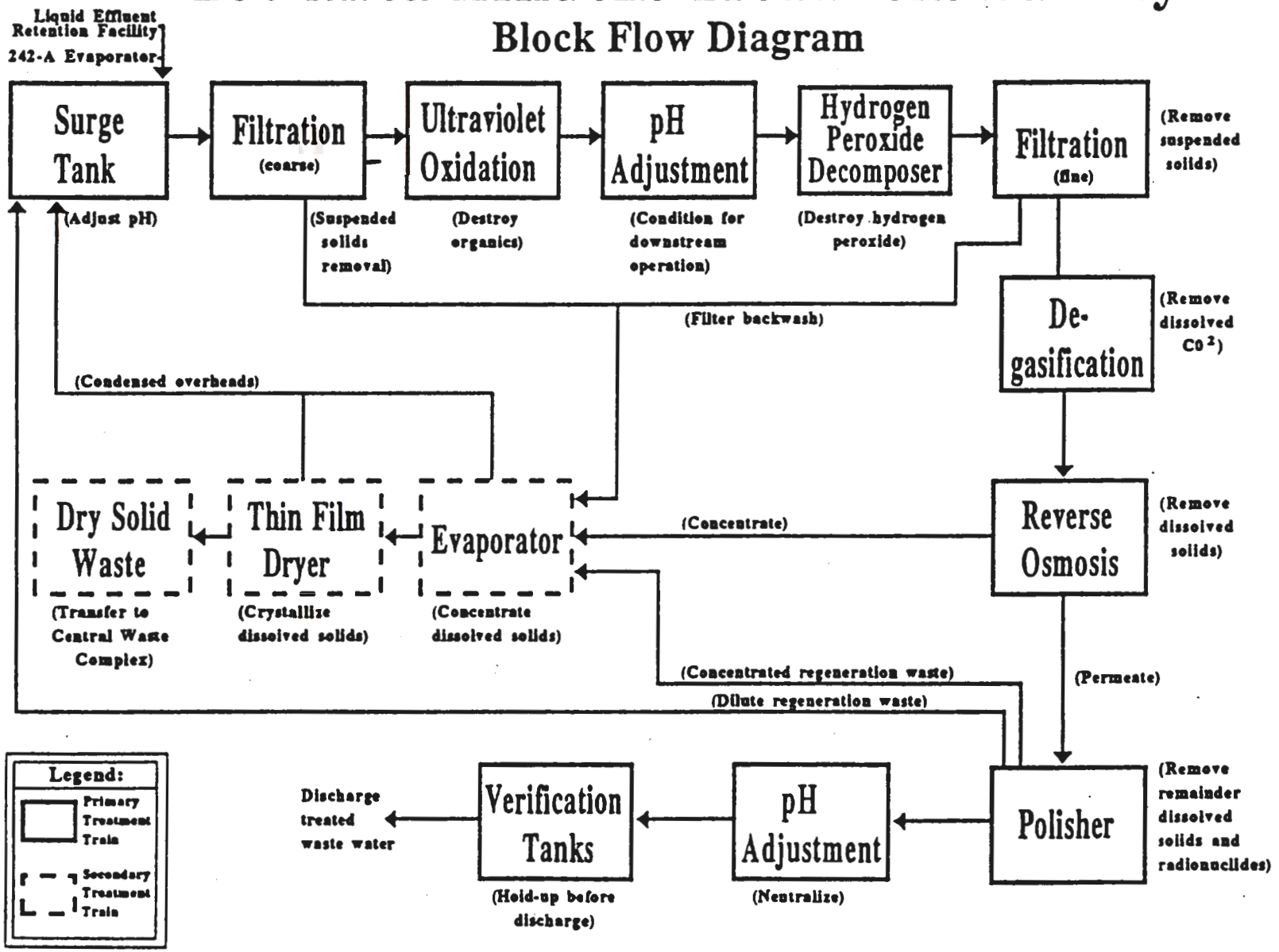
200 Area Effluent Treatment Facility

Site Plan

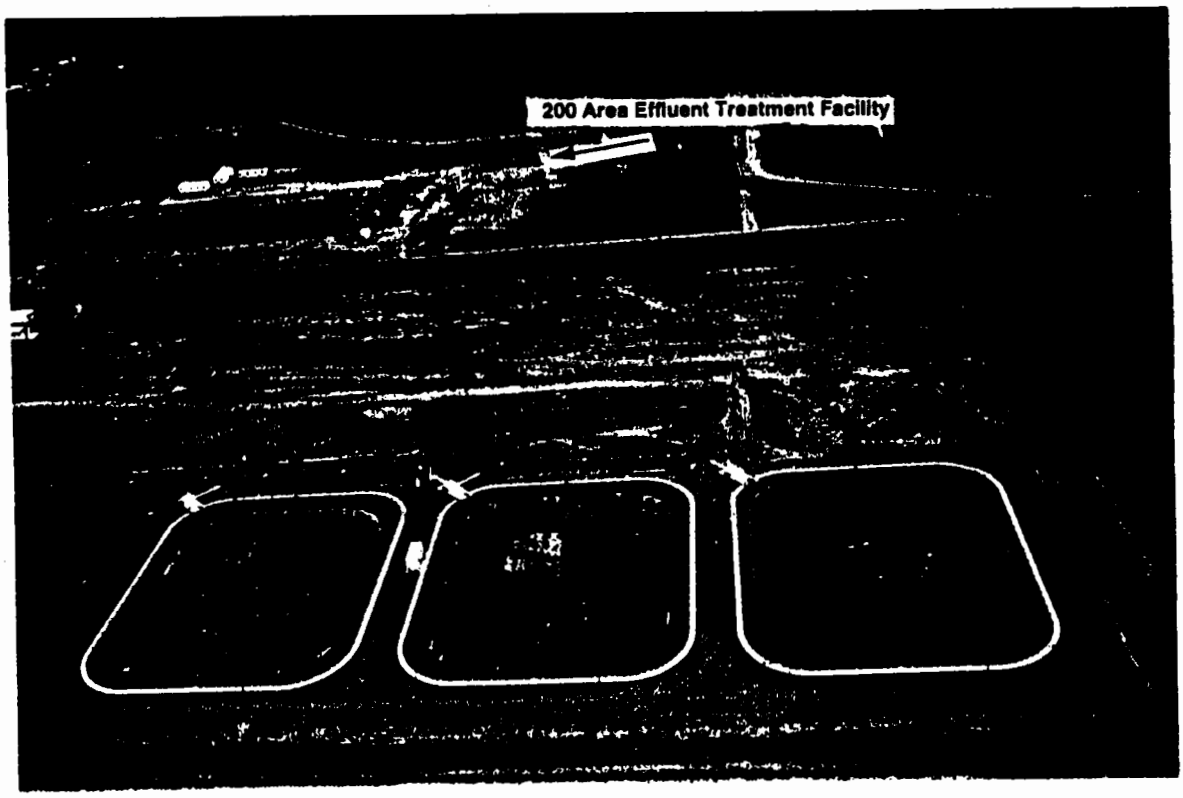


200 Area Effluent Treatment Facility

Block Flow Diagram



200 AREA EFFLUENT TREATMENT FACILITY



46°33'42.33"
119°30'21.70"

93030994-79CN
(PHOTO TAKEN 1993)

PURGEWATER TANKS FORM 3

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION ACCEPTED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION (place an "X" below and provide the appropriate date)

☐ 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)

MO. | DAY | YR. — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (see the boxes to the left)

☒ 2. NEW FACILITY (Complete item below.)

MO. 01 | DAY 25 | YR. 90 — FOR NEW FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION (place an "X" below and complete Section I above)

☐ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Two lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET (the volume that would cover one acre to a depth of one foot) OR HECTARE-METER
LAND APPLICATION	D82	ACRES OR HECTARES
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S02	600	G		5				
X-2	T03	20	E		6				
1	S05	6,000,000 *	G		7				
2	T04	14,000	U		8				
3									
4									

* Process Code S05 is being utilized to designate the 600 Area Purgewater Storage and Treatment Facility as 'miscellaneous units' per the proposed Washington State Dangerous Waste Regulation 173-303 'Subpart X'.

Continued from the front

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY

S05 - The 600 Area Purge Water Storage and Treatment Facility consists of six above ground 1,000,000 gallon miscellaneous units, with a combined total capacity of 6,000,000 gallons. These units are located in the 600 Area, north of the 216-B-3 Pond. The purgewater storage and treatment miscellaneous units are used for interim storage and treatment of purgewater generated from the groundwater monitoring wells located throughout the Hanford Site. The purgewater is generated when a groundwater monitoring well is developed or groundwater samples are obtained. The purgewater from a groundwater monitoring well is transported by tank truck and pumped directly into the 600 Area miscellaneous units.

T04 - Treatment of the purgewater by evaporation is carried out in the six 600 Area miscellaneous units. Approximately 14,000 gallons per day of purgewater can be treated by solar evaporation based upon the evaporation rates calculated for the Hanford Site and assuming all six miscellaneous units are in use.

IV. DESCRIPTION OF DANGEROUS WASTES

A. **DANGEROUS WASTE NUMBER** — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. **ESTIMATED ANNUAL QUANTITY** — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non—listed waste(s) that will be handled which possess that characteristic or contaminant.

C. **UNIT OF MEASURE** — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non—listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. **PROCESS DESCRIPTION:** If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER — Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	included with above

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter codes)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter codes)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F001	50,072,346	P	S05	Storage/Miscellaneous Units
2	F002	↓	↓	↓	↓
3	F003	↓	↓	↓	Included With Above
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter codes)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	F001	42,644,948	P	T04	Treatment/Other/Evaporation (Miscellaneous Units)
2	F002				
3	F003				Included With Above
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

CONTINUE ON REVERSE

Continued from the front

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The purgewater that is stored and treated in the 600 Area miscellaneous units comes from groundwater monitoring wells located throughout the Hanford Site.

The estimated annual quantity of waste indicated is based upon the maximum projected storage and treatment capacities of the miscellaneous units. The volumes resulting from well sampling and well development activities can be estimated, however the volumes resulting from aquifer testing are still unknown.

Materials stored in this facility may potentially include the nonspecific waste codes F001, F002, and F003.

This Part A permit application is being submitted as a protective filing in order that this facility may be authorized to store regulated waste. This facility will also be used to store non-regulated purgewater.

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

VI. PHOTOGRAPHS

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on attached drawings and photographs

LATITUDE (degrees, minutes, & seconds)	LONGITUDE (degrees, minutes, & seconds)

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. (area code & no.)

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (print or type)	SIGNATURE	DATE SIGNED
Michael J. Lawrence Manager, Richland Operations United States Department of Energy	Michael J. Lawrence	2-20-90

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (print or type)	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

John E. Nolan

Co-operator
John E. Nolan, President
Westinghouse Hanford Company

1/18/90
Date

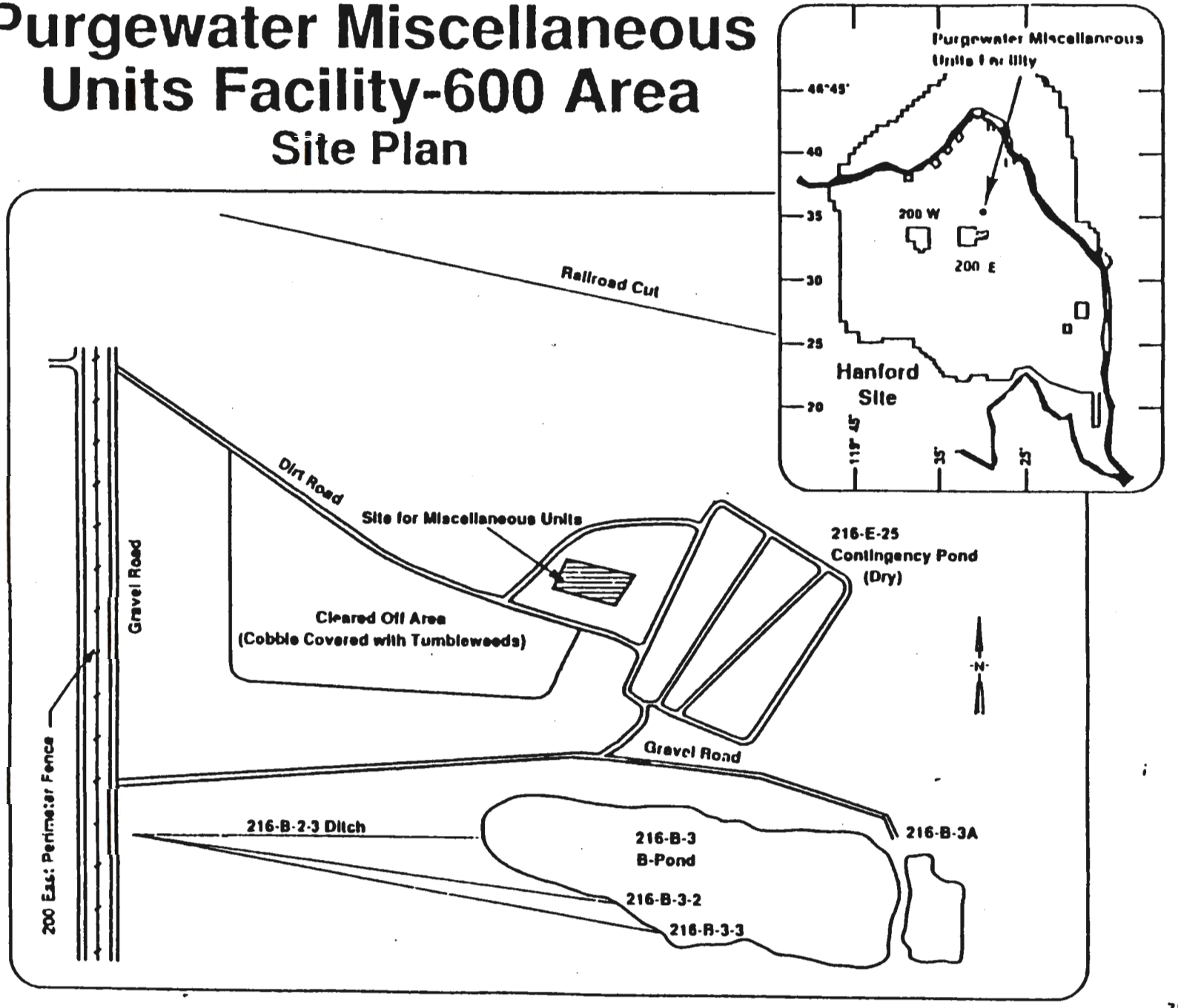
Michael J. Lawrence

Owner/Operator
Michael J. Lawrence, Manager
U.S. Department of Energy
Richland Operations Office

2-20-90
Date

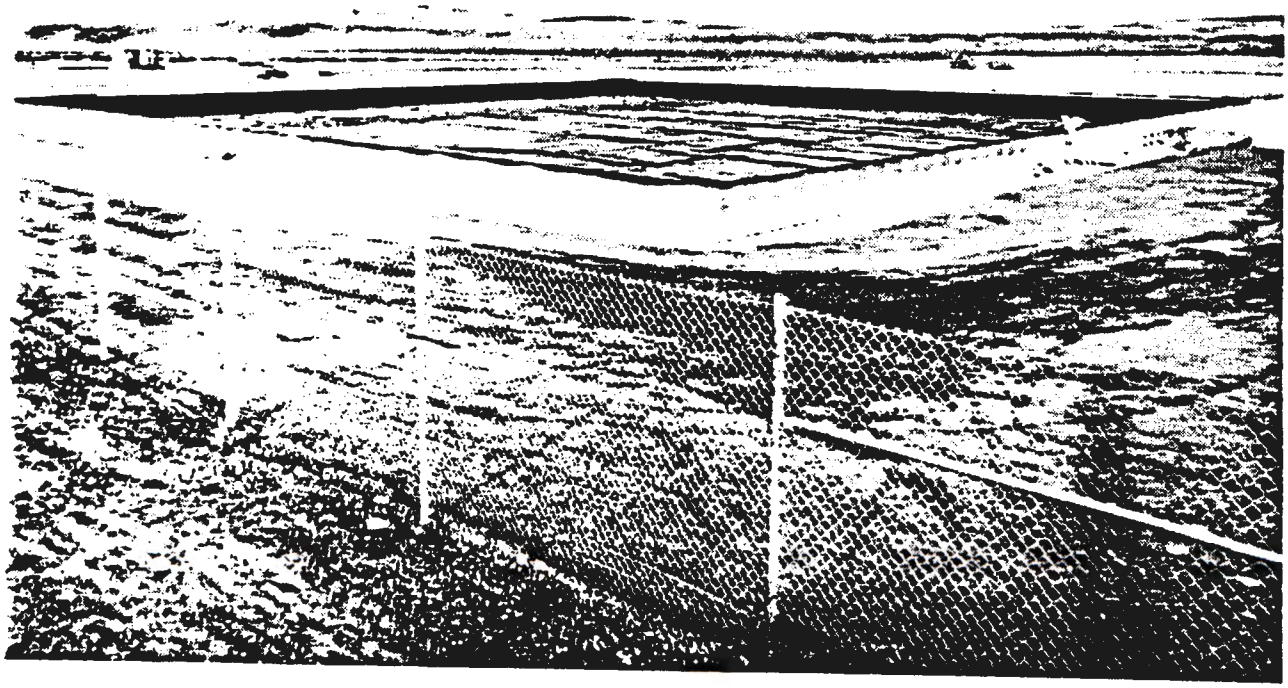
Purgewater Miscellaneous Units Facility-600 Area

Site Plan



78911068.2

600 AREA PURGEWATER STORAGE AND TREATMENT FACILITY MISCELLANEOUS UNIT (TYPICAL)



46°45'33"
119°45'33"

89122121-3CN
(PHOTO TAKEN 1990)

APPENDIX D

200-BP-11 OPERABLE UNIT DATA QUALITY OBJECTIVE DECISIONS/AGREEMENTS/COMMITMENTS

200-BP-11 Operable Unit Data Quality Objectives Decisions/Agreements/Commitments

As of October 26, 1994, there have been two Data Quality Objective (DQO) processes held amongst the Department of Energy (Richland Office), Washington State Department of Ecology (Ecology), and U.S. Environmental Protection Agency (EPA) in preparation of a coordinated RCRA Facility Investigation/ Corrective Measure Study (RFI/CMS) for the 200-BP-11 Operable unit and the closure/postclosure of the RCRA TSD units contained within the operable unit.

The first DQO process spanned from October 1993 to March 1994 and included the DQOs for preparation of the *200-BP-11 Operable Unit and 216-B-3 Main Pond Work/Closure Plan* (DOE/RL-93-74), Volume 1, Draft A. The operable unit at the time of the first DQO process consisted of ten waste management units: the 216-B-3 Main Pond; the 216-B-3A, 216-B-3B and 216-B-3C Expansion Ponds; the 216-B-3-1, 216-B-3-2, and 216-B-3-3 Ditches; the 216-E-28 Contingency Pond; and Unplanned Releases UN-200-E-14 and UN-200-E-92. The 216-B-3 Main Pond and 216-B-3-3 Ditch are united to form one RCRA TSD unit called the 216-B-3 Main Pond, and the 216-B-3A, 216-B-3B, and 216-B-3C Expansion Ponds are combined to form another RCRA TSD unit called the 216-B-3 Expansion Ponds.

The second DQO process was finalized in October 1994 and took about one month to complete. This process occurred because of the addition of five waste management units to the operable unit: the 216-A-29 Ditch; the 216-B-63 Trench; and the 216-B-2-1, 216-B-2-2, and 216-B-2-3 Ditches. The 216-A-29 Ditch and the 216-B-63 Trench are individual RCRA TSD units.

The significant decisions, agreements, and commitments resulting from the two DQO processes are provided on the following pages and are accepted by the tri-parties as endorsed below.

Bryan J. Foley, 1/4/95
DOE Operations Office, Richland

Joanne S. Wallace 1/4/95
Washington State Department of Ecology, RCRA Past-Practice

Joanne S. Wallace 1/4/95
Washington State Department of Ecology, RCRA TSD

Paul H. Beam
U.S. Environmental Protection Agency

Joseph Cogliati
200 Area Project Management

200-BP-11 Operable Unit Data Quality Objectives
Decisions/Agreements/Commitments

1. Assumptions.

   a. The 216-B-3A, 216-B-3B, and 216-B-3C Expansion Pond TSD unit will be clean closed as described in the *216-B-3 Expansion Ponds Closure Plan*, DOE/RL-89-28, Rev. 2.

   b. Quality Assurance Project Plans (QAPjPs) and Sampling and Analysis Plans (SAPs) will meet both RCRA TSD and RCRA Past-Practice DQOs.

   c. The 200-BP-11 Operable Unit meets the Model Toxics Control Act (MTCA) definition of Industrial, thus the future land use for the 200-BP-11 Operable Unit is assumed to be Industrial.

   d. The risk assessment methodology from the Hanford Site Baseline Risk Assessment Methodology (HSBRAM) will utilized for the 200 Area Industrial scenario. The risk assessment may need to be updated at a later date to assess risks based on a residential scenario.

   e. Waste might be left in place in the operable unit and/or the TSD units within the operable unit.

   f. RCRA TSDs within the operable unit may be clean closed, modified clean closed, and/or closed as landfills under Washington State regulations (WAC 173-303).

   g. The same cleanup standards will apply to the TSD and the Past-Practice waste management units within the operable unit.

2. Statistical Sampling Approach.

   Upon evaluation by WHC, MacTec, Enserch (Ebasco), and PNL statisticians, it was agreed that currently available data is not representative for the area under study (all 200-BP-11 waste management units). Additional information required to compute the needed sample size (number of samples) are: the acceptable Type I and Type II error rates; the difference between the mean contaminant concentration and applicable cleanup standard that is important for the test to detect; the estimates of variabilities (lateral and vertical); and exposure unit.

   Therefore, a phased approach will be taken toward characterization of the operable unit and Phase 1 (Pilot Study) sampling will be engineered biased (i.e., sample in locations expected to have highest contaminant concentrations). Phase 1 sampling data will be evaluated (distribution, frequency, validation, variability, contamination levels, regulatory guidelines, etc.) to aid in the assessment of characterization activities following Phase 1.

200-BP-11 Operable Unit Data Quality Objectives
Decisions/Agreements/Commitments

3. Phase 1 Sampling Objective. Below are the key objectives of Phase 1 sampling.

   a. Assess site contamination to Industrial Cleanup Standards (MTCA C for dangerous waste and HSBRAM [Hanford Site Baseline Risk Assessment Methodology] for radionuclides). However, the analyses provided in support of characterization will have practical quantitation limits below the Residential Cleanup Standards (MTCA B for dangerous waste and HSBRAM for radionuclides) or Site Background to support an evaluation of clean closure or modified closure for the following RCRA TSD units: 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch.

   b. Answer the question -- is an Interim Remedial Measure (IRM) justified? If yes, the IRM action will be taken followed by final corrective actions. If not, then the final corrective actions will be pursued.

   c. Provide data for a qualitative/quantitative risk assessment.

   - Note that groundwater sampling is beyond the scope of the 200-BP-11 characterization activities, but groundwater contamination and monitoring will need to be addressed prior to closure of the TSDs. Additionally, prior to borehole drilling, groundwater personnel will be consulted to assess their need for groundwater monitoring wells.

4. The agreed-to potential Contaminants of Concern (COC), Practical Quantitation Limits (PQL), Method Detection Limits (MDL), Analytical Methods, and Cleanup Standards for the operable unit are provided in Attachment 1. The agreements that are inherent to Attachment 1 include:

   a. Analytical methods will be SW-846 with summary deliverables for all data packages. As data packages are selected for validation (Item 12), they will be upgraded to standalone deliverable standards. (Note that upgrading of the data packages from a summary deliverable to a standalone deliverable will take approximately 3 weeks.)

   b. Non-detects will be reported as less than the PQL or MDL concentration number. Other calculations can be reported if requested.

   c. The following compounds do not have readily available methods and have a low probability of being present and will be identified and estimated in concentration as Tentatively Identified Compounds (TICs): 1-butanol (8240), ethyl ether (8240), formaldehyde (8270), acetate (8270), and kerosene (8270).

200-BP-11 Operable Unit Data Quality Objectives
Decisions/Agreements/Commitments

4. (cont.)

   d. Tributylphosphate (TBP) is not on any standard analyte list. The laboratory will calibrate for this compound during the 8270 analysis and will quantitate each sample for this analyte. PQLs will be determined and reported for this analyte. This is a requirement for whatever lab is performing the analyses.

   e. Hydrazine will not be analyzed because it will have decomposed.

   f. Nitrate and nitrite will be examined for all samples using both method 300 (ion chromatography with a 48 hour holding time) and Method 353 (28 day holding time). (Method 300 is also used for sulfate/sulfite and therefore there is no cost increase to report nitrite/nitrate and compare to the Method 353 results.)

   g. Total chromium will be analyzed using method 6010 and assumed as chromium six.

5. Supplementary Analyses.

   All samples will be analyzed for a "modified" 40 CFR 264 Appendix IX groundwater monitoring list. The modified Appendix IX list for the 200-BP-11 operable unit is defined as the Appendix IX analytical methods minus analyses for phosphorous pesticides (method 8140), herbicides (method 8150), dioxins (method 8280), and non-halogenated volatile organics (method 8015). The non-halogenated volatile organics (e.g. kerosene) will be analyzed as TICs using method 8240B and 8270B.

6. Sampling Design and Approach.

   a. The sampling design for the first round of sampling is provided in Attachment 2. (Note that auger holes may be substituted for a test pit.)

   b. Round One of the Field Investigation -- Sampling will be performed to assess the question; are dangerous constituents or radionuclide contamination present in concentrations greater than Industrial Cleanup Standards (per MTCA C and HSBRAM Industrial, respectively)?

200-BP-11 Operable Unit Data Quality Objectives
Decisions/Agreements/Commitments

6. (cont.)

   c. Round 2 of the Field Investigation -- The extent of this sampling effort will be defined after evaluation of the analytical results from round one of the field investigation. Possible scenarios include:

      i. If contamination concentrations are established between Residential and Industrial Cleanup Standards, then sample to further prove the absence of dangerous constituents and radionuclide contamination above Industrial Cleanup Standards. This task should fulfill sampling requirements to support modified closure.

      ii. If contamination concentrations are established below Residential Standards for dangerous waste and below Industrial Standards for radionuclides, then sampling may be performed, if feasible, to "clean close" one, two, or three of the RCRA TSDs. Feasibility will depend on the benefits of clean closure versus additional sampling costs. If clean closure is not feasible, then sample per (i.) above or not at all.

      iii. If contamination is established above Industrial Standards, ascertain the extent of contamination above these cleanup standards.

7. Field Screening and Sampling Criteria.

   a. All samples and cuttings will be field screened for evidence of volatile organics and radionuclides. Volatiles will be screened by the field geologist or other qualified personnel using an organic vapor monitor. Radionuclides will be screened by alpha and gamma counting instruments. Either a FID (flame ionization detector) or PID (photoionization detector) can be used to detect volatile organics.

   b. The sampling criteria for radionuclide screening is twice background. The sampling criteria for volatile organic screening is 5 ppm. The intent of these criteria is to trigger assessment for sampling. The field geologist will make this assessment, i.e., if there are many locations above the criteria, the field geologist will determine when and where the samples should be taken.

      Note that specific surface samples are not planned since interim stabilization has already occurred, and therefore field screening and/or rad surveys will be used to evaluate potential surface sampling sites.

   c. Local area background radiation will be determined by taking a background reading using the above instruments at an pre-agreed local site in the field, e.g. the Contingency Pond. The local area background will be measured on freshly disturbed surface soil, holding the instruments less than 2.5 cm (1 in.) from the soil. The background readings may be taken daily depending on meteorology, e.g., inversions, wind, etc."

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8. Sampling Locations at Depth.

   a. Sampling from the ground surface to the pond/ditch sediments: Because all of the waste management units to be sampled are interim stabilized (backfilled) except for the 216-B-3A Expansion Pond, this item describes the sampling scenario from the ground surface to the pond/ditch sediments. If surface radiation at the ground level of a sampling location is equal to or greater than twice background, then a sample will be taken at the ground surface. If the surface radiation is not at least twice background, then a sample will be taken between 2 to 6 feet below the surface to support a risk assessment. If the pond/ditch sediments are within this 2 to 6 foot range, then a sample will be taken from the pond/ditch sediments. Also, if a lithological change is encountered, a sample will be taken at the lithologic interface as determined by the field geologist. Samples to be taken below the sediments are described next.

   b. Sampling below the pond/ditch sediments: Samples below the sediments will be taken at lithological interfaces as determined by the field geologist, hot spots, and/or at predetermined depths.

      i. **Lithological Changes.** Estimates of lithologic changes will be made using current stratigraphy maps. The field geologist will make the determination of significant lithologic changes for sampling.

      ii. **Hot Spots.** The field geologist or other qualified person will make the determination as to when to sample a hot spot. Typically, the first indication of a hot spot (as defined in 7b above) will be sampled. In shallow boreholes and test pits (or auger holes), field screening and potential sampling will continue to a minimum of 5 feet below the last hot spot.

      iii. **Pre-established Depths.** Pre-established sampling depths will be used in the absence of lithologic interfaces and hot spots, and apply below the sediment surfaces only (i.e the 0 datum is the pond/ditch sediments). Pre-established sampling depths are as follows:

         - Deep Groundwater Borehole -- 2, 5, 10, 20, 30, 40, 50, 75, 100, and 150 ft., with an additional sample, if possible, above the water table (≈200ft.).

         - Intermediate (50 ft) Boreholes -- 2, 5, 10, 20, 30, 40, and 50 ft.

         - Shallow Test Pits and/or Auger Holes -- 2, 5, 10, 15, and 20 ft.

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9. Perched Water Samples.

If perched water is encountered in a boring, a perched water well will be installed that is screened against the water-bearing interval. Normally one sample will be taken. However, for inorganics, two samples will be collected per well: one will be unfiltered, and a second will be filtered through a 0.45 micron filter onsite before being bottled and preserved. These samples will also be analyzed for the modified Appendix IX list plus fluoride, C-14, and tritium.

10. Physical Sample Analyses.

Samples will be taken at major lithologies within boreholes and may be analyzed for physical properties such as:

- Bulk density
- Particle size distribution
- Moisture content
- pH
- Unsaturated hydraulic conductivity

When possible, the physical samples will be archived until chemical analytical results are obtained and evaluated.

11. Priority of Analyses.

Field screening for radiation will be performed on the loose soil from the drill casing.

At the discretion of the field geologist, when there is sufficient sample size, VOA samples will always be taken first. Other samples will be taken in a sequence which will yield best results.

If there is insufficient sample size, then the following will be the analytical priority:

RCRA Past-Practice and TSD Units	Perched Water
Rad	Rad
Metals	Metals
Semi-VOA	VOA
VOA	Semi-VOA
General Chemistry	General Chem
Physical	Physical

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12. Data Validation.

Initially, summary deliverables will be requested for all data packages. After evaluation of the analytical results, the data packages for validation will be prioritized based on the samples with the highest contaminant concentrations. The data packages selected for validation will then be upgraded with standalone deliverables. Regardless of the analytical results, at least 20% of the data packages will be validated. The overall progress of data package validation will be communicated to DOE, Ecology and EPA for their concurrence.

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POTENTIAL INORGANIC CONTAMINANTS OF CONCERN FOR THE 200-BP-11 OPERABLE UNIT

CONTAMINANT	ORAL RfD	ORAL SF	PQL	HSBRAM (mg/kg)				MTCA (mg/kg)				ANALYTICAL
			(mg/kg	Residential		Industrial		Method "B"		Method,"C"		
	(mg/kg-d)	(mg/kg-d)-1	or ppm)	non-carc.	carcino.	non-carc.	carcino.	non-carc.	carcino.	non-carc.	carcino.	METHOD
Arsenic	3.0E-04	1.7	10 or 0.3	2.40E+01	3.76E-01	1.05E+03	7.10E+00	2.40E+01	5.90E-01	1.05E+03	7.60E+01	GFAA/6010 or 7060)
Barium	7.0E-02	NC	1	5.60E+03		2.45E+05		5.60E+03		2.45E+05		ICP/6010
Beryllium	5.0E-03	4.3	1	4.00E+02	1.50E-01	1.75E+04	2.80E+00	4.00E+02	2.33E-01	1.75E+04	3.10E+01	ICP/6010
Bismuth	NF	NF	7									AA
Boron	9.0E-02	NC	10	7.20E+03		3.20E+05		7.20E+03		3.20E+05		ICP/6010
Cadmium	1.0E-03	NC	2	8.00E+01		3.50E+03		8.00E+01		3.50E+03		ICP/6010
Chromium-VI (a)	1.0E+00	NC	2	4.00E+02		1.75E+04		4.00E+02		1.75E+04		ICP/6010
Copper	4.0E-02	NC	2	3.20E+03		1.40E+05		3.20E+03		1.40E+05		ICP/6010
Iron	NT	NC	10									ICP/6010
Lead	ND	ND	10 or 0.3									ICP/6010 or 7421
Manganese	1.4E-01	NC	1	1.12E+04		4.90E+05		1.12E+04		4.90E+05		ICP/6010
Mercury	3.0E-04	NC	0.1	2.40E+01		1.05E+03		2.40E+01		1.05E+03		AA/7471
Nickel	2.0E-02	NC	4	1.60E+03		7.00E+04		1.60E+03		7.00E+04		ICP/6010
Potassium			500									ICP/6010
Selenium		NC	25 or 0.3	4.00E+02				4.00E+02		1.75E+04		GFAA/6010 or 7740
Silver		NC	20	4.00E+02				2.40E+02		1.75E+04		ICP/6010
Tin	6.0E-01	NC	50	4.80E+04		2.10E+06		4.80E+02		2.10E+06		ICP/7870
Uranium (b)	3.0E-01	ND	7	2.40E+02		1.05E+04		2.40E+02		1.05E+04		ICP/6010
Vanadium	7.0E-03	NC	2	5.60E+02		2.45E+04		5.60E+02		2.45E+04		ICP/6010
Zinc	3.0E-01	NC	2	2.40E+04		1.05E+06		2.40E+04		1.05E+06		ICP/6010

NC = Not classified as a carcinogen or not carcinogenic via this exposure route.
ND = No EPA toxicity data (but compound present in IRIS or HEAST)
NF = This compound not present in IRIS or HEAST
W = Toxicity data withdrawn from HEAST or IRIS
CLP = Contract Laboratory Procedure
IC = Ion Chromotography
VOA = Volatile Organic Analysis
GCFID = Gas Chromatograph Flame Ionization Detector
Note: HSBRAM Risk Based Concentrations based on HQ = 1 and ICR = 1E-06.
(a) Cr-VI will be analyzed as total Cr
(b) Uranium (soluble salts) toxicity values for chemical (not radioactive) characteristics. See radionuclide tables for rad values.

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POTENTIAL VOLATILE ORGANIC, SEMI-VOLATILE ORGANIC, AND OTHER INORGANIC CONTAMINANTS OF CONCERN FOR THE 200-BP-11 OPERABALE UNIT

				HSBRAM (mg/Kg)				MTCA (mg/Kg)				
	ORAL RfD	ORAL SF	PQL	Residential		Industrial		Method "B"		Method,"C"		ANALYTICAL
CONTAMINANT	(mg/kg-d)	(mg/kg-d)-1	(ug/L)	non-carc.	carcino.	non-carc.	carcino.	non-carc.	carcino.	non-carc.	carcino.	METHOD
Other Inorganics												
Acetate (from acetic acid)	NF	NF	?									8270 TIC
Ammonia	34 mg/L (a)	NC	30 (b)					Method A				350.2
Cyanide (total)	2.0E-02	NC	0.78 (b)	1.60E+03		7.00E+04		1.60E+03		7.00E+04		Colorimetric/CLP Metals/9010
Flouride	6.0E-02	NC	6 (b)	3.20E+03		1.40E+05		3.20E+03		1.40E+05		IC/300
Nitrate	1.6E+00	NC	51 (b)	1.30E+05		5.60E+06		1.30E+05		5.60E+06		IC/300 & 353
Nitrite (as N)	1.0E-01	NC	100 (b)	8.00E+03		8.00E+03		8.00E+03		3.50E+05		IC/300 & 353
Sulfate (from sulfuric acid)	ND	ND	150 (b)									IC/300
			PQL									
Volatile Organics			(ug/kg)									
Acetone	1.0E-01	NC	10	8.00E+03		3.50E+05		8.00E+03		3.50E+05		VOA/8240
Butanol, 1-	1.0E-01	NC		8.00E+03		3.50E+05		8.00E+03		3.50E+05		8240 TIC
Butanone, 2- (MEK)	6.0E-01	ND	10	4.80E+04		2.10E+06		4.80E+04		2.10E+06		VOA/8240
Carbon tetrachloride	7.0E-04	1.3E-01	5	5.60E+01	4.92E+00	2.45E+03	9.23E+01	5.60E+01	7.69E+00	2.45E+03	1.00E+03	VOA/8240
Chloroform	1.0E-02	6.1E-03	5	8.00E+02	1.05E+02	3.50E+04	1.97E+03	8.00E+02	1.64E+02	3.50E+04	2.13E+04	VOA/8240
Ethyl ether	2.0E-01	NC		1.60E+04		7.00E+05		1.60E+04		1.75E+06		8240 TIC
Methylene chloride	6.0E-02	7.5E-03	5	4.80E+03	8.53E+01	2.10E+05	1.60E+03	4.80E+03	1.33E+02	2.10E+05	1.83E+04	VOA/8240
Toluene	2.0E-01	NC	5	1.60E+04		7.00E+05		1.60E+04		7.00E+05		VOA/8240
Trichloroethane, 1,1,1-	ND	NC	5					7.20E+03		3.20E+05		VOA/8240
Trichloroethane, 1,1,2-	4.0E-03	5.7E-02	5		1.10E+01	1.40E+04	2.10E+02	3.20E+02	1.80E+01	1.40E+04	2.30E+03	VOA/8240
			PQL									
Semivolatile Organics			(ug/kg)									
Formaldehyde	2.0E-01	ND		1.60E+04		7.00E+05			3.30E+01		4.40E+03	8270 TIC
Hydrazine	ND	3.0E+00			2.13E-01		4.00E+00		3.33E-01		4.33E+01	Will not be analyzed
Kerosene	NF	NF	5,000									8270 TIC
PCBs	ND	7.7E+00	21 or 33		8.30E-02		1.60E+00		1.30E-01		1.70E+01	8080 (PCBs 1242 = 21; all others = 33)
Tributyl phosphate	5.0E-03	NC		4.00E+02		1.80E+04		4.00E+02		1.80E+04		8270 (special calibration)
Naphthalene	4.0E-03	NC	660	3.20E+02		1.40E+04		3.20E+02		1.40E+04		8270

NC = Not classified as a carcinogen or not carcinogenic via this exposure route.
ND = No EPA toxicity data (but compound present in IRIS or HEAST)
NF = This compound not present in IRIS or HEAST
CLP = Contract Laboratory Procedure
IC = Ion Chromotography
VOA = Volatile Organics Analysis
GCFID = Gas Chromatograph Flame Ionization Detector
Note: HSBRAM Risk Based Concentrations based on HQ = 1 and ICR = 1E-06.
(a) Ammonia concentration in drinking water, specifically related to organoleptic threshold
(b) Listed quantitation limits are for water. Quantitation limits are highly matrix dependent and will be higher in soils.

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POTENTIAL RADIONUCLIDE CONTAMINANTS OF CONCERN FOR THE 200-BP-11 OPERABLE UNIT

RADIONUCLIDE	MDA (pCi/g)	INDUSTRIAL HSBRAM (pCi/g) Oral SF 1/pCi	Soil Ingestion by Children/Adults	Oral SF 1/pCi	Dust Inhalation by Adults	ANALYTICAL METHOD	COMMENTS
Gross Alpha	10.00					Gas Proportional	
Gross Beta	15.00					"	
Cesium-137 (Ba-137m)	0.10	2.80E-11	2.50E+02	1.90E-11	1.10E+04	Gamma Spectrometry	Cs-137 measured by counting Ba-137m
Cobalt-60	0.05	1.50E-11	4.60E+02	1.50E-10	1.30E+03	"	
Europium-152	0.10	2.10E-12	3.30E+03	1.10E-10	1.80E+03	"	
Europium-154	0.10	3.00E-12	2.30E+03	1.40E-10	1.40E+03	"	
Europium-155	0.10	4.50E-13	1.50E+04	1.80E-11	1.10E+04	"	
Uranium-235 (Pa-231)		1.60E-11	4.30E+02	2.50E-08	8.00E+00	"	U-235 measured by counting Pa-231
Americium-241	1.00	2.40E-10	2.90E+01	3.20E-08	6.30E+00	Alpha Spectometry	May also use gamma spectrometry
Curium-244	1.00	1.60E-10	4.30E+01	2.20E-08	9.10E+00	"	
Neptunium-237	1.00	2.20E-10	3.10E+01	2.90E-08	6.90E+00	"	
Plutonium-238	1.00	2.20E-10	3.10E+01	3.90E-08	5.10E+00	"	
Plutonium-239/240	1.00	2.30E-10	3.00E+01	3.90E-08	5.30E+00	"	
Plutonium-241	15.00	3.60E-12	1.90E+03	2.30E-10	8.70E+02	"	
Thorium-228		5.50E-11	1.30E+02	7.80E-08	2.60E+00	"	
Thorium-230	1.00	1.30E-11	5.30E+02	2.90E-08	6.90E+00	"	
Thorium-232	1.00	1.20E-11	5.80E+02	2.80E-08	7.10E+00	"	
Uranium-233/234		1.60E-11	4.30E+02	2.70E-08	7.40E+00	"	Most U-233/234 samples measured
Uranium-235	1.00	1.60E-11	4.30E+02	2.50E-08	8.00E+00	"	by counting Pa-231m
Uranium-236		1.50E-11	4.60E+02	2.50E-08	8.00E+00	"	
Uranium-238		2.80E-11	2.50E+02	5.20E-08	3.80E+00	"	
Iodine-129	2.00	1.90E-10	3.50E+01	1.20E-10	1.70E+03	Beta Counting	
Strontium-90 (Y-90)	1.00	3.60E-11	1.90E+02	6.20E-11	3.20E+03	"	Sr-90 measured by counting
Technetium-99	15.00	1.30E-12	5.30E+03	8.30E-12	2.40E+04	"	counting Y-90
Selenium-79	5.00	5.80E-12	1.20E+03	6.00E-12	3.30E+04	"	
Samarium-151		1.10E-13	6.30E+04	8.70E-12	2.30E+04	"	
Carbon-14	50.00	9.00E-13	7.70E+03	6.40E-15	3.10E+07	Liquid scintillation	C-14 & H-3 not applicable
Tritium (H-3)	400.00	5.30E-14	1.30E+05	7.80E-14	2.60E+06		for soil samples

HSBRAM = Hanford-Site Baseline Risk Assessment Methodology (DOE-RL 1993)
Risk-based concentrations at incremental cancer risk level of 1E-06 for an industrial scenario based on assumptions in the HSBRAM, Rev.2
MDA = Minimum Detectable Activities
Oral Slope factors from Health Effects Assessment Summary Tables (HEAST, EPA 1992)
Shaded areas indicate cleanup standard for the 200-BP-11 Operable Unit

200-BP-11 Operable Unit Data Quality Objectives
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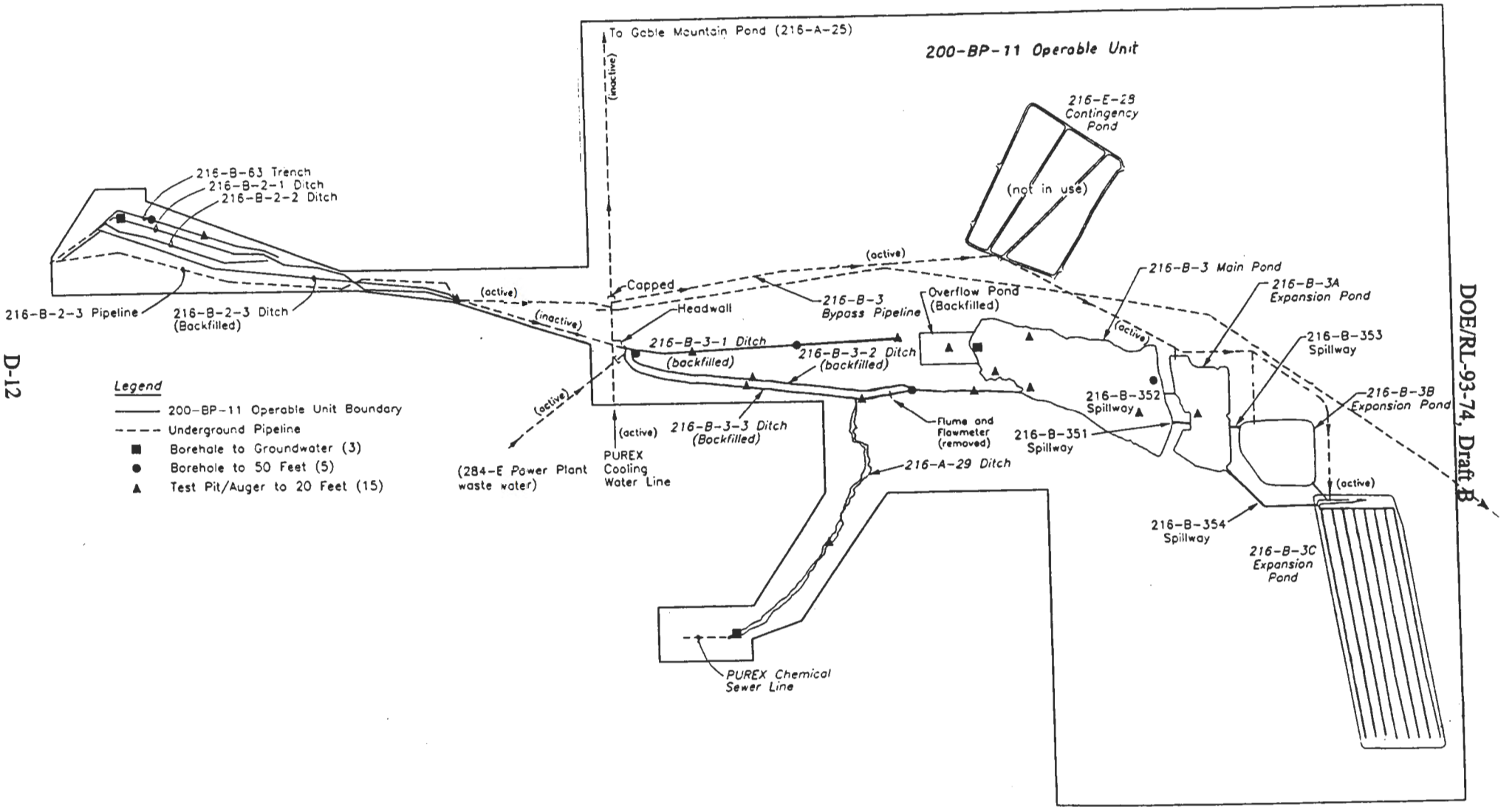

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN

ACRONYMS

ASTM	American Society for Testing and Materials
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
EIP	Environmental Investigations Procedure
EPA	U.S. Environmental Protection Agency
GC	gas chromatography
HEIS	Hanford Environmental Information System
IMO	Information Management Overview
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QPP	Quality Program Procedure
RCRA	*Resource Conservation and Recovery Act*
SAF	sample authorization form
SDG	Sample Disposition Record
VOA	volatile organics analysis
WHC	Westinghouse Hanford Company

GLOSSARY

Accuracy: Accuracy may be interpreted as the measure of the bias in a system. The factors that influence the accuracy of the data include sample procedures, field conditions, sample preservation, sample matrix, instrument calibration, and analysis technique. Sampling accuracy is normally assessed through the evaluation of matrix-spiked samples and reference samples (see glossary entry).

Audit: For the purposes of environmental investigations, audits are considered to be systematic checks to verify the quality of operation of one or more elements of the total measurement system. In this sense, audits may be of two types: (1) performance audits, in which quantitative data are independently obtained for comparison with data routinely obtained in a measurement system, or (2) system audits, involving a qualitative onsite evaluation of laboratories or other organizational elements of the measurement system for compliance with established quality assurance program and procedure requirements. For environmental investigations at the Hanford Site, performance audit requirements are fulfilled by periodic submittal of blind samples to the primary laboratory, or the analysis of split samples by an independent laboratory. System audit requirements are implemented through the use of standard surveillance procedures.

Bias: Bias represents a systematic error that contributes to the difference between a population mean of a set of measurements and an accepted reference or true value.

Blind Sample: A blind sample refers to any type of sample routed to the primary laboratory for performance audit purposes, relative to a particular sample matrix and analytical method. Blind samples are not specifically identified as such to the laboratory. They may be made from traceable standards, or may consist of sample material spiked with a known concentration of a known compound. See the glossary entry for Audit.

Comparability: For the purposes of environmental investigations, comparability is an expression of the relative confidence with which one data set may be compared with another.

Completeness: For the purposes of environmental investigations, completeness may be interpreted as a measure of the amount of valid data obtained compared to the total data expected under correct normal conditions.

Deviation: For the purposes of environmental investigations, deviation refers to an approved departure from established criteria that may be required as a result of unforeseen field situations or that may be required to correct ambiguities in procedures that may arise in practical applications.

Equipment Blanks: Equipment blanks consist of pure deionized distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples. They are used to verify the adequacy of sampling equipment decontamination procedures, and are normally collected at the same frequency as field duplicate samples.

Field Blanks: Field blanks for water analyses consist of pure deionized distilled water, transferred to a sample container at the site and preserved with the reagent specified for the analyses of interest. They are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected at the same frequency as field duplicate samples.

Field Duplicate Sample: Field duplicate samples are samples retrieved from the same sampling location using the same equipment and sampling technique, placed in separate, identically prepared and preserved containers, and analyzed independently.

Matrix-Spiked Samples: Matrix-spiked samples are a type of laboratory quality control sample. They are prepared by splitting a sample received from the field into two homogenous aliquots (i.e., replicate samples) and adding a known quantity of a representative analyte of interest to one aliquot in order to calculate the percentage of recovery of that analyte and as a test of laboratory accuracy.

Nonconformance: A nonconformance is a deficiency in the characteristic, documentation, or procedure that renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought into conformance with immediate corrective action, it shall not be categorized as a nonconformance. If the nature of the condition is such that it cannot be immediately and satisfactorily corrected, however, it shall be documented in compliance with approved procedures and brought to the attention of management for disposition and appropriate corrective action.

Precision: Precision is a measure of the repeatability or reproducibility of specific measurements under a given set of conditions. The relative percent difference is used to assess the precision of the sampling and analytical method. The relative percent difference is a quantitative measure of the variability. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed in terms of standard deviation, but may also be expressed as the coefficient of variation (i.e., relative standard deviation) and range (i.e., maximum value minus minimum value). Precision is assessed by means of duplicate/replicate sample analysis.

Quality Assurance: For the purposes of environmental investigations, quality assurance refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meet all end-user requirements and/or the intended end use of the data.

Quality Assurance Project Plan: The QAPjP is an orderly assembly of management policies, project objectives, methods, and procedures that defines how data of known quality will be produced for a particular project or investigation.

Quality Control: For the purposes of environmental investigations, quality control refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Range: Range refers to the difference between the largest and smallest reported values in a sample, and is a statistic for describing the spread in a set of data.

Reference Samples: Reference samples are a type of laboratory quality control sample prepared from an independent, traceable standard at a concentration other than that used for analytical equipment calibration, but within the calibration range.

Replicate Sample: Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

Representativeness: For the purposes of environmental investigations, representativeness may be interpreted as the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of a sampling program.

Split Sample: A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples are usually routed to separate laboratories for independent analysis, generally for purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method. See the glossary entry for Audit. In the laboratory, samples are generally split to create matrix-spiked samples (see the glossary entry).

VOA Trip Blanks: Volatile organics analysis (VOA) trip blanks are a type of field quality control sample, consisting of pure deionized distilled water in a clean, sealed sample container, accompanying each batch of containers shipped to the sampling site and returned unopened to the laboratory. Trip blanks are used to identify any possible contamination originating from container preparation methods, shipment, handling, storage or site conditions.

Validation: For the purposes of environmental investigations, validation refers to a systematic process of reviewing data against a set of criteria to provide assurance that the data are acceptable for their intended use. Validation methods may include review of verification activities, editing, screening, cross-checking, or technical review.

Verification: For the purposes of environmental investigations, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities may include inspections, audits, surveillance, or technical review.

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1.0 PROJECT DESCRIPTION

1.1 PROJECT OBJECTIVE

The *200-BP-11 Operable Unit RFI/CMS and 216-B-3 Main Pond, 216-B-63 Trench, and 216-A-29 Ditch Work/Closure Plan* and its supporting project plans have been developed to meet specific U.S. Environmental Protection Agency (EPA) guidelines for format and structure, within the overall quality assurance (QA) program structure mandated by the U.S. Department of Energy, Richland Operations Office (DOE-RL) for all activities at the Hanford Site. These DOE mandates include DOE Order 5700.6C, *Quality Assurance* (DOE 1991), DOE/RL-90-28, *Environmental Restoration Program Quality Assurance Systems Requirements for the Hanford Site* (DOE-RL 1993), and other QA guidance documents as applicable, e.g., the *Hanford Analytical Services Quality Assurance Plan* (DOE-RL 1994). The purpose of this Quality Assurance Project Plan (QAPjP) is to ensure the objectives described above and in Section 1.5 of this work/closure plan will be met. Data resulting from this investigation will be evaluated to determine the most feasible options for additional investigation, remediation, or closure.

1.2 BACKGROUND INFORMATION

The 200-BP-11 Source Operable Unit is located within the 200 Areas of the Hanford Site, shown in Figure 1-1 of the work/closure plan. The waste management units that will be studied during the 200-BP-11 Source Operable Unit field investigation are discussed in Chapter 1.

Detailed background information regarding the history and current use of the operable unit is provided in Chapter 2 of the work/closure plan.

1.3 QUALITY ASSURANCE PROJECT PLAN APPLICABILITY AND RELATIONSHIP TO THE BECHTEL HANFORD, INC. QUALITY ASSURANCE PROGRAM

This QAPjP applies specifically to the field activities and chemical laboratory analyses performed as part of the field investigation for the 200-BP-11 Source Operable Unit. This plan describes the means selected to implement the overall QA program requirements defined by the Bechtel Hanford, Inc. (BHI) *Quality Management Plan* (BHI 1994c), as applicable to the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) and *Resource Conservation and Recovery Act* (RCRA) facility investigation/corrective measures study environmental investigations. The QAPjP is subject to mandatory review and revision prior to use on any subsequent phases of the investigation. Distribution and revision control procedures applicable to the QAPjP and work/closure plan shall be in compliance with Section 5 of the *Quality Management Plan* (BHI 1994c). Interim changes to this QAPjP or the work/closure plan shall be documented, reviewed, and approved as required by Environmental Investigations Procedure (EIP) 1.3, "Work Plan Review and Control" (BHI 1994a), and shall be documented in monthly unit managers' meeting minutes. The QAPjP distribution shall routinely include all review/approval personnel indicated on the title page of the document and all other individuals designated by the BHI technical lead for each investigation. All plans and procedures referenced in the QAPjP are available for regulatory review on request by the direction of the technical lead.

1.4 SCHEDULE OF ACTIVITIES

Five separate investigations will be conducted in the 200-BP-11 Source Operable Unit, including geological, surface water and sediment, groundwater, and ecological investigations, as well as an investigation made up of other miscellaneous tasks. More detailed discussions of individual tasks are contained in Chapter 5 of the work/closure plan. Procedures directly applicable to the tasks described here are discussed in Chapter 4 of the QAPjP.

The field-related tasks to be conducted are:

- Task 2: Source Characterization
- Task 3: Geologic Investigation
- Task 4: Surface Water/Sediment Investigation
- Task 5: Vadose Zone Investigation
- Task 6: Air Investigation.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 TECHNICAL LEAD RESPONSIBILITIES

The Environmental Engineering Function of BHI has primary responsibilities for conducting this investigation. Organizational charts are included in the project management plan of the aggregate area management study report that define personnel assignments and individual BHI field team structures applicable to the tasks included in the investigations.

External participant contractors or subcontractors shall be evaluated and selected for certain portions of task activities at the direction of the technical lead in compliance with Section 4 of the *Quality Management Plan* (BHI 1994c). Major participant contractor and subcontractor resources are discussed in Chapter 7 of the work/closure plan. All contractor QA plans and field and laboratory procedures shall be approved by BHI prior to use and shall be made available for regulatory review at the direction of the BHI technical lead.

2.2 ANALYTICAL LABORATORIES

Regardless of the radiation levels observed during field screening, all samples shall be screened for total activity counts and isotopic identification in accordance with the *Hanford Site Radiological Control Manual* (BHI 1994b) prior to shipment to the analytical laboratory. Those samples with short holding times, such as volatile organic analyses (VOAs), will be given the highest priority during this screening to ensure that holding times are not exceeded.

Packaging and shipping requirements shall be selected on the basis of total activity values and the preservation requirements applicable to the parameters of interest, as described in EIP 3.1, "Sample Packaging and Shipping" (BHI 1994a). All analyses shall be coordinated through BHI Sample Management and shall be performed in compliance with BHI-approved laboratory QA plans and analytical procedures; all analytical laboratories shall be subject to the surveillance controls described

by Part 2, Section 9.3 of the *Quality Management Plan* (BHI 1994c) and Quality Program Procedure (QPP) 3.1, "Surveillance" (BHI 1995). For subcontractors or participant contractors, applicable quality requirements shall be invoked as part of the approved procurement documentation or work order; see Section 4.2. Services of alternate qualified laboratories shall be procured for radioactive sample analysis if onsite laboratory capacity is not available, and/or for the performance of split sample analysis at the technical lead's discretion. If such an option is selected, the laboratory QA plan and applicable analytical procedures from the alternate laboratory shall be approved by BHI before their use, as noted in Section 4.2.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENTS

The rationale for establishing data quality objectives (DQOs) and data needs for this investigation are presented in Section 4.1 of the work/closure plan. Analytical procedures are discussed in Chapter 7 of the QAPjP and include both standard and nonstandard procedures. Standard EPA methods selected from *Test Methods for Evaluating Solid Waste* (EPA 1986) shall be used for analysis of metals and organics as shown in Table E-1. Laboratory-specific methods based on industry standard methodologies, reviewed and accepted by BHI personnel, will be utilized for the analysis of radiological parameters. However, these laboratory-specific methodologies will coincide with the analytical technology (e.g., gamma spectrometry) specified in DQOs. Analysis of the soil physical properties will require both standard American Society for Testing and Materials (ASTM) methods and nonstandard methods as described in Chapters 4 and 5 of the work/closure plan. Methods for soil analysis have been published by the American Society of Agronomy, and include *Methods of Soil Analysis: Part 1* (Klute 1986) and *Methods of Soil Analysis: Part 2 - Chemical and Microbiological Properties* (Page et al. 1982). These reference methods will form the basis of project-specific test procedures that shall be developed, reviewed, approved, and issued in compliance with Section 15 of the *Quality Management Plan* (BHI 1994c).

All of the analytical parameters selected for the soil and water sampling phase of this investigation are listed in Table E-1 and cross-referenced to analytical method requirements and maximum quantitation limit or detection limit values and maximum acceptable ranges for precision and accuracy in soil matrices. Where Practical Quantitation Limits are not defined for a particular parameter listed in Table E-1, Contractually Required Quantitation Limits are provided that represent maximum values that can be reliably achieved by analytical laboratories under normal conditions. Precision and accuracy values are provided for all chemical and radiological parameters that also represent maximum values that can be reliably achieved by analytical laboratories under normal conditions. The requirements of Table E-1 shall be considered a minimum performance standard and shall be incorporated into the agreements for services established with individual BHI, participant contractor, or subcontractor analytical laboratories.

Goals for data representativeness are addressed qualitatively by the specification of sampling depths and intervals in Section 4.2 of the work/closure plan. Sampling locations are specified in Chapter 5 or work orders issued to the subcontractors or participating contractors responsible for conducting sampling activities. Objectives for the completeness of this investigation shall require that contractually or procedurally established requirements for precision and accuracy be met for at least 90% of the total number of requested determinations. Failure to meet this criterion shall be documented and evaluated in the validation process described in Chapter 8; corrective action shall be

taken as warranted, as described in Chapter 13. Approved analytical procedures shall require the use of the reporting techniques and units specified in the EPA reference methods in Table E-1 to facilitate the comparability of data sets in terms of precision and accuracy.

4.0 SAMPLING PROCEDURES

4.1 PROCEDURES

The procedures that will be used to support the work/closure plan shall be primarily selected from BHI's system. Selected procedures will include EIPs from the *Environmental Investigations Procedures* (BHI 1994a), and procedures from the BHI *Quality Management Plan* (BHI 1994c). Procedure approval, revision, and distribution control requirements applicable to EIPs are addressed in EIP 1.1, "Preparing, Revising, and Canceling Environmental Investigations Procedures" (BHI 1994a). Other procedures applicable to the preparation, review, and revision of analytical services and other Hanford analytical laboratory procedures shall comply with the requirements of Section 5 of the BHI *Quality Management Plan* (BHI 1994c). All procedures are available for regulatory review on request at the direction of the technical lead.

4.2 PARTICIPANT CONTRACTOR/SUBCONTRACTOR PROCEDURES

As previously noted in Section 2.1, participant contractor and/or subcontractor services shall be procured under the applicable requirements of the *Quality Management Plan* (BHI 1994b). Submittal of procedures for BHI review and acceptance before use shall be included in the procurement document or work order, as applicable, when such services require procedural controls. Analytical laboratories shall be required to submit the current version of their internal QA program plans, and analytical procedures for review and acceptance by qualified personnel from the BHI Sample Management group, or other qualified personnel, as directed by the technical lead.

All reviewers shall be qualified under the requirements of EIP 1.12, "Indoctrination, Training, and Qualification" (BHI 1994a), or Section 2 of the *Quality Management Plan*, as applicable. All participant contractor or subcontractor procedures, plans, and/or manuals shall be retained as project records in compliance with Section 6 of the *Quality Management Plan* (BHI 1994c).

4.3 PROCEDURE CHANGES

Should deviations from established EIPs be required to accommodate unforeseen field situations, they may be authorized by the field team leader in accordance with the requirements specified in EIP 1.1, "Preparing, Revising, and Cancelling Environmental Investigations Procedures" (BHI 1994a). Documentation, review, and disposition of instruction change authorization forms shall be as defined by EIP 1.1. Other types of procedure change requests shall be documented as required by Section 5 of the *Quality Management Plan* (BHI 1994c). To deviate from established radiation monitoring procedures, a field change request shall be completed in accordance with the *Hanford Site Radiological Control Manual* (BHI 1994b) and approved by the Occupational Health and Safety manager assigned to this investigation.

4.4 SAMPLING PROCEDURES

4.4.1 Sample Acquisition

All soil and sludge sampling shall be performed in accordance with EIP 4.0, "Soil and Sediment Sampling" (BHI 1994a). Perched water sampling shall be performed in compliance with EIP 4.1, "Groundwater Sampling" (BHI 1994a); soil-gas sampling shall be performed in compliance with EIP 5.1, "Soil-Gas Sampling" (BHI 1994a). Surface water and other specialized types of sampling shall be in compliance with EIPs developed in accordance with EIP 1.1, "Preparing, Revising, and Cancelling Environmental Investigations Procedures" (BHI 1994a), or BHI-approved participant contractor or subcontractor procedures. All drilling activities shall be in compliance with BHI-SPEC-00008, *Technical Specification for Environmental Drilling Services* (BHI 1994d). All boreholes shall be logged in compliance with EIP 7.0, "Geologic Logging" (BHI 1994a). Sampling procedure applicability to individual project tasks is shown in Table 5-2 of the work/closure plan. Sampling depths and intervals will be identified in site-specific descriptions of work prepared in compliance with EIP 1.4, "Preparing and Revising Descriptions of Work" (BHI 1994a). Sample locations will be detailed in the statements of work or work orders issued to the responsible subcontractors or participating contractors. Documentation requirements are contained within individual EIPs and the Information Management Overview (IMO).

Sample container types, preservation requirements, analyses, and special handling requirements are defined in EIP 4.0, "Soil and Sediment Sampling" (BHI 1994a). Sample authorization forms (SAFs) will be produced by Sample Management to further define these requirements. Written instructions on these requirements shall be provided by a description of work prior to conducting sampling activities.

4.4.2 Radiological Testing

The BHI field sampling team leader and the assigned health physics technician shall be responsible for screening all samples collected to determine proper handling protocols, in compliance with the Radiation Work Permit established for the sampling site. At a minimum, all sampler assemblies shall be screened for alpha and beta gamma radiation with field instrumentation in compliance with descriptions of work written for specific activities. Sampler assemblies that do not exhibit radiation above background levels may be opened and sample materials extracted and placed in appropriate containers in compliance with EIP 4.0, "Soil and Sediment Sampling" (BHI 1994a). Any samples exhibiting radiation levels during field screening that are above background will be handled per approved Radiation Work Permits.

4.4.3 Geologic and Geophysical Testing

Borehole logging shall be conducted concurrent with the drilling operations. A well sheet summary shall be completed for the entire length of the boring activity for each day. The summary sheet shall contain the geologic and construction information listed in EIP 7.0, "Geologic Logging" (BHI 1994a).

4.5 OTHER INVESTIGATIVE AND SUPPORTING PROCEDURES

Procedures that will be required in this investigation are identified in the text of the work/closure plan and in Table E-2. Documentation requirements shall be addressed within individual procedures and/or the IMO as appropriate. Analytical procedures required for this investigation are listed in Table E-1. All computer software models developed for this investigation shall be documented and verified to comply with procedures identified under Section 7 of the *Quality Management Plan* (BHI 1994c).

4.6 RECORDS

Records requirements for sample collection include (but are not limited to) field notebooks, chain-of-custody records, sample analysis request forms, geologic logs, scintillation logs, and other documents. All records shall be managed in compliance with Section 6 of the *Quality Management Plan* (BHI 1994c), and the *Document Control and Records Management Manual* (WHC 1990a).

5.0 SAMPLE CUSTODY

5.1 CHAIN-OF-CUSTODY PROCEDURES

All samples obtained during the course of this investigation shall be controlled as required by EIP 3.0, "Chain of Custody" (BHI 1994a), from the point of origin to the analytical laboratory. Samples are to be prepared, packaged, and transported to the laboratory in accordance with EIP 3.1, "Sample Packaging and Shipping" (BHI 1994a). Laboratory chain-of-custody procedures shall be reviewed and approved in compliance with the requirements of Section 4.1 of this QAPjP, and shall ensure the maintenance of sample integrity and identification throughout the analytical process. At the direction of the technical lead, requirements for the return of residual sample materials after completion of analysis shall be defined in accordance with procedures described in the procurement documentation to subcontractor or participant contractor laboratories. Chain-of-custody forms shall be initiated for returned residual samples as required by the approved procedures applicable within the laboratory. All analytical results shall be controlled as permanent project quality records as required by EIPs 2.0 through 2.7 (BHI 1994a), Section 6 of the *Quality Management Plan* (BHI 1994c), and Section 9 of the *Document Control and Records Management Manual* (WHC 1990a).

6.0 CALIBRATION PROCEDURES

The procedural control for the use, handling, maintenance, and calibration of health and safety monitoring instruments used in RCRA and CERCLA investigations shall be done in accordance with the *Quality Management Plan* (BHI 1994c). Calibration of all BHI measuring and test equipment, whether in existing inventory or procured for this investigation, shall be controlled as required by Section 13 of the *Quality Management Plan* (BHI 1994c). The instruments used for geophysical borehole logging shall be calibrated and operated in accordance with *Base Calibration of Pacific*

Northwest Laboratory's Gross Gamma Borehole Geophysical Logging System (WHC 1992). All calibration of analytical laboratory equipment shall be as defined by applicable standard analytical methods and are subject to BHI review and acceptance prior to use.

7.0 ANALYTICAL PROCEDURES

Analytical methods or procedures for each parameter identified in Table E-1 shall be selected or developed and approved before use to comply with appropriate WHC and/or BHI procedures and/or procurement control requirements. Table E-1 contains minimum requirements that shall be considered minimum performance standards that shall be incorporated into the agreements for services established with all analytical laboratories.

The final requirements for sample preservation, containers, and holding times for each of the analytes of interest will be specified in the SAF from Sample Management. The preservation technique should be initiated immediately after the sample is extracted. Holding time is based on the maximum amount of time allowable, if proper preservation techniques are applied, to analyze the sample before the validity of the data could be considered suspect. All analytical procedures approved for use in this investigation shall require the use of standard units to facilitate the comparability of data sets in terms of precision and accuracy. All approved procedures shall be retained in the project quality records and shall be available for review on request.

Table E-1 lists various methods for the analysis of parameters listed. Standard EPA approved methods for evaluating solid waste (i.e., *Test Methods for Evaluating Solid Wastes* [EPA 1990]) will be used for analysis of the metals and organics. Geochemical and physical property testing will be conducted based on ASTM or other nationally recognized consensus methods. All test methods shall be documented by the laboratory and submitted for BHI review and acceptance prior to use. These tests shall be performed in accordance with Section 15 of the *Quality Management Plan* (BHI 1994c).

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

All analytical laboratories shall be responsible for preparing a report summarizing the results of analysis and for preparing a detailed data package. The data package includes identifying samples, sampling and analysis dates, raw analytical data, reduced data, data outliers, reduction formulas, recovery percentages, quality control check data, equipment calibration data, supporting chromatogram or spectrograms, and documentation of any nonconformances affecting the measurement system in use during the analysis of the particular group of samples. Data reduction schemes shall be contained within individual laboratory analytical methods and/or QA manuals, submitted for BHI review and acceptance as discussed in Section 4.1. The completed data package shall be reviewed and approved by the analytical laboratory's QA manager (or field team leader for field screening type analysis) before its submittal to the BHI technical lead. Completed data packages shall be submitted to Sample and Data Management for tracking and data validation functions. All

data packages shall be verified; the percentage of data packages requiring fill validation will be established based on the end use of the data. The requirements of this section shall be included in procurement documentation or work orders, as appropriate, to comply with the standard BHI procurement control procedures noted in Section 4.1.

8.2 VALIDATION

Validation of the completed data package will be performed by qualified BHI Sample Management personnel or by a qualified independent contractor. Subcontracted validation responsibilities shall be defined in procurement documentation or work orders as appropriate. All validation shall be performed in compliance with BHI-EE-01, *Environmental Investigations Procedures* (BHI 1994a). Data validation has been previously agreed to by the ERC, DOE-RL, Washington Department of Ecology, and EPA as documented in Item 12 of Appendix D as follows: Initially, summary deliverables will be requested for all data packages. After evaluation of the analytical results, the data packages for validation will be prioritized based on the samples with the highest contaminant concentrations. The data packages selected for validation will then be upgraded with standalone deliverables. Regardless of the analytical results, at least 20% of the data packages will be validated. The overall progress of data package validation will be communicated to DOE, Ecology and EPA for their concurrence.

8.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages shall be subject to a final technical review by a qualified reviewer at the direction of the BHI technical lead, before their submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with the *Document Control and Records Management Manual* (WHC 1990a) and Section 6 of the *Quality Management Plan* (BHI 1994c) requirements.

8.4 PROCESS FOR HANDLING UNACCEPTABLE OR SUSPECT DATA

The analytical data flow and data management process is described in detail in BHI-EE-01, Section 2, "Sample Management" (BHI 1994a). Data errors or procedural discrepancies related to laboratory analytical processes shall prompt data requalification by the validator, requests for reanalysis, or other appropriate corrective action by the responsible laboratory as required by governing Sample Management or approved subcontractor data validation procedures. If sample holding time requirements are compromised, insufficient sample material is available for reanalysis, or any other condition prevents compliance with governing analytical methods and data validation protocols, the situation shall be formally documented on a Sample Disposition Record (SDG) per EIP 2.7, "Sample Disposition Record" (BHI 1994a). If required, the incident will also be documented as a nonconformance in compliance with Section 3 of the BHI *Quality Management Plan* (BHI 1994c). If a Nonconformance Report is issued, corrective action shall be in accordance with Section 3 of the BHI *Quality Management Plan* (BHI 1994c), and brought to the immediate attention of the BHI technical lead and QA coordinator for their appropriate action. The same process (SDG) shall be used if problems are observed with validated data, either as part of the data assessment process described in Chapter 12 of this QAPjP or if separately observed by the operable unit manager; if the

data have been entered in the Hanford Environmental Information System (HEIS), the HEIS data custodian shall be immediately notified in order that the data may be flagged (in compliance with BHI-EE-01 [BHI 1994a] and the *HEIS User's Manual* [WHC 1990b]) as suspect, pending resolution of the nonconformance and completion of all required corrective actions.

9.0 INTERNAL QUALITY CONTROL

General procedures used in the field and laboratory to maintain data quality include the following:

- Use of accepted sampling and analysis techniques
- Justification and documentation of any actions contrary to accepted or specified techniques
- Documentation of pre-field activities, such as container preparation and instrument calibration
- Documentation of post-field activities including sample shipment and receipt, equipment check-in, and debriefing
- Documentation of quality control data
- Documentation of field and laboratory activities
- Generation of quality control samples.

All analytical samples shall be subject to in-process quality control measures in both the field and laboratory. Internal quality control checks for reference method analysis shall be as specified by the current statement of work, work orders for sampling activities, or in applicable EIPs; the number of quality control samples are shown in Table E-4.

9.1 FIELD QUALITY CONTROL CHECKS

The number of field quality control samples specified in Table E-4 are based on the following minimum requirements. These requirements are adapted from *Test Methods for Evaluating Solid Waste* (EPA 1986), as modified by the proposed rule changes included in the *Federal Register*, 1989, Volume 54, No. 13, pp 3212-3228, and 1990, Volume 55, No. 27, pp 4440-4445.

- Field duplicate samples. For each shift of sampling activity under an individual sampling subtask, a minimum of 5% of the total collected samples shall be duplicated, or one duplicate shall be collected for every 20 samples, whichever is greater. Duplicate samples shall be retrieved from the same sampling location using the same equipment and sampling technique and shall be placed into two identically prepared and preserved containers. All field duplicates shall be analyzed independently to provide an indication of gross errors in sampling techniques.

- Split samples. Upon specific BHI or regulator request, and at the technical lead's direction, field or field duplicate samples may be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory. Frequency shall meet the minimum schedule requirements for audit procedures or the specific needs of the requesting organization.

- Blind samples. At the technical lead's discretion, blind reference samples may be introduced into any sampling round as a quality control check of the primary laboratory. Blind sample type shall be as directed by the technical lead; frequency shall meet the minimum schedule requirements for audit procedures.

- Field blanks. Field blanks shall consist of pure deionized distilled water, transferred into a sample container at the site and preserved with the reagent specified for the analytes of interest. Field blanks are used as a check on reagent and environmental contamination and shall be collected at the same frequency as field duplicate samples.

- Equipment rinsate blanks. Equipment blanks shall consist of pure deionized distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples. Equipment blanks are used to verify the adequacy of sampling equipment decontamination procedures and shall be collected at the same frequency as field duplicate samples where applicable.

- Volatile organic analysis trip blanks. The VOA trip blanks consist of pure deionized distilled water added to one clean sample container, accompanying each batch (cooler) of sample containers shipped to the sampling facility. Trip blanks shall be returned unopened to the laboratory and are prepared as a check on possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. The trip blank shall be analyzed for volatile organic compounds only, as shown on EPA's target compound list (EPA 1991). In compliance with standard BHI procurement procedures, requirements for trip blank preparation shall be included in procurement documents of work orders to the sample container supplier and/or preparer.

9.2 LABORATORY QUALITY CONTROL CHECKS

Laboratory quality control data are necessary to determine precision and accuracy of the analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. Unless otherwise specified in BHI-approved analytical methods, internal quality control checks performed by analytical laboratories shall meet the following minimum requirements.

- Matrix-spike/matrix-spike duplicate samples. Matrix-spiked samples require the addition of a known quantity of a representative analyte of interest to the sample as a measure of recovery percentage and as a test of laboratory accuracy. The spike shall be made in a replicate of a field duplicate sample. Replicate samples are separate aliquots removed from the same sample container in the laboratory. Spike compound selection, quantities, and concentrations shall be described in the analytical procedures submitted for BHI review and acceptance. One sample shall be spiked per analytical batch, or once every 20 samples, whichever is more frequent.

- Quality control reference samples. A quality control reference sample shall be prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples are required as an independent check on analytical technique and methodology and shall be run with every analytical batch, or every 20 samples, whichever is more frequent.

- Laboratory/method blank.

Other requirements specific to laboratory analytical equipment calibration are included in Chapter 6 of this QAPjP. For field screening gas chromatography (GC) analysis only, at least one duplicate sample per day or 1 duplicate per 20 samples, whichever is greater, shall be routed to a qualified laboratory as an overcheck on the proper use and functioning of field GC procedures and equipment. Duplicates shall be selected, whenever possible, from samples in which significant readings have been observed during field analysis. The minimum requirements of this section shall be invoked in procurement documents or work orders in compliance with standard WHC procedures as noted in Section 4.1.

10.0 PERFORMANCE AND SYSTEM AUDITS/ASSESSMENTS

Performance and systems audits will be performed regularly throughout the course of the activities addressed by the work plan; schedules shall be developed as required by their governing procedures. Additional surveillance may be scheduled as a consequence of corrective action requirements or may be performed upon request. All quality-affecting activities are subject to surveillance. All aspects of inter-operable unit activities may also be evaluated as part of routine QA program audits, pursuant to the requirements of the Section 9 of the *Quality Management Manual* (BHI 1994c). Program audits shall be conducted in accordance with Section 9 of the *Quality Management Plan* (BHI 1994c).

Systems audits/assessments consist of the evaluation of the components of the measurement systems to determine their proper selection and use. Systems surveillance requirements will be implemented according to the procedures in Part 2, Section 9.3 of the *Quality Management Plan* (BHI 1994c), and QPP 3.1, "Surveillance" (BHI 1995).

After systems are operational and are generating data, performance audits/assessments will be conducted to ensure the accuracy of the total system or its individual parts. In a performance audit/assessment, known quantitative data are compared with data produced by the measurement system.

Any discrepancies observed during the evaluation of performance audit results or during system audit surveillance activities that cannot be immediately corrected to the satisfaction of the investigator shall be documented on a surveillance report and resolved in compliance with Part 2, Section 9.3 of the *Quality Management Plan* (BHI 1994c), and QPP 3.1, "Surveillance" (BHI 1995).

11.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratories that directly affect the quality of the field and analytical data shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime and corresponding schedule delays. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment. Maintenance requirements, spare parts lists, and instructions shall be included in individual laboratory QA plans, subject to BHI review and acceptance as noted in Sections 2.1, 2.2, and 4.1 of this QAPjP. BHI field equipment shall be drawn from inventories subject to standard preventive maintenance and calibration procedures per Section 13 of the *Quality Management Plan* (BHI 1994c). Field procedures submitted for BHI review and acceptance by participant contractors or subcontractors shall contain provisions for preventive maintenance schedules and spare parts lists to ensure minimization of equipment downtime.

12.0 DATA MEASUREMENT ASSESSMENT PROCEDURES

As discussed in Chapter 5, various uncertainty may exist in the variability of physical and chemical parameters used in the data characterization. Various statistical and probabilistic techniques may be used in the process of data comparison and analysis. *Soil Sampling Quality Assurance User's Guide* (Barth and Mason 1984) provides statistical techniques necessary to numerically assess the statistical uncertainty considerations and quality control checks which shall be routinely assessed for all sampling data. *A Rationale for the Assessment of Errors in the Sampling of Soils* (Van Ee and Blume 1989) also provides equations for estimating uncertainty of data. The statistical methodologies and assumptions to be used in such evaluations shall be defined by written directions that are signed, dated and retained as project records in compliance with Chapter 9 of the *Document Control and Records Management Manual* (WHC 1990a) and/or Section 6 of the *Quality Management Plan* (BHI 1994c).

13.0 CORRECTIVE ACTION

Corrective action requests required as a result of surveillance reports, nonconformance reports, or audit activity shall be documented and dispositioned as required by Part 1, Section 3.2 of the *Quality Management Plan* (BHI 1994c). Other measurement systems procedure or plan corrections that may be required as a result of data assessment or routine review processes shall be resolved as required by governing procedures or shall be referred to the technical lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation shall be placed with the project quality records on completion or closure.

13.1 EQUIPMENT OPERATING RANGES

Instruments or equipment found to be operating outside acceptable operating ranges or found to be in use after the expiration of the calibration period must be investigated in accordance with the procedures specified in Chapter 6.

13.2 DEVIATIONS FROM PROCEDURES

Unplanned deviations from procedural requirements, either technical or administrative, must be documented and called to the attention of the technical lead. The report of the deviation must identify the requirement deviated from, the cause of the deviation, whether any data were affected, and the corrective action necessary to remedy the immediate problem and to prevent recurrence. Records of unplanned deviations must be maintained in accordance with EIP 1.1, "Preparing, Revising, and Cancelling Environmental Investigations Instructions" (BHI 1994a), and Section 9 of the *Document Control and Records Management Manual* (WHC 1990a). Planned deviations will be handled in accordance with EIP 1.1 (BHI 1994a) or other applicable BHI document control procedures.

13.3 NONCONFORMING MATERIALS

Materials that do not conform to specifications must be handled as required by Part 1, Section 3.1 of the *Quality Management Plan* (BHI 1994c). If appropriate, such nonconforming items must be segregated and tagged to identify their status pending disposition.

14.0 QUALITY ASSURANCE REPORTS

As previously stated in Chapters 10 and 13, project activities shall be regularly assessed by performance and system auditing and associated corrective action processes. Surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project quality records on completion or closure of the activity. A report summarizing all audit and surveillance activity (see Sections 4.4 and 13.2), and any associated corrective actions, shall be prepared by the QA coordinator at the completion of the investigation. Such information will become an integral part of the final field investigation report prepared under Task 10 (see Chapter 5). The final report shall include an assessment of the overall adequacy of the total measurement system with regard to the DQOs of the investigation.

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Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a/]	Precision, Soil[b/]	Accuracy, Soil[b/]	Target Quantitation Limit Water[a/]	Precision, Water[b/]	Accuracy, Water[b/]
Acetone	8240[c/]	10 μg/kg	±20	75-125	TBD	±20	75-125
Butanol, 1-	8240[c/j/]	TBD μg/kg	±20	75-125	TBD	±20	75-125
Butanone, 2- (MEK)	8240[c/]	10 μg/kg	±20	75-125	TBD	±20	75-125
Carbon tetrachloride	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Chloroform	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Ethyl Ether	8240[c/j/]	TBD μg/kg	±20	75-125	TBD	±20	75-125
Methylene chloride	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Toluene	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Trichloroethane, 1,1,1-	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Trichloroethane, 1,1,2-	8240[c/]	5 μg/kg	±20	75-125	TBD	±20	75-125
Formaldeyde	8270[c/j/]	TBD μg/kg	±20	75-125	TBD	±20	75-125
Kerosene	8270[c/j/]	5,000 μg/kg	±20	75-125	TBD	±20	75-125
Tributyl Phosphate	8270[c/j/]	TBD μg/kg	±20	75-125	TBD	±20	75-125
Polychlorinated Biphenyls	8080[c/]	21 or 33 μg/kg	±20	75-125	TBD	±20	75-125
Naphthalene	8270[c/]	660 μg/kg	±20	75-125	TBD	±20	75-125
Arsenic	7060[c/]	0.3 mg/kg	±20	75-125	TBD	±20	75-125
Barium	6010[c/]	1 mg/kg	±20	75-125	TBD	±20	75-125
Beryllium	6010[c/]	1 mg/kg	±20	75-125	5 mg/l	±20	75-125
Bismuth	7471[c/],	TBD mg/kg	±20	75-125	TBD	±20	75-125
Boron	6010[c/]	10 mg/kg	±20	75-125	TBD	±20	75-125

Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a]	Precision, Soil[b]	Accuracy, Soil[b]	Target Quantitation Limit Water[a]	Precision, Water[b]	Accuracy, Water[b]
Cadmium	6010[c]	2 mg/kg	±20	75-125	2 mg/l	±20	75-125
Chromium	6010[c]	2 mg/kg	±20	75-125	10 mg/l	±20	75-125
Copper	6010[c]	2 mg/kg	±20	75-125	10 mg/l	±20	75-125
Iron	6010[c]	10 mg/kg	±20	75-125	30 mg/l	±20	75-125
Lead	6010 or 7421[c]	10 or 0.3 mg/kg (respectively)	±20	75-125	5 mg/l	±20	75-125
Manganese	6010[c]	1 mg/kg	±20	75-125	5 mg/l	±20	75-125
Mercury	7471[c,e]/245.2[c,d]	0.1 mg/kg	±20	75-125	0.1 mg/l	±20	75-125
Nickel	6010[c]	4 mg/kg	±20	75-125	10 mg/l	±20	75-125
Potassium	6010[c]	500 mg/kg	±20	75-125	TBD	±20	75-125
Selenium	6010 or 7740[c]	25 or 0.3 mg/kg (respectively)	±20	75-125	TBD	±20	75-125
Silver	6010[c]	20 mg/kg	±20	75-125	10 mg/l	±20	75-125
Tin	7870[c]	50 mg/kg	±20	75-125	TBD	±20	75-125
Vanadium	6010[c]	2 mg/kg	±20	75-125	TBD	±20	75-125
Zinc	6010	2 mg/kg	±20	75-125	5 mg/l	±20	75-125
Acetate	8270[c,j]	TBD	±20	75-125	TBD μg/l	±20	75-125
Ammonia	350.2	TBD	±20	75-125	30 μg/l	±20	75-125
Cyanide	9010[c,e]/320.3[c,d]	TBD	±20	75-125	0.8 μg/l	±20	75-125

Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a]	Precision, Soil[b]	Accuracy, Soil[b]	Target Quantitation Limit Water[a]	Precision, Water[b]	Accuracy, Water[b]
Fluoride	EPA 300/modified[d,g]	TBD	±20	75-125	6 μg/L	±20	75-125
Nitrate	EPA 300 modified and 353[g]	1.0 mg/kg	±20	75-125	51 μg/L	±20	75-125
Nitrite	EPA 300 modified and 353[g]	1.0 mg/kg	±20	75-125	100 μg/L	±20	75-125
Sulfate	EPA 300	TBD	±20	75-125	150 μg/l	±20	75-125
Tritium (water only)	906.0[d,h]	--	--	--	400 pCi/L	±20	75-125
Americium-241	Am-01[d,k]/Am-02[d]	1 pCi/g	±30	±25	1 pCi/L	±25	±25
Barium-134m (Cesium-137)[m]	D3649 M	0.1 pCi/g	±30	±25	15 pCi/L	±25	±25
Cobalt-60	D3649 M	0.05 pCi/g	±30	±25	25 pCi/L	±25	±25
Curium-244	907.0 M[e,h]/ 907.0[d,h]	1.0 pCi/g	±30	±25	1 pCi/L	±25	±25
Europium-152	D3649 M[o]	0.1 pCi/g	±30	±25	50 pCi/L	±25	±25
Europium-154	D3649 M[o]	0.1 pCi/g	±30	±25	50 pCi/L	±25	±25
Europium-155	D3649 M[o]	0.1 pCi/g	±30	±25	50 pCi/L	±25	±25
Iodine-129	902.0 M[e,h]/ 902.0[d,h]	2.0 pCi/g	±30	±25	5 pCi/L	±25	±25
Neptunium-237	907.0 M[e]/907.0[d]	1.0 pCi/g	±30	±25	1 pCi/L	±25	±25
Plutonium-238	Pu-02[e,k]/Pu[o,d,k]	1.0 pCi/g	±30	±25	TBD	±25	±25
Plutonium-239/240	Pu-02[e,k]/Pu[o,d,k]	1.0 pCi/g	±30	±25	1 pCi/L	±25	±25
Plutonium-241	Pu-02[e,k]/Pu[o,d,k]	15.0 pCi/g	±30	±25	TBD	±25	±25

Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a]	Precision, Soil[b]	Accuracy, Soil[b]	Target Quantitation Limit Water[a]	Precision, Water[b]	Accuracy, Water[b]
Thorium-228	Alpha Spectometry	TBD pCi/g	±30	±25	TBD	±25	±25
Thorium-230	Alpha Spectometry	1.0 pCi/g	±30	±25	TBD	±25	±25
Thorium-232	Alpha Spectometry	1.0 pCi/g	±30	±25	TBD	±25	±25
Samarium-151	TBD	TBD pCi/g	±30	±25	TBD	±25	±25
Selenium-79	Beta Counting	5.0 pCi/g	±30	±25	TBD	±25	±25
Uranium-234	U-04[e/k]/908.0[d/h]	TBD pCi/g	±30	±25	1 pCi/L	±25	±25
Uranium-235 (Pa-231)	U-04[e/k]/908.0[d/h]	TBD pCi/g	±30	±25	1 pCi/L	±25	±25
Uranium-236	U-04[e/k]/908.0[d/h]	TBD pCi/g	±30	±25	TBD	±25	±25
Uranium-238	U-04[e/k]/908.0[d/h]	TBD pCi/g	±30	±25	1 pCi/L	±25	±25
Carbon-14 (water only)	C-01[d/n]	--	--	--	50.0 pCi/L	±25	±25
Yttrium-90 (Sr-90)[p]	Sr-02[k]	1.0 pCi/g	±30	±25	2 pCi/L	±25	±25
Technetium-99	TC-01 M[e/k]/ TC-01[d/k]	15.0 pCi/g	±30	±25	15 pCi/L	±25	±25
Gross alpha	Water 900[h] Soil 900.0M[k]	10.0 pCi/g	±30	75-125	3pCi/L	±20	75-125
Gross beta	Water 900[h] Soil 900.0 M[k]	15.0 pCi/g	±30	75-125	4 pCi/L	±20	75-125
GROUNDWATER PARAMETERS							
Specific Conductance	[l]	NA	NA	NA	25 μmhos/cm	±20	NA
pH	[l]	NA	NA	NA	NA	NA	NA
Temperature	[l]	NA	NA	NA	NA	±1°C	NA

Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a/]	Precision, Soil[b/]	Accuracy, Soil[b/]	Target Quantitation Limit Water[a/]	Precision, Water[b/]	Accuracy, Water[b/]
Dissolved Oxygen	360.1[f/]	NA	NA	NA	100 μg/L	±20	NA
Total Disolved Solids	160.1[f/]	NA	NA	NA	10,000 μg/L	±20	NA
Total Organic Carbon	415.1[f/]	NA	NA	NA	1,000 μg/L	±20	75-125
Turbidity	180.1[f/]	NA	NA	NA	0.05 NTU	±.05 NTU	NA
Soil Physical and Chemical Properties	--	NA	NA	NA	NA	NA	NA
Bulk Density	ASTM D3550-87	--	--	--	--	--	--
Particle Size Distribution	ASTM D433	--	--	--	--	--	--
Moisture Content	ASTM D2216-90	--	--	--	--	--	--
$CaCO_3$ Content	ASTM D4373	--	--	--	--	--	--
Saturated Hydraulic Conductivity	ASTM D5084						
Unsaturated Hydraulic Conductivity	--	--	--	--	--	--	--
Matric Potential and Soil Moisture Retention Curves	ASTM D2325-68, D3152-72	--	--	--	--	--	--
Particle Density	ASTM D854	--	--	--	--	--	--
Cation Exchange Capacity	SW 846 9081	--	--	--	--	--	--
Organic Carbon Content	SW 846 9060	--	--	--	--	--	--
Iron and Manganese Content	--	--	--	--	--	--	--

Table E-1. Analytical Methods, Analytes of Interest, Quantitation Limits, and Precision and Accuracy Guidelines for the 200-BP-11 Source Operable Unit.

Analyte	Analytical Method	Target Quantitation Limit Soil[a]	Precision, Soil[b]	Accuracy, Soil[b]	Target Quantitation Limit Water[a]	Precision, Water[b]	Accuracy, Water[b]
pH and if possible Eh	ASTM G51, SW 846 9050	--	--	--	--	--	--
Minerology	--	--	--	--	--	--	--

[a] Values are to be considered requirements in the absence of known or suspected analytical interferences that may hinder achieving the limit by the analytical laboratory.

[b] Precision is expressed as relative percent difference; accuracy is expressed as percent recovery. These limits apply to sample results greater than five times the target quantitation limit and are to be considered requirements in the absence of known or suspected analytical interferences that may hinder achieving the limit by the analytical laboratory.

[c] Methods specified from *Test Methods for Evaluating Solid Waste: Chemical/Physical Methods* (EPA 1990).

[d] Water analysis.

[e] Soil analysis.

[f] Methods specified from *Methods for Chemical Analysis of Water and Wastes* (Kopp and McKee 1983).

[g] Method is from *Determination of Inorganic Anions in Aqueous and Solid Samples by Ion Chromatography* (Lindahl 1984) and is modified from EPA method 300.0.

[h] Methods from *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (Krieger and Whittaker 1980) or an equivalent method.

[i] Methods, quantitation limits, and target values for precision and accuracy shall be developed in compliance with BHI or BHI-approved participant contractor or subcontractor procedures.

[j] 1-butanol and ethyl ether will analzed as tentantively identified compounds under 8240. Formaldehyde, kerosene, and acetate will be analyzed as tentatively identified compounds under 8270. Tributyl phosphate will be analyzed using a special calibration under 8270. Additionally, all RCRA TSD waste management unit (excluding the Expansion Ponds) samples will include analyzes for the volatile (8240) and semi-volatile (8270) tentantively identified compounds.

[k] Applicable methods shall be selected from the *EML Procedures Manual* (Volchok and dePlanque 1982) or an equivalent method.

[l] Parameter measured in the field in compliance with EIP 4.1, "Groundwater Sampling" (BHI 1994a).

[m] The first radionuclide is analyzed in order to derive a concentration for the radionuclide in parentheses.

[n] Method from Radiochemistry Procedures Manual, Eastern Environmental Radiation Facility (EPA 1987) or an equivalent method.

[o] Method from Standard Test Method for High-Resolution Gamma-Ray Spectrometry of Water (ASTM 1991) or equivalent method. Soils counted using reproducible geometry, e.g., Marinelli beakers of Petri dishes and standards with sand matrix.

Table E-2. Sampling and Investigative Procedures for Field Investigations.

Procedure Title or Subject[a]	Task Number			
	2	3	4	5
EIP 1.1 Preparing, Revising, and Cancelling Environmental Investigations Procedures	X	X	X	X
EIP 1.4 Preparing and Revising Descriptions of Work				
EIP 1.5 Field Logbooks	X	X	--	--
EIP 1.6 Surveying	--	--	--	X
EIP 1.12 Indoctrination, Training, and Qualification	X	X	X	X
EIP 2.0 Sample Event Coordination	X	--	X	X
EIP 3.0 Chain of Custody	X	--	X	X
EIP 3.1 Sample Packaging and Shipping	X	--	X	X
EIP 4.0 Soil and Sediment Sampling	X	X	--	--
EIP 4.1 Groundwater Sampling	X	--	--	X
EIP 5.1 Soil-Gas Sampling	X	--	--	--
EIP 6.0 Documentation of Well Drilling and Completion Operations	--	--	--	X
EIP 6.2 Field Decontamination	--	--	--	X
EIP 6.10 Decommissioning Wells	X	--	--	--
EIP 7.0 Geologic Logging	--	--	--	X
EIP 7.1 Aquifer Testing	--	--	--	0X
EIP 11.1 Purgewater Management	--	--	--	X
BHI-SH-02, Section 8, "Environmental Safety and Health Training" BHI-SH-02, Vol. 1, "General Safety and Health Implementing Procedures; and Vol. 2, "Occupational Health"	X	X	X	--
BHI-FS-01, Section 4.0, "Waste Management"	X	X	X	X
BHI-SH-05, Industrial Hygiene Desk Instsructions	X	--	X	X
WHC-CM-4-12, Health Physics Practices Manual	X	--	X	X

[a] Procedures are latest version of Environmental Investigations Procedures (EIPs) selected from the *Environmental Investigations Procedures* (BHI 1994a) unless otherwise specified.

Table E-3. Required Preservation, Container, and Holding Times.

Parameter	Preservation	Container	Holding Time
Water Matrix			
Total Extractable Petroleum Hydrocarbons	HCl to pH <2, Cool 4°C	Gs	14 Days
Volatile Organics	HCl to pH <2, Cool 4°C	Gs	14 Days
Metals	HNO_3 to pH <2	G	6 Months
Mercury	HNO_3 to pH <2	G	28 Days
Cyanide, Total	NaOH to pH ≥12	P	14 Days
Fluoride, Total	None	P/G	28 Days
Radionuclides	Isotope Specific	Isotope Specific	Isotope Specific
Nitrate/Nitrite	H_2SO_4 to pH <2, Cool 4°C	P/G	28 Days
Tributyl Phosphate	Cool 4°C	aG	7 Days[2]
Kerosene	Cool 4°C	Gs*	14 Days
Soil Matrix			
Total Extractable Petroleum Hydrocarbons	Cool 4°C	G, Teflon-lined Cap	14 Days
Volatile Organics	Cool 4°C	G, Teflon-lined Cap	7 Days
Metals	Cool 4°C	G	6 Months
Mercury	Cool 4°C	G	28 Days
Cyanide, Total	None	P	14 Days
Fluoride, Total	None	P/G	28 Days
Radionuclides	Isotope Specific	Isotope Specific	Isotope Specific
Nitrate/Nitrite	Cool 4°C	P/G	28 Days
Tributyl Phosphate	Cool 4°C	aG	7 Days[a]
Kerosene	Cool 4°C	G, Teflon-lined Cap	14 Days[b]

[a]7 days for extraction, 40 days for analysis.

[b]14 days for extraction, 40 days for analysis.

G = glass; Gs = glass septum; P = plastic; Gs* = glass septum with zero headspace; aG = amber glass

Table E-4. Quality Assurance Control Samples.

Parameters	Field[a] Samples	Duplicate Sample	Field and Equipment Rinsate Blanks	Trip Blank	MS/MSD[b]
Physical Properties - Type A[c]	55	6	NA	NA	NA
Physical Properties - Type B[d]	18	2	NA	NA	NA
Organics, Inorganics, and Rad	121	12	12	TBD	TBD

[a] Approximate number of field samples.
[b] Matrix spike/matrix spike duplicates are described in Section 9.2 of the QAPjP; one sample per analytical batch or one in every 10 samples shall be analyzed.
[c] Type A samples will be run for the following analyses: moisture content, bulk density, particle-size distribution, and $CaCO_3$ (samples from the test pits will not be run for bulk density).
[d] Type B samples will be run for Type A analyses: saturated hydraulic conductivity, cation exchange capacity, moisture retention curves, organic carbon content, iron and manganese content, pH, and if possible, Eh and mineralogy.

Table E-5. Soil Physical Parameters for the 200-BP-11 Source Operable Unit.

Parameter	ASTM or Other Standard Method
Bulk density	[a]
Particle size distribution	D-422[b]
Permeability	D-2434[b]
Moisture content	D-2216[b]

[a] Method shall be developed by the laboratory contractor and submitted for BHI review and approval before use.
[b] Method is from the *1991 Annual Book of ASTM Standards* (ASTM 1991).

APPENDIX F

INFORMATION MANAGEMENT OVERVIEW

ACRONYMS AND ABBREVIATIONS

AR	administrative record
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CMS	Corrective Measures Study
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
Ecology	Washington Department of Ecology
EDMC	Environmental Data Management Center
EII	Environmental Investigations Instructions
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FOMP	Field Office Management Plan
FS	feasibility study
GIS	geographic information system
HAS	Hanford Analytical Services
HEHF	Hanford Environmental Health Foundation
HEIS	Hanford Environmental Information System
HLAN	Hanford Local Area Network
HMS	Hanford Meteorological Station
IMO	Information Management Overview
KEH	ICF Kaiser Hanford Co.
PNL	Pacific Northwest Laboratory
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	*Resource Conservation and Recovery Act*
RFI	RCRA Facility Investigation
TR	training records
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and disposal
Westinghouse Hanford	Westinghouse Hanford Company

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DEFINITIONS OF TERMS

Action Plan. Action plan for implementation of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1994). The Action Plan defines the methods and processes by which hazardous waste permits will be obtained, and by which closure and post-closure actions under the *Resource Conservation and Recovery Act of 1976* (RCRA) and by which remedial actions under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) will be conducted on the Hanford Site.

Administrative Record (AR). In CERCLA, the official file that contains all information that was considered or relied on by the regulatory agency in arriving at a final remedial action decision, as well as all documentation of public participation throughout the process. In RCRA, the official file that contains all documents to support a final RCRA permit determination.

Administrative Record File. The assemblage of documents compiled and maintained by an agency pertaining to a proposed project of administrative action and designated as AR or that are candidates for inclusion in the AR once a record of decision (ROD) is attained.

Data Management. The planning and control of activities affecting data.

Data Quality. The totality of features and characteristics of data that bears on its ability to satisfy a given purpose. The characteristics of major importance are accuracy, precision, completeness, representativeness, and comparability.

Data Validation. The process whereby data are accepted or rejected based on a set of criteria. This aspect of quality assurance involves establishing specified criteria for data validation. The quality assurance project plan (QAPP) must indicate the specified criteria that will be used for data validation.

Environmental Data Management Center (EDMC). The central facility and services that provide a files management system for processing environmental information.

Environmental Information. Data related to the protection or improvement of the Hanford Site environment, including data required to satisfy environmental statutes, applicable DOE orders, or the Tri-Party Agreement.

Field File Custodian. An individual who is responsible for receipt, storage, maintenance, control, and disposition of information or other records generated in support of Environmental Division activities.

Hanford Environmental Information System (HEIS). A computer-based information system used as a resource for the storage, analysis, and display of investigative data collected for use in site characterization and remediation activities. Subject areas include geophysics/soil gas, vadose zone soil (geologic), groundwater, atmospherics, and biota.

Information System. Collection of components relate to the management of data and reporting of information. Information systems typically include computer hardware, computer software, operating systems, utilities, procedures, and data.

Lead Agency. The regulatory agency (EPA or Ecology) that is assigned the primary administrative and technical responsibility with respect to actions at a particular operable unit.

Nonrecord Material. Copies of material that are maintained for information, reference, and operating convenience and for which another office has primary responsibility.

Operable Unit. An operable unit at the Hanford Site is a group of land disposal and groundwater sites placed together for the purposes of site cleanup and remediation. The primary criteria for placement of a site into an operable unit are geographic proximity, similarity of waste characteristics and site types, and the possibility for economies of scale.

Primary Document. A document that contains information on which key decisions are made with respect to the remedial action or permitting process. Primary documents are subject to dispute resolution and are part of the administrative record file.

Project Manager. The individual responsible for implementing the terms and conditions of the Action Plan on behalf of his respective party. The EPA, DOE, and Ecology will each designate one project manager.

Quality Affecting Record. Information contained on any media, including but not limited to, hard copy, sample material, photo copy, and electronic systems, that is complete in terms of appropriate content and that furnishes evidence of the quality of items and/or activities affecting quality.

Quality Assurance. The systematic actions necessary to provide adequate confidence that a material, component, system, process, or facility performs satisfactorily or as planned in service.

Quality Assured Data. Data developed under an integrated program for assurance of the reliability of data.

Raw Data. Unprocessed or unanalyzed information.

Record Validation. A review to determine that records are complete, legible, and meet records requirements. Documents shall be considered valid records only if stamped, initialed or signed and dated by authorized personnel or otherwise authenticated. Authentication may be a statement by the responsible individual or organization.

Retention Period. The period of time that records are to be kept and maintained. The time is usually expressed in years from the date of the record, but may also be expressed as contingent on the occurrence of an event.

Secondary Document. A document providing information that does not, in itself, reflect or support key decisions. A secondary document is subject to review by the regulatory agencies and may be part of the administrative record field. It is not subject to dispute resolution.

Validated Data. Data that meet criteria contained in an approved company procedure.

Verified Data. Data that have been checked for accuracy and consistency following a transfer action (e.g., from manual log to computer, or from distributed database to centralized data repository).

1.0 INTRODUCTION AND OBJECTIVES

1.1 INTRODUCTION

An extensive amount of data will be generated over the next several years in connection with the activities planned for the 200-BP-11 Operable Unit. The quality of these data are extremely important to the full remediation of the operable unit as agreed on by the U.S. Department of Energy (DOE), Washington Department of Ecology (Ecology), U.S. Environmental Protection Agency (EPA), and interested parties.

This Information Management Overview (IMO) provides an overview of the data management activities at the operable unit level and identifies procedures and plans which control the collection and handling of these data. The IMO provides guidance for the Project Manager, Unit Managers, Technical Lead, Remedial Investigation/Feasibility Study Coordinators, and other involved personnel and reviewers to fulfill their respective roles. All data collected will be in accordance with the Environmental Investigations Procedures (EIPs) contained in Bechtel Hanford, Inc.'s (BHI) *Environmental Investigations Procedures* (BHI 1994).

The *Environmental Restoration Program Document Control Plan* (Montgomery 1993) and the *Environmental Restoration Program Records Management Plan* (Montgomery 1992) are comprehensive plans for the management of all environmental data and documents generated at the Hanford Site. The purpose of these plans is to identify and fulfill the document and data control requirements of the U.S. Department of Energy, Richland Operations Office, the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement [Ecology et al. 1994]), BHI, and the DOE Environmental Restoration (ER) Program.

1.2 OBJECTIVES

This IMO describes the process for the collection and control procedures for validated data, records, documents, correspondence, and other information associated with this operable unit. This IMO addresses the following:

- Types of data to be collected
- Plans for managing data
- Organizations controlling data
- Databases used to store the data
- Hanford Environmental Information System (HEIS).

2.0 TYPES OF DATA

2.1 TYPES OF DATA

The general types of technical data specified in the 200-BP-11 RFI/CMS work/closure plan to be collected are listed in Table F-1. The *Environmental Investigations Procedures* (BHI 1994) provides the procedures, defined as Environmental Investigations Procures (EIPs) for the collection and management environmental and site characterizations. EIPs controlling activities outlined in the work/closure plan are also included in Table F-1.

All such data are submitted to the EDMC for retention in project files and entered into the administrative record, if appropriate.

General types of related administrative data associated with ER projects are depicted in Table F-2. The table is organized in terms of general personal and regulatory type data and references applicable procedures and record custodians. As noted previously, data associated with the operable unit investigation will be submitted to the EDMC for entry into the AR, as appropriate.

2.2 DATA COLLECTION

Data collection activities are described in the operable unit work/closure plan. Additional direction and detail will be provided in sampling and analyses plans and descriptions of work. All data collection will be conducted in accordance with the Quality Assurance Project Plan (QAPjP). Section 2.1 listed the controlling procedures for data collection and handling before turnover to the organization responsible for data storage. All procedures for data collection shall be approved in compliance with the *Environmental Investigations Procedures* (BHI 1994).

2.3 DATA STORAGE AND ACCESS

Data will be handled and stored according to procedures approved in compliance with applicable Westinghouse Hanford Company (WHC) procedures (WHC 1988a) until such time BHI equivalents are put in place. The EDMC is the central files manager and process facility. All data entering the EDMC will be indexed, recorded, and placed into safe and secure storage. Data designated for placement into the AR will be copied, placed into the Hanford Site AR file, and distributed by the EDMC to the user community. The hard copy files are the primary sources of information; the various electronic databases are secondary sources.

Normal access to data is through EDMC, which is responsible for the AR. The Administrative Record Public Access Room is located in the 2440 Stevens Center facility in Richland, Washington. This facility includes AR file documents (including identified guidance documents and technical literature).

Administrative record documents consist of the documents and information considered or relied upon in order to arrive at a final decision for site cleanup. Requirements governing the AR for a CERCLA response action is specified in Section 113(k) of CERCLA. Requirements governing the AR for RCRA corrective actions are specified in 40 CFR 124.9 and 124.18. Section 9.4 of the Tri-Party

Agreement (Ecology 1994) provides an overview of the Administrative Record. Tri-Party Agreement unit managers determine what additional documents, including sampling and analysis results, sample validation, technical studies, inspection and other studies that may be appropriate for inclusion as part of the AR. Table F-3 presents a partial list of documents that typically constitute AR files. The Tri-Party Agreement defines a number of these documents as primary and secondary documents. Status as primary or secondary determines administrative requirements applicable to the document.

Project participants may access data that are not in the AR by requesting it at the monthly unit managers' meeting for the operable unit of concern. As the project moves to completion, all of the relevant data will be contained in the AR and the need to access data by requesting it at the unit managers' meetings will be minimal.

In addition to the AR, the following types of data will be accessed from and reside in locations other than the EDMC:

Data Type	Data location
• QA/QC laboratory data	HAS (BHI)
• Sample status	HAS (BHI)
• Archived samples	Laboratory performing analyses
• Training records	Technical Training Records and Scheduling (BHI)
• Meteorological data	Hanford Meteorological Station (HMS) (Pacific Northwest Laboratory [PNL])
• Radiological exposure	Pacific Northwest Laboratory.

2.4 DATA QUANTITY

Data quantities for the investigative activities will be estimated based on the sampling and analysis plans developed for investigation of sites within the operable unit. Section 5.1.3 of the 200-BP-11 Operable Unit RFI/CMS Work/closure Plan, Volume 1, describes field investigation activities for the operable unit. Table 5-2 of the work/closure plan summarizes these activities, including proposed sampling locations and estimates of the number of samples to be collected at each location.

3.0 DATA MANAGEMENT

3.1 OBJECTIVE

A considerable amount of data will be generated through the implementation of the operable unit sampling and analysis plans. This section identifies responsible organizations, databases available, and records management programs used to manage data in support of remediation activities at the

200-BP-11 Operable Unit. The QAPjP will provide the specific procedural direction and control for obtaining and analyzing samples in conformance with requirements to ensure quality data results. For intrusive activities, the sampling and analysis plans will provide the basis for selecting the location, depth, frequency of collection, etc., of media to be sampled and methods to be employed to obtain samples of selected media for cataloging, shipment, and analysis. Figure F-1 displays the general data management model for data generated through work/closure plan activities.

3.2 ORGANIZATIONS CONTROLLING DATA

This section addresses the organizations that are involved in the management of data generated from operable unit activities. Chapters 4, 5, and 6 of this appendix present discussions of ER programs for records, document and data management.

3.2.1 200 Area Project Team

The 200 Area Project Team provides the operable unit technical coordinator. The technical coordinator is responsible for maintaining and transmitting data to the designated storage facility. The 200 Area Team is responsible for transmitting to Ecology and EPA the validated laboratory analytical data within 15 days of validation.

3.2.2 Tri-Party Agreement Unit Managers

Tri-Party Agreement Unit Managers are responsible for identifying administrative record documents and ensuring that copies of these documents are provided to the EDMC, within the EPIC, for inclusion in the applicable administrative record files.

3.2.3 Hanford Analytical Services

The BHI HAS is the laboratory point of contact for technical activities conducted by ER. The HAS verifies data packages from the contract laboratory for completeness, and transmits the validated laboratory package to the EDMC within 21 days. The initial document package transmitted by HAS to the 200 Area Project Team contains copies of the validation documentation (including the Case Narrative for Contract Laboratory Program (CLP) data packages), verification form, transmittal letter and hardcopy and/or computer generated record containing at a minimum the validated analytical results and data qualifiers to the original laboratory's results. An entire copy of all unvalidated CLP data is transferred to the EDMC. Additional responsibilities include; development of statements of work for laboratory services, issuing sample numbers, and maintaining a system for tracking sample status.

3.2.4 Environmental Restoration Information Center

Environmental Restoration Information Center (EPIC) provides a centralized location for the processing and retrieval of ER Program information (data, documents, and records) utilizing existing management systems for document control and records management. The ER Program Information

Center will utilize the Environmental Data Management Center (EDMC) and the Administrative Records (AR) information repository systems to meet Tri-Party Agreement records requirements and information access.

3.2.4.1 Environmental Data Management Center. The EDMC, a branch of the EPIC, provides a file management system for processing environmental information. The EDMC manages and controls the processing, indexing and access for documents and records for the Administrative Records and Administrative Record Public Access Room at the Hanford Site. The EDMC will also provide read-only access to the HEIS computerized database used to store and retrieve environmental sampling data. The following procedures address data transmittal to the EDMC:

- EII 1.5, "Field Logbooks"
- EII 1.6, "Record Processing"
- EII 14.1, "Analytical Laboratory Data Management"
- TPA-MP-02, "Information Transmittals and Receipt Controls" (DOE-RL 1990)
- TPA-MP-07, "Administrative Record Collection and Management" (DOE-RL 1990)
- Project Management System, - RL Implementing Procedure 4700.1A, Chg. 1, (DOE-RL 1992).

3.2.5 Hanford Environmental Health Foundation (HEHF)

The HEHF performs the analyses on the nonradiological health and exposure data (Section 3.3.2) and forwards summary reports to the Fire and Protection Group and the Safety and Health Group within BHI. Nonradiological and health exposure data are maintained also for other Hanford Site contractors (PNL and ICF Kaiser Hanford Co. [KEH]) associated with operable unit activities. The HEHF provides summary data to the appropriate site contractor.

3.2.6 BHI Safety and Health Group

The BHI Safety and Health Group maintains personal protective equipment fitting records and maintains nonradiological health field exposure and exposure summary reports provided by HEHF for BHI and subcontractor personnel.

3.2.7 Technical Training Records and Scheduling Group

The BHI Technical Training Records and Scheduling Section provides training and maintains training records (Section 3.3.4).

3.2.8 Pacific Northwest Laboratory

The PNL operates the HMS and collects and maintains meteorological data (Section 3.3.1). Data management is discussed in Andrews (1988).

The PNL collects and maintains radiation exposure data (Section 3.3.3).

3.3 DATABASES

This section addresses databases that will receive data generated from the operable unit activities. All of these databases exist independently of this operable unit and serve other site functions. Data pertinent to the operable unit, housed in these databases, will be submitted to the AR.

3.3.1 Meteorological Data

The HMS collects and maintains meteorological data. Their database contains meteorological data from 1943 to the present, and Andrews (1988) is the document containing meteorological data management information.

3.3.2 Nonradiological Exposure and Medical Records

The HEHF collects and maintains data for all nonradiological exposure records and medical records.

3.3.3 Radiological Exposure Records

The PNL collects and maintains data on occupational radiation exposure. This database contains respiratory personal protective equipment fitting records, work restrictions, and radiation exposure information.

3.3.4 Training Records

Training records for BHI and subcontractor personnel are managed by the BHI Technical Training Records and Support Group. Other Hanford Site contractors (WHC, PNL and KEH) maintain their own personnel training records. Training records for non-BHI personnel are entered into the BHI database to document compliance WHC-CM-4-3, Volume 4, *Health and Safety Programs for Hazardous Waste Operations* (WHC 1991).

Training records include:

- Initial 40-h hazardous waste worker training
- Annual 8-h hazardous waste worker training update
- Hazardous waste generator training
- Hazardous waste site specific training
- Radiation safety training

- Cardiopulmonary resuscitation
- Scott air pack
- Fire extinguisher
- Noise control
- Mask fit.

3.3.5 Environmental Restoration/Administrative Record

The EPIC will develop, establish, and maintain a single "master" database to index and provide status of the ER Program. The database will identify the status of documents during processing and the location of documents within applicable document control systems. The database will provide an index of key information on all data transmitted to the EDMC. This database will be used to assist in data retrieval and to produce index lists as required. The ER/AR database will be managed by BHI personnel.

3.3.6 Sample Status Tracking

The HAS maintains the sample status tracking database. This database contains information about each sample. Information maintained includes sample number, ship date, receipt date, and laboratory identification.

4.0 ENVIRONMENTAL RESTORATION PROGRAM RECORDS MANAGEMENT PLAN

This section briefly discusses the *Environmental Restoration Program Records Management Plan* (Montgomery 1992). This records management plan describes how applicable records management requirements will be implemented for the ER program, including identifying records created and scheduling final disposition. The plan specifically develops criteria for identifying appropriate requirements for individual records related to ER program work activities and provides description of file management and support services related to the compilation of ER Program files. The plan also describes the responsibilities of ER performing organizations. The records management plan identifies standards for how records are validated and controlled, development and maintenance of a computer-based records management system, and sustaining a centralized file management system.

There are three categories of Hanford Site environmental restoration records: QA records, other record material, and non-record material. Record category may be identified based on the response to each of the following three questions.

- Is the information related to an environmental restoration work activity?
- Is the information a QA record?
- Is the information other record material or nonrecord material?

Responses to these three questions determine the appropriateness, importance, and level of control required per WHC Document Control and Records Management Manual (WHC-CM-3-5, WHC 1988b).

4.1.1 QA Records

Records that furnish evidence of the quality of items and/or conditions associated with environmental restoration, waste management, and regulatory compliance should be considered QA records. Records and quality objectives should be evaluated in accordance with *Environmental Restoration Program Quality Assurance Systems Requirements for the Hanford Site* (DOE-RL 1993). In general, ER Program QA records include records that:

- Assess performance of engineered and natural systems important to waste management and environmental restoration activities
- Document performance of hazardous waste site studies, monitoring, and site remediation
- Associated with management of hazardous waste
- Document environmental permitting and compliance activities.

All environmental restoration QA records are to be validated or authenticated according to QA Requirement 17 of WHC-CM-4-2 and the *Environmental Restoration Program Quality Assurance Systems Requirements for the Hanford Site* (DOE-RL 1993). Once validated, all QA records must be transmitted to the EPIC or satellite records center for incorporation into the BHI records management system.

4.1.2 Other Record Material

Other record material is information that requires preservation because its of administrative, legal, research, scientific, or historical value and information generated or received that documents an organization's functions, policies, decisions, procedures, and essential transactions. Other record material includes, but is not limited to, administrative records, sampling, analysis, investigations, and monitoring activities conducted for the Tri-Party Agreement. ER Program management records and formalized reports are also considered Other Record Material.

Other Record Material is maintained by the performing organization; however, a file custodian must be identified, and storage location and maintenance must be documented in a Records Inventory and Disposition Schedule in accordance with existing Hanford Site requirements. In accordance with the approved Records Inventory and Disposition Schedule, Other Record Material will be maintained by EPIC in the appropriate file until such time that the material is no longer needed.

4.1.3 Nonrecord Material

Nonrecord Material is material that is maintained for operating convenience that another office or organization has primary responsibility. Materials accumulated during preparation of records, but is not significant enough to justify retention, is considered Nonrecord Material. Typical Nonrecord material includes library materials, reference documents kept for convenience, rough drafts, and preliminary worksheets that do not provide complete explanations for results.

A Nonrecord Material file will be maintained by the performing organization until the activity is completed and/or the need for the information is exhausted. The Nonrecord Material file will be identified on the organizations Records Inventory and Disposition Schedule in accordance with WHC-CM-3-5 (WHC 1988b), including record retention time and any special instructions. When the Nonrecord Material is determined to be no longer required, the material will be reviewed prior to destruction to determine if it warrants retention in the official project files and/or upgraded to a category of Other Record Material.

5.0 ENVIRONMENTAL RESTORATION PROGRAM DOCUMENT CONTROL PLAN

The *Environmental Restoration Program Document Control Plan* (Montgomery 1993) applies to all documents generated, used, or maintained by or for preforming organizations in support of ER activities at the Hanford Site. The document control plan provides descriptions and detailed methods for managing and implementing the document control system requirements identified in the *Environmental Restoration Program Quality Assurance Systems Requirements for the Hanford Site* (DOE-RL 1992).

The requirements of this plan are primarily intended to control documents considered to be QA Records. However, these requirements should also be applied to any documents when specifically identified by the ER Program office, when imposed by contractual agreements, or by performing organizations. Controlled environmental restoration documents include:

- Controlled Manuals per *Management Requirements and Procedures*, WHC-CM-1-3
- Engineering documents
- Environmental field and other controlled notebooks
- Documents published according to the *Uniform Publication System*, WHC-CM-3-6
- Primary, selected secondary, and Administrative Records listed in the Tri-Party Agreement (Ecology et al. 1994)
- Public Information Repository documents listed in the Community Relations Plan for the Hanford Federal Facility Agreement and Consent Order (Ecology et al. 1994)
- Documents that contain requirements in which failure to comply adversely affects other ER documents.

Environmental Restoration documents should be prepared according to the requirements applicable to the document being generated and should be reviewed for adequacy in accordance to applicable QA requirements. For example, documents important to safety, quality, or environmental protection, review and approval requirements are determined in WHC-CM-1-3, *Management Requirements and Procedures*. Documents generated by the ER Program may be distributed by the performing organization or service organizations according the organization's implementing procedures and

document category. Document revision of Tri-Party Agreement documents is to be conducted according to the process identified in the Tri-Party Agreement (Ecology et al. 1994).

6.0 HANFORD ENVIRONMENTAL INFORMATION SYSTEM

The HEIS has been developed to serve as a primary resource for computerized storage, retrieval, and analysis of quality-assured technical data associated with ER programs for cleanup activities being undertaken at the Hanford Site. The HEIS provides a means of interactive access to data sets extracted from other databases relevant to implementation of the Tri-Party Agreement (Ecology et al. 1994). HEIS will serve to ensure that data consistency, quality, traceability, and security are achieved through incorporation of all environmental data within a single controlled database.

The following is a list of data subjects available in HEIS:

- Geologic
- Geophysics
- Atmospheric
- Biotic
- Site characterization
- Soil gas
- Waste site information
- Surface monitoring
- Groundwater.

The HEIS data is currently accessible via the Hanford Local Area Network (HLAN) to local users and to offsite users via a modem link to the HEIS database computer. The latest *Hanford Environmental Information System (HEIS) User's Manual* (DOE-RL 1994) was issued in January 1994.

The HEIS geographic information system (GIS) can display detailed maps for the Hanford restoration sites including data from the HEIS database. Such spatially related data can be used to support analysis of waste site technical issues and restoration options. The combination of the HEIS for data and the GIS spatial displays offers some powerful tools for many users to analyze and collectively evaluate the environmental data from the ER and site-wide monitoring programs.

7.0 REFERENCES

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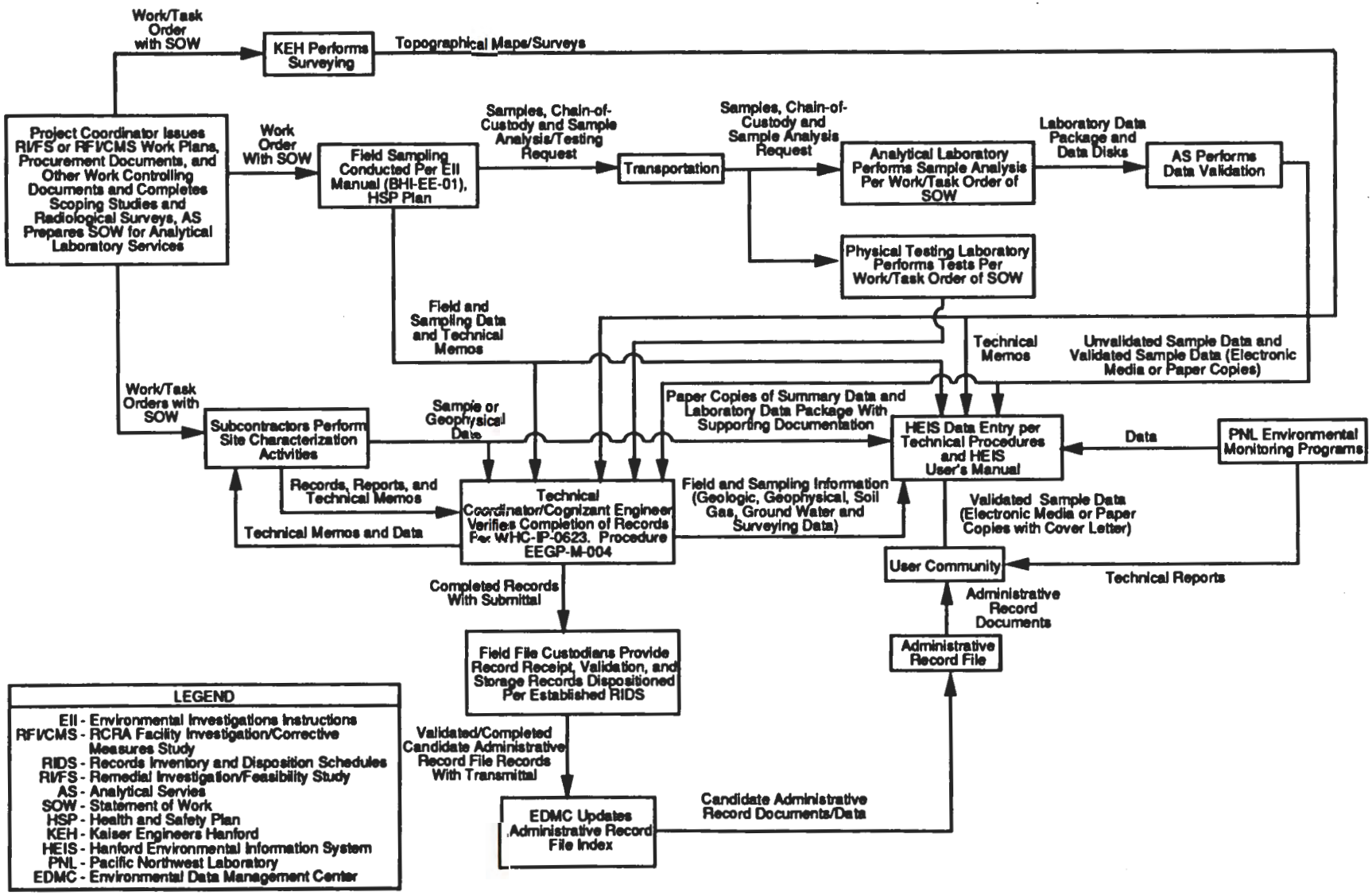

Figure F-1. Environmental Engineering Data Management Model.

Table F-1. Technical Data Types and Controlling Procedures.

Work/closure Plan Task - Type of Data	Controlling EII
Data Review - Source data including historical records, aerial photos, personal interviews, Hanford Site drawings	Technical Data Management(under development)
Surface Radiological Surveys	EII 2.2, WHC-CM-4-10
Surface Geophysics Surveys	EII 11.2
Soil Sampling	EII 3.4, 5.1, 5.2, 5.4, 14.1
Well Installation	EII 6.1 through 6.10
Cone Penetrometer Probes	EII 3.5
Groundwater Sampling and Water Level Measurement	EII 5.8, 10.2, 14.1
Downhole Radiation and Soil Gas Measurements	EII 5.9, 11.1, 14.1
Air Monitoring	EII 5.12
Ecological Monitoring	EII 5.3, 14.1
Technology Demonstration and Performance Evaluation	To Be Determined
Soil Removal and Confirmatory Sampling	EII 5.2, 14.1
Camera and Radiologic Inspections	To Be Determined

Table F-2. Types of Related Administrative Data.

Type of Data	Controlling document/ procedure	Record Custodians				
		TR	HEHF	PNL	EDMC	H&S
Personnel						
Personnel training and qualifications	EII 1.7[a/]	X				
Occupational exposure records (nonradiological)	EII 2.2[a/]		X			X
Radiological exposure records				X		
Respiratory protection fitting						X
Personnel health and safety records	EII 2.1[a/]		X			X
Compliance/regulatory						
Action-specific requirements/screening levels	EII 1.6[a/]				X	
Guidance document tracking	EII 1.6[a/]				X	
Compliance issues	EII 1.6[a/]				X	
Problem resolution	EII 1.6[a/]				X	
Administrative record	TPA-MP-11[b/]				X	

a/ BHI, 1994, *Environmental Investigations Proceudres*.
b/ DOE-RL, 1990, *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) Handbook*.
EDMC = Environmental Data Management Center (BHI and WHC).
H&S = Health and Safety Group (BHI).
EII = Environmental Investigations Instructions.
HEHF = Hanford Environmental Health Foundation.
TR = training records (BHI, WHC, PNL, and KEH).

Table F-3. Environmental Restoration (ER) Program Documents. (sheet 1 of 2)

Document Title or Description	Source Requirement Document	Originating/ Responsible Organization	Interim Record Keeping Organization	Record Copy Holder
Administrative Record (AR) Index (RL-TPA-90-0002)	Tri-Party Agreement RL-TPA-90-0001	ERIS	ERIS	CF
Characterization Documents	WAC	ERO	ERO	DS
Closure Plans	RCRA WAC 303-610(3)(a) WHC-CM-7-5	RCRA Closures	RCRA Closures	CF
Community Relations Plan For the Hanford Federal Facility Agreement and Consent Order	40 CFR 300.430 (c) Tri-Party Agreement	Public Involvement	COM	COM
Corrective Measures Implementation (CMI) Work Plans	RCRA/BHI-EE-01/EII 1.9	ERE	ERE	CF
Corrective Measures Study Reports	RCRA/BHI-EE-01/EII 1.9	ERE	ERE	CF
Description of Work (DOW)	WHC-CM-6-1 BHI-EE-01/EII 1.14	ERE	N/A	CF
Document Control Plans	DOE/RL-89-29	ERIS	ERIS	CF
Engineering Studies	WHC-CM-6-1	Cog Eng	Config. Mgmt.	CF
Environmental Assessments (EA)	NEPA WHC-CM-7-5/4.0	NEPA Function	NEPA Function	RHA
Expedited Response Action (ERA) Project Plans	TBD	TBD	TBD	TBD
Facility Closure/Post-Closure Plans	RCRA WAC 303-610(3)(a) WHC-CM-7-5	RCRA Closures	RCRA Closures	CF
Facility Decommissioning Reports	DOE 5480.2A	DE	DE	DS
Feasibility Study (FS) Phase I & II Reports	CERCLA	ERE	ERE	CF
Feasibility Study (FS) Phase III Reports	CERCLA	ERE	ERE	CF
Field Logbooks	BHI-EE-01/EII 1.5	ERE/EFS/GEO	ERE/EFS/GEO	RHA
Final Decommissioning or Phase Reports	WHC-CM-6-6	DE	DE	DE
Fiscal Year (FY) Program/ Project Work Plans	TBD	EPB	EPB	CF
Hanford Site Waste Management Units Report (HSWMUR)	HSWA 3004 (U)	EDM	EDM	CF
Interim Measure Proposals	RCRA BHI-EE-01/EII 1.9	ERE	ERE	CF
Interim Response Action (IRA) Proposals	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Part A Permit Applications	RCRA WAC 173-303/WHC-CM-7-5	RCRA Unit Permits	RCRA Unit Permits	CF
Part B Notices of Deficiency (NOD)	RCRA WAC WHC-CM-7-5	RCRA Unit Permits	REGSUP	CF
Part B Permit Applications	RCRA WAC 173-303/WHC-CM-7-5	RCRA Unit Permits	REGSUP	CF
Permitting Plans	WHC-CM-7-5	REGSUP	REGSUP	CF
Post-Closure Plans	WAC 173-303-160 (6) WHC-CM-7-5	RCRA Closure	RCRA Closure	CF

Table F-3. Environmental Restoration (ER) Program Documents. (sheet 2 of 2)

Document Title or Description	Source Requirement Document	Originating/ Responsible Organization	Interim Record Keeping Organization	Record Copy Holder
Project Specific Quality Assurance Plan, Standard For RCRA Compliant Groundwater Monitoring Wells (WHC-SD-WM-WAPP-002)	TBD	EQA	EQA	CF
Quality Assurance Project Plans (QAPjP)	DOE/RL-90-28, Rev. 1	EQA	EQA	CF
Records of Decision (ROD)	CERCLA Tri-Party Agreement	EPA/Ecology	EPA	EPA
Remedial Action (RA) Work Plans	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Remedial Action Design (RA) Reports	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Remedial Investigation (RI) Phase I Reports	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Remedial Investigation (RI) Phase II Reports	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Remedial Investigation/ Feasibility Study (RI/FS) Work Plans	CERCLA BHI-EE-01/EII 1.9	ERE	ERE	CF
Safety and Health Plans	TBD	PS&D	PS&D	PS&D
Treatability Investigation Work Plans	TBD	TBD	TBD	TBD
Treatability Study Work Plans & Characterization Plans	TBD	TBD	TBD	TBD
Work Plans	OSWER 9355.3-01 BHI-EE-01/EII 1.9 RCRA	ERE (CERCLA) RCRA Closures (RCRA)	ERE (CERCLA) RCRA Closures (RCRA)	CF

A&WP Air & Water Permits
AR Administrative Record
CF Central files (3706 Building)
Cog Eng Cognizant Engineer
COM Communications
CM Controlled Manual
DE Decommissioning Engineering
DS Decommissioning Support
EDM Environmental Data Management
EII Environmental Investigations Instruction
EP External Publication
EPB Environmental Program Baseline
EQA Environmental Quality Assurance
ERE Environmental Restoration Engineering
ERIS Environmental Records & Information Services
ERO Environmental Restoration Operations
FATP Federal Agency Technical Publication
GEL Geotechnical Engineering Laboratory
GEO Geosciences
N/A Not Applicable
NEPA NEPA Documentation Organization
PMS Program Management Systems
PS&D Program Self-Assessment and Development
REGSUP Regulatory Support
RHA Records Holding Area (712 Building)
RLIP RL Implementing Procedure
TBD To Be Determined

Source: Modified from Montgomery 1993.

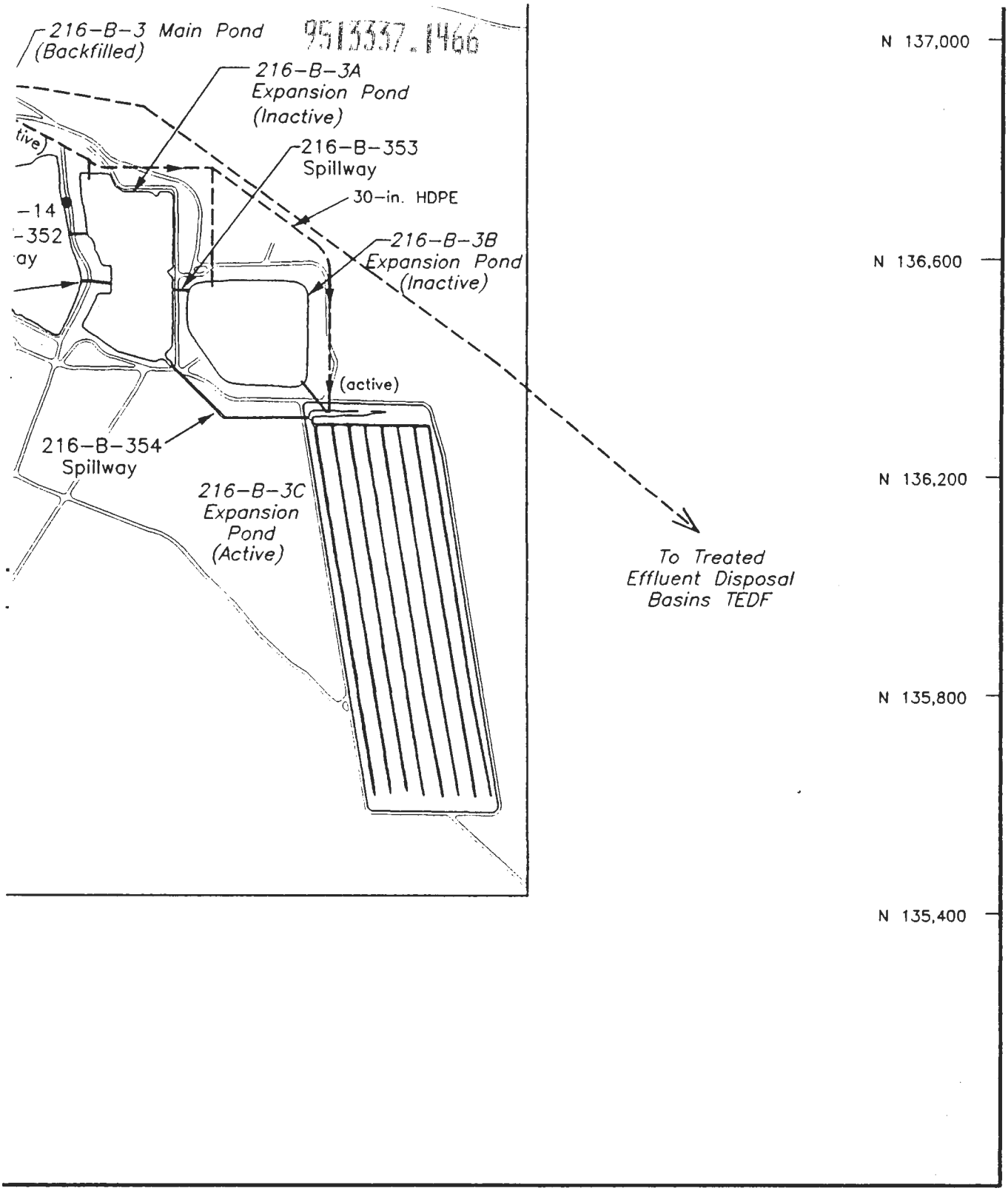

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Plate 1
200-BP-11 Operable Unit Map

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Plate 2
200-BP-11 Operable Unit Sampling Design

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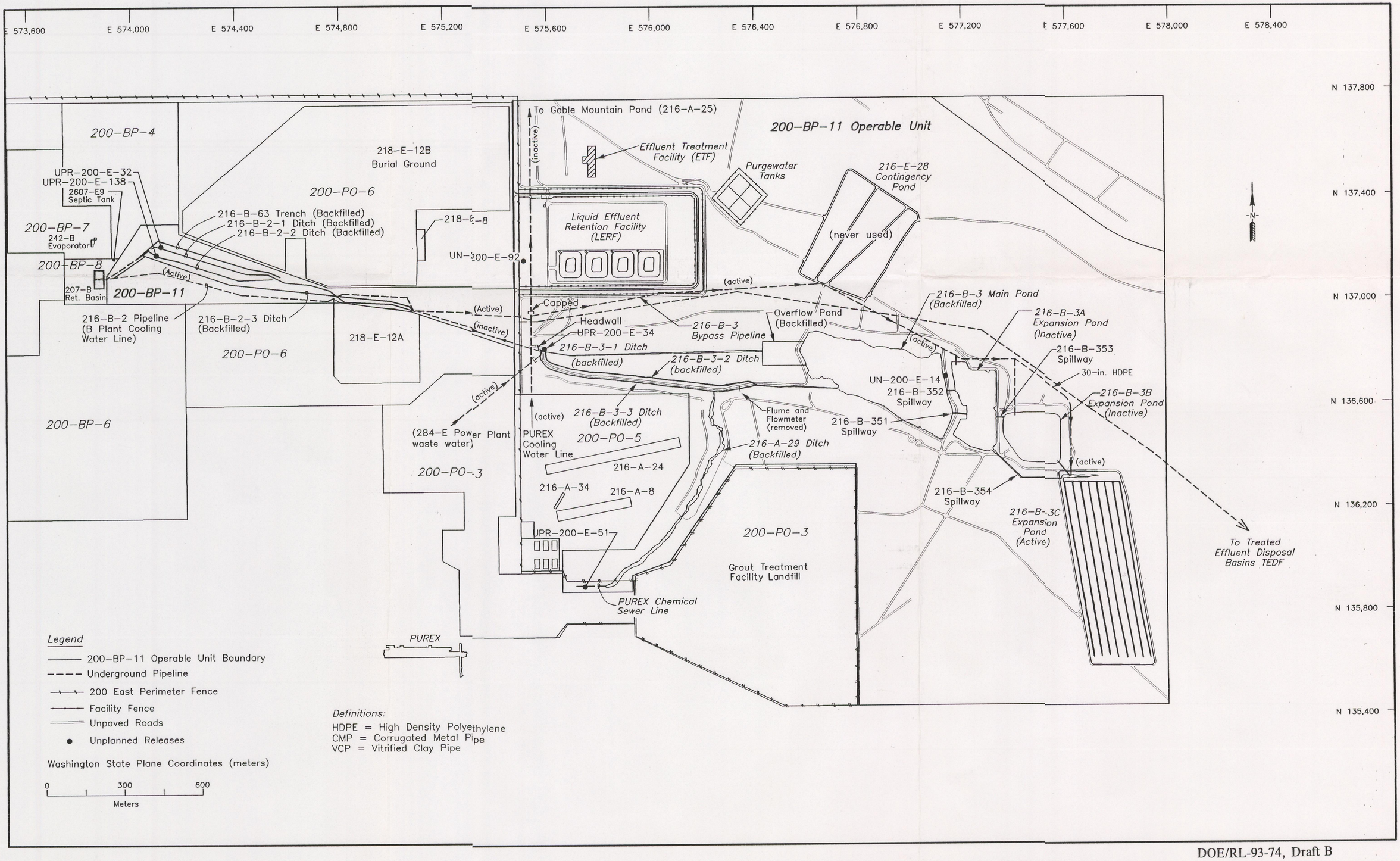

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Plate 1
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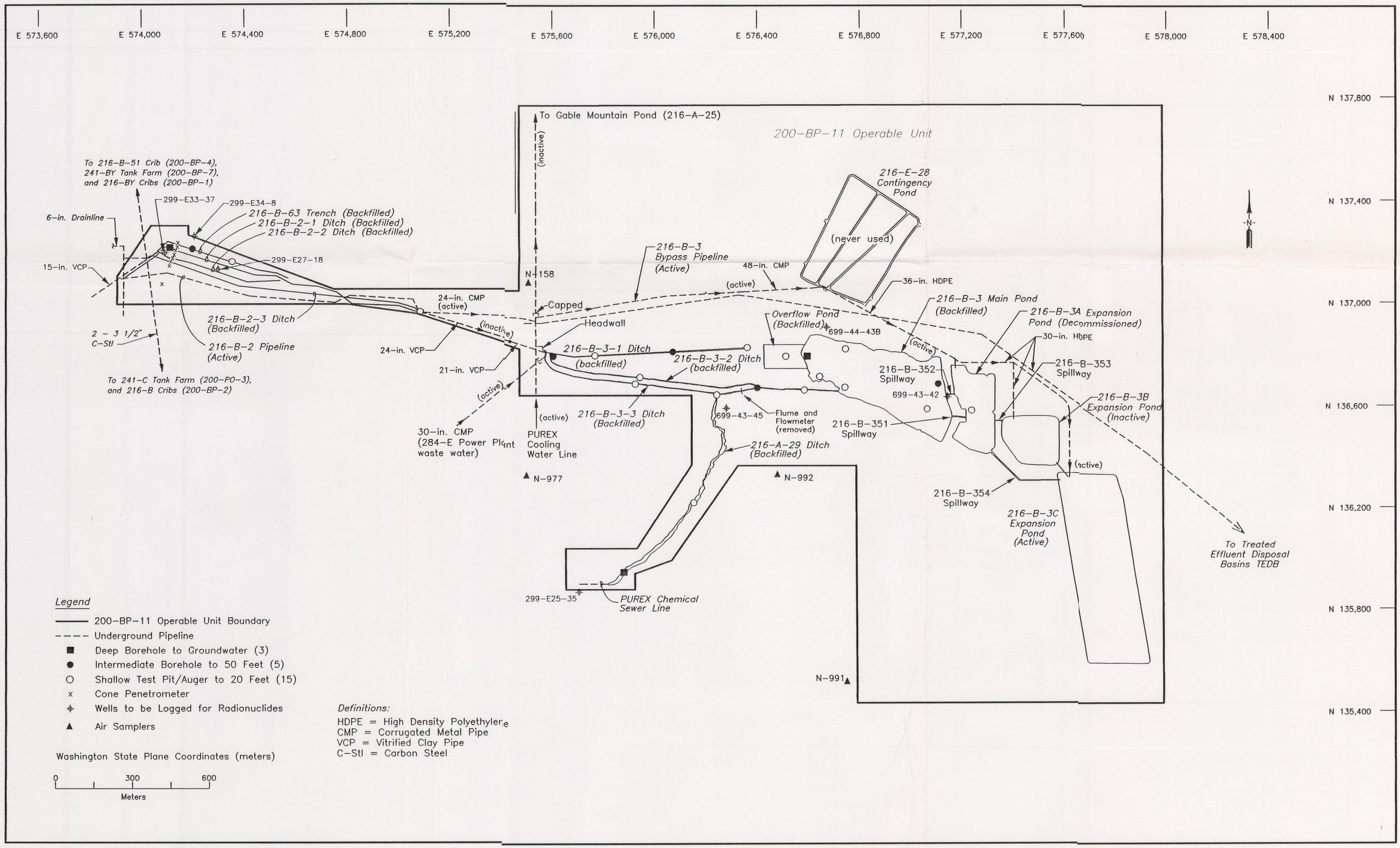

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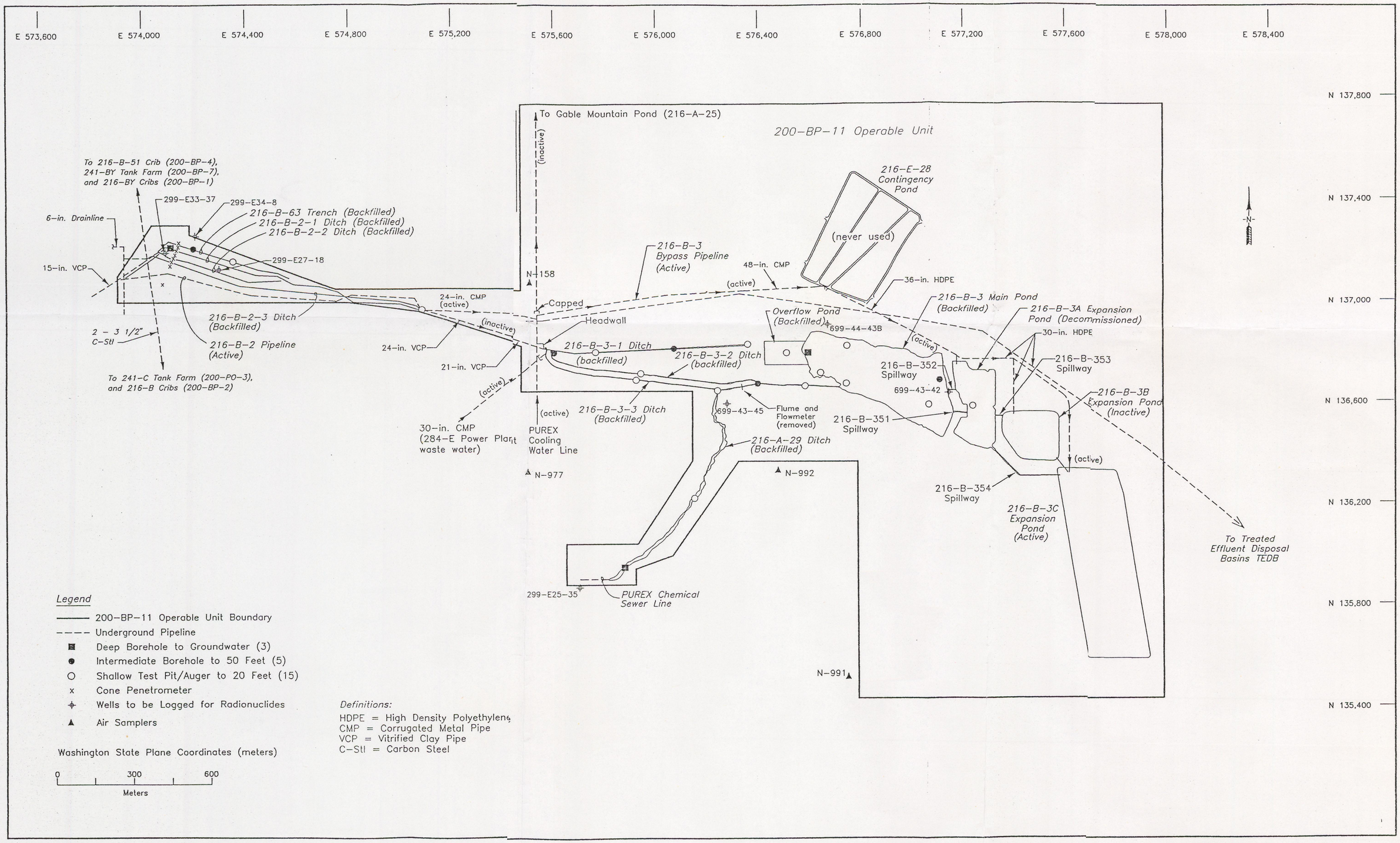
Plate 2
200-BP-11 Operable Unit Sampling Design



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