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Pacific Northwest
National Laboratory
Operated by Battelle for the
U.S. Department of Energy

Integrated Monitoring Plan for the Hanford Groundwater Monitoring Project

M. J. Hartman
P. E. Dresel
J. P. McDonald
R. B. Mercer
D. R. Newcomer
E. C. Thornton

September 1998

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Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

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Pacific Northwest National Laboratory
Richland, Washington 99352

Summary

Groundwater is monitored at the Hanford Site to fulfill a variety of state and federal regulations, including the *Atomic Energy Act of 1954*; the *Resource Conservation and Recovery Act of 1976*; the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*; and Washington Administrative Code. Separate monitoring plans are prepared for various requirements, but sampling is coordinated and data are shared among users to avoid duplication of effort. The U.S. Department of Energy manages these activities through the Hanford Groundwater Monitoring Project.

This document is an integrated monitoring plan for the groundwater project. It documents well and constituent lists for monitoring required by the *Atomic Energy Act of 1954* and its implementing orders; includes other, established monitoring plans by reference; and appends a master well/constituent/ frequency matrix for the entire site.

The objectives of monitoring fall into three general categories: plume and trend tracking, treatment/ storage/disposal unit monitoring, and remediation performance monitoring. Criteria for selecting *Atomic Energy Act of 1954* monitoring networks include locations of wells in relation to known plumes or contaminant sources, well depth and construction, historical data, proximity to the Columbia River or other areas of special interest, and well use for other programs. Constituent lists were chosen based on known plumes and waste histories, historical groundwater data, and, in some cases, statistical modeling. Sampling frequencies were based on regulatory requirements, variability of historical data, and proximity to key areas. For sitewide plumes, most wells will be sampled every 3 years rather than annually, as in the past. Wells monitoring specific waste sites or in areas of high variability will be sampled more frequently. A total of 458 different wells will be monitored in fiscal years 1999 through 2001.

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1.0 Introduction

Groundwater is monitored in hundreds of wells at the Hanford Site to fulfill a variety of requirements. Separate monitoring plans are prepared for various requirements, but sampling is coordinated and data are shared among users to avoid duplication of effort. The U.S. Department of Energy (DOE) manages these activities through the Hanford Groundwater Monitoring Project ("groundwater project"), which is the responsibility of Pacific Northwest National Laboratory.[1] The groundwater project does not include all of the monitoring to assess performance of groundwater remediation or all monitoring associated with active facilities.

This document is the first integrated monitoring plan for the groundwater project and contains: well and constituent lists for monitoring required by the *Atomic Energy Act of 1954* and its implementing orders ("surveillance monitoring"); other, established monitoring plans by reference; and a master well/constituent/frequency matrix for the entire Hanford Site.

1.1 Purpose

The purpose of this plan is to provide a venue to integrate groundwater monitoring for various requirements on the Hanford Site. Specific objectives of this plan are the following:

- design and describe monitoring well networks, constituent lists, sampling frequency, and quality assurance/quality control for the surveillance monitoring network; explain criteria used to design the program

- encompass *Resource Conservation and Recovery Act of 1976* (RCRA), *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), Washington Administrative Code (WAC) regulations, and other monitoring plans by reference

- provide well, constituent, and sampling frequency lists for all groundwater monitoring on the site.

This plan is subordinate to the *Environmental Monitoring Plan, U.S. Department of Energy, Richland Operations Office* (DOE 1997), which is required by DOE Orders, and the *Hanford Site Ground-Water Protection Management Plan* (Barnett et al. 1995a). This plan describes how DOE will implement the groundwater-monitoring requirements described in those documents.

Recently, efforts have been made to develop fully integrated monitoring programs to fill data needs for a variety of requirements using the data quality objectives process (e.g., in the 100-N and 200-East

[1] Pacific Northwest National Laboratory is operated by Battelle for DOE.

Areas). The results of these efforts are incorporated into this plan. Additional data quality objectives-based networks will be developed in the future and will be incorporated into changes to the sampling schedule and future revisions of this plan.

1.2 Objectives of Groundwater Monitoring

The Environmental Monitoring Plan (DOE 1997) lists the purposes and objectives of groundwater monitoring and the groundwater project. These purposes and objectives fall into three general categories: 1) plume and trend tracking, 2) monitoring of treatment/storage/disposal units, and 3) independent assessment of performance monitoring for groundwater remediation activities (Table 1.1).

Plume and trend tracking are the primary objectives of surveillance monitoring. Treatment/storage/disposal unit monitoring includes units regulated under RCRA or state codes (recently active sites), CERCLA (past-practice sites), and the *Atomic Energy Act of 1954*. Monitoring associated with remediation activities is the responsibility of the environmental restoration contractor, but the groundwater project is responsible for "providing continuing, independent assessment of groundwater remediation activities" (DOE 1997).

Table 1.1. Objectives of Groundwater Monitoring (DOE 1997)

Plume and Trend Tracking
Determine baseline conditions of groundwater quality and quantity.
Characterize and define hydrogeologic, physical, and chemical trends in the groundwater system.
Identify existing and potential groundwater contamination sources.
Assess existing and emerging groundwater quality problems.
Evaluate existing and potential offsite impacts of groundwater contaminants.
Provide data on which decisions can be made concerning land-disposal practices and management and protection of groundwater resources.
Treatment/Storage/Disposal Unit Monitoring
Demonstrate compliance with applicable regulations and orders (RCRA, WAC)
Provide data to permit early detection of groundwater pollution or contamination.
Groundwater Remediation Performance Monitoring
Provide continuing, independent assessment of groundwater remediation activities (groundwater remediation and performance monitoring are conducted by the environmental restoration contractor; currently, Bechtel Hanford Inc.; groundwater project provides independent assessment).

1.3 Organization of This Plan

A brief overview of the hydrogeology of the Hanford Site is provided in Chapter 2.0 as background for the remainder of the plan. Chapter 3.0 describes the monitoring program, with an explanation of criteria for choosing well networks, constituent lists, and sampling frequency. Chapters 4.0 through 9.0 describe the waste sites, monitoring history, and a conceptual model of the movement of contaminants for each geographic region of the site. Chapter 10.0 describes the sampling and analysis plan, including methods for sampling and analysis, quality assurance, and quality control. Chapter 11.0 describes the water-level-monitoring program; Chapter 12.0 describes data management, compliance issues, and reporting; followed by Chapter 13.0, the references cited herein.

An integrated monitoring matrix is presented in Appendix A, showing all wells to be sampled by the groundwater project for various requirements (e.g., sitewide surveillance, RCRA, CERCLA). Appendix B lists wells for water-level measurements. The appendixes will be updated at least annually.

2.0 Hydrogeology

The hydrogeology of the Hanford Site has been described in many documents (e.g., Chapter 3.0 in Hartman and Dresel 1998). A brief summary is provided here for the reader's convenience.

The uppermost aquifer beneath most of the Hanford Site is unconfined and composed of unconsolidated to semiconsolidated sands and gravels deposited on basalt bedrock. In some areas, deeper parts of the aquifer are locally confined by layers of silt and clay. Confined aquifers occur within the underlying basalt flows and associated sedimentary interbeds. A simplified stratigraphic column is illustrated in Figure 2.1.

Groundwater in the unconfined aquifer system generally moves from recharge areas along the western boundary of the site to the east and north toward the Columbia River, which is the major discharge area. This natural flow pattern was altered by the formation of groundwater mounds created by large volumes of artificial recharge at wastewater-disposal facilities. These mounds are declining, and groundwater flow is gradually returning to earlier patterns. Figure 2.2 shows a water-table map for June 1997.

The extent of major radionuclide contaminants in groundwater in 1997 is illustrated in Figure 2.3. Tritium, iodine-129, technetium-99, uranium, and strontium-90 were present at levels above drinking water standards. Carbon-14, cesium-137, and plutonium exceeded standards in smaller areas. The extent of major hazardous chemical constituents in 1997 is shown in Figure 2.4. The most significant of these include carbon tetrachloride, chromium, and nitrate. Trichloroethylene and arsenic are also elevated in smaller areas.

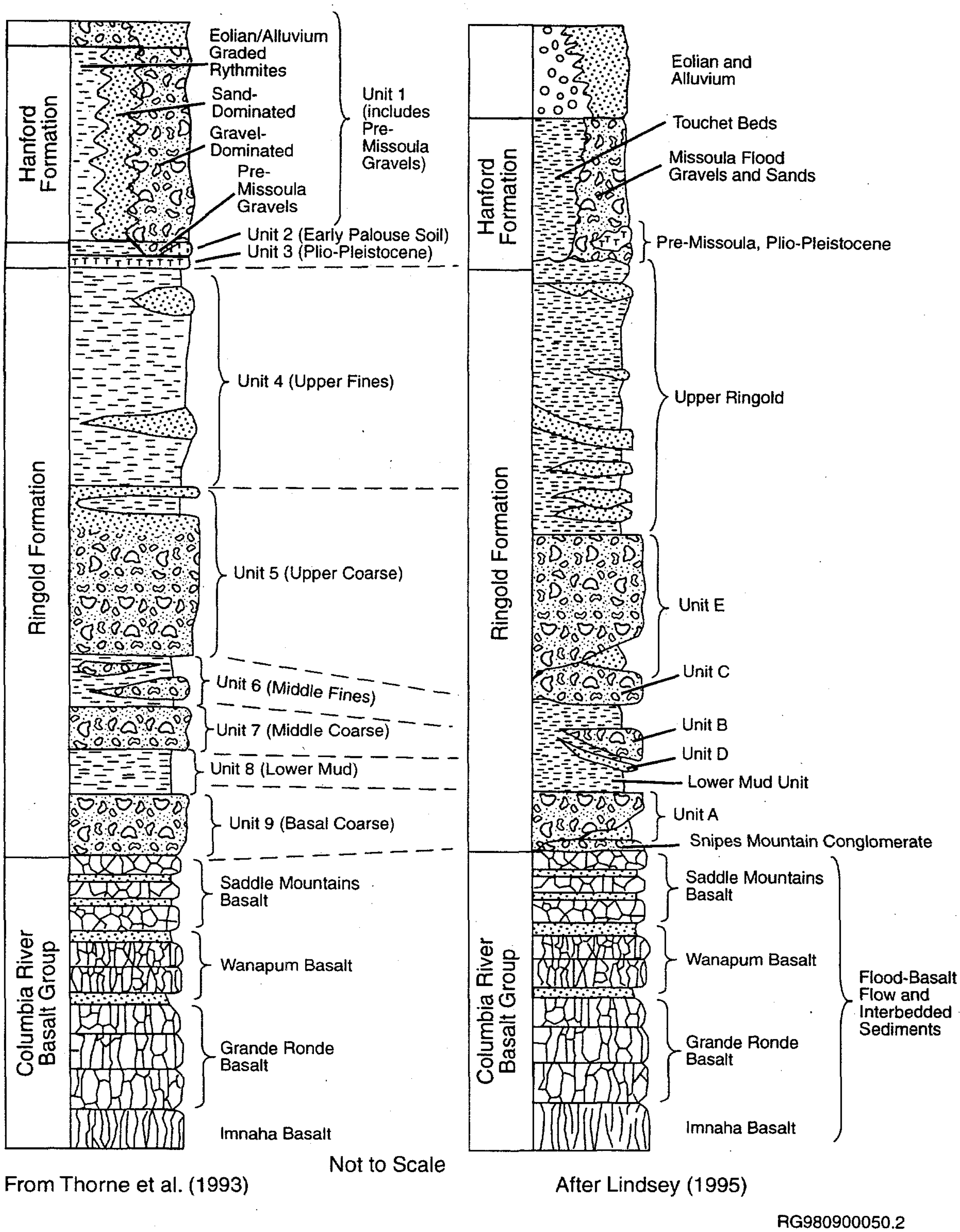

Figure 2.1. Comparison of Generalized Hydrogeologic and Geologic Stratigraphy

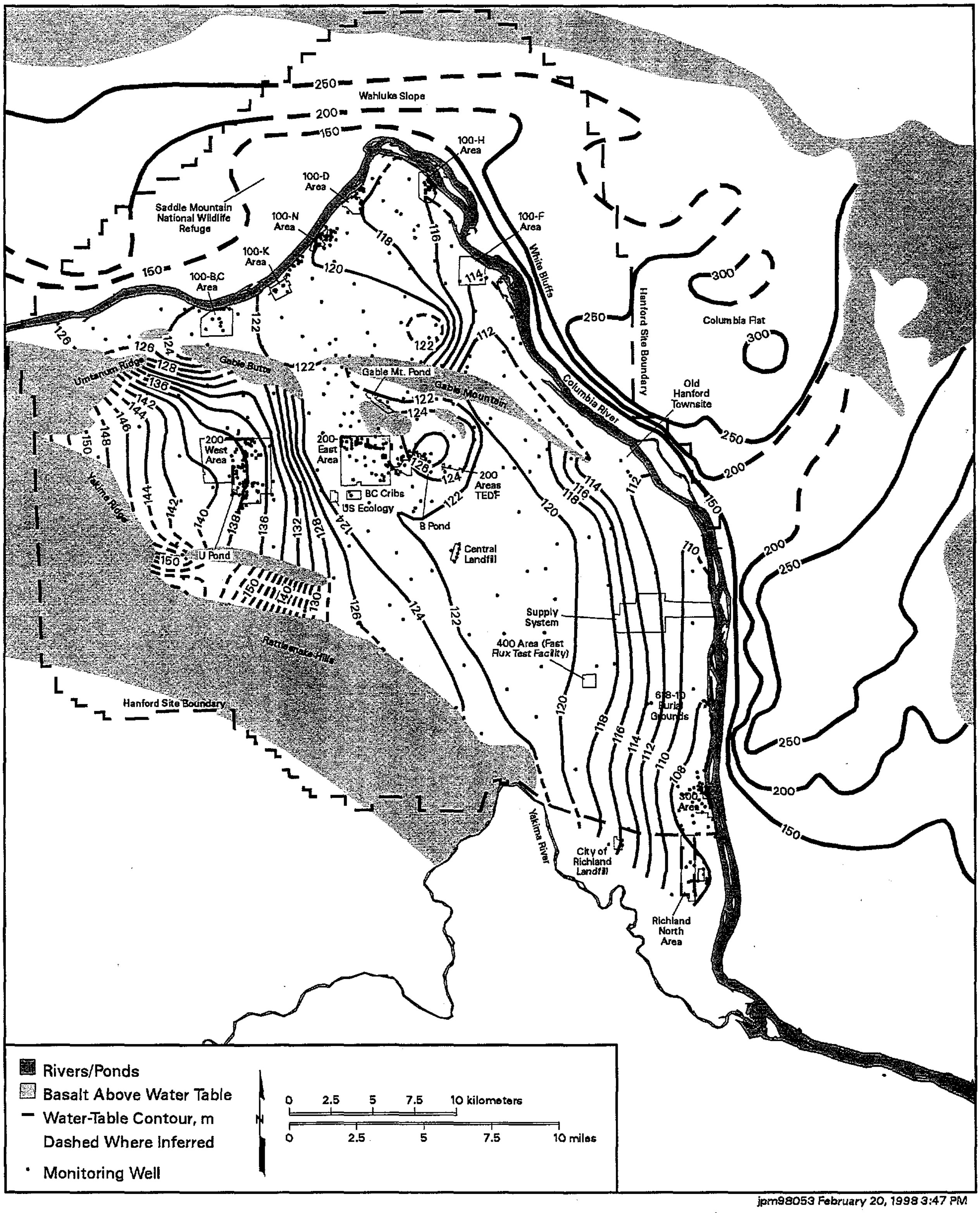

Figure 2.2. Hanford Site and Outlying Areas Water-Table Map, June 1997 (from Hartman and Dresel 1998)

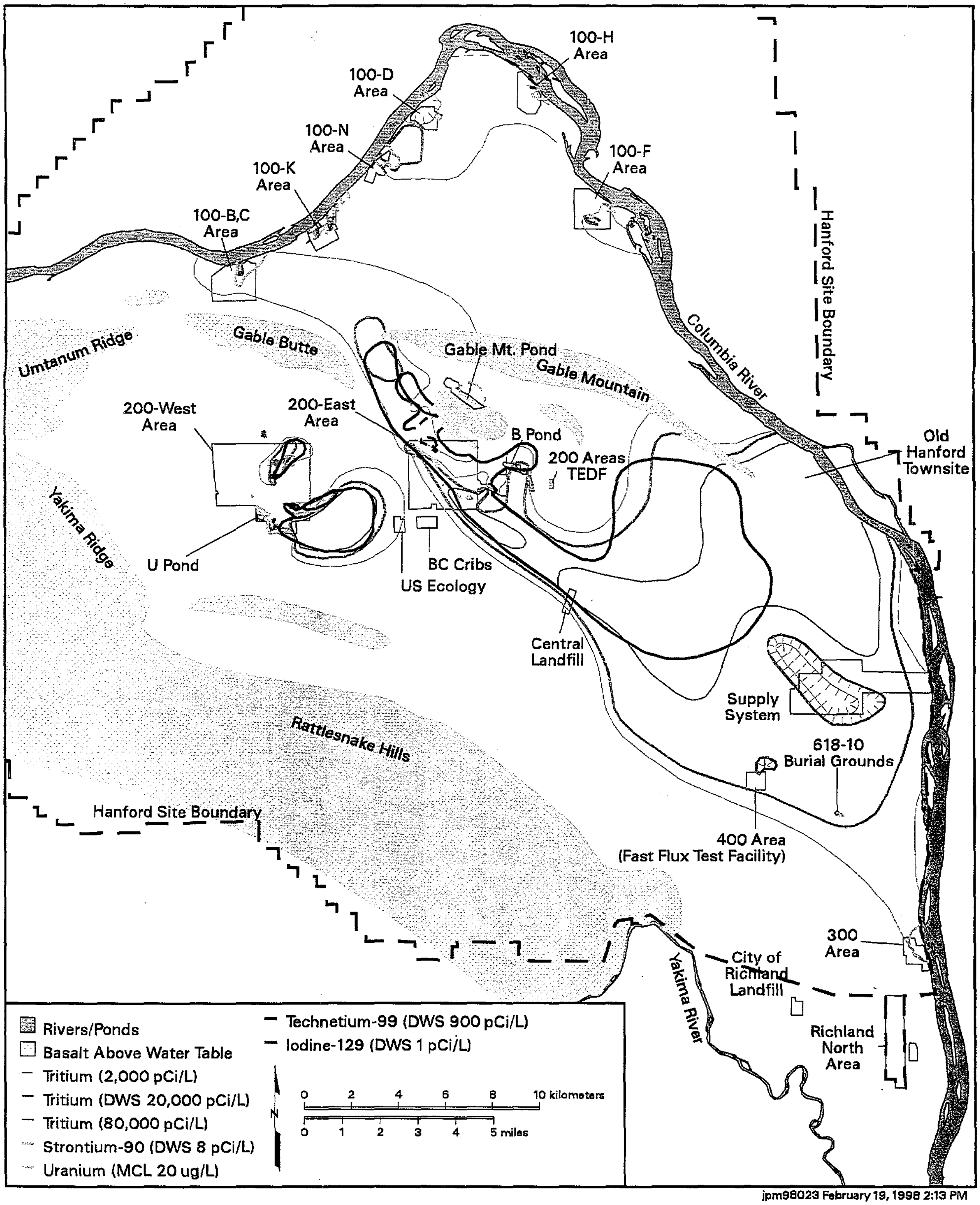

Figure 2.3. Distribution of Major Radionuclides in Groundwater at Concentrations Above Maximum Contaminant Levels (MCLs) or Interim Drinking Water Standards (DWSs), Fiscal Year 1997 (Hartman and Dresel 1998)

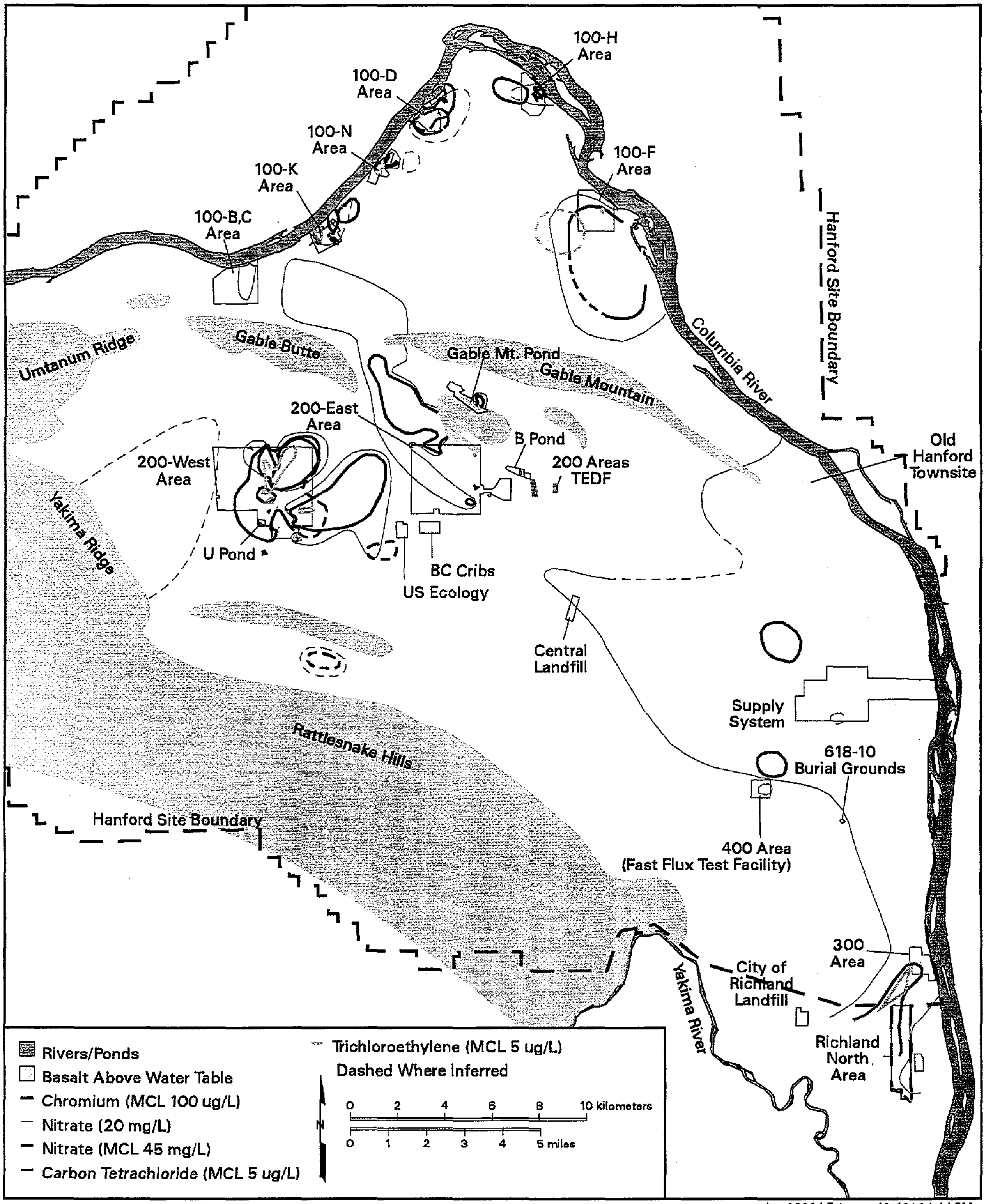

Figure 2.4. Distribution of Major Hazardous Chemicals in Groundwater at Concentrations Above Maximum Contaminant Levels (MCLs), Fiscal Year 1997 (Hartman and Dresel 1998)

3.0 Monitoring Program

The integrated sampling and analysis matrix for the groundwater project is given in Appendix A. The matrix was designed for use in fiscal year 1999, but also includes wells that will be sampled every 2 or 3 years, as discussed in Section 3.3. The matrix includes well name, sampling frequency, and constituents to be monitored. Additional details, such as schedule, analytical methods, etc., reside in a project database.

3.1 Groundwater-Monitoring Network

Wells on the Hanford Site are monitored in compliance with: 1) the *Atomic Energy Act 1954* and its implementing orders ("surveillance monitoring"), 2) CERCLA operable units, 3) remedial action performance assessment, 4) RCRA, and 5) WAC permits. Monitoring networks for items 2 through 5 are defined in monitoring plans, interim records of decision (RODs), or change agreements listed in Chapters 4.0 through 8.0. Most of these monitoring networks are included in the monitoring matrix of Appendix A. The criteria for choosing wells for surveillance monitoring are discussed below.

1. Defining plumes - A representative areal distribution of wells within the plume is monitored, with an emphasis on wells with the highest concentrations of contaminants and wells near plume boundaries. Some wells in uncontaminated areas between plumes are also monitored to help control interpretation of plume boundaries and to monitor plume migration. Plumes migrating onto the site from offsite sources are also monitored (e.g., agricultural effects, Richland Landfill, Siemens Power Corporation). A geostatistical approach was employed to determine which wells should be sampled to track major plumes from the 200-East Area (discussed in Chapter 6.0).

2. Monitoring contaminant sources - Waste-disposal facilities not regulated by RCRA or the WAC are included in surveillance monitoring (e.g., 100-K Basins, 216-U-1 Crib).[1] Wells downgradient of these facilities are monitored to detect their impact on groundwater.

3. Interval monitored - Most of the groundwater contamination on the Hanford Site is contained in the uppermost (unconfined) aquifer, so most of the monitoring wells are screened there. Newer wells installed for RCRA and CERCLA are screened across the water table and monitor the top 3 to 10 m of the unconfined aquifer. Wells that monitor a longer interval are less desirable because contaminants could be diluted from representative concentrations to below detection limits. A few wells monitor deeper intervals of the suprabasalt sediments or confined aquifers in the basalt. These wells are sampled to monitor whether contamination has migrated deeper in the hydrologic system.

[1] This type of monitoring has been called "operational monitoring" in the past. It is now considered part of surveillance monitoring.

4. Historical data - Previous groundwater chemistry or water-level data in a well are useful for monitoring trends and for determining sampling frequency and constituent lists. Wells with historical data are preferable to those without.

5. Adequacy of well construction - Wells with poor seals, broken casing, or other problems may not provide representative data, and will be remediated or decommissioned.

6. Amount of water in the well - Declining water levels are causing some wells to go dry. Wells that are likely to contain sufficient water for sampling are chosen for the network.

7. Proximity to the Columbia River - In some cases, it is desirable to monitor wells very near the river shore to assess what concentrations of contaminants are entering the river. In other cases, it is more advantageous to choose wells farther inland to avoid fluctuations in concentration caused by bank storage effects.

8. Use by other requirements of the groundwater project (e.g., RCRA, CERCLA) - Wells being sampled for other purposes are used for surveillance monitoring, where possible, for a more cost-effective program.

9. "Guard wells" - Key areas have been identified as being of special interest: bands of wells in Gable Gap and southeast of the 200-East Area were chosen to monitor contamination migrating out of the 200 Areas (discussed in Chapter 6.0), wells near the Columbia River, wells in the southern portion of the site near the City of Richland's North Well Field and recharge basins.

10. Performance assessment - The environmental restoration contractor (i.e., Bechtel Hanford, Inc.) conducts performance assessment monitoring in conjunction with remedial actions. The groundwater project is responsible for providing independent assessment of remedial actions, so wells near the remedial actions are included.

3.2 Constituents

Constituents are included in the sampling matrix of Appendix A. This matrix is an abbreviated version of the sampling matrix maintained by the groundwater project, which specifies various methods of analysis for some constituents.

The following criteria were considered to determine what analyses should be run on the samples for surveillance monitoring:

1. Proximity to known plumes or waste sites - If a well is located in a contaminant plume or downgradient of a plume, it is generally sampled for that contaminant.

2. Historical data in well - Wells are generally not sampled for constituents that have not been detected or are below some level of interest (e.g., drinking water standards) unless they are monitoring movement of a nearby plume.

3. Statistical modeling (discussed in Chapter 6.0).

4. Use for other requirements - If there is a choice of analytical method for a desired constituent, the method used for other monitoring purposes is chosen if it is satisfactory for surveillance monitoring.

5. State of Washington Department of Health constituents - Constituents, including total alpha, anions, total beta, gamma, iodine-129, technetium-99, tritium, and uranium isotopes, are co-sampled to provide a quality control check.

The choice of constituents for RCRA, CERCLA, and other monitoring requirements are based on waste history, permit conditions, and constituents of concern, as discussed in their monitoring plans.

3.3 Sampling Frequency

Sampling frequency for RCRA, CERCLA, and other monitoring requirements are determined by regulation, permits, or other agreements. Frequency for plume and trend tracking are based on the following criteria:

1. Variability of historical data - If previous concentrations are level or are on a steady trend, less-frequent sampling (every 3 years) is sufficient. Wells with larger variability are sampled more frequently (annually or more often).

2. Proximity to key areas - Guard wells (see Section 3.1) and wells monitoring source areas are sampled more frequently.

3. Mobility of contaminants in groundwater - Contaminants with greater mobility (e.g., tritium) may be sampled more frequently than those that are not very mobile in groundwater (e.g., strontium-90).

3.4 Changes to Monitoring Program

As data are received and evaluated, changes will be made to the program, as needed. For example, if the concentration of a contaminant in a well increases suddenly, an additional sample may be collected and analyzed to confirm or refute the initial result. This type of "one-time" change may be made without revision of this plan.

Each year the well/constituent matrix in this plan will be reviewed for adequacy and revised, if necessary, for the following fiscal year. These revisions will incorporate any changes made to monitoring plans for RCRA, CERCLA, and other requirements.

4.0 100 Areas

For the purposes of this plan, "100 Areas" describes that portion of the Hanford Site north of Gable Mountain and Gable Butte and south of the Columbia River and includes the six reactor areas (100-B,C, 100-K, 100-N, 100-D, 100-H, and 100-F [upstream to downstream]) and the 600 Area in between.

4.1 Background

4.1.1 Waste Sites, Discharges, and Groundwater Operable Units

Hundreds of waste sites have been identified in the 100 Areas, including fuel-storage or retention basins that leaked; effluent disposal cribs, ditches, and drains; and various spills or other unplanned releases. Those with site-specific monitoring requirements and those that appear to have affected groundwater quality are listed in Table 4.1.

Most of the sites are inactive radiological or mixed waste sites, and will be cleaned up or monitored under the requirements of CERCLA or as RCRA past-practice sites. Five sites are regulated under RCRA because they were more recently active and contained dangerous waste constituents. Two sites currently discharge nondangerous effluent to the ground (sanitary waste and filter backwash in the 100-N Area).

Groundwater beneath the reactor areas and surrounding areas is divided into five groundwater operable units: 100-BC-5 (100-B,C Area), 100-KR-4 (100-K), 100-NR-2 (100-N), 100-HR-3 (100-D and 100-H), and 100-FR-3 (100-F Area). Pump-and-treat systems are active in the 100-K, 100-D, and 100-H Areas for chromium and in the 100-N Area for strontium-90. An in situ treatment system is active in the 100-D Area to chemically reduce hexavalent chromium to insoluble chromium compounds (redox manipulation). All of these remediation systems are considered interim actions; final remedial actions have not yet been selected.

4.1.2 Groundwater-Monitoring Requirements and History

Limited groundwater monitoring has been conducted in the reactor areas since the 1940s. Very few monitoring wells existed in the early decades but more were installed in the 100-K, 100-N, and 100-H Areas in the 1970s and monitored for DOE requirements. RCRA monitoring began in the late 1980s in the 100-N and 100-H Areas, and in the early 1990s in the 100-D Area, so additional wells were installed. CERCLA investigations and cleanup actions in the 1990s resulted in the installation of dozens more wells, spread among the reactor areas and the intervening 600 Area between the 100-D and 100-H Areas.

CERCLA interim actions in the 100-K, 100-N, 100-D, and 100-H Areas include specific monitoring requirements. CERCLA operable unit monitoring networks have also been defined for these areas and for

Table 4.1. Selected Waste Sites in the 100 Areas[a]

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site
100-B,C Area			
116-B-11 (1944-68) and 116-C-5 (1952-69) retention basins	Reactor coolant effluent; leaks known	Radionuclides, metals strontium-90, chromium	Past-practice
116-B-1 (1950-68) and 116-C-1 (1952-68) waste-disposal trenches	Coolant effluent from fuel-element failure (highly radioactive)	Radionuclides	Past-practice
116-B-5 crib (1950-68)	Process effluent	Tritium	Past-practice
118-B-6 burial ground (1950-53)	Contaminated equipment	High-level tritium	Past-practice
Storage tanks and transfer facilities (1944-69)	Sodium dichromate leakage from water-treatment facilities	Chromium	Past-practice
100-K Area			
Reactor buildings fuel-storage basins (KE: 1955-71; 1975-present. KW: 1955-71; 1981-present)	Radionuclide-contaminated water; leaks known	Tritium, strontium-90	Active
116-KE-3 (1955-71) and 116-KW-2 (1955-70) french drain/reverse well	Effluent from fuel-storage basin drainage collection	Tritium, strontium-90	Past-practice
116-KE-1 (1955-71) and 116-KW-1 (1955-71) cribs	Reactor condensate	Tritium, carbon-14	Past-practice
116-K-2 trench (1955-71)	Reactor coolant water, decontamination liquids	Chromium, strontium-90	Past-practice
116-KW-3 (1954-70) and 116-KE-4 (1955-71) retention basins	Reactor coolant; leaks known	Radionuclides	Past-practice
Storage tanks and transfer facilities	Sodium dichromate leakage from 183-KE and 183-KW water-treatment facilities	Chromium	Past-practice
100-N Area			
1301-N liquid waste-disposal facility (1963-85)	Reactor coolant	Strontium-90, tritium, minor hazardous constituents[b]	RCRA past-practice
1325-N liquid waste-disposal facility (1983-89)	Reactor coolant	Strontium-90, tritium, minor hazardous constituents[b]	RCRA past-practice
1324-NA percolation pond (1986-90)	Treated demineralizer effluent	Sulfate, sodium, pH[b]	RCRA past-practice
Fuel station	Fuel tank leaks confirmed	Hydrocarbons	Past-practice

Table 4.1. (contd)

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site
N Reactor basins	Fuel-storage basins	Radionuclides	Inactive
183-N backwash discharge pond (1983-present)	Filter backwash	None	Active
124-N-10 sewage lagoon (1987-present)	Sanitary waste	Nitrate, coliform	Active; WAC permitted
100-D Area			
116-D-7 (1944-67) and 116-DR-9 (1950-67) retention basins	Reactor coolant; leaks known	Radionuclides, chromium	Past-practice
116-D-1 (1947-67) and 116-DR-2 (1950-67) trenches	Highly radioactive coolant from fuel-element failure	Radionuclides	Past-practice
Reactor cribs, drains	Water and sludges from fuel-storage basins; decontamination solutions; condensate from inert gas system	Carbon-14, nitrate, strontium-90	Past-practice
Storage tanks and transfer facilities	Sodium dichromate leakage from corrosion inhibitor	Chromium	Past-practice
120-D-1 ponds (1977-94)	Effluent from water treatment	pH, mercury[b]	RCRA[c]
100-H Area			
116-H-7 (107-H) retention basin (1949-65)	Reactor coolant; leaks known	Tritium, strontium-90	Past-practice
116-H-1 (107-H) trench (1952-65)	Highly radioactive coolant from reactor fuel-element failure	Tritium, strontium-90, nitrate	Past-practice
Reactor cribs, drains	Water and sludge from fuel-storage basins; decontamination solutions	Chromium	Past-practice
183-H solar evaporation basins (1973-85)	Neutralized acid etch solutions	Technetium-99, uranium, nitrate, chromium, fluoride	RCRA[d]
100-F Area			
116-F-14 retention basin and pipelines (1945-65)	Reactor coolant; leaks known	Strontium-90, chromium	Past-practice
116-F-2 trench (1950-65)	Highly radioactive coolant	Strontium-90, chromium	Past-practice
116-F-9 trench (1963-76)	Cleaning wastes from experimental animal laboratories	Radionuclides	Past-practice

Table 4.1. (contd)

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site
116-F-3 (1947-51) and 116-F-6 (1952-65) trenches	Reactor coolant and sludge	Radionuclides	Past-practice
116-F-1 trench (1953-65)	Liquid waste from reactor and associated buildings	Radionuclides, metals, uranium, strontium-90, nitrate	Past-practice
118-F-1 (1954-65) and 118-F-6 (1965-73) solid waste-burial grounds	Contaminated equipment, animal wastes, coal ash	Tritium, plutonium	Past-practice

(a) Sites with specific groundwater-monitoring requirements and those that appear to have affected groundwater quality.
(b) Known or suspected in waste; not significantly detected in groundwater to date.
(c) To be clean closed; groundwater monitoring will cease when incorporated into site RCRA permit (scheduled for December 1998).
(d) Groundwater beneath 183-H to be remediated under CERCLA.

the 100-B,C and 100-F Areas. The K Basins, where spent reactor fuel rods are stored, have leaked in the past and are monitored under DOE Order 5400.1. Monitoring plans for the K Basins, CERCLA, and RCRA are given in Table 4.2.

The *Atomic Energy Act of 1954* and DOE Order 5400.1 also require sitewide surveillance monitoring to track contaminant plumes. Wells monitored for those requirements in 1996 were listed by Bisping (1996).

4.2 Conceptual Model

The most widespread contaminants of concern in 100 Areas' groundwater are tritium, nitrate, and hexavalent chromium. Groundwater is locally contaminated with strontium-90, carbon-14, technetium-99, uranium, trichloroethylene, and sulfate. Groundwater also flows into the 100 Areas through the gap between Gable Mountain and Gable Butte, carrying contamination from the 200 Areas.

Contaminated effluent has been reaching the soil in the 100 Areas for ~50 years from leaking retention basins and disposal trenches. Radionuclides with short half-lives decayed in the retention basins or in the vadose zone. Nonradioactive constituents and longer-lived radionuclides were carried down through the vadose zone beneath the waste sites. Some of these sorbed to sediments, some remained in the moisture in the vadose zone, and large quantities were carried into the groundwater (Figure 4.1).

Table 4.2. Groundwater Monitoring in the 100 Areas

Monitoring Requirement (monitoring plan reference)	Comments
100-B,C Area	
CERCLA (Federal Facility Agreement and Consent Order Change Control Form M-15-96-07)	Long-term plume monitoring
100-K Area	
CERLCA (ROD 1996a, DOE 1996a)	CERCLA interim action for chromium; wells near 116-K-2 trench[a]
CERCLA (National Priorities List Change Control Form 108, 11/20/96)	100-KR-4 Operable Unit remedial investigation
DOE Order 5400.1 (Johnson et al. 1995)	KE and KW fuel-storage basins
100-N Area	
RCRA (Hartman 1996)	1301-N, 1324-N/NA, 1325-N sites
CERCLA (National Priorities List Change Control Form 113, 3/25/97)	N springs expedited response action (strontium-90 plume near 1301-N)[a]
CERCLA (Federal Facility Agreement and Consent Order Change Control Form M-15-96-08, 10/9/96; Borghese et al. 1996)	100-NR-2 Operable Unit remedial investigation; also includes RCRA wells of Hartman (1996)
Liquid effluent[b]	N Reactor basin (well 199-N-46)
National Pollutant Discharge Elimination System Permit WA-000374-3[c]	Well 199-N-8T
100-D Area	
RCRA (Hartman 1991)	120-D-1 ponds (to be clean closed; groundwater monitoring will cease when incorporated into Site RCRA permit)
CERCLA (ROD 1996a, DOE 1996a)	CERCLA interim action for chromium; wells near retention basins and disposal trenches[a]
CERCLA (National Priorities List Change Control Form 107, 11/20/96)	100-HR-3 (D Area) Operable Unit remedial investigation
100-H Area	
RCRA (Hartman 1997)	183-H solar evaporation basins
CERCLA (ROD 1996a, DOE 1996a)	CERCLA interim action for chromium[a]
CERLCA (Peterson and Raidl 1996; National Priorities List Change Control Form 107, 11/20/96)	100-HR-3 (H Area) Operable Unit remedial investigation
100-F Area	
CERLCA (Federal Facility Agreement and Consent Order Change Control Form M-15-96-06)	Long-term plume monitoring

(a) Groundwater monitored independently of groundwater project.
(b) Basin recently dewatered; monitoring no longer required.
(c) Will be eliminated when new permit issued.

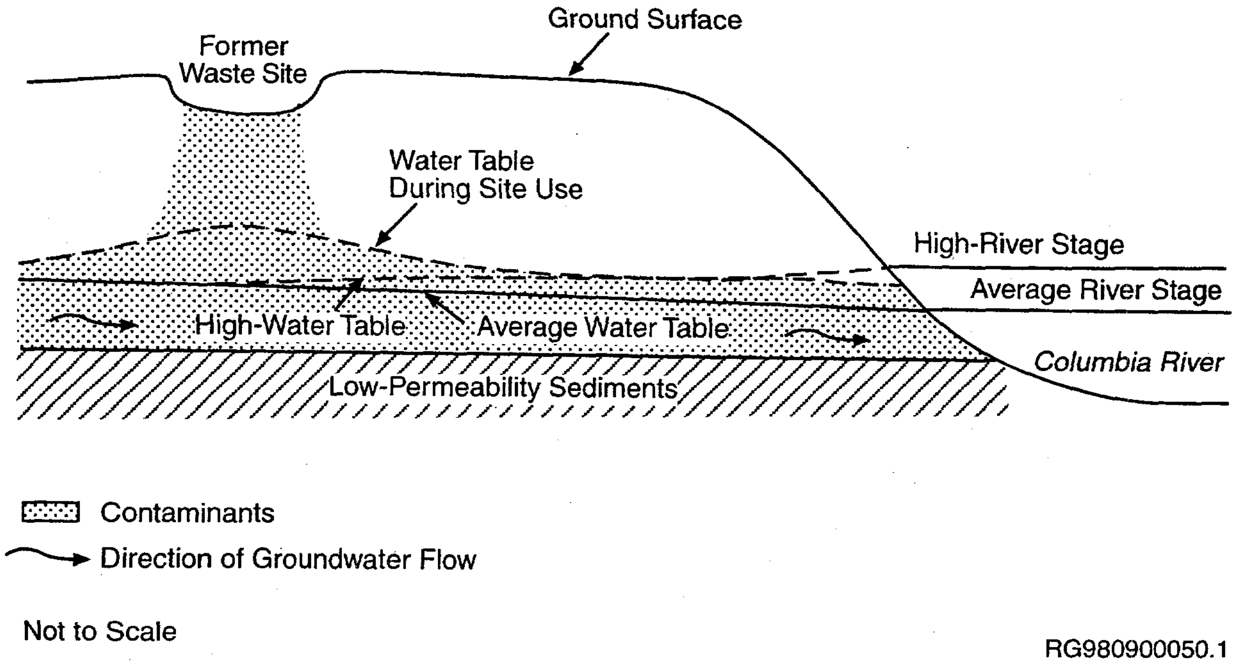

Figure 4.1. Conceptual Model of Subsurface Contamination in the 100 Areas

When the reactors were active, huge volumes of water were discharged, creating large groundwater mounds that disrupted the natural groundwater-flow patterns. The contaminants moved outward on these mounds, contaminating a larger area in the saturated zone than in the vadose zone. The mounds dissipated after discharges ceased, and groundwater flow resumed its normal pattern (i.e., toward the river). Groundwater beneath the 100 Areas continues to carry contaminants to the river, where it discharges from springs, seeps, and through the riverbed below the water line. Groundwater nearest the river often has lower concentrations of contaminants because of dilution. When river stage is high, the water table may rise into the former mound areas and mobilize some constituents (see Figure 4.1) or it may dilute contaminants further. This influx of river water also temporarily disrupts the direction and rate of groundwater flow. Locally, groundwater extraction and injection also affect flow directions and intercept contaminants before they reach the river.

The vertical component of groundwater flow in the 100 Areas is generally upward, and most of the contamination is limited to the unconfined aquifer. However, it is likely that when groundwater mounds were present, there was a significant downward gradient, and several wells that monitor the confined Ringold or basalt-confined aquifers appear to be contaminated.

Contaminant concentrations are expected to decrease with time because of dispersion, dilution, radioactive decay, remediation, and discharge to the river. There are no new sources of contamination, but concentrations will vary because of plume movement and mobilization of vadose zone contamination.

4.3 Monitoring Program

Locations of monitoring wells for the 100 Areas are illustrated in Figures 4.2 through 4.8 and are listed in Appendix A. In addition to the shallow unconfined wells, the network includes most of the few available deeper wells (completed in the confined Ringold or the basalt-confined aquifer). Most of the 600 Area wells will be sampled every 3 years. Wells in the reactor areas are sampled every year, except for those wells near the river or wells with highly variable concentrations that are sampled more frequently. Wells monitoring the in situ redox manipulation application in the 100-D Area are monitored quarterly.

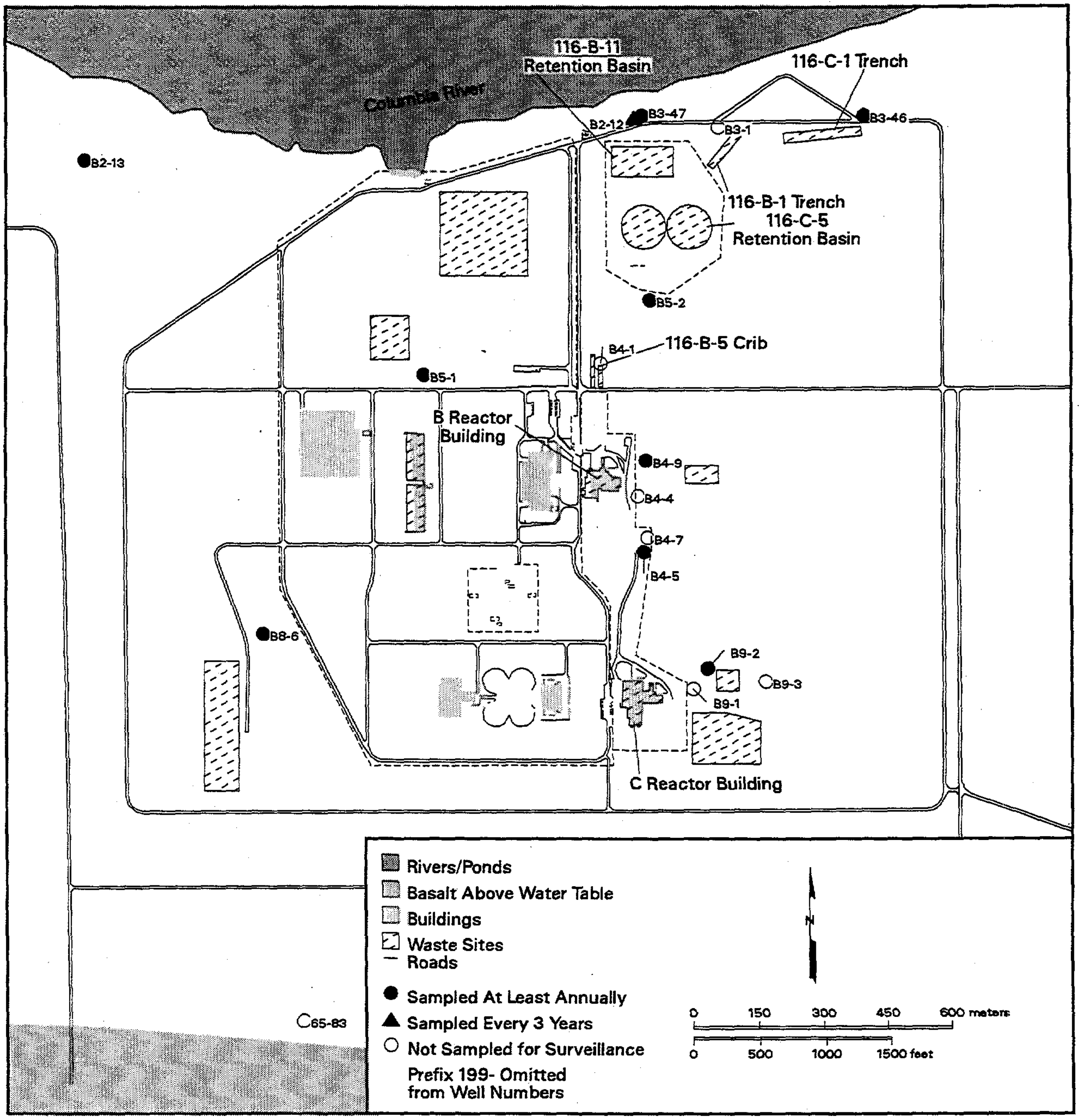

Figure 4.2. Groundwater Project Well Locations: 100-B,C Area

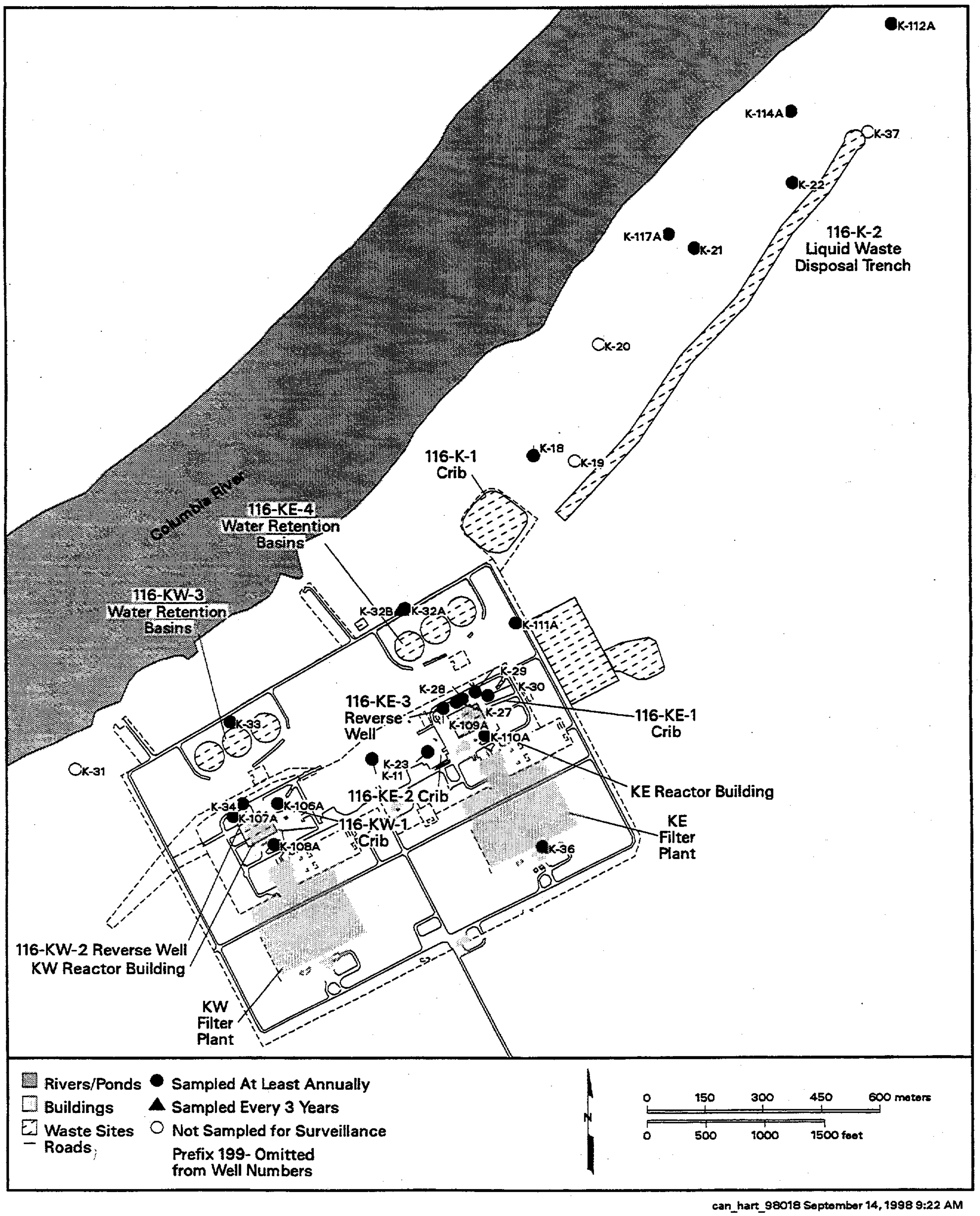

Figure 4.3. Groundwater Project Well Locations: 100-K Area

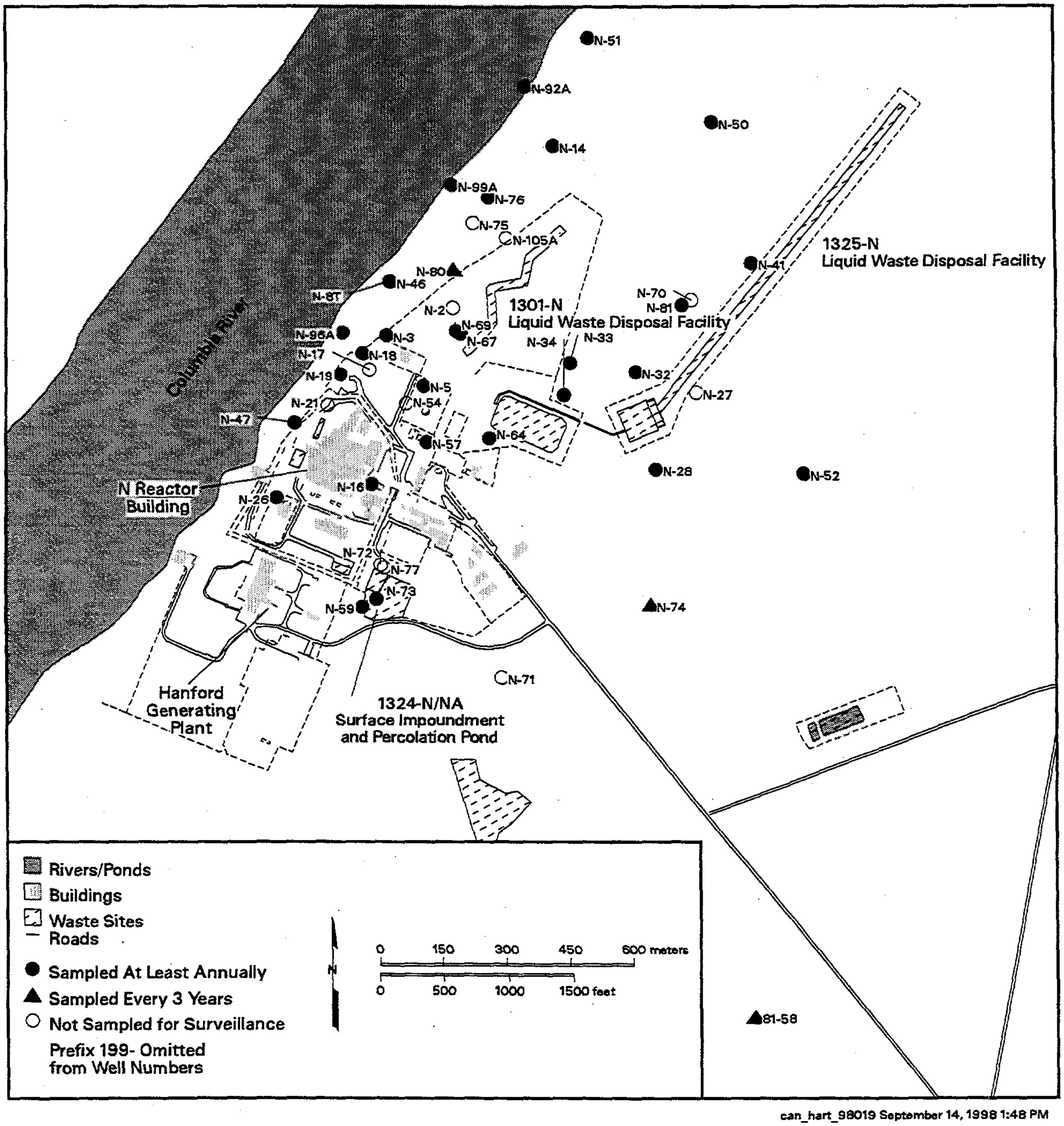

Figure 4.4. Groundwater Project Well Locations: 100-N Area

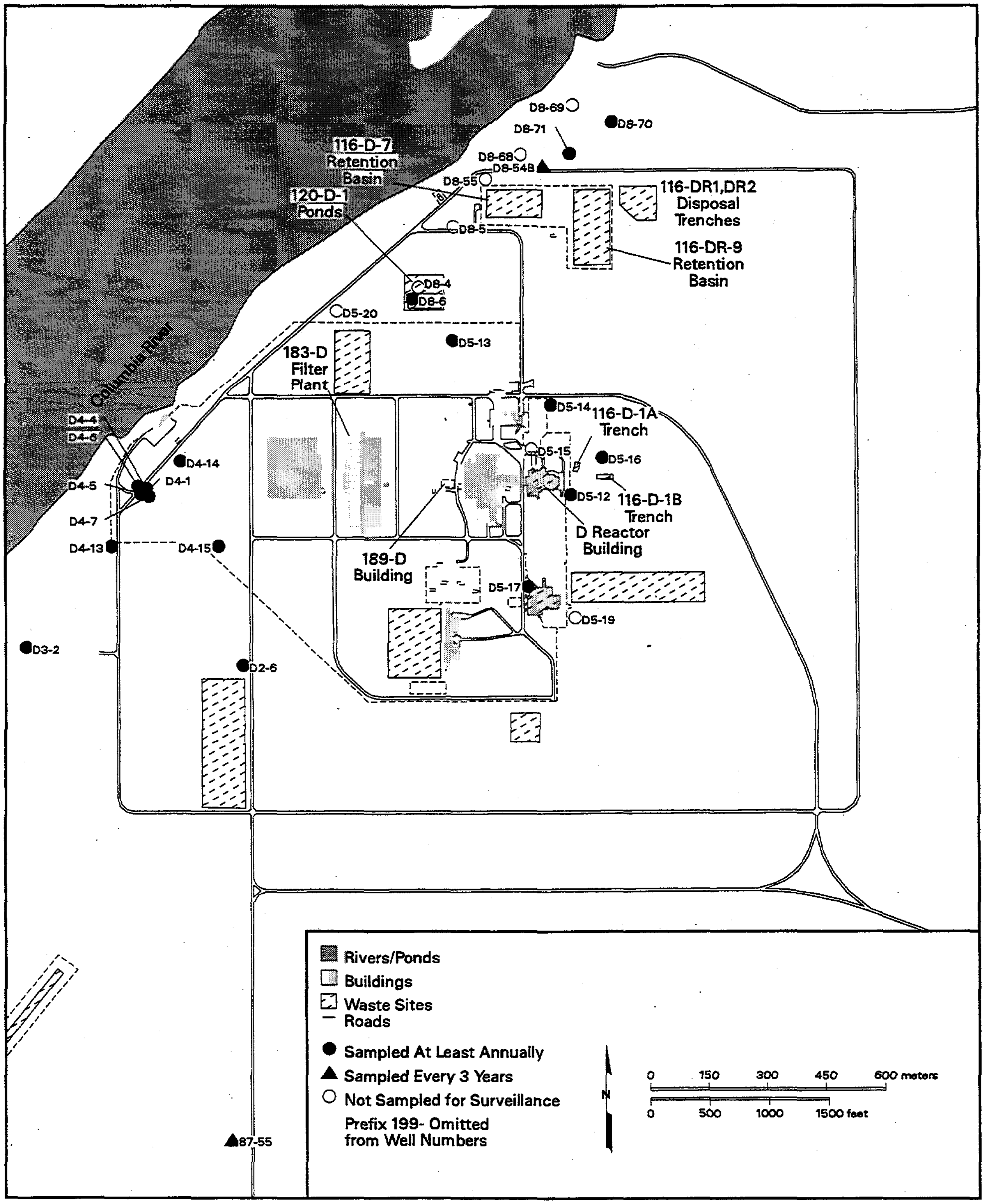

Figure 4.5. Groundwater Project Well Locations: 100-D Area

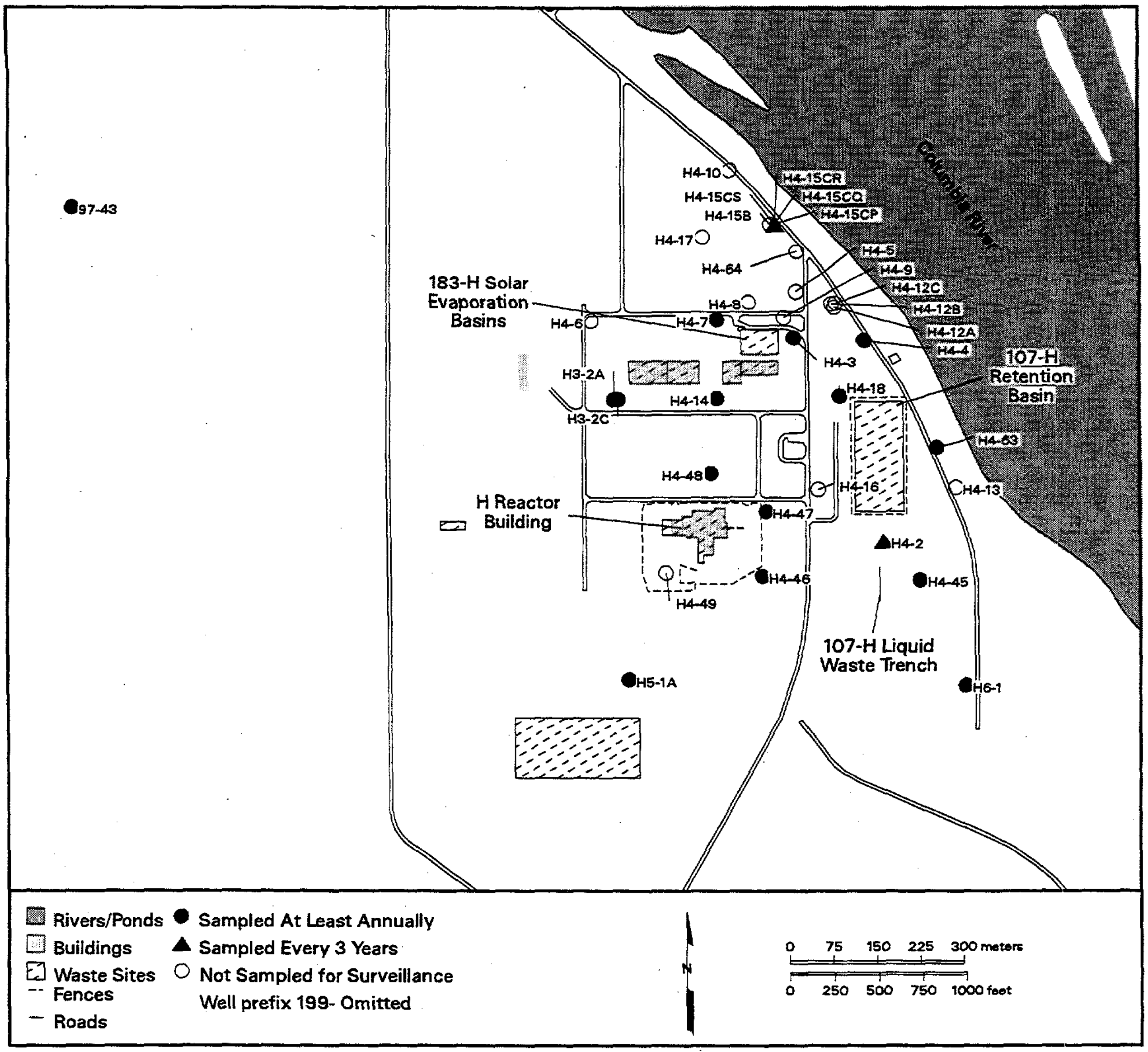

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Figure 4.6. Groundwater Project Well Locations: 100-H Area

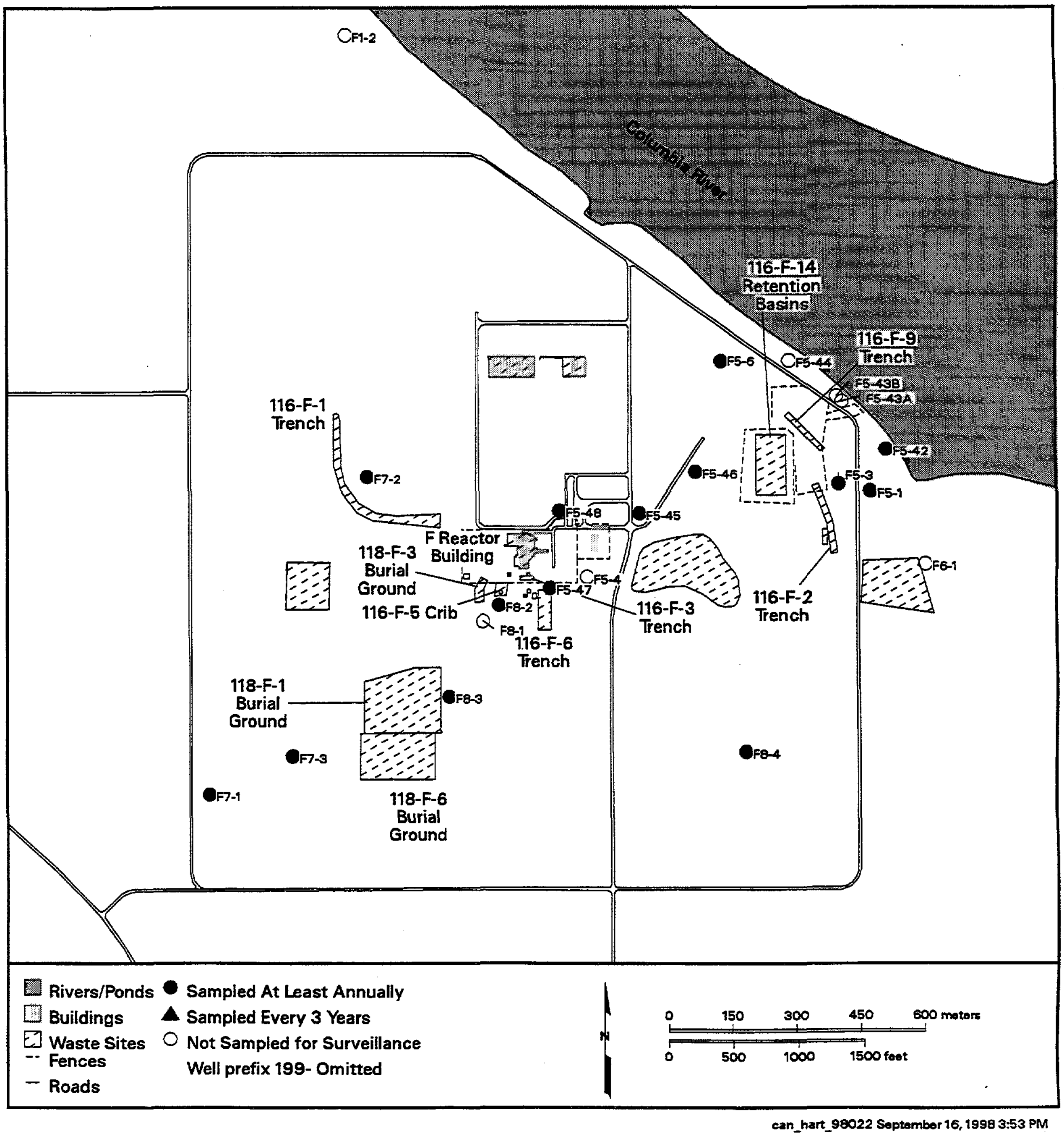
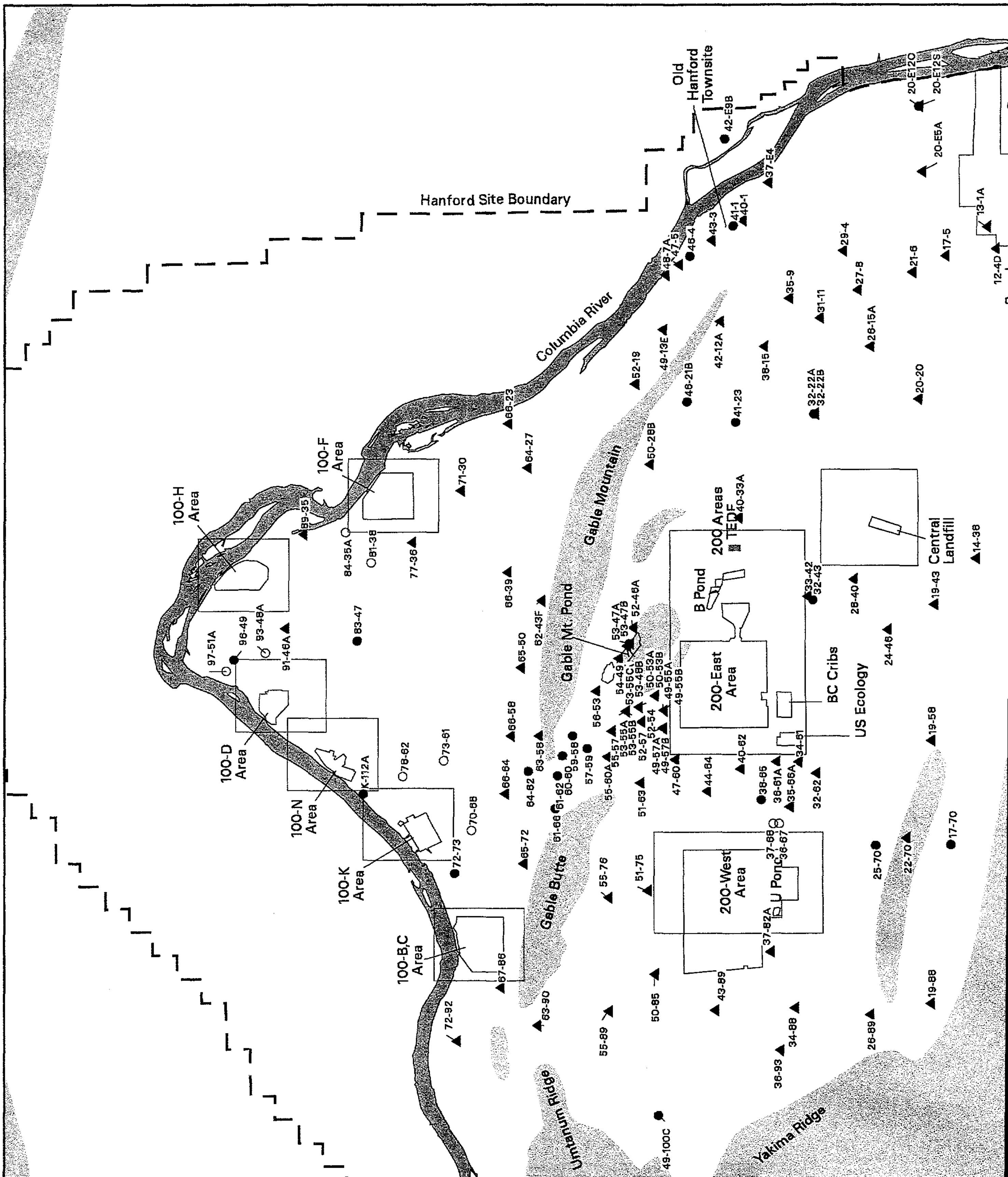


Figure 4.7. Groundwater Project Well Locations: 100-F Area



Hanford Site Boundary
Columbia River
Old Hanford Townsite
100-H Area
100-F Area
100-D Area
100-N Area
100-K Area
100-B,C Area
Gable Mountain
Gable Mt. Pond
Gable Butte
200 Areas TEDF
B Pond
200-East Area
BC Cribs
US Ecology
200-West Area
U Pond
Central Landfill
Umtanum Ridge
Yakima Ridge
42-E9B
37-E4
41-1
40-1
43-3
46-4
47-5
48-7A
20-E12O
20-E12S
20-E5A
13-1A
17-5
12-4D
29-4
27-8
21-6
35-9
31-11
28-15A
52-19
49-13E
42-12A
38-15
46-21B
41-23
32-22A
32-22B
20-20
66-23
64-27
50-28B
71-30
40-33A
89-35
84-35A
81-38
77-36
66-39
33-42
32-43
28-40
19-43
14-38
93-48A
96-49
97-51A
91-46A
83-47
62-43F
53-47A
53-47B
52-46A
65-50
24-46
19-58
73-61
76-62
K-112A
66-58
63-58
59-58
60-60
61-62
64-62
66-64
57-59
56-53
54-49
53-55C
53-48B
50-53A
50-53B
49-55A
49-55B
55-57
53-55A
53-55B
52-57
52-54
49-57A
49-57B
47-60
55-60A
51-63
44-64
40-62
36-61A
35-66A
34-61
38-65
32-62
36-66
37-68
36-67
70-68
61-66
65-72
72-73
51-75
55-76
25-70
22-70
17-70
37-82A
67-86
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72-92
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34-88
36-93
26-89
19-88
49-100C

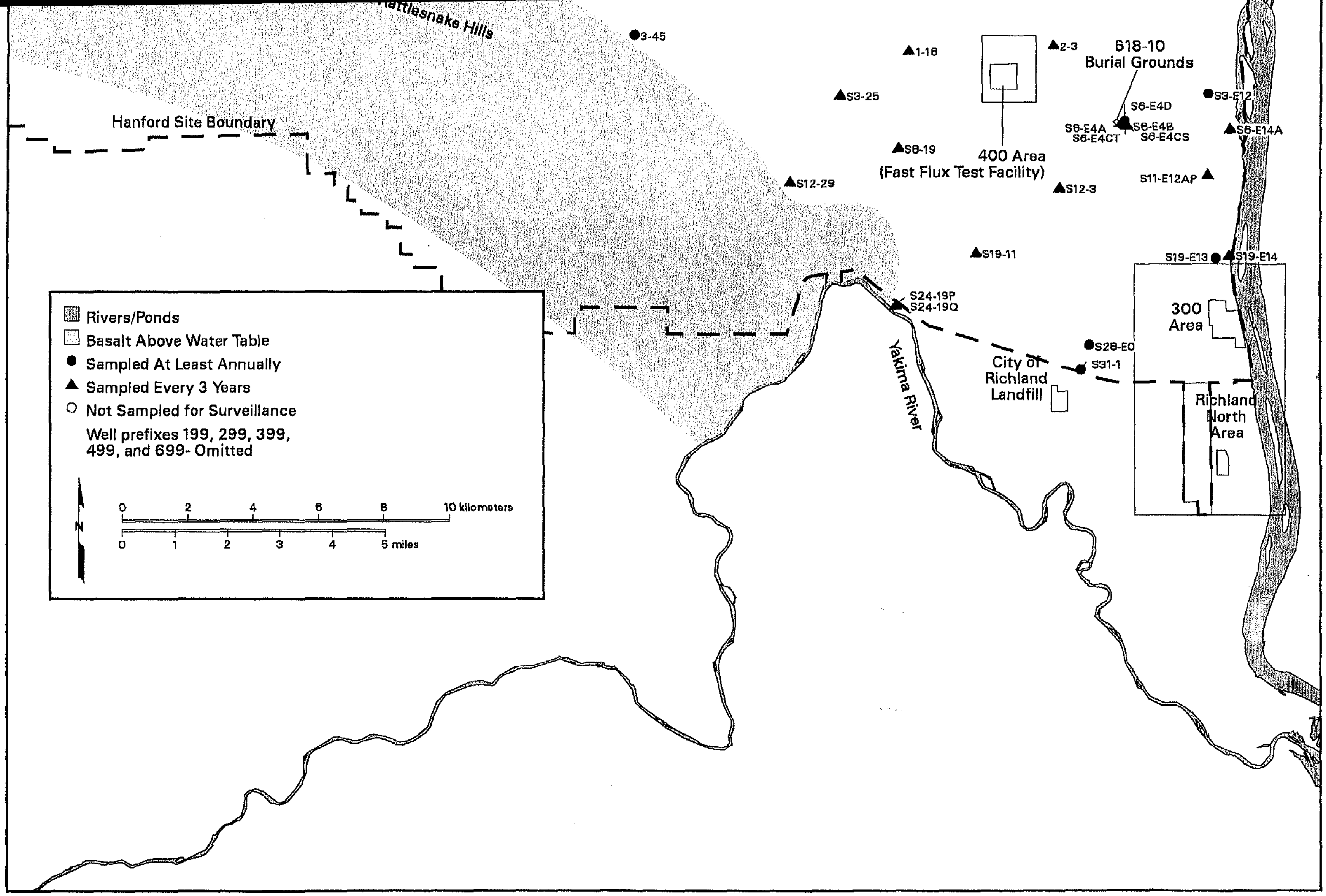

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Figure 4.8. Groundwater Project Well Locations: 600 Area

5.0 200-West Area

The 200-West Area is located on the central plateau of the Hanford Site. Portions of the 600 Area affected by groundwater contamination originating in or near the 200-West Area were evaluated for the monitoring network in this chapter.

5.1 Background

Activities within this area have included processing and liquid and solid waste storage and disposal. This area has been used since the 1940s.

5.1.1 Waste Sites, Discharges, and Groundwater Operable Units

Several processing facilities in the 200-West Area have contributed to groundwater contamination through disposal of radioactive and hazardous liquid wastes in ponds, cribs, ditches, and underground storage tanks. Large quantities of solid wastes, both from on and off the site, have been disposed of in numerous burial grounds in the 200-West Area. The major sites are listed in Table 5.1. Additional information is provided in Hartman and Dresel (1998), and more complete site inventories are included in reports listed in the bibliography of that document. A number of facilities are regulated under RCRA because they were more recently active and contain, or contained, dangerous chemical waste constituents. Six RCRA units have groundwater-monitoring requirements, including two low-level burial grounds, which are the only sites actively receiving waste within the 200-West Area. Four single-shell tank waste management areas located in the 200-West Area also are monitored under RCRA; the tanks currently are used to store mixed waste. The 616-A Crib, also known as the State-Approved Land-Disposal Site, is located just north of the 200-West Area. The site consists of a drain field that is used to dispose of liquid waste containing tritium.

Two CERCLA groundwater operable units relate to 200-West Area contamination. The 200-UP-1 Operable Unit generally covers the groundwater in the southeastern part of the area, where technetium-99 and uranium contamination near U Plant are being remediated by a CERCLA interim action. The 200-ZP-1 Operable Unit generally covers groundwater contamination originating in the northwestern part of the 200-West Area, where interim actions are in place to remediate carbon tetrachloride contamination.

5.1.2 Groundwater-Monitoring Requirements and History

Groundwater-monitoring wells in the 200-West Area were installed to monitor specific disposal facilities in the mid 1940s. RCRA monitoring wells were installed beginning in 1987. Several injection and extraction wells have been drilled to support interim-action pump-and-treat systems.

The *Atomic Energy Act of 1954* and DOE Order 5400.1 require monitoring to identify and track contaminant plumes. Wells monitored for those requirements in 1996 were listed by Bisping (1996).

Table 5.1. Selected Waste Sites in the 200-West Area[(a)]

Facility	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site (monitoring plan reference)
Single-shell tank farms (Waste Management Areas S-SX, T, TX-TY, and U)	Radioactive/chemical slurries	Sodium hydroxide, sodium salts, radionu-clides, ferrocyanide	RCRA (Caggiano 1996a, Caggiano and Goodwin 1991, Caggiano and Chou 1993)
T Plant cribs (216-T-26, -28, -19) and 216-T-25 trench	Diverse chemical and radiological waste	Tritium, iodine-129, technetium-99, nitrate, chromium, carbon tetra-chloride, chloroform, trichloroethylene, fluoride	Past-practice
Reduction-Oxidation Plant disposal facilities (including 216-S-10 pond/ditch)	Solvent-extraction process wastes	Nitrate, trichloroethyl-ene, tritium, iodine-129, technetium-99, uranium	Past-practice, except S-10: RCRA (Airhart et al. 1990)
U Plant disposal facilities (216-U-12 and other retention trenches)	Supernatant from scavenged waste	Iodine-129, technetium-99, uranium, nitrate, trichloroethylene	Past-practice, except U-12: RCRA (Jensen et al. 1990, Williams and Chou 1993). 200-UP-1 interim action (DOE 1996b, ROD 1997)[(b)]
Plutonium Finishing Plant cribs (216-Z-1A and -Z-9)	Transuranic and chemical wastes	Nitrate, carbon tetra-chloride, chloroform, trichloroethylene	Past-practice 200-ZP-1 interim action (Freeman-Pollard 1996)[(b)]
Low-level burial grounds (Waste Management Areas 3 and 4)	Radioactive solid waste	Various chemical and radioactive wastes[(c)]	RCRA (Last and Bjornstad 1989)
616A Crib (State-Approved Land-Disposal Site)	Treated liquid effluent	Tritium	Active; WAC permitted (Davis et al. 1996)[(b)]
Environmental Restoration Disposal Facility	Excavated, contami-nated soil and debris (potentially radioactive and/or hazardous)	None anticipated (double-lined facility)	Active (Weeks et al. 1996, Ford 1996)

(a) Sites with specific groundwater-monitoring requirements and those that appear to have affected groundwater quality.
(b) Groundwater monitored independently of groundwater project.
(c) Present in waste; not found in groundwater.

5.2 Conceptual Model

The most widespread contaminants of concern in 200-West Area groundwater are nitrate, carbon tetrachloride, and chloroform. Smaller plumes of chromium and trichloroethylene are also present. Technetium-99, uranium, tritium, and iodine-129 are the most significant radionuclides in groundwater.

Contaminated effluent has reached the soil from cribs, trenches, tile fields, surface impoundments, and leaking tanks associated with T Plant, Reduction-Oxidation Plant, U Plant, and Plutonium Finishing Plant. Radionuclides with short half-lives decayed in the vadose zone, while nonradioactive constituents and longer-lived radionuclides were carried deeper. Some of these sorbed to sediments, some remained in the moisture in the vadose zone, and large quantities were carried into the groundwater.

The groundwater-flow direction beneath the southern portion of the 200-West Area is to the east. Groundwater flows to the northeast beneath the northern part of the area. In the past, waste-disposal practices created groundwater mounds that caused some westward flow of contaminants. Contaminants moved outward on these mounds, contaminating a larger area in the saturated zone than in the vadose zone. These mounds are still present but are declining, and the most recent information indicates that the westward flow has ceased. Interim remedial action systems, where groundwater is extracted, treated, and reinjected, locally perturb groundwater-flow directions near the Plutonium Finishing Plant and east of U Plant.

The few shallow and deep well pairs indicate that the vertical flow gradient is downward in the 200-West Area. Contamination in the deeper parts of the unconfined aquifer appear to be considerably less than in the upper portion of the aquifer. It should be noted, however, that very few wells monitor the deeper portions of the aquifer.

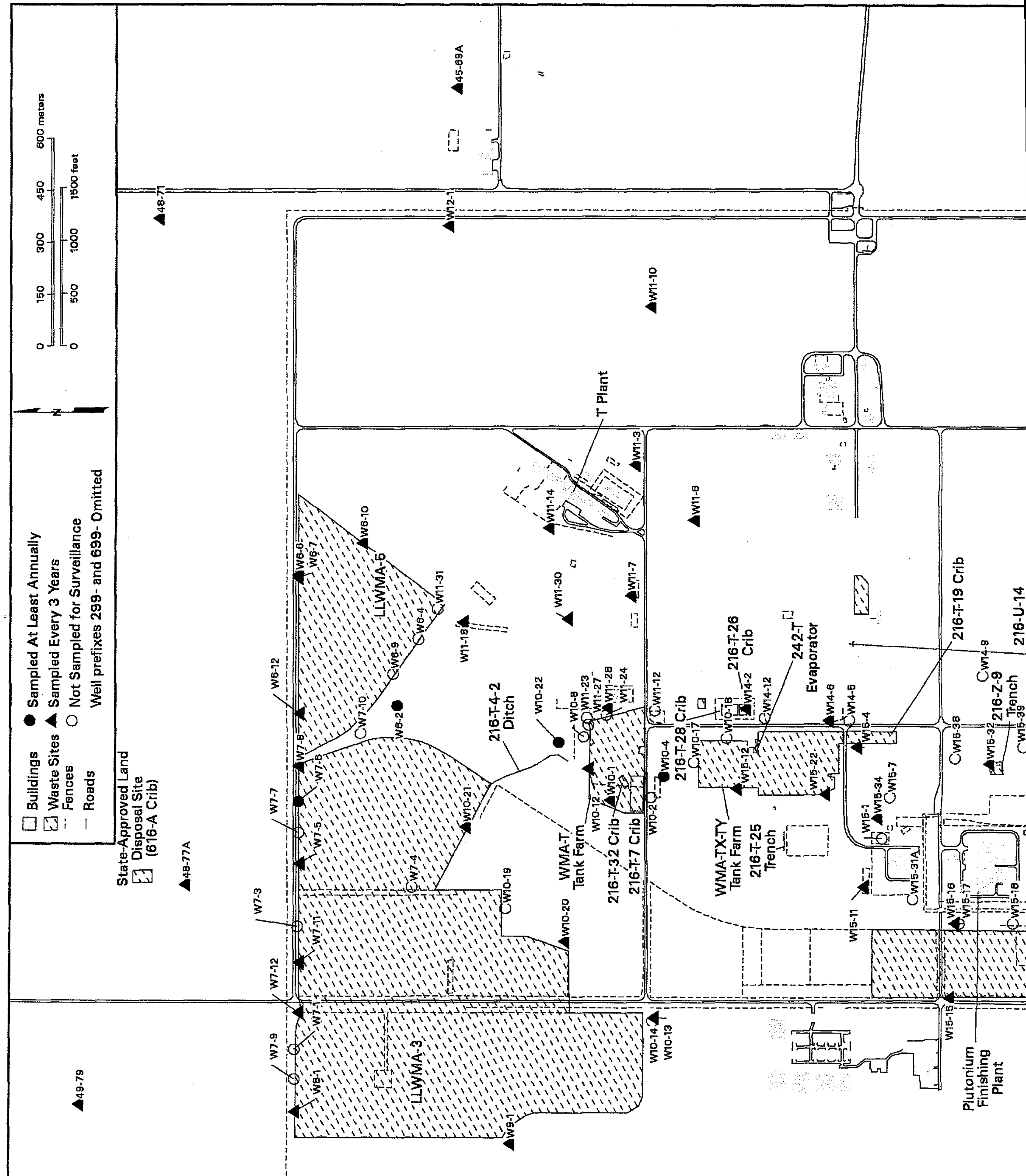
Contaminant concentrations are expected to decrease with time because of dispersion, dilution, radioactive decay, remediation, and migration. There are no new sources of contamination, but concentrations will vary because of plume movement and mobilization of vadose zone contamination.

5.3 Monitoring Program

The primary objective of the surveillance monitoring program in the 200-West Area is to monitor the extent of plumes emanating from 200-West Area waste sites. Most of the sites have ceased operation, and wells will be sampled every 3 years to track the rate of migration and attenuation of these plumes.

Another objective of surveillance monitoring is to address radioactive and hazardous waste sites that ceased operation before 1985 and, thus, are not regulated by RCRA. Wells are monitored near the most significant sources to see if contaminants are declining as expected and to detect contaminants migrating from the vadose zone. These wells are monitored annually or more frequently.

The locations of the monitoring wells in the 200-West Area are illustrated in Figure 5.1 (600 Area wells were shown in Figure 4.8). Wells and constituents are listed in Appendix A.



Buildings
Waste Sites
Fences
Roads
State-Approved Land Disposal Site (616-A Crib)
Sampled At Least Annually
Sampled Every 3 Years
Not Sampled for Surveillance
Well prefixes 299- and 699- Omitted
0 150 300 450 600 meters
0 500 1000 1500 feet
N
T Plant
LLWMA-5
LLWMA-3
216-T-4-2 Ditch
WMA-T Tank Farm
216-T-32 Crib
216-T-7 Crib
216-T-28 Crib
216-T-26 Crib
242-T Evaporator
216-T-19 Crib
WMA-TX-TY Tank Farm
216-T-25 Trench
216-Z-9 Trench
216-U-14
Plutonium Finishing Plant
45-69A
48-71
48-77A
49-79
W12-1
W11-10
W11-3
W11-6
W11-14
W11-7
W11-30
W11-18
W11-31
W6-10
W6-6
W6-7
W6-4
W6-9
W6-12
W6-2
W7-10
W7-8
W7-6
W7-7
W7-5
W7-4
W7-3
W7-11
W7-12
W7-1
W7-9
W8-1
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W10-22
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W11-23
W11-27
W11-28
W11-24
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W10-1
W10-2
W10-4
W10-17
W10-18
W10-14
W10-13
W14-2
W14-12
W14-6
W14-5
W14-9
W15-4
W15-12
W15-22
W15-38
W15-32
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W15-31A
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W15-16
W15-17
W15-18
W15-15

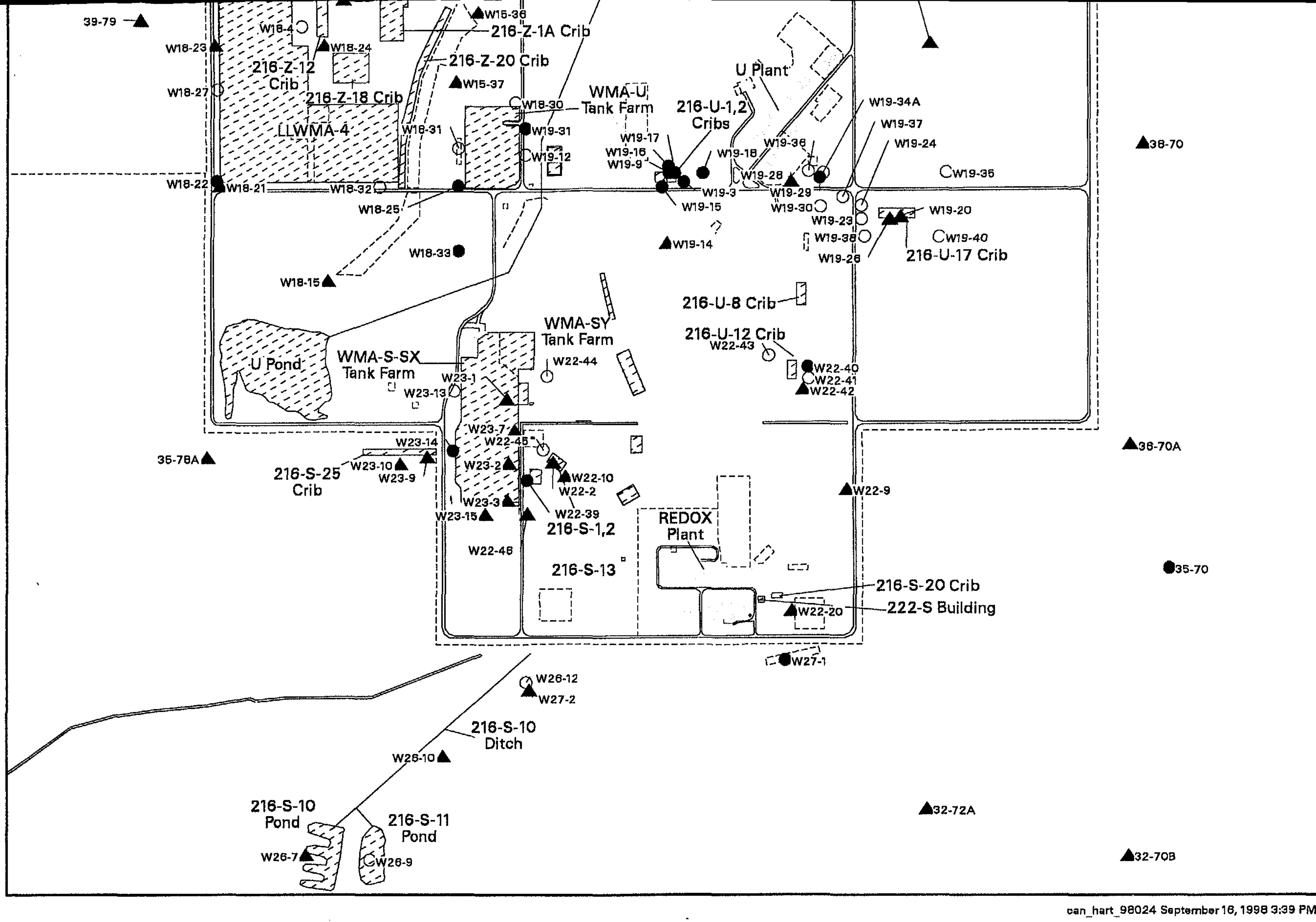


Figure 5.1. Groundwater Project Well Locations: 200-West Area

6.0 200-East Area

For the purposes of this plan, "200-East Area" describes that portion of the Hanford Site within the 200-East Area fence line, those parts of the site downgradient from the area that shows impacts by contaminants originating in the 200-East Area, and those disposal facilities outside the fence line but associated with 200-East Area operations. Thus, B Pond, Gable Mountain Pond, and BC Cribs will be included in the following discussion. The 200 Areas Treated Effluent-Disposal Facility also falls generally within this part of the site but is monitored under the specific requirements of its state waste-discharge permit.

6.1 Background

6.1.1 Waste Sites, Discharges, and Groundwater Operable Units

Hundreds of waste sites have been identified in the 200-East Area, including radioactive and mixed waste-storage tanks; low-level burial grounds; effluent disposal cribs, ditches, drains, and ponds; and various spills or other unplanned releases. The major sites are listed in Table 6.1. Additional information is provided in Hartman and Dresel (1998), and more complete site inventories are included in reports listed in the bibliography of that document. A number of facilities are regulated under RCRA because they were more recently active and contain, or contained, dangerous waste constituents. Several of the RCRA units have groundwater-monitoring requirements and are included in Table 6.1.

The 200 Areas Treated Effluent-Disposal Facility, located east of the 200-East Area proper, is the only active liquid-disposal facility in the area. As mentioned above, this is monitored under a state waste-discharge permit. The permitted discharge does not include radioactive or hazardous constituents. Low-Level Waste Management Areas 1 and 2 are burial grounds regulated under RCRA, which continue to receive radioactive solid waste. Three single-shell tank waste management areas, also regulated under RCRA, no longer actively receive waste but currently store mixed waste.

Groundwater in the northwestern part of the 200-East Area forms the 200-BP-5 Operable Unit, while the southeastern part of the site is in the 200-PO-1 Operable Unit. 200-BP-5 remediation is being performed under CERCLA regulations, while 200-PO-1 is being remediated under RCRA regulations (although requirements of both sets of regulations are considered in the cleanup process). Two groundwater-extraction treatability tests were performed in the 200-BP-5 Operable Unit – the first near the 216-B-5 injection well and the second just north of the northwestern corner of the 200-East Area in an area of contamination originating in the BY Cribs. There is no active groundwater remediation in the 200-East Area. The interim action recommended in the *Hanford Sitewide Groundwater Remediation Strategy* (DOE 1995a) is natural attenuation and decay of contaminant plumes. There is, however, no interim or final ROD for the operable units in the 200-East Area.

Table 6.1. Selected Waste Sites in and Downgradient of the 200-East Area

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site (monitoring plan reference)
200-East Area Proper and Adjacent Facilities			
Single-shell tank farms (Waste Management Areas A-AX, B-BX-BY, C)	Radioactive/chemical slurries	Sodium hydroxide, sodium salts, radionuclides, ferrocyanide	RCRA (Caggiano and Goodwin 1991, Caggiano 1996b)
216-B-7A, -7B, -8 cribs	Supernatant from settling tanks	Sodium hydroxide, sodium salts, radionuclides, ferrocyanide	Past-practice (200-BP-5 Operable Unit; DOE 1995b)
216-B-37 trench	Concentrated waste from tank bottoms	Sodium hydroxide, sodium salts, radionuclides, ferrocyanide	Past-practice (200-BP-5 Operable Unit; DOE 1995b)
216-B-5 injection well (1945-46)	Hot cell drainage; supernatant from settling tanks	Strontium-90, cesium-137, plutonium	Past-practice (200-BP-5 Operable Unit; DOE 1995b)
BY cribs and trench (1954-55)	Uranium-recovery waste supernatant	Ferrocyanide, radionuclides	Past-practice (200-BP-5 Operable Unit; DOE 1995b)
216-B-63 trench (1970-92)	Steam condensate	Sulfuric acid, sodium hydroxide, radionuclides	RCRA (Sweeney 1995a)
Plutonium-Uranium Extraction Plant waste-disposal cribs	Process distillate	Radionuclides (especially tritium, iodine-129), nitrate	216-A-10, -36B, -37-1: RCRA (Lindberg 1997); others: past-practice (200-PO-1 Operable Unit; DOE 1996c)
216-A-29 ditch	Plutonium-Uranium Extraction Plant chemical waste	Sodium hydroxide, sulfuric acid	RCRA (Kasza and Goodwin 1991)
216-B-3 pond	B Plant steam condensate and chemical waste; Plutonium-Uranium Extraction Plant chemical waste	Tritium, aluminum nitrate, potassium hydroxide, nitric acid, sulfuric acid	RCRA (Sweeney 1995b)
200 Areas Treated Effluent-Disposal Facility	Treated liquid effluent from 200 Areas	Trihalomethane	Active; WAC permitted (Barnett at al. 1995b)[a]
Low-Level Burial Grounds (Waste Management Areas 1 and 2)	Radioactive solid waste	Various chemical and radioactive wastes[b]	RCRA (Last and Bjornstad 1989)

Table 6.1. (contd)

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site (monitoring plan reference)
Liquid Effluent Retention Facility	242-A evaporator process condensate	Ammonium, acetone, aluminum, 1-butanol, 2-butanone, tritium, strontium-90, ruthenium-106, cesium-137[(b)]	RCRA (Schmid 1990)
600 Area Facilities			
Gable Mountain Pond (1957-87)	200-East Area liquid wastes	Strontium-90, cesium-137, ruthenium-106	Inactive
618-10 burial ground and 316-4 crib (1948-62)	Low- to high-activity radioactive waste	Nitrate, hexone, organic wastes	Past-practice (300-FF-2 Operable Unit)
Solid Waste Landfill	Solid waste, sewage, garage wash water	Organics	WAC permitted (Hodges 1993)
Nonradioactive Dangerous Waste Landfill	Asbestos, laboratory wastes, solvents, batteries, mercury	Organics	RCRA (Hodges 1992)

(a) Groundwater monitored independently of groundwater project.
(b) Present in waste; not found in groundwater.

6.1.2 Groundwater-Monitoring Requirements and History

Groundwater monitoring has been conducted in the 200-East Area since the 1940s. Very few monitoring wells existed in the early decades but more were installed in the 1970s and monitored for DOE requirements. Approximately 100 new wells were installed when RCRA monitoring began in the late 1980s. CERCLA investigations in the 1990s resulted in the installation of several wells but relied primarily on data from existing groundwater-monitoring networks and additional wells installed in support of RCRA.

The *Atomic Energy Act of 1954* and DOE Order 5400.1 require monitoring to identify and track contaminant plumes. Wells monitored for those requirements in 1996 were listed by Bisping (1996).

6.2 Conceptual Model

The most widespread groundwater contaminants of concern originating from the 200-East Area are tritium, nitrate, and iodine-129. A significant plume of technetium-99 at levels above the drinking water standards extends northwest from the 200-East Area fence line toward the gap between Gable Mountain and Gable Butte. This plume area also contains low levels of cobalt-60 and cyanide. Arsenic is found at levels above drinking water standards in the eastern part of the 200-East Area. Groundwater is locally contaminated with strontium-90 at high levels near Gable Mountain Pond (decommissioned) and at low levels near cribs south of the Plutonium-Uranium Extraction Plant. Contamination with plutonium, strontium-90, and cesium-137 is found in the immediate vicinity of the 216-B-5 injection well. Localized uranium and chromium contamination is also found.

The most extensive contaminant plumes are attributable predominantly to liquid discharges to cribs, with some contribution from ponds, ditches, and other sources. Most pond discharge, however, was more dilute and did not contribute to the highest levels of contamination. The ponds, particularly B Pond, did have a large influence on contaminant migration because the large amounts of water that went to the ponds affected flow directions. Groundwater mounding at B Pond remains evident, though the mound is declining since discharge to the pond ceased. Contamination from tank leaks, unplanned releases, and specific retention trenches appears to have produced groundwater contamination of limited extent, though considerable inventory may remain in the vadose zone. No groundwater impact from low-level waste-burial grounds in the 200-East Area has been identified.

Contaminant levels are declining through much of the area. Many short-lived radionuclides detected in the past, such as ruthenium-106 and cobalt-60, are no longer detected or are detected at much lower concentrations. Tritium concentrations near the source areas are declining because of termination of discharge and the subsequent dispersion and decay within the plume. It appears that residual contamination in the vadose zone at many of the sources continues to drain into the groundwater. It is expected that the amount of transport to groundwater will decline with time. Some contaminants that have been retarded by sorption to sediments or that never reached groundwater because of limited discharge volumes (i.e., specific retention trenches) may break through to the water table, and concentrations then could increase. In addition, any uncontrolled discharge, such as leaks from water lines, may enhance transport of contaminants to the groundwater from the vadose zone. Tritium concentrations north of the 300 Area near the Columbia River continue to increase, reflecting the continued spread of contamination at the downgradient plume boundaries. The contamination is predicted not to spread southward beyond the site boundary (Hartman and Dresel 1998).

Several waste streams discharged at the site included chemical complexants along with other radioactive and hazardous constituents. Complexation is known to have enhanced the mobility of some constituents such as cobalt-60. Cobalt-60 concentrations are declining because of its short half-life, but other constituents such as americium, plutonium, and neptunium may also have increased mobility. The data on these constituents and on complexant concentrations are sparse. More work is needed to evaluate the potential for complexant-enhanced mobility of radionuclides before including them in routine monitoring. Evaluation of enhanced mobility and distribution of americium and neptunium is planned for fiscal year 1999.

Vertical migration of contaminants to deeper parts of the aquifer or deeper aquifers may have occurred through several mechanisms. Significant groundwater mounds developed at a number of facilities. By far, the greatest mounding occurred at B Pond, where monitoring evidence indicates there was some movement of contamination down to the upper basalt-confined aquifer. This mounding produced vertical gradients to transport contamination downward in the sedimentary sequence. Poorly sealed wells may have produced conduits, thus enhancing vertical migration.

Additional vertical migration probably occurred through the discharge of high-density, high-salt wastes. This dense material migrated down through the aquifer. Few monitoring data are available on the lower parts of the unconfined aquifer because of the paucity of monitoring wells. Dense waste could have moved down-dip along the top of basalt. The unconsolidated sediments are thin in the area where high-density wastes were discharged, increasing the potential for the waste to reach the basalt. Further evaluation of areas where this type of vertical migration may have occurred is needed to determine additional monitoring needs.

A third mechanism for vertical migration is the intersection of the water table by confining layers in the suprabasalt sediments. The lower Ringold mud intersects the water table downgradient of B Pond and dips approximately to the south. This serves to induce downward flow to the sediments below the confining mud. The lower part of the Ringold sediments thus forms a confined aquifer in this area.

6.3 Monitoring Program

The surveillance monitoring program in the 200-East Area has been designed to meet several objectives and to complement the RCRA monitoring networks. The first objective is to monitor the extent of plumes emanating from 200-East Area waste sites. Most of these sites have ceased operations and, thus, it is expected that the monitoring network will be suitable to track the rate of dissipation and attenuation of the plumes. To do this, the overall extent of the major plumes will be sampled at 3-year intervals. A combination of geostatistical assessment and site knowledge was used in developing the plume-monitoring system. The planned network has been assessed with a geostatistical model of the plumes, and the network was determined to provide sufficient data for plume tracking. The model used stochastic simulation to provide estimates of concentrations throughout the plume area and a measure of the uncertainties associated with the plume model. These uncertainties were used to rank wells according to their importance to the statistical model. Wells close to other wells and wells in areas where concentrations do not vary greatly received low rankings, while remote wells and wells where concentrations vary considerably over short distances were ranked higher. These rankings were then used by groundwater project scientists to choose wells to delete from the network. The geostatistical model was then used to evaluate the proposed network to ensure that similar results could be obtained with fewer monitoring wells.

Three bands of guard wells will be monitored annually for a longer list of constituents to ensure that the nature of contamination found downgradient of the operational and waste-disposal areas has been sufficiently characterized. These bands are shown in Figure 6.1; the wells are listed in Table 6.2. One band is located in the gap between Gable Mountain and Gable Butte and serves to detect contaminant movement to the north. The second band is located to the southeast of the 200-East Area and detects contamination moving into the southern and eastern parts of the site. The third band is along the Columbia River to provide assurance that offsite impacts are identified. In addition to the known contaminants,

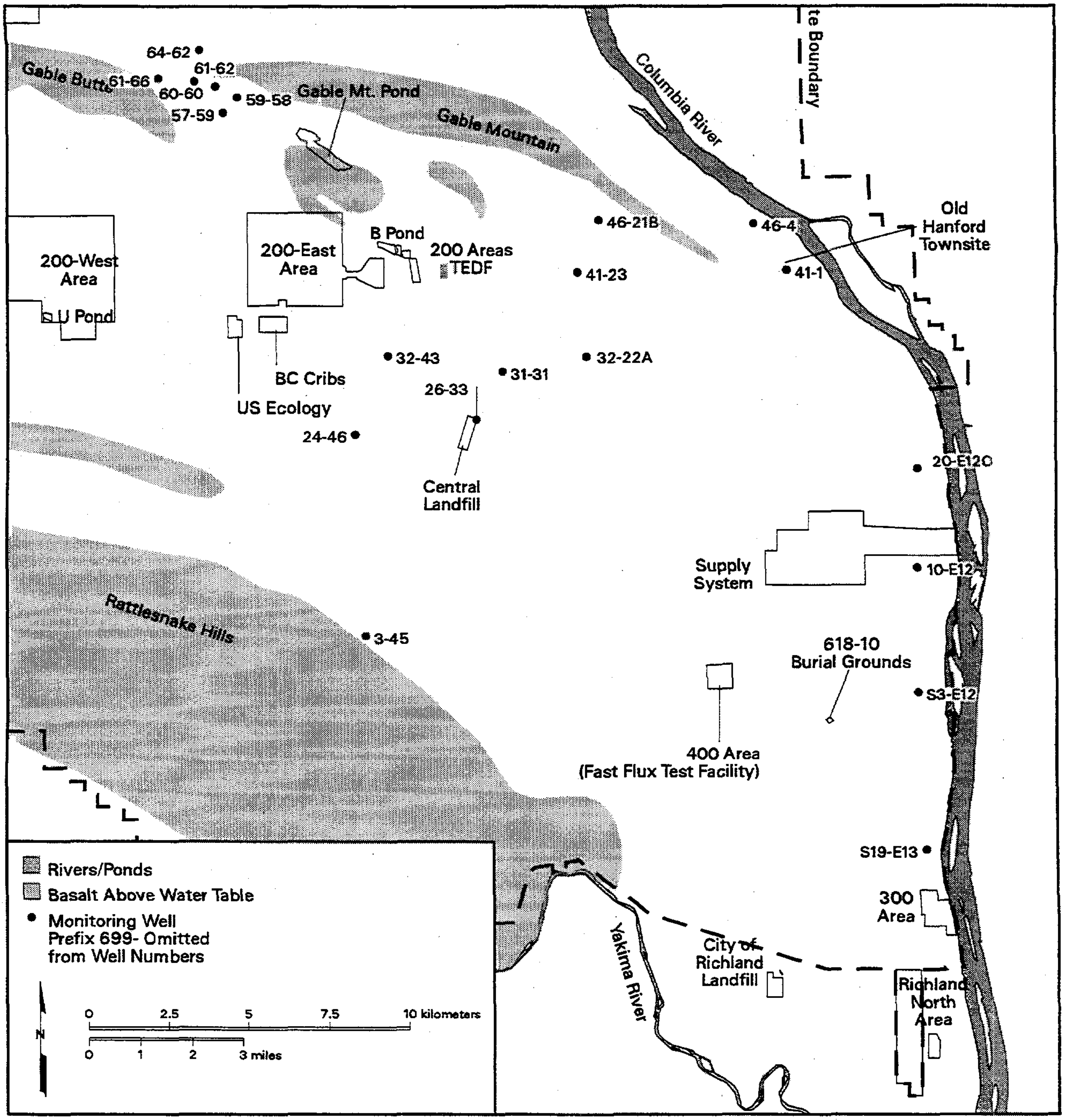


Figure 6.1. Locations of 200-East Area Guard Wells

Table 6.2. 200-East Area Guard Wells

Gap	Southeast	River
699-57-59	699-3-45[a]	699-10-E12
699-59-58	699-24-46	699-20-E12O
699-60-60	699-26-33	699-41-1
699-61-62	699-31-31	699-46-4
699-61-66	699-32-22A	699-S3-E12
699-64-62	699-32-43	699-S19-E13[b]
	699-41-23[a]	
	699-46-21B[a]	
Constituent List: Inductively coupled-plasma metals; anions; gross alpha, beta, and gamma; strontium-90; technetium-99; tritium; total organic halides; total organic carbon; and alkalinity.		

(a) Reduced list - Sample tritium, alpha, beta, anions annually; Full list - Sample every 3 years.
(b) Also monitors Richland North Area and southern portion of the Hanford Site.

wells in these bands will be monitored for inductively coupled-plasma metals, anions, gross alpha, gross beta, gamma, strontium-90, technetium-99, tritium, total organic halides, total organic carbon, and alkalinity.

The monitoring network is also designed to complement the RCRA detection and assessment monitoring of contaminant sources. The RCRA-monitoring networks only address sources, containing hazardous constituents, that were operational after 1985. RCRA and past-practice source monitoring serves to ensure that concentrations of groundwater contaminants are declining near the most significant sources and to detect the breakthrough of new contamination from the vadose zone. The source monitoring places a high priority on the potentially largest contaminant sources and on areas near the 200-East Area boundary. This helps ensure that any new contamination will be detected before it moves out of the operational area.

Locations of monitoring wells for the 200-East Area are illustrated in Figure 6.2 (wells in the 600 Area were shown in Figure 4.8). Wells and constituents are listed in Appendix A.

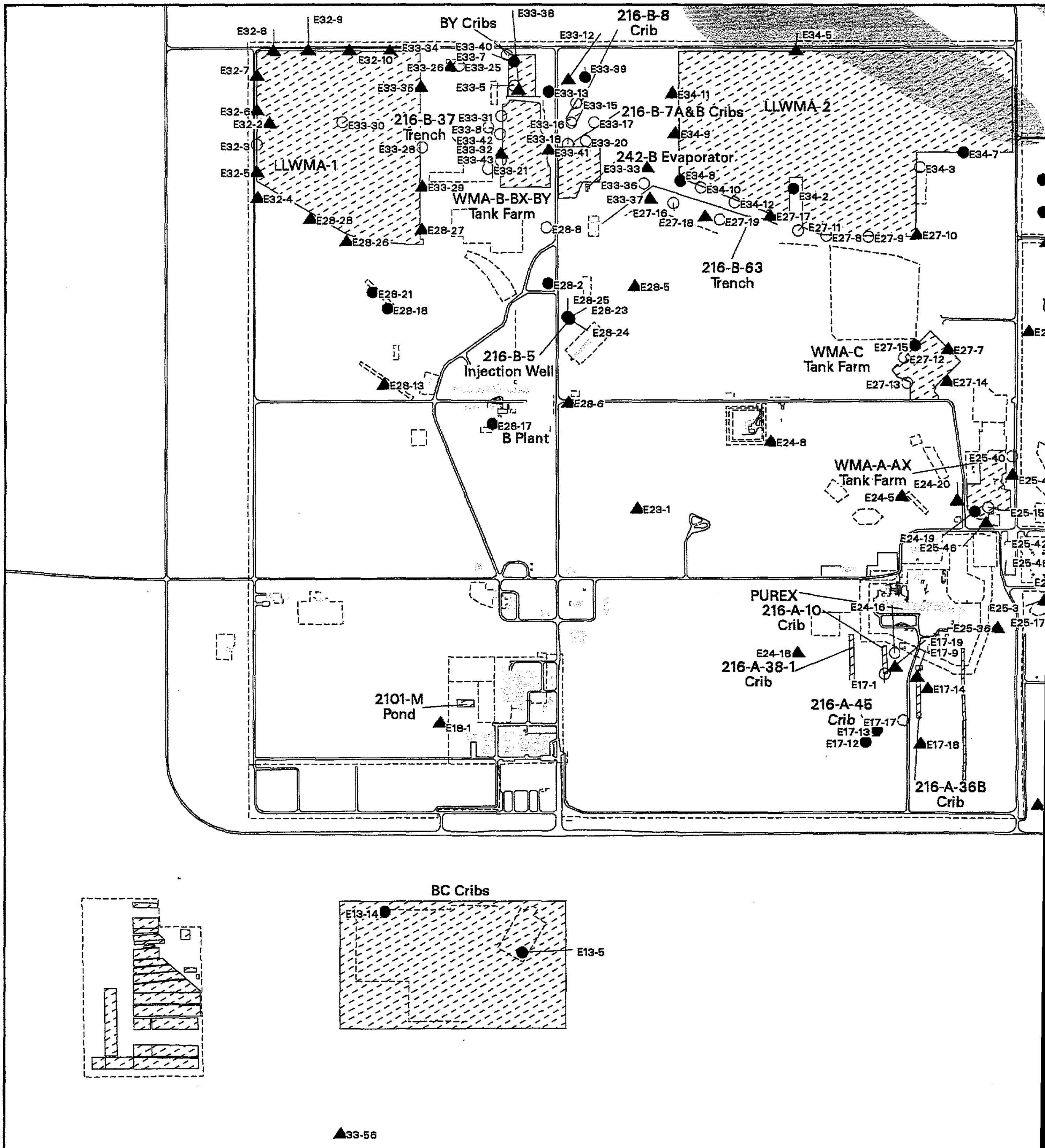
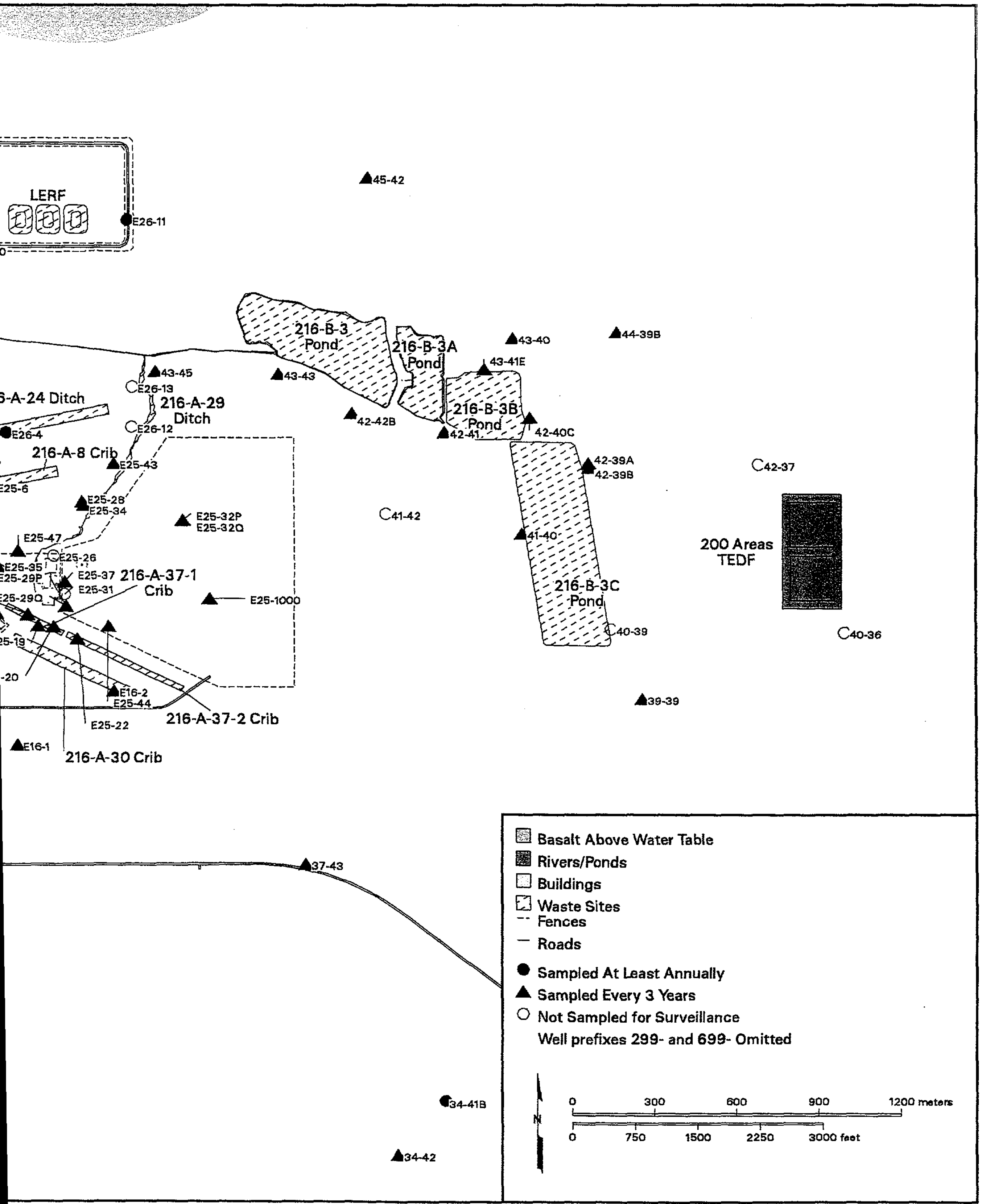


Figure 6.2. Groundwater Project



Locations: 200-East Area

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7.0 400 Area

7.1 Background

This section covers activities in the 400 Area, the location of the Fast Flux Test Facility, a liquid sodium-cooled reactor. The reactor is on standby, pending a restart decision for the production of medical isotopes and tritium.

Primary local groundwater-monitoring activities include the area around the 4608 B/C Ponds (also called the 400 Area process ponds), which receive wastewater effluent. The water supply for the 400 Area, including the drinking water supply, is also monitored by sampling wells completed in the unconfined aquifer system.

7.1.1 Waste Sites

The 400 Area process ponds are located north of the 400 Area perimeter fence and are unlined infiltration ponds that receive wastewater from the 400 Area facilities (Figure 7.1). The waste stream consists primarily of cooling water and intermittent small contributors such as sinks and drains.

7.1.2 Groundwater-Monitoring Requirements and History

The 400 Area process ponds are monitored in accordance with State Waste Discharge Permit ST4501, issued on August 1, 1996 and modified on February 10, 1998. This integrated groundwater-monitoring plan provides information related to sampling activities and quality assurance/quality control to ensure that the data needs of various users are satisfied. The primary objective of groundwater monitoring at this facility is to ensure that wastewater entering the ponds meets acceptable standards and does not adversely affect local groundwater quality. The monitoring network includes a downgradient well (699-2-7) and an upgradient well (699-8-17), shown in Figure 4.8. In addition, a second downgradient well has been installed near the ponds (699-2-6A). Constituents analyzed in quarterly groundwater samples, as specified by the discharge permit, include filtered metals (cadmium, chromium, lead, mercury, and manganese), pH, sulfate, total organic carbon, and total dissolved solids. In addition, the wells are co-sampled for surveillance monitoring for other constituents, as indicated in Appendix A.

Nitrate is the only contaminant that has been consistently identified at concentrations above regulatory limits in the local groundwater-monitoring network for the 400 Area process ponds, where it has been monitored in well 699-2-7 since 1986. This is attributed to a sanitary sewage lagoon located immediately west and upgradient of the ponds. Disposal to the lagoon has been discontinued, and the lagoon has been backfilled; thus, groundwater contamination from this source is expected to diminish with time.

Slightly elevated manganese concentrations have been identified in the effluent wastewater discharged to the ponds. A few of the manganese values are in excess of the discharge permit (50 μg/L,

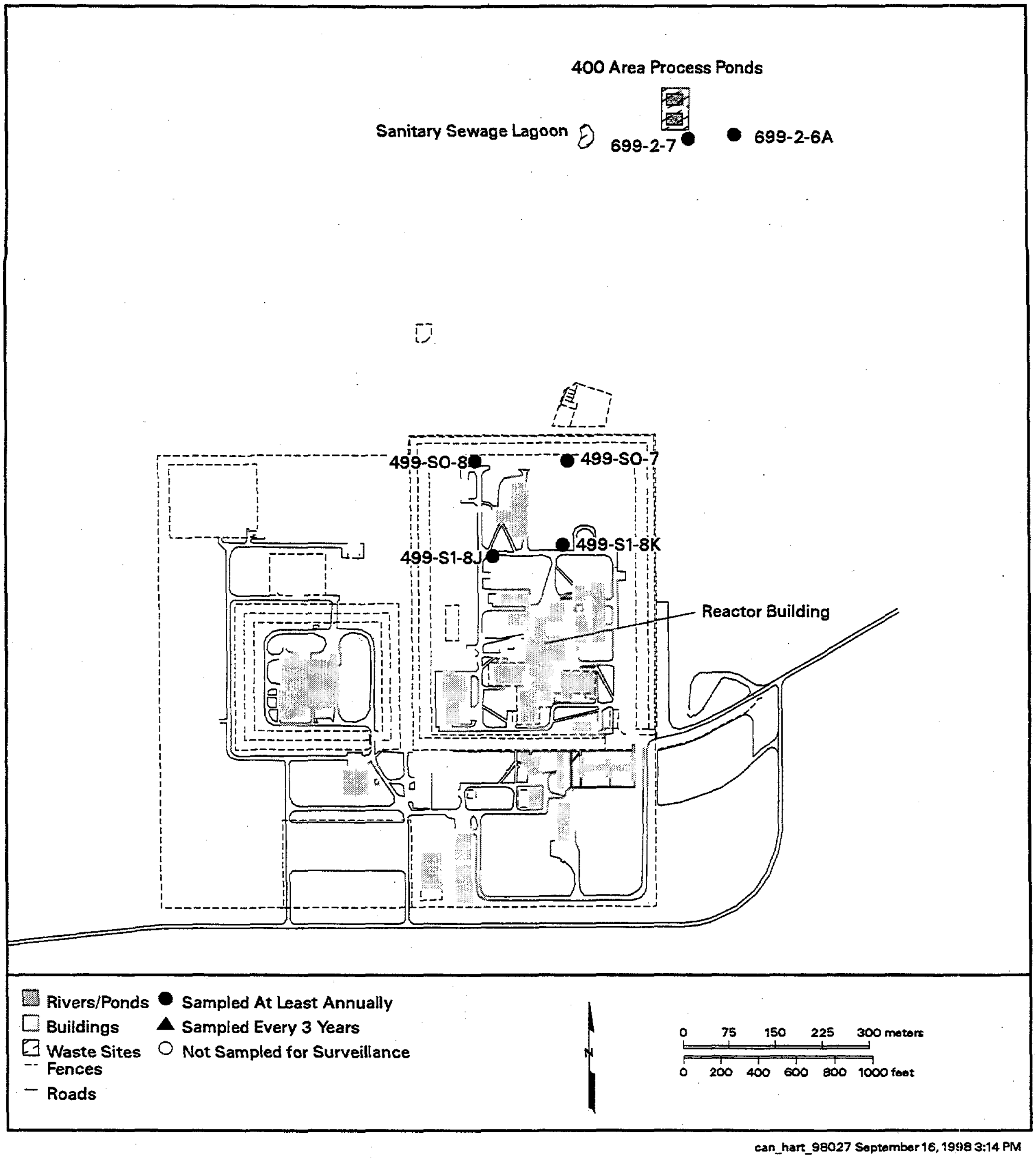


Figure 7.1. Groundwater Project Well Locations: 400 Area

unfiltered). Groundwater-sampling data suggest that the elevated manganese values are unlikely to have been introduced by the water-supply wells and probably represent particulate matter derived from corrosion in tanks or disposal lines.

The primary groundwater-monitoring compliance issue related to the 400 Area water supply is related to tritium. Wells 499-S0-7 and 499-S0-8, the original water-supply wells, were completed near the top of the unconfined aquifer and have been monitored since 1972. When tritium contamination was detected in the water supply, an additional well (499-S1-8J) was drilled in the lower unconfined aquifer in 1985. Although well 499-S1-8J is currently the primary water-supply well, wells 499-S0-7 and 499-S0-8 are still used for backup supply and emergency uses.

Tritium is consistently detected at levels above the interim 20,000-pCi/L drinking water standard in the backup supply wells, but well below it in the primary supply well. Because the backup wells are seldom used, monthly water-supply sampling results indicate that the concentration in the drinking water does not exceed a dosage level of 4 mrem/yr if ingested at the average annual rate of consumption. Moreover, the dose-conversion factor used in setting the interim drinking water standard for tritium is more conservative than that used in more current methodology (Hartman and Dresel 1998).

7.2 Conceptual Model

Water-level contours indicate that groundwater generally flows from west to east across the 400 Area. In addition, tritium and nitrate plumes, which originate in the 200-East Area, indicate that groundwater flows toward the east to southeast. The tritium plume is detected in the 400 Area water-supply wells, as discussed above. Tritium levels are lower in the vicinity of the 400 Area process ponds as a result of dilution effects. However, nitrate levels are currently elevated in the vicinity of the process ponds, apparently from the former disposal of sanitary sewage to a nearby lagoon, as indicated above.

7.3 Monitoring Program

Monitoring well locations in the 400 Areas are presented in Figure 7.1. Upgradient well 699-8-17 was shown in Figure 4.8. Constituents monitored and sampling frequencies are presented in Appendix A.

8.0 300 and Richland North Areas

The 300 and Richland North Areas include the southern portion of the Hanford Site and adjacent area to the south between the Yakima and Columbia Rivers. The 300 Area is located along the Columbia River in the southeastern portion of the Hanford Site. The Richland North Area, though not formally defined, includes the 1100 and 3000 Areas, part of the 600 Area adjacent to the 300 Area, and parts of nearby Richland. Figure 8.1 shows the locations of these two areas.

8.1 Background

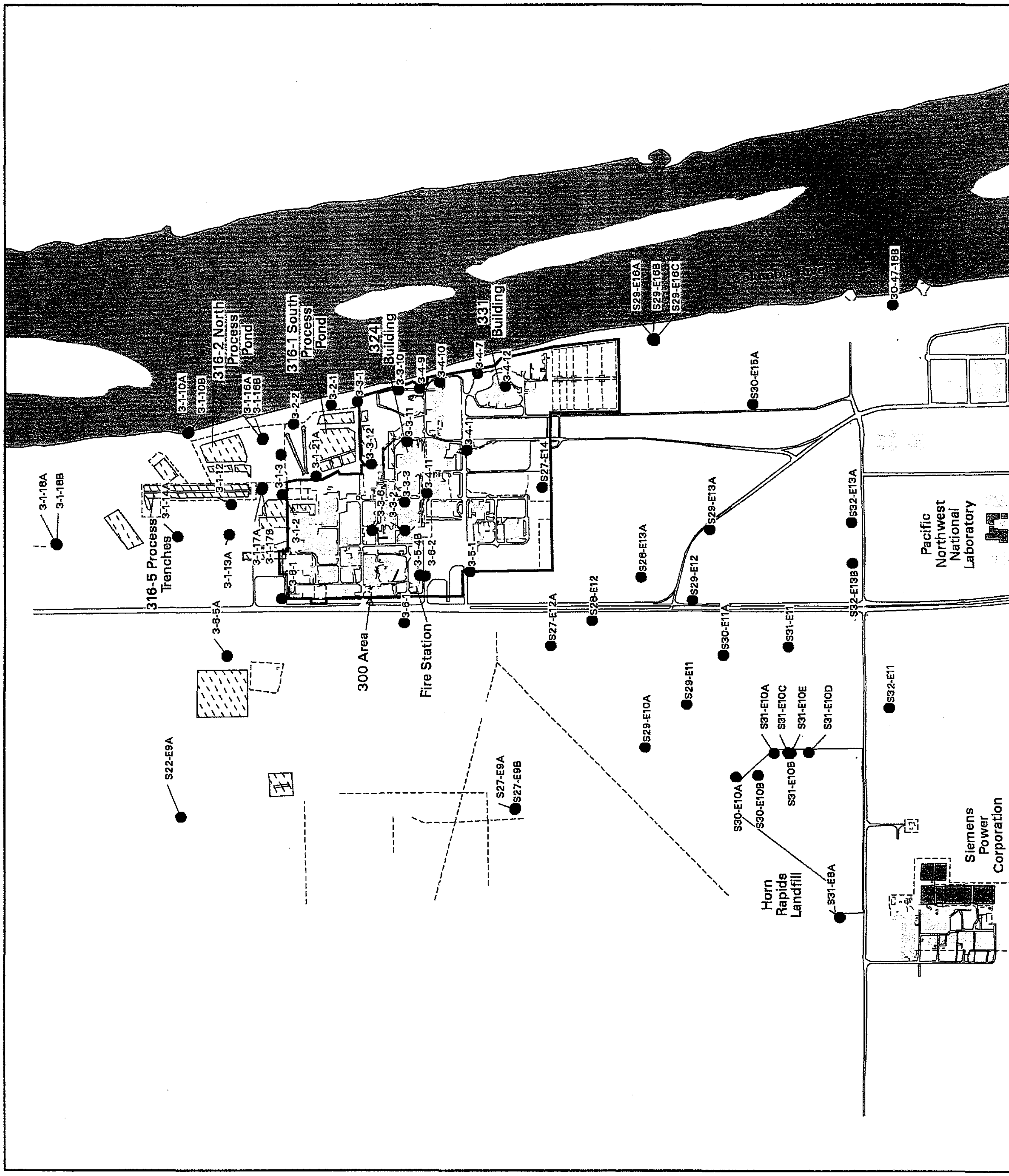
The 300 Area has been used for research-and-development and nuclear fuel-fabrication process activities associated with uranium fuel elements for nuclear reactors. The Richland North Area consists of a variety of both onsite and offsite land uses, including municipal, industrial, and agricultural. Municipal and industrial facilities and agricultural activities in the Richland North Area influence groundwater. Offsite facilities of particular interest with respect to groundwater include the City of Richland's North Well Field and recharge basins, Siemens Power Corporation, Richland Landfill, Lamb-Weston Richland Plant, Interstate Nuclear Services, and Allied Technology Group. Offsite agricultural irrigation influences groundwater over a wide area in the Richland North Area.

8.1.1 Waste Sites, Discharges, and Groundwater Operable Units

In the 300 Area, inactive waste sites known to have received liquid waste containing uranium and other known or suspected contaminants include the 316-5 process trenches and the 316-1 and 316-2 process ponds. These are the primary sites affecting groundwater contamination. Other sites that received wastes include sanitary septic tanks, trenches, and tile fields; ash pits; filter backwash ponds; and a number of burial grounds. The 300 Area also contained underground tanks for storing gasoline and diesel fuels.

The 316-5 process trenches require groundwater monitoring to meet RCRA requirements because the trenches are regulated as dangerous waste surface impoundments. The process trenches were modified as part of an expedited response action in 1991, and discharges to the trenches ceased in 1994. The 316-1 and 316-2 process ponds, monitored to meet CERCLA requirements, received uranium-contaminated wastewater until 1975 when the process trenches began receiving the wastewater. The storage tanks were monitored under the state's underground storage tank program in the early 1990s, but monitoring is no longer required by the state. Groundwater in the 300 Area forms the 300-FF-5 Operable Unit.

Waste sites in the Richland North Area include the inactive Horn Rapids Landfill in the 600 Area and a number of disposal pits and underground storage tanks in the 1100 Area. Groundwater associated with these waste sites is monitored to meet CERCLA requirements. The 1100-EM-1 Operable Unit ROD (1993) required groundwater monitoring at a point of compliance downgradient from the inactive Horn



Columbia River
316-2 North Process Pond
316-1 South Process Pond
324 Building
331 Building
316-5 Process Trenches
300 Area
Fire Station
Pacific Northwest National Laboratory
Siemens Power Corporation
Horn Rapids Landfill
3-1-18A
3-1-18B
3-1-10A
3-1-10B
3-1-16A
3-1-16B
3-1-12
3-1-14A
3-1-13A
3-1-17A
3-1-17B
3-1-2
3-1-3
3-1-21A
3-2-1
3-2-2
3-3-1
3-3-10
3-3-11
3-3-12
3-3-2
3-3-3
3-3-6A
3-4-1
3-4-7
3-4-9
3-4-10
3-4-11
3-4-12
3-5-1
3-5-4B
3-6-1
3-6-2
3-8-1
3-8-5A
S29-E16A
S29-E16B
S29-E16C
S30-E15A
S27-E14
S29-E13A
S28-E13A
S29-E12
S28-E12
S27-E12A
S30-E11A
S31-E11
S32-E13A
S32-E13B
S32-E11A
S32-E11
S29-E11
S29-E10A
S31-E10A
S31-E10C
S31-E10E
S31-E10D
S31-E10B
S30-E10A
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S27-E9B
30-47-18B

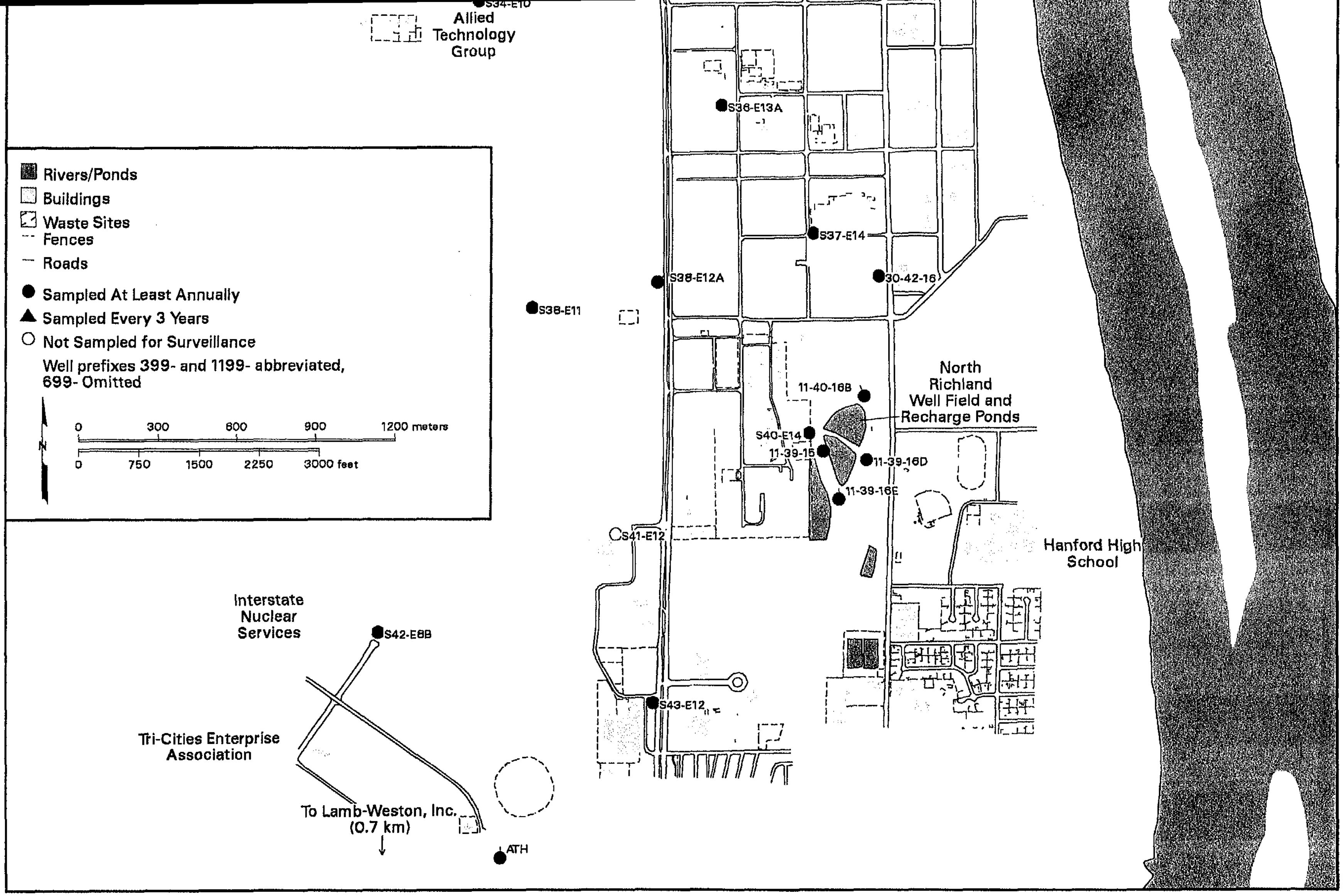

Figure 8.1. Groundwater Project Well Locations: 300 and Richland North Areas

Rapids Landfill. There are no waste sites requiring RCRA groundwater monitoring in the Richland North Area. The waste sites in the 300 and Richland North Areas requiring groundwater monitoring are listed in Table 8.1 along with their waste types, period of use, associated constituents in groundwater, and regulatory program.

Table 8.1. Selected Waste Sites in the 300 and Richland North Areas

Facility (period of use)	Waste Type	Constituents of Interest for Groundwater Monitoring	Type of Site (monitoring plan reference)
300 Area			
316-5 process trenches (1975-94)	Variety of chemical and uranium wastes	Uranium, trichloroethylene, cis-1,2-dichloroethylene, metals, nitrate	RCRA (Lindberg et al. 1995)
316-1 (south) and 316-2 (north) process ponds (1940s-75)	Variety of chemical and uranium wastes	Uranium, trichloroethylene, cis-1,2-dichloroethylene	Past-practice (300-FF-1 and -5 Operable Units, ROD 1996b, DOE 1996d)
300 Area fire station (two underground storage tanks and piping) (19??-92)	Unleaded gas and diesel	Benzene, toluene, ethylbenzene, xylene, total petroleum, hydrocarbons	State of Washington Department of Ecology underground storage tank program; surveillance monitoring
Richland North Area			
Horn Rapids Landfill (1950s-70)	Office and construction wastes, asbestos, sewage sludge, fly ash	Trichloroethylene, breakdown products of trichloroethylene (vinyl chloride, 1,1-dichloroethylene), chromium, technetium-99, nitrate	Past-practice (1100-EM-1 Operable Unit, ROD 1993, DOE 1995c)
Siemens Power Corporation process lagoons (offsite) (1971-present)	Ammonia, fluoride, nitrate, radionuclides (primarily uranium)	Trichloroethylene, nitrate	Active RCRA; Siemens (1996)[a]
Lamb-Weston (offsite)	Potato-processing wastes	Nitrate	Active
Agriculture (offsite)	Fertilizers	Nitrate	Active

(a) Groundwater monitored independently of groundwater project.

8.1.2 Offsite Sources

Probable sources of groundwater contamination that originated from the Richland North Area off the Hanford Site include Siemens Power Corporation, agricultural irrigation, and Lamb-Weston Richland Plant. Siemens Power Corporation is located adjacent to the Hanford Site boundary southwest of the Horn Rapids Landfill, and a surface impoundment system at the site contributed to solvent and nitrate contamination in groundwater. Fertilizers applied to the agricultural fields upgradient (south) of Siemens Power Corporation and potato-processing waste from the Lamb-Weston Richland Plant are probable sources of nitrate. The Richland Landfill, Interstate Nuclear Services, and Allied Technology Group are not known to contribute to groundwater contamination on the Hanford Site.

The City of Richland's North Well Field and recharge basins, located in the south-central part of the Richland North Area, are the primary influence on groundwater-elevation changes in the area. The well field serves as a secondary water supply for the City of Richland, and the basins recharge the unconfined aquifer with Columbia River water. The net recharge causes a groundwater mound to form in this area and decreases nitrate levels in groundwater to less than ambient.

Irrigation applied to agricultural fields contributes to groundwater recharge during the growing season. As a result, this contributes to groundwater flow to the northeast, east, and southeast.

8.1.3 Groundwater-Monitoring Requirements and History

Extensive groundwater monitoring has been conducted in the 300 Area as far back as 1975, when the 316-5 process trenches replaced the 316-1 and 316-2 process ponds as the main facility for disposal of uranium-contaminated wastewater. The earliest major study on groundwater contamination in the 300 Area was in 1977 (Lindberg and Bond 1979). A site-specific program of groundwater monitoring of the 300 Area has been conducted since 1977. In 1985, interim-status groundwater monitoring of the process trenches was initiated under RCRA, which required additional wells to be installed (Schalla et al. 1988). The RCRA program went into final-status groundwater monitoring in 1996 (Lindberg et al. 1995). In response to the Tri-Party Agreement (Ecology et al. 1989), CERCLA activities were initiated in the early 1990s and included additional groundwater monitoring. An expedited response action was implemented in 1991 to remove sources of contamination and resulted in lower contaminant concentrations in groundwater downgradient from the process trenches. An interim remedial action required continued groundwater monitoring of contaminants in the 300 Area (ROD 1996b).

Groundwater well installation and monitoring began in the 1100 Area in 1988 after a limited groundwater-sampling effort in 1986 revealed low levels of contaminants (DOE 1990). A study was conducted in 1989-1992 and included well installation and groundwater monitoring to determine the nature and extent of groundwater contamination in the 1100 Area (DOE 1992). In 1993, continued and expanded groundwater monitoring in the 1100 Area were required (ROD 1993). In response to the ROD, additional well installation and monitoring were implemented at the inactive Horn Rapids Landfill (DOE 1995c). The ROD required the monitoring of trichloroethylene in groundwater downgradient of the inactive Horn Rapids Landfill. The ROD also required monitoring of trichloroethylene breakdown products and nitrate. The monitoring of nitrate was needed because its concentrations were above the maximum contaminant levels for nitrate.

The surface impoundment system at Siemens Power Corporation consists of six lagoons, which are regulated under the Revised Code of Washington, Title 70, Chapter 105 (Siemens Power Corporation 1997). Siemens Power Corporation has monitored groundwater at their facility since 1994 to meet the requirements of RCRA interim-status facilities.

8.2 Conceptual Model

The most widespread contaminants of concern in the 300 and Richland North Areas are tritium and nitrate. Groundwater is locally contaminated with uranium and trichloroethylene. The movement and distribution of these contaminants in groundwater are heavily influenced by Columbia River stage, a recharge mound at the Richland North Well Field, and agricultural irrigation practices.

The tritium plume is derived from past wastewater-disposal activities in the 200-East Area and represents the southern margin of the sitewide plume that is encroaching into the 300 Area. Tritium migrates across the northeastern portion of the 300 Area from the north and enters the Columbia River. Tritium levels have generally been steady with time in and north of the 300 Area in recent years. The southward migration of tritium is limited to the 300 Area because of the following factors:

- Groundwater is recharged by the Yakima River, flows generally from east to west, and discharges to the Columbia River.

- Recharge from agricultural irrigation between the Richland Landfill and the 1100 Area contributes to eastward groundwater flow.

- Net recharge at the City of Richland's North Well Field has resulted in a groundwater mound that directs groundwater flow outward, including a component to the north.

In the 300 Area, wastewater effluent, containing uranium and chlorinated solvent compounds, percolated through the soils from leaking process trenches and ponds for approximately 50 years. These constituents were driven down through the soils in the vadose zone beneath the waste sites by subsequent effluent discharges and natural recharge. As the constituents were carried downward, some were sorbed to sediments and trapped in soil moisture and some reached groundwater. Uranium in groundwater migrates toward and enters the Columbia River.

Uranium concentrations in groundwater fluctuate indirectly in response to river-stage changes. As the river stage rises, groundwater near the river rises into a portion of the vadose zone. As a result, uranium is desorbed from the sediments and mobilized, increasing the uranium concentrations in groundwater. As the groundwater levels drop, uranium concentrations decrease because the thickness of the saturated sediments from which uranium desorbs decreases.

Chlorinated solvent compounds are found in the deeper portion of the unconfined aquifer, but not in the upper part of the unconfined aquifer beneath the process trenches and ponds. Two conceptual model hypotheses have been suggested for this. One hypothesis is that dissolved chlorinated compounds in groundwater were transported by a downward vertical hydraulic gradient created when discharged effluent to the ponds and trenches recharged the aquifer, causing groundwater levels to rise. The second hypothesis is that an immiscible phase that is denser than water was driven to the bottom of the unconfined aquifer by density and rested on top of the silty clay unit. A portion of the dense phase would then dissolve into the aqueous phase.

A plume is migrating toward the 300 Area from the inactive Horn Rapids Landfill, located to the southwest. The constituents with the highest concentrations in this plume include nitrate and trichloroethylene. Nitrate contamination is the result of offsite industrial and agricultural uses. Wastewater effluent containing ammonia was discharged to lagoons at Siemens Power Corporation. Effluent has apparently leaked to the underlying soils from the lagoons, and some of the ammonia reached groundwater. Under aerobic conditions, the ammonia degrades relatively quickly to nitrate, which is highly mobile in groundwater. In agricultural areas to the southwest, fertilizers containing nitrate are applied during the growing season. As irrigation is applied, the dissolved nitrate is carried downward through the soils and is taken up by crops in the root zone. However, some of the nitrate is carried downward below the root zone by irrigation recharge and reaches groundwater.

Trichlorothylene contamination is the result of offsite industrial solvent use at Siemens Power Corporation. Solvents were used during installation, cleaning, and repairing of lagoon liners over a 10-year period between 1978 and 1988. Excess solvents came into contact with the soils by spillage and were driven downward into the vadose zone and reached groundwater, which is very shallow in this area. On reaching groundwater, trichloroethylene is very mobile. One hypothesis has been suggested that natural attenuation may be reducing the mass of the trichloroethylene in groundwater. Natural attenuation in groundwater can occur by volatilization through passive pumping and biodegradation. Measurable trichloroethylene concentrations were observed in soil gas in the vicinity of the inactive Horn Rapids Landfill (Evans 1989).

8.3 Groundwater-Monitoring Network

Wells, constituents, and frequencies are listed in Appendix A. Well locations were shown in Figure 8.1. Geostatistical assessment and current knowledge of the site were used in developing the monitoring network. Geostatistical assessment was used only in developing the monitoring network for the primary constituents of concern (see Chapter 6.0).

The primary constituents of concern in the 300 and Richland North Areas are tritium and nitrate. Constituents of concern on a localized scale in the 300 and Richland North Areas include uranium and trichloroethylene, respectively. Special considerations in these areas include tracking the movement of the leading edges of the plumes that are near the City of Richland, monitoring effects of river-stage changes, and monitoring wells downgradient from potential offsite contaminant sources.

One objective is to monitor the extent of groundwater contamination in the 300 and Richland North Areas to ensure that contaminants have not migrated offsite and have not impacted wells in the City of Richland. This requires intensive monitoring near the leading edges of the plumes, in areas along the site boundary, and in areas where concentrations are low. Monitoring in areas where levels are low provides a baseline from which to determine concentration changes and, thus, early detection of offsite migration.

Another objective is to monitor the extent of plumes that have migrated onto the site from offsite sources. This monitoring is needed to show impacts to onsite groundwater and to show that groundwater contamination attributed to these plumes is not derived from onsite waste sites.

9.0 600 Area Non-Operational Monitoring Activities

9.1 Background

The 600 Area includes those parts of the Hanford Site not specifically included within the boundaries of the operational areas, though many of the 600 Area wells serve to monitor large contaminant plumes with their sources in the operational areas. The 600 Area also includes those areas east and north of the Columbia River, though no Hanford Site disposal facilities are located in that area.

This section largely addresses those parts of the 600 Area of the Hanford Site not included in the monitoring activities associated with the operational areas discussed in the other sections. These wells provide a basis for defining background groundwater chemistry. In addition, monitoring of chemistry and hydraulic head data is conducted within confined aquifers. Specifically, the region addressed in this section is that portion of the 600 Area west of the 200-West, east and north of the Columbia River, and several facilities not covered in other sections of this plan.

9.1.1 Waste Sites

The Central Landfill, 618-10 burial ground, and 316-4 crib are facilities located in the 600 Area that are not included in other sections of this plan and are discussed below. The Gable Mountain Pond was included in Chapter 6.0 because it was associated with 200-East Area operations.

Agricultural activities in the area west of the Hanford Site contribute nitrate to the western portion of the 600 Area. Similar impacts of agriculture are recognized in the 600 Area north and east of the Columbia River.

9.1.1.1 Central Landfill

The Central Landfill is located approximately 5.5 km southeast of the 200-East Area and consists of the Solid Waste Landfill and the Nonradioactive Dangerous Waste Landfill, which are currently considered separately under differing regulations (Table 9.1).

Table 9.1. Groundwater-Monitoring Plans for 600 Area Facilities

Facility	Plan
Solid Waste Landfill	Hodges (1993)
Nonradioactive Dangerous Waste Landfill	Hodges (1992)
618-10 burial ground	This plan
316-4 crib	This plan

9.1.1.2 618-10 Burial Ground and 316-4 Crib

The burial ground and adjacent crib are located southeast of the 400 Area. The burial ground operated from 1954 to 1963 and received a variety of low- to high-activity radioactive wastes, mostly composed of fission products with some plutonium-contaminated material (DOE 1996e). These wastes were disposed in caissons and trenches and may have included liquid and solid waste forms.

The crib began receiving uranium-bearing waste solutions in 1948 and continued to receive nitrate, hexone, and organic wastes periodically through at least 1962. This site was investigated as part of a CERCLA limited field investigation for the 300-FF-2 Operable Unit (DOE 1996e).

9.1.2 Groundwater-Monitoring Requirements and History

Monitoring of groundwater levels and contaminant concentrations in the 600 Area were initiated in the 1940s. Water-table maps of the unconfined aquifer have been prepared at various times since 1944. The primary monitoring objective is to obtain data needed to track major groundwater-contaminant plumes across the site as required by the *Atomic Energy Act of 1954* and its implementing orders. Additional wells were installed around the Central Landfill in 1986-1987 for RCRA and landfill monitoring.

9.2 Conceptual Model

Groundwater levels indicate that flow directions in the 600 Area west of the 200-West Area are generally from west to east. This reflects natural recharge and irrigation input into the upper Cold Creek and Dry Creek Valleys (Hartman and Dresel 1998, Section 3.6). Significant contamination is not present in this area, though nitrate is present in certain wells. It is inferred that irrigation is the primary source of nitrate in this area.

Movement of tritium and nitrate plumes and measurement of water levels provide a basis for inferring groundwater-flow directions in the 600 Area across the central and eastern portions of the Hanford Site. The tritium and nitrate plumes, which originate in the 200-East Area and pass beneath the Central Landfill, indicate that the principal direction of groundwater flow is toward the southeast.

The rate of groundwater flow beneath the landfill is estimated to be on the order of 1.2 to 1.8 m/d, based on site-specific hydrologic testing and the observed hydraulic gradients. However, groundwater-velocity estimates based on tritium and nitrate concentrations and tracer test results indicate groundwater-transport rates of 6 to >30 m/d. The lack of a detectable head difference in several well pairs located at the Central Landfill indicates that the vertical gradient within the upper portion of the aquifer is negligible.

The Central Landfill appears to have had little impact on Hanford Site groundwater, owing to minimal disposal of liquids at this facility. Associated groundwater monitoring consists primarily of measurement of RCRA indicator parameters (pH, specific conductance, total organic carbon, and total organic halides), though minor (below maximum contaminant level) contamination with chlorinated hydrocarbons exists. Localized contamination of groundwater with uranium and hydrocarbons exists in the vicinity of the 618-10 burial ground and 316-4 crib.

Monitoring of the chemistry and hydraulic head in the upper basalt-confined aquifer is also conducted at the Hanford Site. The primary objective of this activity is to determine if contamination is moving downward from the unconfined aquifer. In general, the hydraulic gradient appears to be directed downward over most of the central portion of the Hanford Site, though the gradient is directed upward in the eastern portion of the site.

Water-level elevations north and east of the Columbia River are much greater than on the Hanford Site. The water-table elevation to the east of the Columbia River is currently 50 to 150 m higher than on the Hanford Site. Groundwater flow in the unconfined aquifer system north and east of the Columbia River follows the bedrock structure and is toward the Columbia River. The water-table configuration in these areas largely reflects recharge from irrigation.

Steep hydraulic gradients are observed along the eastern bank of the Columbia River east of Gable Mountain in the area known as White Bluffs and also in the area east of the river and north of the 300 Area. These steep gradients represent a series of springs and seepage faces along the bluffs, where groundwater flow intersects the ground surface. Groundwater flow in these areas is controlled primarily by low-permeability zones (i.e., caliche) near the top of the bluffs and other low-permeability horizons in the upper Ringold Formation (Hartman and Dresel 1998, Section 3.9).

9.3 Monitoring Program

Except for the monitoring networks at the Central Landfill, the 618-10 burial ground, and the 316-4 crib, the 600 Area monitoring activities discussed are not directly related to specific Hanford Site facilities. Monitoring wells are maintained west of the 200-West Area and are sampled primarily for nitrate, which is probably related primarily to offsite agricultural activities. It is proposed that selected wells be identified, possibly west of the 200-West Area, that could be sampled on a routine basis for the purpose of more adequately establishing background groundwater chemistry for Hanford Site unconfined and confined aquifers.

There are six DOE wells located in the 600 Area north and east of the Columbia River, three of which have been used for contaminant-monitoring activities. Currently, monitoring of contaminant concentrations in this area is limited to well 699-42-E9B (shown in Figure 4.8). It is proposed that additional monitoring be undertaken in fiscal year 1999 in confined-aquifer units across the river from the 300 Area. The primary objective of this activity would be to ensure that contamination is not moving beneath the Columbia River and would include obtaining groundwater samples for analysis of tritium, chlorinated solvents (primarily trichloroethylene), nitrate, and uranium isotopes. Although no DOE wells are located in this area, other available wells will be evaluated for potential use for this purpose during fiscal year 1999.

Monitoring well locations for the Central Landfill are shown in Figure 9.1 (wells in the rest of the 600 Area were presented in Figure 4.8). Constituents monitored and sampling frequencies are presented in Appendix A.

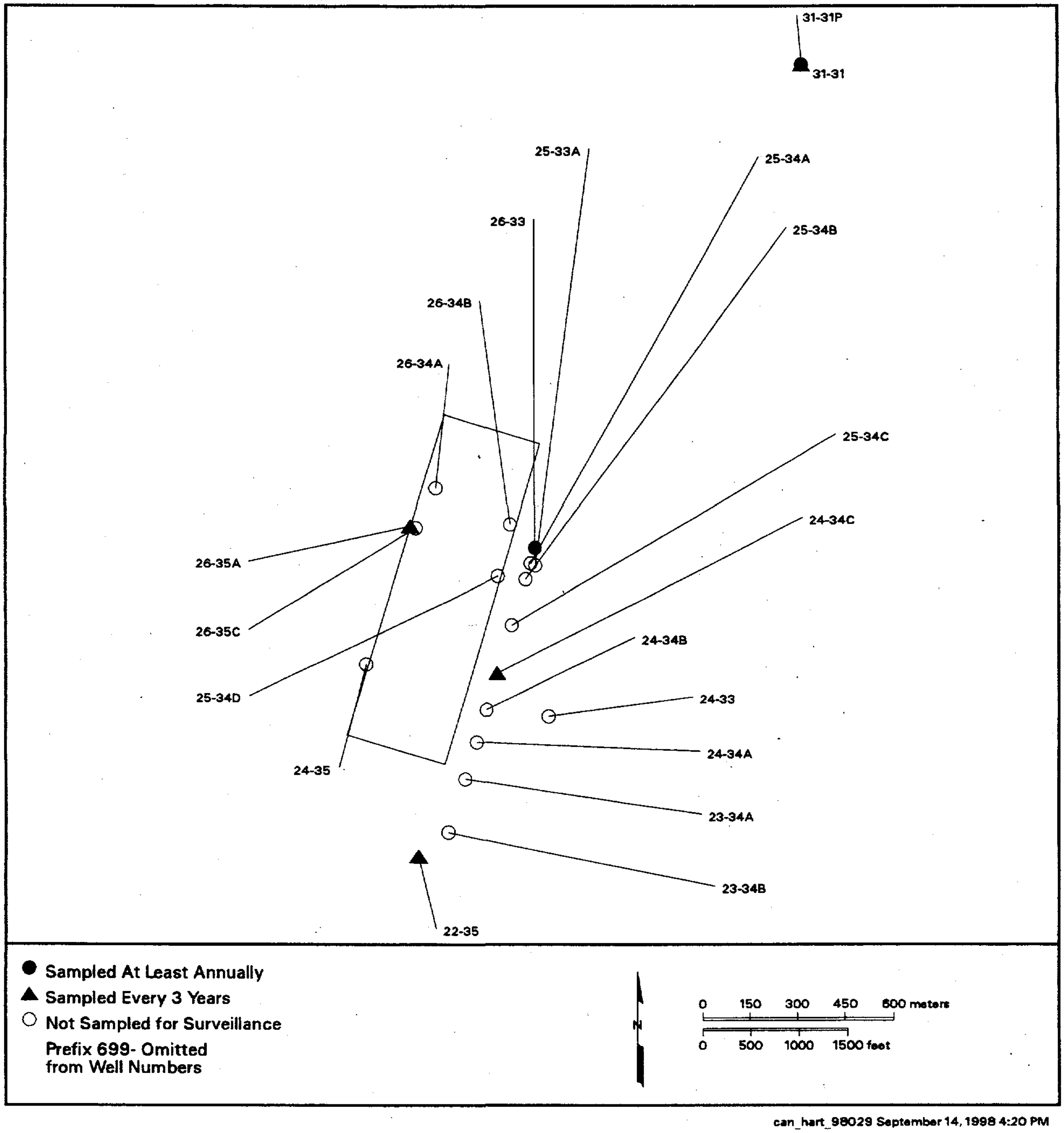

Figure 9.1. Groundwater Project Well Locations: Central Landfill Vicinity

10.0 Sampling and Analysis

10.1 Sampling

Employees and subcontractors of Pacific Northwest National Laboratory sample wells for the groundwater project. Samplers follow their company's documented procedures for sampling, recordkeeping, field measurements, and sample shipment, consistent with *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, 3rd Edition* (EPA 1986a). Water levels are measured, wells are purged of stagnant water, and samples are collected in prepared containers. Nearly all of the wells are equipped with pumps that are dedicated to a specific well. Most samples for metals are filtered in the field, and most other samples are unfiltered. Sample integrity is ensured through the use of chain-of-custody procedures.

10.2 Analytical Methods

Analytical methods used by the laboratories are described by Hartman and Dresel (1998, Appendix C). Methods for chemical analysis of groundwater samples conform to *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, 3rd Edition* (EPA 1986a); *Methods for Chemical Analysis of Water and Wastes* (EPA 1982), or other EPA methods; *Annual Book of ASTM Standards* (American Society for Testing and Materials 1986); and *Standard Methods for the Examination of Water and Wastewater, 17th Edition* (American Public Health Association 1989). The methods used for analysis of radiochemical constituents were developed by the analyzing laboratory and are recognized as acceptable within the technical radiochemical industry.

10.3 Quality Assurance and Quality Control

The quality assurance and quality control practices used by the groundwater project ensure the reliability and validity of field and laboratory measurements conducted to support these programs. The primary components used to assess data quality are accuracy, precision, and detection. Representativeness, completeness, and comparability may also be used. These parameters are evaluated through laboratory quality control checks (e.g., matrix spikes, laboratory blanks), replicate sampling and analysis, analysis of blind samples and blanks, and interlaboratory comparisons. Acceptance criteria have been established for each of these parameters. When a parameter is outside the criteria, corrective actions are taken to prevent a future occurrence. Quality control practices for the groundwater project are described in Hartman and Dresel (1998, Appendix D).

Data are reviewed quarterly according to a Pacific Northwest National Laboratory procedure to ensure they are complete and representative. The review includes verification of the data in the Hanford Environmental Information System (HEIS) database, evaluation of data from field quality control samples (e.g., blanks, duplicates) and laboratory quality control samples, and a technical review by a scientist familiar with the hydrogeology of a particular location of the site. If the data review identifies suspect data, they are investigated to establish whether they reflect true conditions or an error, according to Pacific Northwest National Laboratory's "request for data review" procedure. Groundwater data associated with out-of-range quality control data or identified as suspect during the technical review are flagged in the database.

11.0 Water-Level Monitoring

Water levels in the groundwater system are monitored on the Hanford Site primarily to help determine the direction and velocity of groundwater flow. This information is used to interpret observed contaminant plume movements and to predict future plume movements. Other uses of water-level information include the identification of recharge and discharge areas, assessing the interaction between groundwater and surfacewater bodies, assessing the interaction between aquifers or hydrogeologic units, calibration of groundwater-flow models, and assessing the impact of liquid effluent-disposal practices on groundwater flow. This chapter provides an overview of water-level monitoring on and adjacent to the Hanford Site. A separate, more detailed, water-level monitoring plan is scheduled to be prepared during fiscal year 1999.

11.1 Monitoring Network

The network of wells across the site is monitored in a single month to provide data 1) for a water-table map of the unconfined aquifer for the entire site and adjacent offsite areas, 2) for a map showing how the water table changed over the preceding year (and thus, how the water table responded to transient changes in natural and artificial recharge), 3) for a saturated thickness map of the unconfined aquifer, 4) for a potentiometric surface map of the upper basalt-confined aquifer system, and 5) to provide information on the vertical flow component within the unconfined aquifer. In addition, smaller networks of wells are measured for other purposes (e.g., RCRA, CERCLA) at various frequencies (i.e., monthly, quarterly). All wells currently measured by the groundwater project are listed in Appendix B.

Wells used to measure water levels for the water-table map were selected using the following criteria:

- open interval does not extend more than 10 m below the water table
- well location and elevation are accurately known.

Exceptions were made where no alternative wells exist and vertical gradients are small relative to horizontal gradients. In some areas where there are many wells, a subset of wells that met these criteria were selected. Additional wells in the unconfined aquifer that monitor perched, semiconfined, or confined conditions are also measured. Well clusters where shallow and deep completed wells occur together are also monitored to determine vertical gradients. Water levels are also measured in wells completed in the upper basalt-confined aquifer system (Rattlesnake Ridge interbed, Elephant Mountain interflow contact, and Levey interbed) and are used to prepare a potentiometric surface map.

11.2 Monitoring Frequency

It is desired that the annual water-table map be representative of the annual-average flow conditions in the unconfined aquifer. Wells monitored for the site water-table map are measured once per year. In the past, this has been done during June, which is typically a time of high stage in the Columbia River. This resulted in maps that reflected transient conditions near the river, with a higher-than-average water table and often a reversed gradient (i.e., potential for water flow from the river into the aquifer). Continuous water-level measurements recorded in the unconfined aquifer adjacent to the river will be evaluated, and the average-annual flow condition in the aquifer determined. Then, the month that is most representative of this average condition will be selected for the annual measurements (assuming that the month chosen does not typically exhibit severe weather that would interfere with the taking of field measurements).

In addition to water levels measured annually, water levels are measured more frequently (i.e., monthly, quarterly, semiannually) and at more closely spaced wells in the vicinity of the Hanford Site operational facilities, groundwater remediation projects, and the Richland North Area. Continuous measurements are also made at some locations where water levels change rapidly.

11.3 Procedures

Procedures for measuring water levels were developed in accordance with the techniques described by the American Society for Testing and Materials (1988), the U.S. Environmental Protection Agency (1986b), Garber and Koopman (1968), and U.S. Geological Survey (1977). Water levels are measured with steel tapes or laminated steel electric sounding tapes that are standardized by comparison to a calibrated steel tape.

A few wells completed in the upper basalt-confined aquifer are under flowing artesian conditions; where the potentiometric surface is above the top of the well or piezometer. For these wells, which are pressure sealed from the atmosphere, a pressure gauge or transducer is used to measure the equivalent head above the top of the surveyed elevation.

Pressure transducers and data loggers are used to measure and record the heads in a few wells where water levels change rapidly (e.g., near the Columbia River and near groundwater-extraction or -injection wells). Pressure transducers and data loggers are also used to measure river stage to provide spatial and temporal control as it relates to groundwater levels near the river. River-stage-monitoring stations, which support CERCLA monitoring activities, are located at the 100-B, 100-F, 100-H, 100-N, and 300 Areas. The data logger systems generally record pressure head at 1-h intervals. The transducer networks are not included in Appendix B because they are maintained by the environmental restoration contractor, not the groundwater project.

12.0 Data Evaluation

12.1 Data Management

Results of groundwater sampling and analysis are made accessible in the HEIS database. Analytical results from all Hanford Site groundwater-monitoring activities are stored in this common database, with the exception of some data collected for limited special projects that may not be directly comparable to standard data. The data are made available to federal and state regulators for retrieval.

The HEIS programmers and HEIS data owners, including the groundwater project, ensure database integrity and data consistency through membership in the onsite HEIS configuration control board and other ad hoc groups. The majority of data are loaded into the database from electronic files provided by the analytical laboratories. This minimizes data-entry errors and reduces the cost of data management.

As discussed in Section 10.3, a data validation and verification process results in flags and qualifiers based on quality control data and a technical review by a scientist. These flags are stored with the data in HEIS.

12.2 Compliance Issues and Data Evaluation

Data collected for the groundwater project are used to comply with a variety of requirements, including the *Atomic Energy Act of 1954* (and associated DOE Orders), RCRA, CERCLA, and WAC permits. To comply with these requirements, data are compared with standards and subjected to statistical evaluations, as appropriate. The requirements and evaluation methods are listed in Table 12.1.

12.3 Reporting

Results of Hanford Site groundwater activities are reported annually (e.g., Hartman and Dresel 1998). That report presents contaminant-distribution maps, water-level maps, and concentration trend plots of contaminants and wells of interest; and meets the annual reporting requirements of RCRA and DOE Orders. CERCLA activities, including groundwater remediation and monitoring, are summarized.

Quarterly letter reports of RCRA data availability are submitted to the State of Washington Department of Ecology. Data from RCRA networks and the entire groundwater project are available on the HEIS database to the regulators.

Table 12.1. Compliance Issues and Methods of Evaluation

Requirement	Evaluation
DOE Order 5400.1	Compare groundwater concentrations to drinking water standards, derived concentration guides, and historical trends. Produce maps of contaminant distribution.
RCRA interim-status units	Indicator evaluation - Compare average downgradient concentrations of indicator parameters to background critical mean values. Assessment - Evaluate rate and extent of contamination (methods described in site-specific monitoring plans).
RCRA final-status units	Detection - Compare downgradient concentrations of contaminants of interest to baseline concentrations. Compliance - Compare downgradient concentrations to background, maximum concentration limits, or alternate concentration limits (methods described in site-specific monitoring plans and site permit). Corrective action - Track progress of cleanup and compare downgradient concentrations of constituents to background, maximum concentration limits, or alternate concentration limits (methods described in site-specific monitoring plans and site permit).
WAC-permitted units (216 permits)	Compare to conditions of permit.
CERCLA operable units	Compare concentrations to levels defined in RODs.
Performance assessment monitoring	Compare concentrations to levels defined in RODs.

Certain conditions require reporting to DOE as unusual occurrences or off-normal events (DOE Order 232.1-1A). Those applicable to groundwater-monitoring results include the following:

- general environmental monitoring where data are greater than historical data or than expected of normal operations (off-normal occurrence)

- discovery of groundwater contamination resulting from DOE operations not part of an existing plume previously identified in either an annual report or in any CERCLA/RCRA activity or report (unusual occurrence).

Reporting requirements for WAC-permitted facilities are described in their permits.

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Appendix A

Sampling Matrix for Hanford Groundwater Monitoring Project

Appendix A

Sampling Matrix for Hanford Groundwater Monitoring Project

This appendix contains the integrated sampling and analysis matrix for the Hanford Groundwater Monitoring Project. The matrix was designed for use in fiscal year 1999, but also includes wells that will be sampled every 2 or 3 years (as discussed in Section 3.3 of the main text). The matrix includes well names, seeps, sampling frequency, and constituents to be monitored. Additional details, such as schedule, analytical methods, etc., reside in a project database.

The following is a description of the columns in the matrix.

WELL: Wells are listed numerically by digit; e.g., "1199" precedes "199" and "699-29-4" precedes "699-3-45." Wells with a 199- prefix are in reactor areas, 299- in 200 Areas, 399- in 300 Area, 499- in 400 Area, 699- in 600-Area, and 1199- in 1100 Area. For 699-xx-yy wells, xx and yy designate Hanford north and west coordinates in thousands of feet from an origin in the southern part of the site. Multiple listings indicate that a well is used for more than one monitoring requirement and data are shared among users. Seeps (shoreline springs), which are monitored in the reactor areas for the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, are designated with the prefixes SB, SK, etc.

Most of the wells monitor the uppermost aquifer. Wells that monitor deeper units are noted in the OTHER/COMMENTS field. However, these designations are incomplete.

PROG (program): This column indicates the requirements the well is being sampled for. The following gives the full spellouts:

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DOH = State of Washington Department of Health
FFTF = Fast Flux Test Facility (400 Area process ponds)
LTMC = Long-term monitoring, CERCLA (B,C, and F operable units)
RCRA = Resource Conservation and Recovery Act of 1976
SURV = sitewide surveillance (plume and trend tracking).

PROJ (project): This column gives the subsets of the programs listed above.

Project Designation	Explanation
100B	100-B,C Area
100BC5	100-BC-5 Operable Unit
100D	100-D Area
100F	100-F Area

Project Designation	Explanation
100FR3	100-FR-3 Operable Unit
100H	100-H Area
100HR3IAM(1) or (2)	100-HR-3 interim action monitoring
100K	100-K Area
100KR4IAM(1) or (2)	100-KR-4 interim action monitoring
100N	100-N Area
100NR2IAM(1) or (2)	100-NR-2 interim action monitoring
1301N	1301-N liquid waste-disposal facility
1324N	1324-N surface impoundment and 1324-NA percolation pond
1325N	1325-N liquid waste-disposal facility
183H	183-H solar evaporation basins
200E	200-East Area
200UP1IAM	200-UP-1 interim action monitoring
200W	200-West Area
200ZP1IAM	200-ZP-1 interim action monitoring
222-S	222-S Building
300	300 Area
300-APT	300 Area process trenches (316-5)
300FF5	300-FF-5 Operable Unit
3D	Three-dimensional characterization (deeper well completion)
400	400 Area
600	600 Area
618-10	618-10 burial grounds
A-29	216-A-29 ditch
B-62	216-B-62 trench
B-63	216-B-63 trench
B-PLT	B Plant
BPOND	216-B-3 pond
CITY	City of Richland
ERDF	Environmental Restoration Disposal Facility
HRLF	Horn Rapids Landfill
K-Basins	100-K fuel-storage basins
LERF	Liquid effluent retention facility
LLBG(1)	Low-level burial grounds, waste management area 1
LLBG(2)	Low-level burial grounds, waste management area 2
LLBG(3)	Low-level burial grounds, waste management area 3
LLBG(4)	Low-level burial grounds, waste management area 4
NRDW	Nonradioactive Dangerous Waste Landfill

Project Designation	Explanation
PUREX	Plutonium-Uranium Extraction Plant waste facilities
REDOX	Reduction-oxidation project
River	Wells monitoring potential contamination near Columbia River (see Chapter 6.0 in the main text)
S-10	216-S-10 pond and ditch
SST(A)	Single-shell tanks, waste management area A-AX
SST(B)	Single-shell tanks, waste management area B-BX-BY
SST(C)	Single-shell tanks, waste management area C
SST(S) or (SX)	Single-shell tanks, waste management area S-SX
SST(T)	Single-shell tanks, waste management area T
SST(TX/TY)	Single-shell tanks, waste management area TX-TY
SST(U)	Single-shell tanks, waste management area U
SWL	Solid Waste Landfill
Transect	Wells monitoring potential contamination out of 200 Areas (see Chapter 6.0 in the main text)
U-1/2	216-U-1 and 216-U-2 cribs
U-12	216-U-12 crib
U-14	216-U-14 ditch
U-PLT	U Plant

FREQ (sampling frequency): The following are the definitions for this column

2-xx, 3-xx = sampled every 2 or 3 years, beginning in fiscal year 1999 (-99), 2000 (-00), or 2001 (-01)
A = annually
M = monthly
Q = quarterly
SA = semiannually (twice each year).

Records with more than one frequency are sampled for different constituents at different frequencies (e.g., "A/SA" is sampled semiannually for each constituent with a "2" in its column; annually for each constituent with a "1" in its column). The designation "1X4" indicates the number of replicates collected (in this case, four replicates are collected once per year).

The next 15 columns give the most commonly analyzed constituents. Some constituents may be analyzed by several methods; however, those details are not specified in this plan and are included in the project database. The following is the full spellout of the constituents analyzed for

ALKA = alkalinity
ANIO = anions

ICP	=	metals by the inductively coupled-plasma method
VOA	=	volatile organic constituents
PHEN	=	phenols
TOC	=	total organic carbon
TOX	=	total organic halides
ALPH	=	gross alpha
BETA	=	gross beta
GAM	=	gamma scan
TRIT	=	tritium
I129	=	iodine-129
SR90	=	strontium-90 (or strontium-89 and -90)
TC99	=	technetium-99
URAN	=	total uranium.

Numbers in the constituent columns indicate the number of samples planned for the sample year (also see note under sampling frequency). Unfiltered and filtered samples for ICP metals are denoted U and F, respectively. "fld" denotes field analysis.

OTHER/COMMENTS: Metals are listed by their standard abbreviations, followed by "F" if filtered. Additional constituents are abbreviated as follows:

Amm	=	ammonium
C14	=	carbon-14
COD	=	chemical oxygen demand
CN	=	cyanide
col	=	coliform bacteria
Cr6	=	hexavalent chromium
DO	=	dissolved oxygen
O/G	=	oil and grease
Pu-iso	=	isotopic plutonium
REDOX	=	oxidation/reduction potential
TDS	=	total dissolved solids
TPH	=	total petroleum hydrocarbons
U-iso	=	isotopic uranium.

NOTES:

Wells 699-35-66A, 699-36-67, 699-36-70A, and 699-37-68 CERCLA ERDF additional constituents: filtered and unfiltered trace metals (As, Ba, Cr, Pb, Sn, V, Zn, Se), C14, NO2/NO3, radium, TDS.

Well 299-W22-79 RCRA U-12 additional constituents: A: AsF, HgF, PbF, SeF, TlF, CN, Col, semivolatile organic constituents, dioxins and dibenzofurans, herbicides, pesticides, organophosphates, polychlorinated biphenyls, radium, sulfate. Q: TDS.

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
1199-39-15	SURV	CITY	A		1									1					
1199-39-16D	SURV	CITY	A		1		1				1	1		1				1	
1199-39-16E	SURV	CITY	A		1									1					
1199-40-16B	SURV	CITY	A		1									1					
199-B2-12	LTMC	100BC5	A		1	U/F					1	1		1		1			
199-B2-12	SURV	100B	3-99	1	1	F								1					
199-B2-13	SURV	100B	A	1	1	F								1					
199-B3-1	LTMC	100BC5	A/Q		1	U/F					1	1		1		4			
199-B3-46	LTMC	100BC5	A/Q		1	U/F					1	1		1		4			
199-B3-46	SURV	100B	A	1	1	F								1		1			
199-B3-47	LTMC	100BC5	A/Q		1	U/F					1	1		1		4			Q: Cr6
199-B3-47	SURV	100B	A	1	1	F								1		1			
199-B4-1	LTMC	100BC5	2-99		1	U/F					1	1		1		1			
199-B4-4	LTMC	100BC5	2-00		1	U/F					1	1		1		1			
199-B4-5	LTMC	100BC5	2-00	1	1	U/F					1	1		1		1			
199-B4-5	SURV	100B	A													1			
199-B4-7	LTMC	100BC5	2-00		1	U/F					1	1		1		1			
199-B4-9	SURV	100B	A	1	1	F								1		1			
199-B5-1	LTMC	100BC5	A/Q		1	U/F					1	1		1		1			Q: Cr6
199-B5-1	SURV	100B	A	1	1	F								1					
199-B5-2	LTMC	100BC5	A		1	U/F					1	1		1		1			
199-B5-2	SURV	100B	A	1	1	F								1		1			
199-B8-6	LTMC	100BC5	2-00		1	U/F					1	1		1		1			
199-B8-6	SURV	100B	A	1	1	F								1					
199-B9-1	LTMC	100BC5	2-99		1	U/F					1	1		1		1			
199-B9-2	LTMC	100BC5	2-00		1	U/F					1	1		1		1			
199-B9-2	SURV	100B	A	1	1	F	1							1					
199-B9-3	LTMC	100BC5	2-99		1	U/F					1	1		1		1			
199-D2-6	CERCLA	100HR3IAM(2)	SA		2	2U/2F					2	2		2		2			
199-D2-6	SURV	100D	A	1	1	F								1					
199-D3-2	CERCLA	100HR3IAM(2)	Q		4	4U/4F					4	4		4		4			Cr6
199-D3-2	SURV	100D	A	1	1	F								1					
199-D4-1	CERCLA	100HR3IAM(2)	Q		4	4U/4F					4	4		4		4			Cr6. Redox influence
199-D4-1	SURV	100D	A	1	1	F								1					Redox influence
199-D4-13	CERCLA	100HR3IAM(2)	Q		4	4U/4F					4	4		4		4			Cr6. Redox influence
199-D4-13	SURV	100D	A	1	1	F													Redox influence
199-D4-14	CERCLA	100HR3IAM(2)	Q		4	4U/4F					4	4		4		4			Cr6. Redox influence
199-D4-14	SURV	100D	A	1	1	F													Redox influence

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-D4-15	CERCLA	100HR3IAM(2)	Q		4	4U/4F					4	4		4		4			Cr6
199-D4-15	SURV	100D	A	1	1	F													
199-D4-4	SURV	REDOX	SA/Q	2	2	2F													Q:Eh, DO, Cr6, Cr6F. Redox influence
199-D4-5	SURV	REDOX	SA/Q	2	2	2F													Q:Eh, DO, Cr6, Cr6F. Redox influence
199-D4-6	SURV	REDOX	SA/Q	2	2	2F													Q:Eh, DO, Cr6, Cr6F. Redox influence
199-D4-7	SURV	REDOX	SA/Q	2	2	2F													Q:Eh, DO, Cr6, Cr6F. Redox influence
199-D5-12	CERCLA	100HR3IAM(2)	A/Q		1	U/F					1	1				4			
199-D5-12	SURV	100D	A	1	1	F								1		U/F			
199-D5-13	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
199-D5-13	RCRA	100D	A/SA	2	2	2F		1	2X4	2X4									SA: HgF
199-D5-13	SURV	100D	A	1	1	F								1					
199-D5-14	CERCLA	100HR3IAM(2)	A/Q		1	U/F					1	1				1			Q: Cr6. Former extraction well.
199-D5-14	SURV	100D	A	1	1	F													Former extraction well.
199-D5-15	CERCLA	100HR3IAM(2)	A/Q		1	U/F					1	1				1			Q: Cr6. Former extraction well.
199-D5-16	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			Former extraction well.
199-D5-16	SURV	100D	A											1					Former extraction well.
199-D5-17	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
199-D5-17	SURV	100D	A	1	1	F								1					
199-D5-19	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			Former injection well.
199-D5-20	CERCLA	100HR3IAM(2)	A/Q		1	U/F					1	1				1			Q: Cr6
199-D8-4	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
199-D8-4	RCRA	100D	A/SA	2	2	2F		1	2X4	2X4									SA: HgF
199-D8-5	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
199-D8-5	RCRA	100D	A/SA	2	2	2F		1	2X4	2X4									SA: HgF
199-D8-54B	CERCLA	100HR3IAM(1)	A/SA		1	U/F					1	1				1			SA: Cr6. Confined Ringold.
199-D8-54B	SURV	3D	3-99	1	1	F								1					Confined Ringold
199-D8-55	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
199-D8-6	RCRA	100D	A/SA	2	2	2F		1	2X4	2X4									SA: HgF
199-D8-6	SURV	100D	A	1	1	F													
199-D8-68	CERCLA	100HR3IAM(1)	A/M											1		1			M: Cr6
199-D8-69	CERCLA	100HR3IAM(1)	A/M											1		1			M: Cr6
199-D8-70	CERCLA	100HR3IAM(1)	A/M											1X3		1X3			MX3: Cr6. 3 intervals.
199-D8-70	SURV	100D	A	1	1	F													
199-D8-71	CERCLA	100HR3IAM(1)	SA																Cr6
199-D8-71	SURV	100D	A	1	1	F								1					
199-F1-2	LTMC	100FR3	A		1	U/F	1				1	1		1		1			
199-F5-1	DOH	100F	A		1						1	1	1	1	1		1		U-iso
199-F5-1	LTMC	100FR3	A/Q	1	1	U/F	1				1	1		1		4			

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-F5-1	SURV	100F	A	1	1	F					1	1	1	1	1	1	1	1	
199-F5-3	LTMC	100FR3	A/Q	1	1	U/F	1				1	1		1		4			
199-F5-3	SURV	100F	A	1	1	F										1			
199-F5-4	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
199-F5-42	LTMC	100FR3	A		1	U/F	1				1	1		1		1			
199-F5-42	SURV	100F	A													1			
199-F5-43A	LTMC	100FR3	A	1	1	U/F	1				1	1		1		1			
199-F5-43B	LTMC	100FR3	A	1	1	U/F	1				1	1		1		1			deep
199-F5-44	LTMC	100FR3	A		1	U/F	1				1	1		1		1			
199-F5-45	LTMC	100FR3	2-99/Q		4	U/F	1				1	1		1		1			
199-F5-45	SURV	100F	A	1	1	F	1							1		1			
199-F5-46	LTMC	100FR3	A/Q		1	U/F	1				1	1		1		1			Q: Cr6
199-F5-46	SURV	100F	A	1	1	F								1		1			
199-F5-47	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
199-F5-47	SURV	100F	A	1	1	F								1		U/F			
199-F5-48	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
199-F5-48	SURV	100F	A													1		1	
199-F5-6	LTMC	100FR3	A		1	U/F	1				1	1		1		1			
199-F5-6	SURV	100F	A	1	1	F								1		U/F			
199-F6-1	LTMC	100FR3	A		1	U/F	1				1	1		1		1			
199-F7-1	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
199-F7-1	SURV	100F	A	1	1	F	1												
199-F7-2	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
199-F7-2	SURV	100F	A	1	1	F	1							1					
199-F7-3	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
199-F7-3	SURV	100F	A	1	1	F	1							1					
~~199-F8-1~~	~~LTMC~~	~~100FR3~~	~~2-99~~		~~1~~	~~U/F~~	~~1~~				~~1~~	~~1~~		~~1~~		~~1~~			decommissioned
199-F8-2	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
199-F8-2	SURV	100F	A															1	
199-F8-3	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
199-F8-3	SURV	100F	SA											2				2	
199-F8-4	LTMC	100FR3	A		1	U/F	1				1	1		1		1			C14
199-F8-4	SURV	100F	A	1	1	F								1				1	
199-H3-2A	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					Extraction well.
199-H3-2A	SURV	100H	A	1	1	F								1					Extraction well.
199-H3-2C	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					
199-H3-2C	SURV	100H	A	1	1	F								1					
199-H4-10	CERCLA	100HR3IAM(1)	A/SA		1	U/F					1	1		1					SA: Cr6

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-H4-12A	RCRA	183H	A	1	1	F											1	1	Extraction well.
199-H4-12B	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-12C	CERCLA	100HR3IAM(1)	A/SA		1	U/F					1	1		1					SA: Cr6. Confined Ringold.
199-H4-12C	RCRA	183H	A	1	1	F											1	1	Confined Ringold.
199-H4-13	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H4-14	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-14	SURV	100H	A	1	1	F													
199-H4-15B	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-15CP	SURV	3D	3-00	1	1	F								1			1	1	Basalt-confined.
199-H4-15CQ	SURV	3D	3-99	1	1	F													Confined Ringold.
199-H4-15CR	SURV	3D	3-99	1	1	F													Confined Ringold.
199-H4-15CS	CERCLA	100HR3IAM(1)	SA																Cr6. Confined Ringold.
199-H4-15CS	SURV	3D	3-99	1	1	F								1			1	1	Confined Ringold.
199-H4-16	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-17	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-18	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H4-18	SURV	100H	SA	2	2	2F								2			2	2	
199-H4-2	SURV	3D	3-00	1	1	F										1			Basalt-confined.
199-H4-3	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H4-3	RCRA	183H	A	1	1	F											1	1	
199-H4-3	SURV	100H	A	1	1	F											1	1	
199-H4-4	CERCLA	100HR3IAM(1)	A/M		1	U/F					1	1		1		1	1	1	M: Cr6
199-H4-4	DOH	100H	A		1						1	1	1	1	1		1		U-iso
199-H4-4	SURV	100H	SA	2	2	2F					2	2	2	2	2		2	2	
199-H4-45	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H4-45	SURV	100H	A	1	1	F										1			
199-H4-46	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-46	SURV	100H	A	1	1	F													
199-H4-47	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					
199-H4-47	SURV	100H	A	1	1	F								1		1			
199-H4-48	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H4-48	SURV	100H	A	1	1	F													
199-H4-49	CERCLA	100HR3IAM(2)	A/SA		1	U/F					1	1		1		1	1	1	SA: Cr6
199-H4-5	CERCLA	100HR3IAM(1)	A/M		1	U/F					1	1		1					M: Cr6
199-H4-6	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-63	CERCLA	100HR3IAM(1)	A/M		1									1		1	1	1	M: Cr6
199-H4-63	SURV	100H	A	1	1	F										1			
199-H4-64	CERCLA	100HR3IAM(1)	A/M		1									1		1	1	1	M: Cr6

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-H4-7	RCRA	183H	A	1	1	F											1	1	Extraction well.
199-H4-7	SURV	100H	A	1	1	F										U/F	U/F	U/F	Extraction well.
199-H4-8	CERCLA	100HR3IAM(1)	SA																Cr6
199-H4-9	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					
199-H5-1A	CERCLA	100HR3IAM(1)	A/SA		1	U/F					1	1		1					SA: Cr6
199-H5-1A	SURV	100H	A	1	1	F													
199-H6-1	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					
199-H6-1	SURV	100H	A	1	1	F										1			
199-K-106A	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	4					A: C14
199-K-106A	SURV	K-BASINS	A/Q/M	1	4	F	1				4	4		12					A:C14
199-K-107A	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	1					Q: Cr6
199-K-107A	SURV	K-BASINS	A/Q	1	4	F	1				4	4		4		1			A:C14
199-K-108A	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	1					A: C14. Q: Cr6
199-K-108A	SURV	K-BASINS	A/Q	1	4	F	1				4	4		4					A:C14
199-K-109A	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	1		4			
199-K-109A	DOH	100K	A		1						1	1	1	1	1	1			C14, U-iso
199-K-109A	SURV	K-BASINS	A/Q/M	1	4	F					4	12		12		4			A:C14
199-K-11	SURV	100K	A	1	1	F								1		1			
199-K-110A	SURV	K-BASINS	A/Q	1	4	F					4	4		4		4			A:C14
199-K-110A	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					
199-K-111A	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					C14
199-K-111A	SURV	100K	A	1	1	F								1		1			C14
199-K-112A	CERCLA	100KR4IAM(1)	A/M											1		1			M: Cr6
199-K-112A	SURV	100K	A	1	1	F													
199-K-114A	CERCLA	100KR4IAM(1)	A/M											1		1			M: Cr6
199-K-114A	SURV	100K	A													1			
199-K-117A	CERCLA	100KR4IAM(1)	A/M											1		1			MX4: Cr6
199-K-117A	SURV	100K	A	1	1	F										1			
199-K-18	CERCLA	100KR4IAM(1)	A/M		1	U/F					1	1	1	1		1			M: Cr6
199-K-18	SURV	100K	A	1	1	F								1					
199-K-19	CERCLA	100KR4IAM(1)	A/SA		1	U/F					1	1	1	1					SA: Cr6
199-K-20	CERCLA	100KR4IAM(1)	A/M		1	U/F					1	1	1	1		1			M: Cr6
199-K-21	CERCLA	100KR4IAM(2)	A/SA		1	U/F					1	1	1	1					SA: Cr6
199-K-21	SURV	100K	A													1			
199-K-22	CERCLA	100KR4IAM(2)	A/SA		1	U/F					1	1	1	1					SA: Cr6
199-K-22	SURV	100K	A	1	1	F								1		1			
199-K-23	SURV	100K	A	1	1	F										1			C14
199-K-27	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	4					

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-K-27	DOH	100K	A/SA		2						2	2	2	2	1	2	1		SA: U-iso. A: C14, Pu-iso
199-K-27	SURV	K-BASINS	A/Q/M	1	4	F					4	4		12		1			A:C14
199-K-28	SURV	K-BASINS	A/Q	1	4	F					4	4		4		1			A:C14
199-K-29	SURV	K-BASINS	A/Q	1	4	F					4	4		4					A:C14
199-K-30	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	4					A:C14
199-K-30	SURV	K-BASINS	A/Q/M	1	4	F					4	4		12					A:C14
199-K-31	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					
199-K-32A	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					C14
199-K-32A	SURV	K-BASINS	A/Q	1	4	F					4	4		4		1			A:C14
199-K-32B	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					Confined Ringold.
199-K-32B	SURV	3D	3-99	1	1	F								1					Confined Ringold.
199-K-33	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					C14
199-K-33	SURV	100K	A	1	1	F	1							1		1			C14
199-K-34	SURV	K-BASINS	A/Q	1	4	F					4	4		4		1			C14
199-K-36	CERCLA	100KR4IAM(2)	A/Q		1	U/F					1	1	1	1					A: Hg/HgF. Q: Cr6
199-K-36	SURV	100K	A	1	1	F								1					
199-K-37	CERCLA	100KR4IAM(2)	A/SA		1	U/F					1	1	1	1					SA: Cr6
199-N-105A	RCRA	1301N	A/SA	1	1	F			2	2									Extraction well.
199-N-14	CERCLA	100NR2IAM(1)	SA		2	2F						2		2		2			
199-N-14	DOH	100N	A/SA		2						2	2	2	2	1	2	2		
199-N-14	SURV	100N	SA	2	2	2F								2		2			
199-N-16	CERCLA	100NR2IAM(1)	A		1	F						1				1			O/G, TPH
199-N-16	SURV	100N	A	1	1	F													
199-N-16	RCRA	1324N	SA	2	2	2F													
199-N-17	CERCLA	100NR2IAM(1)	A																O/G, TPH
199-N-18	CERCLA	100NR2IAM(1)	A																O/G, TPH
199-N-18	SURV	100N	A	1	1	F								1		1			O/G, TPH
199-N-19	SURV	100N	A	1	1	F										1			
199-N-19	RCRA	1324N	SA	2	2	2F													
199-N-2	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-2	RCRA	1301N	A/SA	1	1	F			2	2									
199-N-21	CERCLA	100NR2IAM(1)	A		1	F													
199-N-26	SURV	100N	A	1	1	F													
199-N-26	RCRA	1324N	SA	2	2	2F													
199-N-27	CERCLA	100NR2IAM(1)	A		1	F					1		1	1					
199-N-28	RCRA	1325N	A/SA	1	1	F			2	2									
199-N-28	SURV	100N	A	1	1	F								1		1			
199-N-3	CERCLA	100NR2IAM(1)	SA		2	2F						2		2		2			

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-N-3	RCRA	1301N	A/SA	1	1	F			2	2									
199-N-3	SURV	100N	A	1	1	F								1		1			
199-N-3	RCRA	1324N	SA	2	2	2F													
199-N-32	CERCLA	100NR2IAM(1)	SA		2	2F						2	2	2		2			
199-N-32	RCRA	1325N	A/SA	1	1	F			2	2									
199-N-32	SURV	100N	A	1	1	F								1		1			
199-N-33	SURV	100N	A	1	1	F								1		1			
199-N-34	RCRA	1301N	A/SA	1	1	F			2	2									
199-N-34	SURV	100N	A	1	1	F								1		1			
199-N-41	RCRA	1325N	A/SA	1	1	F			2	2									
199-N-41	SURV	100N	A													1			
199-N-46	SURV	100N	SA											2		2			
199-N-47	SURV	100N	A	1	1	F													
199-N-5	SURV	100N	A											1		1			
199-N-50	CERCLA	100NR2IAM(1)	A									1		1					
199-N-50	SURV	100N	A											1					
199-N-51	CERCLA	100NR2IAM(1)	A									1		1					
199-N-51	SURV	100N	A											1		1			
199-N-52	SURV	100N	A	1	1	F								1		1			
199-N-54	CERCLA	100NR2IAM(1)	SA		2	2F						2	2			2			O/G, TPH
199-N-57	RCRA	1301N	A/SA	1	1	F			2	2									
199-N-57	SURV	100N	A	1	1	F										1			
199-N-59	SURV	100N	A	1	1	F	1		2	2									
199-N-59	RCRA	1324N	SA	2	2	2F			2	2									
199-N-64	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-64	SURV	100N	A	1	1	F								1		1			
199-N-67	CERCLA	100NR2IAM(1)	SA		2	2F					2	2				2			
199-N-67	SURV	100N	A	1	1	F								1		U/F			
199-N-69	SURV	3D	A											1		1			Bottom uppermost aquifer.
199-N-70	CERCLA	100NR2IAM(1)	A		1	F					1	1	1	1		1			Bottom uppermost aquifer.
199-N-71	RCRA	1324N	SA	2	2	2F			2	2									
199-N-72	RCRA	1324N	SA	2	2	2F			2	2									
199-N-73	RCRA	1324N	S/A	2	2	2F			2	2									
199-N-73	SURV	100N	A	1	1	F													
199-N-74	CERCLA	100NR2IAM(1)	A			F					1	1	1						
199-N-74	RCRA	1325N	A/SA	1	1	F			2	2									
199-N-74	SURV	100N	3-99	1	1	F								1					
199-N-75	CERCLA	100NR2IAM(1)	SA		2	2F						2		2		2			Extraction well.

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
199-N-76	CERCLA	100NR2IAM(1)	SA		2	2F						2	2	2		2			
199-N-76	DOH	100N	A		1						1	1	1	1	1	1			
199-N-76	SURV	100N	A													1			
199-N-77	RCRA	1324N	SA	2	2	2F			2	2									Bottom uppermost aquifer.
199-N-80	CERCLA	100NR2IAM(1)	A		1	F					1	1	1	1		1			Confined Ringold.
199-N-80	SURV	3D	3-99	1	1	F								1		1			Confined Ringold.
199-N-81	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-81	RCRA	1325N	A/SA	1	1	F			2	2									
199-N-81	SURV	100N	A													U/F			
199-N-8T	CERCLA	NPDES	Q																Amm, Cr, Fe, O/G
199-N-92A	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-92A	SURV	100N	A											1		1			
199-N-96A	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-96A	SURV	100N	A		1	F						1		1		1			
199-N-99A	CERCLA	100NR2IAM(1)	A		1	F						1		1		1			
199-N-99A	SURV	100N	A											1		1			
299-E13-14	SURV	200E	A		1	F					1	1	1	1		1		1	
299-E13-5	SURV	200E	A		1	F					1	1	1	1	1	1			
299-E16-1	SURV	3D	3-00		1	F					1	1		1	1				Basalt-confined.
299-E16-2	SURV	200E	3		1									1	1				AsF
299-E17-1	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E17-12	SURV	200E	A		1	F					1	1		1	1				AsF
299-E17-13	SURV	200E	A	1	1	F					1	1		1	1	1			AsF
299-E17-14	RCRA	PUREX	Q	4	4	4F		4			4	4		4	4	4			Amm, AsF
299-E17-14	SURV	200E	3-01		1									1	1				AsF
299-E17-17	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E17-18	SURV	200E	3-01		1									1	1				AsF
299-E17-19	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E17-19	SURV	200E	3-01		1									1	1				AsF
299-E17-9	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E17-9	SURV	200E	3-01		1									1	1				AsF
299-E18-1	SURV	200E	3-01		1	F								1	1				AsF
299-E23-1	SURV	200E	3-01		1									1	1				
299-E24-16	RCRA	PUREX	Q	4	4	4F		4			4	4		4	4	4			Amm, AsF
299-E24-18	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E24-18	SURV	200E	3-01		1									1	1				AsF
299-E24-19	RCRA	SST(A)	A/SA/M	2	12	12F		1	2X4	2X4	2	12	2	2	2	1	12	2	SA:TDS
299-E24-19	SURV	200E	A		1						1	1		1					

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-E24-20	RCRA	SST(A)	A/SA	2	2	2F		1	2x4	2x4	2	2	2	2	2	1	2	2	SA:TDS
299-E24-20	SURV	200E	3-01		1									1	1				AsF
299-E24-5	SURV	200E	3-01		1									1	1				AsF
299-E24-8	SURV	200E	3-01		1						1	1	1	1	1				
299-E25-1000	SURV	200E	3-01		1									1	1				AsF
299-E25-15	RCRA	SST(A)	A/SA	2	2	2F		1	2X4	2X4	2	2	2	2	2	1	2	2	SA:TDS
299-E25-17	SURV	200E	3-01		1									1	1				AsF
299-E25-17	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E25-18	SURV	200E	3-01		1									1	1				AsF
299-E25-19	RCRA	PUREX	Q	4	4	4F		4			4	4		4	4	4			Amm, AsF
299-E25-19	SURV	200E	3-01		1									1	1				AsF
299-E25-20	SURV	200E	3-01		1									1	1				AsF
299-E25-22	SURV	200E	3-01		1									1	1				AsF
299-E25-26	RCRA	A-29	A/SA	2	2	F			2X4	2X4									
299-E25-28	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
299-E25-28	SURV	200E	3-01		1									1	1				AsF
299-E25-29P	SURV	200E	3-01		1									1	1				AsF
299-E25-29Q	SURV	200E	3-01		1									1	1				AsF
299-E25-3	SURV	200E	3-01		1									1	1				AsF
299-E25-31	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm, AsF
299-E25-32P	SURV	200E	3-01		1									1	1				AsF
299-E25-32P	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
299-E25-32Q	SURV	3D	3-01	1	1	F								1	1				AsF. Confined Ringold?
299-E25-34	SURV	200E	3-01		1									1	1				AsF
299-E25-34	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
299-E25-35	SURV	200E	3-01		1									1	1				AsF
299-E25-35	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
299-E25-36	SURV	200E	3-01		1									1	1				AsF
299-E25-37	SURV	200E	3-01		1									1	1				AsF
299-E25-40	RCRA	SST(A)	A/SA	2	2	2F		1	2X4	2X4	2	2	2	2	2	1	2	2	SA:TDS
299-E25-41	SURV	200E	3-01		1									1	1				AsF
299-E25-41	RCRA	SST(A)	A/SA	2	2	2F		1	2x4	2x4	2	2	2	2	2	1	2	2	SA:TDS
299-E25-42	SURV	200E	3-01		1									1	1				AsF
299-E25-43	SURV	200E	3-01		1									1	1				
299-E25-44	SURV	200E	3-01											1	1				
299-E25-44	SURV	200E	3-01											1	1				
299-E25-46	SURV	200E	3-01		1									1	1				
299-E25-46	RCRA	SST(A)	A/SA/M	2	12	12F		1	2x4	2x4	2	12	2	2	2	1	12	2	SA:TDS

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-E25-47	SURV	200E	3-01		1									1	1				
299-E25-48	RCRA	A-29	A/SA	2	2	F			2X4	2X4									
299-E25-6	SURV	200E	3-01		1						1	1	1	1	1		1	1	AsF
299-E26-10	RCRA	LERF	A/SA	1	1	F	2	1	2x4	2x4	2	2							SA:Amm
299-E26-10	SURV	200E	3-01		1									1	1				AsF
299-E26-11	RCRA	BPOND	SA						2x4	2x4	2	2							
299-E26-11	SURV	200E	A		1									1					
299-E26-11	RCRA	LERF	A/SA	1	1	F	2	1	2x4	2x4	2	2							SA:Amm
299-E26-11	SURV	200E	A/3-01		1									1	x				A:AsF, x:every 3 yr; 1:annually
299-E26-12	RCRA	A-29	A/SA	2	2	F			2X4	2X4									
299-E26-13	RCRA	A-29	A/SA	2	2	F			2X4	2X4									
299-E26-4	SURV	200E	A		1	F					1	1	1	1	1				AsF
299-E26-8	SURV	3D	3-00		1									1	1				Basalt-confined.
299-E26-9	RCRA	LERF	A/SA	1	1	F	2	1	2X4	2X4	2	2							SA: Amm
299-E26-9	SURV	200E	A											1					
299-E27-10	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF, PCB
299-E27-10	SURV	200E	3-01		1									1	1				AsF
299-E27-11	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E27-11	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA: HgF, PbF, PCB
299-E27-12	RCRA	SST(C)	A/SA/M	2	12	12F			2X4	2X4	2	12	2	1	1	1	12	1	SA:TDS
299-E27-13	RCRA	SST(C)	A/SA/M	2	12	12F			2X4	2X4	2	12	2	1	1	1	12	1	SA:TDS
299-E27-14	RCRA	SST(C)	A/SA/M	2	12	12F			2x4	2x4	2	12	2	1	1	1	12	1	SA:TDS
299-E27-14	SURV	200E	3-01		1									1	1				AsF
299-E27-15	RCRA	SST(C)	A/SA/M	2	12	12F			2X4	2X4	2	12	2	1	1	1	12	1	SA:TDS
299-E27-15	SURV	200E	A		1						1	1		1					
299-E27-16	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E27-17	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF, PCB
299-E27-17	RCRA	B-63	A/SA	1	1	F		1	2x4	2x4	2	2							
299-E27-17	SURV	200E	3-01		1									1	1				AsF
299-E27-18	SURV	200E	3-01		1									1	1				AsF
299-E27-18	RCRA	B-63	A/SA	1	1	F		1	2x4	2x4	2	2							
299-E27-19	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E27-7	RCRA	SST(C)	A/SA/M	2	12	12F			2x4	2x4	2	12	2	1	1	1	12	1	SA:TDS
299-E27-7	SURV	200E	3-01		1									1	1				AsF
299-E27-8	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E27-8	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA: HgF, PbF, PCB
299-E27-9	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA:HgF, PbF, PCB
299-E27-9	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-E28-13	SURV	200E	3-01		1						1	1		1	1			1	AsF
299-E28-17	SURV	B-PLT	A		1						1	1	1	1	1	1		1	AsF
299-E28-18	SURV	B-62	A		1						1	1		1	1			1	AsF
299-E28-2	SURV	200E	A		1	F					1	1	1	1	1	1	1		AsF, Pu-iso
299-E28-21	SURV	B-62	A		1						1	1		1				1	
299-E28-23	SURV	200E	A								1	1	1	1		1/F		1	Pu-iso
299-E28-24	SURV	200E	A								1	1	1	1		1/F		1	Pu-iso
299-E28-25	SURV	200E	A		1						1	1	1	1	1	1/F		1	AsF, Pu-iso
299-E28-26	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E28-26	SURV	200E	3-01		1									1	1				AsF
299-E28-27	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E28-27	SURV	200E	3-01		1									1	1				AsF
299-E28-28	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E28-28	SURV	200E	3-01		1									1	1				
299-E28-5	SURV	200E	3-01		1						1	1	1	1	1	1		1	AsF
299-E28-6	SURV	200E	3-01		1						1	1	1	1	1	1		1	AsF
299-E28-8	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E32-10	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-10	SURV	200E	3-01		1							1	1	1	1		1	1	AsF, CN
299-E32-2	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-2	SURV	200E	3-01		1									1	1				
299-E32-3	RCRA	LLBG(1)	A/SA	2	2	2F		1	2X4	2X4	2	2		2				2	SA:HgF, PbF
299-E32-4	SURV	200E	3-01		1									1	1				
299-E32-4	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-5	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-5	SURV	200E	3-01		1									1	1			1	
299-E32-6	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-6	SURV	200E	3-01		1									1	1			1	
299-E32-7	SURV	200E	3-01		1									1	1				
299-E32-7	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-8	SURV	200E	3-01		1									1	1				
299-E32-8	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E32-9	SURV	200E	3-01		1									1	1				
299-E32-9	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E33-12	SURV	3D	3-00	1	1	F					1	1	1	1	1		1	1	CN. Basalt-confined.
299-E33-13	SURV	200E	A		1								1	1	1		1	U/F	AsF,CN,U-iso
299-E33-13	RCRA	SST(B)	Q/M		12	12F					12	12	4				12	12U/12F	Q:CN,PbF
299-E33-15	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-E33-16	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E33-17	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E33-18	RCRA	SST(B)	Q/M		12	12F					12	12	4				12	12U/12F	Q:CN, PbF
299-E33-20	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E33-21	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E33-25	RCRA	SST(B)	Q	4	4	4F					4	4	4				4	4U/4F	CN, PbF, TDS
299-E33-26	RCRA	SST(B)	Q	4	4	4F					4	4	4				4	4U/4F	CN, PbF, TDS
299-E33-26	SURV	200E	3-01		1						1	1	1	1	1		1	1	
299-E33-28	RCRA	LLBG(1)	A/SA	2	2	2F		1	2X4	2X4	2	2		2				2	SA:HgF, PbF
299-E33-29	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E33-29	SURV	200E	3-01		1									1	1				AsF
299-E33-30	RCRA	LLBG(1)	A/SA	2	2	2F		1	2X4	2X4	2	2		2				2	SA:HgF, PbF
299-E33-31	RCRA	SST(B)	A/Q/M	4	12	12F			1	1	4	12	4	1	1	1	12	4U/4F	Q:CN, PbF, TDS
299-E33-32	SURV	200E	3-01		1									1	1				AsF
299-E33-32	RCRA	SST(B)	A/Q/M	4	12	12F			1	1	4	12	4	1	1	1	12	4U/4F	Q:CN,PbF,TDS
299-E33-33	SURV	200E	3-01		1									1	1			1	AsF
299-E33-33	RCRA	B-63	A/SA	1	1	F		1	2x4	2x4	2	2							
299-E33-33	RCRA	SST(B)	A/Q	4	4	4F			1	1	4	4	4	1	1X2	1X2	4	4U/4F	Q:CN,PbF, TDS
299-E33-34	SURV	200E	3-01		1									1	1		1		AsF
299-E33-34	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E33-35	SURV	200E	3-01		1						1	1	1	1	1		1	1	AsF,CN
299-E33-35	RCRA	LLBG(1)	A/SA	2	2	2F		1	2x4	2x4	2	2		2				2	SA:HgF,PbF
299-E33-36	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E33-36	RCRA	SST(B)	A/Q	4	4	4F			1	1	4	4	4	1	1X2	1X2	4	4U/4F	Q:CN, PbF, TDS
299-E33-37	SURV	200E	3-01		1									1	1				AsF
299-E33-37	RCRA	B-63	A/SA	1	1	F		1	2x4	2x4	2	2							
299-E33-38	SURV	200E	3-01		1						1	1	1	1	1		1	1	AsF,CN
299-E33-38	RCRA	SST(B)	A/Q		4	4F			1	1	4	4	4	1	1	1	4	4U/4F	Q:CN,PbF
299-E33-39	SURV	200E	A		1									1	1		1	1	AsF,CN
299-E33-39	RCRA	SST(B)	Q		4	4F			1	1	4	4	4	1	1	1	4	4U/4F	Q:CN,PbF
299-E33-40	RCRA	SST(B)	Q	4	4	4F					4	4	4					4U/4F	CN, PbF, TDS. Basalt-confined.
299-E33-41	SURV	200E	3-01		1						1	1	1	1	1		1	1	AsF,CN,U-iso
299-E33-41	RCRA	SST(B)	A/Q/M	4	12	12F			1	1	12	12	4	1	1	1	12	12U/12F	Q:CN,PbF,TDS
299-E33-42	RCRA	SST(B)	A/Q/M	4	12	12F			1	1	4	12	4	1	1	1	12	4U/4F	Q:CN, PbF, TDS
299-E33-43	RCRA	SST(B)	A/Q/M	4	12	12F			1	1	4	12	4	1	1	1	12	4U/4F	Q:CN, PbF, TDS
299-E33-44	RCRA	SST(B)	Q/M	4	12	12F					12	12	4				12	12U/12F	Q:CN, PbF, TDS.
299-E33-5	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN, PbF
299-E33-7	SURV	200E	A		1						1	1	1	1	1		1	1	CN

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-E33-7	RCRA	SST(B)	Q		4	4F					4	4	4				4	4U/4F	CN,PbF
299-E33-8	RCRA	SST(B)	Q/M		12	4F					4	12	4				12	4U/4F	Q:CN, PbF
299-E34-10	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E34-10	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA:HgF, PbF, PCB
299-E34-11	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF,PCB
299-E34-11	SURV	200E	3-01		1									1	1		1	1	AsF
299-E34-12	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA: HgF, PbF, PCB
299-E34-2	SURV	200E	A		1									1	1				AsF
299-E34-2	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF,PCB
299-E34-3	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA:HgF, PbF, PCB
299-E34-5	SURV	200E	3-01		1									1	1				
299-E34-5	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF,PCB
299-E34-7	SURV	200E	A		1						1	1		1					
299-E34-7	RCRA	LLBG(2)	A/SA	2	2	2F		1	2X4	2X4	2	2		2					SA:HgF, PbF, PCB
299-E34-8	RCRA	B-63	A/SA	1	1	F		1	2X4	2X4	2	2							
299-E34-8	SURV	200E	A											1					
299-E34-9	SURV	200E	3-01		1									1	1		1	1	AsF
299-E34-9	RCRA	LLBG(2)	A/SA	2	2	2F		1	2x4	2x4	2	2		2					SA:HgF,PbF,PCB
299-E35-2	SURV	200E	A											1					
299-E35-2	RCRA	LERF	A/SA	1	1	F	2	1	2X4	2X4	2	2							SA:Amm
299-W10-1	SURV	200W	3-00		1	F	1				1	1	1	1			1		
299-W10-1	RCRA	SST(T)	SA	2	2	2F			2		2	2	2	2	2		2		TDS
299-W10-12	RCRA	SST(T)	SA	2	2	2F			2		2	2	2	2	2		2		TDS
299-W10-12	SURV	200W	3-00		1	F	1				1	1	1	1			1		
299-W10-13	SURV	200W	3-00		1		1							1					
299-W10-13	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W10-14	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W10-17	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS. To be replaced by W10-25.
299-W10-18	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS. To be replaced by W10-26.
299-W10-19	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W10-19	RCRA	SST(T)	SA		2				2	2			2	2	2		2		TDS
299-W10-2	RCRA	SST(T)	SA	2	2	2F			2		2	2	2	2	2		2		TDS
299-W10-20	SURV	200W	3-00		1		1							1					
299-W10-20	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W10-20	RCRA	SST(T)	SA		2				2	2			2	2	2		2		TDS
299-W10-21	SURV	200W	3-00		1		1							1					
299-W10-21	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W10-21	RCRA	SST(T)	SA		2				2	2			2	2	2		2		TDS

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W10-22	SURV	200W	SA		2						2	2		2					
299-W10-22	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W10-23	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W10-24	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W10-25	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W10-26	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W10-4	SURV	200W	A		1				1		1	1		1					
299-W10-4	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W10-8	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W11-10	SURV	200W	3-00		1		1							1	1				
299-W11-12	RCRA	SST(T)	Q	4	4	4F					4	4	4	4	4		4		TDS
299-W11-14	SURV	200W	3-00				1						1	1	1			1	
299-W11-18	SURV	200W	3-00		1		1						1		1			1	
299-W11-23	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W11-24	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W11-27	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS. To be replaced by W10-24..
299-W11-28	RCRA	SST(T)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W11-28	SURV	200W	3-00		1	F	1				1	1		1	1		1		
299-W11-3	SURV	200W	3-00				1								1			1	
299-W11-30	RCRA	SST(T)	SA	2		2F											2		
299-W11-30	CERCLA	200ZP1IAM	SA				2 fld												
299-W11-30	SURV	200W	3-00		1		1							1	1			1	
299-W11-31	RCRA	SST(T)	SA	2	2	2F					2	2	2	2	2		2		TDS
299-W11-6	SURV	200W	3-00				1							1	1				
299-W11-7	RCRA	SST(T)	SA	2	2	2F					2	2	2	2	2		2		TDS
299-W11-7	SURV	200W	3-00				1				1	1		1	1				
299-W12-1	SURV	200W	3-00		1	F	1							1	1		1	1	
299-W14-12	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS. To be replaced by W15-40.
299-W14-13	SURV	200W	3-00		1	F	1							1	1		1		
299-W14-13	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W14-2	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W14-2	SURV	200W	3-00		1	F	1				1	1	1	1	1		1		
299-W14-5	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W14-6	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W14-6	SURV	200W	3-00		1	F	1				1	1	1	1	1		1		
299-W14-9	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-1	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-11	CERCLA	200ZP1IAM	Q				4 fld												

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W15-11	SURV	200W	3-00		1														
299-W15-12	RCRA	SST(T)	SA	2	2	2F			2		2	2	2	2	2		2		TDS
299-W15-12	SURV	200W	3-00		1	F					1	1	1	1			1		
299-W15-15	SURV	200W	3-00		1		1												
299-W15-15	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-15	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W15-16	SURV	200W	3-00		1		1												
299-W15-16	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W15-16	CERCLA	200ZP1IAM	SA				2fld												
299-W15-17	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA: HgF, PbF
299-W15-18	CERCLA	200ZP1IAM	SA				2 fld												
299-W15-18	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA: HgF, PbF
299-W15-22	SURV	200W	3-00		1	F	1							1	1		1		To be replaced by W14-13.
299-W15-22	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS. To be replaced by W14-13.
299-W15-31A	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-32	SURV	200W	3-00		1	F	1						1	1					Extraction well.
299-W15-34	SURV	200W	3-00		1		1							1					
299-W15-36	SURV	200W	3-00		1		1												
299-W15-37	SURV	200W	3-00		1		1												
299-W15-38	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-39	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-4	CERCLA	200ZP1IAM	Q				4 fld												
299-W15-4	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS
299-W15-4	SURV	200W	3-00		1	F	1				1	1		1			1		
299-W15-40	RCRA	SST(TX/TY)	Q	4	4	4F			4		4	4	4	4	4		4		TDS.
299-W15-7	CERCLA	200ZP1IAM	Q				4 fld												
299-W18-1	CERCLA	200ZP1IAM	Q				4 fld												Extraction well.
299-W18-1	SURV	200W	3-00		1	F	1				1	1							Extraction well.
299-W18-15	SURV	200W	3-00				1											1	
299-W18-21	SURV	200W	3-00				1											1	
299-W18-21	CERCLA	200ZP1IAM	Q				4 fld												
299-W18-21	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W18-22	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W18-22	SURV	200W	A		1				1		1	1		1					
299-W18-23	SURV	200W	3-00		1		1												
299-W18-23	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W18-24	SURV	200W	3-00		1		1												
299-W18-24	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W18-24	CERCLA	200ZP1IAM	SA				2 fld												
299-W18-25	RCRA	SST(U)	A/Q	4	4	4F		1	4X4	4X4	4	4		4			4		Q:TDS
299-W18-25	SURV	200W	A		1				1		1	1		1					
299-W18-26	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W18-26	CERCLA	200ZP1IAM	Q				4fld												
299-W18-27	CERCLA	200ZP1IAM	Q				4fld												
299-W18-30	CERCLA	200ZP1IAM	Q				4 fld												
299-W18-30	RCRA	SST(U)	Q	4	4	4F			4X4	4X4	4	4		4			4		Q:TDS
299-W18-31	RCRA	SST(U)	A/Q	4	4	4F		1	4X4	4X4	4	4		4			4		Q:TDS
299-W18-32	CERCLA	200ZP1IAM	Q				4 fld												
299-W18-32	RCRA	LLBG(4)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W18-33	SURV	U-14	A		1	F			1		1	1		1				1	AsF
299-W18-4	CERCLA	200ZP1IAM	Q				4 fld												
299-W19-12	RCRA	SST(U)	Q	4	4	4F			4X4	4X4	4	4		4			4		Q:TDS
299-W19-14	SURV	200W	3-00		1		1								1		1	1	
299-W19-15	SURV	U-1/2	A		1		1		1		1	1		1	1		1	1	
299-W19-16	SURV	U-1/2	A		1				1		1	1		1				1	
299-W19-17	SURV	U-1/2	A		1				1		1	1		1				1	
299-W19-18	SURV	U-1/2	A		1		1		1		1	1		1	1			1	
299-W19-20	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-20	SURV	200W	3-00		1		1										1	1	
299-W19-23	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-24	CERCLA	200UP1IAM	SA/Q				2 fld										4	4 fld	Extraction well.
299-W19-26	CERCLA	200UP1IAM	A/Q				fld										4	4 fld	
299-W19-26	SURV	200W	3-00		1		1							1	1			1	
299-W19-28	SURV	200W	3-00		1										1		1	1	
299-W19-28	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-29	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-29	SURV	U-PLT	A		1	F			1		1	1		1			1	1	
299-W19-3	SURV	U-PLT	A		1	F			1		1	1		1	1			1	
299-W19-30	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-31	RCRA	SST(U)	A/Q	4	4	4F		1	4	4	4X4	4X4		4			4		Q:TDS. To be replaced by W19-41.
299-W19-31	SURV	U-14	A		1				1		1	1		1					To be replaced by W19-41.
299-W19-34A	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-35	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-36	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	Injection well.
299-W19-37	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-38	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W19-4	SURV	200W	3-00		1		1										1	1	
299-W19-40	CERCLA	200UP1IAM	Q				4 fld										4	4 fld	
299-W19-41	SURV	U-14	A		1				1		1	1		1					
299-W19-41	RCRA	SST(U)	A/Q	4	4	4F		1	4	4	4	4		4			4		Q:TDS.
299-W19-42	SURV	200W	A				1												
299-W19-42	RCRA	SST(U)	A/Q	4	4	4F		1	4	4	4	4		4			4		Q:TDS.
299-W19-42	SURV	U-14	SA		2	2F			2		2	2		2				2	AsF.
299-W19-9	SURV	U-1/2	A		1				1		1	1		1				1	
299-W22-10	SURV	200W	3-00										1	1	1		1		
299-W22-2	SURV	200W	3-00		1		1						1	1					
299-W22-20	DOH	200W	A		1						1	1	1	1	1		1		U-iso
299-W22-20	SURV	200W	3-00		1	F	1				1	1	1	1	1		1	1	
299-W22-39	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W22-39	SURV	200W	A		1				1		1	1		1					
299-W22-40	SURV	200W	A		1				1		1	1		1					To be replaced by W22-79.
299-W22-40	RCRA	U-12	A/Q	4	4	F					4	4		4	1		4		Q:TDS. To be replaced by W22-79.
299-W22-41	RCRA	U-12	A/Q	4	4	F					4	4		4	1		4		Q:TDS
299-W22-42	RCRA	U-12	A/Q	4	4	F					4	4		4	1		4		Q:TDS. To be replaced by W22-79.
299-W22-42	SURV	200W	3-00		1		1							1	1			1	
299-W22-43	RCRA	U-12	A/Q	4	4	F					4	4		4	1		4		Q:TDS
299-W22-44	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W22-45	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W22-46	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W22-46	SURV	200W	3-00		1	F	1				1	1	1	1	1		1	1	
299-W22-79	RCRA	U-12	A/Q	4	4	F	1		1X4	1X4	4	4		4	1		4		Q:TDS. See note.
299-W22-9	SURV	200W	3-00		1	F	1						1	1	1			1	
299-W23-1	SURV	200W	3-00				1					1	1	1			1		
299-W23-1	RCRA	SST(SX)	Q		4	4F					4	4	4	4		4	4	4	
299-W23-10	SURV	200W	3-00		1		1							1				1	
299-W23-13	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W23-14	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W23-14	SURV	200W	A		1				1		1	1		1					
299-W23-15	RCRA	SST(S)	Q	4	4	4F			4	4	4	4	4	4		4	4		TDS
299-W23-15	SURV	200W	3-00		1	F	1				1	1	1	1			1	1	
299-W23-2	SURV	200W	3-00		1							1	1	1			1	1	
299-W23-2	RCRA	SST(SX)	Q		4	4F					4	4	4	4		4	4	4	
299-W23-3	SURV	200W	3-00				1					1	1	1			1	1	
299-W23-3	RCRA	SST(SX)	Q		4	4F					4	4	4	4		4	4	4	

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W23-7	RCRA	SST(SX)	Q		4	4F					4	4	4	4		4	4	4	
299-W23-7	SURV	200W	3-00		1							1	1	1			1	1	
299-W23-9	SURV	200W	3-00		1		1						1	1			1	1	
299-W23-9	RCRA	SST(SX)	Q		4	4F					4	4		4			4	4	
299-W26-10	SURV	200W	3-00		1		1												
299-W26-10	RCRA	S-10	A/SA	2	1	F		1	2X4	2X4	2	2							
299-W26-12	RCRA	S-10	A/SA	2	1	F		1	2X4	2X4	2	2							
299-W26-7	SURV	200W	3-00			F	1												
299-W26-7	RCRA	S-10	A/SA	2	1	F		1	2X4	2X4	2	2							
299-W26-9	RCRA	S-10	A/SA	2	1	F		1	2X4	2X4	2	2							
299-W27-1	SURV	222-S	A/Q		4		1		4		4	4		4	1		1		
299-W27-2	RCRA	S-10	A/SA	2	1	F		1	2	2	2	2							
299-W27-2	SURV	200W	3-00				1							1	1			1	
299-W6-10	SURV	200W	3-00		1	F	1				1	1	1	1			1		
299-W6-10	RCRA	SST(T)	SA	2	2		2F				2	2	2	2	2		2		TDS
299-W6-12	SURV	200W	3-00		1		1												
299-W6-2	SURV	200W	A		1				1		1	1		1					
299-W6-2	RCRA	SST(T)	SA		2				2	2			2	2	2		2		TDS
299-W6-2	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W6-4	RCRA	SST(T)	SA	2	2	2F					2	2	2	2	2		2		TDS
299-W6-6	SURV	3D	3-00												1				Bottom unconfined.
299-W6-7	SURV	200W	3-00		1		1							1	1				
299-W6-9	RCRA	SST(T)	SA	2	2	2F					2	2	2	2	2		2		TDS
299-W7-1	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-10	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-11	SURV	200W	3-00		1														
299-W7-11	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-12	SURV	200W	3-00		2														
299-W7-12	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-3	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-4	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-5	SURV	200W	3-00		1		1												
299-W7-5	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
299-W7-6	SURV	200W	A		1				1		1	1		1					
299-W7-6	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-7	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W7-8	SURV	200W	3-00											1					
299-W7-8	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
299-W7-9	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W8-1	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF, PbF
299-W8-1	SURV	200W	3-00		1		1												
299-W9-1	SURV	200W	3-00		1		1												
299-W9-1	RCRA	LLBG(3)	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:HgF,PbF
3099-42-16	SURV	CITY	A		1									1					
3099-47-18B	SURV	CITY	A		1									1					
399-1-10A	RCRA	300-APT	SA/Q				2											4	
399-1-10A	SURV	300	A		1		1							1					
399-1-10B	SURV	300	A											1					
399-1-10B	RCRA	300-APT	SA				2											2	
399-1-12	SURV	300	A															1	
399-1-13A	SURV	300	A											1					
399-1-14A	SURV	300	A		1		1							1				1	
399-1-16A	RCRA	300-APT	SA/Q				2											4	
399-1-16A	SURV	300	A		1									1					
399-1-16B	RCRA	300-APT	SA/Q			2F	4											2	SA: DO, REDOX fld. Bottom unconfined.
399-1-16B	SURV	3D	A											1					Bottom unconfined.
399-1-17A	SURV	300	A/SA		2		1				2	2		2	1			2	
399-1-17A	DOH	300	A/SA		2						2	2	2	2	1		1		SA: U-iso
399-1-17A	RCRA	300-APT	SA/Q				2											4	
399-1-17B	SURV	3D	A											1					Bottom unconfined.
399-1-17B	RCRA	300-APT	SA			2F	2											2	DO, REDOX fld. Bottom unconfined.
399-1-18A	RCRA	300-APT	SA				2											2	
399-1-18A	SURV	300	A		1									1					
399-1-18B	SURV	3D	A											1					Bottom unconfined.
399-1-18B	RCRA	300-APT	SA			2F	2											2	DO, REDOX fld. Bottom unconfined.
399-1-2	SURV	300	A															1	
399-1-21A	SURV	300	A		1		1							1				1	
399-1-3	SURV	300	A				1										1	1	
399-2-1	LTMC	300FF5	A															1	
399-2-1	SURV	300	A				1												
399-2-2	SURV	300	A																
399-3-1	SURV	300	A															1	
399-3-10	SURV	300	A				1											1	
399-3-11	SURV	300	A/SA		1		1				2	2		1		F/U		2	
399-3-12	SURV	300	A		1									1					
399-3-12	LTMC	300FF5	A															1	

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
399-3-2	SURV	300	A				1												
399-3-3	SURV	300	A				1											1	
399-3-6	SURV	300	A/SA		1		1							2				1	
399-4-1	SURV	300	SA		2		2							2					
399-4-1	LTMC	300FF5	A															1	
399-4-10	SURV	300	A				1												
399-4-11	SURV	300	A/SA		1		2							1				1	
399-4-12	LTMC	300FF5	A				1											1	
399-4-12	SURV	300	A		1		1							1					
399-4-7	SURV	300	A/SA				1							2				1	
399-4-9	SURV	300	A		1		1							1				1	
399-4-9	LTMC	300FF5	A															1	
399-5-1	SURV	300	A/SA		2		1							1				1	
399-5-4B	SURV	300	A/SA				2							1					
399-6-1	SURV	300	A				1												
399-6-2	SURV	300	SA				2												
399-8-1	SURV	300	A				1							1				1	
399-8-5A	SURV	300	A		1		1							1				1	
499-S0-7	SURV	400	A/M	1	1	F					1	1		12	1				Amm
499-S0-8	SURV	400	A/M	1	1	F					1	1		12	1				
499-S1-8J	SURV	400	A/M		1	F	1				1	1	1	12	1	1	1	1	Amm, U-iso. Drinking water well.
499-S1-8J	DOH	400	A		1						1	1	1	1	1	1	1		U-iso. Drinking water well.
499-S1-8K	SURV	400	A		1						1	1		1					
699-10-E12	SURV	River	A	1	1	F			1	1	1	1	1	1		1	1		
699-1-18	SURV	600	3-01		1									1					
699-12-4D	SURV	600	3-01		1									1	1				
699-13-1A	SURV	600	3-01		1						1	1		1	1				
699-14-38	SURV	600	3-01		1	F								1					
699-17-5	DOH	600	A		1						1	1	1	1	1				
699-17-5	SURV	600	3-01	1	1	F	1				1	1	1	1	1	1	1		
699-17-70	SURV	600	A		1									1					
699-19-43	SURV	600	3-01		1	F								1	1				
699-19-58	SURV	600	3-01		1	F								1					
699-19-88	SURV	600	3-00		1	F	1		1	1				1					CN
699-20-20	SURV	600	3-01		1	F					1	1	1	1	1		1		
699-20-20	DOH	600	A		1						1	1	1	1	1		1		
699-20-E12O	SURV	River	A	1	1	F			1	1	1	1	1	1	1	1	1		
699-20-E12S	SURV	3D	3-01	1	1									1					Confined Ringold?

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-20-E5A	SURV	600	3-01		1									1					
699-21-6	SURV	600	3-01		1									1	1				
699-22-35	SURV	600	3-01		1									1	1				
699-22-35	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Q:Amm,COD,Col,TC,TDS
699-22-70	SURV	3D	3-00	1	1	F								1					Basalt-confined.
699-2-3	SURV	600	3-01		1									1	1				
699-23-34A	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-23-34B	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-24-33	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-24-34A	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-24-34B	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-24-34C	SURV	600	3-01		1									1	1				
699-24-34C	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm,COD,Col,TC,TDS
699-24-35	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-24-46	SURV	Transect	3-01/A	1	1	F			1	1	1	1	1	1	x	1	1		x: every 3 yr; 1: annually
699-25-33A	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-25-34A	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-25-34B	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-25-34C	RCRA	SWL	Q	4	4	4F	4		4X4	4X4	4	4		4					Amm, COD, Col, TC, TDS
699-25-34D	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-25-70	SURV	600	A		1	F								1	1				
699-26-15A	SURV	600	3-01		1									1	1				
699-26-33	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-26-33	RCRA	NRDW	A/SA	2	2	2F	2	1	2x4	2x4	2	2		2					SA:Col,TC,TDS
699-26-34A	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-26-34B	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-26-35A	RCRA	SWL	Q	4	4	4F	4		4x4	4x4	4	4		4					Q:Amm,COD,Col,TC,TDS
699-26-35A	RCRA	NRDW	A/SA	2	2	2F	2	1	2x4	2x4	2	2		2					SA:Col,TC,TDS
699-26-35A	SURV	600	3-01		1									1	1				
699-26-35C	RCRA	NRDW	A/SA	2	2	2F	2	1	2X4	2X4	2	2		2					SA:Col, TC, TDS
699-26-89	SURV	600	3-00		1									1					
699-2-6A	FFTF	400	Q			4U			4										Cd, Cr, Hg, Pb, SO4, TDS
699-2-6A	SURV	400	A/Q	4	4	F			4		1	1		1					A: Col, HgF, PbF
699-2-7	FFTF	400	Q			4U			4										Cd,Cr,Hg,Pb,SO4,TDS
699-2-7	SURV	400	A/Q	4	4	F			4		1	1		1					A: Col, HgF, PbF
699-27-8	SURV	600	3-01		1									1	1				
699-28-40	SURV	600	3-01		1	F								1	1				
699-29-4	SURV	600	3-01		1									1	1				

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-31-11	SURV	600	3-01		1									1	1				
699-31-31	DOH	600	A/SA		2						2	2	2	2	1				
699-31-31	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-31-31P	SURV	600	3-01		1									1	1				
699-32-22A	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-32-22B	SURV	3D	3-00		1									1	1				Basalt-confined.
699-32-43	SURV	Transect	A	1	1	F			1	1	1	1	1	1	1	1	1		
699-32-43	DOH	600	A		1						1	1	1	1	1		1		
699-32-62	SURV	600	3-00		1	F								1	1				
699-32-70B	SURV	600	3-00		1									1	1				
699-32-72A	SURV	600	3-00		1									1	1				
699-33-42	SURV	600	3-01		1	F								1	1				
699-33-56	SURV	600	3-00		1	F								1					
699-34-41B	SURV	600	A		1									1	1				
699-34-42	SURV	600	3-01		1									1	1				
699-3-45	SURV	Transect	3-01/A	x	1	xF			x	x	1	1	x	1		x	x		x: every 3 yr; 1: annually
699-34-61	SURV	600	3-00		1	F								1	1				
699-34-88	SURV	600	3-00		1		1					1		1					
699-35-66A	SURV	600	3-00		1									1	1				
699-35-66A	CERCLA	ERDF	SA	2	2		2			2	2	2			2		2	2	See Notes
699-35-70	DOH	600	A/SA		2						2	2	2	2	1	1	1		SA: U-iso
699-35-70	SURV	600	A/SA		2	2F					2	2	2	1	2		1	2	A: U-iso
699-35-78A	SURV	200W	3-00		1	F	1					1					1	1	
699-35-9	SURV	600	3-01		1									1	1				
699-36-61A	SURV	600	3-00		1	F								1	1				
699-36-67	CERCLA	ERDF	SA	2	2		2			2	2	2			2		2	2	See note
699-36-70A	SURV	600	3-00		1		1							1					
699-36-70A	RCRA	U-12	A/Q	4	4	F					4	4		4	1		4		Q: TDS
699-36-70A	CERCLA	ERDF	SA	2	2		2			2	2	2			2		2	2	See Notes
699-36-93	SURV	600	3-00		1									1					
699-37-43	SURV	600	3-01		1									1	1				
699-37-47A	SURV	600	3-01		1									1	1				AsF
699-37-47A	RCRA	PUREX	SA	2	2	2F		2			2	2		2	2	2			Amm,AsF
699-37-68	CERCLA	ERDF	SA	2	2		2			2	2	2			2		2	2	See note
699-37-82A	SURV	600	3-00		1		1							1					
699-37-E4	SURV	600	3-01	1	1	F								1	1				
699-38-15	SURV	600	3-01		1									1	1				
699-38-65	SURV	600	A		1	F	1				1	1	1	1	1		1	1	U-iso

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-38-65	DOH	600	A		1						1	1	1	1	1		1		U-iso
699-38-70	SURV	600	3-00		1		1							1	1		1	1	
699-39-39	SURV	600	3-01		1									1	1				
699-39-79	SURV	600	3-00				1							1					
699-39-79	CERCLA	200ZP1IAM	Q				4 fld												
699-40-1	SURV	600	3-01		1									1	1				
699-40-33A	SURV	600	3-01		1									1	1				
699-40-36	RCRA	BPOND	SA						2X4	2X4	2	2							
699-40-39	RCRA	BPOND	SA						2X4	2X4	2	2							
699-40-62	SURV	600	3-00		1									1	1				
699-41-1	DOH	600	A/SA		2						2	2	2	2	1		2		
699-41-1	SURV	River	A	1	1	F			1	1	1	1	1	1	1	1	1		
699-41-23	SURV	Transect	3-01/A	x	1	xF			x	x	1	1	x	1		x	x		x: every 3 yr; 1:annually
699-41-40	SURV	3D	3-01	1	1						1	1		1	1				Confined Ringold.
699-41-42	RCRA	BPOND	SA						2X4	2X4	2	2							
699-42-12A	SURV	600	3-01		1									1	1				
699-42-37	RCRA	BPOND	SA						2X4	2X4	2	2							
699-42-39A	SURV	600	3-01		1									1	1				
699-42-39B	SURV	600	3-01	1	1									1	1				
699-42-40C	SURV	3D	3-00		1									1	1				Basalt-confined.
699-42-41	SURV	600	3-01		1									1	1				AsF
699-42-42B	SURV	600	3-01	1	1									1	1				
699-42-E9B	SURV	3D	A	1	1	F					1	1	1	1	1				U-iso. Basalt-confined. E of river.
699-42-E9B	DOH	600	A		1						1	1	1	1	1				U-iso. Basalt-confined. E of river.
699-43-3	SURV	600	3-01		1									1	1				
699-43-40	SURV	600	3-01		1									1	1				AsF
699-43-41E	SURV	600	3-01		1									1	1				AsF
699-43-43	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
699-43-43	SURV	600	3-01		1									1	1				AsF
699-43-43	RCRA	BPOND	SA						2x4	2x4	2	2							
699-43-45	SURV	600	3-01		1									1	1				AsF
699-43-45	RCRA	A-29	A/SA	2	2	F			2x4	2x4									
699-43-45	RCRA	BPOND	SA						2x4	2x4	2	2							
699-43-89	SURV	600	3-00		1		1							1					
699-44-39B	SURV	600	3-01		1									1	1				
699-44-39B	RCRA	BPOND	SA						2x4	2x4	2	2							
699-44-64	SURV	600	3-00		1		1				1	1	1	1	1		1	1	
699-45-42	SURV	600	3-01		1									1	1				

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-45-69A	SURV	600	3-00		1	F	1							1	1			1	
699-46-21B	SURV	Transect	3-01/A	x	1	xF			x	x	1	1	x	1		x	x		x: every 3 yr; 1: annually
699-46-4	SURV	River	A	1	1	F			1	1	1	1	1	1	1	1	1		
699-47-5	SURV	600	3-01		1									1	1				
699-47-60	SURV	600	3-00		1		1							1	1		1	1	
699-47-60	CERCLA	200ZP1IAM	A				fld												
699-48-71	SURV	600	3-00		1	F	1							1	1				
699-48-77A	SURV	600	3-00		1		1							1					
699-48-7A	SURV	600	3-01											1					
699-49-100C	SURV	600	A		1	F	1				1	1	1	1	1		1	1	Pu-iso, U-iso
699-49-100C	DOH	600	A		1						1	1	1	1	1				U-iso
699-49-13E	SURV	600	3-01		1						1	1	1	1	1				
699-49-55A	SURV	600	3-99		1							1		1	1		1		CN
699-49-55B	SURV	3D	3-00	1	1	F					1	1	1	1	1		1		CN. Basalt-confined.
699-49-57A	SURV	600	3-99		1								1	1	1		1		AsF, CN
699-49-57B	SURV	3D	3-00		1								1	1	1		1		Basalt-confined.
699-49-79	SURV	600	3-00		1		1							1					
699-50-28B	SURV	600	3-01		1									1	1				
699-50-53A	SURV	600	3-99		1							1		1	1		1		CN
699-50-53B	SURV	3D	3-00	1	1	F						1		1	1		1	1	CN. Basalt-confined.
699-50-85	SURV	600	3-00		1		1							1					
699-51-63	SURV	600	3-00		1							1	1	1	1		1		AsF, CN
699-51-63	CERCLA	200ZP1IAM	A				fld												
699-51-75	SURV	600	3-00		1		1							1					
699-52-19	SURV	600	3-01		1									1					
699-52-46A	SURV	3D	3-00	1	1	F					1	1	1	1	1	1			Basalt-confined.
699-52-54	SURV	600	3-99		1								1	1	1	1	1		CN
699-52-57	SURV	600	3-99		1							1	1	1	1		1		CN
699-53-47A	SURV	600	A		1						1	1		1		1			
699-53-47B	DOH	600	A		1						1	1	1	1	1	1	1		U-iso
699-53-47B	SURV	600	3-99	1	1	F					1	1	1	1	1	1	1		CN, U-iso
699-53-48A	SURV	600	3-99		1	F						1		1	1	1			
699-53-48B	SURV	600	3-99		1							1		1		1			
699-53-55A	SURV	600	3-99		1								1	1			1		CN
699-53-55B	SURV	600	3-99		1								1	1			1		CN
699-53-55C	SURV	600	3-99		1								1	1			1		CN
699-54-49	SURV	600	3-99		1							1		1		1			
699-55-57	SURV	600	3-99		1								1	1	1		1		CN

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-55-60A	SURV	600	3-99		1						1	1	1	1	1		1		CN
699-55-76	SURV	600	3-00		1							1		1					
699-55-89	SURV	600	3-00		1		1							1					
699-56-53	SURV	3D	3-00	1	1	F						1	1	1	1	1	1		CN. Basalt-confined.
699-57-59	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-59-58	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-60-60	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-61-62	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-61-66	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-62-43F	SURV	600	3-99	1	1	F								1					
699-63-58	SURV	600	3-99	1	1	F								1	1				
699-63-90	SURV	600	3-99	1	1	F	1				1	1	1	1	1				
699-64-27	SURV	600	3-99	1	1	F	1							1	1				
699-64-62	SURV	Transect	A	1	1	F			1	1	1	1	1	1		1	1		
699-65-50	SURV	600	3-99	1	1	F								1	1		1		
699-65-72	LTMC	100BC5	2-99		1	U/F					1	1		1		1			
699-65-72	SURV	600	3-99	1	1	F								1					
699-65-83	LTMC	100BC5	2-00		1	U/F					1	1		1		1			
699-66-23	SURV	600	3-99	1	1	F	1							1	1				
699-66-39	SURV	600	3-99	1	1	F								1	1				
699-66-58	SURV	600	3-99		1									1	1		1		
699-66-64	LTMC	100BC5	2-99		1	U/F					1	1		1		1			
699-66-64	SURV	600	3-99		1									1	1		1		
699-67-86	LTMC	100BC5	2-00	1	1	U/F					1	1		1		1			
699-67-86	SURV	600	3-99	1	1	F								1					
699-70-68	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					
699-71-30	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
699-71-30	SURV	100F	3-99	1	1	F	1							1					
699-72-73	LTMC	100BC5	A		1	U/F					1	1		1		1			
699-72-73	SURV	600	A											1					
699-72-92	LTMC	100BC5	A	1	1	U/F					1	1		1		1			
699-72-92	SURV	600	3-99	1	1	F								1					
699-73-61	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					
699-77-36	LTMC	100FR3	2-00	1	1	U/F	1				1	1		1		1			C14
699-77-36	SURV	600	3-99	1	1	F	1							1					
699-78-62	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					
699-81-38	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
699-81-58	SURV	600	3-99	1	1	F								1					

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-8-17	FFTF	400	Q			4U			4										Cd,Cr,Hg,Pb,SO4,TDS
699-8-17	SURV	400	A/Q	4	4	F			4		1	1		1	1				A: Col, HgF, PbF
699-8-25	SURV	600	3-01		1									1	1				
699-83-47	LTMC	100FR3	2-00		1	U/F	1				1	1		1		1			
699-83-47	SURV	600	A	1	1	F								1					
699-84-35A	LTMC	100FR3	2-99		1	U/F	1				1	1		1		1			
699-87-55	SURV	600	3-99	1	1	F								1					
699-89-35	SURV	600	3-99	1	1	F								1					
699-91-46A	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
699-91-46A	SURV	600	3-99	1	1	F								1					
699-96-43	SURV	600	Mar-99			F													
699-93-48A	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
699-96-49	SURV	600	A	1	1	F								1					
699-97-43	CERCLA	100HR3IAM(2)	A		1	U/F					1	1		1					
699-97-43	SURV	600	A	1	1	F								1					
699-97-51A	CERCLA	100HR3IAM(2)	A		1	U/F					1	1				1			
699-9-E2	SURV	600	3-01		1						1	1	1	1	1				
699-ATH	SURV	CITY	A		1		1							1				1	
699-S11-E12AP	SURV	3D	3-00	1	1	F					1	1		1					Basalt-confined.
699-S12-29	SURV	600	3-01		1									1					
699-S12-3	SURV	600	3-01		1									1					
699-S19-11	SURV	600	3-01		1									1					
699-S19-E13	SURV	River	A/SA	2	2	F			1	1	1	1	1	2		1	1		
699-S19-E14	SURV	600	3-01		1									1					
699-S22-E9A	SURV	600	A		1									1					
699-S24-19P	SURV	600	3-01	1	1	F								1					
699-S24-19Q	SURV	600	3-01	1	1	F								1					
699-S27-E12A	LTMC	HRLF	A		1		1												
699-S27-E12A	SURV	600	A		1		1												
699-S27-E14	SURV	600	A/SA		2		2							2				1	
699-S27-E9A	SURV	600	A		1		1							1					
699-S27-E9B	SURV	600	A				1							1					
699-S28-E0	SURV	600	A		1		1				1	1		1					
699-S28-E12	LTMC	HRLF	A				1												
699-S28-E12	SURV	600	A		1		1							1				1	
699-S28-E13A	LTMC	HRLF	A		1		1												
699-S28-E13A	SURV	600	A		1		1												
699-S29-E10A	LTMC	HRLF	A		1		1												

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-S29-E10A	SURV	600	A		1		1												
699-S29-E11	SURV	600	A		1		1												
699-S29-E12	SURV	600	A				1												
699-S29-E13A	LTMC	HRLF	A		1		1							1					
699-S29-E13A	SURV	600	A		1		1							1					
699-S29-E16A	SURV	600	A/Q		1		1							4				1	
699-S29-E16B	SURV	600	A											1					
699-S29-E16C	SURV	600	A											1					
699-S30-E10A	SURV	600	A		1		1				1							1	
699-S30-E10A	LTMC	HRLF	A				1												
699-S30-E10B	SURV	600	A				1				1	1					1	1	
699-S30-E11A	LTMC	HRLF	A		1		1												
699-S30-E11A	SURV	600	A		1		1												
699-S30-E15A	SURV	600	A		1						1	1		1					
699-S30-E15A	DOH	600	A		1						1	1	1	1					U-iso
699-S31-1	SURV	600	A		1						1	1		1	1				
699-S31-1	DOH	600	A		1						1	1	1	1	1		1		U-iso
699-S31-E10A	LTMC	HRLF	A				1												
699-S31-E10A	SURV	600	A				1												
699-S31-E10B	SURV	600	A		1		1				1	1		1			1	1	
699-S31-E10C	LTMC	HRLF	A				1												
699-S31-E10C	SURV	600	A				1												
699-S31-E10D	LTMC	HRLF	A				1												
699-S31-E10D	SURV	600	A				1												
699-S31-E10E	SURV	600	A				1												
699-S31-E11	LTMC	HRLF	A		1		1												
699-S31-E11	SURV	600	A		1		1												
699-S31-E8A	SURV	600	A		1		1				1	1		1	1		1	1	
699-S31-E8A	DOH	600	A		1						1	1	1	1	1		1		U-iso
699-S3-25	SURV	600	3-01		1									1					
699-S32-E11	SURV	600	A		1														
699-S32-E13A	SURV	600	A		1									1					
699-S32-E13B	SURV	600	A				1												
699-S34-E10	SURV	600	A		1		1							1				1	
699-S34-E15	SURV	600	A		1									1					
699-S36-E13A	SURV	600	A		1		1							1					
699-S37-E14	DOH	600	A		1						1	1	1	1					
699-S37-E14	SURV	600	A		1		1				1	1		1					

WELL	PROG	PROJ	FREQ	ALKA	ANIO	ICP	VOA	PHEN	TOC	TOX	ALPH	BETA	GAM	TRIT	I129	SR90	TC99	URAN	OTHER/COMMENTS
699-S38-E11	SURV	600	A		1														
699-S38-E12A	SURV	600	A		1		1							1					
699-S3-E12	SURV	River	A	1	1	F			1	1	1	1	1	1		1	1		
699-S40-E14	SURV	600	A		1									1					
699-S41-E12	LTMC	HRLF	A		1									1					Cr, CrF
699-S42-E8B	SURV	CITY	A		1		1							1				1	
699-S43-E12	SURV	600	A		1		1							1					
699-S6-E14A	SURV	600	3-01		1						1	1	1	1					
699-S6-E4A	SURV	618-10	A/SA	1	1	F	1				2	2	1	1		1		2	A:Pu-iso, U-iso
699-S6-E4B	SURV	618-10	3-01		1						1	1	1	1					
699-S6-E4CS	SURV	3D	A											1				1	
699-S6-E4CT	SURV	3D	A											1				1	
699-S6-E4D	SURV	618-10	A								1	1		1				1	
699-S8-19	SURV	600	3-01		1									1					
SB-037-1	LTMC	100BC5	A		1	U/F					1	1		1		1			Seep
SB-039-2	LTMC	100BC5	A		1	U/F					1	1		1		1			Seep
SD-102-1	CERCLA	100HR3IAM(2)	A		1	F					1	1				1			Seep
SD-110-1	CERCLA	100HR3IAM(2)	A		1	F					1	1				1			Seep
SD-110-2	CERCLA	100HR3IAM(2)	A		1	F					1	1				1			Seep
SD-98-1	CERCLA	100HR3IAM(2)	A		1	F					1	1				1			Seep
SF-187-1	LTMC	100FR3	A		1	U/F	1				1	1		1		1			Seep
SF-190-4	LTMC	100FR3	A		1	U/F	1				1	1		1		1			Seep
SF-207-1	LTMC	100FR3	A		1	U/F	1				1	1		1		1			Seep
SF-211-1	LTMC	100FR3	A	1	1	U/F	1				1	1		1		1			Seep; C14. Alt. For SF-207-1.
SH-144-1	CERCLA	100HR3IAM(2)	A		1	F					1	1		1					Seep
SH-145-1	CERCLA	100HR3IAM(2)	A		1	F					1	1		1					Seep
SH-150-1	CERCLA	100HR3IAM(2)	A		1	F					1	1		1					Seep
SH-152-2	CERCLA	100HR3IAM(2)	A		1	F					1	1		1					Seep
SH-153-1	CERCLA	100HR3IAM(2)	A		1	F					1	1		1					Seep
SK-057-3	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					Seep
SK-077-1	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					Seep
SK-082-2	CERCLA	100KR4IAM(2)	A		1	U/F					1	1	1	1					Seep

Appendix B

Water-Level-Monitoring Network

Appendix B

Water-Level-Monitoring Network

The following table lists wells monitored for water levels on the Hanford Site and the surrounding area. The table does not include water-level measurements done before sampling. The following is a description of the columns in the table.

WELL_NAME: Hanford Site wells have numbers with the prefixes 199-, 299-, 399-, 499-, 699-, 1199-, or 3099-. Other types of well numbers are offsite wells and the approximate coordinates of the wells are given.

TYPE: BW = Basalt Waste Isolation Project, GW = groundwater monitoring, OS = offsite, RW = Richland well.

ZONE: An attempt has been made to identify which portion of the aquifer, in relation to the water table, is monitored by the wells, though the effort is incomplete. One discrepancy is in the use of the term "unconfined." It generally means the Ringold and Hanford sediments above the basalt, but in some instances, means only the uppermost aquifer (as distinguished from confined Ringold aquifers). The following abbreviations are used:

U	=	undifferentiated unconfined
TU	=	top of unconfined (screened across water table)
UU	=	upper unconfined (screened below water table)
MU	=	middle unconfined (various units)
LU	=	lower unconfined
CR	=	confined Ringold
TB	=	top of basalt
C	=	undifferentiated basalt-confined
UC	=	upper basalt-confined
LC	=	lower basalt-confined
P	=	perched above water table.

SURV: A number other than zero in this column indicates the well supports surveillance monitoring. The number indicates the number of times per year the water level is measured for surveillance. Zero indicates the well is not monitored for this purpose.

TOTAL: This is the total number of times water levels are measured for all purposes (surveillance, *Resource Conservation and Recovery Act of 1976*, *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, and others).

Well Name	Type	Zone	Surv	Total	Well Name	Type	Zone	Surv	Total
SPC-P-1			1	1	199-D2-5	GW	TU	4	4
08N30E03A01	OS		1	1	199-D2-6	GW	TU	0	2
09N29E02C01	OS		1	1	199-D5-13	GW	TU	0	2
09N29E09C01	OS		1	1	199-D5-14	GW	TU	0	2
09N29E15N01	OS		1	1	199-D5-16	GW	TU	0	2
09N30E02B01	OS		1	1	199-D5-17	GW	TU	0	2
09N30E06D01	OS		1	1	199-D5-19	GW	TU	0	2
09N30E16F01	OS		1	1	199-D5-20	GW	TU	0	2
09N30E17C01	OS		1	1	199-D8-3	GW	TU	0	2
09N30E23N01	OS		1	1	199-D8-4	GW	TU	1	2
10N29E01A01	OS		1	1	199-D8-5	GW	TU	1	2
10N29E08R01	OS		1	1	199-D8-53	GW	TU	0	2
10N29E11N01	OS		1	1	199-D8-54B	GW	MU	0	2
10N29E25A01	OS		1	1	199-F1-2	GW		0	1
10N29E26A01	OS		1	1	199-F5-1	GW	TU	0	4
10N29E27C01	OS		1	1	199-F7-1	GW	TU	0	1
10N29E28B01	OS		1	1	199-F8-1	GW	TU	0	1
10N29E34C01	OS		1	1	199-F8-4	GW		0	1
10N30E04E01	OS		1	1	199-H3-1	GW	TU	0	2
10N30E08F01	OS		1	1	199-H3-2A	GW	TU	0	4
10N30E14N01	OS		1	1	199-H3-2B	GW	TU	0	4
10N30E18Q02	OS		1	1	199-H4-10	GW	TU	0	2
10N30E21R01	OS		1	1	199-H4-12A	GW	TU	0	4
11N28E25R02	OS		1	1	199-H4-12B	GW	UU	0	4
11N29E05D01	OS		1	1	199-H4-12C	GW	MU	0	4
11N29E14R01	OS		1	1	199-H4-13	GW	TU	0	2
11N29E16N01	OS		1	1	199-H4-15B	GW	UU	0	2
11N29E19R01	OS		1	1	199-H4-15CP	GW	UC	1	2
11N29E24R01	OS		1	1	199-H4-15CQ	GW	CR	1	2
11N29E26D01	OS		1	1	199-H4-15CR	GW	LU	1	2
11N30E06N01	OS		1	1	199-H4-15CS	GW	MU	1	2
11N30E08N01	OS		1	1	199-H4-16	GW	TU	0	2
11N30E32D01	OS		1	1	199-H4-17	GW	TU	0	2
14N27E03PA	OS		1	1	199-H4-18	GW	TU	0	4
14N27E03PB	OS		1	1	199-H4-2	GW	UC	1	2
14N27E03PC	OS		1	1	199-H4-3	GW	TU	0	4
1199-37-16	RW	U	1	1	199-H4-4	GW	TU	0	4
1199-38-16	RW	U	1	1	199-H4-45	GW	TU	0	2
1199-39-15	RW	U	1	1	199-H4-46	GW	TU	0	2
1199-39-16A	RW	U	1	1	199-H4-47	GW	TU	0	2
1199-39-16C	RW	U	1	1	199-H4-48	GW	TU	0	2
1199-39-16E	RW	U	1	1	199-H4-49	GW	TU	0	2
1199-41-15	RW	U	1	1	199-H4-5	GW	TU	0	2
199-B3-1	GW	TU	1	1	199-H4-6	GW	TU	0	4
199-B3-46	GW		1	1	199-H4-8	GW	TU	0	2
199-B4-1	GW	TU	4	4	199-H4-9	GW	TU	0	4
199-B4-9	GW		0	1	199-H5-1A	GW		0	2
199-B8-6	GW		0	1	199-H6-1	GW	TU	0	2

Well Name	Type	Zone	Surv	Total	Well Name	Type	Zone	Surv	Total
199-K-19	GW	TU	0	1	299-E24-19	GW	TU	0	2
199-K-20	GW	TU	0	1	299-E24-20	GW	TU	0	2
199-K-27	GW	TU	0	1	299-E24-7	GW	TU	0	1
199-K-34	GW	TU	0	1	299-E25-11	GW	LU	0	0
199-K-36	GW	TU	0	1	299-E25-12	GW	TU	0	1
199-K-37	GW		0	1	299-E25-19	GW	TU	0	0
199-N-14	GW	TU	0	1	299-E25-2	GW	TU	0	2
199-N-2	GW	TU	0	2	299-E25-26	GW	UU	0	4
199-N-20	GW	TU	0	2	299-E25-28	GW	LU	0	4
199-N-25	GW	TU	0	2	299-E25-31	GW	TU	0	1
199-N-26	GW	TU	0	2	299-E25-32P	GW	TU	0	4
199-N-27	GW	TU	1	2	299-E25-34	GW	TU	0	4
199-N-28	GW	TU	0	2	299-E25-35	GW	TU	0	4
199-N-3	GW	TU	0	2	299-E25-36	GW	TU	0	1
199-N-32	GW	TU	0	2	299-E25-40	GW	TU	0	2
199-N-33	GW	TU	4	4	299-E25-41	GW	TU	0	2
199-N-34	GW	TU	0	2	299-E25-42	GW	TU	0	1
199-N-41	GW	TU	0	2	299-E25-44	GW	TU	0	1
199-N-42	GW	TU	0	2	299-E25-46	GW	TU	0	2
199-N-43	GW	TU	0	2	299-E25-48	GW	TU	0	4
199-N-49	GW	TU	0	2	299-E26-10	GW	TU	1	2
199-N-52	GW	TU	0	2	299-E26-11	GW	TU	0	2
199-N-56	GW	TU	0	2	299-E26-12	GW	TU	0	4
199-N-57	GW	TU	0	2	299-E26-13	GW	TU	0	4
199-N-59	GW	TU	0	2	299-E26-2	GW	TU	0	1
199-N-62	GW	TU	0	2	299-E26-4	GW	TU	1	1
199-N-66	GW	TU	0	2	299-E26-8	GW	UC	1	1
199-N-67	GW	TU	4	4	299-E26-9	GW	TU	0	2
199-N-71	GW	TU	0	2	299-E27-10	GW	TU	0	1
199-N-72	GW	TU	0	2	299-E27-11	GW	TU	0	2
199-N-73	GW	TU	0	2	299-E27-12	GW	TU	0	2
199-N-74	GW	TU	0	2	299-E27-13	GW	TU	0	2
199-N-77	GW	LU	0	2	299-E27-14	GW	TU	0	2
199-N-8P	GW	LU	0	2	299-E27-15	GW	TU	0	2
199-N-81	GW		0	2	299-E27-16	GW	TU	0	2
299-E13-10	GW	TU	0	1	299-E27-17	GW	TU	0	2
299-E13-14	GW	TU	0	1	299-E27-18	GW	TU	0	2
299-E16-1	GW	UC	1	1	299-E27-19	GW	TU	0	2
299-E17-1	GW	TU	0	0	299-E27-7	GW	TU	0	2
299-E17-12	GW	TU	0	1	299-E27-8	GW	TU	0	2
299-E17-14	GW	TU	0	1	299-E27-9	GW	TU	0	2
299-E17-18	GW	TU	0	1	299-E28-14	GW	U	1	1
299-E17-19	GW	TU	0	1	299-E28-17	GW	TU	0	1
299-E18-1	GW	TU	0	1	299-E28-26	GW	TU	0	1
299-E18-2	GW	TU	0	1	299-E28-27	GW	TU	0	1
299-E23-1	GW	TU	0	1	299-E28-28	GW	TU	0	1
299-E24-16	GW	TU	0	1	299-E28-4	GW	U	0	1
299-E24-18	GW	TU	0	1	299-E28-9	GW	TU	0	1

Well Name	Type	Zone	Surv	Total
299-E32-10	GW	TU	0	1
299-E32-2	GW	TU	0	1
299-E32-3	GW	TU	0	1
299-E32-4	GW	TU	0	4
299-E32-5	GW	TU	0	1
299-E32-6	GW	TU	0	1
299-E32-7	GW	TU	0	1
299-E32-8	GW	TU	0	1
299-E32-9	GW	TU	0	1
299-E33-12	GW	UC	1	1
299-E33-13	GW	TU	1	1
299-E33-18	GW	TU	0	4
299-E33-21	GW	TU	0	4
299-E33-28	GW	TU	0	1
299-E33-29	GW	TU	0	1
299-E33-30	GW	TU	0	1
299-E33-31	GW	TU	0	4
299-E33-32	GW	TU	0	4
299-E33-33	GW	TU	0	4
299-E33-34	GW	TU	0	1
299-E33-35	GW	TU	0	1
299-E33-36	GW	TU	0	4
299-E33-37	GW	TU	0	2
299-E33-38	GW	TU	0	4
299-E33-39	GW	TU	1	4
299-E33-41	GW	TU	0	4
299-E33-42	GW	TU	0	4
299-E33-43	GW	TU	0	4
299-E33-5	GW	TU	0	4
299-E33-7	GW	UU	1	1
299-E33-8	GW	TU	0	4
299-E34-10	GW	TU	0	2
299-E34-11	GW	TU	0	1
299-E34-12	GW	TU	0	1
299-E34-2	GW	TU	0	1
299-E34-3	GW	TU	0	1
299-E34-4	GW	TU	0	1
299-E34-5	GW	TU	0	1
299-E34-6	GW	TU	0	1
299-E34-7	GW	TU	0	1
299-E34-8	GW	TU	0	2
299-E34-9	GW	TU	0	1
299-E35-1	GW	TU	0	1
299-E35-2	GW	TU	0	2
299-W10-10	GW	TU	0	4
299-W10-11	GW	TU	0	4
299-W10-12	GW	TU	0	4
299-W10-13	GW	TU	0	1

Well Name	Type	Zone	Surv	Total
299-W10-14	GW	LU	0	1
299-W10-15	GW	TU	0	4
299-W10-16	GW	TU	0	4
299-W10-17	GW	TU	0	4
299-W10-18	GW	TU	0	4
299-W10-19	GW	TU	0	4
299-W10-20	GW		0	4
299-W10-21	GW		0	4
299-W10-22	GW		0	4
299-W10-8	GW	TU	0	4
299-W11-10	GW	TU	0	1
299-W11-23	GW	TU	0	4
299-W11-24	GW	TU	0	4
299-W11-27	GW	TU	0	4
299-W11-28	GW	TU	0	4
299-W11-31	GW	TU	0	4
299-W11-6	GW	U	0	1
299-W11-7	GW	TU	0	1
299-W11-9	GW	UU	0	1
299-W12-1	GW	TU	0	1
299-W14-12	GW	TU	0	4
299-W15-12	GW	TU	0	4
299-W15-15	GW	TU	0	1
299-W15-16	GW	TU	0	1
299-W15-17	GW	LU	0	1
299-W15-18	GW	TU	0	1
299-W15-19	GW	TU	0	1
299-W15-2	GW	TU	0	1
299-W15-20	GW	TU	0	1
299-W15-22	GW	TU	0	4
299-W15-23	GW	TU	0	1
299-W15-24	GW	TU	0	1
299-W15-4	GW	TU	0	1
299-W18-21	GW	TU	0	1
299-W18-22	GW	LU	0	1
299-W18-23	GW	TU	0	1
299-W18-24	GW	TU	0	1
299-W18-25	GW	TU	0	4
299-W18-26	GW	TU	0	1
299-W18-27	GW	TU	0	1
299-W18-28	GW	TU	0	1
299-W18-29	GW	P	0	1
299-W18-30	GW	TU	0	4
299-W18-31	GW	TU	0	4
299-W18-32	GW	TU	0	1
299-W18-33	GW		0	4
299-W19-14	GW	TU	0	1
299-W19-15	GW	U	0	1

Well Name	Type	Zone	Surv	Total
299-W19-20	GW	TU	0	1
299-W19-21	GW	TU	0	1
299-W19-27	GW	TU	0	4
299-W19-28	GW	TU	0	1
299-W19-31	GW	TU	0	4
299-W19-32	GW	TU	0	4
299-W22-20	GW	TU	1	1
299-W22-24O	GW		1	1
299-W22-24P	GW		1	1
299-W22-24Q	GW		1	1
299-W22-24R	GW		1	1
299-W22-24S	GW		1	1
299-W22-24T	GW		1	1
299-W22-39	GW	TU	0	4
299-W22-40	GW	TU	0	4
299-W22-41	GW	TU	0	4
299-W22-42	GW	TU	0	4
299-W22-43	GW	TU	0	4
299-W22-44	GW	TU	0	4
299-W22-45	GW	TU	0	4
299-W22-46	GW	TU	0	4
299-W23-11	GW	UU	0	1
299-W23-13	GW	TU	0	4
299-W23-14	GW	TU	0	4
299-W23-15	GW	TU	0	4
299-W26-10	GW	TU	0	2
299-W26-11	GW	P	0	2
299-W26-12	GW	TU	0	2
299-W26-3	GW	U	0	2
299-W26-6	GW	U	0	2
299-W26-7	GW	TU	0	2
299-W26-8	GW	TU	0	2
299-W26-9	GW	TU	0	2
299-W6-10	GW	TU	0	4
299-W6-11	GW	TU	0	1
299-W6-12	GW	TU	0	1
299-W6-2	GW	TU	0	4
299-W6-3	GW	LU	0	1
299-W6-4	GW	TU	0	4
299-W6-5	GW	TU	0	1
299-W6-6	GW	LU	0	1
299-W6-7	GW	TU	0	1
299-W6-8	GW	TU	0	1
299-W6-9	GW	TU	0	4
299-W7-1	GW	TU	0	1
299-W7-10	GW	TU	0	1
299-W7-11	GW	TU	0	1
299-W7-12	GW	TU	0	1

Well Name	Type	Zone	Surv	Total
299-W7-2	GW	TU	0	1
299-W7-3	GW	LU	0	1
299-W7-4	GW	TU	0	1
299-W7-5	GW	TU	0	1
299-W7-6	GW	TU	0	1
299-W7-7	GW	TU	0	1
299-W7-8	GW	TU	0	1
299-W7-9	GW	TU	0	1
299-W8-1	GW	TU	0	1
299-W9-1	GW	TU	0	1
3099-42-16	GW	U	1	1
3099-47-18B	GW	U	0	1
399-1-1	GW	TU	0	2
399-1-10A	GW	TU	0	2
399-1-11	GW	TU	0	2
399-1-12	GW	UU	0	2
399-1-13A	GW	TU	0	2
399-1-14A	GW	TU	0	2
399-1-15	GW	TU	0	2
399-1-16A	GW	TU	0	2
399-1-16B	GW	LU	0	2
399-1-17A	GW	TU	0	2
399-1-17B	GW	LU	0	2
399-1-17C	GW	CR	0	2
399-1-18A	GW	TU	0	2
399-1-18B	GW	MU	0	2
399-1-18C	GW	LU	0	2
399-1-19	GW	U	0	2
399-1-3	GW	TU	0	2
399-1-4	GW	TU	0	2
399-1-5	GW	TU	0	2
399-1-6	GW	TU	0	1
399-1-7	GW	TU	0	2
399-1-8	GW	LU	0	2
399-1-9	GW	CR	0	2
399-2-1	GW	TU	0	2
399-2-2	GW	TU	0	2
399-2-3	GW	TU	0	2
399-3-1	GW	TU	0	2
399-3-10	GW	TU	0	2
399-3-11	GW	TU	1	1
399-3-12	GW	TU	1	1
399-3-6	GW	TU	0	2
399-3-9	GW	TU	0	2
399-4-1	GW	TU	0	2
399-4-10	GW	TU	0	2
399-4-11	GW	TU	0	2
399-4-7	GW	TU	0	2

Well Name	Type	Zone	Surv	Total
399-4-9	GW	TU	0	2
399-5-1	GW	TU	0	2
399-5-2	GW	UC	1	1
399-5-4B	GW		1	1
399-6-1	GW	TU	0	2
399-8-1	GW	TU	0	2
399-8-2	GW	TU	0	2
399-8-3	GW	TU	0	2
399-8-4	GW	TU	1	1
399-8-5A	GW	TU	1	1
399-8-5B	GW	LU	1	1
399-8-5C	GW	CR	1	1
699-S11-E12A	GW	LU	1	1
699-S11-E12AP	GW	UC	1	1
699-S12-29	GW	TU	1	1
699-S12-29P	GW	MU	1	1
699-S12-29Q	GW	TB	1	1
699-S12-3	GW	TU	0	1
699-S14-20A	GW	UU	1	1
699-S16-24	GW	LC	1	1
699-S18-E2A	GW	MU	1	1
699-S18-E2AP	GW		1	1
699-S18-E2B	GW	TU	1	1
699-S19-E13	GW	TU	1	1
699-S19-E14	GW	TU	0	1
699-S19-11	GW	TU	0	1
699-S22-E9A	GW	TU	1	1
699-S22-E9B	GW	MU	1	1
699-S22-E9C	GW	TB	1	1
699-S24-19P		UC	1	1
699-S24-19Q		U	1	1
699-S27-E12A	GW		1	1
699-S27-E14	GW	TU	12	12
699-S27-E9A	GW	TU	1	1
699-S27-E9B	GW	LU	1	1
699-S27-E9C	GW	TB	1	1
699-S28-E12	GW	TU	0	1
699-S28-E13A	GW		1	1
699-S29-E10A	GW	TU	12	12
699-S29-E11	GW	TU	1	1
699-S29-E12	GW	UU	1	1
699-S29-E13A	GW		1	1
699-S29-E16A	GW	TU	1	1
699-S29-E16B	GW	MU	1	1
699-S29-E16C	GW	CR	1	1
699-S2-34A	GW		1	1
699-S2-34B	GW		1	1
699-S30-E10A	GW	TU	12	12
699-S30-E14	GW	LC	1	1
699-S30-E15A	GW	TU	1	1
699-S31-E10B	GW	TU	1	1
699-S31-E10C	GW	MU	0	1
699-S31-E10E	GW	MU	1	1
699-S31-E11	GW	TU	1	1
699-S31-E8A	GW	TU	12	12
699-S31-1	GW	UU	4	4
699-S31-1P	GW	TB	1	1
699-S32-E11	GW	TU	12	12
699-S32-E13A	GW	UU	12	12
699-S32-E13B	GW	UU	1	1
699-S32-E8	GW	CR	1	1
699-S33-2A		UU	1	1
699-S34-E10	GW	TU	1	1
699-S34-E15	GW	TU	1	1
699-S34-2A		UU	1	1
699-S34-2B		UU	1	1
699-S34-4A		UU	1	1
699-S36-E12B	GW	MU	0	1
699-S36-E13A	GW	UU	0	1
699-S36-E13B	GW	MU	1	1
699-S37-E11A	GW	TU	1	1
699-S37-E12A	GW	TU	1	1
699-S37-E14	GW	TU	12	12
699-S38-E11	GW	TU	1	1
699-S38-E12A	GW	TU	1	1
699-S38-E12B	GW	MU	1	1
699-S3-E12	GW	TU	0	1
699-S3-25	GW	TU	1	1
699-S40-E13A	GW	TU	1	1
699-S40-E13B	GW	TU	1	1
699-S40-E13C	GW	TU	1	1
699-S40-E14	GW	TU	12	12
699-S41-E11A	GW	TU	1	1
699-S41-E12	GW	TU	0	1
699-S41-E13A	GW	TU	1	1
699-S41-E13B	GW	MU	1	1
699-S41-E13C	GW	LU	1	1
699-S42-E8A	OS	TU	1	1
699-S42-E8B	OS	TU	1	1
699-S43-E12	GW	TU	12	12
699-S43-E7A	OS	TU	12	12
699-S6-E14A	GW	TU	1	1
699-S6-E4B	GW	TU	1	1
699-S6-E4D	GW	TU	1	1
699-S7-34	GW	MU	1	1
699-S7-34P	GW	UC	1	1

Well Name	Type	Zone	Surv	Total
699-S7-34Q	GW	UC	1	1
699-S8-19	GW	TU	1	1
699-101-48B	GW	UU	0	1
699-103-25	OS		1	1
699-107-79	OS	UC	1	1
699-10-E12	GW	TU	1	1
699-10-E12P	GW	TB	1	1
699-10-E12Q	GW	UU	1	1
699-10-54A	GW	UU	1	1
699-117-11	OS		1	1
699-11-45A	GW	U	0	1
699-13-1C	GW	UC	1	1
699-13-64	GW	TU	1	1
699-14-E6P	GW	UC	1	1
699-14-E6Q	GW	UC	1	1
699-14-E6R	GW	CR	1	1
699-14-E6S	GW	LU	1	1
699-14-38	GW	TU	0	1
699-14-47	GW	TU	0	1
699-15-E13	GW	C	1	1
699-15-15A	GW	TU	0	1
699-15-26	GW	TU	0	1
699-17-47	GW	LC	1	1
699-17-5	GW	TU	1	1
699-17-70	GW	TU	1	1
699-19-43	GW	UU	0	1
699-19-47B	GW	U	1	1
699-19-58	GW	TU	0	1
699-19-88	GW	TU	1	1
699-1-18	GW	TU	1	1
699-20-E12	GW	TU	1	1
699-20-E12P	GW	CR	1	1
699-20-E12Q	GW	LU	1	1
699-20-E12R	GW	MU	1	1
699-20-E12S	GW	UU	1	1
699-20-E5A	GW	TU	1	1
699-20-E5T	GW	UU	1	1
699-20-20	GW	TU	4	4
699-20-39	GW	TU	1	1
699-20-39P	GW	CR	1	1
699-20-41P	GW	LC	1	1
699-20-41Q	GW	LC	1	1
699-20-41R	GW	LC	1	1
699-21-17	GW	U	1	1
699-21-6	GW	TU	1	1
699-22-35	GW	TU	0	4
699-22-70	GW	UC	1	1
699-22-70P	GW	UC	1	1
699-22-70Q	GW	LC	1	1
699-23-34A	GW	TU	0	4
699-24-1P	GW	UC	1	1
699-24-1Q	GW	LU	1	1
699-24-1R	GW	LU	1	1
699-24-1S	GW	MU	1	1
699-24-1T	GW	UU	1	1
699-24-34B	GW	TU	0	1
699-24-35	GW	TU	0	1
699-24-46	GW	TU	1	1
699-25-34C	GW	TU	0	4
699-25-55	GW	TU	0	1
699-25-70	GW	TU	0	1
699-25-80	BW	LC	1	1
699-26-15A	GW	TU	1	1
699-26-15C	BW	TB	1	1
699-26-33	GW	TU	0	1
699-26-34A	GW	TU	0	4
699-26-34B	GW	TU	0	4
699-26-35A	GW	TU	0	4
699-26-83A	BW	UC	1	1
699-26-83BP	GW	LC	1	1
699-26-83BQ	GW	LC	1	1
699-26-83BR	GW	LC	1	1
699-26-89	GW	TU	0	1
699-27-8	GW	TU	0	1
699-28-52A	GW	TU	0	1
699-29-4	GW	TU	1	1
699-29-70AP	GW	UC	1	1
699-29-70AQ	GW	CR	1	1
699-29-70CP	GW	LC	1	1
699-29-70CQ	GW	LC	1	1
699-29-70CR	GW	LC	1	1
699-29-70CS	GW	LC	1	1
699-29-70CT	GW	LC	1	1
699-29-70CU	GW	LC	1	1
699-29-70DP	GW	LC	1	1
699-29-78	GW	LU	0	1
699-29-83	BW	UC	1	1
699-2-3	GW	TU	0	1
699-2-33A	GW	TU	1	1
699-2-33B	GW		1	1
699-2-33BP	GW	LU	1	1
699-2-33BQ	GW	MU	1	1
699-2-7	GW	U	1	1
699-31-84B	BW	LC	1	1
699-32-22A	GW	TU	1	1
699-32-22B	GW	UC	1	1

Well Name	Type	Zone	Surv	Total
699-32-43	GW	TU	0	1
699-32-62	GW	TU	1	1
699-32-62P	GW	LU	1	1
699-32-62Q	GW	MU	1	1
699-32-77	GW	TU	0	2
699-33-42	GW	TU	0	1
699-33-56	GW	TU	0	1
699-34-39A	GW	TU	0	1
699-34-41B	GW	TU	0	1
699-34-51	GW	UU	0	1
699-34-88	GW	TU	0	1
699-35-27	GW	LC	1	1
699-35-66A	GW	TU	0	1
699-35-70	GW	TU	0	1
699-35-78A	GW	TU	1	1
699-35-9	GW	TU	0	1
699-36-27	GW	U	1	1
699-36-61A	GW	TU	0	1
699-36-70A	GW		0	4
699-37-43	GW	TU	0	1
699-37-47A	GW	TU	0	1
699-37-82A	GW	TU	1	1
699-38-65	GW	TU	0	1
699-38-70	GW	TU	0	1
699-39-0	GW	TU	1	1
699-39-7A	GW	U	1	1
699-39-79	GW	TU	4	4
699-39-84CP	GW	LC	1	1
699-39-84CQ	GW	LC	1	1
699-39-84CR	GW	LC	1	1
699-39-84CS	GW	LC	1	1
699-39-84CT	GW	LC	1	1
699-39-84CU	GW	LC	1	1
699-3-45	GW	TU	1	1
699-40-1	GW	TU	0	1
699-40-12C	GW	U	1	1
699-40-20	GW	U	1	1
699-40-33A	GW	TU	0	1
699-40-36	GW	MU	0	4
699-40-40A	GW	MU	0	4
699-40-62	GW	TU	0	1
699-40-84	BW	TB	1	1
699-41-11	GW	U	1	1
699-41-23	GW	TU	0	1
699-41-25	GW	U	1	1
699-41-31	GW	U	1	1
699-41-35	GW	MU	0	4
699-41-40	GW	MU	0	4
699-41-42	GW	MU	0	4
699-42-E9AO	GW	TU	1	1
699-42-E9B	GW	UC	1	1
699-42-12A	GW	TU	1	1
699-42-12C	GW	TU	1	1
699-42-2	GW	TU	1	1
699-42-37	GW	MU	0	4
699-42-39B	GW	LU	0	4
699-42-40A	GW	UU	1	1
699-42-40B	GW	UU	1	1
699-42-40C	GW	UC	1	1
699-42-41	GW	TU	0	4
699-42-42A	GW	UC	1	1
699-42-42B	GW	MU	0	4
699-43-104	GW	TU	4	4
699-43-18	GW	U	1	1
699-43-40	GW	TU	0	4
699-43-41E	GW	UU	0	4
699-43-41G	GW	MU	0	4
699-43-42J	GW	TU	0	1
699-43-43	GW	TU	0	4
699-43-45	GW	TU	0	4
699-43-83	GW	TU	1	1
699-43-89	GW	TU	0	1
699-43-9	GW	U	1	1
699-43-91A	BW	U	1	1
699-43-91AP	GW	UC	1	1
699-43-91AQ	GW	CR	1	1
699-43-91DP	GW	LC	1	1
699-44-16	GW	U	1	1
699-44-39B	GW	UU	0	4
699-44-42	GW	TU	0	1
699-44-43B	GW	TU	0	4
699-44-64	GW	TU	0	1
699-44-91P	GW	LC	1	1
699-44-91Q	GW	LC	1	1
699-44-91R	GW	LC	1	1
699-44-91S	GW	LC	1	1
699-44-91T	GW	LC	1	1
699-44-91U	GW	LC	1	1
699-45-42	GW	TU	0	1
699-46-21B	GW	TU	0	1
699-46-31	GW	U	1	1
699-46-32	GW	UC	1	1
699-47-35A	GW	UU	0	1
699-47-35B	GW	UU	0	1
699-47-50	GW	UC	1	1
699-47-60	GW	TU	0	1

Well Name	Type	Zone	Surv	Total
699-47-80AP	GW	UC	1	1
699-47-80AQ	GW	LU	1	1
699-47-80CP	GW	LC	1	1
699-47-80CQ	GW	LC	1	1
699-47-80CR	GW	LC	1	1
699-47-80CS	GW	LC	1	1
699-47-80CT	GW	LC	1	1
699-47-80CU	GW	LC	1	1
699-47-80DP	GW	LC	1	1
699-48-18	GW	TU	1	1
699-48-48AP	BW	LC	1	1
699-48-48AQ	BW	LC	1	1
699-48-48AR	BW	LC	1	1
699-48-48AS	BW	LC	1	1
699-48-48AT	BW	LC	1	1
699-48-50	GW	TU	1	1
699-48-71	GW	TU	0	1
699-48-77A	GW	TU	0	12
699-48-77C	GW	MU	0	12
699-48-77D	GW		0	12
699-48-96	GW		1	1
699-49-100A	BW	LC	1	1
699-49-100B	BW	U	1	1
699-49-111	GW	LC	1	1
699-49-13E	GW	UU	0	1
699-49-28	GW	TU	0	1
699-49-31	GW	U	1	1
699-49-32B	GW	UC	1	1
699-49-55A	GW	TU	1	1
699-49-55B	GW	UC	1	1
699-49-57A	GW	TU	1	1
699-49-57B	GW	UC	1	1
699-49-79	GW	TU	0	1
699-50-28B	GW	UU	0	1
699-50-30	GW	TU	1	1
699-50-42	GW	TU	1	1
699-50-42P	GW	UC	1	1
699-50-45	GW	UC	1	1
699-50-48B	GW	UC	1	1
699-50-53A	GW	TU	1	1
699-50-53B	GW	UC	1	1
699-50-85	GW	TU	0	1
699-51-19	GW	U	1	1
699-51-36A	GW	LC	1	1
699-51-36B	GW	UC?	1	1
699-51-36C	GW	UC?	1	1
699-51-36D	GW	C?	1	1
699-51-46	GW	UC	1	1

Well Name	Type	Zone	Surv	Total
699-51-63	GW	TU	0	1
699-51-75	GW	TU	0	1
699-52-19	GW	TU	0	1
699-52-46A	GW	UC	1	1
699-52-48	GW	UC	1	1
699-52-52	GW	LC	1	1
699-52-54	GW	TU	0	1
699-52-57	GW	TU	0	1
699-53-103	GW	LC	1	1
699-53-111	GW	LC	1	1
699-53-114	GW	LC	1	1
699-53-35	GW	UU	1	1
699-53-47A	GW	TU	0	1
699-53-50	GW	UC	1	1
699-54-18A	GW	U	1	1
699-54-34	GW	TB	0	1
699-54-37A	GW	TB	1	1
699-54-42	GW	TU	1	1
699-54-45A	GW	TU	0	1
699-54-48	GW	TU	0	1
699-54-49	GW	TU	1	1
699-54-57	GW	UC	1	1
699-55-44	GW	UU	0	1
699-55-50C	GW	TU	0	1
699-55-55	GW	TU	0	1
699-55-60A	GW	MU	1	1
699-55-70	GW	TU	0	1
699-55-76	GW	TU	0	1
699-55-89	GW	TU	1	1
699-55-95	GW	UU	1	1
699-56-43	GW	UC	1	1
699-56-53	GW	UC	1	1
699-57-29A	GW	TU	1	1
699-57-59	GW	TU	0	1
699-57-83A	GW	UU	1	1
699-57-83BP	GW	LC	1	1
699-57-83BQ	GW	LC	1	1
699-57-83BR	GW	LC	1	1
699-57-83C	BW	LC	1	1
699-58-24	GW	TU	1	1
699-59-32	GW	UU	0	1
699-59-55	BW	U	1	1
699-59-58	GW	TU	0	1
699-59-80B	GW	TU	0	1
699-60-32	GW	UU	0	1
699-60-57	GW	U	1	1
699-60-60	GW	TU	4	4
699-61-37	GW	TU	1	1

Well Name	Type	Zone	Surv	Total
699-61-41	GW	TU	1	1
699-61-55B	BW	LC	1	1
699-61-57	BW	LC	1	1
699-61-62	GW	TU	0	1
699-61-66	GW	TU	0	1
699-62-31	GW	UU	0	1
699-62-43A	GW	UU	0	1
699-62-43F	GW	TU	1	1
699-63-25A	GW	TU	0	1
699-63-51	GW	TU	0	1
699-63-55	GW	TU	0	1
699-63-58	GW	TU	0	1
699-63-90	GW	TU	0	1
699-63-92	GW	UC	1	1
699-63-95	BW	LC	1	1
699-64-62	GW	TU	0	1
699-65-22	GW	U	0	1
699-65-50	GW	TU	0	1
699-65-59A	GW	TU	0	1
699-65-72	GW	TU	0	1
699-65-83	GW	TU	0	1
699-65-95	GW	LC	1	1
699-66-103	GW	TU	0	1
699-66-23	GW	TU	1	1
699-66-38	GW	TU	0	1
699-66-39	GW	TU	1	1
699-66-58	GW	TU	0	1
699-66-64	GW	TU	0	1
699-66-91	GW	UC	1	1
699-67-51	GW	TU	1	1
699-67-51P	GW	MU	1	1
699-67-51Q	GW	LU	1	1
699-67-86	GW	TU	0	1
699-67-98	GW	TU	0	1
699-68-105	GW	TU	0	1
699-69-38	GW	U	0	1
699-69-45	GW	TU	1	1
699-69-45O	GW	TU	1	1
699-69-45P	GW		1	1
699-69-45Q	GW		1	1
699-69-45R	GW		1	1
699-70-23	GW	U	0	1
699-70-37	GW	U	1	1
699-70-68	GW	TU	0	1
699-71-30	GW	TU	0	1
699-71-52	GW	TU	0	1
699-72-73	GW	TU	0	1
699-72-88	GW	TU	0	1
699-72-92	GW	TU	1	1
699-73-61	GW	TU	0	1
699-74-44	GW	TU	0	1
699-77-36	GW	TU	0	1
699-77-54	GW	TU	0	1
699-78-62	GW	TU	0	1
699-80-43P	GW	LU	1	1
699-80-43S	GW	UU	1	1
699-81-38	GW	U	0	1
699-81-58	GW	TU	0	1
699-83-47	GW	TU	0	1
699-84-35A	GW	U	1	1
699-84-35AO	GW		1	1
699-84-35AP	GW		1	1
699-84-35AQ	GW		1	1
699-84-35AR	GW		1	1
699-84-35AS	GW		1	1
699-86-42	GW	U	0	1
699-87-2	OS		1	1
699-87-42A	GW	U	0	1
699-87-55	GW	TU	0	2
699-88-41	GW	U	0	1
699-89-35	GW	TU	0	1
699-8-17	GW	TU	1	1
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