002222

PNL-6957
UC-11,41

START

RESOURCE CONSERVATION AND RECOVERY ACT GROUND-WATER MONITORING PROJECTS FOR HANFORD FACILITIES: PROGRESS REPORT FOR THE PERIOD JANUARY 1 TO MARCH 31, 1989

R. M. Smith
D. J. Bates
R. E. Lundgren

June 1989

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

Pacific Northwest Laboratory
Richland, Washington 99352

9111190977

AUG 1989
RECEIVED
EDMC

PREFACE

This document describes the progress of 13 Hanford Site ground-water monitoring projects for the period January 1 to March 31, 1989. The work described in this document is conducted by the Pacific Northwest Laboratory under the management of Westinghouse Hanford Company for the U.S. Department of Energy.

Concentrations of ground-water constituents are compared to federal drinking water standards throughout this document for reference purposes. All drinking water supplied from the sampled aquifer meets regulatory standards for drinking water quality.

9 1 1 1 8 8 9 0 9 7 9

SUMMARY

This report describes the progress of 13 Hanford ground-water monitoring projects for the period January 1 to March 31, 1989. There are 16 individual hazardous waste facilities covered by the 13 ground-water monitoring projects. These are the

- 300 Area Process Trenches (300 Area)
- 183-H Solar Evaporation Basins (100-H Area)
- 200 Areas Low-Level Burial Grounds, composed of

  Waste Management Area (WMA) 1
  Waste Management Area (WMA) 2
  Waste Management Area (WMA) 3
  Waste Management Area (WMA) 4

- Nonradioactive Dangerous Waste Landfill (southeast of the 200 Areas)
- 1301-N Liquid Waste Disposal Facility (100-N Area)
- 1324-N Surface Impoundment and 1324-NA Percolation Pond (100-N Area)
- 1325-N Liquid Waste Disposal Facility (100-N Area)
- 216-A-10 Crib (200-East Area)
- 216-A-29 Ditch (200-East Area)
- 216-A-36B Crib (200-East Area)
- 216-B-3 Pond (east of the 200-East Area)
- 2101-M Pond (200-East Area)
- Grout Treatment Facility (200-East Area).

This report is the eleventh in a series of quarterly status reports; the first ten cover the period from May 1, 1986, through December 31, 1988 (PNL 1986; 1987a, 1987b, 1987c, 1987d; 1988b, 1988c, 1988d; Fruland, Bates, and Lundgren 1989a, 1989b).

The 13 projects discussed in this report were designed according to applicable interim-status ground-water monitoring requirements specified in the Resource Conservation and Recovery Act of 1976 (RCRA) as amended, in 40 CFR 265, Subpart F, and in WAC 173-303.

9 1 1 9 8 9 0 9 8 1

During this quarter, field activities primarily consisted of ground-water sampling and analyses, and water-level monitoring.

9 1 1 3 9 0 9 3 2

ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this report.

ASTM - American Society for Testing and Materials

CFR - U.S. Code of Federal Regulations

DOE - U.S. Department of Energy
DOE-RL - U.S. Department of Energy-Richland Operations Office

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

ft - feet
ft/mi - feet per mile
FY - fiscal year (i.e., October through September)

gal - gallon
gal/d - gallons per day
gal/yr - gallons per year
gpm - gallons per minute
GTF - Grout Treatment Facility

LLBGs - Low-Level Burial Grounds
LWDF - Liquid Waste Disposal Facility

MCL - maximum contaminant level

NRDW - Nonradioactive Dangerous Waste Landfill

PCE - perchloroethene
pCi/L - pico curies per liter
PNL - Pacific Northwest Laboratory
ppb - parts per billion
ppm - parts per million
PUREX - plutonium-uranium extraction

RCRA - Resource Conservation and Recovery Act

SWL - Solid Waste Landfill
SWS - surface water station

TEGD - Technical Enforcement Guidance Document (EPA 1986a)
TOC - total organic carbon
TOX - total organic halogen
TOXLDL - total organic halogen, lower detection limit

UST - United States Testing Company, Incorporated

VOC - volatile organic compounds, constituents, or chemicals

WAC - Washington Administrative Code
WMA - Waste Management Area

μg/L - micrograms per liter
μmhos - micromhos (measure of conductivity)

9 1 1 1 3 8 9 0 9 3 4

CONTENTS

PREFACE iii

SUMMARY v

ABBREVIATIONS AND ACRONYMS vii

1.0 INTRODUCTION. 1.1

ANALYTICAL ANOMALIES. 1.3

Methylene Chloride 1.3

Chromium 1.3

QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM 1.4

ERRATA FROM PREVIOUS REPORTS 1.5

2.0 300 AREA PROCESS TRENCHES (R. Schalla). 2.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 2.2

Abandonment. 2.2

Hydrogeologic Characterization 2.2

WATER LEVELS. 2.2

WATER CHEMISTRY DATA. 2.3

3.0 183-H SOLAR EVAPORATION BASINS (S. H. Hall) 3.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 3.2

WATER LEVELS 3.2

WATER CHEMISTRY DATA 3.2

4.0 200 AREAS LOW-LEVEL BURIAL GROUNDS (G. V. Last) 4.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 4.1

WATER LEVELS 4.1

WATER CHEMISTRY DATA 4.2

5.0 NONRADIOACTIVE DANGEROUS WASTE LANDFILL (R. M. Fruland) . . . 5.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 5.2

WATER LEVELS 5.2

WATER CHEMISTRY DATA 5.2

6.0 1301-N LIQUID WASTE DISPOSAL FACILITY (T. J. Gilmore) 6.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 6.1

WATER LEVELS 6.2

WATER CHEMISTRY DATA 6.2

Background Indicator Parameter Analyses 6.2

Initial Planning for the Ground-Water Quality Assessment Program 6.4

Ground-Water Analyses Other than Indicator Parameter 6.4

7.0 1324-N SURFACE IMPOUNDMENT AND 1324-NA PERCOLATION POND (T. J. Gilmore). 7.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 7.2

WATER LEVELS 7.2

WATER CHEMISTRY DATA 7.2

Collection and Analysis. 7.3

8.0 1325-N LIQUID WASTE DISPOSAL FACILITY (T. J. Gilmore) 8.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 8.1

WATER LEVELS 8.1

WATER CHEMISTRY DATA 8.2

Discussion of Results. 8.2

9.0 216-A-10 CRIB (S. P. Luttrell). 9.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 9.1

WATER LEVELS 9.1

WATER CHEMISTRY DATA 9.2

10.0 216-A-29 DITCH (S. P. Luttrell) 10.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 10.1

WATER LEVELS 10.1

WATER CHEMISTRY DATA 10.1

11.0 216-A-36B CRIB (S. P. Luttrell) 11.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 11.1

WATER LEVELS 11.2

WATER CHEMISTRY DATA 11.2

12.0 216-B-3 POND (S. P. Luttrell) 12.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 12.1

WATER LEVELS 12.1

WATER CHEMISTRY DATA. 12.2

13.0 2101-M POND (M. A. Chamness). 13.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 13.1

WATER LEVELS. 13.1

WATER CHEMISTRY DATA 13.2

14.0 GROUT TREATMENT FACILITY (S. S. Teel) 14.1

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION 14.2

WATER LEVELS 14.2

WATER CHEMISTRY DATA 14.2

Discussion of Results. 14.3

15.0 REFERENCES. 15.1

9 1 1 3 9 0 9 9 7

FIGURES

1.1 RCRA Ground-Water Monitoring Projects and Landmarks on the Hanford Site, March 1989 . . . . . 1.6

2.1 Locations for Wells Used in December for the 27-Well Monitoring Network for the 300 Area Process Trenches. 2.6

2.2 Water-Level Well Locations and Ground-Water Flow Pattern Near the 300 Area Process Trenches. 2.7

2.3 Water-Level Elevations for Wells 399-1-16A and 399-1-16C and the Surface Water Station SWS-2 Near the 300 Area Process Trenches 2.9

2.4 Uranium Concentrations in pCi/L in Wells 399-1-11, 399-1-17A, 399-1-18A, and 399-1-19. . . . . 2.11

3.1 Monitoring Well Locations Near the 183-H Solar Evaporation Basins 3.4

3.2 Columbia River Elevation at the 100-H Area for the Period December 29, 1988, to January 31, 1989. . . . . 3.5

3.3 Columbia River Elevation at the 100-H Area for the Period January 31 to February 27, 1989 . . . . . 3.6

3.4 Columbia River Elevation at the 100-H Area for the Period February 27 to March 30, 1989 . . . . . 3.7

3.5 Water-Table Contour Map for the 100-H Area at High River Stage 3.8

3.6 Water-Table Contour Map for the 100-H Area at Low River Stage 3.9

3.7 Extent of the Contaminant Plume Attributed to the 183-H Solar Evaporation Basins, Based on Nitrate, Chromium, Uranium, and Technetium-99 Data from Ground-Water Samples Collected from July 1987 to September 1988 . . . . . 3.10

4.1 Monitoring Well Locations for the 200-East Area Low-Level Burial Grounds 4.5

4.2 Monitoring Well Locations for the 200-West Area Low-Level Burial Grounds 4.6

5.1 Monitoring Well Locations for the Solid Waste Landfill and the Nonradioactive Dangerous Waste Landfill 5.3

6.1 Monitoring Well Locations for the 1301-N Liquid Waste Disposal Facility as of October 1988 . . . . . 6.5

6.2 Monitoring Well Locations in the 100-N Area 6.6

6.3 Computer-Generated Water-Table Map of the 100-N Area, January 1989. . . . . 6.7

6.4 Computer-Generated Water-Table Map of the 100-N Area, February 1989 . . . . . 6.8

6.5 Computer-Generated Water-Table Map of the 100-N Area, March 1989 . . . . . 6.9

6.6 Plot of Conductivity Data for Wells 199-N-2, 199-N-3, 199-N-4, 199-N-14, 199-N-49, 199-N-67, and 199-N-69, March 1987 to December 1988 . . . . . 6.10

7.1 Monitoring Well Locations for the 1324-N/NA Facilities . . . 7.4

8.1 Monitoring Well Locations for the 1325-N Liquid Waste Disposal Facility 8.5

9.1 Monitoring Well Locations for the 216-A-10 Crib 9.3

10.1 Monitoring Well Locations for the 216-A-29 Ditch. 10.3

11.1 Monitoring Well Locations for the 216-A-36B Crib. 11.3

12.1 Monitoring Well Locations for the 216-B-3 Pond. 12.3

13.1 Monitoring Well Locations for the 2101-M Pond 13.3

14.1 Monitoring Well Locations for the Grout Treatment Facility 14.5

14.2 Water-Level Elevations Near the Grout Treatment Facility, March 1989. . . . . 14.6

9 1 1 3 8 7 0 9 9 9

TABLES

1.1 Status of Hanford Site Resource Conservation and Recovery Act Interim-Status Ground-Water Monitoring Projects as of February 28, 1989 . . . . . 1.7

2.1 Ground-Water Monitoring Wells for the 300 Area Process Trenches 2.12

2.2 Sampling Schedule for the 300 Area Process Trenches 2.13

2.3 Water-Level Data for 300 Area Wells on February 6 and March 8, 1989 . . . . . 2.14

2.4 Constituent List and Summary of Sampling Results for the 300 Area Process Trenches, December 1988 Through February 1989 . . . . . 2.15

2.5 Constituents with at Least One Detected Value for the 300 Area Process Trenches, December 1988 Through February 1989 . . . . . 2.18

2.6 Volatile Organic Analyses for Monitoring Abandonment of Well 399-1-16D 2.27

3.1 Sampling Schedule for the 183-H Solar Evaporation Basins . . 3.11

3.2 Water-Level Data for the 183-H Basins, January Through March 1989 . . . . . 3.12

3.3 Constituent List and Summary of Sampling Results for the 183-H Solar Evaporation Basins, December 1988 Through February 1989 . . . . . 3.17

3.4 Constituents with at Least One Detected Value for the 183-H Solar Evaporation Basins, December 1988 Through February 1989 . . . . . 3.20

4.1 Ground-Water Monitoring Wells for the 200 Areas Low-Level Burial Grounds 4.7

4.2 Sampling Schedule for the 200 Areas Low-Level Burial Grounds 4.8

4.3 Water-Level Data for Monitoring Wells Near the 200-East Area Low-Level Burial Grounds 4.9

4.4 Water-Level Data for Monitoring Wells Near the 200-West Area Low-Level Burial Grounds 4.10

4.5 Constituent List and Summary of Sampling Results for the Low-Level Burial Grounds, WMA-1, December 1988 Through February 1989 . . . . . 4.12

4.6 Constituents with at Least One Detected Value for the Low-Level Burial Grounds, WMA-1, December 1988 Through February 1989 . . . . . 4.15

4.7 Constituent List and Summary of Sampling Results for the Low-Level Burial Grounds, WMA-2, December 1988 Through February 1989 . . . . . 4.19

4.8 Constituents with at Least One Detected Value for the Low-Level Burial Grounds, WMA-2, December 1988 Through February 1989 . . . . . 4.22

4.9 Constituent List and Summary of Sampling Results for the Low-Level Burial Grounds, WMA-3, December 1988 Through February 1989 . . . . . 4.25

4.10 Constituents with at Least One Detected Value for the Low-Level Burial Grounds, WMA-3, December 1988 Through February 1989 . . . . . 4.28

4.11 Constituent List and Summary of Sampling Results for the Low-Level Burial Grounds, WMA-4, December 1988 Through February 1989 . . . . . 4.33

4.12 Constituents with at Least One Detected Value for the Low-Level Burial Grounds, WMA-4, December 1988 Through February 1989 . . . . . 4.37

5.1 Sampling Schedule for the Nonradioactive Dangerous Waste Landfill 5.4

5.2 Water-Level Data for Wells Monitoring the Nonradioactive Dangerous Waste Landfill and the Solid Waste Landfill, January 31, 1989. . . . . 5.4

5.3 Constituents with at Least One Detected Value for the Non-Radioactive Dangerous Waste Landfill, December 1988 Through February 1989 . . . . . 5.5

5.4 Contamination Indicator Parameter Replicate Averages for the Non-Radioactive Dangerous Waste Landfill, December 1988 Through February 1989. . . . . 5.6

6.1 Water-Level Data for Wells in the 100-N Area, January Through March 1989 . . . . . 6.11

6.2 Background Ground-Water Constituent Values for the 1301-N Facility 6.14

6.3 Inorganic, Organic, and Radiological Constituents and Other Parameters to be Analyzed for in the 1301-N Ground-Water Quality Assessment Monitoring Network 6.14

6.4 Inorganic Constituents and Parameters to be Analyzed for in the 1301-N Ground-Water Quality Assessment Monitoring Network 6.15

6.5 Ground-Water Quality Assessment Program Sampling Schedule for the 1301-N Facility, 1989 . . . . . 6.15

6.6 Constituent List and Summary of Sampling Results for the 1301-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 6.16

6.7 Constituents with at Least One Detected Value for the 1301-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 6.24

6.8 Contamination Indicator Parameter Replicate Averages for the 1301-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 6.27

7.1 Sampling Schedule for the 1324-N/NA Facilities. 7.5

7.2 Background Ground-Water Constituent Values for the 1324-N/NA Facilities 7.5

8.1 Sampling Schedule for the 1325-N Liquid Waste Disposal Facility 8.6

8.2 Constituent List and Summary of Sampling Results for the 1325-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 8.7

8.3 Constituents with at Least One Detected Value for the 1325-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 8.10

8.4 Contamination Indicator Parameter Replicate Averages for the 1325-N Liquid Waste Disposal Facility, December 1988 Through February 1989 . . . . . 8.15

8.5 Site-Specific Sampling Constituents for the 1325-N Facility 8.17

8.6 Background Ground-Water Constituent Values for the 1325-N Facility 8.17

9.1 Sampling Schedule for the 216-A-10 Crib 9.4

9.2 Water-Level Data for Wells Near the 216-A-10 Crib 9.5

9.3 Constituent List and Summary of Sampling Results for the 216-A-10 Crib, December 1988 Through February 1989 . . . 9.6

9.4 Constituents with at Least One Detected Value for the 216-A-10 Crib, December 1988 Through February 1989 . . . . . 9.10

10.1 Sampling Schedule for the 216-A-29 Ditch 10.4

10.2 Water-Level Data for Wells Near the 216-A-29 Ditch 10.4

10.3 Constituent List and Summary of Sampling Results for the 216-A-29 Ditch, December 1988 Through February 1989 . . . . . 10.5

10.4 Constituents with at Least One Detected Value for the 216-A-29 Ditch, December 1988 Through February 1989 . . . . . 10.8

11.1 Sampling Schedule for the 216-A-36B Crib 11.4

11.2 Water-Level Data for Wells Near the 216-A-36B Crib 11.4

11.3 Constituent List and Summary of Sampling Results for the 216-A-36B Crib, December 1988 Through February 1989 . . . . . 11.5

11.4 Constituents with at Least One Detected Value for the 216-A-36B Crib, December 1988 Through February 1989 . . . . . 11.10

12.1 Sampling Schedule for the 216-B-3 Pond 12.4

12.2 Water-Level Data for Wells Near the 216-B-3 Pond 12.5

12.3 Constituent List and Summary of Sampling Results for the 216-B-3 Pond, December 1988 Through February 1989 . . . . 12.6

12.4 Constituents with at Least One Detected Value for the 216-B-3 Pond, December 1988 Through February 1989 . . . . . 12.10

13.1 Sampling Schedule for the 2101-M Pond 13.4

13.2 Water-Level Elevation Data for Wells Near the 2101-M Pond 13.5

13.3 Constituent Lists and Summary of Sampling Results for the 2101-M Pond, December 1988 Through February 1989. . . . . 13.6

13.4 Constituents with at Least One Detected Value for the 2101-M Pond, December 1988 Through February 1989. . . . . 13.10

14.1 Sampling Schedule for the Grout Treatment Facility 14.7

14.2 Water-Level Data Taken Before Sample Collection at the Grout Treatment Facility, January Through March 1989 . . . . 14.8

14.3 Monthly Water-Level Data Collected During the First Quarter of 1989 for the Grout Treatment Facility 14.9

14.4 Constituent List and Summary of Sampling Results for the Grout Treatment Facility, December 1988 Through February 1989 . . . . . 14.11

14.5 Constituents with at Least One Detected Value for the Grout Treatment Facility, December 1988 Through February 1989 . . . . . 14.15

14.6 List 2 Constituents for the Grout Treatment Facility 14.21

14.7 List 4 Constituents for the Grout Treatment Facility 14.21

1.0 INTRODUCTION

The U.S. Department of Energy-Richland Operations Office (DOE-RL) administers and Westinghouse Hanford Company currently operates the Hanford facilities included in this report. The Hanford Site in southeastern Washington (Figure 1.1) is one of many DOE installations across the United States involved in a variety of activities related to energy research and development, nuclear weapons, and national security. A number of Hanford facilities use and generate hazardous materials and wastes, which must be managed so that public health and the environment are protected. The Resource Conservation and Recovery Act (RCRA) was enacted in 1976, providing a regulatory structure for the management of solid wastes, which includes hazardous wastes. The Pacific Northwest Laboratory (PNL) initiated RCRA site characterization and ground-water monitoring activities in 1985 for UNC Nuclear Industries, Westinghouse Hanford Company, and Rockwell Hanford Operations, which were Hanford operating contractors at the time. Pacific Northwest Laboratory designed ground-water monitoring programs to meet the requirements contained in RCRA, 40 CFR 265, Subpart F, and in WAC 173-303. The analytical results of the RCRA ground-water monitoring programs are compared to drinking water standards. However, the unconfined aquifer is not used as a source of drinking water at any of the facilities included in this report.

A RCRA Part A application for the Hanford Site has been submitted to the U.S. Environmental Protection Agency (EPA) Region 10 and the Washington State Department of Ecology (hereafter called Ecology). Currently, the Hanford Site is operating under RCRA interim status. Interim-status standards applicable to ground-water monitoring activities are discussed in 40 CFR 265.90 to 265.94, and WAC 173-303-400, and are applicable to Hanford Site facilities until final administrative disposition of Part B permit or closure application(s).

Hanford interim-status ground-water monitoring projects are conducted as either background, indicator parameter, or ground-water quality assessment monitoring programs (40 CFR 265). A background monitoring program involves

quarterly monitoring for the first year to obtain background data to characterize the quality of the ground water, followed in subsequent years by a minimum of semiannual monitoring of indicator parameters. Data obtained during indicator parameter monitoring are compared with the background levels established during the first year of ground-water monitoring. If a statistically significant change occurs, a ground-water quality assessment program is implemented, which among other requirements, reinstitutes quarterly monitoring.

This report describes progress from January 1 through March 31, 1989, for 13 RCRA ground-water monitoring projects at 16 Hanford Site hazardous waste disposal facilities: 300 Area Process Trenches, 183-H Solar Evaporation Basins, four Waste Management Areas (WMAs) in the 200 Areas Low-Level Burial Grounds (LLBGs), Nonradioactive Dangerous Waste Landfill (NRDW), 1301-N Liquid Waste Disposal Facility (LWDF), 1324-N Surface Impoundment and 1324-NA Percolation Pond, 1325-N LWDF, 216-A-10 Crib, 216-A-29 Ditch, 216-A-36B Crib, 216-B-3 Pond, 2101-M Pond, and the Grout Treatment Facility. The location of each facility is shown in Figure 1.1.

Table 1.1 presents the status of each ground-water monitoring project. Ground-water quality assessment projects are in progress for the 300 Area Process Trenches and the 183-H Solar Evaporation Basins. Of the projects listed in Table 1.1, the Nonradioactive Dangerous Waste Landfill and the 1301-N and 1325-NLWDFs are in the indicator evaluation phase, and the remaining programs are in the first year of background monitoring. Elevated levels of specific conductance have been reported for the 1301-N facility and the process to begin ground-water quality assessment has been initiated.

Ten previous quarterly reports (PNL 1986; 1987a, 1987b, 1987c, 1987d; 1988b, 1988c, 1988d; Fruland, Bates, and Lundgren 1989a, 1989b) have been issued in this series and cover the period from May 1, 1986, to December 31, 1988. This report includes activities conducted during the first calendar quarter of 1989 (January 1 to March 31, 1989). For most facilities, analytical results from sampling activities accomplished during the last month of this quarter were not available in time for inclusion in this report and will be reported in the next quarterly report (April 1 to June 30, 1989).

ANALYTICAL ANOMALIES

Several projects report two constituents that are currently suspected of not representing true ground-water conditions. These are methylene chloride (dichloromethane), listed in WAC 173-303-9905 and 40 CFR 264, Appendix IX, and chromium, listed in 40 CFR 265, Appendix III.

Methylene Chloride

This constituent has been found sporadically in volatile organic compound (VOC) and total organic halogen (TOX) samples since the implementation of RCRA ground-water monitoring in 1985. Early cases were apparently caused by contaminated sample bottles; a few bladder pumps in the 100-H and 300 Area wells may also have been contaminated by methylene chloride. Incidents of methylene chloride detection decreased to only spurious events until the summer of 1988.

Beginning in June and continuing into the fall of 1988, a number of elevated methylene chloride and TOX (believed to be a result of methylene chloride) levels have been reported across the Site. However, there is no consistent pattern: the occurrence is random in time and space, and resampling the wells thus far has indicated the absence of methylene chloride. A number of investigations into the problem, including resampling the wells, analysis of some materials and lubricants on field vehicles, and investigation into sampling preparations, have ruled out contamination in the field from two commonly used lubricants, contamination from sample bottles, and laboratory contamination. The occurrence of this constituent is being carefully monitored and evaluated. Although the source has not yet been determined, it currently appears to have been introduced during field collection.

Chromium

Elevated concentrations of chromium greater than 50 $\mu g/L$ in unfiltered samples have been observed in a number of newly constructed Hanford ground-water monitoring wells over the past year. These chromium concentrations, associated with elevated iron, manganese, and nickel concentrations, are mainly observed in unfiltered samples and are much lower or undetected in the corresponding filtered samples. Other detected species that have been observed in unfiltered samples include nickel and aluminum. Possible

sources of these constituents are natural borehole sediments and well construction materials. Although the source for some constituents may seem obvious (e.g., stainless steel casing for nickel), it is not possible to attribute these constituents to one particular source (e.g., iron is also a very common constituent in natural sediments), based on the present data. The contamination is of a particulate nature that can be readily purged by pumping and may therefore be an artifact of well construction rather than true ground-water contamination. The source of these metals and practical solutions to the problem are the subjects of an ongoing investigation. Meanwhile, chromium concentrations are being carefully monitored and evaluated.

QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM

The RCRA ground-water monitoring projects are covered by a quality assurance plan designed in accordance with QAMS-005/80, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (Stanley and Verner 1983).

The quality control program to assess the analytical results reported includes 1) submission of blind standard, blank, and replicate samples; 2) submission of duplicate samples to alternate laboratories; and 3) participation of the analytical laboratory in interlaboratory and intralaboratory comparison programs. The quality control program has been designed based on draft guidance from EPA Region 10 and EPA RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD) (EPA 1986a). Analyses are performed by the primary analytical laboratory (United States Testing Company, Incorporated) in accordance with the current edition of EPA's Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (EPA 1986b) and are updated as necessary. Values from interlaboratory comparisons must fall within 2.8 standard deviations based on EPA Water Supply or Water Pollution Laboratory Performance Evaluations. This is equivalent to the 95% confidence interval for two independent samples analyzed by the laboratories.

For blind standard samples where a true concentration is known, 2.0 standard deviations, equivalent to the 95% confidence limit, is the target range. If results fall outside the 99% confidence interval, a request for data verification is warranted (ASTM 1987).

ERRATA FROM PREVIOUS REPORTS

In the previous report in this series (Fruland, Bates, and Lundgren 1989b), Table 13.2 contained a typographic error. Except for the first half column under "Metals Results," all other columns under that heading should read 299-E18-3. The corrected table follows.

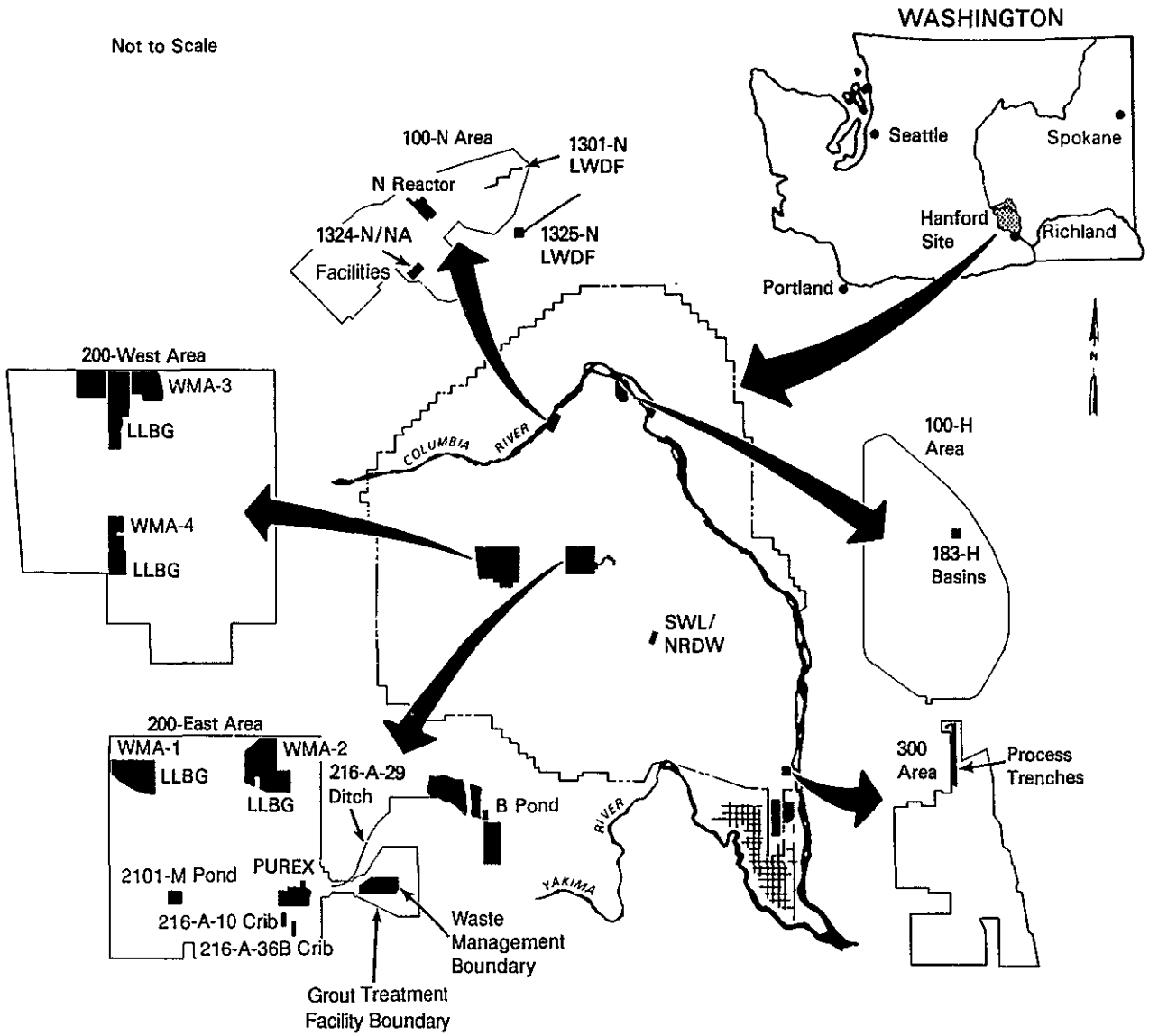

FIGURE 1.1. RCRA Ground-Water Monitoring Projects and Landmarks on the Hanford Site, March 1989

TABLE 1.1. Status of Hanford Site Resource Conservation and Recovery Act Interim-Status Ground-Water Monitoring Projects as of February 28, 1989

Project	Background (quarters monitored)	Indicator Parameter Evaluation	Ground-Water Quality Assessment Monitoring
300 Area Process Trenches			X
183-H Solar Evaporation Basins			X
LLBG WMA-1	2		
LLBG WMA-2	2		
LLBG WMA-3	2		
LLBG WMA-4	2		
Nonradioactive Dangerous Waste Landfill		X	
1301-N LWDF		X	
1324-N/NA Facilities	4		
1325-N LWDF		X	
216-A-10 Crib	3		
216-A-29 Ditch	2		
216-A-36B Crib	2[a]		
216-B-3 Pond	2		
2101-M Pond	3		
Grout Treatment Facility	3		

(a) Three sets of quarterly samples have been collected; however, the samples collected the first quarter are not considered representative because of incomplete well development.

TABLE 13.2. Results of Borehole Sediment Analysis Using X-Ray Fluorescence Method, Corrected Table

Constituent	Metals Results		
	299-E18-1 (195 ft)	299-E18-3 (45 ft)	299-E18-3 (45 ft)[a]
Aluminum (%)	6.79 ± 0.39	6.63 ± 0.38	6.56 ± 0.38
Silica (%)	30.0 ± 1.5	30.4 ± 1.5	31.7 ± 1.6
Phosphorus (%)	<0.069	<0.064	<0.068
Sulfur (%)	<0.019	<0.018	<0.019
Chlorine (%)	<0.010	<0.010	<0.010
Potassium (%)	1.833 ± 0.093	2.07 ± 0.10	2.12 ± 0.11
Calcium (%)	2.64 ± 0.13	2.26 ± 0.12	2.27 ± 0.12
Titanium (%)	0.385 ± 0.020	0.292 ± 0.015	0.291 ± 0.015
Vanadium (ppm)	98 ± 23	65 ± 20	58 ± 20
Chromium (ppm)	34 ± 12	32 ± 11	24 ± 11
Manganese (ppm)	625 ± 34	484 ± 27	459 ± 26
Iron (ppm)	3.33 ± 0.17	2.57 ± 0.13	2.52 ± 0.13
Cobalt (ppm)	<35	43 ± 16	<31
Nickel (ppm)	19.3 ± 4.1	21.4 ± 3.7	15.4 ± 3.6
Copper (ppm)	19.6 ±1.8	14.7 ± 1.5	15.8 ± 1.6
Zinc (ppm)	57.0 ± 3.3	45.0 ± 2.7	45.1 ± 2.6
Gallium (ppm)	14.5 ± 1.1	13.2 ± 1.0	13.4 ± 1.0
Mercury (ppm)	<2.5	<2.4	<2.4
Selenium (ppm)	<0.89	<0.87	<0.86
Lead (ppm)	13.1 ± 1.4	11.1 ± 1.4	10.6 ± 1.3
Arsenic (ppm)	4.63 ± 0.74	4.46 ± 0.72	5.11 ± 0.74
Bromine (ppm)	<0.84	<0.80	0.83 ± 0.40
Rubidium (ppm)	70.5 ± 3.6	87.5 ± 4.5	87.0 ± 4.4
Strontium (ppm)	412 ± 21	358 ± 18	352 ± 18
	299-E18-3 (62 ft)	299-E18-3 (84 ft)	299-E18-3 (97 ft)
Aluminum (%)	6.74 ± 0.39	6.73 ± 0.39	6.92 ± 0.40
Silica (%)	30.0 ± 1.5	29.9 ± 1.5	30.8 ± 1.6
Phosphorus (%)	<0.066	<0.066	<0.066
Sulfur (%)	<0.018	<0.018	<0.018
Chlorine (%)	<0.010	<0.009	<0.010
Potassium (%)	2.02 ± 0.10	2.00 ± 0.10	1.971 ± 0.099
Calcium (%)	2.23 ± 0.11	2.32 ± 0.12	2.26 ± 0.12
Titanium (%)	0.386 ± 0.020	0.355 ± 0.019	0.347 ± 0.018
Vanadium (ppm)	121 ± 23	92 ± 22	91 ± 21
Chromium (ppm)	32 ± 11	38 ± 11	40 ± 11
Manganese (ppm)	593 ± 32	546 ± 30	542 ± 30
Iron (ppm)	3.14 ± 0.16	2.93 ± 0.15	2.73 ± 0.14
Cobalt (ppm)	<34	<33	<32
Nickel (ppm)	23.0 ± 4.0	20.4 ± 3.9	23.5 ± 3.8
Copper (ppm)	18.7 ± 1.7	17.9 ± 1.7	18.0 ± 1.7
Zinc (ppm)	58.1 ± 3.3	58.8 ± 3.4	59.3 ± 3.4
Gallium (ppm)	13.5 ± 1.0	14.9 ± 1.1	14.5 ± 1.1
Mercury (ppm)	<2.5	<2.5	<2.4

TABLE 13.2. (contd)

Constituent	Metal Results		
	299-E18-3 (195 ft)	299-E18-3 (45 ft)	299-E18-3 (45 ft)
Selenium (ppm)	<0.88	<0.87	<0.86
Lead (ppm)	13.4 ± 1.4	15.5 ± 1.5	13.3 ± 1.5
Arsenic (ppm)	6.58 ± 0.82	6.34 ± 0.81	9.60 ± 0.90
Bromine (ppm)	<0.86	<0.87	<0.86
Rubidium (ppm)	79.5 ± 4.1	86.4 ± 4.4	80.7 ± 4.1
Strontium (ppm)	363 ± 19	352 ± 18	360 ± 19
	299-E18-3 (194 ft)	299-E18-3 (194 ft)[a]	
Aluminum (%)	6.68 ± 0.39	6.53 ± 0.38	
Silica (%)	29.3 ± 1.5	30.0 ± 1.5	
Phosphorus (%)	<0.067	<0.067	
Sulfur (%)	<0.018	<0.018	
Chlorine (%)	<0.010	<0.010	
Potassium (%)	2.01 ± 0.10	1.98 ± 0.10	
Calcium (%)	2.50 ± 0.13	2.51 ± 0.13	
Titanium (%)	0.347 ± 0.018	0.344 ± 0.018	
Vanadium (ppm)	<41	93 ± 22	
Chromium (ppm)	46 ± 12	48 ± 12	
Manganese (ppm)	473 ± 27	481 ± 27	
Iron (ppm)	2.85 ± 0.14	2.84 ± 0.14	
Cobalt (ppm)	47 ± 17	<33	
Nickel (ppm)	30.4 ± 4.0	25.1 ± 2.4	
Copper (ppm)	19.5 ± 1.8	19.6 ± 1.7	
Zinc (ppm)	58.5 ± 3.3	60.3 ± 3.4	
Gallium (ppm)	14.6 ± 1.1	13.8 ± 1.1	
Mercury (ppm)	<2.4	<2.5	
Selenium (ppm)	1.14 ± 0.43	<0.87	
Lead (ppm)	13.8 ± 1.4	15.1 ± 1.5	
Arsenic (ppm)	10.08 ± 0.92	10.00 ± 0.92	
Bromine (ppm)	<0.85	<0.86	
Rubidium (ppm)	81.1 ± 4.2	79.8 ± 4.1	
Strontium (ppm)	383 ± 20	374 ± 19	

(a) Duplicate analysis.

THIS PAGE INTENTIONALLY
LEFT BLANK

2.0 300 AREA PROCESS TRENCHES

R. Schalla

The ground water near the 300 Area Process Trenches has been monitored by a RCRA interim-status well network since June 1985. This project is currently in the ground-water quality assessment stage of monitoring. A revised ground-water monitoring plan has been prepared for this facility (DOE 1986).

The 300 Area Process Trenches are located in the northern portion of the 300 Area. The two trenches are each 1500 ft long, 10 ft wide at the bottom, and about 34 ft wide at the top. They are unlined trenches, excavated about 12 ft into the subsurface and separated by an earthen berm. The trench bottoms are about 20 ft above the water table. Since 1975, the trenches have been used for disposal of most liquid wastes generated in the 300 Area. Discharge volumes gradually increased to about 3 million gal/d of waste water in 1987. This waste water consisted primarily of cooling water with small quantities of nonhazardous maintenance and process wastes. Following shutdown of fuel fabrication and some other operations in the 300 Area in 1988, the volume of process water has declined to approximately 1.5 million gal/d of waste water. The liquid wastes also contained hazardous constituents usually in very low concentrations; however, higher concentrations of hazardous constituents such as perchloroethylene (PCE) have been reported (Cline et al. 1985). Administrative controls to prevent disposal of dangerous wastes to the process trenches were instituted by Westinghouse Hanford Company on February 1, 1985. Perchloroethylene and its degradation isomers (i.e., trichloroethene and dichloroethene) continue to be present in a few monitoring wells downgradient of the process trenches, but no large spills affecting the process trenches have occurred since administrative controls were implemented.

There are 27 wells in the monitoring network for the process trenches. The purposes of these wells are shown in Table 2.1. The locations of these wells are shown in Figure 2.1. The locations of the water-level wells are shown in Figure 2.2. Table 2.2 shows the sampling schedule for the 27-well network.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Drilling activities during this quarter involved completion of abandonment of well 399-1-16D, which is in a cluster with three other wells (399-1-16A, 399-1-16B, and 399-1-16C). These are all wells downgradient from the process trenches (Figure 2.1).

Abandonment

The abandonment of well 399-1-16D began December 1, 1988. The water levels and chemistry were monitored in three adjacent wells (399-1-16A, 399-1-16B, and 399-1-16C) to assess the impact of the abandonment activities and determine whether hydraulic isolation between the confined and unconfined aquifers has been restored. Communication between the unconfined and confined aquifers occurred because a section of broken steel casing in well 399-1-16D extended through a confining clay layer. The well was abandoned by completion of a subsurface seal to isolate the two aquifers on January 24, 1989.

Hydrogeologic Characterization

Hydrogeologic characterization efforts have been suspended until additional data are collected for analysis.

WATER LEVELS

Water-level hydrographs of the unconfined aquifer well 399-1-16A, the adjacent confined aquifer well 399-1-16C, and the nearest surface-water station SWS-2 are shown in Figure 2.3. The water level in well 399-1-16C has not shown any discernable recovery since January 24, 1989. This indicates that the abandonment effort for well 399-1-16D did not restore hydraulic isolation between the aquifers, which typically have differences in hydraulic head of 30 ft.

Routine data collection has continued and includes the collection of continuous surface-water and ground-water levels using data loggers, in addition to monthly measurement of water levels in a network of 49 wells in the 300 Area (Figure 2.2). Table 2.3 presents the routinely collected water-level elevation data.

The southerly flow of ground water and the gentle hydraulic gradient (only 0.75 ft/mi in Figure 2.2) represents a flow pattern that is not typical for the unconfined aquifer. Based on the hydrographs in Figure 2.3, this southerly flow was caused by a rise in river stage and probably persisted for only a few days in early February. The gradient in the river at this time was slightly greater (approximately 1 ft/mi) than the average gradient in the unconfined aquifer. Such short-term conditions are caused by the high and rapid rise in river stage that resulted in flow into the river bank (unconfined aquifer) and created the appearance of a no-flow boundary at the river's edge.

Continuous water-level monitoring is continuing at eight locations: SWS-1 and SWS-2, the two surface-water monitoring stations on the Columbia River (shown in Figure 2.1), and in monitoring wells 399-1-10, 399-1-13, 399-1-16A, 399-1-16C, 399-1-17A, and 399-1-18A. As discussed in the previous quarterly report, a problem with the data logger in SWS-1 did indeed result in the loss of the December 1988 data. The problem was corrected, and the surface water station was operative this quarter. Several failures of transducers installed in well 399-1-17A have occurred.

WATER CHEMISTRY DATA

In addition to the semiannual sampling of 27 wells conducted in December 1988, the ground water near the 300 Area Process Trenches has been sampled on a biweekly basis from three wells adjacent to the process trenches (399-1-11, 399-1-17A, and 399-1-19) and one upgradient well (399-1-18A). In addition, wells 399-1-16A, 399-1-16B, and 399-1-16C were sampled once in December and twice in January to monitor abandonment of well 399-1-16D. Available results for the 399-1-16 wells are discussed later in this section.

Since October 1988, three wells (399-1-11, 399-1-17A, and 399-1-19) near the 300 Area Process Trenches have been sampled weekly for a limited set of specific constituents (i.e., volatile chlorinated hydrocarbons, anions, and uranium). Based on an analysis of historical data, biweekly sampling replaced weekly sampling this quarter. Sampling this set of wells every

2 weeks would detect releases of even the most mobile contaminants (e.g., nitrate) migrating from the process trenches.

In addition to the standard laboratory quality control program, duplicate field samples have been analyzed by PNL to confirm the results from United States Testing Company, Incorporated (UST), the contracted analytical laboratory. This work is described in Section 1.0 Introduction.

A summary of all results from December 1988 through February 1989 are presented in Table 2.4. Analytical data for detected constituents are presented in Table 2.5 for the biweekly network, the well abandonment monitoring, and the semiannual sampling of the 27-well network.

Table 2.6 presents analyses for special samples collected to monitor the impact of abandoning well 399-1-16D on surrounding monitoring locations. The data indicate that most of the 1,2-dichloroethene is the cis isomer.

The biweekly network samples show a rise in the concentration of uranium during December through February (Figure 2.4).

The baseline samples from wells 399-1-16A, 399-1-16B, and 399-1-16C were analyzed by PNL and UST to determine the amount of residual contamination in the confined aquifer before abandonment was initiated, to identify the impact of the activities associated with well 399-1-16D abandonment, and ultimately to demonstrate the success of abandonment. All sample data for volatile organic constituents and other constituents collected in January 1989 from wells 399-1-16A, 399-1-16B, and 399-1-16C are summarized in Tables 2.4 and 2.5.

Elevated concentrations (61 and 30 ppb) of chromium in unfiltered samples were present in well 399-1-16C on December 6, 1988, and January 13, 1989. Unfiltered nickel and iron concentrations were also elevated on those dates. Because 304 series stainless steel monitoring well casing is composed primarily of chromium, nickel, and iron, the elevated metal particulates were likely produced during attempts to drill over and grind out the 6-in.-dia stainless steel casing in adjacent well 399-1-16D on December 5 and 6, 1988.

Two volatile organic constituents were present in concentrations greater than maximum contaminant levels (MCLs): trichloroethene (MCL is 5 ppb) in

wells 399-1-16B and 399-1-16C, with concentrations several factors above the drinking water standard, and cis-1,2-dichloroethene (proposed MCL is 70 ppb) in well 399-1-16B, with a concentration about equal to the proposed MCL.

9 1 1 1 3 8 7 1 0 0 3

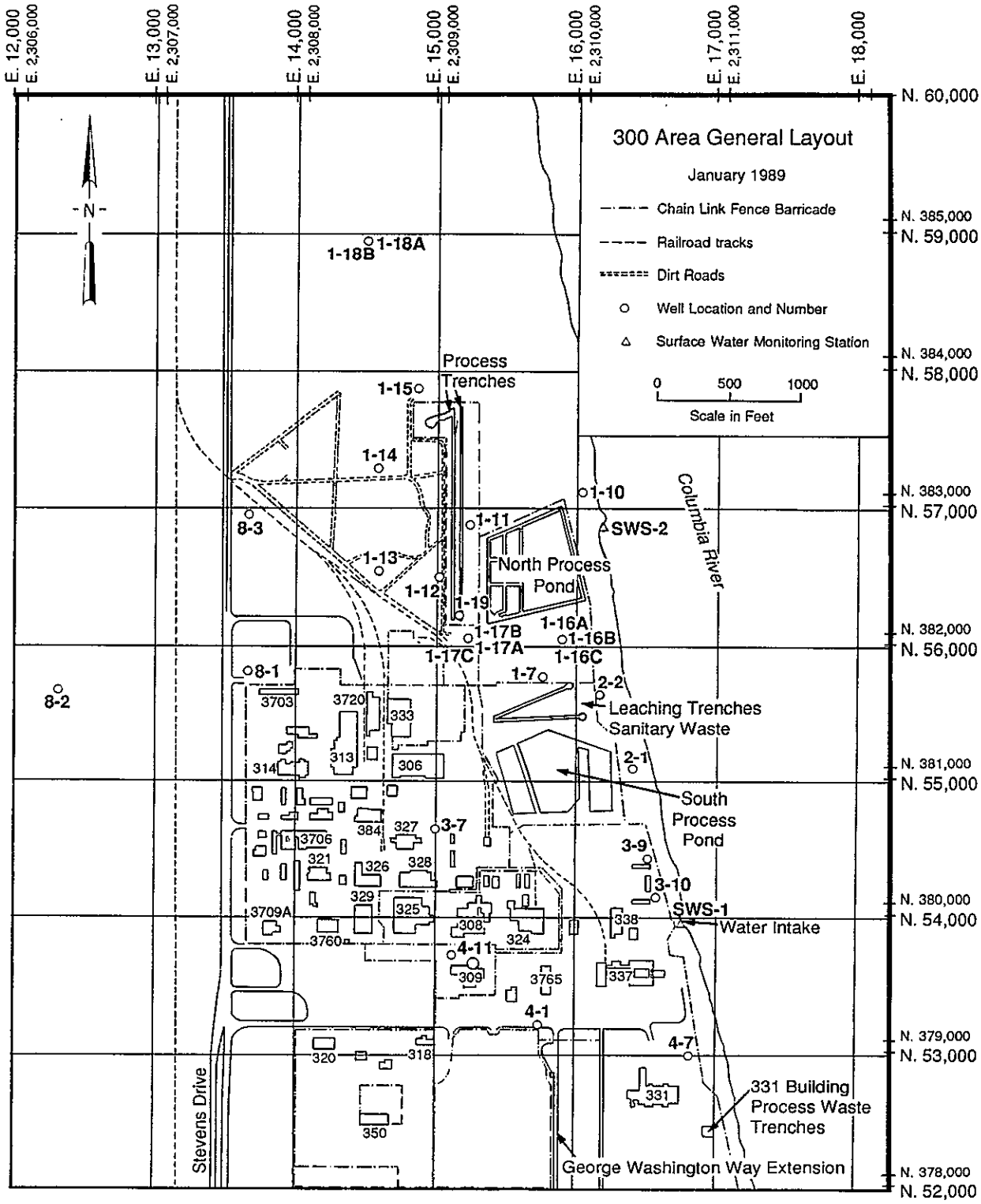

FIGURE 2.1. Locations for Wells Used in December for the 27-Well Monitoring Network for the 300 Area Process Trenches

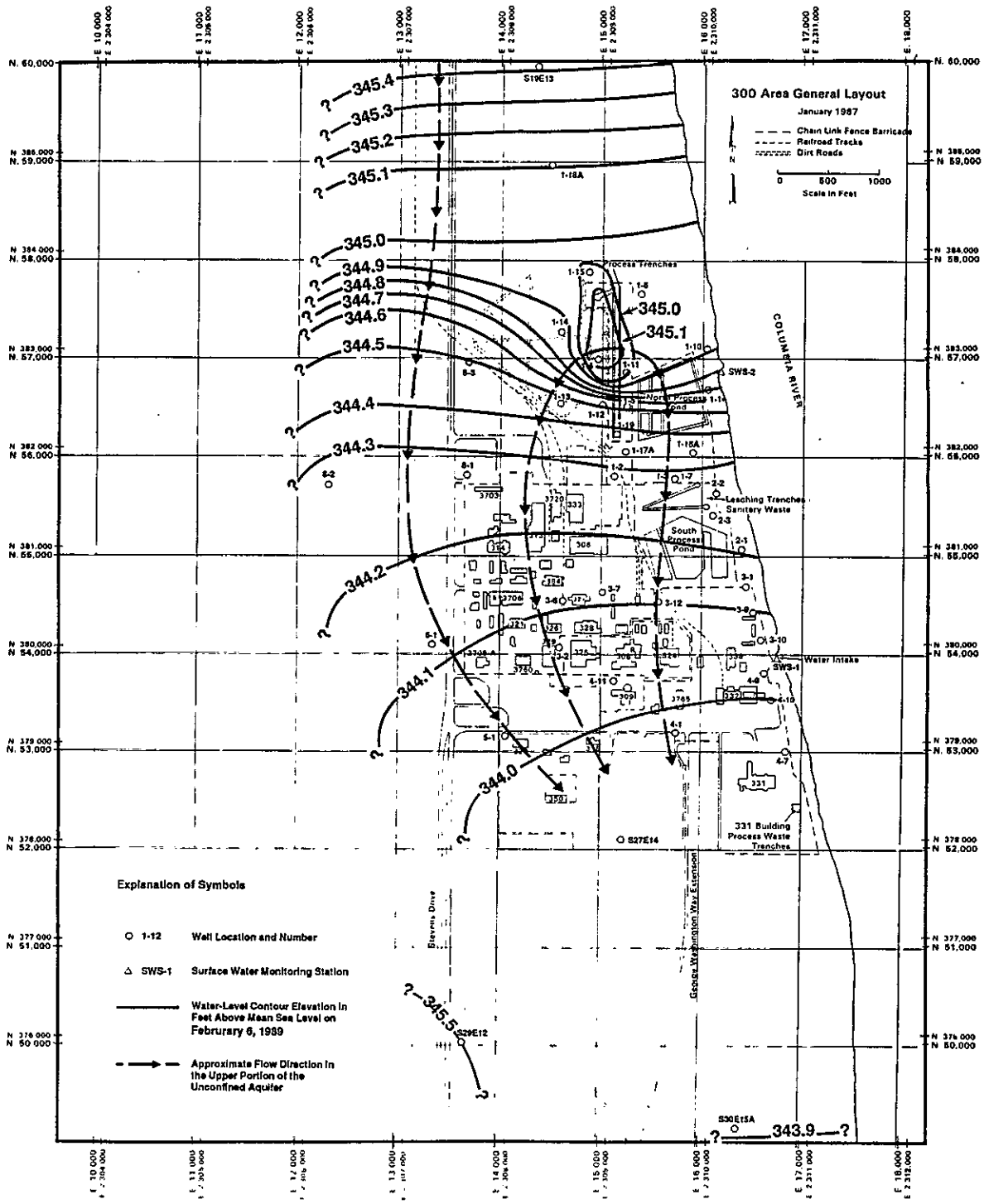

FIGURE 2.2. Water-Level Well Locations and Ground-Water Flow Pattern Near the 300 Area Process Trenches (February 1989)

THIS PAGE INTENTIONALLY
LEFT BLANK

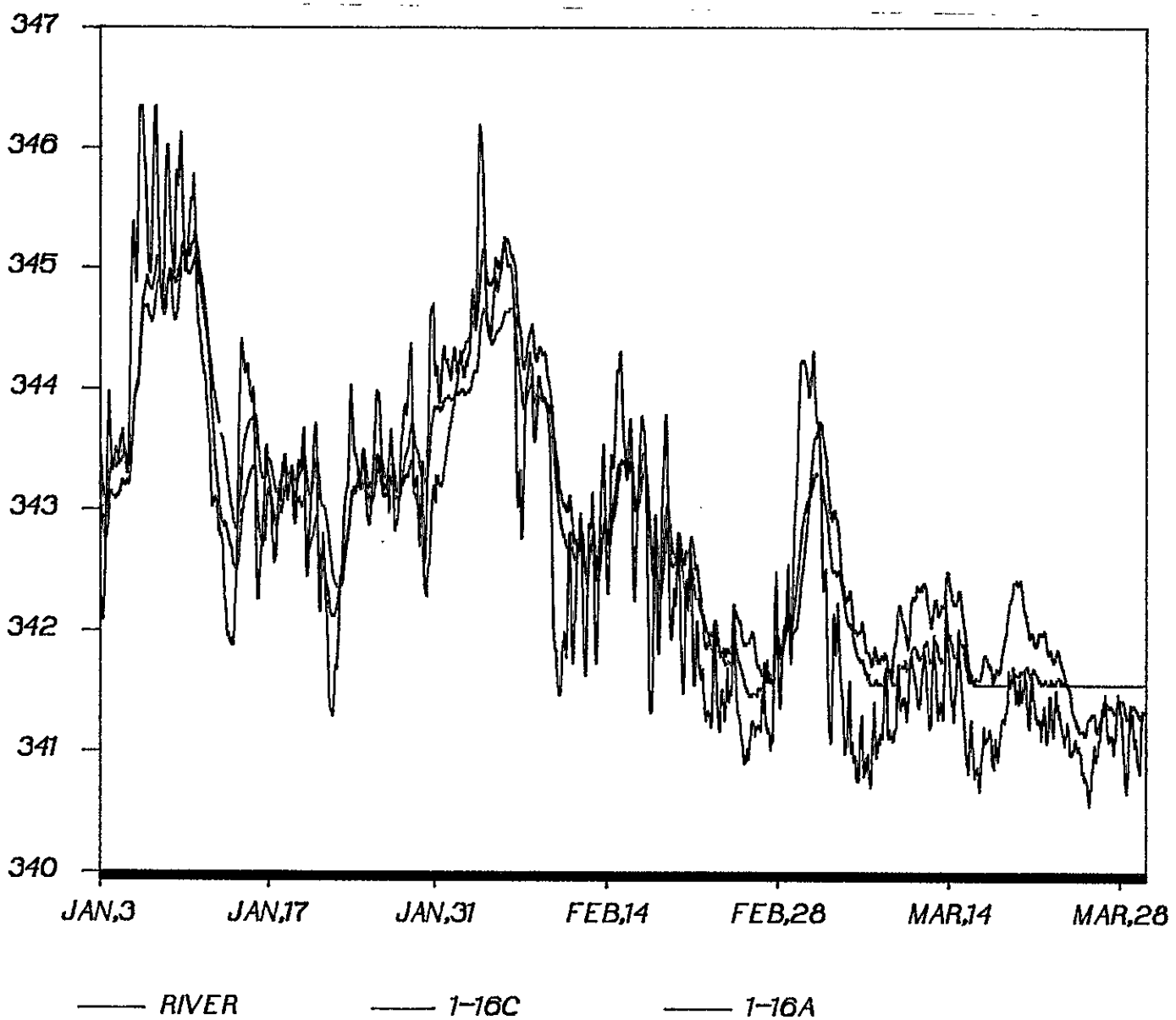

FIGURE 2.3. Water-Level Elevations for Wells 399-1-16A and 399-1-16C and the Surface Water Station SWS-2 Near the 300 Area Process Trenches (January to March 1989)

THIS PAGE INTENTIONALLY
LEFT BLANK

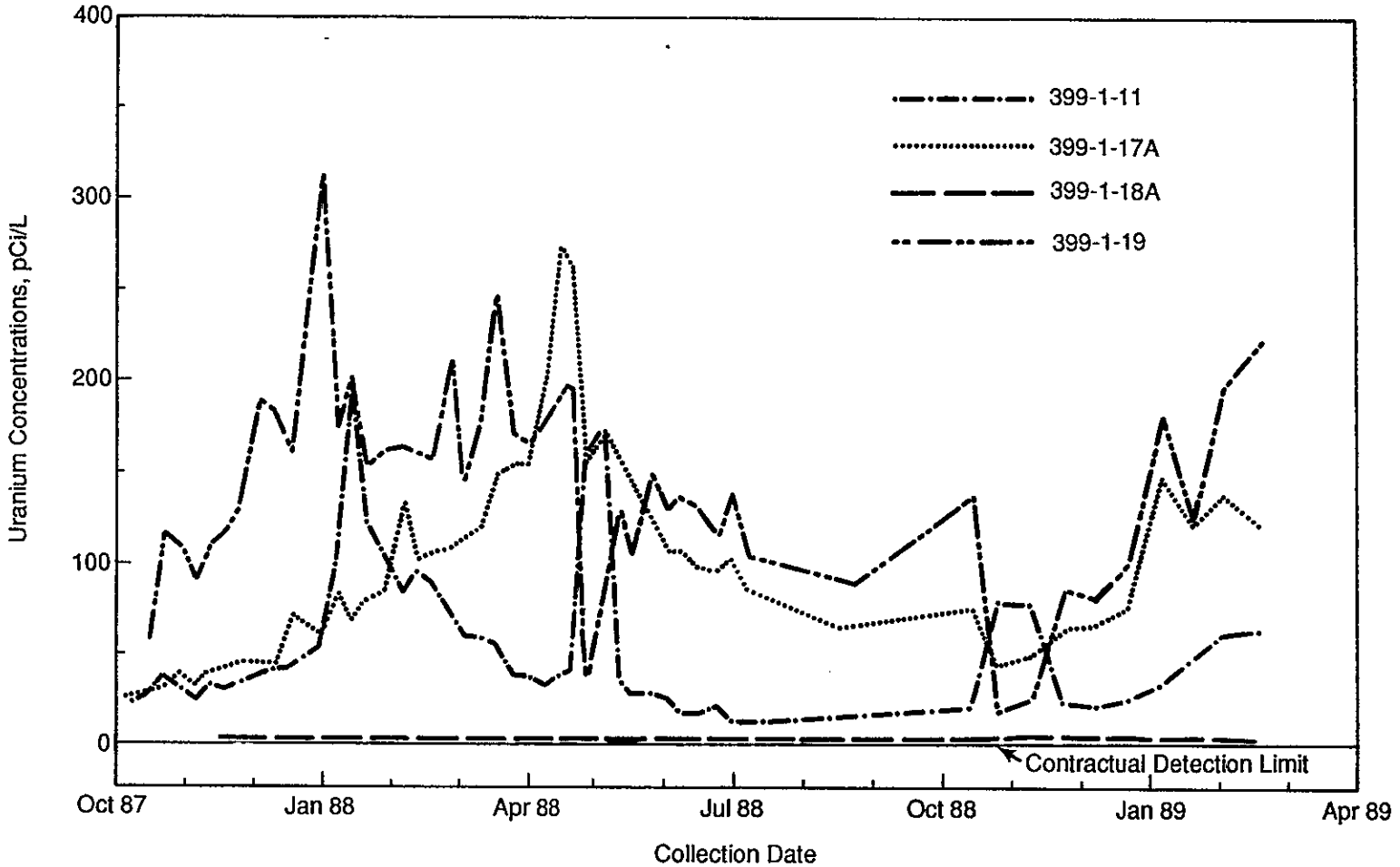

FIGURE 2.4. Uranium Concentrations in pCi/L in Wells 399-1-11, 399-1-17A, 399-1-18A, and 399-1-19. (Plotting symbols are abbreviations of well names. Horizontal solid line is contractual detection level.)

TABLE 2.1. Ground-Water Monitoring Wells for the 300 Area Process Trenches

Wells for Point of Compliance

399-1-11
399-1-17A
399-1-19

Background Wells

399-1-18A
399-1-18B
399-8-2

Wells to Define the Horizontal Extent of Contamination

399-1-7
399-1-10
399-1-12
399-1-13
399-1-14
399-1-15
399-1-16A
399-2-1
399-2-2
399-3-7
399-3-9
399-3-10
399-4-1
399-4-7
399-4-11
399-8-1
399-8-3

Wells to Define the Vertical Extent of Contamination

399-1-16B
399-1-16C
399-1-17B
399-1-17C

TABLE 2.2. Sampling Schedule for the 300 Area Process Trenches

	1988			1989								
Well	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
399-1- 7			XRV					L				
399-1-10			X					L				
399-1-11	BW	BW	XBW	BW	BW	BW	BW	LBW	BW	BW	BW	BW
399-1-12			X					L				
399-1-13			X					L				
399-1-14			X					L				
399-1-15			X					LRV				
399-1-16A		A	XA	AA				L				
399-1-16B		A	XA	AA				L				
399-1-16C		A	XA	AA				L				
399-1-17A	BW	BW	XBWRV	BW	BW	BW	BW	LBW	BW	BW	BW	BW
399-1-17B			X					L				
399-1-17C			X					L				
399-1-18A	BW	BW	XBW	BW	BW	BW	BW	LBW	BW	BW	BW	BW
399-1-18B			X					L				
399-1-19	BW	BW	XBW	BW	BW	BW	BW	LBW	BW	BW	BW	BW
399-2- 1			X					L				
399-2- 2			X					L				
399-3- 7			X					LRV				
399-3- 9			X					L				
399-3-10			X					L				
399-4- 1			X					L				
399-4- 7			X					L				
399-4-11			X					L				
399-8- 1			X					L				
399-8- 2			X					L				
399-8- 3			X					L				

A = sampled in the well abandonment study.
AA = sampled twice for the well abandonment study.
BW = sampled biweekly.
L = sampled for the long list of constituents (WAC 173-303-9905).
R = quality control replicates were collected.
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 2.4).

TABLE 2.3. Water-Level Data for 300 Area Wells on February 6 and March 8, 1989

Well Number	Depth to Water[a]		Casing Elevation[b]	Elevation[b] of Water Surface	
	2/6/89	3/8/89		2/6/89	3/8/89
Shallow Wells					
399-1-1	31.18	34.52	375.90	344.72	341.38
399-1-2	40.27	43.01	384.52	344.25	341.51
399-1-3	40.49	43.47	384.75	344.26	341.28
399-1-4	35.61	37.82	380.83	345.22	343.01
399-1-5	35.29	38.05	379.82	344.53	341.77
399-1-6	28.82	31.56	373.81	344.99	342.25
399-1-7	41.39	44.37	385.63	344.24	341.26
399-1-10	28.74	32.24	373.65	344.91	341.41
399-1-11	32.73	35.18	377.79	345.06	342.61
399-1-12	39.99	42.65	384.45	344.46	341.80
399-1-13	NM	46.58	388.62	NM	342.04
399-1-14	38.40	37.82	383.23	344.83	345.41
399-1-15	34.54	36.72	379.59	345.05	342.87
399-1-16A	NM	40.35	381.51	NM	341.16
399-1-17A	NM	35.91	377.47	NM	341.56
399-1-18A	45.70	47.71	390.83	345.13	343.12
399-1-19	30.28	32.94	374.64	344.36	341.70
399-2-1	31.03	34.30	375.26	344.23	340.96
399-2-2	31.28	34.43	375.53	344.25	341.10
399-2-3	31.22	34.39	375.44	344.22	341.05
399-3-1	40.29	43.52	384.43	344.14	340.91
399-3-2	48.31	51.05	392.36	344.05	341.31
399-3-6	48.73	51.36	392.85	344.12	341.49
399-3-7	50.09	52.85	394.22	344.13	341.37
399-3-9	43.21	46.42	387.31	344.10	340.89
399-3-10	41.36	44.61	385.40	344.04	340.79
399-3-12	42.28	45.31	386.38	344.10	340.07
399-4-1	51.06	54.21	395.00	343.94	340.79
399-4-7	33.03	36.37	376.99	343.96	340.62
399-4-9	NM	40.63	381.40	NM	340.77
399-4-10	33.59	36.92	377.59	344.00	340.67
399-4-11	60.46	63.45	404.53	344.07	340.98
399-5-1	51.58	53.85	395.60	344.02	341.75
399-6-1	42.82	44.68	386.93	344.11	342.25
399-8-1	50.59	52.62	394.88	344.29	342.26
399-8-2	51.81	52.90	396.06	344.25	343.16
399-8-3	48.62	50.41	393.11	344.49	342.70
699-S19-E13	49.10	50.86	394.51	345.41	343.65
699-S27-E14	55.82	58.97	399.76	343.94	340.79
699-S29-E12	42.46	42.64	387.95	345.49	345.31
699-S30-E15A	56.22	59.20	400.14	343.92	340.94
Shallow Hybrid Well					
399-1-8	40.66	43.59	384.91	344.25	341.32
Intermediate Wells					
399-1-16B	36.68	39.83	381.14	344.46	341.31
399-1-17B	33.43	36.18	377.87	344.44	341.69
399-1-18B	44.64	46.71	389.94	345.30	343.23
399-1-18C	42.36	44.23	388.05	345.69	343.82
Deep Wells					
399-1-9	16.71	18.25	384.80	368.09	366.55
399-1-16C	37.64	40.92	382.29	344.65	341.37
399-1-17C	1.88	2.32	378.13	376.25	375.81

(a) Depth to water measured in feet from top of casing with steel tape.
(b) Elevations are in feet above mean sea level according to the U.S. Coast and Geodetic 1929 survey datum, which is 0.28 ft lower than the 300 Area Reference datum.
NM Not Measured

TABLE 2.4. Constituent List and Summary of Sampling Results for the 300 Area Process Trenches December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
191	CONDFLD	umho	1	53	0	700	WDOE	xxx	Specific conductance, field
199	PHFIELD		0.1	53	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	9	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	38	0	.			Total organic carbon
H42	TOXLDL	ppb	10	36	1	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	27	24	1	EPA	xxx	Coliform bacteria
111	BETA	pCi/L	8	29	0	50	EPA		Gross beta
181	RADIUM	pCi/L	1	29	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	29	0	15	EPA	xxx	Gross alpha
A06	BARIUM	ppb	6	38	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	38	38 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	38	31	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	38	38 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	29	26	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	27	27 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	29	29 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	27	27 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	27	27 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	27	27 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	27	27 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	27	27 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	27	27 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	27	27 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	29	29 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	58	8	45000	EPA		Nitrate
C74	FLUORID	ppb	500	58	47	4000	EPA		Fluoride
H13	2,4-D	ppb	2	27	27 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	27	27 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	38	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	38	36	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	38	38 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	38	38 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	29	25	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	27	27 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	29	29 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	29	29 ***	50	EPA		Lead, filtered

TABLE 2.4. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	38	0	.			Sodium
A17	MANGESE	ppb	5	38	25	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	38	14	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	58	2	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	58	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	38	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	38	26	50	EPAS	xxx	Manganese, filtered
H31	FIRON	ppb	30	38	23	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	27	27 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
104	U	pCi/L	0.5	52	0	600	DOE		Uranium
A01	BERYLUM	ppb	5	38	38 ***	.			Beryllium
A03	STRONUM	ppb	20	38	0	.			Strontium
A04	ZINC	ppb	5	38	19	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	38	0	.			Calcium
A12	NICKEL	ppb	10	38	31	.			Nickel
A13	COPPER	ppb	10	38	27	1300	EPAP		Copper
A14	VANADUM	ppb	5	38	29	.			Vanadium
A15	ANTIONY	ppb	100	38	38 ***	.			Antimony
A16	ALUMNUM	ppb	150	38	38 ***	.			Aluminum
A18	POTASUM	ppb	100	38	0	.			Potassium
A50	MAGNES	ppb	50	38	0	.			Magnesium
A61	TETRANE	ppb	5	47	47 ***	5	EPA		Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	12	12 ***	5	EPA		Benzene
A64	METHONE	ppb	10	47	47 ***	.			Methyl ethyl ketone
A66	TOLUENE	ppb	5	12	12 ***	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	47	44	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	47	47 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	47	33	5	EPA	xxx	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	47	43	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	47	47 ***	440	EPAP		Xylene-o,p
A80	CHLFORM	ppb	5	47	14	100	EPA		Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	12	12 ***	.			1,1-Dichloroethane
A90	1,2-DIC	ppb	5	12	12 ***	5	EPA		1,2-Dichloroethane
A91	TRANDCE	ppb	5	17	12	70	EPAP	xxx	trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	47	25	.			Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	12	12 ***	2	EPA		Vinyl chloride
B14	M-XYLE	ppb	5	47	47 ***	440	EPAP		Xylene-m
C76	PHOSPHA	ppb	1000	58	58 ***	.			Phosphate
H15	2,4,5-T	ppb	2	27	27 ***	.			2,4,5-T
H16	TC	ppb	1000	9	0	.			Total carbon
H17	TDS	ppb	5000	29	0	500000	EPAS		Total dissolved solids

TABLE 2.4. (contd)

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H18	FZINC	ppb	5	38	20	5000	EPAS	Zinc, filtered
H19	FCALCIU	ppb	50	38	0	.		Calcium, filtered
H25	FNICKEL	ppb	10	38	32	.		Nickel, filtered
H26	FCOPPER	ppb	10	38	25	1300	EPAP	Copper, filtered
H27	FVANADI	ppb	5	38	20	.		Vanadium, filtered
H28	FALUMIN	ppb	150	38	38 ***	.		Aluminum, filtered
H30	FPOTASS	ppb	100	38	0	.		Potassium, filtered
H32	FMAGNES	ppb	50	38	0	.		Magnesium, filtered
H33	FBERYLL	ppb	5	38	38 ***	.		Beryllium, filtered
H35	FSTRONT	ppb	20	38	0	.		Strontium, filtered
H36	FANTIMO	ppb	100	38	38 ***	.		Antimony, filtered
H58	ALKALIN	ppb	20000	29	0	.		Total alkalinity, as CaCO3
H66	BROMIDE	ppb	1000	22	22 ***	.		Bromide
H67	NITRITE	ppb	1000	22	22 ***	.		Nitrite
H68	HEXONE	ppb	10	47	47 ***	.		Hexone [Methyl isobutyl ketone]
H86	FBORON	ppb	10	6	0	.		Boron, filtered
H87	FCOBALT	ppb	20	6	6 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	6	3	.		Lithium, filtered
H89	FMOLY	ppb	40	6	6 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	6	0	.		Silicon, filtered
H91	FTIN	ppb	30	6	6 ***	.		Tin, filtered
H92	FTITAN	ppb	60	6	6 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	6	6 ***	.		Zirconium, filtered
I01	ACETONE	ppb	10	18	12	.		Acetone by VOA
I28	TAF	ppb	10	12	12 ***	.		Tetrahydorfuran
J69	2HEXANO	ppb	50	1	0	.		2-Hexanone
L49	VINYLAC	ppb	5	1	0	.		Vinyl acetate
L63	14DBEN	ppb	5	12	12 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
P01	BORON	ppb	10	6	0	.		Boron
P02	COBALT	ppb	20	6	6 ***	.		Cobalt
P03	LITHIUM	ppb	10	6	4	.		Lithium
P04	MOLY	ppb	40	6	6 ***	.		Molybdenum
P05	SILICON	ppb	50	6	0	.		Silicon
P06	TIN	ppb	30	6	6 ***	.		Tin
P07	TITAN	ppb	60	6	6 ***	.		Titanium
P08	ZIRCON	ppb	50	6	6 ***	.		Zirconium

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 2.5. Constituents with at Least One Detected Value for the 300 Area Process Trenches
December 1988 through February 1989

Bi-weekly Samples

Well name	Collection Date	Duplicate sample number	1,1,1-T ppb 5/200	ACETONE ppb 10/.	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	CONDFLD umho 1/700w	FLUORID ppb 500/4000	METHYCH ppb 5/.
3-1-11	22DEC88		<5	.	18	6,800	148	<500	#3
	05JAN89		<5	<10	16	12,000	143	<500	<5
	19JAN89		#3	<10	18	9,900	213	<500	#4
	01FEB89		.	.	.	13,000	151	<500	.
	17FEB89		<5	<10	16	22,900	523	<500	#4
3-1-17A	22DEC88		<5	.	15	29,900	242	<500	#2
	05JAN89		<5	<10	36	46,300	222	<500	<5
	19JAN89		9	<10	17	22,800	262	<500	#3
	01FEB89		.	.	.	32,500	216	<500	.
	17FEB89		<5	<10	14	29,500	249	<500	<5
3-1-18A	22DEC88		<5	.	<5	16,600	420	<500	#3
	05JAN89		<5	<10	<5	16,300	326	<500	<5
	19JAN89		<5	<10	<5	16,600	459	<500	#2
	01FEB89		.	.	.	17,200	368	<500	.
	17FEB89		<5	<10	<5	17,400	446	<500	<5
3-1-19	22DEC88		<5	.	18	32,400	257	<500	#3
	05JAN89		<5	<10	17	53,500	242	<500	#2
	19JAN89		<5	<10	<5	39,200	328	<500	#3
	01FEB89		.	.	.	27,000	202	<500	.
	17FEB89		<5	<10	14	28,000	261	<500	<5

Well name	Collection Date	Duplicate sample number	NITRATE ppb 500/45000	PERCENE ppb 5/.	PHFIELD 0.1/8.5s	SULFATE ppb 500/250000s	TRANDCE ppb 5/70p	TRICENE ppb 5/5	U pCi/L 0.5/600d
3-1-11	22DEC88		2,100	<5	7.2	15,300	.	<5	25.10
	05JAN89		2,300	<5	7.3	18,400	<5	<5	32.70
	19JAN89		2,400	#2	8.5	17,700	<5	<5	48.00
	01FEB89		1,500	.	7.5	16,800	.	.	60.70
	17FEB89		2,100	<5	8.0	17,200	<5	<5	63.20
3-1-17A	22DEC88		2,100	<5	7.4	18,100	.	<5	76.30
	05JAN89		1,800	<5	7.0	16,100	<5	#1	149.00
	19JAN89		3,100	5	7.5	17,400	<5	<5	120.00
	01FEB89		2,500	.	7.3	18,700	.	.	138.00
	17FEB89		2,500	<5	7.0	17,400	<5	<5	122.00
3-1-18A	22DEC88		21,700	<5	8.6	48,000	.	<5	4.69
	05JAN89		21,600	<5	7.8	48,900	<5	<5	3.02
	19JAN89		22,200	<5	8.3	49,800	<5	<5	3.22
	01FEB89		22,500	.	7.9	49,900	.	.	3.57
	17FEB89		22,400	<5	7.7	50,700	<5	<5	3.20
3-1-19	22DEC88		1,800	<5	7.8	15,600	.	<5	101.00
	05JAN89		1,900	#1	7.1	16,800	<5	#3	182.00
	19JAN89		3,800	<5	8.1	20,200	<5	<5	125.00
	01FEB89		2,800	.	7.3	18,300	.	.	198.00
	17FEB89		2,700	<5	7.6	18,100	<5	#3	223.00

TABLE 2.5. (contd)

399-1-16D Well Abandonment Samples

Well name	Collection Date	Duplicate sample number	1,1,1-T ppb 5/200	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BORON ppb 10/.	FBORON ppb 10/.	FCADMIU ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLFORM ppb 5/100
3-1-16A	06DEC88		<5	24	24	.	.	<2	19,800	18,800	15
	13JAN89		.	27	27	13	17	<2	20,800	20,200	.
	27JAN89		.	31	30	15	15	<2	22,000	23,800	.
3-1-16B	06DEC88		<5	47	52	.	.	<2	20,800	17,900	<5
	13JAN89		.	50	53	41	44	<2	19,700	17,800	.
	27JAN89		.	50	48	41	41	<2	17,100	18,100	.
3-1-16C	06DEC88		<5	40	41	.	.	<2	20,600	18,800	6
	13JAN89		.	56	56	42	41	<2	19,600	17,500	.
	27JAN89		.	46	49	32	34	<2	20,600	20,100	.

Well name	Collection Date	Duplicate sample number	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CONDFLD umho 1/700w	COPPER ppb 10/1300p	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s
3-1-16A	06DEC88		11,000	<10	162	12	11	<500	45	<30
	13JAN89		16,100	<10	183	14	12	<500	98	<30
	27JAN89		21,300	<10	.	16	12	<500	<30	<30
3-1-16B	06DEC88		11,000	<10	290	<10	<10	1,200	92	90
	13JAN89		11,500	<10	322	<10	<10	1,300	100	76
	27JAN89		12,700	<10	.	<10	<10	1,200	116	83
3-1-16C	06DEC88		13,900	61	244	<10	<10	800	278	<30
	13JAN89		12,600	30	327	<10	<10	1,200	182	<30
	27JAN89		15,800	<10	.	<10	<10	900	63	<30

Well name	Collection Date	Duplicate sample number	FLITHI ppb 10/.	LITHIUM ppb 10/.	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.
3-1-16A	06DEC88		.	.	3,730	3,750	<5	<5	<10	36	36
	13JAN89		<10	<10	3,620	3,570	<5	<5	.	28	25
	27JAN89		<10	<10	4,190	4,160	<5	<5	.	29	24
3-1-16B	06DEC88		.	.	6,390	6,990	86	75	<10	<10	<10
	13JAN89		11	11	5,870	6,160	83	79	.	<10	<10
	27JAN89		11	<10	5,790	5,870	79	82	.	<10	<10
3-1-16C	06DEC88		.	.	5,650	5,690	25	30	<10	29	<10
	13JAN89		13	14	5,770	5,970	45	50	.	16	<10
	27JAN89		<10	<10	5,690	6,160	31	31	.	<10	<10

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	NITRATE ppb 500/45000	PERCENE ppb 5/.	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	FPOTASS ppb 100/.	POTASUM ppb 100/.	FSILICO ppb 50/.	SILICON ppb 50/.
3-1-16A	06DEC88		2,900	<5	7.1	7.6	2,490	2,550	.	.
	13JAN89		2,800	.	7.2	6.3	2,450	2,670	7,680	7,860
	27JAN89		2,900	.	7.4	.	2,810	2,910	7,310	7,880
3-1-16B	06DEC88		<500	<5	7.9	8.1	5,430	5,230	.	.
	13JAN89		<500	.	8.0	7.6	5,330	5,420	21,700	20,500
	27JAN89		<500	.	8.1	.	5,190	5,200	20,900	19,900
3-1-16C	06DEC88		1,700	<5	7.9	8.1	4,410	4,550	.	.
	13JAN89		<500	.	8.0	7.3	5,970	6,400	22,900	23,600
	27JAN89		1,500	.	8.1	.	5,420	5,110	18,100	16,400

Well name	Collection Date	Duplicate sample number	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TOC ppb 2000/.	TOXLDL ppb 10/.
3-1-16A	06DEC88		11,700	11,800	85	83	15,400	14,400	#500	27
	13JAN89		12,400	11,500	93	94	16,000	12,600	#500	21
	27JAN89		13,500	12,700	106	110	16,500	13,500	#700	30
3-1-16B	06DEC88		50,400	54,000	113	101	8,200	39,100	#200	69
	13JAN89		53,000	52,900	113	106	10,200	34,000	#300	54
	27JAN89		49,500	49,600	105	107	12,100	34,400	#400	63
3-1-16C	06DEC88		29,900	28,800	106	103	20,800	23,900	#400	46
	13JAN89		53,500	48,300	114	107	15,600	31,800	#300	44
	27JAN89		35,600	36,600	123	115	22,000	25,000	#400	61

Well name	Collection Date	Duplicate sample number	TRANDCE ppb 5/70p	TRICENE ppb 5/5	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
3-1-16A	06DEC88		.	<5	.	7	<5	7	6
	13JAN89		.	.	6.96	<5	<5	13	8
	27JAN89		.	.	.	<5	<5	9	8
3-1-16B	06DEC88		69	16	.	<5	<5	<5	<5
	13JAN89		.	.	1.60	<5	<5	8	7
	27JAN89		.	.	.	<5	<5	8	<5
3-1-16C	06DEC88		37	14	.	5	<5	5	<5
	13JAN89		.	.	2.08	<5	<5	18	<5
	27JAN89		.	.	.	<5	<5	10	5

TABLE 2.5. (contd)

Semi-annual Samples

Well name	Collection Date	Duplicate sample number	1,1,1-T ppb 5/200	2HEXANO ppb 50/.	ACETONE ppb 10/.	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000
3-1-7	12DEC88		<5	.	21[a]	58,100	23.700	<5	<5	22	19
	12DEC88	1	<5	.	42[a]	57,400	28.300	<5	<5	24	19
3-1-10	09DEC88		<5	.	.	53,300	6.970	<5	<5	21	21
3-1-11	07DEC88		<5	.	.	54,800	18.800	<5	<5	12	13
3-1-12	11DEC88		M	.	.	58,900	36.600	<5	<5	16	13
3-1-13	11DEC88		<5	.	.	66,800	7.470	<5	<5	19	17
3-1-14	09DEC88		<5	.	.	72,400	10.600	<5	<5	21	18
3-1-15	12DEC88		<5	.	17	128,000	3.030	<5	<5	44	42
3-1-16A	13DEC88		<5	.	.	55,600	6.820	<5	<5	24	26
3-1-16B	13DEC88		<5	.	.	158,000	2.570	<5	<5	48	48
3-1-16C	13DEC88		<5	.	.	98,200	10.200	<5	<5	39	42
3-1-17A	07DEC88		<5	.	.	51,800	84.900	<5	<5	23	25
	07DEC88	1	<5	.	.	51,600	73.400	<5	<5	24	27
3-1-17B	11DEC88		<5	.	.	179,000	*0.284	<5	<5	67	64
3-1-17C	11DEC88		<5	.	.	188,000	*0.166	<5	<5	79	85
3-1-18A	07DEC88		<5	.	.	128,000	3.290	6	5	46	43
3-1-18B	08DEC88		<5	.	.	187,000	*-0.199	<5	<5	35	41
3-1-19	07DEC88		<5	.	.	53,200	84.800	<5	<5	19	19
3-2-1	11DEC88		<5	.	.	53,600	7.890	<5	<5	57	38
3-2-2	11DEC88		<5	.	.	60,200	22.700	<5	<5	23	25
3-3-7	08DEC88		<5	.	.	112,000	5.360	<5	<5	31	31
3-3-9	11DEC88		<5	.	#8	65,800	15.900	<5	<5	33	56
3-3-10	09DEC88		<5	.	.	91,600	21.500	<5	<5	46	50
3-4-1	21DEC88		<5	2	#6	117,000	5.760	<5	<5	32	33
3-4-7	09DEC88		<5	.	.	101,000	19.100	<5	<5	32	36
3-4-11	15DEC88		<5	.	.	109,000	4.910	<5	<5	30	31
3-8-1	09DEC88		<5	.	.	114,000	1.760	<5	5	30	35
3-8-2	09DEC88		#4	.	.	128,000	1.840	5	6	35	38
3-8-3	09DEC88		<5	.	#9	129,000	2.290	5	7	36	33

(a) Results of volatile organic compound analysis of the laboratory reagent blank for this sample revealed 35 ppb acetone.

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	FCADMIU ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	COLIFRM MPN 2.2/1	CONDFLD umho 1/700w
3-1-7	12DEC88		22.40	<2	20,800	24,900	16	14,500	<10	<2.2	199
	12DEC88	1	21.20	<2	20,400	22,200	16	14,400	<10	.	.
3-1-10	09DEC88		5.29	<2	18,700	19,300	18	6,200	<10	<2.2	166
3-1-11	07DEC88		4.17	<2	18,400	17,400	15	4,600	<10	<2.2	164
3-1-12	11DEC88		5.20	5	19,600	21,400	M	9,000	14	<2.2	1,290
3-1-13	11DEC88		5.09	<2	23,700	24,600	13	5,900	<10	<2.2	1,240
3-1-14	09DEC88		6.19	<2	25,300	27,900	13	6,900	<10	<2.2	195
3-1-15	12DEC88		10.90	<2	44,800	47,500	<5	17,900	<10	<2.2	461
3-1-16A	13DEC88		5.21	<2	20,400	19,400	15	12,800	<10	<2.2	152
3-1-16B	13DEC88		10.80	<2	19,600	19,600	<5	12,000	17	<2.2	250
3-1-16C	13DEC88		8.03	<2	20,700	18,400	8	14,100	<10	<2.2	212
3-1-17A	07DEC88		38.90	<2	28,500	28,600	14	35,600	<10	<2.2	283
	07DEC88	1	29.00	<2	31,200	29,100	14	34,800	<10	.	.
3-1-17B	11DEC88		8.54	<2	19,800	21,600	<5	9,800	14	<2.2	338
3-1-17C	11DEC88		11.20	<2	11,900	10,600	<5	10,300	18	<2.2	490
3-1-18A	07DEC88		11.20	<2	46,400	49,300	<5	17,500	<10	<2.2	478
3-1-18B	08DEC88		8.28	<2	14,100	12,500	<5	10,700	<10	<2.2	421
3-1-19	07DEC88		32.20	<2	21,500	21,500	13	21,700	<10	<2.2	233
3-2-1	11DEC88		10.90	<2	21,000	33,100	10	12,700	<10	16.0	190
3-2-2	11DEC88		7.71	<2	22,900	22,500	14	15,200	<10	2.2	192
3-3-7	08DEC88		*2.99	<2	39,000	40,500	7	13,100	<10	<2.2	335
3-3-9	11DEC88		8.87	2	31,100	20,100	8	9,100	<10	2.2	228
3-3-10	09DEC88		7.58	<2	33,900	31,900	13	8,200	<10	<2.2	252
3-4-1	21DEC88		6.96	<2	41,500	33,700	11	11,400	<10	<2.2	340
3-4-7	09DEC88		8.92	<2	38,100	35,100	11	10,000	<10	<2.2	352
3-4-11	15DEC88		12.40	<2	35,600	34,500	11	9,700	<10	<2.2	290
3-8-1	09DEC88		3.51	<2	44,300	40,200	<5	10,300	13	<2.2	295
3-8-2	09DEC88		6.78	<2	44,100	41,700	<5	10,600	<10	<2.2	340
3-8-3	09DEC88		5.07	<2	38,500	44,100	16	10,900	<10	<2.2	340

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	COPPER ppb 10/1300p	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s
3-1-7	12DEC88		14	11	<500	<30	<30	4,880	4,100	<5
	12DEC88	1	<10	10	<500	<30	<30	4,410	4,070	<5
3-1-10	09DEC88		<10	11	<500	<30	<30	4,030	3,930	<5
3-1-11	07DEC88		28	31	<500	<30	<30	4,020	4,220	<5
3-1-12	11DEC88		22	21	<500	92	<30	4,630	4,280	<5
3-1-13	11DEC88		12	12	<500	129	<30	5,210	5,060	<5
3-1-14	09DEC88		10	<10	<500	72	<30	5,600	5,110	<5
3-1-15	12DEC88		<10	<10	<500	36	<30	12,000	11,400	<5
3-1-16A	13DEC88		<10	12	<500	<30	50	3,720	3,800	6
3-1-16B	13DEC88		<10	<10	1,100	128	104	6,610	6,430	80
3-1-16C	13DEC88		<10	<10	800	<30	78	5,220	5,560	25
3-1-17A	07DEC88		32	33	<500	<30	<30	6,140	6,180	<5
	07DEC88	1	31	30	<500	<30	<30	6,240	6,690	<5
3-1-17B	11DEC88		<10	<10	900	207	150	7,830	7,260	65
3-1-17C	11DEC88		<10	<10	1,600	142	87	4,920	5,370	26
3-1-18A	07DEC88		<10	<10	<500	<30	<30	14,600	13,000	<5
3-1-18B	08DEC88		<10	<10	1,400	202	135	5,360	6,100	36
3-1-19	07DEC88		33	31	<500	424	41	4,870	4,780	<5
3-2-1	11DEC88		<10	<10	<500	44	<30	7,520	4,460	<5
3-2-2	11DEC88		<10	<10	<500	274	248	4,280	4,410	<5
3-3-7	08DEC88		<10	<10	<500	<30	57	8,520	8,480	<5
3-3-9	11DEC88		<10	<10	<500	<30	<30	4,250	7,220	<5
3-3-10	09DEC88		<10	<10	<500	99	80	7,050	7,420	<5
3-4-1	21DEC88		<10	<10	<500	33	43	7,760	8,370	<5
3-4-7	09DEC88		<10	<10	<500	30	<30	6,960	7,430	<5
3-4-11	15DEC88		<10	<10	<500	<30	33	7,400	7,590	<5
3-8-1	09DEC88		<10	<10	<500	437	<30	8,910	9,730	<5
3-8-2	09DEC88		<10	<10	<500	<30	<30	9,170	9,540	<5
3-8-3	09DEC88		<10	<10	<500	205	<30	9,840	8,530	<5

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000	PERCENE ppb 5/.	PHFIELD 0.1/8.5s	FPOTASS ppb 100/.	POTASUM ppb 100/.
3-1-7	12DEC88		<5	#3	<10	<10	3,800	<5	7.0	2,570	2,770
	12DEC88	1	<5	#3	<10	<10	3,800	<5	.	2,620	2,550
3-1-10	09DEC88		<5	10	<10	<10	2,400	<5	7.0	2,370	2,430
3-1-11	07DEC88		<5	<10	<10	<10	1,900	<5	7.6	1,270	1,210
3-1-12	11DEC88		<5	M	<10	<10	2,300	M	7.5	1,800	1,970
3-1-13	11DEC88		<5	#7	<10	<10	3,500	<5	7.6	3,400	3,440
3-1-14	09DEC88		<5	<10	<10	<10	5,100	<5	7.1	2,560	2,940
3-1-15	12DEC88		<5	#2	<10	10	21,200	<5	8.0	5,650	5,470
3-1-16A	13DEC88		<5	<10	37	35	2,900	<5	6.9	2,610	2,360
3-1-16B	13DEC88		83	<10	<10	<10	<500	<5	7.5	5,200	5,060
3-1-16C	13DEC88		23	<10	<10	<10	1,800	<5	7.3	4,430	3,930
3-1-17A	07DEC88		<5	<10	<10	<10	1,700	<5	7.4	2,140	2,030
	07DEC88	1	<5	<10	<10	<10	1,700	<5	.	2,180	2,030
3-1-17B	11DEC88		72	<10	<10	<10	<500	<5	7.9	5,860	6,380
3-1-17C	11DEC88		23	#9	11	<10	<500	<5	8.0	11,100	10,900
3-1-18A	07DEC88		<5	<10	<10	<10	21,700	<5	8.2	5,940	7,050
3-1-18B	08DEC88		34	<10	<10	<10	<500	<5	7.8	7,050	6,250
3-1-19	07DEC88		15	#3	<10	<10	1,800	<5	7.5	1,870	1,910
3-2-1	11DEC88		<5	#7	<10	<10	4,500	<5	7.0	3,090	3,510
3-2-2	11DEC88		<5	10	<10	<10	4,100	<5	6.6	2,590	2,490
3-3-7	08DEC88		<5	<10	<10	52	11,900	<5	7.7	4,540	4,530
3-3-9	11DEC88		<5	<10	<10	<10	23,300	<5	7.0	3,380	2,940
3-3-10	09DEC88		<5	#4	<10	<10	12,800	<5	7.1	3,490	3,160
3-4-1	21DEC88		<5	#2	<10	<10	11,400	<5	8.0	4,750	4,380
3-4-7	09DEC88		<5	<10	<10	<10	9,700	<5	7.2	4,370	4,160
3-4-11	15DEC88		<5	<10	<10	<10	10,900	<5	7.6	4,600	4,600
3-8-1	09DEC88		<5	<10	<10	<10	20,300	<5	7.8	5,440	4,910
3-8-2	09DEC88		5	<10	<10	<10	23,300	#4	7.5	5,400	5,190
3-8-3	09DEC88		<5	10	<10	<10	10,700	<5	7.7	4,770	5,840

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	RADIUM pCi/L 1/5	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TDS ppb 5000/500000s	TOC ppb 2000/.
3-1-7	12DEC88		*0.0352	13,000	12,000	90	103	15,800	111,000	#600
	12DEC88	1	*0.0821	12,100	12,200	89	94	15,600	113,000	#600
3-1-10	09DEC88		*-0.0431	7,870	7,840	83	84	15,300	97,000	#500
3-1-11	07DEC88		*0.1360	6,890	7,450	85	78	15,600	88,000	#800
3-1-12	11DEC88		0.2680	12,600	11,600	83	92	15,200	94,000	#700
3-1-13	11DEC88		*0.0042	7,980	8,090	97	100	17,100	115,000	#600
3-1-14	09DEC88		*0.0453	7,110	6,470	104	114	20,000	119,000	#500
3-1-15	12DEC88		*0.1180	18,300	19,700	200	209	50,400	271,000	#600
3-1-16A	13DEC88		0.2940	10,700	11,700	87	82	15,500	108,000	#700
3-1-16B	13DEC88		*0.0753	48,800	48,400	105	105	11,500	225,000	#400
3-1-16C	13DEC88		*0.1230	25,400	27,800	105	96	20,400	177,000	#600
3-1-17A	07DEC88		*0.0511	10,900	11,800	136	130	15,400	140,000	#700
	07DEC88	1	*0.0005	11,000	12,300	145	131	15,600	142,000	#700
3-1-17B	11DEC88		0.1740	54,700	51,700	111	118	1,000	231,000	#300
3-1-17C	11DEC88		*0.0942	67,800	73,600	83	73	<500	255,000	#200
3-1-18A	07DEC88		*0.1510	25,600	21,700	222	244	49,700	288,000	#300
3-1-18B	08DEC88		*0.0660	61,300	71,900	87	75	<500	253,000	#300
3-1-19	07DEC88		*0.0227	11,000	10,800	100	99	16,200	97,000	#800
3-2-1	11DEC88		*0.0526	12,800	12,400	88	137	15,500	112,000	#700
3-2-2	11DEC88		0.1610	12,800	13,600	92	89	15,800	118,000	#500
3-3-7	08DEC88		*0.1000	17,200	17,800	152	147	34,200	218,000	#500
3-3-9	11DEC88		*0.1290	11,600	12,500	131	84	32,600	157,000	#500
3-3-10	09DEC88		*0.0046	11,200	12,600	162	150	21,100	176,000	#600
3-4-1	21DEC88		*0.1050	15,800	16,100	158	148	28,200	208,000	#400
3-4-7	09DEC88		*0.0448	16,400	17,200	160	149	30,900	198,000	#600
3-4-11	15DEC88		0.2590	13,900	14,000	142	137	27,800	203,000	#400
3-8-1	09DEC88		0.1700	13,600	14,900	177	161	28,200	229,000	#400
3-8-2	09DEC88		*-0.0297	18,100	18,500	185	177	29,800	249,000	#500
3-8-3	09DEC88		*0.1440	22,700	18,900	155	179	31,200	240,000	#300

TABLE 2.5. (contd)

Well name	Collection Date	Duplicate sample number	TOXLDL ppb 20/.	TRANDCE ppb 5/70p	TRICENE ppb 5/5	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	VINYLAC ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
3-1-7	12DEC88		29	.	#2.0	31.4000	<5	<5	.	8	5
	12DEC88	1	.	.	#2.0	28.6000	6	<5	.	<5	7
3-1-10	09DEC88		22	.	#3.5	9.1300	7	<5	.	5	<5
3-1-11	07DEC88		50	.	<5.0	21.2000	6	<5	.	16	14
3-1-12	11DEC88		38	.	M	39.6000	<5	<5	.	<5	<5
3-1-13	11DEC88		23	.	<5.0	6.7900	<5	<5	.	<5	<5
3-1-14	09DEC88		25	.	<5.0	7.7600	<5	<5	.	<5	<5
3-1-15	12DEC88		#6	.	<5.0	4.9800	10	10	.	<5	6
3-1-16A	13DEC88		29	.	<5.0	8.9500	<5	6	.	5	49
3-1-16B	13DEC88		57	75	20.0	2.4100	<5	<5	.	<5	40
3-1-16C	13DEC88		75	46	21.0	9.1500	<5	6	.	<5	42
3-1-17A	07DEC88		42	.	<5.0	61.5000	5	<5	.	<5	6
	07DEC88	1	.	.	<5.0	69.7000	<5	<5	.	<5	<5
3-1-17B	11DEC88		#8	10	<5.0	*0.0622	<5	<5	.	16	<5
3-1-17C	11DEC88		#8	.	<5.0	0.1730	<5	<5	.	<5	<5
3-1-18A	07DEC88		#4	.	<5.0	3.5900	10	8	.	<5	<5
3-1-18B	08DEC88		#15	.	<5.0	0.3570	<5	<5	.	16	<5
3-1-19	07DEC88		35	.	<5.0	79.2000	6	<5	.	5	<5
3-2-1	11DEC88		23	.	#3.0	6.8800	<5	<5	.	14	12
3-2-2	11DEC88		31	.	<5.0	14.8000	<5	<5	.	7	12
3-3-7	08DEC88		#17	.	<5.0	8.6700	10	<5	.	<5	<5
3-3-9	11DEC88		#16	.	<5.0	19.9000	12	<5	.	8	15
3-3-10	09DEC88		486	.	<5.0	27.7000	5	<5	.	6	<5
3-4-1	21DEC88		#15	.	7.0	8.5400	7	<5	1	<5	<5
3-4-7	09DEC88		#16	.	#3.0	24.7000	6	9	.	<5	<5
3-4-11	15DEC88		#17	.	#3.0	6.8900	10	7	.	<5	35
3-8-1	09DEC88		#5	.	<5.0	2.8300	13	8	.	<5	<5
3-8-2	09DEC88		#10	.	<5.0	1.8900	12	11	.	<5	9
3-8-3	09DEC88		#9	.	<5.0	3.3100	6	11	.	<5	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 2.6. Volatile Organic Analyses for Monitoring Abandonment of Well 399-1-16D

Well Name	Trans-1,2-DCE,[a] ppb	Cis-1,2-DCE, ppb	$CHCl_3$,[b] ppb	1,1,1-TCA,[c] ppb	CCl_4,[d] ppb	TCE,[e] ppb	PCE,[f] ppb
PNL laboratory results for: January 13, 1989							
3-1-16A	<0.20	<0.40	13	0.33	<0.01	2.5	0.62
3-1-16B	1.1	78	0.20	<0.04	<0.01	17	0.19
3-1-16C	1.7	51	1.7	<0.04	<0.01	21	0.03
3-1-16D Mud Storage Pit	(g)	(g)	0.25	0.18	<0.01	0.14	0.19
PNL laboratory results for: January 27, 1989							
3-1-16A	<0.50	<0.30	15	1.2	<0.01	1.3	0.79
3-1-16B	1.0	88	0.34	<0.04	<0.01	24	0.74
3-1-16C	5.1	65	4.7	0.26	<0.01	29	0.15

(a) DCE = dichloroethene
(b) $CHCl_3$ = chloroform
(c) TCA = trichlorethane
(d) CCl_4 = carbon tetrachloride
(e) TCE = trichloroethylene
(f) PCE = perchloroethylene
(g) Large amount of mid- to high-molecular weight constituents interfering with detection of trans and cis-1,2-dichloroethene.

THIS PAGE INTENTIONALLY
LEFT BLANK

3.0 183-H SOLAR EVAPORATION BASINS

S. H. Hall

The ground water near the 183-H Solar Evaporation Basins has been monitored by a RCRA interim-status well network since June 1985. This project is currently in the ground-water quality assessment stage of monitoring. A Final Status Post-Closure Permit Application for this facility was submitted to the Washington State Department of Ecology in June 1988 (DOE 1988a).

The 183-H Solar Evaporation Basins consist of four concrete basins in the 100-H Area (see Figures 1.1 and 3.1) that were used for solar evaporation and storage of aqueous chemical wastes from nuclear fuel processing operations elsewhere on the Hanford Site (Liikala et al. 1988). The wastes discharged to the basins consisted primarily of nitric, sulfuric, and hydrofluoric acids, contaminated by heavy metals and radionuclides, and neutralized by sodium hydroxide. Originally, the basins were used for water treatment for the 100-H plutonium production reactor, which was retired in 1965. Each basin has a capacity of approximately 450,000 gal. Until August 1978, only basin #1 was in use. In 1973, it received 8000 gal, and from January 1975 to August 1978, it received wastes at the rate of about 145,000 gal/yr. Elevated nitrate concentrations were detected in nearby well 199-H4-3 in mid-1977, indicating that the basin was leaking. Basins #2 and #3 were coated with urethane to receive wastes and were ready for service by August 1978. At that time, the waste stream was redirected to basins #2 and #3, and the liquid fraction of the waste remaining in basin #1 was pumped to the newly prepared basins, leaving a slurry. The slurry remained in basin #1 until July 1985. There is no evidence of leakage from basin #2 or #3 (or from basin #4, later put into service with a butyl and Hypalon coating).

There are 23 wells in the monitoring network for the 183-H Solar Evaporation Basins (Figure 3.1). Wells 199-H3-1, 199-H3-2A, 199-H3-2B, 199-H3-2C, 199-H4-6, 199-H4-7, 199-H4-8, 199-H4-14, and 199-H4-17 are considered to be upgradient from the basins. Wells 199-H4-3, 199-H4-4, 199-H4-5, 199-H4-9, 199-H4-10, 199-H4-11, 199-H4-12A, 199-H4-12B, 199-H4-12C, 199-H4-13, 199-H4-15A, 199-H4-15B, 199-H4-16, and 199-H4-18 are considered to

be downgradient. Well 199-H4-2 was used only for hydrogeologic characterization and is capped. Table 3.1 shows the fiscal year 1989 sampling schedule for the wells in the monitoring network.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or aquifer testing was conducted during the report period.

WATER LEVELS

Water-table elevations measured during the period are listed in Table 3.2. Figures 3.2 through 3.4 represent river-stage data collected from December 29, 1988, to March 27, 1989. Water-level fluctuations have been confirmed by measurements at Priest Rapids Dam by the U.S. Geologic Survey. Figures 3.5 and 3.6 are water-table contour maps for high and low river stage during the reporting period (March 30 and January 6, respectively).

WATER CHEMISTRY DATA

Ground water in the vicinity of the 183-H basins has been routinely sampled and analyzed since 1985. Ten wells were sampled in January 1989, and the results of analysis are summarized in Tables 3.3 and 3.4. Table 3.3 summarizes analytical data for January 1989 for each of the sampled wells. Inspection of the data shows continuing strong correlations between technetium-99 and gross beta, and between uranium and gross alpha in the waste plume attributable to the 183-H basins.

Table 3.4 shows that two chemical parameters were found to exceed the standards in 40 CFR 265, Appendix III, in at least one well in the monitoring network surrounding the 183-H basins. These are chromium (in both filtered and unfiltered samples) and nitrate. Gross alpha, gross beta, and technetium-99 exceed the 900-pCi/L standard in EPA (1976).

Liikala et al. (1988) have shown that the apparent shape and extent of the contaminant plume extending from the 183-H basins is highly dependent upon river stage. At high river stage (see Figure 3.5), there is a temporary

gradient reversal, although the net annual flow is towards the Columbia River. It is possible to estimate the extent of the "net annual plume" by considering the distribution of contaminants over time (a minimum of 1 year is necessary to smooth seasonal variations). The results of such an analysis are shown in Figure 3.7, which represents data collected from July 1987 to September 1988. (The figure represents preliminary results from a study that will be fully reported later this year.) The map is intended to show only the areal extent of the plume and cannot be used to infer contaminant concentrations.

During the weekend of January 14 and 15, a water main within 20 ft of well 199-H4-7 ruptured, causing caving and washout. Also, related excavation was required at a hydrant within 25 ft of well 199-H4-8. Inspection by PNL showed no apparent physical damage to either well. The volume of water that might have been lost to the soil column is unknown. Pacific Northwest Laboratory will be alert for anomalous ground-water chemistry results in the vicinity of these wells.

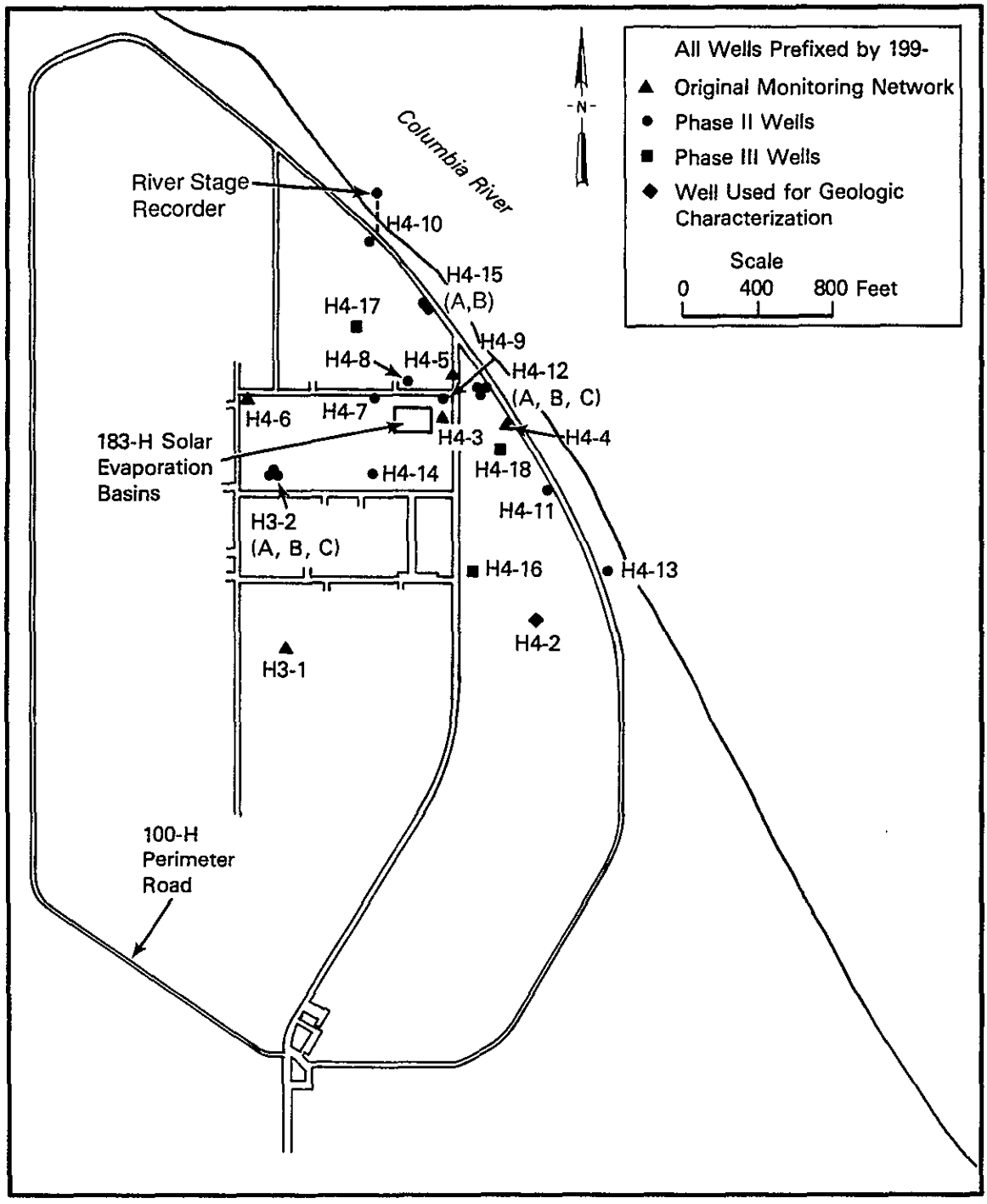

FIGURE 3.1. Monitoring Well Locations Near the 183-H Solar Evaporation Basins

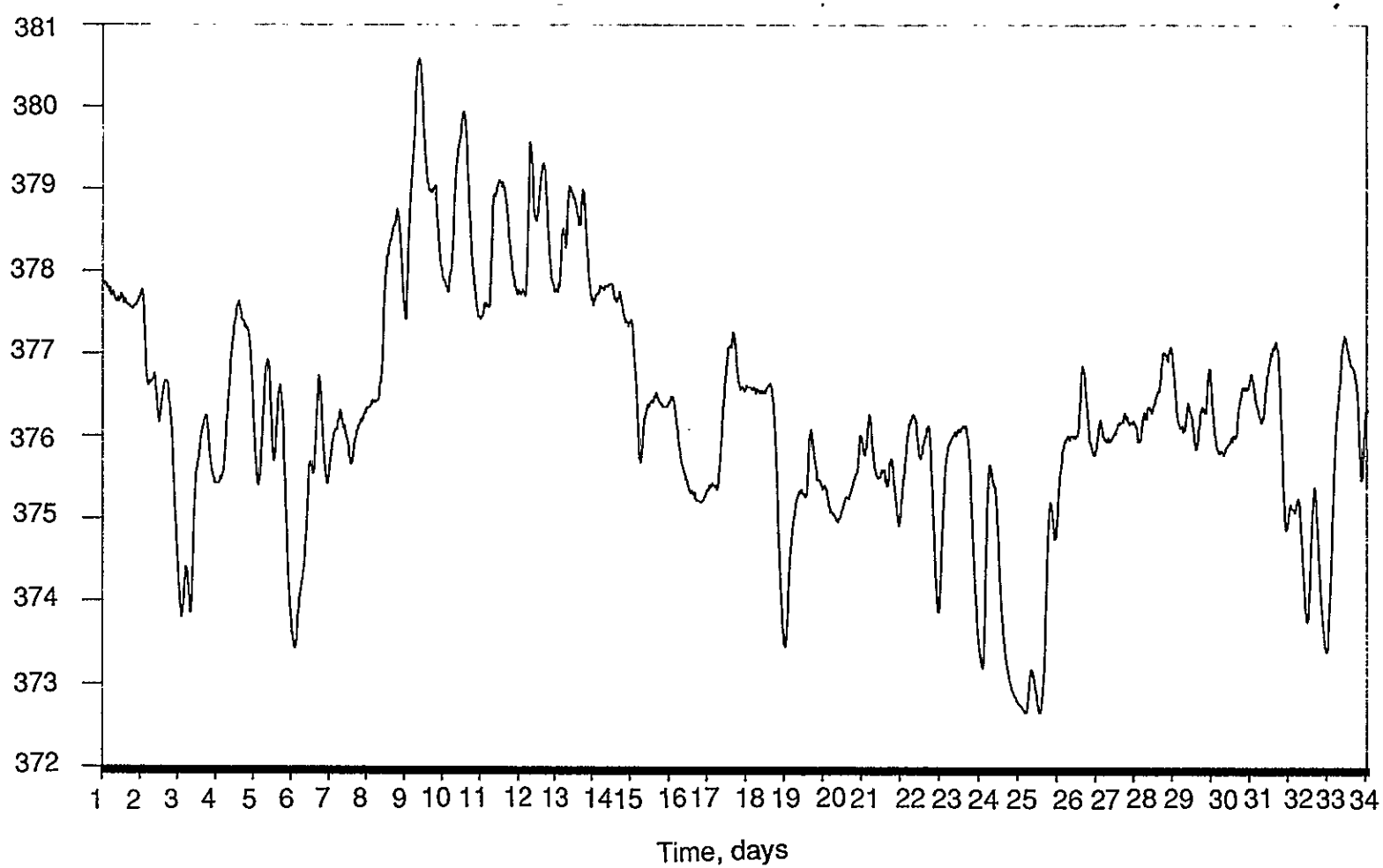

FIGURE 3.2. Columbia River Elevation (in feet above mean sea level) at the 100-H Area for the Period December 29, 1988, to January 31, 1989

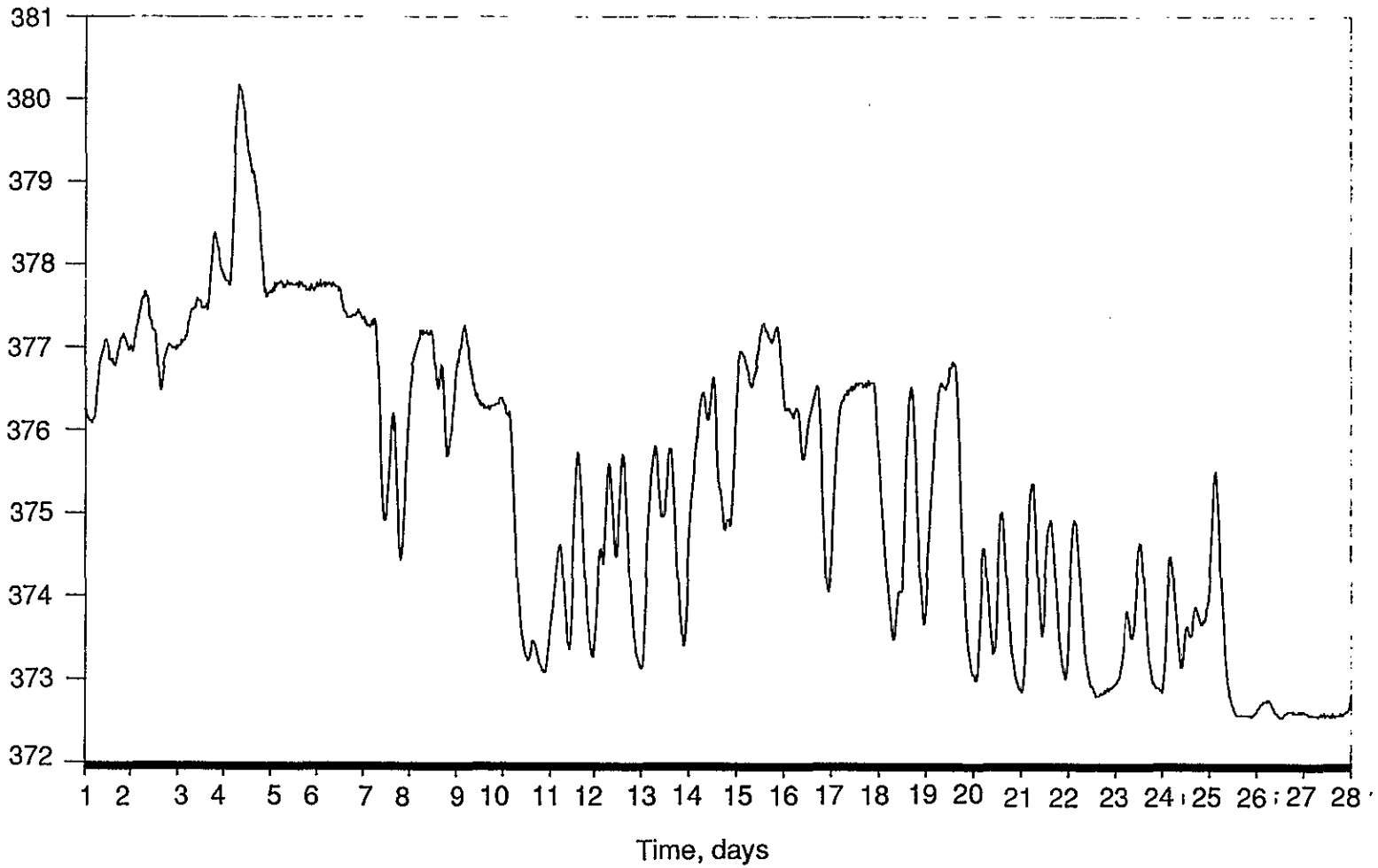

FIGURE 3.3. Columbia River Elevation (in feet above mean sea level) at the 100-H Area for the Period January 31 to February 27, 1989

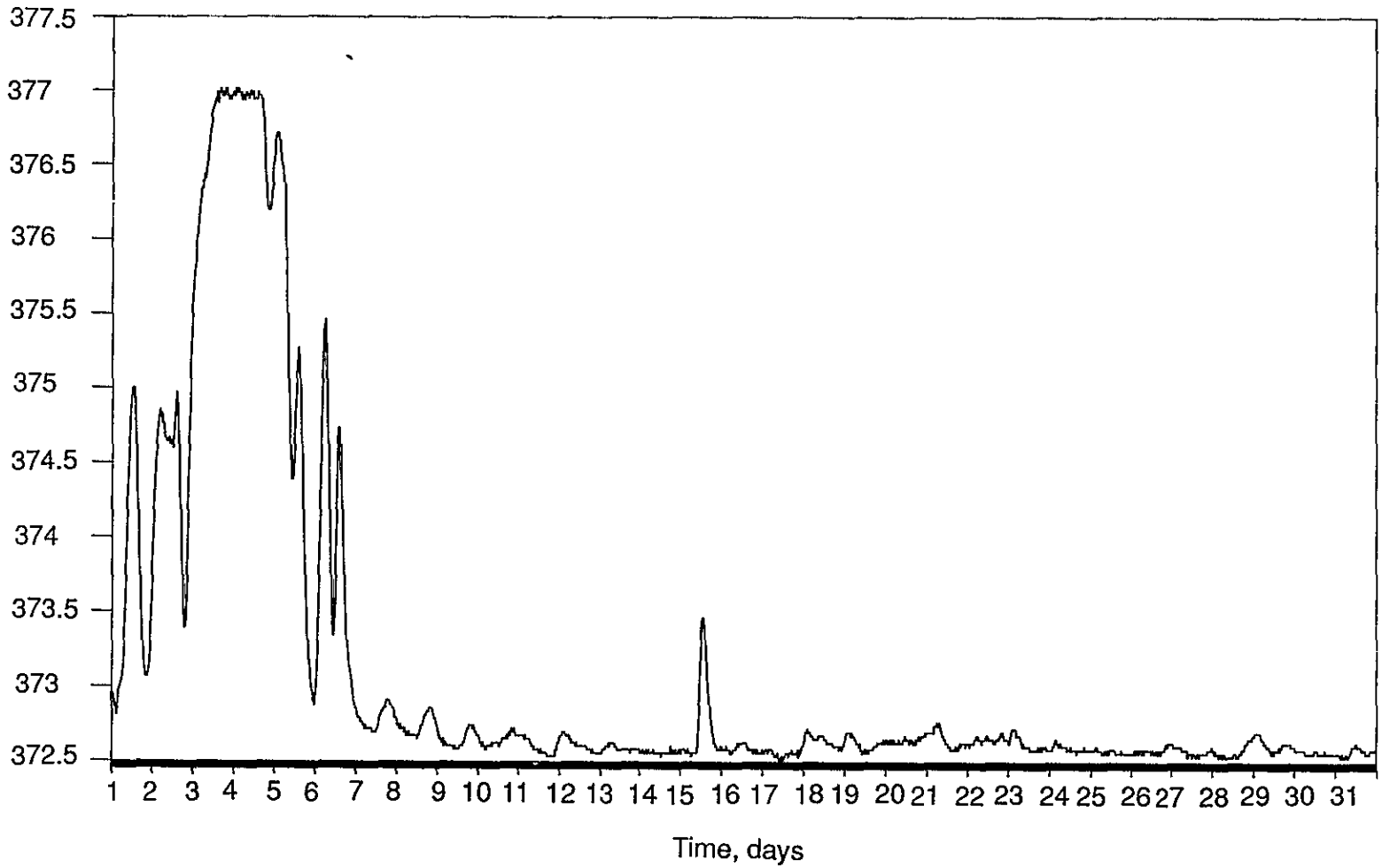

FIGURE 3.4. Columbia River Elevation (in feet above mean sea level) at the 100-H Area for the Period February 27 to March 30, 1989

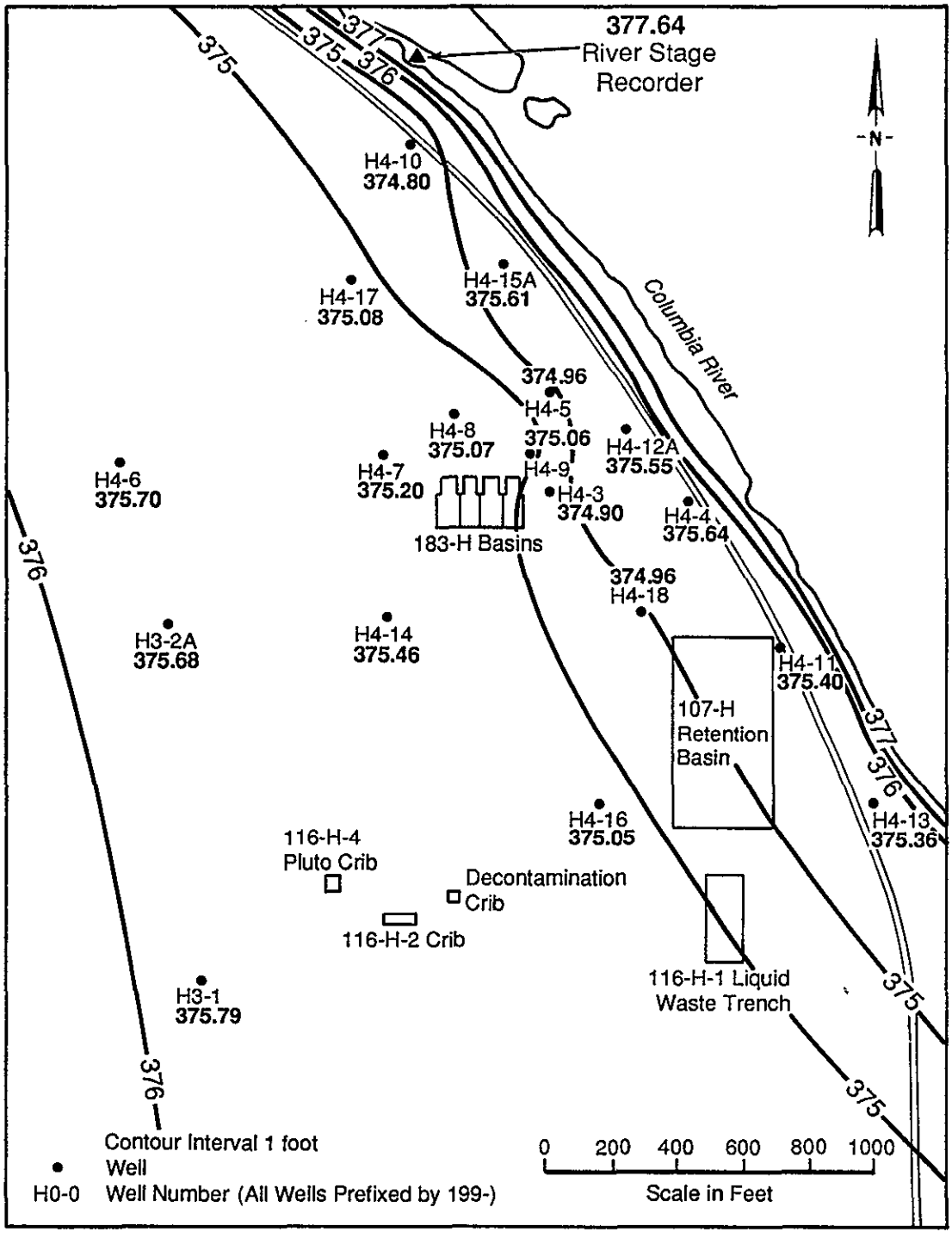

FIGURE 3.5. Water-Table Contour Map for the 100-H Area at High River Stage (January 6, 1989)

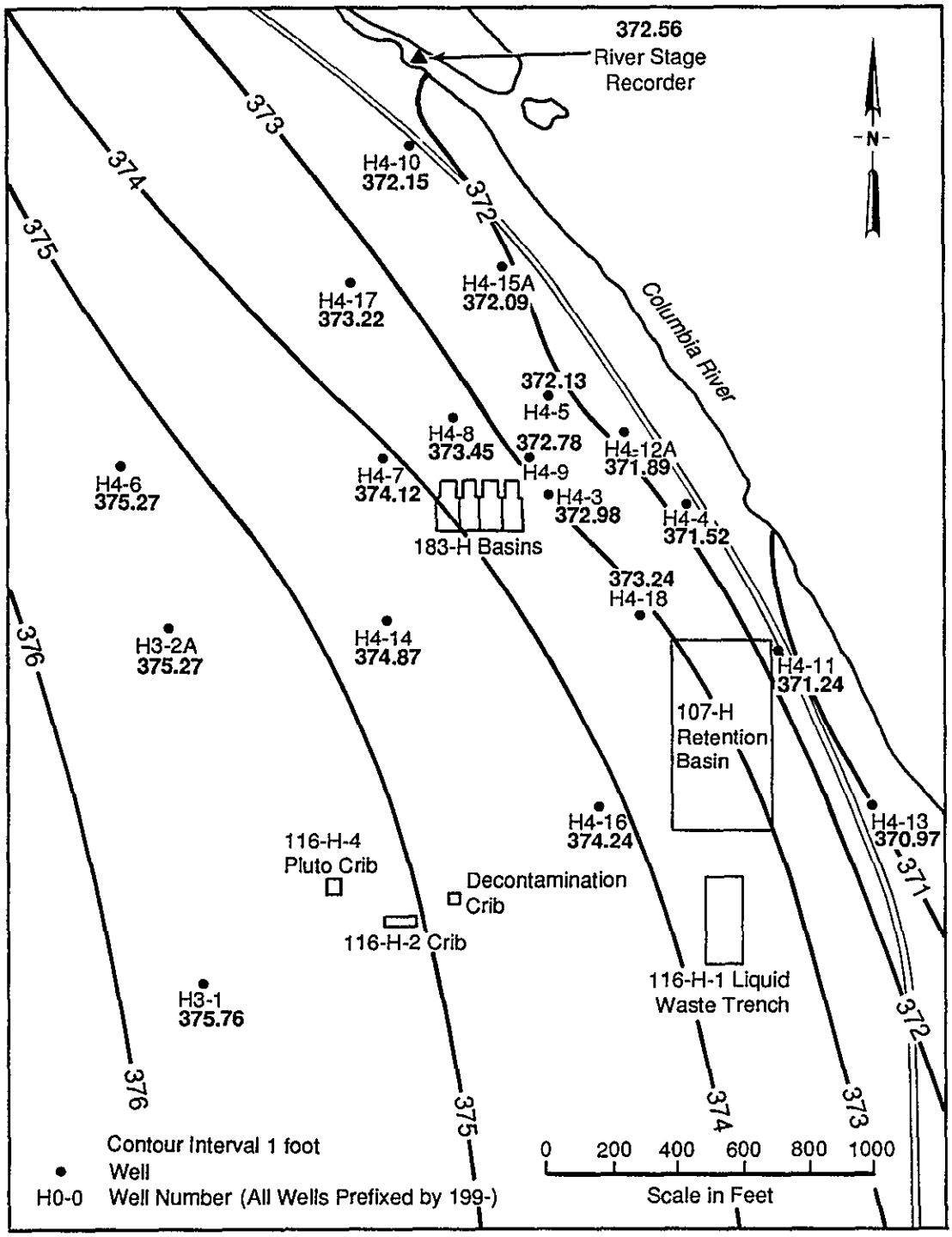

FIGURE 3.6. Water-Table Contour Map for the 100-H Area at Low River Stage (March 30, 1989)

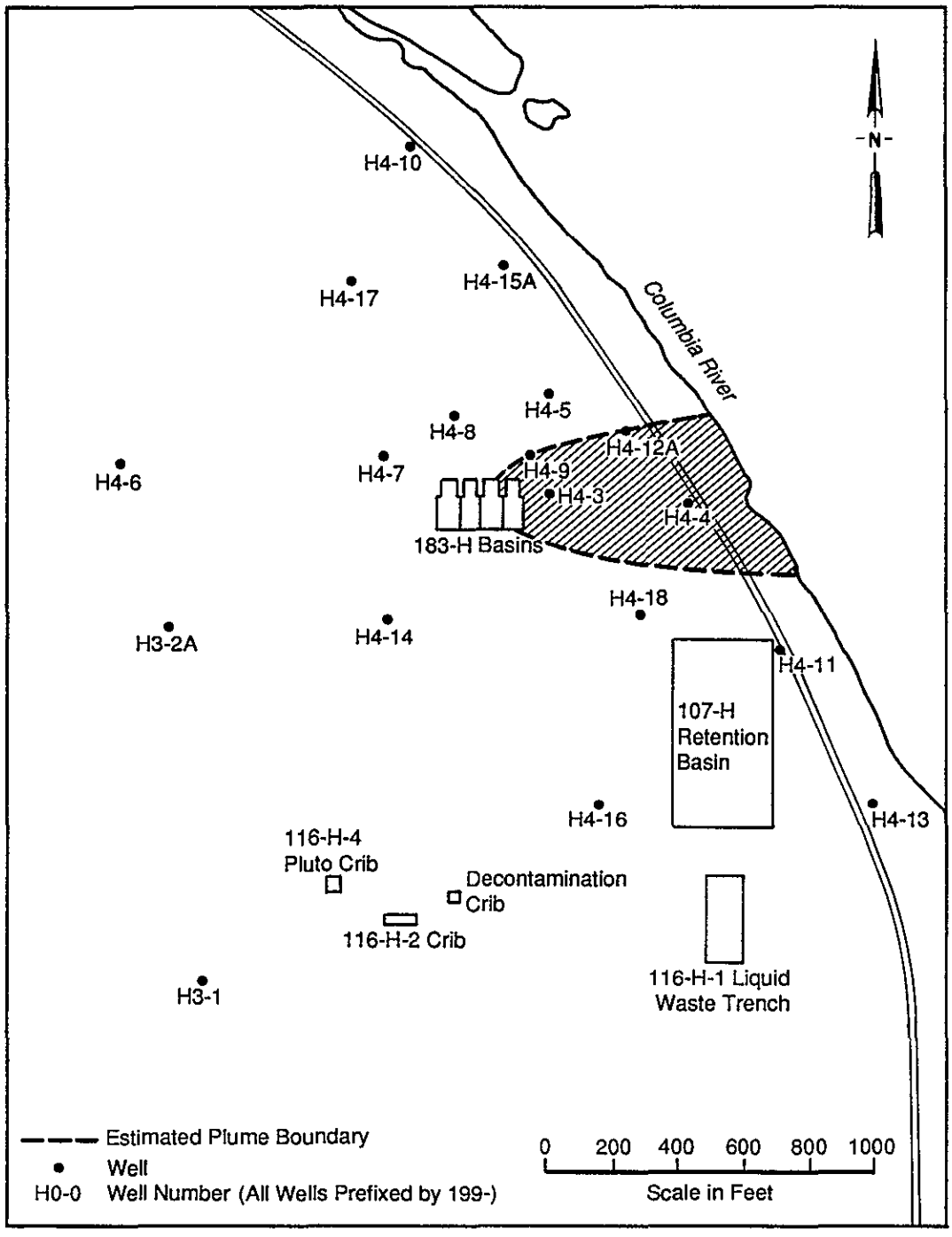

FIGURE 3.7. Extent of the Contaminant Plume Attributed to the 183-H Solar Evaporation Basins, Based on Nitrate, Chromium, Uranium, and Technetium-99 Data from Ground-Water Samples Collected from July 1987 to September 1988

TABLE 3.1. Sampling Schedule for the 183-H Solar Evaporation Basins

Well	1988			1989								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
199-H3- 1							L					
199-H3- 2A	X			X			L			X		
199-H3- 2B							LRV					
199-H3- 2C							L					
199-H4- 3	XR			X			L			X		
199-H4- 4	X			X			L			X		
199-H4- 5	X			XR			L			X		
199-H4- 6	X			X			L			XR		
199-H4- 7							L					
199-H4- 8							L					
199-H4- 9	X			X			L			X		
199-H4-10							L					
199-H4-11							L					
199-H4-12A	X			X			L			X		
199-H4-12B	X			X			L			X		
199-H4-12C	X			X			L			X		
199-H4-13							LRV					
199-H4-14							L					
199-H4-15A							L					
199-H4-15B							L					
199-H4-16							L					
199-H4-17							L					
199-H4-18	X			X			L			X		

L = sampled for the long list of constituents (WAC 173-303-9905).
R = quality control replicates were collected.
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 3.4).

TABLE 3.2. Water-Level Data for the 183-H Basins, January Through March 1989

Well Name	Date	Casing Elevation, ft above MSL[a]	Depth to Water, ft	Water-Level Elevation, ft above MSL
199-H3-1	1/06/89	421.48	45.69	375.79
199-H3-1	1/31/89	421.48	45.51	375.97
199-H3-1	2/15/89	421.48	45.43	376.05
199-H3-1	2/28/89	421.48	45.45	376.03
199-H3-1	3/16/89	421.48	45.56	375.92
199-H3-1	3/30/89	421.48	45.72	375.76
199-H3-2A	1/06/89	417.83	42.15	375.68
199-H3-2A	1/31/89	417.83	41.97	375.86
199-H3-2A	2/15/89	417.83	41.89	375.94
199-H3-2A	2/28/89	417.83	42.07	375.76
199-H3-2A	3/16/89	417.83	42.30	375.53
199-H3-2A	3/30/89	417.83	42.56	375.27
199-H3-2B	1/06/89	418.42	42.74	375.68
199-H3-2B	1/31/89	418.42	42.55	375.87
199-H3-2B	2/15/89	418.42	42.48	375.94
199-H3-2B	2/28/89	418.42	42.65	375.77
199-H3-2B	3/16/89	418.42	42.89	375.53
199-H3-2B	3/30/89	418.42	43.15	375.27
199-H3-2C	1/06/89	418.22	42.54	375.68
199-H3-2C	1/31/89	418.22	42.42	375.80
199-H3-2C	2/15/89	418.22	42.34	375.88
199-H3-2C	2/28/89	418.22	42.66	375.56
199-H3-2C	3/16/89	418.22	42.93	375.29
199-H3-2C	3/30/89	418.22	43.19	375.03
199-H4-3	1/06/89	420.29	45.39	374.90
199-H4-3	1/31/89	420.29	45.32	374.97
199-H4-3	2/15/89	420.29	45.48	374.81
199-H4-3	2/28/89	420.29	46.33	373.96
199-H4-3	3/16/89	420.29	46.86	373.43
199-H4-3	3/30/89	420.29	47.31	372.98
199-H4-4	1/06/89	413.70	38.06	375.64
199-H4-4	1/31/89	413.70	39.26	374.44
199-H4-4	2/15/89	413.70	38.98	374.72
199-H4-4	2/28/89	413.70	41.12	372.58
199-H4-4	3/16/89	413.70	41.72	371.98
199-H4-4	3/30/89	413.70	42.08	371.62
199-H4-5	1/06/89	416.21	41.25	374.96
199-H4-5	1/31/89	416.21	41.55	374.66
199-H4-5	2/15/89	416.21	41.60	374.61
199-H4-5	2/28/89	416.21	42.95	373.26
199-H4-5	3/16/89	416.21	43.52	372.69
199-H4-5	3/30/89	416.21	44.08	372.13
199-H4-6	1/06/89	419.58	43.88	375.70
199-H4-6	1/31/89	419.58	43.70	375.88
199-H4-6	2/15/89	419.58	43.63	375.95

TABLE 3.2. (contd)

Well Name	Date	Casing Elevation, ft above MSL[a]	Depth to Water, ft	Water-Level Elevation, ft above MSL
199-H4-6	2/28/89	419.58	43.81	375.77
199-H4-6	3/16/89	419.58	44.05	375.53
199-H4-6	3/30/89	419.58	44.31	375.27
199-H4-7	1/06/89	420.59	45.39	375.20
199-H4-7	1/31/89	420.59	45.06	375.53
199-H4-7	2/15/89	420.59	45.18	375.41
199-H4-7	2/28/89	420.59	45.65	374.94
199-H4-7	3/16/89	420.59	46.09	374.50
199-H4-7	3/30/89	420.59	46.47	374.12
199-H4-8	1/06/89	420.00	44.93	375.07
199-H4-8	1/31/89	420.00	44.67	375.33
199-H4-8	2/15/89	420.00	44.83	375.17
199-H4-8	2/28/89	420.00	45.53	374.47
199-H4-8	3/16/89	420.00	46.08	373.92
199-H4-8	3/30/89	420.00	46.55	373.45
199-H4-9	1/06/89	418.08	43.02	375.06
199-H4-9	1/31/89	418.08	43.06	375.02
199-H4-9	2/15/89	418.08	43.22	374.86
199-H4-9	2/28/89	418.08	44.13	373.95
199-H4-9	3/16/89	418.08	44.74	373.34
199-H4-9	3/30/89	418.08	45.30	372.78
199-H4-10	1/06/89	404.44	29.84	374.60
199-H4-10	1/31/89	404.44	29.73	374.71
199-H4-10	2/15/89	404.44	29.53	374.91
199-H4-10	2/28/89	404.44	31.26	373.18
199-H4-10	3/16/89	404.44	31.77	372.67
199-H4-10	3/30/89	404.44	32.29	372.15
199-H4-11	1/06/89	416.84	41.44	375.40
199-H4-11	1/31/89	416.84	42.59	374.25
199-H4-11	2/15/89	416.84	42.19	374.65
199-H4-11	2/28/89	416.84	44.64	372.20
199-H4-11	3/16/89	416.84	45.36	371.48
199-H4-11	3/30/89	416.84	45.60	371.24
199-H4-12A	1/06/89	413.50	37.95	375.55
199-H4-12A	1/31/89	413.50	38.98	374.52
199-H4-12A	2/15/89	413.50	38.72	374.78
199-H4-12A	2/28/89	413.50	40.62	372.88
199-H4-12A	3/16/89	413.50	41.16	372.34
199-H4-12A	3/30/89	413.50	41.61	371.89
199-H4-12B	1/06/89	413.52	37.95	375.57
199-H4-12B	1/31/89	413.52	38.99	374.53
199-H4-12B	2/15/89	413.52	38.73	374.79
199-H4-12B	2/28/89	413.52	40.61	372.91
199-H4-12B	3/16/89	413.52	41.17	372.35
199-H4-12B	3/30/89	413.52	41.62	371.90

TABLE 3.2. (contd)

Well Name	Date	Casing Elevation, ft above MSL[a]	Depth to Water, ft	Water-Level Elevation, ft above MSL
199-H4-12C	1/06/89	413.52	37.90	375.62
199-H4-12C	1/31/89	413.52	38.80	374.72
199-H4-12C	2/15/89	413.52	38.39	375.13
199-H4-12C	2/28/89	413.52	40.37	373.15
199-H4-12C	3/16/89	413.52	41.16	372.36
199-H4-12C	3/30/89	413.52	41.49	372.03
199-H4-13	1/06/89	418.20	42.84	375.36
199-H4-13	1/31/89	418.20	44.17	374.03
199-H4-13	2/15/89	418.20	43.64	374.56
199-H4-13	2/28/89	418.20	46.27	371.93
199-H4-13	3/16/89	418.20	47.04	371.16
199-H4-13	3/31/89	418.20	47.23	370.97
199-H4-14	1/06/89	420.59	45.13	375.46
199-H4-14	1/31/89	420.59	44.90	375.69
199-H4-14	2/15/89	420.59	44.88	375.71
199-H4-14	2/28/89	420.59	45.12	375.47
199-H4-14	3/16/89	420.59	45.42	375.17
199-H4-14	3/30/89	420.59	45.72	374.87
199-H4-15A	1/06/89	407.21	31.60	375.61
199-H4-15A	1/31/89	407.21	32.52	374.69
199-H4-15A	2/15/89	407.21	32.30	374.91
199-H4-15A	2/28/89	407.21	34.11	373.10
199-H4-15A	3/16/89	407.21	34.62	372.59
199-H4-15A	3/30/89	407.21	35.12	372.09
199-H4-15B	1/06/89	406.92	31.32	375.60
199-H4-15B	1/31/89	406.92	32.24	374.68
199-H4-15B	2/15/89	406.92	32.01	374.91
199-H4-15B	2/28/89	406.92	33.82	373.10
199-H4-15B	3/16/89	406.92	34.32	372.60
199-H4-15B	3/30/89	406.92	34.82	372.10
199-H4-15CP	1/06/89	407.07	20 psi[b]	--
199-H4-15CP	1/31/89	407.07	21 psi[b]	--
199-H4-15CP	2/15/89	407.07	20 psi[b]	--
199-H4-15CP	2/28/89	407.07	20 psi[b]	--
199-H4-15CP	3/16/89	407.07	20 psi[b]	--
199-H4-15CP	3/30/89	407.07	20 psi[b]	--
199-H4-15CQ	1/06/89	407.27	20.52	386.75
199-H4-15CQ	1/31/89	407.27	21.25	386.02
199-H4-15CQ	2/15/89	407.27	20.66	386.61
199-H4-15CQ	2/28/89	407.27	21.98	385.29
199-H4-15CQ	3/16/89	407.27	22.10	385.17
199-H4-15CQ	3/30/89	407.27	22.38	384.89
199-H4-15CR	1/06/89	407.37	32.81	374.56
199-H4-15CR	1/31/89	407.37	32.73	374.64
199-H4-15CR	2/15/89	407.37	32.69	374.68
199-H4-15CR	2/28/89	407.37	33.12	374.25

TABLE 3.2. (contd)

Well Name	Date	Casing Elevation, ft above MSL[a]	Depth to Water, ft	Water-Level Elevation, ft above MSL
199-H4-15CR	3/16/89	407.37	33.39	373.98
199-H4-15CR	3/30/89	407.37	33.77	373.60
199-H4-15CS	1/06/89	407.44	31.62	375.82
199-H4-15CS	1/31/89	407.44	32.61	374.83
199-H4-15CS	2/15/89	407.44	32.27	375.17
199-H4-15CS	2/28/89	407.44	34.16	373.28
199-H4-15CS	3/16/89	407.44	34.83	372.61
199-H4-15CS	3/30/89	407.44	35.27	372.17
199-H4-16	1/06/89	424.23	49.18	375.05
199-H4-16	1/31/89	424.23	48.97	375.26
199-H4-16	2/15/89	424.23	48.97	375.26
199-H4-16	2/28/89	424.23	49.27	374.96
199-H4-16	3/16/89	424.23	49.63	374.60
199-H4-16	3/30/89	424.23	49.99	374.24
199-H4-17	1/06/89	419.09	44.01	375.08
199-H4-17	1/31/89	419.09	44.09	375.00
199-H4-17	2/15/89	419.09	44.18	374.91
199-H4-17	2/28/89	419.09	45.05	374.04
199-H4-17	3/16/89	419.09	45.47	373.62
199-H4-17	3/30/89	419.09	45.87	373.22
199-H4-18	1/06/89	421.82	46.86	374.96
199-H4-18	1/31/89	421.82	46.76	375.06
199-H4-18	2/15/89	421.82	46.85	374.97
199-H4-18	2/28/89	421.82	47.66	374.16
199-H4-18	3/16/89	421.82	48.18	373.64
199-H4-18	3/30/89	421.82	48.58	373.24
699-88-41	1/06/89	416.04	33.72	382.32
699-88-41	1/31/89	416.04	33.72	382.32
699-88-41	2/15/89	416.04	33.72	382.32
699-88-41	2/28/89	416.04	33.72	382.32
699-88-41	3/16/89	416.04	33.73	382.31
699-88-41	3/30/89	416.04	33.74	382.30
699-89-35	1/06/89	397.46	25.66	371.80
699-89-35	1/31/89	397.46	25.99	371.47
699-89-35	2/15/89	397.46	25.73	371.73
699-89-35	2/28/89	397.46	26.63	370.83
699-89-35	3/16/89	397.46	26.89	370.57
699-89-35	3/30/89	397.46	27.13	370.33
699-90-34	1/06/89	392.39	20.59	371.80
699-90-34	1/31/89	392.39	21.02	371.37
699-90-34	2/15/89	392.39	20.91	371.48
699-90-34	2/28/89	392.39	22.24	370.15
699-90-34	3/16/89	392.39	Dry	--
699-90-34	3/30/89	392.39	Dry	--
699-90-45	1/06/89	422.15	37.44	384.71
699-90-45	1/31/89	422.15	37.44	384.71

TABLE 3.2. (contd)

Well Name	Date	Casing Elevation, ft above MSL[a]	Depth to Water, ft	Water-Level Elevation, ft above MSL
699-90-45	2/15/89	422.15	37.44	384.71
699-90-45	2/28/89	422.15	37.43	384.72
699-90-45	3/16/89	422.15	37.43	384.72
699-90-45	3/30/89	422.15	37.44	384.71
699-91-37	1/06/89	422.93	49.83	373.10
699-91-37	1/31/89	422.93	49.39	373.54
699-91-37	2/15/89	422.93	49.24	373.69
699-91-37	2/28/89	422.93	49.29	373.64
699-91-37	3/16/89	422.93	49.45	373.48
699-91-37	3/30/89	422.93	49.65	373.28
699-97-43	1/06/89	421.81	43.12	378.69
699-97-43	1/31/89	421.81	42.98	378.83
699-97-43	2/15/89	421.81	42.91	378.90
699-97-43	2/28/89	421.81	42.86	378.95
699-97-43	3/16/89	421.81	42.87	378.94
699-97-43	3/30/89	421.81	42.93	378.88
699-99-42	1/06/89	412.88	Dry	--
699-99-42	1/31/89	412.88	Dry	--
699-99-42	2/15/89	412.88	Dry	--
699-99-42	2/28/89	412.88	Dry	--
699-99-42	3/16/89	412.88	Dry	--
699-99-42	3/30/89	412.88	Dry	--

(a) MSL = mean sea level.
(b) psi = pounds per square inch.

TABLE 3.3. Constituent List and Summary of Sampling Results for the 183-H Solar Evaporation Basins
December 1988 through February 1989

---------- Constituent List=Contamination Indicator Parameters ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
191	CONDFLD	umho	1	10	0	700	WDOE	xxx	Specific conductance, field
199	PHFIELD		0.1	10	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	10	0	6.5-8.5	EPAS		pH, laboratory
H42	TOXLDL	ppb	10	10	0	.			Total organic halogens, low DL

---------- Constituent List=Interim Primary Drinking Water Parameters ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
111	BETA	pCi/L	8	11	0	50	EPA	xxx	Gross beta
212	ALPHA	pCi/L	4	11	0	15	EPA	xxx	Gross alpha
A06	BARIUM	ppb	6	11	1	1000	EPA		Barium
A07	CADMIUM	ppb	2	11	11 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	11	0	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	11	11 ***	50	EPA		Silver
C72	NITRATE	ppb	500	11	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	11	11 ***	4000	EPA		Fluoride
H20	FBARIUM	ppb	6	11	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	11	11 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	11	0	50	EPA	xxx	Chromium, filtered
H23	FSILVER	ppb	10	11	11 ***	50	EPA		Silver, filtered

---------- Constituent List=Water Quality Parameters ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	11	0	.			Sodium
A17	MANGESE	ppb	5	11	8	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	11	1	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	11	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	11	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	11	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	11	10	50	EPAS	xxx	Manganese, filtered
H31	FIRON	ppb	30	11	8	300	EPAS		Iron, filtered

TABLE 3.3. (contd)

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
104	U	pCi/L	0.5	11	0	600	DOE		Uranium
197	TC-99	pCi/L	15	11	0	900	EPAR	xxx	Technetium-99
A01	BERYLUM	ppb	5	11	11 ***	.			Beryllium
A03	STRONUM	ppb	20	11	0	.			Strontium
A04	ZINC	ppb	5	11	4	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	11	0	.			Calcium
A12	NICKEL	ppb	10	11	9	.			Nickel
A13	COPPER	ppb	10	11	8	1300	EPAP		Copper
A14	VANADUM	ppb	5	11	10	.			Vanadium
A15	ANTIONY	ppb	100	11	11 ***	.			Antimony
A16	ALUMNUM	ppb	150	11	10	.			Aluminum
A18	POTASUM	ppb	100	11	0	.			Potassium
A50	MAGNES	ppb	50	11	0	.			Magnesium
C76	PHOSPHA	ppb	1000	11	11 ***	.			Phosphate
H18	FZINC	ppb	5	11	0	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	11	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	11	10	.			Nickel, filtered
H26	FCOPPER	ppb	10	11	11 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	11	5	.			Vanadium, filtered
H28	FALUMIN	ppb	150	11	11 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	11	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	11	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	11	11 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	11	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	11	11 ***	.			Antimony, filtered
H58	ALKALIN	ppb	20000	11	0	.			Total alkalinity, as CaCO3
H66	BROMIDE	ppb	1000	11	11 ***	.			Bromide
H67	NITRITE	ppb	1000	11	11 ***	.			Nitrite
H86	FBORON	ppb	10	11	0	.			Boron, filtered
H87	FCOBALT	ppb	20	11	11 ***	.			Cobalt, filtered
H88	FLITHI	ppb	10	11	11 ***	.			Lithium, filtered
H89	FMOLY	ppb	40	11	11 ***	.			Molybdenum, filtered
H90	FSILICO	ppb	50	11	0	.			Silicon, filtered
H91	FTIN	ppb	30	11	11 ***	.			Tin, filtered
H92	FTITAN	ppb	60	11	11 ***	.			Titanium, filtered
H93	FZIRCON	ppb	50	11	11 ***	.			Zirconium, filtered
P01	BORON	ppb	10	11	0	.			Boron
P02	COBALT	ppb	20	11	11 ***	.			Cobalt
P03	LITHIUM	ppb	10	11	11 ***	.			Lithium
P04	MOLY	ppb	40	11	11 ***	.			Molybdenum
P05	SILICON	ppb	50	11	0	.			Silicon
P06	TIN	ppb	30	11	11 ***	.			Tin
P07	TITAN	ppb	60	11	11 ***	.			Titanium
P08	ZIRCON	ppb	50	11	11 ***	.			Zirconium

TABLE 3.3. (contd)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 3.4. Constituents with at Least One Detected Value for the 183-H Solar Evaporation Basins
December 1988 through February 1989

Well name	Collection Date	Duplicate sample number	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	ALUMNUM ppb 150/.	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.	FCALCIU ppb 50/.
1-H3-2A	06JAN89		130,000	2.75	<150	29	31	7.57	28	36	54,200
1-H4-3	09JAN89		156,000	51.10	414	33	23	95.74	53	65	19,100
1-H4-4	09JAN89		103,000	2.77	<150	32	38	8.37	29	29	46,400
1-H4-5	06JAN89		146,000	*1.68	<150	62	75	7.02	70	73	84,500
	06JAN89	1	144,000	2.26	<150	66	67	5.93	71	115	75,500
1-H4-6	09JAN89		147,000	5.65	<150	42	48	7.49	80	67	70,100
1-H4-9	06JAN89		162,000	5.04	<150	51	53	21.50	119	306	75,200
1-H4-12A	06JAN89		123,000	6.28	<150	49	48	10.90	42	98	51,600
1-H4-12B	06JAN89		137,000	5.22	<150	100	103	10.40	48	65	72,100
1-H4-12C	06JAN89		106,000	1.32	<150	<6	6	3.92	13	46	31,200
1-H4-18	06JAN89		120,000	*1.63	<150	33	33	10.80	40	78	56,600

Well name	Collection Date	Duplicate sample number	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	FCHROMI ppb 10/50	CHROMUM ppb 10/50	CONDFLD umho 1/700w	COPPER ppb 10/1300p	IRON ppb 30/300s	FIRON ppb 30/300s
1-H3-2A	06JAN89		54,100	8,400	67	66	254	33	54	<30
1-H4-3	09JAN89		21,600	10,000	159	179	873	13	2,350	33
1-H4-4	09JAN89		41,300	4,200	70	58	343	<10	233	<30
1-H4-5	06JAN89		71,000	8,600	129	333	473	<10	1,610	<30
	06JAN89	1	75,900	8,500	114	117	.	<10	113	<30
1-H4-6	09JAN89		65,600	12,300	78	72	600	<10	404	33
1-H4-9	06JAN89		76,000	9,900	110	106	555	<10	101	<30
1-H4-12A	06JAN89		53,600	5,900	94	94	252	<10	<30	<30
1-H4-12B	06JAN89		69,800	7,200	128	128	289	67	84	<30
1-H4-12C	06JAN89		30,300	2,500	284	279	150	<10	65	37
1-H4-18	06JAN89		54,100	6,900	135	121	374	<10	37	<30

Well name	Collection Date	Duplicate sample number	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000	PH-LAB 0.01/8.5s
1-H3-2A	06JAN89		11,600	11,800	<5	<5	<10	<10	29,000	7.7
1-H4-3	09JAN89		3,660	3,190	<5	62	<10	<10	191,000	8.0
1-H4-4	09JAN89		7,000	8,030	<5	<5	<10	<10	26,300	7.9
1-H4-5	06JAN89		11,500	13,600	<5	10	202	<10	39,500	7.6
	06JAN89	1	12,100	12,000	<5	<5	<10	<10	40,600	.
1-H4-6	09JAN89		13,700	14,900	73	67	<10	<10	39,100	7.8
1-H4-9	06JAN89		13,400	13,600	<5	<5	<10	<10	58,000	7.7
1-H4-12A	06JAN89		8,540	8,260	<5	<5	<10	<10	29,100	7.8
1-H4-12B	06JAN89		10,800	11,200	<5	<5	<10	<10	39,000	7.9
1-H4-12C	06JAN89		10,400	10,700	<5	<5	22	22	6,400	7.8
1-H4-18	06JAN89		8,890	9,460	<5	<5	<10	<10	27,600	7.7

TABLE 3.4. (contd)

Well name	Collection Date	Duplicate sample number	PHFIELD 0.1/8.5s	FPOTASS ppb 100/.	POTASUM ppb 100/.	FSILICO ppb 50/.	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.
1-H3-2A	06JAN89		7.9	5,190	4,960	14,000	13,700	13,500	13,800	289	279
1-H4-3	09JAN89		7.9	4,410	4,450	14,600	15,500	166,000	169,000	103	112
1-H4-4	09JAN89		8.0	4,380	3,690	13,900	12,400	13,100	15,000	222	187
1-H4-5	06JAN89		7.6	5,840	4,850	15,900	13,500	11,600	13,600	379	310
	06JAN89	1	.	5,140	5,090	13,400	13,700	12,200	12,100	335	331
1-H4-6	09JAN89		8.2	6,660	6,040	14,400	13,400	24,300	26,300	369	330
1-H4-9	06JAN89		7.3	5,310	5,150	14,400	14,700	24,700	24,600	352	335
1-H4-12A	06JAN89		8.0	4,350	4,410	12,700	13,300	12,500	12,400	245	245
1-H4-12B	06JAN89		8.1	5,270	5,030	14,100	13,800	12,000	12,500	332	313
1-H4-12C	06JAN89		9.0	4,700	4,500	27,400	26,700	4,860	5,010	219	206
1-H4-18	06JAN89		7.8	4,620	4,200	14,300	13,700	11,000	11,800	264	244

Well name	Collection Date	Duplicate sample number	SULFATE ppb 500/250000s	TC-99 pCi/L 15/900r	TOXLDL ppb 10/.	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
1-H3-2A	06JAN89		53,900	*-0.65	13	2.51	8	<5	20	7
1-H4-3	09JAN89		83,700	1,100.00	29	53.20	6	<5	<5	10
1-H4-4	09JAN89		35,400	18.10	#8	3.58	6	<5	51	53
1-H4-5	06JAN89		70,200	*0.01	15	2.91	<5	<5	97	110
	06JAN89	1	71,800	*0.24	.	2.79	<5	<5	116	103
1-H4-6	09JAN89		88,900	*-1.66	16	4.46	<5	<5	197	187
1-H4-9	06JAN89		80,100	157.00	17	4.85	6	<5	<5	8
1-H4-12A	06JAN89		48,100	34.60	12	4.50	5	<5	<5	7
1-H4-12B	06JAN89		59,300	58.40	14	4.30	<5	<5	42	12
1-H4-12C	06JAN89		24,200	*-0.63	15	1.09	24	17	<5	9
1-H4-18	06JAN89		48,600	25.20	26	1.57	<5	<5	7	5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

THIS PAGE INTENTIONALLY
LEFT BLANK

4.0 200 AREAS LOW-LEVEL BURIAL GROUNDS

G. V. Last

Ground-water near the 200 Areas Low-Level Burial Grounds (LLBGs) has been monitored via a RCRA interim-status monitoring well network since September 1988. This project is currently in the background stage of monitoring. Two complete sample sets have been collected; however, the third scheduled sample collection was interrupted in late March because of purge water disposal concerns. The additional samples are scheduled for collection in May. A Part B Permit Application and a revised ground-water monitoring plan are being prepared for these facilities.

The LLBGs encompass four waste management areas (WMAs) covering all or portions of six low-level burial grounds located in the 200-East and 200-West Areas of the Hanford Site (Figure 1.1). A diverse range of mixed radioactive/hazardous waste types from Hanford operations (e.g., miscellaneous dry waste, failed equipment, vehicles, contaminated soil, 183-H cleanup wastes) and other offsite wastes (submarine reactor core barrels, Three-Mile Island Reactor cleanup wastes) are buried in unlined trenches and pits from 15 to 60 ft deep. Disposal to these LLBGs has been continuing since 1960.

There are currently 35 wells in the monitoring network for the LLBGs (see Figures 4.1 and 4.2). Table 4.1 lists the upgradient and downgradient wells at each WMA. Table 4.2 shows the sampling schedule for the wells in the monitoring network.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling was conducted this quarter. Characterization efforts centered on finalizing an interim characterization report.

WATER LEVELS

Water levels at each well were measured three times during this quarter; results are listed in Tables 4.3 and 4.4 for the 200-East and 200-West Areas, respectively.

WATER CHEMISTRY DATA

Twenty-one of the 34 wells scheduled for sampling during this report period were sampled in March. The sampling schedule was interrupted because purge water disposal issues had not been resolved. Sampling is expected to resume in May.

The analytical results for samples collected in December 1988/January 1989 are summarized in Tables 4.5, 4.7, 4.9, and 4.11 for WMA-1, WMA-2, WMA-3, and WMA-4, respectively. The results for constituents with at least one detected value are provided in Tables 4.6, 4.8, 4.10, and 4.12 for WMA-1, WMA-2, WMA-3, and WMA-4, respectively. Major observations of the analyses from each WMA are discussed below.

- WMA-1

  - Gross alpha exceeded the 40 CFR 141 standard of 15 pCi/L in well 299-E28-26 (24 pCi/L).

  - Tritium exceeded the 40 CFR 141 standard of 20,000 pCi/L in wells 299-E28-26 (126,000 pCi/L), 299-E28-27 (137,000 pCi/L), 299-E32-2 (64,100 pCi/L), and 299-E32-3 (247,000 pCi/L).

  - Nitrate exceeded the 40 CFR 141 standard of 45 ppm in well 299-E28-26 (52.9 ppm).

  - Ruthenium-106 (EPA 1976) and iron (40 CFR 143) were also found to exceed their standards in wells 299-E33-29 and 299-E28-27, respectively.

- WMA-2

  - Chromium (40 CFR 141) and iron (40 CFR 143) exceeded their respective standards in well 299-E27-9, and manganese exceeded its 40 CFR 143 standard in well 299-E34-6.

- WMA-3

  Note: well 299-W7-6 yields turbid water samples, which may not be totally representative of the ground water. This well is scheduled for further development.

  - The field and/or laboratory pH 40 CFR 143 standards (6.5 to 8.5) were exceeded in wells 299-W7-1, 299-W7-3, 299-W7-4, and 299-W7-6. All had higher than normal pH.

- Gross alpha exceeded the 15 pCi/L standard in 40 CFR 141 in well 299-W7-6 (28.4 pCi/L).

- Nitrate exceed the 45-ppm standard in 40 CFR 141 in wells 299-W6-2 (71.7 ppm), 299-W7-4 (74.3-74.2 ppm), and 299-W7-5 (45.4 ppm).

- Tetrachloromethane (carbon tetrachloride) exceeded the 5-ppb standard in 40 CFR 141 in wells 299-W7-5 (25 ppb) and 299-W10-13 (7 ppb).

- Ruthenium-106 exceeded its standard (EPA 1976) in wells 299-W7-4, 299-W10-13, and 299-W10-14.

- Various metals (chromium, manganese, and iron) exceeded standards in at least one well. The filtered sample from well 299-W7-1 exceeded the manganese 40 CFR 143 standard.

• WMA-4

Note: Ground-water samples were collected from well 299-W15-17 using a Teflon®[a] bailer, rather than a HydroStar®[b] pump as in the other wells. The HydroStar pump has been scheduled to be reinstalled in this well.

- The coliform bacteria count exceeded the 40 CFR 141 standard (1 MPN) in well 299-W18-21 (2.2 MPN).

- Gross alpha exceeded the 15-pCi/L standard in 40 CFR 141 in well 299-W18-21 (20.4 pCi/L).

- Ruthenium-106 exceeded the 30-pCi/L standard (EPA 1976) in three wells: 299-W15-15, 299-W15-16, and 299-W18-24.

- Nitrate exceeded the 45-ppm standard in 40 CFR 141 in wells 299-W15-16 (67.5 ppm) and 299-W15-18 (71.6 ppm).

- Tetrachloromethane (carbon tetrachloride) exceeded the 5-ppb standard in 40 CFR 141 in all shallow wells: 299-W15-15 (264 ppb), 299-W15-16 (1,780 ppb), 299-W15-18 (14 ppb), 299-W18-21 (92 ppb), 299-W18-23 (195 ppb), and 299-W18-24 (575 ppb). These reported values are generally about one half those reported for the September/October 1988 samples; analyses were performed by UST's Hobokan, New Jersey, laboratory. Blind samples sent to Hobokan during the same time period showed a low bias in carbon tetrachloride

---

(a) Teflon® is a registered trademark of E. I. du Pont de Nemours and Company, Incorporated, Wilmington, Delaware.
(b) HydroStar® is the registered tradename of Instrumentation Northwest, Incorporated, Redmond, Washington.

concentration at the 80-ppb level. Three low-level carbon tetrachloride results for blind samples (<40 ppb) were acceptable.

- Cadmium exceeded the 10-ppb standard in 40 CFR 141 in well 299-W15-17 (15 ppb), which was sampled by bailing.

- Various other metals (chromium, manganese, and iron) exceeded their respective standards in at least one well.

9 1 1 1 8 3 1 0 5 5

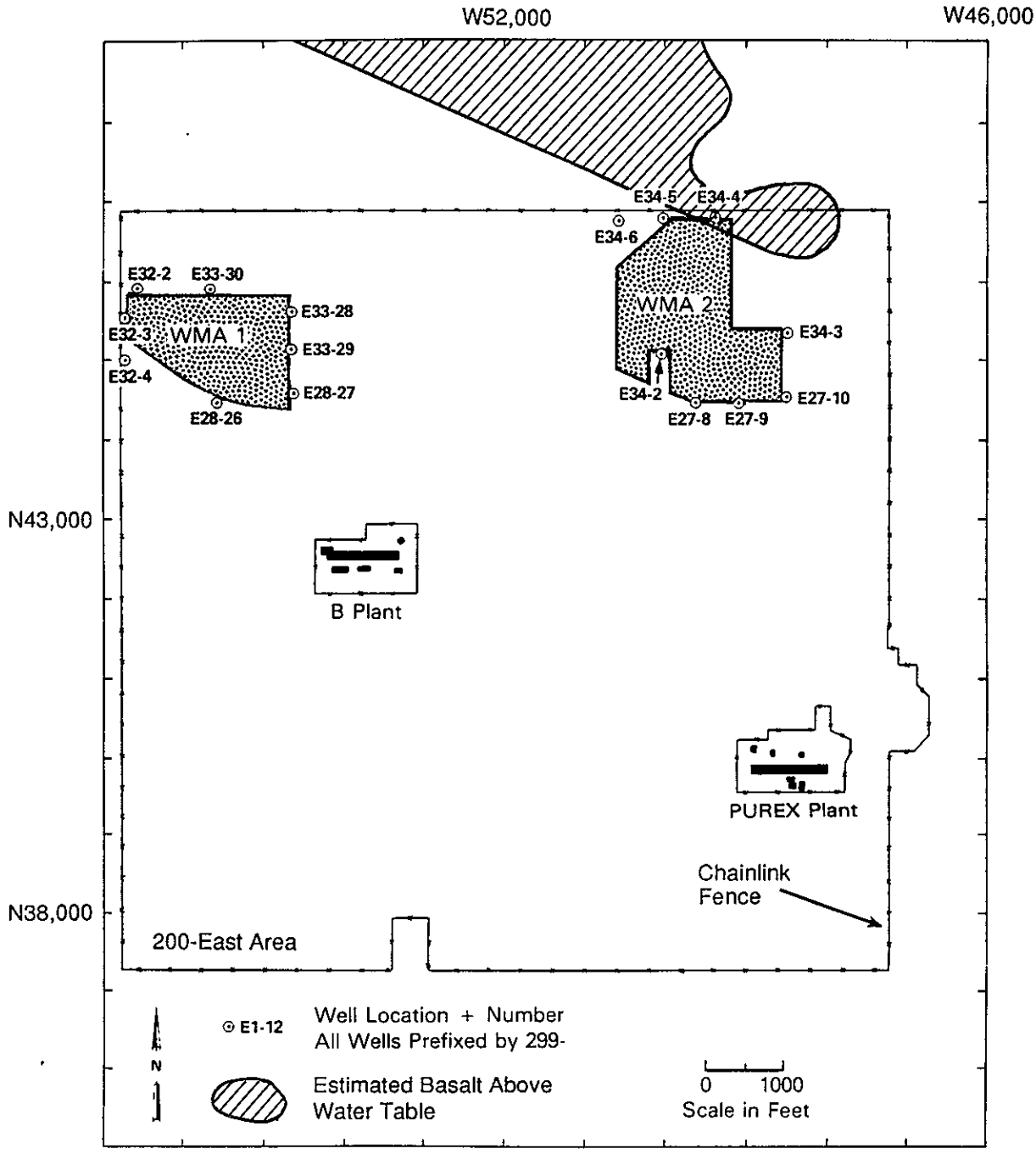

FIGURE 4.1. Monitoring Well Locations for the 200-East Area Low-Level Burial Grounds

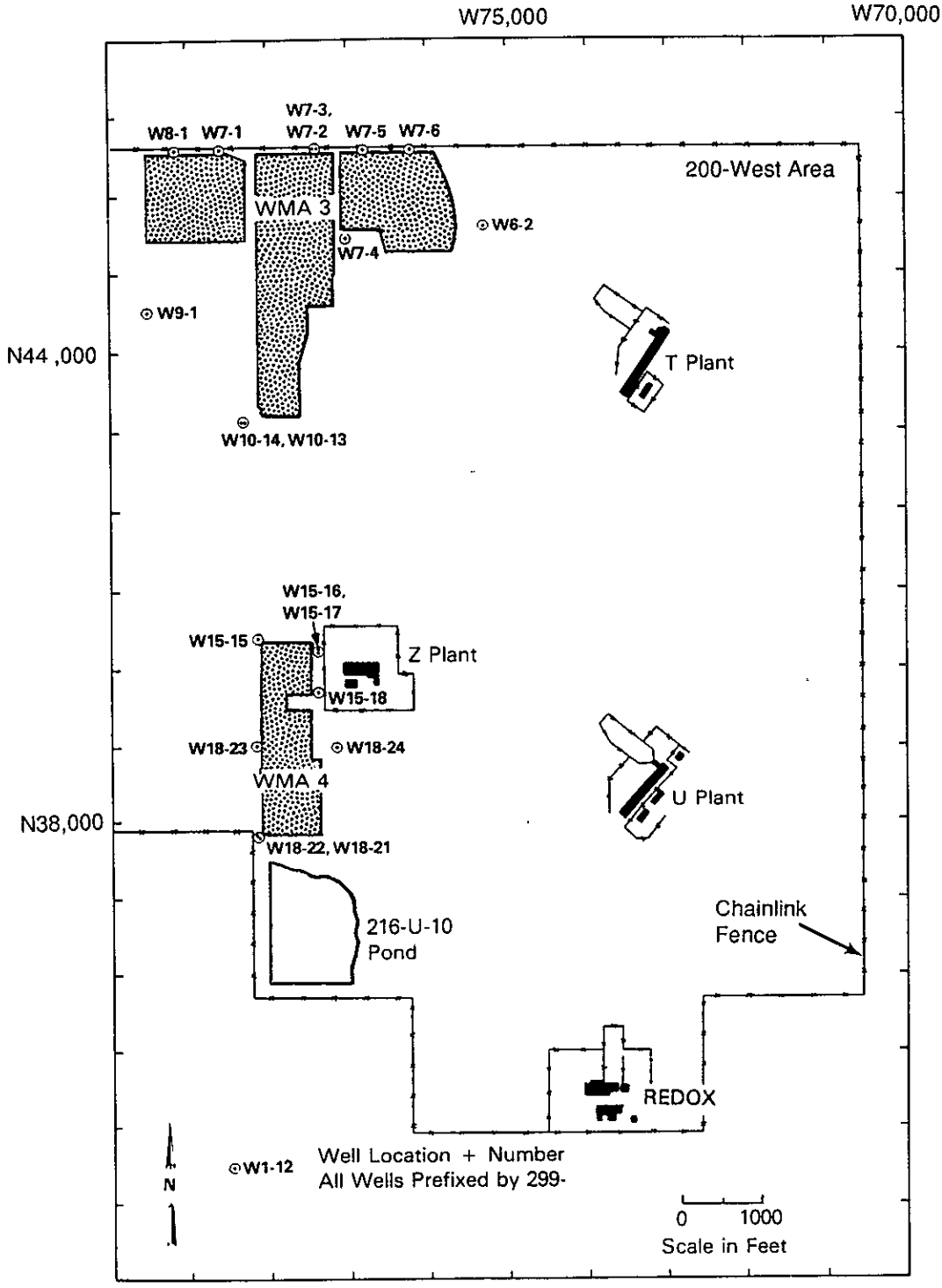

FIGURE 4.2. Monitoring Well Locations for the 200-West Area Low-Level Burial Grounds

TABLE 4.1. Ground-Water Monitoring Wells for the 200 Areas Low-Level Burial Grounds

Upgradient Wells	WMA-1	WMA-2	WMA-3	WMA-4
Shallow Wells (Top of Aquifer)	299-E33-27 299-E33-28 299-E33-29	299-E27-10 299-E34-3	299-W9-1 299-W10-13	299-W15-16 299-W15-18 299-W18-24
Deep Wells (Bottom of Aquifer)	None	None	299-W10-14	299-W15-17
Downgradient Wells				
Shallow Wells (Top of Aquifer)	299-E28-26 299-E32-2 299-E33-3 299-E33-4 299-E33-30	299-E27-8 299-E27-9 299-E34-2 299-E34-4 (Dry) 299-E34-5 299-E34-6	299-W6-2 299-W7-1 299-W7-2 299-W7-4 299-W7-5 299-W7-6 299-W8-1	299-W15-15 299-W18-21 299-W18-23
Deep Wells (Bottom of Aquifer)	None	None	299-W7-3	299-W18-22

TABLE 4.2. Sampling Schedule for the 200 Areas Low-Level Burial Grounds

Well	1989 Projected								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
299-E27- 8			X			X			X
299-E27- 9			XRV			X			X
299-E27-10			X			X			X
299-E28-26			X			X			X
299-E28-27			X			XRV			X
299-E32- 2			X			X			X
299-E32- 3				X[a]		X			X
299-E32- 4			X			X			X
299-E33-28			X			X			XRV
299-E33-29			X			X			X
299-E33-30			X			X			X
299-E34- 2			X			X			X
299-E34- 3			X			X			X
299-E34- 4[b]									
299-E34- 5			X			X			X
299-E34- 6			X			X			X
299-W 6- 2				X		XRV			X
299-W 7- 1				X		X			X
299-W 7- 2			X			X			X
299-W 7- 3			X			X			X
299-W 7- 4			X			X			X
299-W 7- 5			X			X			X
299-W 7- 6			X			X			X
299-W 8- 1				X		X			X
299-W 9- 1				X		X			X
299-W10-13			X			X			XRV
299-W10-14			X			X			X
299-W15-15				X		X			X
299-W15-16				X		X			X
299-W15-17				X		X			X
299-W15-18				X[c]		X			X
299-W18-21				XRV		X			X
299-W18-22			X			X			X
299-W18-23				X		X			X
299-W18-24				X		X			X

R = quality control replicates were collected.
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Tables 4.5, 4.7, 4.9, and 4.11).
(a) Pump failed during March sampling.
(b) Well is dry.
(c) Pump was removed from well to clear obstruction; March sampling not possible.

TABLE 4.3. Water-Level Data for Monitoring Wells Near the 200-East Area Low-Level Burial Grounds[a]

Well Number	Date	Casing Elevation, ft above MSL[b]	Depth to Water from Top of Casing, ft	Water-Level Elevation, ft above MSL
299-E27-8	01/23/89	637.83	232.21	405.62
	02/27/89		232.24	405.59
	03/29/89		232.43	405.40
299-E27-9	01/23/89	629.21	223.48	405.73
	02/27/89		223.47	405.74
	03/29/89		223.71	405.50
299-E27-10	01/23/89	624.47	218.31	406.16
	02/27/89		218.41	406.06
	03/29/89		218.60	405.87
299-E28-26	01/23/89	687.26	281.93	405.33
	02/27/89		281.93	405.33
	03/29/89		282.14	405.12
299-E28-27	01/23/89	680.37	275.04	405.33
	02/27/89		275.13	405.24
	03/29/89		275.21	405.16
299-E32-2	01/23/89	670.06	264.92	405.14
	02/27/89		265.01	405.05
	03/29/89		265.12	404.94
299-E32-3	01/23/89	676.51	271.35	405.16
	02/27/89		271.33	405.18
	03/29/89		271.49	405.02
299-E32-4	01/23/89	685.88	280.84	405.04
	02/27/89		280.82	405.06
	03/29/89		281.01	404.87
299-E33-28	01/23/89	664.23	258.82	405.41
	02/27/89		258.95	405.28
	03/29/89		259.04	405.19
299-E33-29	01/23/89	673.77	268.39	405.38
	02/27/89		268.48	405.29
	03/29/89		268.60	405.17
299-E33-30	01/23/89	663.70	258.41	405.29
	02/27/89		258.42	405.28
	03/29/89		258.60	405.10
299-E34-2	01/23/89	630.80	225.20	405.60
	02/27/89		225.21	405.59
	03/29/89		225.43	405.37
299-E34-3	01/23/89	611.52	205.28	406.24
	02/27/89		205.44	406.08
	03/29/89		205.61	405.91
299-E34-4	01/23/89	587.56	Dry	--
	02/27/89		Dry	--
	03/29/89		Dry	--
299-E34-5	01/23/89	590.79	184.27	406.52
	02/27/89		184.39	406.40
	03/29/89		184.56	406.23
299-E34-6	01/23/89	597.83	192.28	405.55
	02/27/89		192.28	405.55
	03/29/89		192.52	405.31

(a) Note that these data were collected in addition to water-level measurements required at the time of sampling.
(b) MSL = mean sea level.

TABLE 4.4. Water-Level Data for Monitoring Wells Near the 200-West Area Low-Level Burial Grounds[a]

Well Number	Date	Casing Elevation, ft above MSL[b]	Depth to Water from Top of Casing, ft	Water-Level Elevation, ft above MSL
299-W6-2	01/23/89	692.45	230.81	461.64
	02/27/89		230.61	461.84
	03/29/89		230.99	461.46
299-W7-1	01/23/89	690.71	229.21	461.50
	02/27/89		228.92	461.79
	03/29/89		229.35	461.36
299-W7-2	01/23/89	675.59	215.04	460.55
	02/27/89		214.79	460.80
	03/29/89		215.15	460.44
299-W7-3	01/23/89	676.14	216.82	459.32
	02/27/89		216.58	459.56
	03/29/89		216.96	459.18
299-W7-4	01/23/89	671.69	208.82	462.87
	02/27/89		208.64	463.05
	03/29/89		208.94	462.75
299-W7-5	01/23/89	673.03	212.92	460.11
	02/27/89		212.68	460.35
	03/29/89		213.03	460.00
299-W7-6	01/23/89	678.64	218.62	460.02
	02/27/89		218.40	460.24
	03/29/89		218.71	599.93
299-W8-1	01/23/89	701.33	239.49	461.84
	02/27/89		239.13	462.20
	03/19/89		239.62	461.71
299-W9-1	01/23/89	737.73	272.78	464.95
	02/27/89		272.46	465.27
	03/29/89		272.98	464.75
299-W10-13	01/23/89	699.04	232.68	466.36
	02/27/89		232.36	466.68
	03/29/89		232.88	466.16
299-W10-14	01/23/89	699.43	233.46	465.97
	02/27/89		233.15	466.28
	03/29/89		233.70	465.73
299-W15-15	01/23/89	697.96	229.02	468.94
	02/27/89		228.68	469.28
	03/29/89		229.29	468.67
299-W15-16	01/23/89	684.89	215.11	469.78
	02/27/89		214.79	470.10
	03/29/89		215.39	469.50
299-W15-17	01/23/89	684.64	215.30	469.34
	02/27/89		215.00	469.64
	03/29/89		215.60	469.04

TABLE 4.4. (contd)

Well Number	Date	Casing Elevation, ft above MSL[b]	Depth to Water from Top of Casing, ft	Water-Level Elevation, ft above MSL
299-W15-18	01/23/89	685.71	215.58	470.13
	02/27/89		215.25	470.46
	03/29/89		215.88	469.83
299-W18-21	01/23/89	668.62	199.36	469.26
	02/27/89		199.03	469.59
	03/29/89		200.42	468.20
299-W18-22	01/23/89	668.49	200.10	468.39
	02/27/89		199.84	468.65
	03/29/89		200.42	468.07
299-W18-23	01/23/89	696.81	227.54	469.27
	02/27/89		227.20	469.61
	03/29/89		227.86	468.95
299-W18-24	01/23/89	684.35	213.95	470.40
	02/27/89		213.65	470.70
	03/29/89		214.26	470.09

(a) Note that these data were collected in addition to water-level measurements required at the time of sampling.
(b) MSL = mean sea level.

TABLE 4.5. Constituent List and Summary of Sampling Results for the Low Level Burial Grounds, WMA-1
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards	Agency	Exceeded	Full name
088	CONDLAB	umho	.	32	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	32	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	32	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	32	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	1000	32	0	.			Total organic carbon
H42	TOXLDL	ppb	20	32	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	8	8 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	9	0	50	EPA		Gross beta
181	RADIUM	pCi/L	1	8	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	9	0	15	EPA	xxx	Gross alpha
A06	BARIUM	ppb	6	9	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	9	9 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	9	0	50	EPA		Chromium
A10	SILVER	ppb	10	9	9 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	9	2	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	8	8 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	9	8	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	8	8 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	8	8 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	8	8 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	9	9 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	9	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	9	4	4000	EPA		Fluoride
H13	2,4-D	ppb	2	8	8 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	8	8 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	9	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	9	9 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	9	9 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	9	9 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	9	2	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	8	8 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	9	8	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	9	9 ***	50	EPA		Lead, filtered

TABLE 4.5. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
A11	SODIUM	ppb	200	9	0	.			Sodium
A17	MANGESE	ppb	5	9	5	50	EPAS		Manganese
A19	IRON	ppb	30	9	0	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	9	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	9	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	9	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	9	9 ***	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	9	5	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	8	8 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	2	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	2	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	2	0	30	EPAR	xxx	Ruthenium-106
104	U	pCi/L	0.5	9	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	9	0	20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	9	0	8	EPA		Strontium-90
197	TC-99	pCi/L	15	9	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	9	9 ***	.			Beryllium
A03	STRONUM	ppb	20	9	0	.			Strontium
A04	ZINC	ppb	5	9	2	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	9	0	.			Calcium
A12	NICKEL	ppb	10	9	0	.			Nickel
A13	COPPER	ppb	10	9	9 ***	1300	EPAP		Copper
A14	VANADUM	ppb	5	9	0	.			Vanadium
A15	ANTIONY	ppb	100	9	9 ***	.			Antimony
A16	ALUMNUM	ppb	150	9	9 ***	.			Aluminum
A18	POTASUM	ppb	100	9	0	.			Potassium
A50	MAGNES	ppb	50	9	0	.			Magnesium
C76	PHOSPHA	ppb	1000	9	9 ***	.			Phosphate
H16	TC	ppb	1000	9	0	.			Total carbon
H18	FZINC	ppb	5	9	4	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	9	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	9	9 ***	.			Nickel, filtered
H26	FCOPPER	ppb	10	9	9 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	9	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	9	9 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	9	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	9	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	9	9 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	9	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	9	9 ***	.			Antimony, filtered

TABLE 4.5. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	9	9 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A64	METHONE	ppb	10	9	9 ***	.		Methyl ethyl ketone
A67	1,1,1-T	ppb	5	9	9 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	9	9 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	9	9 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	9	9 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	9	9 ***	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	9	9 ***	100	EPA	Chloroform [Trichloromethane]
A93	METHYCH	ppb	5	9	5	.		Methylene chloride [Dichloromethane]
B14	M-XYLE	ppb	5	9	9 ***	440	EPAP	Xylene-m
C70	CYANIDE	ppb	10	9	9 ***	.		Cyanide
C80	AMMONIU	ppb	50	9	7	.		Ammonium ion
H68	HEXONE	ppb	10	9	9 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	2	0	.		Acetone by VOA
I98	UNKALI	ppb	0	1	0	.		Unknown aliphatic HC

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 4.6- Constituents with at Least One Detected Value for the Low Level Burial Grounds, WMA-1
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
2-E28-26	27DEC88		446	533	7.70	7.50	#300	#1
		1	447	523	7.70	7.50	#300	#0
		2	446	522	7.70	7.50	#300	#1
		3	446	513	7.70	7.50	#200	#1
2-E28-27	27DEC88		245	298	8.00	8.00	#500	#-2
		1	245	305	8.00	8.00	#400	#-1
		2	245	280	8.00	8.10	#400	#2
		3	245	276	8.00	8.10	#400	#4
2-E32-2	28DEC88		282	299	8.10	7.90	#400	#5
		1	276	301	8.10	7.90	#400	#8
		2	275	302	8.10	7.90	#500	#2
		3	275	306	8.10	7.90	#400	#2
2-E32-3	28DEC88		353	373	7.80	7.70	#400	#1
		1	353	371	7.80	7.80	#400	#5
		2	353	372	7.80	7.90	#400	#0
		3	353	372	7.80	7.90	#400	#2
2-E32-4	28DEC88		364	423	8.00	7.80	#200	#2
		1	365	422	8.00	7.90	#200	#8
		2	365	422	8.00	7.90	#200	#6
		3	366	422	8.00	7.90	#200	#9
2-E33-28	22DEC88		214	250	7.90	8.00	#400	#4
		1	214	252	7.90	7.90	#400	#3
		2	215	253	7.90	8.00	#400	#8
		3	214	251	7.90	7.90	#400	#3
2-E33-29	22DEC88		247	316	7.90	7.80	#400	#2
		1	247	318	7.90	7.80	#400	#4
		2	251	315	7.90	7.90	#400	#10
		3	251	318	8.00	7.90	#400	#5
2-E33-30	27DEC88		244	278	8.00	7.90	#400	#1
		1	244	287	8.00	7.90	#400	#10
		2	244	302	8.00	7.90	#400	#4
		3	245	294	8.00	7.90	#400	#9

TABLE 4.6. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALPHA pCi/L 4/15	AMMONIU ppb 50/.	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50
2-E28-26	27DEC88		8	24.000	1190	<5	<5	38	39	14.7
2-E28-27	27DEC88		.	3.390	<50	6	6	31	35	23.8
2-E32-2	28DEC88		.	2.780	<50	6	6	33	30	30.6
2-E32-3	28DEC88		.	7.150	430	5	5	36	39	23.9
2-E32-4	28DEC88		.	2.090	<50	<5	<5	67	70	6.5
2-E33-28	22DEC88		.	*0.926	<50	7	7	32	32	20.1
2-E33-29	22DEC88		.	1.270	<50	7	6	39	39	11.3
2-E33-30	27DEC88		.	1.170	<50	7	6	19	22	17.0
	27DEC88	1	6	1.310	<50	7	6	20	23	17.5

Well name	Collection Date	Duplicate sample number	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	CS-137 pCi/L 20/200r	FLUORID ppb 500/4000
2-E28-26	27DEC88		64,300	68,900	8,700	26	.	.	500
2-E28-27	27DEC88		27,900	28,000	6,200	41	.	.	600
2-E32-2	28DEC88		26,500	27,600	8,800	29	.	.	600
2-E32-3	28DEC88		39,200	38,200	5,900	28	.	.	600
2-E32-4	28DEC88		40,300	43,200	8,700	38	.	.	600
2-E33-28	22DEC88		26,800	26,400	5,400	20	*-6.46	*3.97	<500
2-E33-29	22DEC88		31,400	31,100	20,000	28	*1.60	*6.51	<500
2-E33-30	27DEC88		30,800	28,700	17,500	25	.	.	<500
	27DEC88	1	33,000	32,600	16,900	29	.	.	<500

Well name	Collection Date	Duplicate sample number	IRON ppb 30/300s	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	NITRATE ppb 500/45000
2-E28-26	27DEC88		172	91	15,700	15,900	<5	<10	11	52,900
2-E28-27	27DEC88		417	<30	7,950	9,190	7	<10	20	20,900
2-E32-2	28DEC88		190	<30	8,910	8,580	9	11	11	15,200
2-E32-3	28DEC88		107	<30	9,290	9,830	<5	<10	15	39,300
2-E32-4	28DEC88		197	<30	13,300	14,000	5	#2	21	24,200
2-E33-28	22DEC88		104	30	8,500	8,510	<5	#2	65	4,200
2-E33-29	22DEC88		245	<30	10,100	10,300	8	#2	13	8,300
2-E33-30	27DEC88		131	38	8,890	9,970	<5	<10	12	8,200
	27DEC88	1	201	39	9,520	10,500	<5	<10	13	8,300

TABLE 4.6. (contd)

Well name	Collection Date	Duplicate sample number	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r	FSELENI ppb 5/10	SELENUM ppb 5/10	SODIUM ppb 200/.	FSODIUM ppb 200/.
2-E28-26	27DEC88		5,560	4,890	*0.0842	.	5	5	22,500	26,100
2-E28-27	27DEC88		5,980	4,090	*0.0515	.	<5	<5	17,500	26,100
2-E32-2	28DEC88		5,400	5,650	*0.1240	.	<5	<5	23,900	22,700
2-E32-3	28DEC88		5,180	5,020	*0.1170	.	<5	<5	23,100	25,000
2-E32-4	28DEC88		6,400	6,080	*0.0520	.	<5	<5	26,500	28,500
2-E33-28	22DEC88		5,110	5,110	*-0.0485	*-52.5	<5	<5	14,400	14,400
2-E33-29	22DEC88		5,830	5,490	*0.0552	*36.1	<5	<5	18,800	20,200
2-E33-30	27DEC88		5,570	4,500	*0.1440	.	<5	<5	14,400	18,500
	27DEC88	1	5,860	4,630	.	.	<5	<5	14,800	19,500

Well name	Collection Date	Duplicate sample number	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r	TRITIUM pCi/L 500/20000
2-E28-26	27DEC88		*-0.3670	251	254	95,100	24,800	26.9	126,000
2-E28-27	27DEC88		*-0.2950	142	128	32,100	20,200	171.0	137,000
2-E32-2	28DEC88		*-0.1560	132	138	28,800	19,500	146.0	64,100
2-E32-3	28DEC88		*-0.3620	172	165	43,000	21,100	142.0	247,000
2-E32-4	28DEC88		*-0.0512	215	209	55,900	24,900	*4.5	1,890
2-E33-28	22DEC88		*-0.1820	134	135	22,700	5,200	114.0	2,000
2-E33-29	22DEC88		*0.1560	161	163	29,300	14,600	68.2	6,510
2-E33-30	27DEC88		*-0.5200	152	134	31,200	19,700	78.3	4,870
	27DEC88	1	*0.2090	159	144	33,200	20,900	81.1	5,260

Well name	Collection Date	Duplicate sample number	U pCi/L 0.5/600d	UNKALI ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E28-26	27DEC88		28.50	.	11	17	7	<5
2-E28-27	27DEC88		2.51	.	23	25	9	11
2-E32-2	28DEC88		3.01	.	22	26	10	<5
2-E32-3	28DEC88		7.75	.	23	24	<5	<5
2-E32-4	28DEC88		2.46	6	12	19	12	12
2-E33-28	22DEC88		1.35	.	25	26	<5	<5
2-E33-29	22DEC88		1.86	.	24	21	8	7
2-E33-30	27DEC88		1.29	.	23	20	12	7
	27DEC88	1	1.32	.	26	26	10	6

TABLE 4.6. (contd)

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 4.7. Constituent List and Summary of Sampling Results for the Low Level Burial Grounds, WMA-2
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
088	CONDLAB	umho	.	28	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	28	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	28	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	28	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	1000	28	0	.			Total organic carbon
H42	TOXLDL	ppb	20	28	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	7	7 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	7	0	50	EPA		Gross beta
181	RADIUM	pCi/L	1	7	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	7	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	7	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	7	7 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	7	0	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	7	7 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	7	1	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	7	7 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	7	5	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	7	7 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	7	7 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	7	7 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	7	7 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	7	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	7	5	4000	EPA		Fluoride
H13	2,4-D	ppb	2	7	7 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	7	7 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	7	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	7	7 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	7	7 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	7	7 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	7	1	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	7	7 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	7	5	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	7	7 ***	50	EPA		Lead, filtered

TABLE 4.7. (contd)

Constituent List=Water Quality Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
A11	SODIUM	ppb	200	7	0	.			Sodium
A17	MANGESE	ppb	5	7	3	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	7	0	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	7	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	7	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	7	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	7	4	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	7	5	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	7	7 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
104	U	pCi/L	0.5	7	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	7	0	20000	EPA		Tritium (H-3)
121	SR-90	pCi/L	5	7	0	8	EPA		Strontium-90
197	TC-99	pCi/L	15	7	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	7	7 ***	.			Beryllium
A03	STRONUM	ppb	20	7	0	.			Strontium
A04	ZINC	ppb	5	7	3	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	7	0	.			Calcium
A12	NICKEL	ppb	10	7	1	.			Nickel
A13	COPPER	ppb	10	7	7 ***	1300	EPAP		Copper
A14	VANADUM	ppb	5	7	0	.			Vanadium
A15	ANTIONY	ppb	100	7	7 ***	.			Antimony
A16	ALUMNUM	ppb	150	7	6	.			Aluminum
A18	POTASUM	ppb	100	7	0	.			Potassium
A50	MAGNES	ppb	50	7	0	.			Magnesium
C76	PHOSPHA	ppb	1000	7	7 ***	.			Phosphate
H16	TC	ppb	1000	7	0	.			Total carbon
H18	FZINC	ppb	5	7	3	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	7	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	7	6	.			Nickel, filtered
H26	FCOPPER	ppb	10	7	7 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	7	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	7	7 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	7	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	7	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	7	7 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	7	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	7	7 ***	.			Antimony, filtered

TABLE 4.7. (contd)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	7	7 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A64	METHONE	ppb	10	7	7 ***	.		Methyl ethyl ketone
A67	1,1,1-T	ppb	5	7	7 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	7	7 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	7	7 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	7	7 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	7	7 ***	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	7	7 ***	100	EPA	Chloroform [Trichloromethane]
A93	METHYCH	ppb	5	7	4	.		Methylene chloride [Dichloromethane]
B10	TRCMFLM	ppb	10	1	0	.		Trichloromonofluoromethane
B14	M-XYLE	ppb	5	7	7 ***	440	EPAP	Xylene-m
C70	CYANIDE	ppb	10	7	7 ***	.		Cyanide
C80	AMMONIU	ppb	50	7	6	.		Ammonium ion
H68	HEXONE	ppb	10	7	7 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	3	0	.		Acetone by VOA
I99	UNKNOWN	ppb	0	1	0	.		Unknown

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 4.8. Constituents with at Least One Detected Value for the Low Level Burial Grounds, WMA-2
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
2-E27-8	29DEC88		272	329	8.10	7.90	#300	#1
		1	272	332	8.10	7.80	#300	#1
		2	272	336	8.10	7.90	#300	#4
		3	272	337	8.10	7.90	#300	#4
2-E27-9	28DEC88		302	330	8.10	8.00	#400	#4
		1	309	339	8.10	7.90	#400	#4
		2	308	334	8.10	7.90	#500	#5
		3	307	336	8.10	7.00	#600	#3
2-E27-10	28DEC88		236	260	8.20	8.10	#500	#4
		1	235	262	8.20	8.10	#500	#3
		2	237	260	8.20	8.10	#400	#7
		3	239	259	8.20	8.10	#400	#6
2-E34-2	28DEC88		486	510	8.00	8.00	#300	#3
		1	486	509	8.00	8.00	#300	#-1
		2	487	505	8.00	8.00	#300	#3
		3	487	508	8.00	8.00	#400	#1
2-E34-3	28DEC88		292	279	7.90	7.90	#300	#4
		1	293	279	8.00	7.90	#300	#3
		2	292	278	8.00	7.90	#300	#4
		3	293	281	8.00	8.00	#300	#0
2-E34-5	28DEC88		470	452	7.90	8.20	#300	#3
		1	470	448	8.00	8.00	#300	#4
		2	471	452	7.90	8.20	#300	#-1
		3	472	472	7.90	8.10	#300	#3
2-E34-6	28DEC88		415	443	8.00	8.00	#300	#5
		1	416	437	8.00	8.00	#300	#4
		2	416	433	8.00	8.10	#300	#4
		3	417	436	8.00	8.00	#400	#7

TABLE 4.8. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALPHA pCi/L 4/15	ALUMNUM ppb 150/.	AMMONIU ppb 50/.	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000
2-E27-8	29DEC88		.	*0.94	<150	<50	6	8	33	33
2-E27-9	28DEC88		.	1.95	269	<50	7	7	39	37
2-E27-10	28DEC88		.	1.63	<150	<50	7	7	32	38
2-E34-2	28DEC88		4	*1.09	<150	<50	5	5	36	31
2-E34-3	28DEC88		3	1.79	<150	<50	5	6	39	42
2-E34-5	28DEC88		3	2.43	<150	60	5	<5	25	27
2-E34-6	28DEC88		.	2.73	<150	<50	<5	5	32	34

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	FLUORID ppb 500/4000	IRON ppb 30/300s
2-E27-8	29DEC88		7.67	34,400	41,300	7,100	31	<500	159
2-E27-9	28DEC88		5.80	38,200	39,100	6,600	61	<500	892
2-E27-10	28DEC88		5.53	32,500	31,900	4,200	25	<500	205
2-E34-2	28DEC88		14.20	51,300	60,900	12,700	42	500	232
2-E34-3	28DEC88		9.31	35,300	37,200	6,500	31	<500	131
2-E34-5	28DEC88		6.04	51,300	55,900	21,900	19	<500	121
2-E34-6	28DEC88		6.62	45,200	47,300	18,200	20	600	158

Well name	Collection Date	Duplicate sample number	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.
2-E27-8	29DEC88		<30	10,900	10,200	<5	<5	<10	14	<10
2-E27-9	28DEC88		<30	10,400	11,100	<5	20	<10	25	<10
2-E27-10	28DEC88		<30	8,060	9,030	5	7	#2	<10	<10
2-E34-2	28DEC88		<30	16,700	15,300	<5	<5	#2	18	<10
2-E34-3	28DEC88		38	9,300	9,920	<5	<5	<10	14	<10
2-E34-5	28DEC88		63	15,400	15,800	7	9	<10	28	16
2-E34-6	28DEC88		<30	12,300	13,000	49	56	#4	10	<10

Well name	Collection Date	Duplicate sample number	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5	FSELENI ppb 5/10	SELENUM ppb 5/10	SODIUM ppb 200/.	FSODIUM ppb 200/.
2-E27-8	29DEC88		7,000	6,530	7,010	*0.0989	<5	<5	14,600	14,100
2-E27-9	28DEC88		7,400	6,890	5,970	*0.0490	<5	<5	15,400	18,200
2-E27-10	28DEC88		3,200	6,420	5,080	*0.0295	<5	<5	10,900	14,200
2-E34-2	28DEC88		16,400	7,650	8,350	0.2240	6	6	30,100	28,300
2-E34-3	28DEC88		5,400	6,040	4,880	*0.0820	<5	<5	9,760	12,500
2-E34-5	28DEC88		14,300	8,550	6,820	*0.0703	<5	5	25,200	31,900
2-E34-6	28DEC88		6,600	8,100	6,690	*0.0126	5	<5	27,900	34,000

TABLE 4.8. (contd)

Well name	Collection Date	Duplicate sample number	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r	TRCMFLM ppb 10/.
2-E27-8	29DEC88		*-0.251	166	181	46,000	22,200	*-0.671	.
2-E27-9	28DEC88		*0.116	178	172	47,000	24,300	*-0.176	.
2-E27-10	28DEC88		*-0.006	160	144	17,100	26,400	*1.030	4
2-E34-2	28DEC88		*-0.221	238	261	139,000	21,400	*1.310	.
2-E34-3	28DEC88		*0.026	175	163	37,300	22,800	*-1.450	.
2-E34-5	28DEC88		*-0.103	249	247	105,000	22,700	*-1.030	.
2-E34-6	28DEC88		*-0.306	231	222	79,700	24,900	*0.770	.

Well name	Collection Date	Duplicate sample number	TRITIUM pCi/L 500/20000	U pCi/L 0.5/600d	UNKNOWN ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E27-8	29DEC88		9,380	1.94	.	23	32	7	5
2-E27-9	28DEC88		8,780	2.07	.	31	35	42	6
2-E27-10	28DEC88		6,360	2.40	.	32	25	<5	9
2-E34-2	28DEC88		2,090	2.09	.	20	28	<5	<5
2-E34-3	28DEC88		8,780	1.28	.	26	22	5	<5
2-E34-5	28DEC88		*302	2.93	.	22	20	18	13
2-E34-6	28DEC88		412	3.00	46	18	14	<5	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 4.9. Constituent List and Summary of Sampling Results for the Low Level Burial Grounds, WMA-3
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
088	CONDLAB	umho	.	44	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	46	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	46	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	44	0	6.5-8.5	EPAS	xxx	pH, laboratory
C69	TOC	ppb	1000	43	0	.			Total organic carbon
H42	TOXLDL	ppb	20	44	1	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	8	8 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	12	0	50	EPA		Gross beta
181	RADIUM	pCi/L	1	11	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	12	0	15	EPA	xxx	Gross alpha
A06	BARIUM	ppb	6	12	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	12	12 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	12	0	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	12	12 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	12	11	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	11	11 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	12	12 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	11	11 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	11	11 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	11	11 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	12	8	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	12	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	12	11	4000	EPA		Fluoride
H13	2,4-D	ppb	2	11	11 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	11	11 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	12	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	12	12 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	12	9	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	12	12 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	12	12 ***	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	11	11 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	12	12 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	12	11	50	EPA		Lead, filtered

TABLE 4.9. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	12	0	.			Sodium
A17	MANGESE	ppb	5	12	0	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	12	0	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	12	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	12	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	12	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	12	7	50	EPAS	xxx	Manganese, filtered
H31	FIRON	ppb	30	12	7	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	11	11 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	11	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	11	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	11	0	30	EPAR	xxx	Ruthenium-106
100	PU39-40	pCi/L	17	11	0	30	DOE		Plutonium-239,240
102	PU-238	pCi/L	17	11	0	40	DOE		Plutonium-238
104	U	pCi/L	0.5	12	0	600	DOE		Uranium
105	AM-241	pCi/L	0.1	11	0	30	DOE		Americium-241
108	TRITIUM	pCi/L	500	12	0	20000	EPA		Tritium (H-3)
121	SR-90	pCi/L	5	11	0	8	EPA		Strontium-90
197	TC-99	pCi/L	15	12	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	12	12 ***	.			Beryllium
A03	STRONUM	ppb	20	12	0	.			Strontium
A04	ZINC	ppb	5	12	0	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	12	0	.			Calcium
A12	NICKEL	ppb	10	12	1	.			Nickel
A13	COPPER	ppb	10	12	10	1300	EPAP		Copper
A14	VANADUM	ppb	5	12	0	.			Vanadium
A15	ANTIONY	ppb	100	12	12 ***	.			Antimony
A16	ALUMNUM	ppb	150	12	10	.			Aluminum
A18	POTASUM	ppb	100	12	0	.			Potassium
A50	MAGNES	ppb	50	12	0	.			Magnesium
A61	TETRANE	ppb	5	11	8	5	EPA	xxx	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	2	2 ***	5	EPA		Benzene
A64	METHONE	ppb	10	11	11 ***	.			Methyl ethyl ketone
A66	TOLUENE	ppb	5	2	2 ***	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	11	11 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	11	11 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	11	11 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	11	11 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	11	11 ***	440	EPAP		Xylene-o,p
A80	CHLFORM	ppb	5	11	8	100	EPA		Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	2	2 ***	.			1,1-Dichloroethane
A90	1,2-DIC	ppb	5	2	2 ***	5	EPA		1,2-Dichloroethane
A91	TRANDCE	ppb	5	2	2 ***	70	EPAP		trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	11	7	.			Methylene chloride [Dichloromethane]

TABLE 4.9. (contd)

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
B13	VINYIDE	ppb	10	2	2 ***	2	EPA		Vinyl chloride
B14	M-XYLE	ppb	5	11	11 ***	440	EPAP		Xylene-m
C70	CYANIDE	ppb	10	12	12 ***	.			Cyanide
C76	PHOSPHA	ppb	1000	12	12 ***	.			Phosphate
C80	AMMONIU	ppb	50	12	11	.			Ammonium ion
C87	CITRUSR	ppb	1000	1	1 ***	.			Citrus red
H15	2,4,5-T	ppb	2	3	3 ***	.			2,4,5-T
H16	TC	ppb	1000	12	0	.			Total carbon
H18	FZINC	ppb	5	12	1	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	12	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	12	11	.			Nickel, filtered
H26	FCOPPER	ppb	10	12	12 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	12	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	12	11	.			Aluminum, filtered
H30	FPOTASS	ppb	100	12	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	12	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	12	12 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	12	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	12	12 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	3	3 ***	.			Bromide
H67	NITRITE	ppb	1000	3	3 ***	.			Nitrite
H68	HEXONE	ppb	10	11	11 ***	.			Hexone [Methyl isobutyl ketone]
H86	FBORON	ppb	10	3	0	.			Boron, filtered
H87	FCOBALT	ppb	20	3	3 ***	.			Cobalt, filtered
H88	FLITHI	ppb	10	3	3 ***	.			Lithium, filtered
H89	FMOLY	ppb	40	3	3 ***	.			Molybdenum, filtered
H90	FSILICO	ppb	50	3	0	.			Silicon, filtered
H91	FTIN	ppb	30	3	3 ***	.			Tin, filtered
H92	FTITAN	ppb	60	3	3 ***	.			Titanium, filtered
H93	FZIRCON	ppb	50	3	3 ***	.			Zirconium, filtered
I01	ACETONE	ppb	10	2	2 ***	.			Acetone by VOA
I28	TAF	ppb	10	2	2 ***	.			Tetrahydorfuran
L63	14DBEN	ppb	5	2	2 ***	75	EPA		1,4-Dichlorobenzene [p-Dichlorobenzene]
P01	BORON	ppb	10	3	0	.			Boron
P02	COBALT	ppb	20	3	3 ***	.			Cobalt
P03	LITHIUM	ppb	10	3	3 ***	.			Lithium
P04	MOLY	ppb	40	3	3 ***	.			Molybdenum
P05	SILICON	ppb	50	3	0	.			Silicon
P06	TIN	ppb	30	3	3 ***	.			Tin
P07	TITAN	ppb	60	3	3 ***	.			Titanium
P08	ZIRCON	ppb	50	3	3 ***	.			Zirconium

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 4.10. Constituents with at Least One Detected Value for the Low Level Burial Grounds, WMA-3
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
2-W6-2	04JAN89		420	424	7.90	8.00	#400	74
		1	423	422	7.90	8.00	#300	80
		2	418	426	8.00	8.00	#300	83
		3	416	429	8.00	8.00	#300	75
2-W7-1	29DEC88		322	318	9.00	7.60	#500	1,620
		1	323	310	8.50	7.60	M	#3
		2	325	313	8.60	7.60	#500	1,740
		3	321	315	8.50	7.70	#500	#4
2-W7-2	29DEC88		262	288	8.00	8.10	#500	#0
		1	268	289	8.00	8.20	#500	#1
		2	268	287	8,00	8.10	#500	#2
		3	268	286	8.00	8.10	#400	#0
2-W7-3	29DEC88		310	379	7.80	9.50	#300	149
		1	308	386	7.90	9.50	#200	149
		2	309	392	7.90	9.50	#200	163
		3	308	400	7.90	9.50	#200	148
2-W7-3	20FEB89		245	.	.	7.90	.	.
2-W7-4	29DEC88		420	442	8.00	8.60	#200	132
		1	422	442	8.10	8.60	#200	131
		2	424	443	8.00	8.60	#200	123
		3	422	444	8.10	8.60	#300	151
2-W7-5	29DEC88		321	364	8.10	8.00	#300	28
		1	329	367	8.00	8.00	#200	28
		2	329	372	8.00	8.10	#300	29
		3	328	363	8.00	8.10	#300	31
2-W7-6	01DEC88		333	.	.	8.50	.	.
2-W7-6	30DEC88		341	372	8.70	9.10	#700	#2
		1	342	375	8.70	9.10	#700	#-2
		2	341	376	8.60	9.10	#700	#8
		3	341	379	8.70	9.10	#600	#5
2-W8-1	29DEC88		309	392	8.00	7.80	#200	#3
		1	309	392	8.00	7.80	#200	#6
		2	309	390	8.00	7.80	#200	#10
		3	310	391	8.00	7.90	#200	#9

TABLE 4.10. (contd)

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
2-W9-1	29DEC88		263	373	8.30	7.50	#300	#6
		1	265	377	8.30	7.50	#300	#4
		2	265	381	8.30	7.50	#300	#5
		3	267	394	8.30	7.50	#400	#12
2-W10-13	03JAN89		310	348	7.90	8.30	#300	60
		1	310	348	7.80	8.10	#300	54
		2	310	348	7.80	8.10	#300	40
		3	310	349	7.90	8.10	#300	43
2-W10-14	03JAN89		308	350	7.90	8.00	#300	12
		1	308	354	8.00	8.00	#400	125
		2	308	354	8.00	8.00	#400	487
		3	308	353	8.00	8.00	#300	#-2

TABLE 4.10. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ALPHA pCi/L 4/15	FALUMIN ppb 150/.	ALUMNUM ppb 150/.	AM-241 pCi/L 0.1/30d	AMMONIU ppb 50/.	ARSENIC ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000
2-W6-2	04JAN89		*0.484	<150	<150	0.00000	<50	<5	35	35
2-W7-1	29DEC88		*0.696	<150	461	0.00000	90	<5	40	34
2-W7-2	29DEC88		1.730	<150	<150	0.00000	<50	<5	30	30
2-W7-3	29DEC88		*-0.169	<150	<150	0.05610	<50	<5	28	31
2-W7-4	29DEC88		1.870	<150	<150	*0.00511	<50	<5	31	37
	29DEC88	1	*0.383	<150	<150	.	<50	<5	34	38
2-W7-5	29DEC88		1.590	<150	<150	0.02070	<50	<5	35	35
2-W7-6	30DEC88		28.400	328	16100	*0.07030	<50	6	204	41
2-W8-1	29DEC88		*0.871	<150	<150	*0.01040	<50	<5	35	37
2-W9-1	29DEC88		1.870	<150	<150	*0.00801	<50	<5	36	35
2-W10-13	03JAN89		*0.455	<150	<150	*0.00761	<50	<5	27	25
2-W10-14	03JAN89		1.640	<150	<150	*0.00742	<50	<5	71	64

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	FCHROMI ppb 10/50
2-W6-2	04JAN89		12.30	13	12	43,600	44,800	M	5,400	33
2-W7-1	29DEC88		6.07	.	.	29,600	29,000	<5	4,400	<10
2-W7-2	29DEC88		3.48	.	.	30,200	33,700	<5	3,200	<10
2-W7-3	29DEC88		*2.89	.	.	47,900	50,700	<5	8,100	<10
2-W7-4	29DEC88		8.22	.	.	56,500	58,400	5	18,000	<10
	29DEC88	1	11.90	.	.	64,600	63,900	5	17,900	15
2-W7-5	29DEC88		11.60	.	.	44,100	44,800	<5	14,000	11
2-W7-6	30DEC88		25.20	.	.	12,000	23,000	<5	5,600	<10
2-W8-1	29DEC88		6.44	.	.	51,900	51,700	<5	15,300	<10
2-W9-1	29DEC88		8.49	.	.	41,400	44,300	<5	18,500	<10
2-W10-13	03JAN89		4.84	12	19	36,800	42,100	<5	21,800	<10
2-W10-14	03JAN89		6.97	16	17	34,500	35,700	7	9,300	<10

Well name	Collection Date	Duplicate sample number	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	COPPER ppb 10/1300p	CS-137 pCi/L 20/200r	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	FLEAD ppb 5/50
2-W6-2	04JAN89		88	*-0.356	<10	*0.662	<500	350	36	<5
2-W7-1	29DEC88		69	*2.840	<10	*-0.752	<500	2,780	<30	<5
2-W7-2	29DEC88		31	*-0.196	<10	*-2.410	<500	269	31	<5
2-W7-3	29DEC88		72	*-4.290	<10	*0.378	<500	270	<30	<5
2-W7-4	29DEC88		116	*-0.204	<10	*2.010	<500	406	<30	<5
	29DEC88	1	94	.	<10	.	<500	340	<30	<5
2-W7-5	29DEC88		31	*1.960	<10	*1.800	<500	120	<30	<5
2-W7-6	30DEC88		16	*-2.740	12	*-3.490	500	11,700	299	7
2-W8-1	29DEC88		35	*0.379	<10	*0.354	<500	136	<30	<5
2-W9-1	29DEC88		37	*-0.356	<10	*2.320	<500	221	<30	<5
2-W10-13	03JAN89		25	*-0.756	<10	*1.770	<500	149	35	<5
2-W10-14	03JAN89		53	*-5.780	19	*-2.730	<500	277	38	<5

TABLE 4.10. (contd)

Well name	Collection Date	Duplicate sample number	LEADGF ppb 5/50	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.
2-W6-2	04JAN89		<5	18,100	17,600	<5	6	M	29	<10
2-W7-1	29DEC88		9	10,900	11,200	111	146	<10	26	<10
2-W7-2	29DEC88		7	15,100	15,300	<5	7	#8	198	<10
2-W7-3	29DEC88		<5	15,000	16,500	12	19	51	35	<10
2-W7-4	29DEC88		<5	18,300	21,000	<5	6	<10	51	<10
	29DEC88	1	<5	19,600	22,100	<5	8	<10	43	<10
2-W7-5	29DEC88		<5	15,500	16,400	<5	6	<10	14	<10
2-W7-6	30DEC88		43	11,800	4,330	8	202	<10	<10	<10
2-W8-1	29DEC88		<5	16,100	17,100	<5	7	<10	16	<10
2-W9-1	29DEC88		<5	15,700	15,800	5	10	<10	22	<10
2-W10-13	03JAN89		<5	12,400	10,800	<5	6	51	25	11
2-W10-14	03JAN89		6	12,600	12,200	11	24	12	35	<10

Well name	Collection Date	Duplicate sample number	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.	PU-238 pCi/L 17/40d	PU39-40 pCi/L 17/30d	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r	FSILICO ppb 50/.
2-W6-2	04JAN89		71,700	3,280	3,450	*0.00332	*-0.000165	0.2010	*2.78	19,400
2-W7-1	29DEC88		8,800	5,000	4,740	*-0.00144	*-0.000165	0.2080	*-15.80	.
2-W7-2	29DEC88		23,600	2,580	2,590	*-0.00144	*-0.000165	*0.0476	*-1.01	.
2-W7-3	29DEC88		44,400	4,040	3,660	*-0.00144	*-0.000165	*0.0987	*-2.12	.
2-W7-4	29DEC88		74,300	4,000	3,620	*-0.00144	*-0.002260	0.1910	*40.30	.
	29DEC88	1	74,200	4,160	3,940	.	.	.	.	.
2-W7-5	29DEC88		45,400	3,700	3,560	*-0.00144	*0.001730	*0.0428	*-56.70	.
2-W7-6	30DEC88		7,000	2,660	3,910	*-0.00144	*-0.000165	4.0100	*-12.10	.
2-W8-1	29DEC88		29,800	4,380	4,210	*0.00378	*-0.000165	0.2240	*26.90	.
2-W9-1	29DEC88		17,000	4,870	5,010	*0.00075	*0.006400	0.1580	*-16.70	.
2-W10-13	03JAN89		7,800	3,500	3,960	*-0.00144	*-0.002520	0.2570	*35.50	19,500
2-W10-14	03JAN89		18,500	4,780	5,000	*-0.00144	*0.001650	0.2400	*31.20	19,100

Well name	Collection Date	Duplicate sample number	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.
2-W6-2	04JAN89		20,100	11,200	10,700	*-0.2740	246	254	25,300	24,000
2-W7-1	29DEC88		.	22,000	22,500	*0.5520	148	145	26,000	23,800
2-W7-2	29DEC88		.	8,560	8,770	*0.1420	157	160	25,200	20,300
2-W7-3	29DEC88		.	8,570	9,780	*-0.2550	179	167	50,000	19,700
2-W7-4	29DEC88		.	8,450	9,580	*-0.0734	264	239	30,300	21,700
	29DEC88	1	.	9,040	10,000	.	273	255	30,700	21,600
2-W7-5	29DEC88		.	9,930	10,500	*-0.0689	185	178	27,600	20,100
2-W7-6	30DEC88		.	66,600	55,900	*-0.3250	121	299	45,100	26,400
2-W8-1	29DEC88		.	10,800	11,500	*-0.2210	207	199	45,700	21,300
2-W9-1	29DEC88		.	11,800	11,700	*-0.1130	176	183	49,000	20,600
2-W10-13	03JAN89		22,200	11,800	10,400	*-0.0129	146	167	22,300	23,000
2-W10-14	03JAN89		19,600	17,600	16,500	*-0.1520	173	182	25,000	26,100

TABLE 4.10. (contd)

Well name	Collection Date	Duplicate sample number	TC-99 pCi/L 15/900r	TETRANE ppb 5/5	TRITIUM pCi/L 500/20000	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-W8-2	04JAN89		97.500	M	10,500	0.960	23	28	60	6
2-W7-1	29DEC88		*2.480	<5.0	*62	0.842	14	13	1090	22
2-W7-2	29DEC88		*5.220	<5.0	*110	0.796	20	22	15	9
2-W7-3	29DEC88		*5.830	#2.7	*63	0.543	26	32	16	10
2-W7-4	29DEC88		81.200	<5.0	*319	1.600	24	24	14	13
	29DEC88	1	77.200	<5.0	422	1.610	25	28	12	15
2-W7-5	29DEC88		39.400	25.0	*278	1.040	22	24	29	24
2-W7-6	30DEC88		*-0.433	<5.0	590	4.330	20	29	151	31
2-W8-1	29DEC88		18.100	<5.0	*137	0.673	20	33	13	12
2-W9-1	29DEC88		12.900	<5.0	*144	1.080	13	16	22	8
2-W10-13	03JAN89		24.200	7.0	*13	0.673	26	31	8	<5
2-W10-14	03JAN89		*-1.800	<5.0	*40	0.794	21	28	110	59

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 4.11- Constituent List and Summary of Sampling Results for the Low Level Burial Grounds, WMA-4
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
088	CONDLAB	umho	.	31	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	29	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	29	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	31	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	32	0	.			Total organic carbon
H42	TOXLDL	ppb	10	32	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	6	5	1	EPA	xxx	Coliform bacteria
111	BETA	pCi/L	8	8	0	50	EPA		Gross beta
181	RADIUM	pCi/L	1	8	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	8	0	15	EPA	xxx	Gross alpha
A06	BARIUM	ppb	6	9	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	9	7	10	EPA	xxx	Cadmium
A08	CHROMUM	ppb	10	9	0	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	9	9 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	9	9 ***	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	9	9 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	9	7	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	8	8 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	8	8 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	8	8 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	9	7	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	8	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	8	5	4000	EPA		Fluoride
H13	2,4-D	ppb	2	8	8 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	8	8 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	7	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	7	7 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	7	5	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	7	7 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	7	7 ***	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	7	7 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	7	7 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	7	4	50	EPA		Lead, filtered

TABLE 4.11. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	9	0	.			Sodium
A17	MANGESE	ppb	5	9	0	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	9	0	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	8	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	8	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	7	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	7	6	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	7	4	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	8	8 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	8	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	8	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	8	0	30	EPAR	xxx	Ruthenium-106
100	PU39-40	pCi/L	17	8	0	30	DOE		Plutonium-239,240
102	PU-238	pCi/L	17	8	0	40	DOE		Plutonium-238
104	U	pCi/L	0.5	8	0	600	DOE		Uranium
105	AM-241	pCi/L	0.1	8	0	30	DOE		Americium-241
108	TRITIUM	pCi/L	500	8	0	20000	EPA		Tritium (H-3)
121	SR-90	pCi/L	5	8	0	8	EPA		Strontium-90
197	TC-99	pCi/L	15	8	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	9	9 ***	.			Beryllium
A03	STRONUM	ppb	20	9	0	.			Strontium
A04	ZINC	ppb	5	9	0	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	9	0	.			Calcium
A12	NICKEL	ppb	10	9	0	.			Nickel
A13	COPPER	ppb	10	9	7	1300	EPAP		Copper
A14	VANADUM	ppb	5	9	0	.			Vanadium
A15	ANTIONY	ppb	100	9	9 ***	.			Antimony
A16	ALUMNUM	ppb	150	9	7	.			Aluminum
A18	POTASUM	ppb	100	9	0	.			Potassium
A50	MAGNES	ppb	50	9	0	.			Magnesium
C76	PHOSPHA	ppb	1000	8	8 ***	.			Phosphate
H16	TC	ppb	1000	8	0	.			Total carbon
H18	FZINC	ppb	5	7	1	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	7	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	7	6	.			Nickel, filtered
H26	FCOPPER	ppb	10	7	7 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	7	0	.			Vanadium, filtered

TABLE 4.11. (contd)

---------- Constituent List=Site Specific and Other Constituents ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
H28	FALUMIN	ppb	150	7	7 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	7	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	7	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	7	7 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	7	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	7	7 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	2	2 ***	.			Bromide
H67	NITRITE	ppb	1000	2	2 ***	.			Nitrite
H86	FBORON	ppb	10	2	0	.			Boron, filtered
H87	FCOBALT	ppb	20	2	2 ***	.			Cobalt, filtered
H88	FLITHIU	ppb	10	2	2 ***	.			Lithium, filtered
H89	FMOLY	ppb	40	2	2 ***	.			Molybdenum, filtered
H90	FSILICO	ppb	50	2	0	.			Silicon, filtered
H91	FTIN	ppb	30	2	2 ***	.			Tin, filtered
H92	FTITAN	ppb	60	2	2 ***	.			Titanium, filtered
H93	FZIRCON	ppb	50	2	2 ***	.			Zirconium, filtered
P01	BORON	ppb	10	2	0	.			Boron
P02	COBALT	ppb	20	2	2 ***	.			Cobalt
P03	LITHIUM	ppb	10	2	2 ***	.			Lithium
P04	MOLY	ppb	40	2	2 ***	.			Molybdenum
P05	SILICON	ppb	50	2	0	.			Silicon
P06	TIN	ppb	30	2	2 ***	.			Tin
P07	TITAN	ppb	60	2	2 ***	.			Titanium
P08	ZIRCON	ppb	50	2	2 ***	.			Zirconium

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A61	TETRANE	ppb	5	8	2	5	EPA	xxx	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	2	2 ***	5	EPA		Benzene
A64	METHONE	ppb	10	8	8 ***	.			Methyl ethyl ketone
A66	TOLUENE	ppb	5	2	2 ***	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	8	8 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	8	8 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	8	8 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	8	8 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	8	8 ***	440	EPAP		Xylene-o,p
A80	CHLFORM	ppb	5	8	3	100	EPA		Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	2	2 ***	.			1,1-Dichloroethane
A90	1,2-DIC	ppb	5	2	2 ***	5	EPA		1,2-Dichloroethane
A91	TRANDCE	ppb	5	2	2 ***	70	EPAP		trans-1,2-Dichloroethene

TABLE 4.11. (contd)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A93	METHYCH	ppb	5	8	3	.			Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	2	2 ***	2	EPA		Vinyl chloride
B14	M-XYLE	ppb	5	8	8 ***	440	EPAP		Xylene-m
C70	CYANIDE	ppb	10	8	8 ***	.			Cyanide
C80	AMMONIU	ppb	50	8	8 ***	.			Ammonium ion
H15	2,4,5-T	ppb	2	2	2 ***	.			2,4,5-T
H68	HEXONE	ppb	10	8	8 ***	.			Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	2	1	.			Acetone by VOA
I28	TAF	ppb	10	2	2 ***	.			Tetrahydorfuran
L63	14DBEN	ppb	5	2	2 ***	75	EPA		1,4-Dichlorobenzene [p-Dichlorobenzene]

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 4.12- Constituents with at Least One Detected Value for the Low Level Burial Grounds, WMA-4
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-W15-15	29DEC88		180	.	.	7.10	#300	4,550
		1	181	250	7.90	7.10	#300	5,550
		2	180	249	7.90	7.10	#300	4,850
		3	181	246	7.90	7.10	#300	261
2-W15-16	29DEC88		417	576	7.80	7.00	#400	4,670
		1	417	578	7.80	7.10	#400	5,310
		2	419	576	7.80	7.00	#500	4,380
		3	419	579	7.80	7.10	#500	5,130
2-W15-17	30DEC88		332	393	7.90	6.80	#800	#3
		1	.	394	7.90	.	#600	#12
		2	.	392	7.90	.	#600	#4
		3	.	392	7.90	.	#600	#10
2-W15-18	30DEC88		282	387	7.80	8.00	#300	1,740
		1	281	392	7.80	7.80	#300	1,690
		2	281	391	7.80	7.90	#300	1,310
		3	282	389	7.80	7.80	#400	1,770
2-W18-21	30DEC88		175	231	7.80	8.20	#600	82
		1	175	233	7.80	8.10	#400	83
		2	175	231	7.80	8.20	#400	94
		3	177	234	7.80	8.10	#400	87
2-W18-22	30DEC88		258	340	7.90	8.20	#200	#7
		1	263	342	7.90	8.10	#300	#5
		2	262	341	7.90	8.20	#200	#8
		3	262	340	7.90	8.20	#300	#8
2-W18-23	03JAN89		179	252	7.80	7.80	#300	460
		1	179	255	7.90	7.70	#300	564
		2	179	253	7.90	7.90	#400	564
		3	179	253	7.90	7.80	#400	607
2-W18-24	04JAN89		279	279	7.90	7.70	#400	695
		1	279	281	7.90	7.80	#300	716
		2	279	279	7.90	7.80	#400	752
		3	279	280	7.90	7.80	#400	631

TABLE 4.12. (contd)
Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALPHA pCi/L 4/15	ALUMNUM ppb 150/.	AM-241 pCi/L 0.1/30d	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.
2-W15-15	29DEC88		.	3.720	<150	*0.00625	26	29	4.30	.	.
2-W15-16	29DEC88		.	2.770	<150	0.01850	60	65	5.05	.	.
2-W15-17	30DEC88		.	1.670	<150	*0.00534	83	.	10.60	.	.
	30DEC88	1	.	.	278	.	81	.	.	.	.
2-W15-18	30DEC88		.	1.260	<150	*0.00591	46	42	8.82	.	.
2-W18-21	30DEC88		.	20.400	314	0.03040	23	23	5.79	.	.
2-W18-22	30DEC88		.	<0.871	<150	*0.00836	54	48	4.74	.	.
2-W18-23	03JAN89		<10	<0.292	<150	*-0.00144	26	26	4.68	32	22
2-W18-24	04JAN89		70	1.940	<150	*0.00884	29	26	3.30	16	18

Well name	Collection Date	Duplicate sample number	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	FCHROMI ppb 10/50	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r
2-W15-15	29DEC88		<2	25,100	26,800	5	3,100	<10	37	*1.180
2-W15-16	29DEC88		<2	62,200	72,400	#40	18,700	12	48	*6.000
2-W15-17	30DEC88		15	.	36,100	<5	14,100	.	29	*1.780
	30DEC88	1	16	.	35,200	.	.	.	35	.
2-W15-18	30DEC88		<2	37,000	34,900	<5	3,700	<10	53	*-2.650
2-W18-21	30DEC88		<2	21,500	20,200	#4	2,900	10	37	*0.889
2-W18-22	30DEC88		<2	34,800	37,100	<5	8,600	<10	63	*0.202
2-W18-23	03JAN89		<2	26,400	25,800	#4	2,800	<10	53	*3.470
2-W18-24	04JAN89		<2	26,200	25,400	23	3,500	<10	51	7.290

Well name	Collection Date	Duplicate sample number	COLIFRM MPN 2.2/1	COPPER ppb 10/1300p	CS-137 pCi/L 20/200r	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	FLEAD ppb 5/50	LEADGF ppb 5/50
2-W15-15	29DEC88		<2.2	<10	*4.810	<500	303	<30	<5	<5
2-W15-16	29DEC88		<2.2	<10	*1.120	600	195	<30	<5	<5
2-W15-17	30DEC88		<2.2	12	*2.650	<500	1,130	.	.	14
	30DEC88	1	.	18	.	.	1,950	.	.	13
2-W15-18	30DEC88		<2.2	<10	*4.240	600	329	<30	6	<5
2-W18-21	30DEC88		2.2	<10	*2.320	<500	965	233	5	<5
2-W18-22	30DEC88		<2.2	<10	*-0.752	<500	614	<30	5	<5
2-W18-23	03JAN89		M	<10	*-2.900	<500	345	33	<5	<5
2-W18-24	04JAN89		M	<10	*4.970	600	217	43	<5	<5

TABLE 4.12. (contd)

Well name	Collection Date	Duplicate sample number	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000
2-W15-15	29DEC88		8,030	7,900	<5	13	4100	518	<10	5,800
2-W15-16	29DEC88		17,400	18,200	<5	7	<100	21	<10	67,500
2-W15-17	30DEC88		14,500	.	.	88	<10	13	.	19,500
	30DEC88	1	14,200	.	.	94	.	19	.	.
2-W15-18	30DEC88		11,600	12,100	<5	20	#3	12	<10	71,600
2-W18-21	30DEC88		6,690	6,970	8	23	#5	13	73	2,200
2-W18-22	30DEC88		13,600	12,700	<5	14	#2	25	<10	13,800
2-W18-23	03JAN89		7,240	7,320	<5	7	<5	31	<10	5,800
2-W18-24	04JAN89		7,510	7,620	<5	17	13	27	<10	22,000

Well name	Collection Date	Duplicate sample number	FPOTASS ppb 100/.	POTASUM ppb 100/.	PU-238 pCi/L 17/40d	PU39-40 pCi/L 17/30d	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r	SELENUM ppb 5/10	FSILICO ppb 50/.
2-W15-15	29DEC88		3,240	3,390	*0.000764	*-0.000165	0.1560	*45.50	<5	.
2-W15-16	29DEC88		5,480	5,460	*-0.001440	*0.003900	0.2530	*34.50	<5	.
2-W15-17	30DEC88		.	5,530	*-0.001440	*-0.002400	0.2100	*-11.10	6	.
	30DEC88	1	.	5,370	.	.	.	.	5	.
2-W15-18	30DEC88		4,400	4,250	*0.000503	*-0.000165	0.2990	0.00	<5	.
2-W18-21	30DEC88		2,990	2,790	*0.002470	*-0.000165	0.2560	*-8.35	<5	.
2-W18-22	30DEC88		4,210	4,470	*-0.001440	*0.001790	*0.0631	*-3.15	<5	.
2-W18-23	03JAN89		3,220	3,230	*-0.001440	*-0.002070	*0.0517	*14.70	<5	19,000
2-W18-24	04JAN89		2,990	2,950	*-0.001440	*0.001860	*0.1020	*35.20	<5	20,600

Well name	Collection Date	Duplicate sample number	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.
2-W15-15	29DEC88		.	20,200	19,300	*0.0360	98	102	14,300	21,700
2-W15-16	29DEC88		.	46,400	44,500	*0.0329	265	251	84,800	31,800
2-W15-17	30DEC88		.	21,600	.	*0.1640	.	199	34,000	26,500
	30DEC88	1	.	20,900	.	.	.	196	.	.
2-W15-18	30DEC88		.	26,100	27,100	*0.0416	157	153	21,700	22,500
2-W18-21	30DEC88		.	17,600	18,700	*-0.3410	85	81	14,400	21,000
2-W18-22	30DEC88		.	14,700	13,800	*-0.1230	158	171	18,900	27,400
2-W18-23	03JAN89		18,700	14,600	14,700	*-0.2970	103	102	14,800	22,600
2-W18-24	04JAN89		20,300	16,800	16,800	*-0.0912	104	103	20,300	20,400

TABLE 4.12. (contd)

Well name	Collection Date	Duplicate sample number	TC-99 pCi/L 15/900r	TETRANE ppb 5/5	TRITIUM pCi/L 500/20000	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-W15-15	29DEC88		*4.880	264	465	3.620	29	37	34	19
2-W15-16	29DEC88		15.400	1780	*98	1.880	25	32	14	6
2-W15-17	30DEC88		8.670	<5	*-74	0.454	.	9	1,350	.
	30DEC88	1	.	.	.	.	.	13	1,400	.
2-W15-18	30DEC88		9.340	14	*-24	0.795	28	29	38	20
2-W18-21	30DEC88		*1.150	92	*-81	22.100	30	28	36	19
2-W18-22	30DEC88		*0.741	<5	*-15	0.564	25	29	143	67
2-W18-23	03JAN89		*-0.565	195	*-78	0.984	29	28	12	11
2-W18-24	04JAN89		*1.810	575	*17	0.774	31	29	6	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

5.0 NONRADIOACTIVE DANGEROUS WASTE LANDFILL

R. M. Fruland

The ground water at the Nonradioactive Dangerous Waste Landfill (NRDW) has been monitored by five shallow wells since October 1986 and by the seven-well network since January 1987. This project is currently in the indicator parameter evaluation stage of monitoring.

The NRDW is centrally located on the Hanford Site, approximately 6 miles west of the Columbia River (Figure 1.1). The NRDW occupies approximately 11.5 acres next to the Solid Waste Landfill (SWL), which covers about 65 acres (Figure 5.1). The only physical facilities serving the landfills are a perimeter fence and a mobile field office. The NRDW received wastes (containerized liquids and asbestos) from 1975 to 1985, discharged to unlined trenches constructed on 46-ft centers (approximately 400 ft long, 14 ft wide at the base, and 15 ft deep). The SWL is still in operation and has a separate ground-water monitoring program based on WAC 173-304 (for solid waste landfills).

The NRDW interim characterization report (Weekes, Luttrell, and Fuchs 1987) describes the site hydrogeology and the monitoring network, which includes three upgradient wells and four downgradient wells (Figure 5.1). Two "deep" wells are completed at the bottom of the unconfined aquifer; five "shallow" wells are completed in approximately the top 15 ft of the unconfined aquifer. Wells 699-26-34, 699-26-35A, and 699-26-35C (deep) are upgradient wells; wells 699-25-33A (deep), 699-25-34A, 699-25-34B, and 699-26-33 are downgradient wells. Figure 5.1 also shows those wells in the SWL monitoring network. Table 5.1 shows the sampling schedule for the wells in the NRDW monitoring network.

The data presented here have been statistically analyzed using the first year's data from the upgradient wells in accordance with 40 CFR 265.93(b) to determine if contamination indicators in upgradient and downgradient wells have changed significantly from background conditions. Thus far, no significant impact to the ground water from past NRDW operations has been detected.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Currently, no additional drilling or hydrologic characterization work is planned at the NRDW.

WATER LEVELS

Because of the very low (0.0001) gradient in the immediate vicinity of the landfills, monthly water levels at the NRDW, SWL, and five nearby Hanford Site wells are being measured to augment the water levels measured before sample collection. Water-level data show an extremely flat gradient in the vicinity of the NRDW and SWL and continue to support the previously determined general ground-water flow direction of northwest to southeast (Table 5.2). There are apparently minor inconsistencies, based on old survey data, in some of the casing elevations from which water levels are calculated. These small inconsistencies in such a low-gradient situation cause problems in interpreting the data. In particular, the casing elevations of the older wells may not be as accurate or precise as those of the newer SWL and NRDW wells.

WATER CHEMISTRY DATA

The seven ground-water monitoring wells at the NRDW were sampled on January 9 and 10, 1989. Field measurements, including water-table elevation, conductivity, and pH, were made before sample collection. Quadruplicate samples were collected for laboratory conductivity, laboratory pH, total organic carbon (TOC), and total organic halogen, lower detection level (TOXLDL). The results are presented in Table 5.3. Table 5.4 presents the comparison of the current data against the critical background means established during the first year of data collection (PNL 1988a). The statistical evaluation based on the NRDW ground-water monitoring program results at this time indicates that there is no significant impact to the ground water from past NRDW operations.

9 1 1 1 3 8 0 1 0 9 3

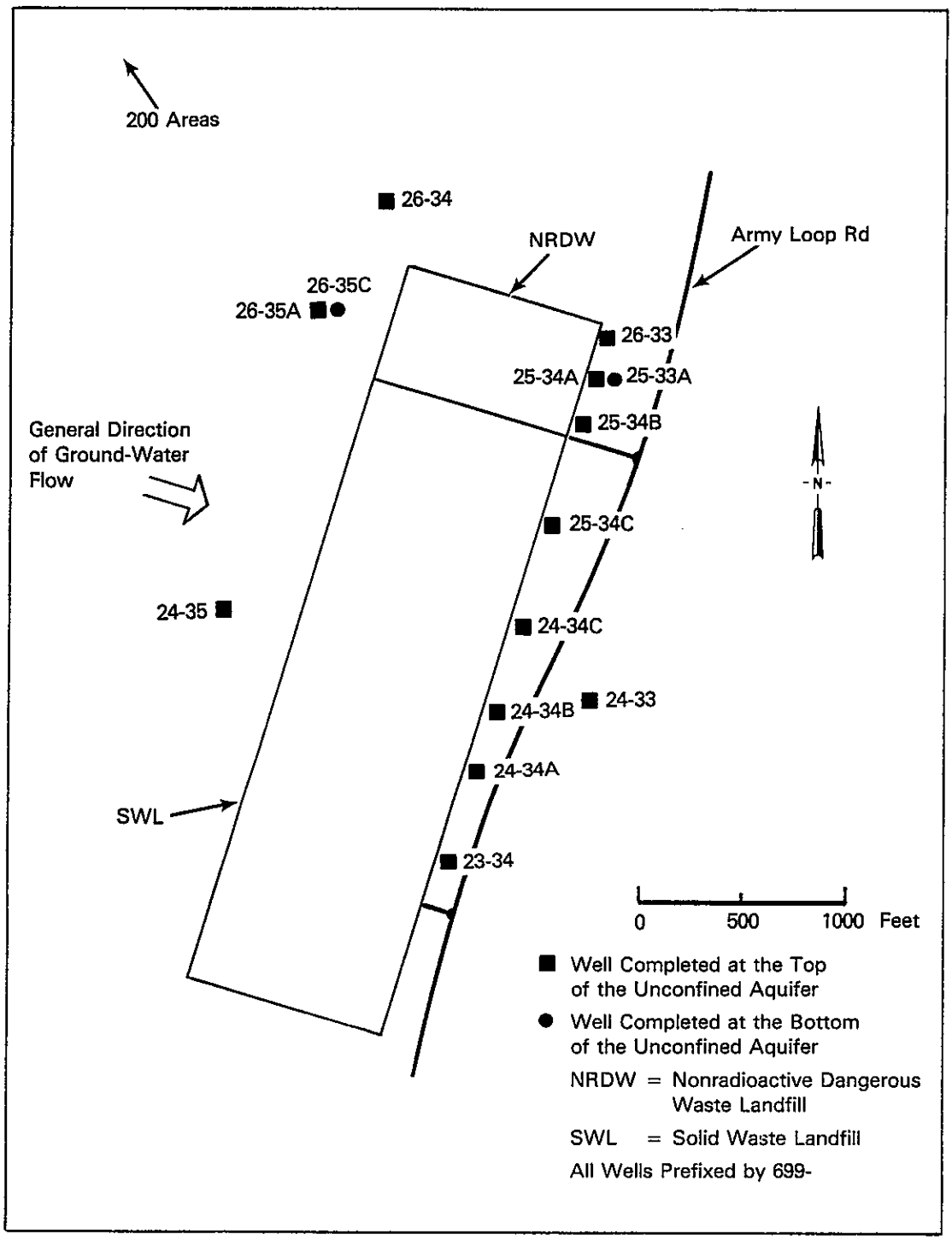

FIGURE 5.1. Monitoring Well Locations for the Solid Waste Landfill and the Nonradioactive Dangerous Waste Landfill

TABLE 5.1. Sampling Schedule for the Nonradioactive Dangerous Waste Landfill

Well	1988			1989 Projected								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
699-25-33A	X		X						LX			
699-25-34A	X		X						LX			
699-25-34B	X		X						LX			
699-26-33	X		X						LX			
699-26-34	X		X						LX			
699-26-35A	X		X						LX			
699-26-35C	X		X						LX			

L = sampled for the long list of constituents (WAC 173-303-9905).
X = samples were collected for quadruplicate indicator parameters.

TABLE 5.2. Water-Level Data for Wells Monitoring the Nonradioactive Dangerous Waste Landfill and the Solid Waste Landfill, January 31, 1989

Well Number	Casing Elevation, ft above MSL[a]	Measured Depth to Water, ft	Calculated Water Level, ft above MSL
NRDW Wells:			
699-26-34	528.09	123.09	405.00
699-26-35A	532.37	127.36	405.01
699-25-34B	529.13	124.19	404.94
699-25-34A	(not collected)		
699-26-33	535.49	130.56	404.93
SWL Wells:			
699-24-35	538.81	133.83	404.98
699-23-34	(tape stuck)		
699-24-34A	533.89	128.95	404.94
699-24-34B	533.50	128.54	404.96
699-24-34C	532.58	127.64	404.94
699-25-34C	535.46	130.50	404.96
699-24-33	524.21	119.37	404.84

(a) MSL = mean sea level.

TABLE 5.3. Constituents with at Least One Detected Value for the Non-Radioactive Dangerous Waste Landfill
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
6-25-33A	10JAN89		368	339	8.20	7.80	#200	10
		1	370	343	8.20	8.00	#300	#8
		2	376	340	8.20	8.00	#300	#4
		3	371	344	8.20	8.00	#200	#4
6-25-34A	09JAN89		319	335	7.90	7.80	#300	#8
		1	320	335	7.90	7.90	#300	#5
		2	321	334	7.90	7.80	#400	#9
		3	321	336	7.90	7.70	#400	10
6-25-34B	09JAN89		M	347	7.80	M	#400	#6
		1	M	343	7.80	M	#500	#7
		2	M	352	7.80	M	#300	#5
		3	M	356	7.90	M	#300	#6
6-26-33	10JAN89		293	351	7.90	7.40	#400	#3
		1	290	354	7.90	7.40	#400	#8
		2	290	355	7.90	7.40	#400	#4
		3	292	355	7.90	7.40	#400	#3
6-26-34	10JAN89		350	349	7.90	7.70	#300	#2
		1	347	347	7.90	7.70	#300	#6
		2	350	346	7.90	7.70	#300	#2
		3	350	347	7.90	7.70	#300	#2
6-26-35A	09JAN89		286	363	8.00	7.30	#300	#2
		1	287	354	8.00	7.50	#300	#3
		2	287	356	8.00	7.50	#300	#5
		3	287	355	8.00	7.40	#200	#3
6-26-35C	09JAN89		300	362	7.80	7.30	#300	#3
		1	298	357	7.80	7.60	#300	#5
		2	298	357	7.80	7.40	#300	#6
		3	297	356	7.80	7.40	#300	#4

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
- s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
- w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
- # - Less than Contractual Detection Limit, measured value reported
- M - Missing Data

TABLE 5.4. Contamination Indicator Parameter Replicate Averages for the Non-Radioactive Dangerous Waste Landfill December 1988 through February 1989

Constituent Code	Name	Units	Well Name	Sample Date	Reps	Replicate Average	Standard Deviation	Minimum	Maximum	Coefficient of Variation
088	CONDLAB	umho	6-25-33A	10JAN89	4	342	2.38	339	344	0.7
			6-25-34A	09JAN89	4	335	0.82	334	336	0.2
			6-25-34B	09JAN89	4	350	5.69	343	356	1.6
			6-26-33	10JAN89	4	354	1.89	351	355	0.5
			6-26-34	10JAN89	4	347	1.26	346	349	0.4
			6-26-35A	09JAN89	4	357	4.08	354	363	1.1
			6-26-35C	09JAN89	4	358	2.71	356	362	0.8
191	CONDFLD	umho	6-25-33A	10JAN89	4	371	3.40	368	376	0.9
			6-25-34A	09JAN89	4	320	0.96	319	321	0.3
			6-25-34B	09JAN89	0	.	.	.	.	.
			6-26-33	10JAN89	4	291	1.50	290	293	0.5
			6-26-34	10JAN89	4	349	1.50	347	350	0.4
			6-26-35A	09JAN89	4	287	0.50	286	287	0.2
			6-26-35C	09JAN89	4	298	1.26	297	300	0.4
199	PHFIELD		6-25-33A	10JAN89	4	7.95	0.100	7.8	8.0	1.3
			6-25-34A	09JAN89	4	7.80	0.082	7.7	7.9	1.0
			6-25-34B	09JAN89	0	.	.	.	.	.
			6-26-33	10JAN89	4	7.40	0	7.4	7.4	0.0
			6-26-34	10JAN89	4	7.70	0	7.7	7.7	0.0
			6-26-35A	09JAN89	4	7.43	0.096	7.3	7.5	1.3
			6-26-35C	09JAN89	4	7.43	0.126	7.3	7.6	1.7
207	PH-LAB		6-25-33A	10JAN89	4	8.20	0	8.2	8.2	0.0
			6-25-34A	09JAN89	4	7.90	0	7.9	7.9	0.0
			6-25-34B	09JAN89	4	7.83	0.05	7.8	7.9	0.6
			6-26-33	10JAN89	4	7.90	0	7.9	7.9	0.0
			6-26-34	10JAN89	4	7.90	0	7.9	7.9	0.0
			6-26-35A	09JAN89	4	8.00	0	8.0	8.0	0.0
			6-26-35C	09JAN89	4	7.80	0	7.8	7.8	0.0
C69	TOC	ppb	6-25-33A	10JAN89	4	250	57.7	200	300	23.1
			6-25-34A	09JAN89	4	350	57.7	300	400	16.5
			6-25-34B	09JAN89	4	375	95.7	300	500	25.5
			6-26-33	10JAN89	4	400	0	400	400	0.0
			6-26-34	10JAN89	4	300	0	300	300	0.0
			6-26-35A	09JAN89	4	275	50.0	200	300	18.2
			6-26-35C	09JAN89	4	300	0	300	300	0.0
H42	TOXLDL	ppb	6-25-33A	10JAN89	4	6.5	3.00	4	10	46.2
			6-25-34A	09JAN89	4	8.0	2.16	5	10	27.0
			6-25-34B	09JAN89	4	6.0	0.82	5	7	13.6
			6-26-33	10JAN89	4	4.5	2.38	3	8	52.9
			6-26-34	10JAN89	4	3.0	2.00	2	6	66.7
			6-26-35A	09JAN89	4	3.3	1.26	2	5	38.7
			6-26-35C	09JAN89	4	4.5	1.29	3	6	28.7

6.0 1301-N LIQUID WASTE DISPOSAL FACILITY

T. J. Gilmore

The ground water near the 1301-N Liquid Waste Disposal Facility (LWDF) has been monitored by a RCRA interim-status well network since December 1987. Monitoring data for the first year have been compiled, and background values for the ground-water indicator parameters have been established. The ground-water sampling in December 1988 marked the first set of analyses to be statistically compared against the established background values.

The 1301-N LWDF is located in the 100-N Area approximately 800 ft east of the Columbia River. It consists of a 52- by 12-ft concrete trough connected to a 125- by 250-ft rectangular basin. The basin bottom is covered with a 3-ft-thick layer of large stones. Adjacent to the basin is an excavated ditch 1600 ft long, 50 ft wide, and 12 ft deep, which extends to the north in a zigzag pattern and is intended to handle the overflow from the basin (Figure 6.1). The facility was used to dispose of waste streams that were generated in the N Reactor and related facilities from the start up of the N Reactor in 1963 until September 1985. It is currently not in use.

There are currently seven monitoring wells in the 1301-N LWDF ground-water monitoring network (Figure 6.1). Wells 199-N-4 and 199-N-66 are designated as the upgradient wells, and wells 199-N-2, 199-N-3, 199-N-14, 199-N-67, and 199-N-69 are designated downgradient wells. Well 199-N-49 was originally designated an upgradient well; however, because of fluctuating water levels in the area, the well was no longer a reliable monitoring structure and in December 1988 was dropped from the monitoring network and replaced by well 199-N-66 (Fruland, Bates, and Lundgren 1989b).

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or characterization work was performed during this period. Water-level measurements were obtained monthly, and the associated water-table maps were constructed.

WATER LEVELS

Water-level measurements are taken in most of the existing 100-N Area wells (Figure 6.2) to monitor the water table near the 1301-N LWDF. Monthly water-level measurements continued this quarter, with measurements obtained from 43 wells in January, 44 wells in February, and 47 wells in March. The number of wells in which water levels are obtained each month is dependent on the accessibility and condition of each well. Three additional existing wells were added in March to the list of wells that are measured monthly as part of the ground-water quality assessment program that is to take effect at the 1301-N LWDF. Water-table maps for each month during the quarter are shown in Figures 6.3, 6.4, and 6.5. The water-table elevations are presented in Table 6.1.

WATER CHEMISTRY DATA

Ground-water samples were collected from all seven wells in the monitoring network in March 1989. To improve its reliability as a monitoring well, on March 9, 1989, well 199-N-3 was rehabilitated, exposing an additional 18.2 ft of screened casing. The fluctuating water-table in the area would occasionally drop below a depth at which well 199-N-3 could be sampled (Fruland, Bates, and Lundgren 1989b). The specific conductance measurement on March 9 before the well was rehabilitated was 606 μmhos; on March 14 after the well was rehabilitated, the measurement was 607 μmhos. These measurements of specific conductance are comparable, indicating that the rehabilitation of the well appears to have had little influence on the water quality in this well. This situation will continue to be monitored.

Background Indicator Parameter Analyses

Background data for contamination indicator parameters currently consist of

- December 1987 - 1 pH, 1 conductivity, 1 total organic carbon (TOC), 1 total organic halogen (lower detection limit) (TOXLDL)
- March 1988 - 1 pH, 1 conductivity, 1 TOC, TOXLDL

9 1 1 1 3 9 1 0 9 9

- June 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL
- September 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL.

Quadruplicate measurements for contamination indicator parameters are required by 40 CFR 265.92(c). Data collected from the first four quarters are then used to determine background conditions. However, during the first two quarters of ground-water monitoring at the 1301-N LWDF only single samples were analyzed for contamination indicator parameters. In spite of this lack of data, the statistical analyses were performed and are presented in Table 6.2. The table lists the average background, standard deviation, and critical mean for the four contamination indicator parameters calculated from the first year of data from the upgradient well. The critical mean is the value to which future measurements will be compared. If a parameter is greater than (or less than in the case of pH) its critical mean, that measurement is considered statistically different from background. These values were determined following the recommended techniques in Appendix B of the TEGD (EPA 1986b). Some of these critical mean values are outside the range that would be reasonably anticipated.

Comparisons of the December 1988 analytical results to the established background levels indicated that specific conductance in well 199-N-3, a downgradient well in the 1301-N LWDF monitoring network, is statistically different from the established background specific conductance (Figure 6.6). Upon receiving the analytical results from the testing laboratory, well 199-N-3 was promptly resampled to determine the validity of the December results. Analytical results from resampling of the well confirmed that specific conductivity in well 199-N-3 was statistically different from background. The major ionic species that account for the specific conductivity are calcium and sulfate. Notification of the elevated specific conductance readings was forwarded to the Washington State Department of Ecology (hereafter called Ecology) on March 23, 1989, within 7 days after the results were verified, as per regulations. A ground-water quality assessment program plan

was developed and will be forwarded to Ecology in April 1989. Reporting of the program progress will be provided in future quarterly reports to Ecology and the EPA.

Initial Planning for the Ground-Water Quality Assessment Program

In the first phase of the ground-water quality assessment program, quarterly sampling will continue for the background well network as originally scheduled for the constituents listed in Table 6.3. Beginning with an April sampling, existing wells 199-N-16, 199-N-17, 199-N-18, 199-N-21, 199-N-54, 199-N-55, 199-N-56, and 199-N-57 will be added to the 1301-N network. The additional wells will be sampled for the constituents listed in Table 6.4 on the same quarterly schedule. The new sampling schedule is presented in Table 6.5. The addition of monthly sampling in April and May will provide needed data to assess the ground-water quality in a timely manner.

Ground-Water Analyses Other than Indicator Parameter

Tables 6.6, 6.7, and 6.8 show the analytical results of the December sampling. Beta activity exceeded the screening level of 50 pCi/L (40 CFR 141) in wells 199-N-2, 199-N-3, 199-N-4, 199-N-14, 199-N-67, and 199-N-69 in December 1988. Beta activity ranged from 76.6 pCi/L in well 199-N-2 to 40,800 pCi/L in well 199-N-67. Tritium activity exceeded the 20,000-pCi/L standard in 40 CFR 141 for wells 199-N-2, 199-N-3, 199-N-4, 199-N-14, 199-N-67, and 199-N-69 in December 1988. Strontium activity exceeded the 8-pCi/L standard (40 CFR 141) in wells 199-N-2, 199-N-3, 199-N-4, 199-N-14, and 199-N-67. Strontium activity in these wells ranged from 12.2 pCi/L in well 199-N-4 to 13,800 pCi/L in well 199-N-67.

Several volatile organic compounds (benzene, toluene, xylenes, chlorobenzene, ethyl benzene, three aliphatic hydrocarbons, and three other indeterminate organic compounds) were reported in a sample from well 199-N-2 collected December 19, 1988, and reported March 16, 1989. Two indeterminate organic compounds and an aliphatic hydrocarbon were detected in a sample from well 199-N-4 from the same date. Since a subsequent sample collected March 19, 1989, shows no such contamination present in 199-N-2, sample contamination is suspected. An investigation is now under way.

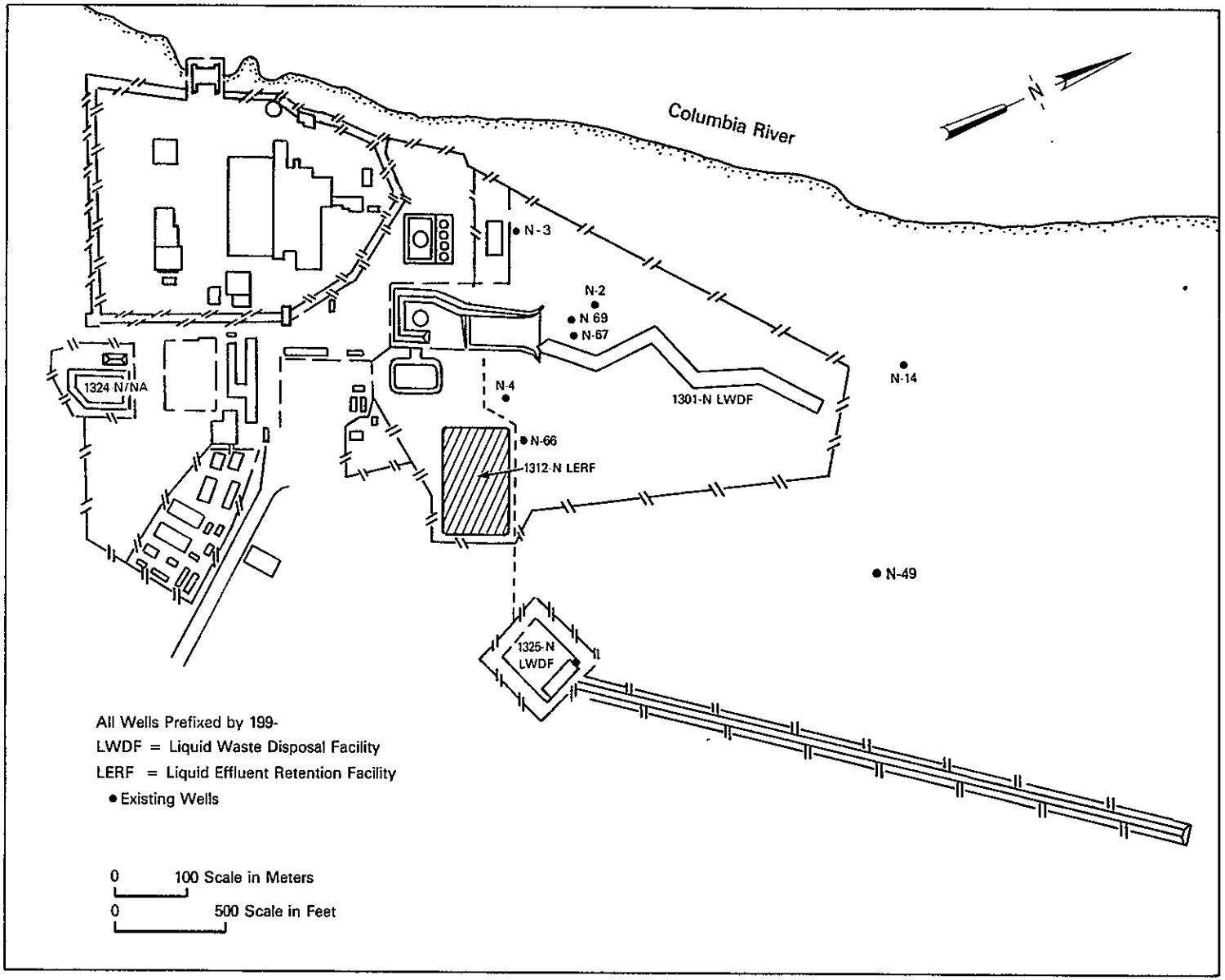

FIGURE 6.1. Monitoring Well Locations for the 1301-N Liquid Waste Disposal Facility as of October 1988. (Well 199-N-66 replaced well 199-N-49 in September 1988.)

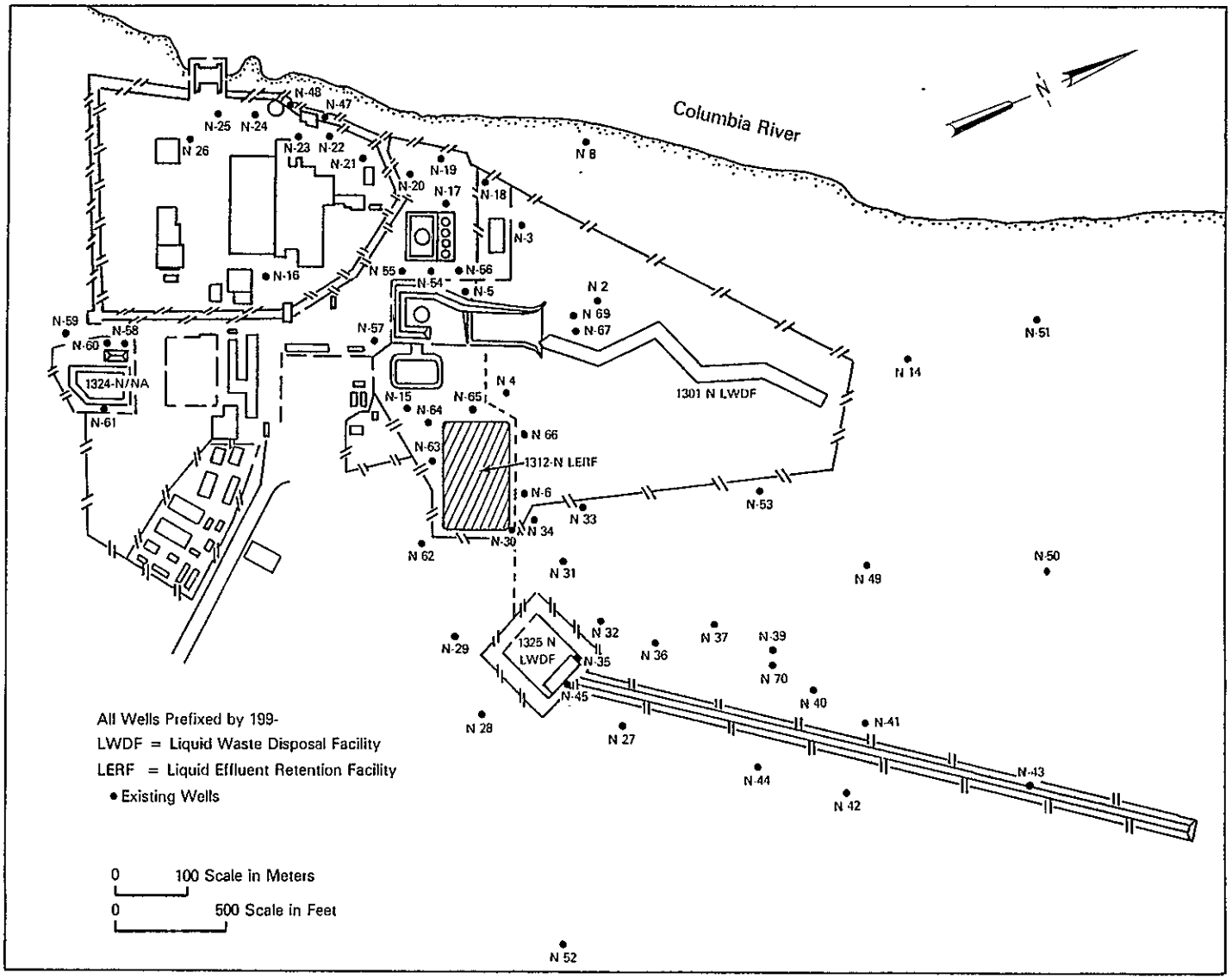

FIGURE 6.2. Monitoring Well Locations in the 100-N Area

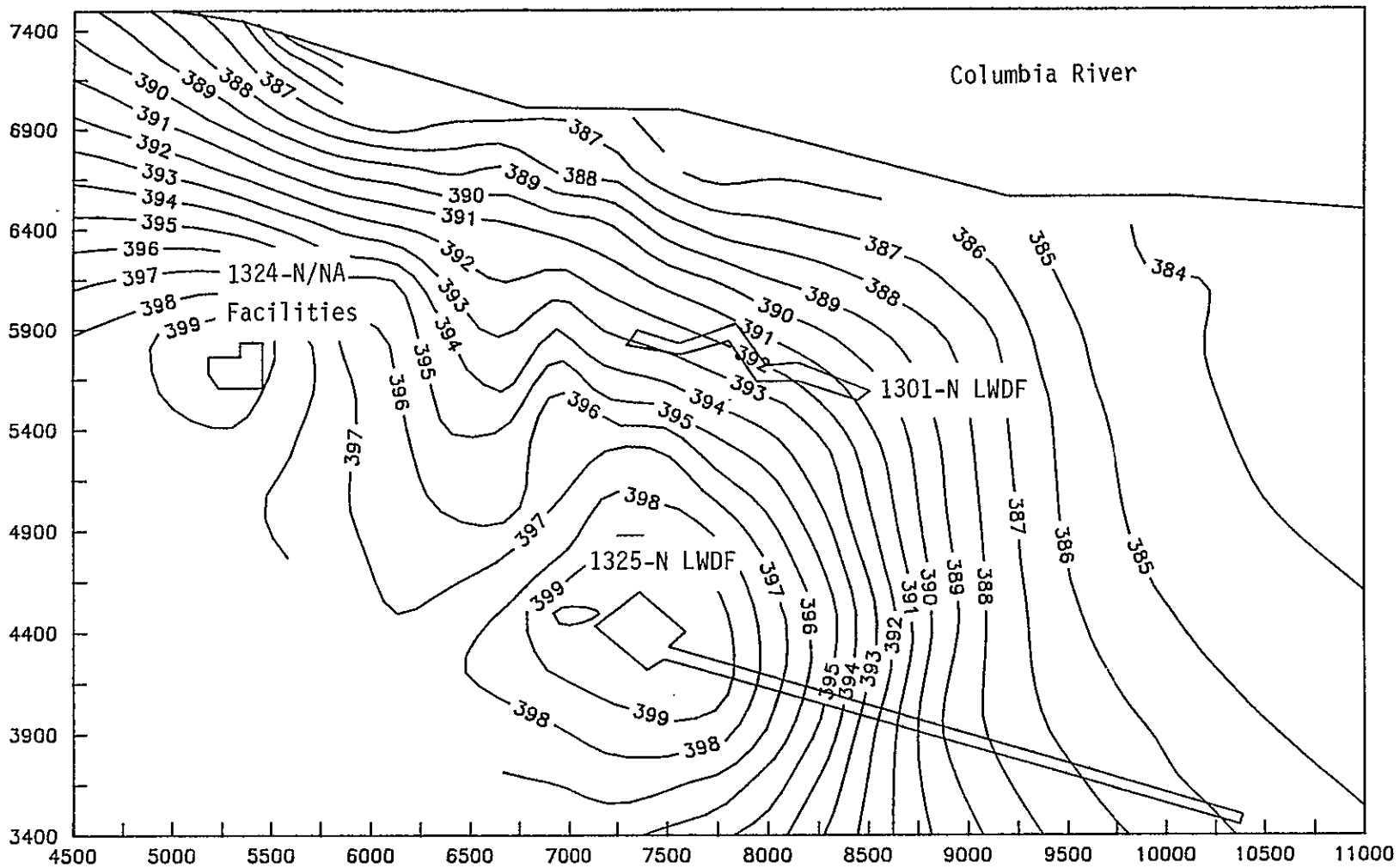

FIGURE 6.3. Computer-Generated Water-Table Map of the 100-N Area, January 1989

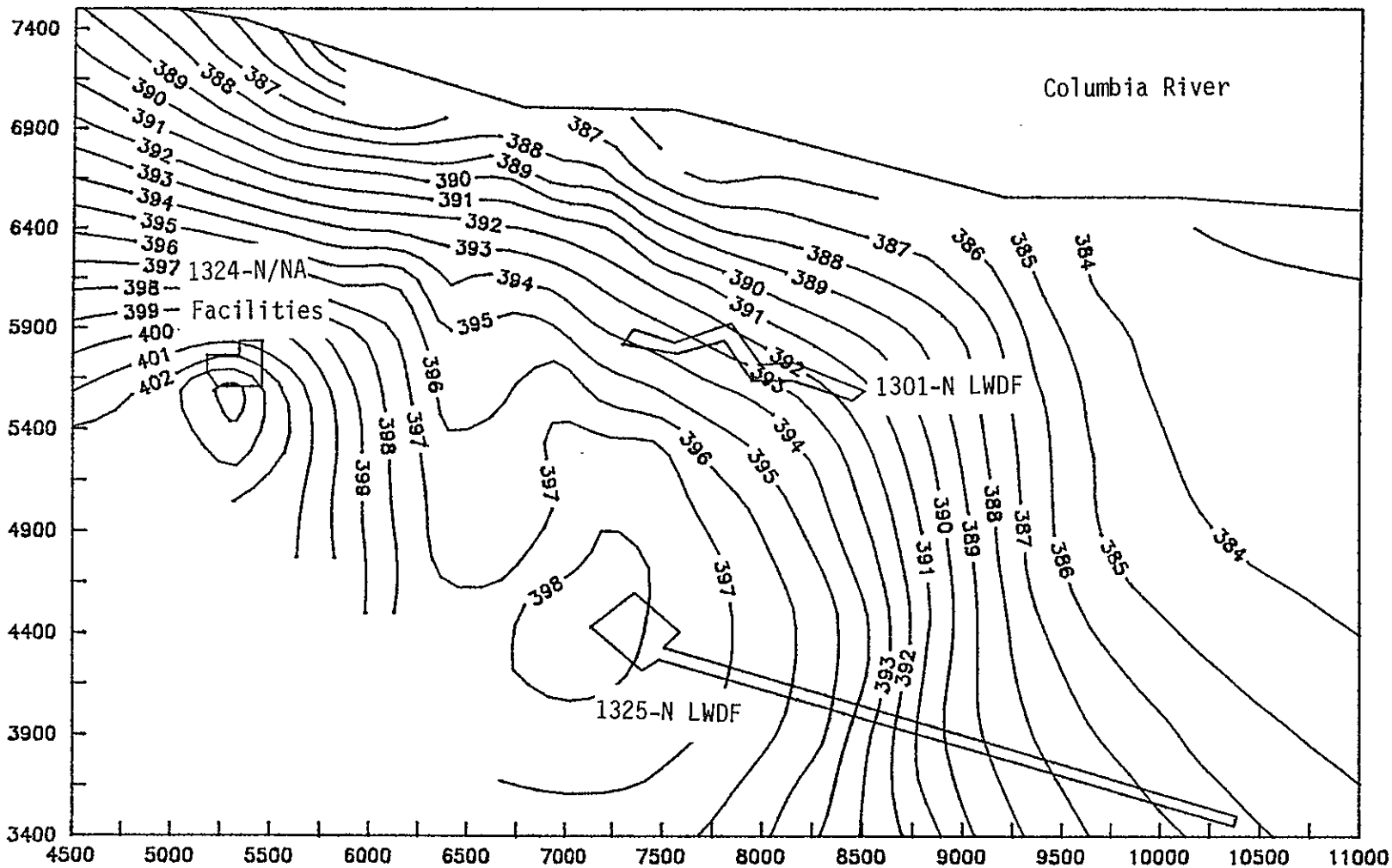

FIGURE 6.4. Computer-Generated Water-Table Map of the 100-N Area, February 1989

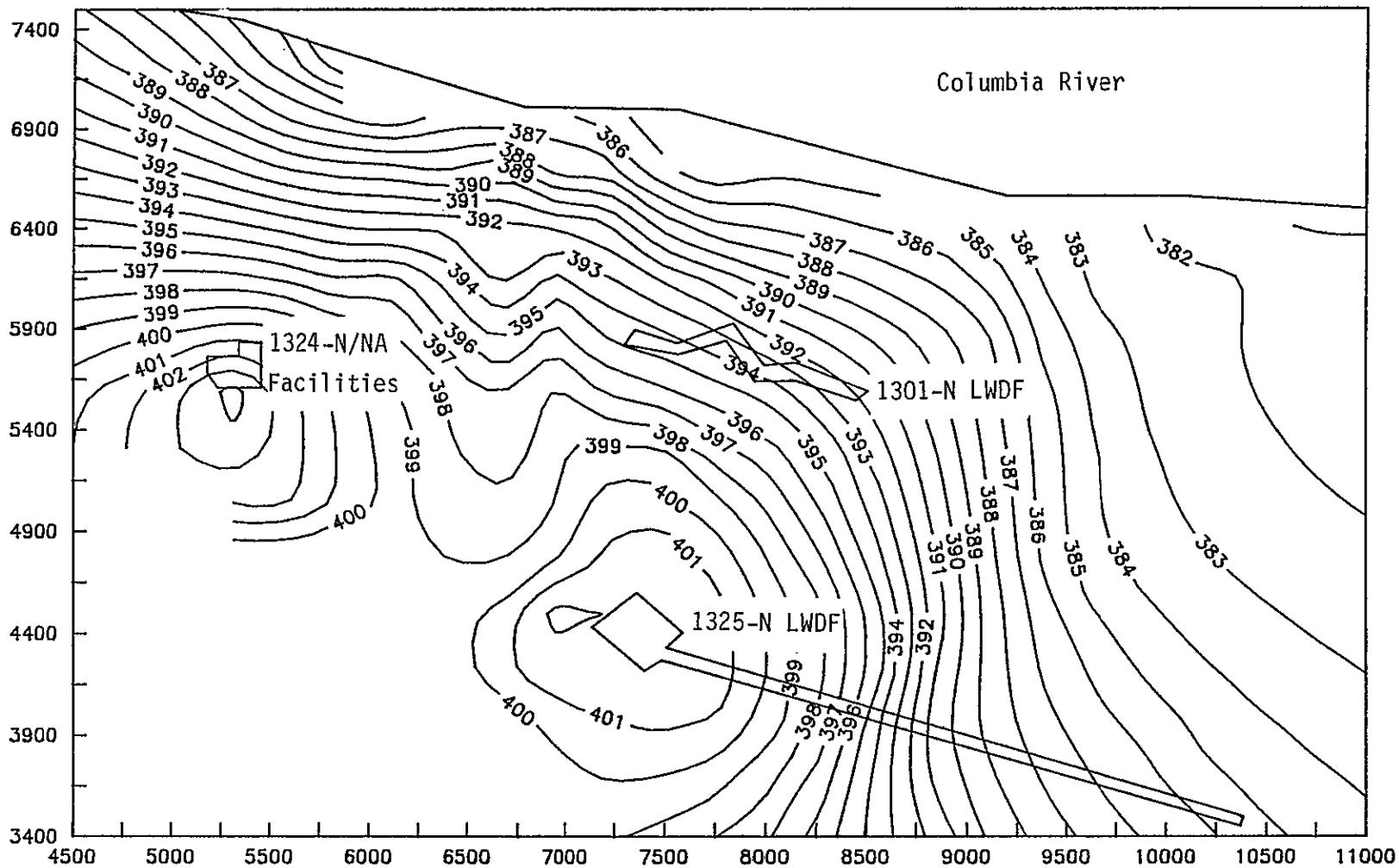

FIGURE 6.5. Computer-Generated Water-Table Map of the 100-N Area, March 1989

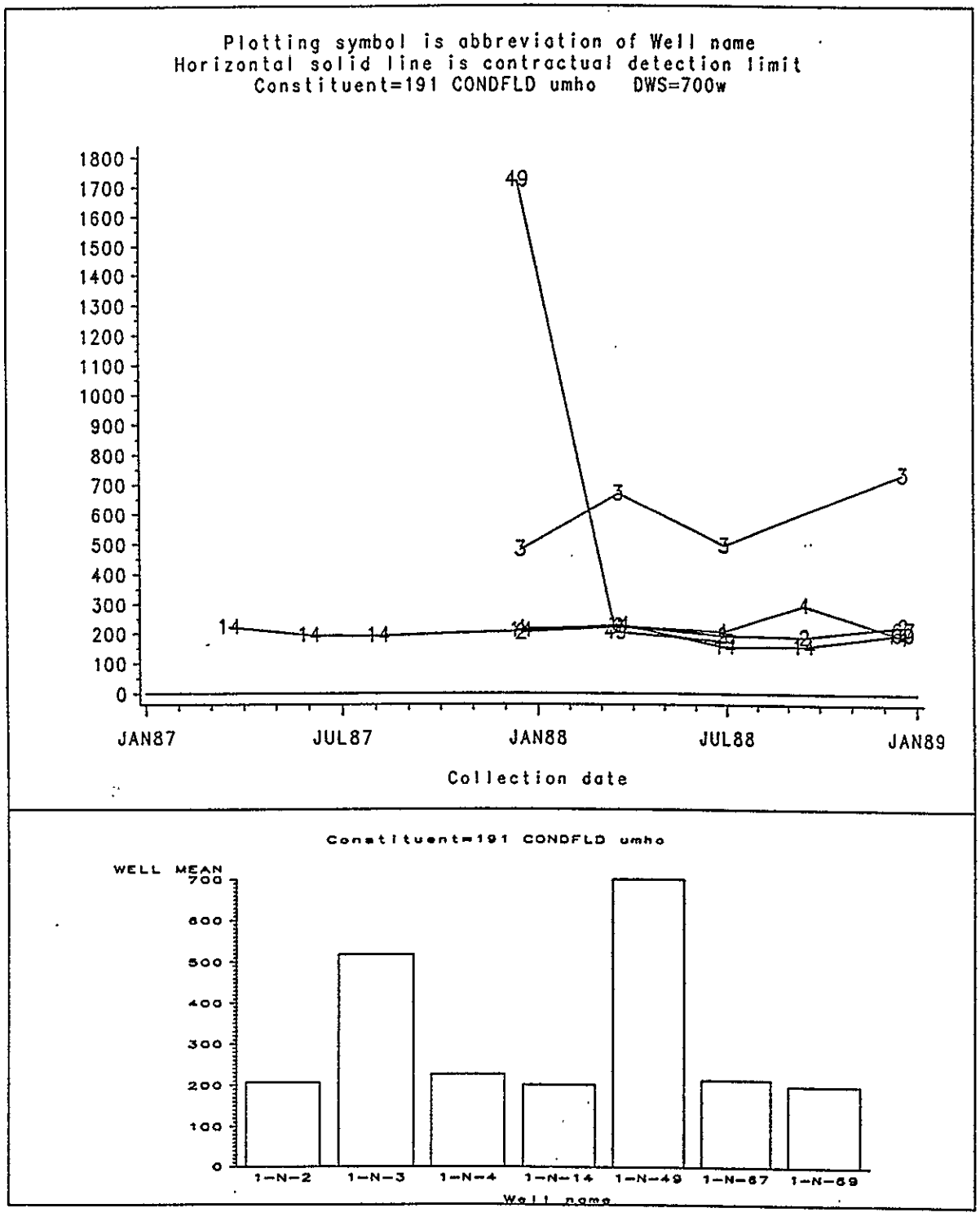

FIGURE 6.6. Plot of Conductivity Data for Wells 199-N-2, 199-N-3, 199-N-4, 199-N-14, 199-N-49, 199-N-67, and 199-N-69, March 1987 to December 1988

TABLE 6.1. Water-Level Data for Wells in the 100-N Area, January Through March 1989

Well Number	Date	Water-Level Elevation, ft above MSL[a]
199-N-2	1/30/89	390.73
199-N-2	2/24/89	391.64
199-N-2	3/31/89	391.93
199-N-3	1/30/89	389.83
199-N-3	2/24/89	390.50
199-N-3	3/31/89	390.59
199-N-4	1/30/89	394.66
199-N-4	2/24/89	395.71
199-N-4	3/31/89	396.91
199-N-6	1/30/89	398.10
199-N-6	2/24/89	398.04
199-N-6	3/31/89	400.50
199-N-14	1/30/89	387.41
199-N-14	2/24/89	387.79
199-N-14	3/31/89	387.40
199-N-15	1/30/89	394.41
199-N-15	2/24/89	395.66
199-N-16	3/31/89	395.09
199-N-17	1/30/89	389.91
199-N-17	2/24/89	390.64
199-N-17	3/31/89	390.68
199-N-18	1/30/89	388.06
199-N-18	2/24/89	388.41
199-N-18	3/31/89	388.07
199-N-19	1/30/89	388.16
199-N-19	2/24/89	388.50
199-N-19	3/31/89	388.05
199-N-20	1/30/89	389.39
199-N-20	2/24/89	389.97
199-N-20	3/31/89	389.86
199-N-23	3/31/89	387.44
199-N-24	3/31/89	384.93
199-N-27	1/30/89	400.09
199-N-27	2/24/89	397.32
199-N-27	3/31/89	401.90
199-N-28	1/30/89	399.00
199-N-28	2/24/89	398.24
199-N-28	3/31/89	401.33
199-N-29	1/30/89	400.34
199-N-29	2/24/89	398.73
199-N-29	3/31/89	402.40
199-N-30	1/30/89	398.79
199-N-30	2/24/89	398.04
199-N-31	1/30/89	398.96
199-N-31	2/24/89	397.85

TABLE 6.1. (contd)

Well Number	Date	Water-Level Elevation, ft above MSL[a]
199-N-31	3/31/89	401.32
199-N-32	1/30/89	399.91
199-N-32	2/24/89	397.64
199-N-32	3/31/89	401.83
199-N-33	1/30/89	397.29
199-N-33	2/24/89	397.21
199-N-33	3/31/89	399.77
199-N-34	1/30/89	398.28
199-N-34	2/24/89	397.76
199-N-34	3/31/89	400.68
199-N-36	1/30/89	398.28
199-N-36	2/24/89	396.83
199-N-36	3/31/89	400.52
199-N-37	1/30/89	396.69
199-N-37	2/24/89	396.17
199-N-37	3/31/89	399.01
199-N-39	1/30/89	394.84
199-N-39	2/24/89	395.26
199-N-39	3/31/89	397.42
199-N-40	1/30/89	392.53
199-N-40	2/24/89	393.80
199-N-40	3/31/89	395.37
199-N-41	1/30/89	389.14
199-N-41	2/24/89	390.32
199-N-41	3/31/89	390.61
199-N-42	1/30/89	389.76
199-N-42	2/24/89	391.00
199-N-42	3/31/89	391.41
199-N-44	1/30/89	394.16
199-N-44	2/24/89	395.11
199-N-44	3/31/89	397.11
199-N-49	1/30/89	390.17
199-N-49	2/24/89	391.62
199-N-49	3/31/89	392.14
199-N-50	1/30/89	385.67
199-N-50	2/24/89	385.43
199-N-50	3/31/89	384.59
199-N-51	1/30/89	384.85
199-N-51	2/24/89	384.44
199-N-51	3/31/89	383.39
199-N-52	1/30/89	395.22
199-N-52	2/24/89	396.30
199-N-52	3/31/89	398.26
199-N-53	1/30/89	393.66
199-N-53	2/24/89	394.19
199-N-53	3/31/89	395.43

9 1 1 1 3 8 6 1 0 9

TABLE 6.1. (contd)

Well Number	Date	Water-Level Elevation, ft above MSL[a]
199-N-54	1/30/89	392.97
199-N-54	2/24/89	394.18
199-N-54	3/31/89	394.81
199-N-55	1/30/89	392.96
199-N-55	2/24/89	394.17
199-N-55	3/31/89	394.78
199-N-56	1/30/89	391.70
199-N-56	2/24/89	392.90
199-N-56	3/31/89	393.45
199-N-57	1/30/89	394.08
199-N-57	2/24/89	395.33
199-N-57	3/31/89	396.20
199-N-58	1/30/89	399.78
199-N-58	2/24/89	400.26
199-N-58	3/31/89	400.88
199-N-59	1/30/89	399.81
199-N-59	2/24/89	400.24
199-N-59	3/31/89	400.39
199-N-60	1/30/89	399.99
199-N-60	2/24/89	400.43
199-N-60	3/31/89	400.79
199-N-61	2/24/89	404.84
199-N-61	3/31/89	404.64
199-N-62	1/30/89	397.40
199-N-62	3/31/89	399.84
199-N-63	1/30/89	396.09
199-N-63	2/24/89	396.93
199-N-63	3/31/89	398.52
199-N-64	1/30/89	395.00
199-N-64	2/24/89	396.13
199-N-64	3/31/89	397.31
199-N-65	1/30/89	394.73
199-N-65	2/24/89	395.87
199-N-65	3/31/89	397.07
199-N-66	1/30/89	396.09
199-N-66	2/24/89	396.65
199-N-66	3/31/89	398.43
199-N-67	3/31/89	392.45
199-N-69	3/31/89	392.05
199-N-85	1/30/89	385.41
199-N-85	2/24/89	385.40
199-N-85	3/31/89	384.08

(a) MSL = mean sea level.

TABLE 6.2. Background Ground-Water Constituent Values for the 1301-N Facility

Constituent	Average Background	Standard Deviation	Critical Mean
Specific Conductance, μmhos/cm	220.3	41.36	539.5
pH	7.44	0.846	1.09, 13.79
TOC, ppb	386.0	165.5	7002.0
TOX, ppb	5.3	1.35	59.3

TABLE 6.3. Inorganic, Organic, and Radiological Constituents and Other Parameters to be Analyzed for in the 1301-N Ground-Water Quality Assessment Monitoring Network

Coliform
Total Organic Halogen
Total Organic Carbon
Metals Analyzed by the Inductively Coupled Argon Plasma Method, Unfiltered/Filtered
Arsenic, Unfiltered/Filtered
Selenium, Unfiltered/Filtered
Lead, Unfiltered/Filtered
Mercury, Unfiltered/Filtered
Anions
Volatile Organic Analyses
Hydrazine
Phenol
Pesticides
Herbicides
Ammonium Ion
Uranium
pH
Specific conductance
Tritium
Strontium-90
Gamma Scan
Radium
Beta
Alpha

TABLE 6.4. Inorganic Constituents and Parameters to be Analyzed for in the 1301-N Ground-Water Quality Assessment Monitoring Network

Turbidity
Metals Analyzed by the Inductively Coupled Argon Plasma Method
Arsenic
Selenium
Lead
Mercury
Alkalinity
Anions
Quality Control/Volatile Organic Constituents
pH
Specific conductance

TABLE 6.5. Ground-Water Quality Assessment Program Sampling Schedule for the 1301-N Facility, 1989

Well	Mar	April	May	June	July	Aug	Sept
199-N-2	DW	L1	L1	L2			L2
199-N-3	DW	L1	L1	L2			L2
199-N-14	DW	L1	L1	L2			L2
199-N-66	DW	L1	L1	L2			L2
199-N-67	DW	L1	L1	L2			L2
199-N-69	DW	L1	L1	L2			L2
199-N-56*		L1	L1	L1			L1
199-N-55*		L1	L1	L1			L1
199-N-21*		L1	L1	L1			L1
199-N-16*		L1	L1	L1			L1
199-N-17*		L1	L1	L1			L1
199-N-18*		L1	L1	L1			L1
199-N-19*		L1	L1	L1			L1
199-N-54*		L1	L1	L1			L1
199-N-57*		L1	L1	L1			L1

DW = the constituent list in WAC 173-303-9905.
L1 = the Table 6.4 constituent list.
L2 = the Table 6.3 constituent list.
* = existing wells to be added to the background monitoring network.

TABLE 6.6. Constituent List and Summary of Sampling Results for the 1301-N Liquid Waste Disposal Facility December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
191	CONDFLD	umho	1	22	0	700	WDOE	xxx	Specific conductance, field
199	PHFIELD		0.1	22	0	6.5-8.5	EPAS	xxx	pH, field
C69	TOC	ppb	1000	24	0	.			Total organic carbon
H42	TOXLDL	ppb	20	24	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	6	6 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	6	0	50	EPA	xxx	Gross beta
181	RADIUM	pCi/L	1	6	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	6	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	6	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	6	6 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	6	4	50	EPA		Chromium
A10	SILVER	ppb	10	6	6 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	6	6 ***	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	6	6 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	6	6 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	6	6 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	6	6 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	6	6 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	6	6 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	6	6 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	6	6 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	6	6 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	6	4	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	6	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	6	6 ***	4000	EPA		Fluoride
H13	2,4-D	ppb	2	6	6 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	6	6 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	6	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	6	6 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	6	6 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	6	6 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	6	6 ***	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	6	6 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	6	6 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	6	6 ***	50	EPA		Lead, filtered

TABLE 6.6. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	6	0	.			Sodium
A17	MANGESE	ppb	5	6	4	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	6	0	300	EPAS	xxx	Iron
C57	PHENOL	ppb	10	1	1 ***	.			Phenol
C73	SULFATE	ppb	500	6	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	6	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	6	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	6	4	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	6	4	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	5	5 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	6	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	6	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	6	0	30	EPAR	xxx	Ruthenium-106
104	U	pCi/L	0.5	6	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	6	0	20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	6	0	8	EPA	xxx	Strontium-90
A01	BERYLUM	ppb	5	6	6 ***	.			Beryllium
A03	STRONUM	ppb	20	6	0	.			Strontium
A04	ZINC	ppb	5	6	1	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	6	0	.			Calcium
A12	NICKEL	ppb	10	6	6 ***	.			Nickel
A13	COPPER	ppb	10	6	6 ***	1300	EPAP		Copper
A14	VANADUM	ppb	5	6	4	.			Vanadium
A15	ANTIONY	ppb	100	6	6 ***	.			Antimony
A16	ALUMNUM	ppb	150	6	5	.			Aluminum
A18	POTASUM	ppb	100	6	0	.			Potassium
A50	MAGNES	ppb	50	6	0	.			Magnesium
C53	HYDRAZI	ppb	3000	1	1 ***	.			Hydrazine
C76	PHOSPHA	ppb	1000	6	6 ***	.			Phosphate
C80	AMMONIU	ppb	50	6	6 ***	.			Ammonium ion
H16	TC	ppb	1000	1	0	.			Total carbon
H17	TDS	ppb	5000	1	0	500000	EPAS		Total dissolved solids
H18	FZINC	ppb	5	6	5	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	6	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	6	6 ***	.			Nickel, filtered
H26	FCOPPER	ppb	10	6	6 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	6	4	.			Vanadium, filtered
H28	FALUMIN	ppb	150	6	6 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	6	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	6	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	6	6 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	6	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	6	6 ***	.			Antimony, filtered
H58	ALKALIN	ppb	20000	1	0	.			Total alkalinity, as CaCO3
H62	LHYDRAZ	ppb	30	4	4 ***	.			Hydrazine, low DL

TABLE 6.6. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A23	THALIUM	ppb	5	1	1 ***	.			Thallium
A24	THIOURA	ppb	200	1	1 ***	.			Thiourea
A25	ACETREA	ppb	200	1	1 ***	.			1-Acetyl-2-thiourea
A26	CHLOREA	ppb	200	1	1 ***	.			1-(o-Chlorophenyl) thiourea
A27	DIETROL	ppb	200	1	1 ***	.			Diethylstilbesterol
A28	ETHYREA	ppb	200	1	1 ***	.			Ethylenethiourea
A29	NAPHREA	ppb	200	1	1 ***	.			1-Naphthyl-2-thiourea
A32	PHENREA	ppb	500	1	1 ***	.			N-phenylthiourea
A40	DDD	ppb	0.1	1	1 ***	.			DDD
A41	DDE	ppb	0.1	1	1 ***	.			DDE
A42	DDT	ppb	0.1	1	1 ***	.			DDT
A43	HEPTLOR	ppb	0.1	1	1 ***	0	EPAP		Heptachlor
A44	HEPTIDE	ppb	0.1	1	1 ***	0	EPAP		Heptachlor epoxide
A46	DIELRIN	ppb	0.1	1	1 ***	.			Dieldrin
A47	ALDRIN	ppb	0.1	1	1 ***	.			Aldrin
A48	CHLOANE	ppb	1	1	1 ***	0	EPAP		Chlordane
A49	END01	ppb	0.1	1	1 ***	.			Endosulfan I (alpha)
A52	END02	ppb	0.1	1	1 ***	.			Endosulfan II (beta)
A54	AR1016	ppb	1	1	1 ***	0	EPAP		Arochlor 1016
A55	AR1221	ppb	1	1	1 ***	0	EPAP		Arochlor 1221
A56	AR1232	ppb	1	1	1 ***	0	EPAP		Arochlor 1232
A57	AR1242	ppb	1	1	1 ***	0	EPAP		Arochlor 1242
A58	AR1248	ppb	1	1	1 ***	0	EPAP		Arochlor 1248
A59	AR1254	ppb	1	1	1 ***	0	EPAP		Arochlor 1254
A60	AR1260	ppb	1	1	1 ***	0	EPAP		Arochlor 1260
A61	TETRANE	ppb	5	6	6 ***	5	EPA		Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	2	1	5	EPA	xxx	Benzene
A63	DIOXANE	ppb	500	1	1 ***	.			Dioxane
A64	METHONE	ppb	10	6	6 ***	.			Methyl ethyl ketone
A65	PYRIDIN	ppb	500	1	1 ***	.			Pyridine
A66	TOLUENE	ppb	5	2	1	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	6	6 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	6	6 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	6	6 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	6	6 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	6	5	440	EPAP		Xylene-o,p
A72	ACROLIN	ppb	10	1	1 ***	.			Acrolein
A73	ACRYILE	ppb	10	1	1 ***	.			Acrylonitrile
A74	BISTHER	ppb	5	1	1 ***	.			Bis(chloromethyl) ether
A75	BROMONE	ppb	5	1	1 ***	.			Bromoacetone
A76	METHBRO	ppb	10	1	1 ***	.			Methyl bromide
A77	CARBIDE	ppb	10	1	1 ***	.			Carbon disulfide
A78	CHLBENZ	ppb	5	2	1	60	EPAP		Chlorobenzene
A79	CHLTHER	ppb	5	1	1 ***	.			2-Chloroethyl vinyl ether
A80	CHLFORM	ppb	5	6	1	100	EPA		Chloroform [Trichloromethane]
A81	METHCHL	ppb	10	1	1 ***	.			Methyl chloride [Chloromethane]
A82	CHMTHER	ppb	10	1	1 ***	.			Chloromethyl methyl ether

TABLE 6.6. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency Exceeded	Full name
A83	CROTONA	ppb	10	1	1 ***	.		Crotonaldehyde
A84	DIBRCHL	ppb	10	1	1 ***	0	EPAP	1,2-Dibromo-3-chloropropane
A85	DIBRETH	ppb	10	1	1 ***	.		1,2-Dibromoethane
A86	DIBRMET	ppb	10	1	1 ***	.		Dibromomethane
A87	DIBUTEN	ppb	10	1	1 ***	.		1,4-Dichloro-2-butene
A88	DICDIFM	ppb	10	1	1 ***	.		Dichlorodifluoromethane
A89	1,1-DIC	ppb	5	1	1 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	1	1 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	1	1 ***	70	EPAP	trans-1,2-Dichloroethene
A92	DICETHY	ppb	10	1	1 ***	7	EPA	1,1-Dichloroethylene
A93	METHYCH	ppb	5	6	4	.		Methylene chloride [Dichloromethane]
A94	DICPANE	ppb	5	1	1 ***	6	EPAP	1,2-Dichloropropane
A95	DICPENE	ppb	5	1	1 ***	.		1,3-Dichloropropene
A96	NNDIEHY	ppb	10	1	1 ***	.		N,N-diethylhydrazine
A99	HYDRSUL	ppb	10	1	1 ***	.		Hydrogen sulfide
B01	IODOMET	ppb	10	1	1 ***	.		Iodomethane
B02	METHACR	ppb	10	1	1 ***	.		Methacrylonitrile
B03	METHTHI	ppb	10	1	1 ***	.		Methanethiol
B04	PENTACH	ppb	10	1	1 ***	.		Pentachloroethane
B05	1112-tc	ppb	10	1	1 ***	.		1,1,1,2-Tetrachlorethane
B06	1122-tc	ppb	5	1	1 ***	.		1,1,2,2-Tetrachlorethane
B08	BROMORM	ppb	5	1	1 ***	100	EPA	Bromoform [Tribromomethane]
B09	TRCMEOL	ppb	10	1	1 ***	.		Trichloromethanethiol
B10	TRCMFLM	ppb	10	1	1 ***	.		Trichloromonofluoromethane
B11	TRCPANE	ppb	10	1	1 ***	.		Trichloropropane
B12	123-trp	ppb	10	1	1 ***	.		1,2,3-Trichloropropane
B13	VINYIDE	ppb	10	1	1 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	6	5	440	EPAP	Xylene-m
B15	DIETHY	ppb	10	1	1 ***	.		Diethylarsine
B19	ACETILE	ppb	3000	1	1 ***	.		Acetonitrile
B20	ACETOPH	ppb	10	1	1 ***	.		Acetophenone
B21	WARFRIN	ppb	10	1	1 ***	.		Warfarin
B22	ACEFENE	ppb	10	1	1 ***	.		2-Acetylaminofluorene
B23	AMINOYL	ppb	10	1	1 ***	.		4-Aminobiphenyl
B24	AMIISOX	ppb	10	1	1 ***	.		5-(Aminomethyl)-3-isoxazolol
B25	AMITROL	ppb	10	1	1 ***	.		Amitrole
B26	ANILINE	ppb	10	1	1 ***	.		Aniline
B27	ARAMITE	ppb	10	1	1 ***	.		Aramite
B28	AURAMIN	ppb	10	1	1 ***	.		Auramine
B29	BENZCAC	ppb	10	1	1 ***	.		Benz[c]acridine
B30	BENZAAN	ppb	10	1	1 ***	.		Benz[a]anthracene
B31	BENDICM	ppb	10	1	1 ***	.		Benzene, dichloromethyl
B32	BENTHOL	ppb	10	1	1 ***	.		Benzenethiol
B33	BENDINE	ppb	10	1	1 ***	.		Benzidine
B34	BENZBFL	ppb	10	1	1 ***	.		Benzo[b]fluoranthene
B35	BENZJFL	ppb	10	1	1 ***	.		Benzo[j]fluoranthene
B36	PBENZQU	ppb	10	1	1 ***	.		p-Benzoquinone

TABLE 6.6. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B37	BENZCHL	ppb	10	1	1 ***	.		Benzyl chloride
B38	BIS2CHM	ppb	10	1	1 ***	.		Bis(2-chloroethoxy) methane
B39	BIS2CHE	ppb	10	1	1 ***	.		Bis(2-chloroethyl) ether
B40	BIS2EPH	ppb	10	1	1 ***	.		Bis(2-ethylhexyl) phthalate
B41	BROPHEN	ppb	10	1	1 ***	.		4-Bromophenyl phenyl ether
B42	BUTBENP	ppb	10	1	1 ***	.		Butyl benzyl phthalate
B43	BUTDINP	ppb	10	1	1 ***	.		2-sec-Butyl-4,6-dinitrophenol (DNBP)
B44	CHALETH	ppb	10	1	1 ***	.		Chloroalkyl ethers
B45	CHLANIL	ppb	10	1	1 ***	.		p-Chloroaniline
B46	CHLCRES	ppb	10	1	1 ***	.		p-Chloro-m-cresol
B47	CHLEPOX	ppb	10	1	1 ***	0	EPAP	1-Chloro-2,3-epoxypropane
B48	CHLNAPH	ppb	10	1	1 ***	.		2-Chloronaphthalene
B49	CHLPHEN	ppb	10	1	1 ***	.		2-Chlorophenol
B50	CHRYSEN	ppb	10	1	1 ***	.		Chrysene
B51	CRESOLS	ppb	10	1	1 ***	.		Cresols
B52	CYCHDIN	ppb	10	1	1 ***	.		2-Cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	ppb	10	1	1 ***	.		Dibenz[a,h]acridine
B54	DIBAJAC	ppb	10	1	1 ***	.		Dibenz[a,j]acridine
B55	DIBAHAN	ppb	10	1	1 ***	.		Dibenz[a,h]anthracene
B56	DIBCGCA	ppb	10	1	1 ***	.		7H-Dibenzo[c,g]carbazole
B57	DIBAEPY	ppb	10	1	1 ***	.		Dibenzo[a,e]pyrene
B58	DIBAHPY	ppb	10	1	1 ***	.		Dibenzo[a,h]pyrene
B59	DIBAIPY	ppb	10	1	1 ***	.		Dibenzo[a,i]pyrene
B60	DIBPHTH	ppb	10	1	1 ***	.		Di-n-butyl phthalate
B61	12-dben	ppb	10	1	1 ***	.		1,2-Dichlorobenzene
B62	13-dben	ppb	10	1	1 ***	.		1,3-Dichlorobenzene
B63	14-dben	ppb	10	1	1 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
B64	DICHBEN	ppb	20	1	1 ***	.		3,3'-Dichlorobenzidine
B65	24-dchp	ppb	10	1	1 ***	.		2,4-Dichlorophenol
B66	26-dchp	ppb	10	1	1 ***	.		2,6-Dichlorophenol
B67	DIEPHTH	ppb	10	1	1 ***	.		Diethyl phthalate
B68	DIHYSAF	ppb	10	1	1 ***	.		Dihydrosafrole
B69	DIMETHB	ppb	10	1	1 ***	.		3,3'-Dimethoxybenzidine
B70	DIMEAMB	ppb	10	1	1 ***	.		p-Dimethylaminoazobenzene
B71	DIMBENZ	ppb	10	1	1 ***	.		7,12-Dimethylbenz[a]anthracene
B72	DIMEYLB	ppb	10	1	1 ***	.		3,3'-Dimethylbenzidine
B73	THIONOX	ppb	10	1	1 ***	.		Thiofanox
B74	DIMPHAM	ppb	10	1	1 ***	.		alpha,alpha-Dimethylphenethylamine
B75	DIMPHEN	ppb	10	1	1 ***	.		2,4-Dimethylphenol
B76	DIMPHTH	ppb	10	1	1 ***	.		Dimethyl phthalate
B77	DINBENZ	ppb	10	1	1 ***	.		Dinitrobenzene
B78	DINCRES	ppb	10	1	1 ***	.		4,6-Dinitro-o-cresol and salts
B79	DINPHEN	ppb	50	1	1 ***	.		2,4-Dinitrophenol
B80	24-dint	ppb	10	1	1 ***	.		2,4-Dinitrotoluene
B81	26-dint	ppb	10	1	1 ***	.		2,6-Dinitrotoluene
B82	DIOPHTH	ppb	10	1	1 ***	.		Di-n-octyl phthalate
B83	DIPHAMI	ppb	10	1	1 ***	.		Diphenylamine

TABLE 6.6. (contd)

Constituent List=WAC 173-303-9905 Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B84	DIPHHYD	ppb	10	1	1 ***	.		1,2-Diphenylhydrazine
B85	DIPRNIT	ppb	10	1	1 ***	.		Di-n-propylnitrosamine
B86	ETHMINE	ppb	10	1	1 ***	.		Ethyleneimine
B87	ETHMETS	ppb	10	1	1 ***	.		Ethyl methanesulfonate
B88	FLUORAN	ppb	10	1	1 ***	.		Fluoranthene
B89	HEXCBEN	ppb	10	1	1 ***	.		Hexachlorobenzene
B90	HEXCBUT	ppb	10	1	1 ***	.		Hexachlorobutadiene
B91	HEXCCYC	ppb	10	1	1 ***	.		Hexachlorocyclopentadiene
B92	HEXCETH	ppb	10	1	1 ***	.		Hexachloroethane
B93	INDENOP	ppb	10	1	1 ***	.		Indeno(1,2,3-cd)pyrene
B94	ISOSOLE	ppb	10	1	1 ***	.		Isosafrole
B95	MALOILE	ppb	10	1	1 ***	.		Malononitrile
B96	MELPHAL	ppb	10	1	1 ***	.		Melphalan
B97	METHAPY	ppb	10	1	1 ***	.		Methapyrilene
B98	METHNYL	ppb	10	1	1 ***	.		Metholonyl
B99	METAZIR	ppb	10	1	1 ***	.		2-Methylaziridine
C01	METCHAN	ppb	10	1	1 ***	.		3-Methylcholanthrene
C02	METBISC	ppb	10	1	1 ***	.		4,4'-Methylenebis(2-chloroaniline)
C03	METACTO	ppb	10	1	1 ***	.		2-Methyllactonitrile
C04	METACRY	ppb	10	1	1 ***	.		Methyl methacrylate
C05	METMSUL	ppb	10	1	1 ***	.		Methyl methanesulfonate
C06	METPROP	ppb	10	1	1 ***	.		2-Methyl-2-(methylthio) propionaldehyde-
C07	METHIOU	ppb	10	1	1 ***	.		Methylthiouracil
C08	NAPHQUI	ppb	10	1	1 ***	.		1,4-Naphthoquinone
C09	1-napha	ppb	10	1	1 ***	.		1-Naphthylamine
C10	2-napha	ppb	10	1	1 ***	.		2-Naphthylamine
C11	NITRANI	ppb	50	1	1 ***	.		p-Nitroaniline
C12	NITBENZ	ppb	10	1	1 ***	.		Nitrobenzene
C13	NITPHEN	ppb	50	1	1 ***	.		4-Nitrophenol [p-Nitrophenol]
C14	NNIBUTY	ppb	10	1	1 ***	.		N-nitrosodi-n-butylamine
C15	NNIDIEA	ppb	10	1	1 ***	.		N-nitrosodiethanolamine
C16	NNIDIEY	ppb	10	1	1 ***	.		N-nitrosodiethylamine
C17	NNIDIME	ppb	10	1	1 ***	.		N-nitrosodimethylamine
C18	NNIMETH	ppb	10	1	1 ***	.		N-nitrosomethylethylamine
C19	NNIURET	ppb	10	1	1 ***	.		N-nitroso-n-methylurethane
C20	NNIVINY	ppb	10	1	1 ***	.		N-nitrosomethylvinylamine
C21	NNIMORP	ppb	10	1	1 ***	.		N-nitrosomorpholine
C22	NNINICO	ppb	10	1	1 ***	.		N-nitrosonornicotine
C23	NNIPIPE	ppb	10	1	1 ***	.		N-nitrosopiperidine
C24	NITRPYR	ppb	10	1	1 ***	.		Nitrosopyrrolidine
C25	NITRTOL	ppb	10	1	1 ***	.		5-Nitro-o-toluidine
C26	PENTCHB	ppb	10	1	1 ***	.		Pentachlorobenzene
C27	PENTCHN	ppb	10	1	1 ***	.		Pentachloronitrobenzene
C28	PENTCHP	ppb	50	1	1 ***	220	EPAP	Pentachlorophenol
C29	PHENTIN	ppb	10	1	1 ***	.		Phenacetin
C30	PHENINE	ppb	10	1	1 ***	.		Phenylenediamine
C31	PHTHEST	ppb	10	1	1 ***	.		Phthalic acid esters

TABLE 6.6. (contd)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
C32	PICOLIN	ppb	10	1	1 ***	.		2-Picoline
C33	PRONIDE	ppb	10	1	1 ***	.		Pronamide
C34	RESERPI	ppb	10	1	1 ***	.		Reserpine
C35	RESORCI	ppb	10	1	1 ***	.		Resorcinol
C36	SAFROL	ppb	10	1	1 ***	.		Safrol
C37	TETRCHB	ppb	10	1	1 ***	.		1,2,4,5-Tetrachlorobenzene
C39	TETRCHP	ppb	10	1	1 ***	.		2,3,4,6-Tetrachlorophenol
C40	THIURAM	ppb	10	1	1 ***	.		Thiuram
C41	TOLUDIA	ppb	10	1	1 ***	.		Toluenediamine
C42	OTOLHYD	ppb	10	1	1 ***	.		o-Toluidine hydrochloride
C43	TRICHLB	ppb	10	1	1 ***	.		1,2,4-Trichlorobenzene
C44	245-trp	ppb	50	1	1 ***	.		2,4,5-Trichlorophenol
C45	246-trp	ppb	10	1	1 ***	.		2,4,6-Trichlorophenol
C46	TRIPHOS	ppb	10	1	1 ***	.		O,o,o-triethyl phosphorothioate
C47	SYMTRIN	ppb	10	1	1 ***	.		Sym-trinitrobenzene
C48	TRISPHO	ppb	10	1	1 ***	.		Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	ppb	10	1	1 ***	.		Benzo[a]pyrene
C50	CHLNAPZ	ppb	10	1	1 ***	.		Chlornaphazine
C51	BIS2ETH	ppb	10	1	1 ***	.		Bis(2-chloroisopropyl) ether
C52	HEXAENE	ppb	10	1	1 ***	.		Hexachloropropene
C54	HEXACHL	ppb	10	1	1 ***	.		Hexachlorophene
C55	NAPHTHA	ppb	10	1	1 ***	.		Naphthalene
C56	123TRI	ppb	10	1	1 ***	.		1,2,3-Trichlorobenzene
C58	135TRI	ppb	10	1	1 ***	.		1,3,5-Trichlorobenzene
C59	1234TE	ppb	10	1	1 ***	.		1,2,3,4-Tetrachlorobenzene
C60	1235TE	ppb	10	1	1 ***	.		1,2,3,5-Tetrachlorobenzene
C61	TETEPYR	ppb	2	1	1 ***	.		Tetraethylpyrophosphate
C62	CHLLATE	ppb	30	1	1 ***	.		Chlorobenzilate
C63	CARBPHT	ppb	2	1	1 ***	.		Carbophenothion
C64	DISULFO	ppb	2	1	1 ***	.		Disulfoton
C65	DIMETHO	ppb	2	1	1 ***	.		Dimethoate
C66	METHPAR	ppb	2	1	1 ***	.		Methyl parathion
C67	PARATHI	ppb	2	1	1 ***	.		Parathion
C70	CYANIDE	ppb	10	1	1 ***	.		Cyanide
C71	FORMALN	ppb	500	1	1 ***	.		Formalin
C77	PERCHLO	ppb	1000	1	1 ***	.		Perchlorate
C78	SULFIDE	ppb	1000	1	1 ***	.		Sulfide
C79	KEROSEN	ppb	10000	1	1 ***	.		Kerosene
C81	ETHYGLY	ppb	10000	1	1 ***	.		Ethylene glycol
C86	DIOXIN	ppb	0.1	1	1 ***	.		Dioxin
C87	CITRUSR	ppb	1000	1	1 ***	.		Citrus red
C90	PARALDE	ppb	2000	1	1 ***	.		Paraldehyde
C91	STRYCHN	ppb	50	1	1 ***	.		Strychnine
C92	MALHYDR	ppb	500	1	1 ***	.		Maleic hydrazide
C93	NICOTIN	ppb	100	1	1 ***	.		Nicotinic acid

TABLE 6.6. (contd)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
C94	ACRYIDE	ppb	10000	1	1 ***	0	EPAP	Acrylamide
C95	ALLYLAL	ppb	2500	1	1 ***	.		Allyl alcohol
C97	CHLACET	ppb	16000	1	1 ***	.		Chloroacetaldehyde
C98	CHLPROP	ppb	4000	1	1 ***	.		3-Chloropropionitrile
H03	ETHCARB	ppb	5000	1	1 ***	.		Ethyl carbamate
H04	ETHCYAN	ppb	2000	1	1 ***	.		Ethyl cyanide
H05	ETHOXID	ppb	10	1	1 ***	.		Ethylene oxide
H06	ETHMETH	ppb	10	1	1 ***	.		Ethyl methacrylate
H09	ISOBUTY	ppb	1000	1	1 ***	.		Isobutyl alcohol
H11	PROPYLA	ppb	10000	1	1 ***	.		n-Propylamine
H12	PROPYNO	ppb	8000	1	1 ***	.		2-Propyn-1-ol
H15	2,4,5-T	ppb	2	1	1 ***	.		2,4,5-T
H40	FTHALLI	ppb	5	1	1 ***	.		Thallium,.filtered
H68	HEXONE	ppb	10	6	6 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	1	0	.		Acetone by VOA
I21	TRIBUPH	ppb	10	1	1 ***	.		Tributylphosphoric acid
I28	TAF	ppb	10	1	0	.		Tetrahydorfuran
I33	ETHBENZ	ppb	5	1	0	680	EPAP	Ethylbenzene
I98	UNKALI	ppb	0	4	0	.		Unknown aliphatic HC
I99	UNKNOWN	ppb	0	5	0	.		Unknown
J69	2HEXANO	ppb	50	1	0	.		2-Hexanone
J73	MIBK	ppb	0	2	0	.		4-Methyl-2-pentanone
L19	ALIALCO	ppb	.	1	0	.		Unknown aliphatic alcohol

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 6.7. Constituents with at Least One Detected Value for the 1301-N Liquid Waste Disposal Facility December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
1-N-2	19DEC88		226	8.80	#300	#6
		1	227	8.80	#300	#11
		2	225	8.70	#200	#2
		3	227	8.70	#200	#2
1-N-3	19DEC88		732	7.50	#500	#15
		1	733	7.30	#400	#18
		2	735	7.50	#400	#8
		3	734	7.50	#400	#6
1-N-4	19DEC88		190	8.20	#200	#11
		1	190	8.10	#200	#2
		2	191	8.10	#200	#1
		3	190	8.00	#300	#2
1-N-14	14DEC88		198	8.60	#300	#4
		1	.	.	#300	#3
		2	.	.	#300	#7
		3	.	.	#200	#6
1-N-14	05JAN89		198	8.20	.	.
1-N-67	19DEC88		213	7.50	#200	#3
		1	214	7.40	#300	#5
		2	214	7.50	#300	#4
		3	214	7.40	#300	#3
1-N-69	19DEC88		197	8.30	#300	#8
		1	200	8.20	#300	#1
		2	200	8.20	#300	#10
		3	200	8.20	#300	#9

TABLE 6.7. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	2HEXANO ppb 50/.	ACETONE ppb 10/.	ALIALCO ppb ./.	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	ALUMNUM ppb 150/.	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BENZENE ppb 5/5
1-N-2	19DEC88		2	11[a]	109	.	1.070	<150	18	19	49
1-N-3	19DEC88		.	.	.	.	3.070	416	134	124	.
1-N-4	19DEC88		.	.	.	.	*0.315	<150	21	23	.
1-N-14	14DEC88		.	.	.	.	*0.020	<150	19	17	.
1-N-67	19DEC88		.	.	.	64,200	*0.113	<150	28	28	<5
1-N-69	19DEC88		.	.	.	.	*0.505	<150	22	21	.

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLBENZ ppb 5/60p	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	CS-137 pCi/L 20/200r
1-N-2	19DEC88		4,390.0	27,200	30,000	23	<5	900	<10	31.7	*2.900
1-N-3	19DEC88		6,220.0	115,000	150,000	.	6	6,300	14	21.7	*4.810
1-N-4	19DEC88		73.6	31,400	30,300	.	#2	1,200	<10	46.6	*1.260
1-N-14	14DEC88		2,240.0	28,800	30,200	.	#3	800	<10	43.3	*-4.840
1-N-67	19DEC88		40,800.0	32,800	32,900	<10	#2	1,100	<10	42.9	*-6.170
1-N-69	19DEC88		43.4	28,400	26,300	.	#3	900	15	50.3	*-0.252

Well name	Collection Date	Duplicate sample number	ETHBENZ ppb 5/680p	IRON ppb 30/300s	FIRON ppb 30/300s	LEADGF ppb 5/50	M-XYLE ppb 5/440p	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s
1-N-2	19DEC88		111	93	<30	<5	146	4,550	4,680	<5	<5
1-N-3	19DEC88		.	2,200	42	7	<5	18,900	19,500	19	153
1-N-4	19DEC88		.	754	<30	<5	<5	4,730	5,590	11	26
1-N-14	14DEC88		.	71	32	<5	<5	5,070	4,930	<5	<5
1-N-67	19DEC88		.	157	<30	7	<5	5,150	5,230	<5	<5
1-N-69	19DEC88		.	74	<30	<5	<5	5,610	5,570	<5	<5

Well name	Collection Date	Duplicate sample number	METHYCH ppb 5/.	MIBK ppb 0/.	NITRATE ppb 500/45000	OPXYLE ppb 5/440p	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r	SODIUM ppb 200/.
1-N-2	19DEC88		<10	1	28,800	8	1,590	1,480	*0.1260	*4.9	2,320
1-N-3	19DEC88		#4	.	21,200	<5	3,630	3,290	*0.1540	*37.3	13,700
1-N-4	19DEC88		<10	.	23,500	<5	2,960	2,390	*-0.0215	*24.4	3,270
1-N-14	14DEC88		<10	.	34,300	<5	1,990	1,850	*0.0422	*24.9	3,510
1-N-67	19DEC88		#2	.	38,500	<5	1,600	1,510	*0.0861	*50.9	2,940
1-N-69	19DEC88		<10	5	29,000	<5	2,030	2,110	*0.1610	*-5.3	2,760

(a) Results of volatile organic compound analysis of the laboratory reagent blank for this sample revealed 10 ppb acetone.

TABLE 6.7. (contd)

Well name	Collection Date	Duplicate sample number	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TAF ppb 10/.	TC ppb 1000/.	TDS ppb 5000/500000s
1-N-2	19DEC88		2,630	1,820.0	106	102	9,700	51	.	.
1-N-3	19DEC88		15,900	2,620.0	428	419	249,000	.	.	.
1-N-4	19DEC88		4,220	12.2	137	116	18,000	.	.	.
1-N-14	14DEC88		3,800	1,080.0	140	137	9,200	.	.	.
1-N-67	19DEC88		3,080	13,800.0	119	117	11,200	.	16,000	136,000
1-N-69	19DEC88		2,760	*0.1	151	153	10,600	.	.	.

Well name	Collection Date	Duplicate sample number	TOLUENE ppb 5/2000p	TRITIUM pCi/L 500/20000	U pCi/L 0.5/600d	UNKALI ppb 0/.	UNKNOWN ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
1-N-2	19DEC88		80	91,400	0.3450	15	42	<5	<5	20	<5
	19DEC88	A	.	.	.	67	70	.	.	.	.
	19DEC88	B	.	.	.	42	35	.	.	.	.
1-N-3	19DEC88		.	31,900	1.2800	.	.	<5	<5	8	<5
1-N-4	19DEC88		.	80,000	0.9770	4	4	7	7	34	<5
	19DEC88	A	.	.	.	.	30	.	.	.	.
1-N-14	14DEC88		.	91,400	*0.0368	.	.	8	11	<5	36
1-N-67	19DEC88		<5	84,900	0.5320	.	.	<5	<5	29	<5
1-N-69	19DEC88		.	90,700	0.3630	.	.	<5	<5	13	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 6.8. Contamination Indicator Parameter Replicate Averages for the 1301-N Liquid Waste Disposal Facility December 1988 through February 1989

Constituent Code	Name	Units	Well Name	Sample Date	Reps	Replicate Average	Standard Deviation	Minimum	Maximum	Coefficient of Variation
191	CONDFLD	umho	1-N-2	19DEC88	4	226	1.0	225	227	0.4
			1-N-3	19DEC88	4	734	1.3	732	735	0.2
			1-N-4	19DEC88	4	190	0.5	190	191	0.3
			1-N-14	14DEC88	1	198	.	198	198	.
				05JAN89	1	198	.	198	198	.
			1-N-67	19DEC88	4	214	0.5	213	214	0.2
			1-N-69	19DEC88	4	199	1.5	197	200	0.8
199	PHFIELD		1-N-2	19DEC88	4	8.75	0.06	8.7	8.8	0.7
			1-N-3	19DEC88	4	7.45	0.10	7.3	7.5	1.3
			1-N-4	19DEC88	4	8.10	0.08	8.0	8.2	1.0
			1-N-14	14DEC88	1	8.60	.	8.6	8.6	.
				05JAN89	1	8.20	.	8.2	8.2	.
			1-N-67	19DEC88	4	7.45	0.06	7.4	7.5	0.8
			1-N-69	19DEC88	4	8.23	0.05	8.2	8.3	0.6
C69	TOC	ppb	1-N-2	19DEC88	4	250	58	200	300	23.1
			1-N-3	19DEC88	4	425	50	400	500	11.8
			1-N-4	19DEC88	4	225	50	200	300	22.2
			1-N-14	14DEC88	4	275	50	200	300	18.2
			1-N-67	19DEC88	4	275	50	200	300	18.2
			1-N-69	19DEC88	4	300	0	300	300	0.0
H42	TOXLDL	ppb	1-N-2	19DEC88	4	5.25	4.27	2	11	81.4
			1-N-3	19DEC88	4	11.8	5.68	6	18	48.3
			1-N-4	19DEC88	4	4.00	4.69	1	11	117.3
			1-N-14	14DEC88	4	5.00	1.83	3	7	36.5
			1-N-67	19DEC88	4	3.75	0.96	3	5	25.5
			1-N-69	19DEC88	4	7.00	4.08	1	10	58.3

THIS PAGE INTENTIONALLY
LEFT BLANK

7.0 1324-N SURFACE IMPOUNDMENT AND 1324-NA PERCOLATION POND

T. J. Gilmore

The ground water near the 1324-N Surface Impoundment and 1324-NA Percolation Pond has been monitored by a RCRA interim-status well network since December 1987. Monitoring data for the first year have been compiled, and background values for the ground-water indicator parameters have been established.

The 1324-N surface impoundment was in service from May 1986 to November 1988, at which time it was replaced with an elementary neutralization vessel. This facility is a double-lined pond with a leachate collection system that was used to neutralize the wastes. It is currently not in use. The 1324-NA percolation pond is an unlined pond that was used to treat corrosive hazardous wastes from August 1977 to May 1986. The 1324-NA pond is currently receiving treated wastes from an elementary neutralization vessel that replaced the 1324-N facility. The facilities are located in the 100-N Area approximately 1300 ft east of the Columbia River.

Discharge to these facilities are waste products resulting from the regeneration of anion and cation exchange columns. The exchange columns are used to demineralize Columbia River water for use in the N Reactor cooling system. Prior to neutralization, the waste streams range in pH from 1.0 to 14.0, depending on the type of regeneration taking place. When the pH of this waste is less than or equal to 2.0 or greater than or equal to 12.5, the waste is defined as corrosive [40 CFR 261.22(a)(2) and WAC 173-303-090(6)(a)(i)].

There are five ground-water wells in the 1324-N/NA ground-water monitoring network (Figure 7.1). Well 699-81-58 is the designated upgradient well, and wells 199-N-58, 199-N-59, 199-N-60, and 199-N-61 are downgradient wells. Originally, well 199-N-61 was designated as the upgradient well with wells 199-N-58, 199-N-59, and 199-N-60 sampled as downgradient wells; however, all four wells are affected by the ground-water mound under the facility, requiring the addition of well 699-81-58 as the upgradient well. The sampling schedule for these wells is shown in Table 7.1.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or characterization work was performed during this reporting period. Water-level measurements were obtained on a monthly basis, and associated water-table maps were constructed.

WATER LEVELS

Water-level measurements are taken in most of the existing 100-N Area wells (Figure 6.2) to monitor the water table near the 1324-N/NA facilities. Monthly water-level measurements continued this quarter, with measurements obtained from 43 wells in January, 44 wells in February, and 47 wells in March. The number of wells in which water levels are obtained each month is dependent on the accessibility and condition of each well. Three additional existing wells were added in March to the list of wells that are measured monthly as part of the ground-water quality assessment program that is to take effect at the nearby 1301-N LWDF. Water-table maps for each month are shown in Figures 6.3, 6.4, and 6.5. The water-table elevations are presented in Table 6.1. The water-table elevations show a significant ground-water mound under the 1324-N/NA facilities. Ground-water gradients in the vicinity of the 1324-N/NA facilities are a function of this ground-water mound.

WATER CHEMISTRY DATA

Current background data for the contamination indicator parameters consist of

- December 1987 - 1 pH, 1 conductivity, 1 TOC, 1 TOXLDL
- March 1988 - 1 pH, 1 conductivity, 1 TOC, 1 TOXLDL
- June 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL
- September 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL
- December 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL.

Quadruplicate measurements for contamination indicator parameters are required by 40 CFR 265.92(c). Data collected from the first four quarters are then used to determine background conditions. However, during the first

two quarters of ground-water monitoring at the 1324-N/NA facilities only single samples were analyzed for contamination indicator parameters. In spite of this lack of data, the statistical analyses were performed and are presented in Table 7.2. The table lists the average background, standard deviation, and critical mean for the four contamination indicator parameters calculated from the most recent four quarters of data from the upgradient well. The critical mean is the value to which March measurements will be compared. If a parameter is greater than (or less than in the case of pH) its critical mean, that measurement is considered statistically different from background. These values were determined following the recommended techniques in Appendix B of the TEGD (EPA 1986b). Some of these critical mean values are outside the range that would be reasonably anticipated. When available, the March 1989 ground-water sampling will be the first analytical results to be statistically compared to established background data.

Collection and Analysis

The 1324-N/NA facilities' ground-water monitoring network was not sampled in December 1988; therefore, there are no analytical results to report for this quarter. The analytical results from the ground-water samples taken in March 1989 will be reported in next quarter's report.

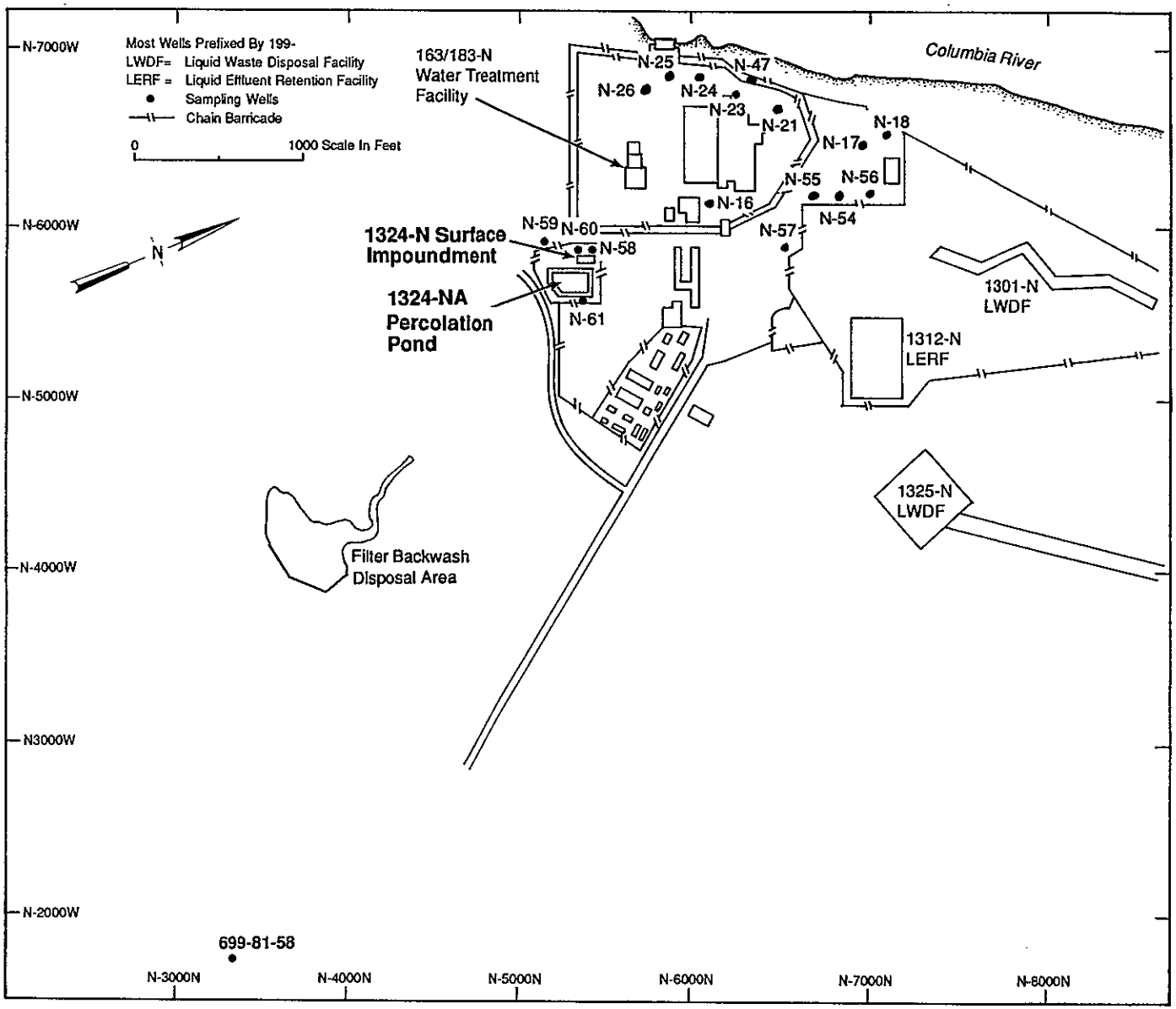

FIGURE 7.1. Monitoring Well Locations for the 1324-N/NA Facilities

TABLE 7.1. Sampling Schedule for the 1324-N/NA Facilities

Well Number	1987 Dec	1988 Jan	Feb	Mar	Jun[a]	Sep	1989 Mar
199-N-58	X	X	X	X	L	X	XL
199-N-59	X	X	X	X	L	X	XL
199-N-60	X	X	X	X	L	X	XL
199-N-61	X	X	X	X	L	X	XL
699-81-58					L[b]	XL	XL

X = Sampled for the regular list of constituents.
L = Sampled for the long list of constituents (WAC 173-303-9905).
(a) Samples were collected in July because unscheduled sample collection at 1301-N and 1325-N LWDFs pre-empted collection.
(b) Included in the 1324-N/NA facilities monitoring network for the first time.

TABLE 7.2. Background Ground-Water Constituent Values for the 1324-N/NA Facilities

Constituent	Average Background	Standard Deviation	Critical Mean
Specific Conductance, μmhos/cm	181.8	50.44	910.6
pH	8.22	0.49	-0.67, 17.11
TOC, ppb	277.3	76.02	1,375.7
TOX, ppb	1.30	3.29	48.8

THIS PAGE INTENTIONALLY
LEFT BLANK

8.0 1325-N LIQUID WASTE DISPOSAL FACILITY

T. J. Gilmore

The ground water near the 1325-N Liquid Waste Disposal Facility (LWDF) has been monitored by a RCRA interim-status well network since December 1987. Monitoring data for the first year have been compiled, and background values for the ground-water indicator parameters have been established.

The 1325-N LWDF was the primary liquid waste disposal system for the N Reactor. The facility began operation in 1983 and is currently in use. The facility is located in the 100-N Area, approximately 900 ft east of the Columbia River. It consists of a concrete 240- by 250-ft basin with an extension trench that is approximately 3000 ft long, 55 ft wide, and 7 ft deep (Figure 8.1).

There are 11 wells in the 1325-N LWDF ground-water monitoring network (Figure 8.1). Well 699-81-58 is designated the upgradient well, and wells 199-N-27, 199-N-29, 199-N-31, 199-N-32, 199-N-33, 199-N-36, 199-N-41, 199-N-42, 199-N-52, and 199-N-70 are the designated downgradient wells. Analytical results indicate that well 199-N-52, which had been designated upgradient, is affected by waste discharges to the 1325-N LWDF; therefore, at this time, it is not considered an upgradient well (see subsection on Water Chemistry Data). The sampling schedule for the 1325-N LWDF monitoring network is given in Table 8.1.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or characterization work was performed during this period. Water-level measurements were obtained monthly, and associated water-table maps were constructed.

WATER LEVELS

Water-level measurements are taken in most of the existing 100-N Area wells to monitor the water table near the 1325-N LWDF. Monthly water-level measurements continued this quarter, with measurements obtained from 43 wells in January, 44 wells in February, and 47 wells in March. The number of wells

in which water levels are obtained each month is dependent on the accessibility and condition of each well. Three additional existing wells were added in March to the list of wells that are measured monthly as part of the ground-water quality assessment program that is to take effect at the nearby 1301-N LWDF. Water-table maps for each month are shown in Figures 6.3, 6.4, and 6.5. The water-table elevations are presented in Table 6.2.

The elevation of the water table in the 100-N Area is affected by the release of effluent to disposal facilities, river stage in the nearby Columbia River, and ground water entering the 100-N Area from other parts of the Hanford Site. Ground-water mounds have developed under the 1325-N and 1324-N/NA facilities as a result of effluent releases to those facilities (Figures 6.3, 6.4, and 6.5). Discharges to the 1325-N LWDF are dependent on the operational status of the N Reactor. In January 1988, the N Reactor began preparations for achieving a cold standby status, resulting in a significant decrease in the volume of liquid effluent discharged to the 1325-N LWDF in 1988. Consequently, the ground-water mound under the 1325-N LWDF declined during 1988. As this mound dissipated, ground-water flow patterns changed near the 100-N Area.

Beginning in January 1989, the N Reactor began defueling operations. This resulted in increased discharge rates to the 1325-N LWDF from approximately 300 gpm during the last quarter of 1988 to approximately 1200 gpm, with short-term discharges of up to 1800 gpm from January to March 1989. Consequently, the ground-water mound under the 1325-N LWDF increased approximately 2 ft from January to March 1989.

WATER CHEMISTRY DATA

Ground-water samples were collected from all 11 wells in the March 1989 sampling. Results from the March sampling will be presented in next quarter's report. Results from the December sampling are discussed below.

Discussion of Results

The analytical results from the December 1988 ground-water sampling were received this quarter and are presented in Tables 8.2, 8.3, and 8.4. Each sample was analyzed for the interim primary drinking water standards

given in Appendix III of 40 CFR 265, water quality parameters and contamination indicators (40 CFR 265.92), and specific dangerous waste constituents known to have been discharged to the facility (Table 8.5). The analytical results were then statistically compared to established background values obtained from the first year of monitoring.

Background data for contamination indicator parameters currently consist of

- December 1987 - 1 pH, 1 conductivity, 1 TOC, 1 TOXLDL
- March 1988 - 1 pH, 1 conductivity, 1 TOC, 1 TOXLDL
- June 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL
- September 1988 - 4 pH, 4 conductivity, 4 TOC, 4 TOXLDL.

Quadruplicate measurements for contamination indicator parameters are required by 40 CFR 265.92(c). Data collected from the first four quarters are then used to determine background conditions. However, during the first two quarters of ground-water monitoring at the 1325 LWDF, only single samples were analyzed for contamination indicator parameters. In spite of this lack of data, the statistical analyses were performed and are presented in Table 8.6. The table lists the average background, standard deviation, and critical mean for the four contamination indicator parameters calculated from the first year of data from the upgradient well. The critical mean is the value to which future measurements will be compared. If a parameter is greater than (or less than in the case of pH) its critical mean, that measurement is considered statistically different from background. These values were determined following the recommended techniques in Appendix B of the TEGD (EPA 1986b). Some of these critical mean values are outside the range that would be reasonably anticipated. The results from the December analysis are the first to be statistically compared to the established background values as required by 40 CFR 265.93(b) (Table 8.6). No ground-water indicator parameters were statistically different from background.

Beta radioactivity exceeded the 50-pCi/L standard (40 CFR 141) in wells 199-N-27, 199-N-29, 199-N-31, 199-N-32, 199-N-33, 199-N-36, 199-N-41, 199-N-42, 199-N-52, and 199-N-70. The activity in the wells ranged from

52.1 pCi/L in well 199-N-41 to 1490.0 pCi/L in well 199-N-29. The 20,000-pCi/L standard for tritium (40 CFR 141) was also exceeded in 10 of the 11 wells. Well 699-81-58 was the only well in which the tritium standard was not exceeded. Tritium values in these wells ranged from 53,300 pCi/L in well 199-N-41 to 234,000 pCi/L in well 199-N-32. The standard for strontium-90 (40 CFR 141) was exceeded in wells 199-N-27, 199-N-29, 199-N-31, 199-N-32, 199-N-33, and 199-N-36. Values ranged from 11.5 pCi/L in well 199-N-32 to 746.0 pCi/L in well 199-N-29.

9 1 1 8 9 1 1 3

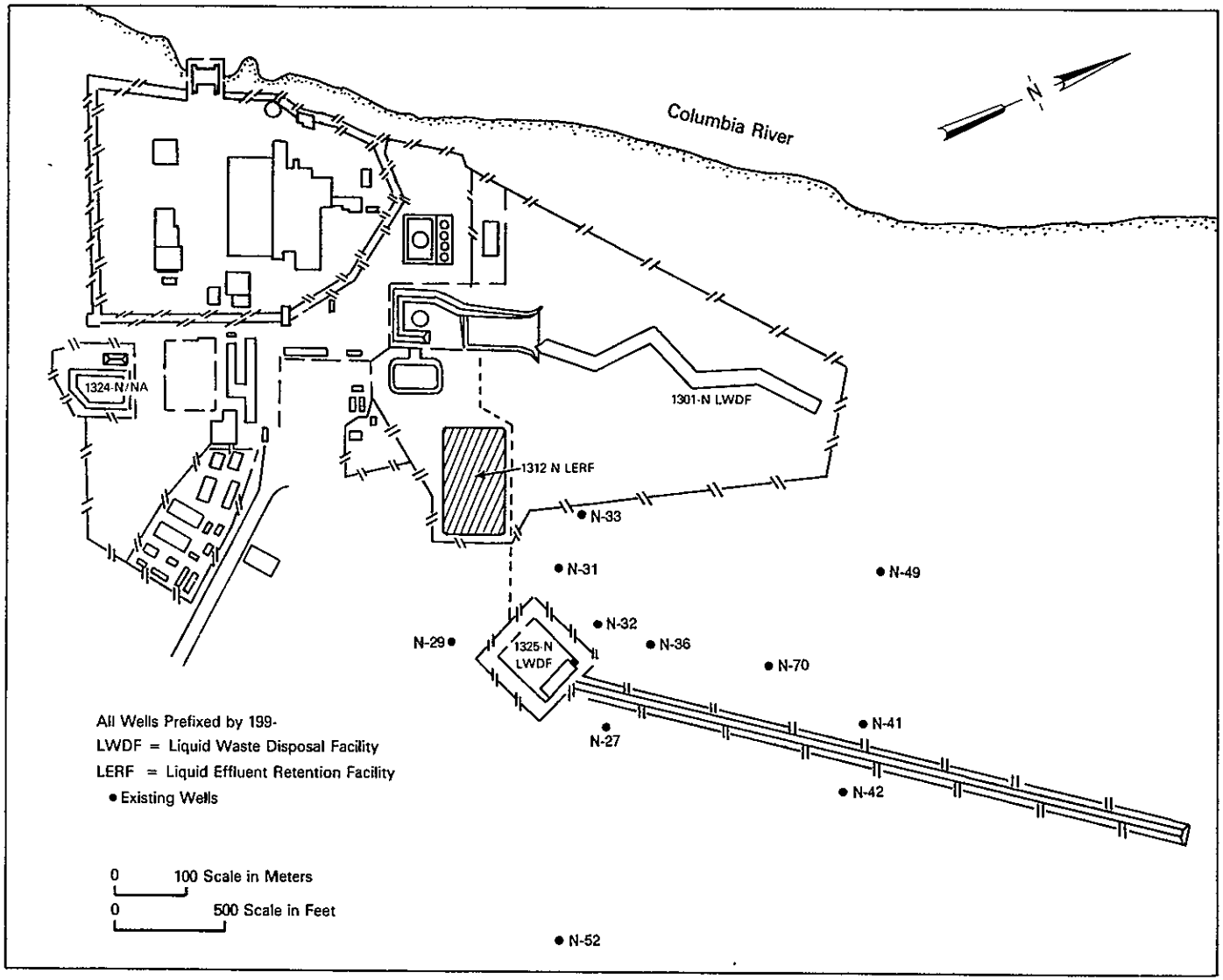

FIGURE 8.1. Monitoring Well Locations for the 1325-N Liquid Waste Disposal Facility (Well 699-81-58 is also part of the monitoring network. It is not shown on this figure because of the scale, but is shown in Figure 7.1.)

TABLE 8.1. Sampling Schedule for the 1325-N Liquid Waste Disposal Facility

Well Number	1987 Dec	1988 Mar	1988 Jun	1988 Sept	1988 Dec	1989 Mar
199-N-27	X	X	X	X	X	L
199-N-29		X	X	X	X	L
199-N-31	X	X	X	X	X	L
199-N-32	X	X	X	X	X	L
199-N-33		X	X	X	X	L
199-N-36	X	X	X	X	X	L
199-N-39	X	X	X	(a)	(a)	(a)
199-N-41	X	X	X	X	X	L
199-N-42	X	X	X	X	X	L
199-N-52	X	X	X	X	X	L
199-N-70					X	L
699-81-58	(b)	X	(c)	XL	X	L

X = sampled for the regular list of constituents (Table 8.2).
L = sampled for the long list of constituents (WAC 173-303-9905).
(a) Well deleted from network.
(b) Well sampled for another project.
(c) Well added to network.

TABLE 8.2. Constituent List and Summary of Sampling Results for the 1325-N Liquid Waste Disposal Facility December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
191	CONDFLD	umho	1	51	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	52	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	1	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	1000	44	0	.			Total organic carbon
H42	TOXLDL	ppb	20	44	4	.			Total organic halogens, low DL

Constituent List=Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	10	9	1	EPA	xxx	Coliform bacteria
111	BETA	pCi/L	8	12	0	50	EPA	xxx	Gross beta
181	RADIUM	pCi/L	1	11	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	12	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	12	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	12	12 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	12	10	50	EPA		Chromium
A10	SILVER	ppb	10	12	12 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	12	6	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	10	10 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	12	12 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	11	11 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	11	11 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	11	11 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	11	11 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	12	11	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	13	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	13	13 ***	4000	EPA		Fluoride
H13	2,4-D	ppb	2	11	11 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	11	11 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	13	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	13	12	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	13	11	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	13	13 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	12	7	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	11	11 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	12	12 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	12	12 ***	50	EPA		Lead, filtered

TABLE 8.2. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
A11	SODIUM	ppb	200	12	0	.			Sodium
A17	MANGESE	ppb	5	12	10	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	12	3	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	13	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	13	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	13	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	13	11	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	13	9	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	11	11 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituent

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	12	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	12	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	12	0	30	EPAR	xxx	Ruthenium-106
104	U	pCi/L	0.5	12	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	12	0	20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	12	0	8	EPA	xxx	Strontium-90
A01	BERYLUM	ppb	5	12	12 ***	.			Beryllium
A03	STRONUM	ppb	20	12	0	.			Strontium
A04	ZINC	ppb	5	12	3	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	12	0	.			Calcium
A12	NICKEL	ppb	10	12	11	.			Nickel
A13	COPPER	ppb	10	12	12 ***	1300	EPAP		Copper
A14	VANADUM	ppb	5	12	1	.			Vanadium
A15	ANTIONY	ppb	100	12	12 ***	.			Antimony
A16	ALUMNUM	ppb	150	12	12 ***	.			Aluminum
A18	POTASUM	ppb	100	12	0	.			Potassium
A50	MAGNES	ppb	50	12	0	.			Magnesium
A61	TETRANE	ppb	5	12	12 ***	5	EPA		Tetrachloromethane [Carbon Tetrachloride
A64	METHONE	ppb	10	12	12 ***	.			Methyl ethyl ketone
A67	1,1,1-T	ppb	5	12	12 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	12	12 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	12	12 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	12	12 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	12	12 ***	440	EPAP		Xylene-o,p
A80	CHLFORM	ppb	5	12	3	100	EPA		Chloroform [Trichloromethane]
A93	METHYCH	ppb	5	12	11	.			Methylene chloride [Dichloromethane]
B14	M-XYLE	ppb	5	12	12 ***	440	EPAP		Xylene-m
C76	PHOSPHA	ppb	1000	13	13 ***	.			Phosphate
C80	AMMONIU	ppb	50	10	9	.			Ammonium ion
H16	TC	ppb	1000	1	0	.			Total carbon

TABLE 8.2. (contd)

Constituent List=Site Specific and Other Constituent

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H18	FZINC	ppb	5	13	9	5000	EPAS	Zinc, filtered
H19	FCALCIU	ppb	50	13	0	.		Calcium, filtered
H25	FNICKEL	ppb	10	13	13 ***	.		Nickel, filtered
H26	FCOPPER	ppb	10	13	13 ***	1300	EPAP	Copper, filtered
H27	FVANADI	ppb	5	13	0	.		Vanadium, filtered
H28	FALUMIN	ppb	150	13	13 ***	.		Aluminum, filtered
H30	FPOTASS	ppb	100	13	0	.		Potassium, filtered
H32	FMAGNES	ppb	50	13	0	.		Magnesium, filtered
H33	FBERYLL	ppb	5	13	13 ***	.		Beryllium, filtered
H35	FSTRONT	ppb	20	13	0	.		Strontium, filtered
H36	FANTIMO	ppb	100	13	13 ***	.		Antimony, filtered
H58	ALKALIN	ppb	20000	1	0	.		Total alkalinity, as CaCO3
H62	LHYDRAZ	ppb	30	10	10 ***	.		Hydrazine, low DL
H66	BROMIDE	ppb	1000	1	1 ***	.		Bromide
H67	NITRITE	ppb	1000	1	1 ***	.		Nitrite
H68	HEXONE	ppb	10	12	12 ***	.		Hexone [Methyl isobutyl ketone]
H86	FBORON	ppb	10	1	1 ***	.		Boron, filtered
H87	FCOBALT	ppb	20	1	1 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	1	1 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	1	1 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	1	0	.		Silicon, filtered
H91	FTIN	ppb	30	1	1 ***	.		Tin, filtered
H92	FTITAN	ppb	60	1	1 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	1	1 ***	.		Zirconium, filtered
I01	ACETONE	ppb	10	3	0	.		Acetone by VOA

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 8.3. Constituents with at Least One Detected Value for the 1325-N Liquid Waste Disposal Facility December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
1-N-27	19DEC88		199	.	8.50	#400	#6
		1	199	.	8.60	#400	#8
		2	199	.	8.60	#400	#10
		3	199	.	8.60	#400	#6
1-N-29	14DEC88		132	.	7.80	#400	#10
		1	133	.	7.80	#400	#8
		2	133	.	7.80	#400	#12
		3	133	.	7.80	#400	#9
1-N-29	06JAN89		98	.	7.50	.	.
1-N-31	15DEC88		155	.	8.40	#500	#12
		1	155	.	8.30	#400	#10
		2	155	.	8.40	#500	#9
		3	155	.	8.40	#400	#10
1-N-31	05JAN89		114	.	8.20	.	.
1-N-32	14DEC88		186	.	8.00	#400	#8
		1	187	.	8.00	#500	#9
		2	187	.	8.00	#500	#18
		3	187	.	8.00	#400	#7
1-N-32	05JAN89		186	.	8.10	.	.
1-N-33	14DEC88		170	.	8.10	#400	#9
		1	170	.	8.10	#400	#6
		2	170	.	8.10	#400	#4
		3	170	.	8.10	#300	#5
1-N-33	05JAN89		173	.	8.10	.	.
1-N-36	15DEC88		149	.	8.10	#500	#6
		1	149	.	8.10	#500	#13
		2	149	.	8.10	M	#6
		3	M	.	8.10	#400	#9
1-N-36	05JAN89		124	.	8.20	.	.
1-N-41	15DEC88		230	.	8.00	#400	#3
		1	230	.	8.00	#400	#7
		2	230	.	8.00	#400	#6
		3	230	.	8.00	#400	#6
1-N-41	05JAN89		211	.	8.00	.	.

TABLE 8.3. (contd)

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
1-N-42	19DEC88		218	.	8.50	#400	#3
		1	219	.	8.40	#500	#1
		2	220	.	8.40	#400	#5
		3	220	.	8.40	#400	#7
1-N-52	19DEC88		208	.	8.20	#200	#7
		1	207	.	8.20	#200	#6
		2	207	.	8.20	#300	#8
		3	206	.	8.20	#200	#5
1-N-70	15DEC88		207	.	8.10	#300	#4
		1	207	.	8.20	#300	#6
		2	208	.	8.20	#300	#5
		3	208	.	8.20	#300	#8
1-N-70	05JAN89		189	.	8.10	.	.
6-81-58	19DEC88		226	.	8.80	#400	#5
		1	227	.	8.90	#200	#3
		2	227	.	8.80	#300	#1
		3	228	.	8.80	#300	#1
6-81-58	16JAN89		166	8.10	8.10	#200	.

TABLE 8.3. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	AMMONIU ppb 50/.	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000
1-N-27	19DEC88		21 (a)	.	1.040	813	<5	<5	15	13
1-N-29	14DEC88		.	.	*-0.257	.	<5	<5	10	9
	06JAN89		.	.	.	<50	.	.	.	.
1-N-31	15DEC88		.	.	*0.238	.	<5	<5	12	12
	05JAN89		.	.	.	<50	.	.	.	.
1-N-32	14DEC88		.	.	1.040	.	<5	<5	17	19
	05JAN89		.	.	.	<50	.	.	.	.
1-N-33	14DEC88		.	.	*0.863	.	<5	<5	14	16
	05JAN89		.	.	.	<50	.	.	.	.
1-N-36	15DEC88		.	.	*0.223	.	5	<5	12	14
	05JAN89		.	.	.	<50	.	.	.	.
1-N-41	15DEC88		.	.	*-0.099	.	6	6	22	19
	05JAN89		.	.	.	<50	.	.	.	.
1-N-42	19DEC88		24 (a)	.	*0.771	<50	11	6	21	11
1-N-52	19DEC88		.	.	1.500	<50	7	6	22	21
	19DEC88	1	.	.	*0.813	.	7	6	23	21
1-N-70	15DEC88		<8	.	*0.775	.	6	5	23	22
	05JAN89		.	.	.	<50	.	.	.	.
6-81-58	19DEC88		.	.	*0.473	.	<5	<5	16	13
	16JAN89		.	93,000	.	.	.	.	.	14

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	FCADMIU ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLFORM ppb 5/100	CHLORID ppb 500/250000s	FCHROMI ppb 10/50	CHROMUM ppb 10/50
1-N-27	19DEC88		643.00	<2	24,700	22,600	5	900	<10	<10
1-N-29	14DEC88		1,490.00	<2	19,400	21,200	5	800	<10	<10
1-N-31	15DEC88		137.00	<2	21,000	19,900	6	800	<10	<10
1-N-32	14DEC88		102.00	<2	28,800	28,700	#4	700	<10	<10
1-N-33	14DEC88		822.00	<2	28,600	27,800	5	600	<10	<10
1-N-36	15DEC88		358.00	<2	21,900	18,900	5	900	<10	<10
1-N-41	15DEC88		52.10	<2	29,800	26,200	<5	1,300	<10	<10
1-N-42	19DEC88		53.20	<2	23,500	23,200	<5	1,200	<10	<10
1-N-52	19DEC88		55.40	<2	28,000	24,500	#4	1,500	<10	<10
	19DEC88	1	36.30	<2	25,100	26,200	#3	1,500	<10	<10
1-N-70	15DEC88		63.30	<2	24,900	23,500	5	900	<10	20
6-81-58	19DEC88		4.43	<2	26,300	29,600	<5	1,300	14	17
	16JAN89		.	3	27,900	.	.	1,500	17	.

(a) Results of volatile organic compound analysis of the laboratory reagent blank for this sample revealed 15 ppb acetone.

TABLE 8.3. (contd)

Well name	Collection Date	Duplicate sample number	CO-60 pCi/L 22.5/100r	COLIFRM MPN 2.2/1	CS-137 pCi/L 20/200r	IRON ppb 30/300s	FIRON ppb 30/300s	LEADGF ppb 5/50	MAGNES ppb 50/.	FMAGNES ppb 50/.
1-N-27	19DEC88		86.500	<2.2	*8.170	<30	<30	<5	4,690	4,740
1-N-29	14DEC88		36.500	<2.2	*2.410	46	<30	<5	3,580	3,310
1-N-31	15DEC88		29.300	<2.2	*-4.810	31	<30	<5	3,440	3,510
1-N-32	14DEC88		54.600	<2.2	*-4.240	110	37	<5	6,090	6,240
1-N-33	14DEC88		63.800	<2.2	*2.650	<30	38	<5	4,650	5,070
1-N-36	15DEC88		58.700	<2.2	*3.150	44	<30	<5	3,770	3,940
1-N-41	15DEC88		20.400	<2.2	*-2.120	171	<30	<5	6,300	6,510
1-N-42	19DEC88		27.000	<2.2	*-4.930	7,280	64	6	5,810	5,670
1-N-52	19DEC88		30.400	16.0	*2.610	<30	<30	<5	7,550	7,720
	19DEC88	1	37.400	.	*3.310	30	<30	<5	7,810	7,640
1-N-70	15DEC88		75.100	M	*2.650	132	55	<5	7,070	6,900
6-81-58	19DEC88		*0.207	<2.2	*-0.373	350	<30	<5	8,620	7,660
	16JAN89		.	.	.	.	<30	.	.	7,200

Well name	Collection Date	Duplicate sample number	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5
1-N-27	19DEC88		<5	<5	<10	<10	21,200	2,950	3,080	*0.0012
1-N-29	14DEC88		<5	<5	<10	<10	11,400	1,600	1,680	*-0.0754
1-N-31	15DEC88		<5	<5	<10	<10	8,600	2,240	2,250	*0.0695
1-N-32	14DEC88		<5	<5	<10	<10	29,800	3,150	2,680	*0.0073
1-N-33	14DEC88		<5	<5	<10	<10	21,600	2,720	2,200	*0.0767
1-N-36	15DEC88		<5	<5	<10	<10	8,700	1,970	2,120	*-0.0428
1-N-41	15DEC88		<5	<5	<10	<10	31,900	3,180	3,460	*-0.0215
1-N-42	19DEC88		7	83	<10	268	21,800	3,150	3,280	*0.0741
1-N-52	19DEC88		<5	<5	<10	<10	25,200	3,530	3,640	*-0.0671
	19DEC88	1	<5	<5	#6	<10	25,000	3,700	3,680	.
1-N-70	15DEC88		12	13	<10	<10	32,700	3,100	3,450	0.2130
6-81-58	19DEC88		<5	<5	#5	<10	2,600	2,670	2,940	*0.0296
	16JAN89		<5	.	.	.	2,700	2,560	.	.

Well name	Collection Date	Duplicate sample number	RU-106 pCi/L 172.5/30r	FSILICO ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s
1-N-27	19DEC88		*91.2	.	2,640	2,590	215.000	114	116	11,300
1-N-29	14DEC88		92.6	.	1,220	1,160	746.000	81	85	12,800
1-N-31	15DEC88		79.2	.	1,520	1,910	28.100	86	84	13,700
1-N-32	14DEC88		79.9	.	2,390	2,750	11.500	156	145	9,300
1-N-33	14DEC88		*40.7	.	2,170	2,640	347.000	128	111	8,400
1-N-36	15DEC88		*-28.3	.	2,020	1,980	175.000	95	94	12,500
1-N-41	15DEC88		*44.3	.	5,050	4,830	*0.116	148	146	13,300
1-N-42	19DEC88		*-12.2	.	6,060	6,330	*-0.505	148	153	11,800
1-N-52	19DEC88		*50.3	.	6,900	6,660	*0.014	163	162	15,200
	19DEC88	1	*29.8	.	6,930	7,090	*-0.097	161	168	15,000
1-N-70	15DEC88		*-14.0	.	5,840	5,400	*-0.026	157	165	9,800
6-81-58	19DEC88		*15.7	.	4,790	4,390	*-0.290	159	178	14,800
	16JAN89		.	8,730	.	4,370	.	169	.	15,900

TABLE 8.3. (contd)

Well name	Collection Date	Duplicate sample number	TC ppb 1000/.	TRITIUM pCi/L 500/20000	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
1-N-27	19DEC88		.	187,000	1.060	11	14	<5	<5
1-N-29	14DEC88		.	118,000	0.743	7	8	<5	23
1-N-31	15DEC88		.	173,000	0.331	11	9	5	<5
1-N-32	14DEC88		.	234,000	0.723	14	12	<5	35
1-N-33	14DEC88		.	208,000	0.502	10	12	13	42
1-N-36	15DEC88		.	194,000	0.355	13	9	11	<5
1-N-41	15DEC88		.	53,300	0.449	24	23	40	<5
1-N-42	19DEC88		.	65,400	0.617	18	41	63	<5
1-N-52	19DEC88		.	73,800	0.833	27	29	11	<5
	19DEC88	1	.	70,000	0.933	27	26	8	<5
1-N-70	15DEC88		.	102,000	0.316	25	21	15	<5
6-81-58	19DEC88		.	*161	0.860	7	<5	7	<5
	16JAN89		20,400	.	.	5	.	.	5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error
M - Sample result is missing

TABLE 8.4. Contamination Indicator Parameter Replicate Averages for the 1325-N Liquid Waste Disposal Facility December 1988 through February 1989

Constituent Code	Name	Units	Well Name	Sample Date	Reps	Replicate Average	Standard Deviation	Minimum	Maximum	Coefficient of Variation
191	CONDFLD	umho	1-N-27	19DEC88	4	199	0	199	199	0.0
			1-N-29	14DEC88	4	133	0.50	132	133	0.4
				06JAN89	1	98	.	98	98	.
			1-N-31	15DEC88	4	155	0	155	155	0.0
				05JAN89	1	114	.	114	114	.
			1-N-32	14DEC88	4	187	0.50	186	187	0.3
				05JAN89	1	186	.	186	186	.
			1-N-33	14DEC88	4	170	0	170	170	0.0
				05JAN89	1	173	.	173	173	.
			1-N-36	15DEC88	3	149	0	149	149	0.0
				05JAN89	1	124	.	124	124	.
			1-N-41	15DEC88	4	230	0	230	230	0.0
				05JAN89	1	211	.	211	211	.
			1-N-42	19DEC88	4	219	0.96	218	220	0.4
			1-N-52	19DEC88	4	207	0.58	206	207	0.3
			1-N-70	15DEC88	4	208	0.58	207	208	0.3
				05JAN89	1	189	.	189	189	.
			6-81-58	19DEC88	4	227	0.82	226	228	0.4
				16JAN89	1	166	.	166	166	.
199	PHFIELD		1-N-27	19DEC88	4	8.58	0.05	8.5	8.6	0.6
			1-N-29	14DEC88	4	7.80	0	7.8	7.8	0.0
				06JAN89	1	7.50	.	7.5	7.5	.
			1-N-31	15DEC88	4	8.38	0.05	8.3	8.4	0.6
				05JAN89	1	8.20	.	8.2	8.2	.
			1-N-32	14DEC88	4	8.00	0	8.0	8.0	0.0
				05JAN89	1	8.10	.	8.1	8.1	.
			1-N-33	14DEC88	4	8.10	0	8.1	8.1	0.0
				05JAN89	1	8.10	.	8.1	8.1	.
			1-N-36	15DEC88	4	8.10	0	8.1	8.1	0.0
				05JAN89	1	8.20	.	8.2	8.2	.
			1-N-41	15DEC88	4	8.00	0	8.0	8.0	0.0
				05JAN89	1	8.00	.	8.0	8.0	.
			1-N-42	19DEC88	4	8.43	0.05	8.4	8.5	0.6
			1-N-52	19DEC88	4	8.20	0	8.2	8.2	0.0
			1-N-70	15DEC88	4	8.18	0.05	8.1	8.2	0.6
				05JAN89	1	8.10	.	8.1	8.1	.
			6-81-58	19DEC88	4	8.83	0.05	8.8	8.9	0.6
				16JAN89	1	8.10	.	8.1	8.1	.
207	PH-LAB		6-81-58	16JAN89	1	8.10	.	8.1	8.1	.

TABLE 8.4. (contd)

Constituent Code Name	Units	Well Name	Sample Date	Reps	Replicate Average	Standard Deviation	Minimum	Maximum	Coefficient of Variation
C69 TOC	ppb	1-N-27	19DEC88	4	400	0	400	400	0.0
		1-N-29	14DEC88	4	400	0	400	400	0.0
		1-N-31	15DEC88	4	450	58	400	500	12.8
		1-N-32	14DEC88	4	450	58	400	500	12.8
		1-N-33	14DEC88	4	375	50	300	400	13.3
		1-N-36	15DEC88	3	467	58	400	500	12.4
		1-N-41	15DEC88	4	400	0	400	400	0.0
		1-N-42	19DEC88	4	425	50	400	500	11.8
		1-N-52	19DEC88	4	225	50	200	300	22.2
		1-N-70	15DEC88	4	300	0	300	300	0.0
		6-81-58	19DEC88	4	300	82	200	400	27.2
			16JAN89	1	200	.	200	200	.
H42 TOXLDL	ppb	1-N-27	19DEC88	4	7.50	1.91	6	10	25.5
		1-N-29	14DEC88	4	9.75	1.71	8	12	17.5
		1-N-31	15DEC88	4	10.30	1.26	9	12	12.3
		1-N-32	14DEC88	4	10.50	5.07	7	18	48.2
		1-N-33	14DEC88	4	6.00	2.16	4	9	36.0
		1-N-36	15DEC88	4	8.50	3.32	6	13	39.0
		1-N-41	15DEC88	4	5.50	1.73	3	7	31.5
		1-N-42	19DEC88	4	4.00	2.58	1	7	64.5
		1-N-52	19DEC88	4	6.50	1.29	5	8	19.9
		1-N-70	15DEC88	4	5.75	1.71	4	8	29.7
		6-81-58	19DEC88	4	2.50	1.91	1	5	76.6

TABLE 8.5. Site-Specific Sampling Constituents for the 1325-N Facility

Coliform
pH
Specific Conductance
Total Organic Halogens
Total Organic Carbons
Metals Analyzed by the Inductively Coupled Argon Plasma Method, Unfiltered/Filtered
Arsenic, Unfiltered/Filtered
Selenium, Unfiltered/Filtered
Lead, Unfiltered/Filtered
Mercury, Unfiltered/Filtered
Anions
Volatile Organic Analyses
Hydrazine
Phenol
Pesticides
Herbicides
Ammonium Ion
Alpha
Beta
Radium
Uranium
Gamma Scan
Strontium-90
Tritium

TABLE 8.6. Background Ground-Water Constituent Values for the 1325-N Facility

Constituent	Average Background	Standard Deviation	Critical Mean
Specific Conductance, μmhos/cm	168.2	40.6	933.5
pH	7.89	0.38	-1.15, 16.93
TOC, ppb	265.1	75.1	1,681
TOX, ppb	1.11	3.22	61.8

THIS PAGE INTENTIONALLY
LEFT BLANK

9.0 216-A-10 CRIB

S. P. Luttrell

The ground water beneath the 216-A-10 crib has been monitored by a RCRA interim-status well network since November 1988. This project is currently in the background stage of monitoring; two sample sets have been collected. A draft ground-water monitoring plan has been prepared for this facility.

The 216-A-10 crib is a cross-sectionally V-shaped crib, approximately 45 ft deep and 275 ft long, and located in the 200-East Area (Figure 1.1). Although it received startup wastes from the Plutonium Uranium Extraction (PUREX) Plant 400 ft to the north during a 4-month period in 1956, it did not begin continuous service until 1961, when it replaced the retired 216-A-5 crib. The crib operated nearly continuously from 1961 to 1973; sporadically in 1977, 1978, and 1981; and again nearly continuously from 1982 to January 1987.

Six wells drilled in 1988 combined with two pre-existing wells constitute the interim-status ground-water monitoring network for the 216-A-10 crib (see Figure 9.1). Wells 299-E24-18 and 299-E25-36 are upgradient wells; wells 299-E17-1, 299-E17-19, 299-E17-20, 299-E24-2, 299-E24-16, and 299-E24-17 are downgradient monitoring wells (see Figure 9.1). Well 299-E17-8, located west of the 216-A-10 crib, is also used for water-level measurements. The sampling schedule for the 216-A-10 crib is shown in Table 9.1.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or hydrogeologic characterization activities were conducted during the quarter.

WATER LEVELS

Water-level measurements were made when samples were collected in February, and supplemental measurements were made in March (Table 9.2).

WATER CHEMISTRY DATA

Ground-water samples were collected from wells at the 216-A-10 crib February 13 through 15, 1989. No sample was collected from well 299-E17-1 because the pump would not operate. The sample will be collected next quarter. The analytical results are summarized in Table 9.3. The results for constituents with at least one detected value are provided in Table 9.4. Major observations from the analyses are the following:

- Field measurements indicate specific conductance has nearly doubled in well 299-E17-19, while it has decreased slightly in most other wells since the last quarter.

- In well 299-E17-19, nitrate has increased from 116 to 316 ppm, and beta has increased from 39.6 to 1150 pCi/L since the last quarter. The analytical laboratory has been requested to review the data for the beta analysis.

- Concentrations of total beta have decreased to less than the 50-pCi/L screening level (40 CFR 265, Appendix III) in every well except 299-E17-19.

- Nitrate is above the 40 CFR 265, Appendix III, standard of 45 ppm in every well (including well 299-E24-18) except 299-E25-36.

- Tritium ranges from 261,000 to 4,600,000 pCi/L in wells near the crib. Well 299-E24-18 has a reported value of 1,430,000 pCi/L.

- Chromium (unfiltered sample) is above the 40 CFR 265, Appendix III, standard of 50 ppb in well 299-E24-18, where it is 51 ppb.

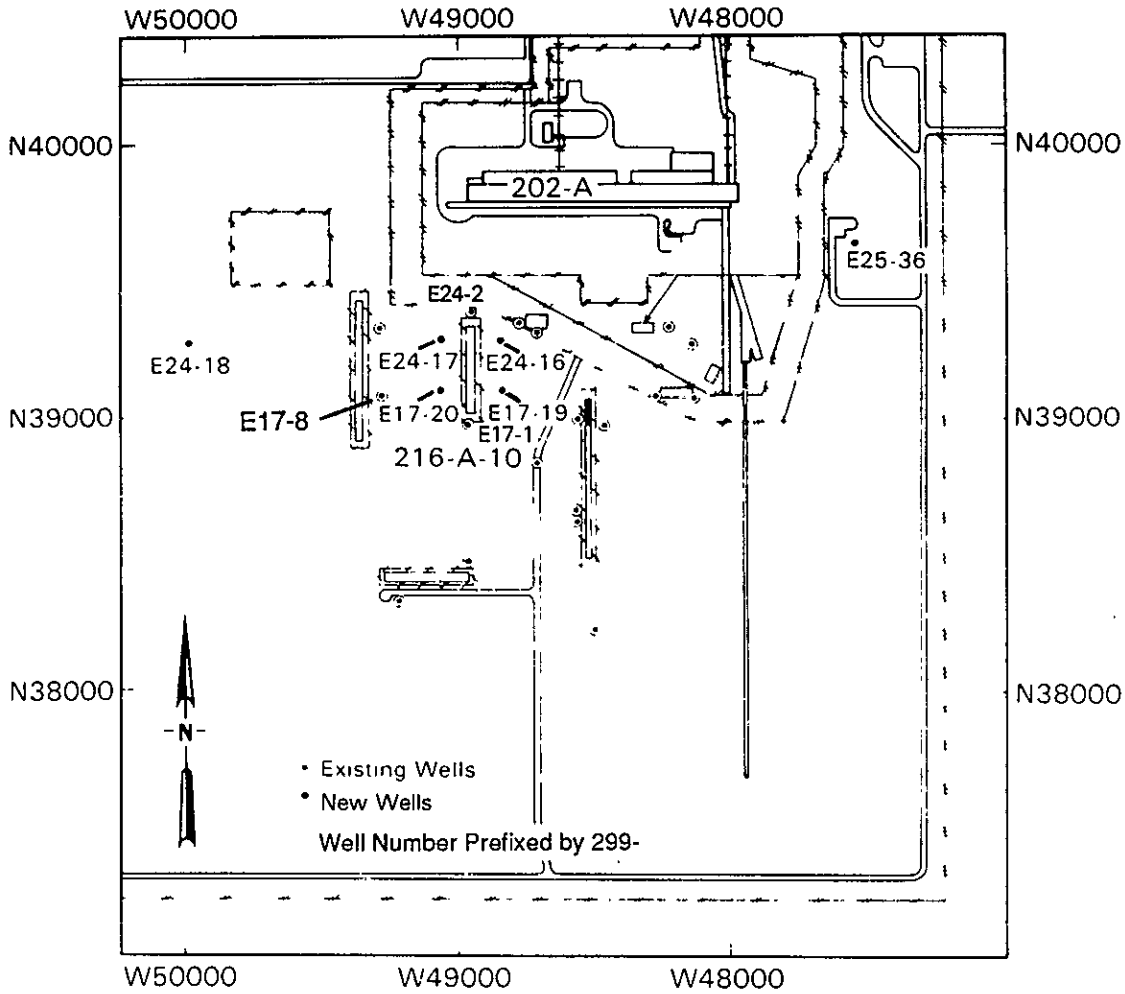

FIGURE 9.1. Monitoring Well Locations for the 216-A-10 Crib

TABLE 9.1. Sampling Schedule for the 216-A-10 Crib

Well	1988			1989 Projected								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
299-E17- 1		L			X[a]			X			X	
299-E17-19		L			X			X			XRV	
299-E17-20		L			X			XRV			X	
299-E24- 2		L			X			X			X	
299-E24-16		L			X			X			X	
299-E24-17		LRV			X			X			X	
299-E24-18		L			X			X			X	
299-E25-36		L			XRV			X			X	

(a) Sample not collected.
L = sampled for the long list of constituents (WAC 173-303-9905).
R = quality control replicates were collected.
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 9.3).

TABLE 9.2. Water-Level Data for Wells Near the 216-A-10 Crib

Well Number	Casing Elevation, ft above MSL[a]	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL
299-E17-1	719.17	3/07/89	313.87	405.30
299-E17-8	718.38	3/07/89	313.25	405.13
299-E17-19	719.33	2/15/89	313.89	405.44
		3/07/89	314.30	405.03
299-E17-20	719.23	2/15/89	313.37	405.86
		3/07/89	313.67	405.56
299-E24-2	717.47	2/13/89	312.18	405.29
		3/07/89	311.87	405.60
299-E24-16	718.27	2/14/89	312.72	405.55
		3/07/89	312.70	405.57
299-E24-17	718.69	3/07/89	314.06	404.63
299-E24-18	719.28	2/14/89	312.44	406.84
		3/07/89	313.84	405.44
299-E25-36	707.39	2/14/89	300.00	407.39
		3/07/89	301.88	405.51

(a) MSL = mean sea level

TABLE 9.3. Constituent List and Summary of Sampling Results for the 216-A10 Crib
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
088	CONDLAB	umho	.	7	0	700	WDOE	xxx	Specific conductance, laboratory
191	CONDFLD	umho	1	29	0	700	WDOE	xxx	Specific conductance, field
199	PHFIELD		0.1	29	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	8	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	29	0	.			Total organic carbon
H42	TOXLDL	ppb	10	28	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	7	7 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	8	0	50	EPA	xxx	Gross beta
112	ALPHAHI	pCi/L	4	8	0	15	EPA		Gross alpha, high DL
A06	BARIUM	ppb	6	8	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	8	6	10	EPA		Cadmium
A08	CHROMUM	ppb	10	8	1	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	8	8 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	8	0	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	7	7 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	8	8 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	7	7 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	7	7 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	7	7 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	8	8 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	9	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	9	7	4000	EPA		Fluoride
H13	2,4-D	ppb	2	7	7 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	7	7 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	9	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	9	9 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	9	9 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	9	9 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	8	0	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	8	8 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	8	8 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	9	9 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	7	1	1	EPA	xxx	Turbidity, nephelometric

TABLE 9.3. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	8	0	.			Sodium
A17	MANGESE	ppb	5	8	2	50	EPAS		Manganese
A19	IRON	ppb	30	8	0	300	EPAS	xxx	Iron
C57	PHENOL	ppb	10	7	7 ***	.			Phenol
C73	SULFATE	ppb	500	9	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	9	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	9	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	9	7	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	9	4	300	EPAS		Iron, filtered

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
104	U	pCi/L	0.5	8	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	7	0	20000	EPA	xxx	Tritium (H-3)
A01	BERYLUM	ppb	5	8	8 ***	.			Beryllium
A03	STRONUM	ppb	20	8	0	.			Strontium
A04	ZINC	ppb	5	8	0	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	8	0	.			Calcium
A12	NICKEL	ppb	10	8	1	.			Nickel
A13	COPPER	ppb	10	8	6	1300	EPAP		Copper
A14	VANADUM	ppb	5	8	0	.			Vanadium
A15	ANTIONY	ppb	100	8	8 ***	.			Antimony
A16	ALUMNUM	ppb	150	8	8 ***	.			Aluminum
A18	POTASUM	ppb	100	8	0	.			Potassium
A50	MAGNES	ppb	50	8	0	.			Magnesium
C76	PHOSPHA	ppb	1000	9	9 ***	.			Phosphate
H16	TC	ppb	1000	8	0	.			Total carbon
H18	FZINC	ppb	5	9	3	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	9	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	9	7	.			Nickel, filtered
H26	FCOPPER	ppb	10	9	8	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	9	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	9	9 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	9	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	9	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	9	9 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	9	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	9	9 ***	.			Antimony, filtered
H58	ALKALIN	ppb	20000	1	0	.			Total alkalinity, as CaCO3
H66	BROMIDE	ppb	1000	8	8 ***	.			Bromide
H67	NITRITE	ppb	1000	8	8 ***	.			Nitrite

TABLE 9.3. (contd)

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H86	FBORON	ppb	10	8	0	.		Boron, filtered
H87	FCOBALT	ppb	20	8	8 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	8	8 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	8	8 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	8	0	.		Silicon, filtered
H91	FTIN	ppb	30	8	8 ***	.		Tin, filtered
H92	FTITAN	ppb	60	8	8 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	8	8 ***	.		Zirconium, filtered
P01	BORON	ppb	10	8	2	.		Boron
P02	COBALT	ppb	20	8	8 ***	.		Cobalt
P03	LITHIUM	ppb	10	8	8 ***	.		Lithium
P04	MOLY	ppb	40	8	8 ***	.		Molybdenum
P05	SILICON	ppb	50	8	0	.		Silicon
P06	TIN	ppb	30	8	8 ***	.		Tin
P07	TITAN	ppb	60	8	8 ***	.		Titanium
P08	ZIRCON	ppb	50	8	8 ***	.		Zirconium

Constituent List=WAC 173-303-9905 Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	8	8 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	8	8 ***	5	EPA	Benzene
A64	METHONE	ppb	10	8	8 ***	.		Methyl ethyl ketone
A66	TOLUENE	ppb	5	8	8 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	8	8 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	8	8 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	8	8 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	8	8 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	8	7	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	8	8 ***	100	EPA	Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	8	8 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	8	8 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	8	8 ***	70	EPAP	trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	8	8 ***	.		Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	8	8 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	8	8 ***	440	EPAP	Xylene-m
B61	12-dben	ppb	10	7	7 ***	.		1,2-Dichlorobenzene
B62	13-dben	ppb	10	7	7 ***	.		1,3-Dichlorobenzene
B63	14-dben	ppb	10	7	7 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
B89	HEXCBEN	ppb	10	7	7 ***	.		Hexachlorobenzene
C26	PENTCHB	ppb	10	7	7 ***	.		Pentachlorobenzene
C37	TETRCHB	ppb	10	7	7 ***	.		1,2,4,5-Tetrachlorobenzene
C43	TRICHLB	ppb	10	7	7 ***	.		1,2,4-Trichlorobenzene
C54	HEXACHL	ppb	10	7	7 ***	.		Hexachlorophene
C55	NAPHTHA	ppb	10	7	7 ***	.		Naphthalene

TABLE 9.3. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
C56	123TRI	ppb	10	7	7 ***	.		1,2,3-Trichlorobenzene
C58	135TRI	ppb	10	7	7 ***	.		1,3,5-Trichlorobenzene
C59	1234TE	ppb	10	7	7 ***	.		1,2,3,4-Tetrachlorobenzene
C60	1235TE	ppb	10	7	7 ***	.		1,2,3,5-Tetrachlorobenzene
C70	CYANIDE	ppb	10	1	1 ***	.		Cyanide
C79	KEROSEN	ppb	10000	7	7 ***	.		Kerosene
C80	AMMONIU	ppb	50	1	1 ***	.		Ammonium ion
H15	2,4,5-T	ppb	2	7	7 ***	.		2,4,5-T
H68	HEXONE	ppb	10	8	8 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	8	8 ***	.		Acetone by VOA
I21	TRIBUPH	ppb	10	7	7 ***	.		Tributylphosphoric acid
I28	TAF	ppb	10	8	8 ***	.		Tetrahydorfuran
L63	14DBEN	ppb	5	8	8 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
L64	CHLROB	ppb	10	7	7 ***	.		Chlorobenzene (by ABN)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 9.4. Constituents with at Least One Detected Value for the 216-A10 Crib
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E17-19	15FEB89		844	771	7.80	8.00	#800	#3
		1	853	.	.	8.00	#700	#4
		2	846	.	.	8.00	#600	#2
		3	842	.	.	8.00	#600	#2
2-E17-20	15FEB89		648	621	7.80	7.70	#400	#3
		1	649	.	.	7.80	#400	#5
		2	648	.	.	7.80	#400	#3
		3	647	.	.	7.80	#600	#0
2-E24-2	02DEC88		340	.	7.80	7.70	#600	.
2-E24-2	13FEB89		304	329	7.90	7.90	#600	#7
		1	306	.	.	7.90	#600	#3
		2	306	.	.	7.90	#700	#4
		3	306	.	.	7.90	#600	#4
2-E24-16	14FEB89		360	432	7.80	7.90	#600	#5
		1	360	.	.	7.90	#700	#2
		2	359	.	.	7.80	#800	#5
		3	360	.	.	7.90	#700	#6
2-E24-17	13FEB89		394	403	7.90	7.90	#700	#2
		1	393	.	.	7.80	#700	#2
		2	394	.	.	7.90	#600	#2
		3	394	.	.	7.80	#600	#6
2-E24-18	14FEB89		323	333	8.40	8.50	#500	#8
		1	323	.	.	8.50	#500	#1
		2	323	.	.	8.50	#600	#3
		3	322	.	.	8.50	#500	#9
2-E25-36	14FEB89		194	217	8.40	8.40	#600	#4
		1	194	.	.	8.40	#600	#3
		2	194	.	.	8.40	#800	#4
		3	194	.	.	8.40	#700	#1

TABLE 9.4. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ALKALIN ppb 20000/.	ALPHAHI pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.
2-E17-19	15FEB89		.	4.91	8	8	55	58	1,160.00	11
2-E17-20	15FEB89		.	2.72	6	6	55	63	28.40	18
2-E24-2	02DEC88		88,600	.	.	.	.	35	.	.
	13FEB89		.	3.26	10	10	36	37	42.60	<10
2-E24-16	14FEB89		.	5.57	8	9	51	50	35.20	19
	14FEB89	1	.	1.54	8	6	47	49	31.00	13
2-E24-17	13FEB89		.	2.73	8	9	50	60	30.10	21
2-E24-18	14FEB89		.	3.75	5	6	47	47	18.10	20
2-E25-36	14FEB89		.	1.14	8	9	21	20	6.89	<10

Well name	Collection Date	Duplicate sample number	FBORON ppb 10/.	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	COPPER ppb 10/1300p
2-E17-19	15FEB89		19	<2	81,800	78,800	3,500	27	11
2-E17-20	15FEB89		24	6	67,300	65,000	3,700	19	<10
2-E24-2	02DEC88		.	.	35,000	.	3,600	.	.
	13FEB89		16	2	31,600	33,600	3,600	<10	<10
2-E24-16	14FEB89		17	<2	41,100	41,200	3,700	49	<10
	14FEB89	1	17	<2	42,900	38,300	3,700	47	<10
2-E24-17	13FEB89		18	<2	43,000	40,400	3,700	32	<10
2-E24-18	14FEB89		13	<2	31,800	31,500	3,600	51	14
2-E25-36	14FEB89		15	<2	22,800	20,800	3,300	28	<10

Well name	Collection Date	Duplicate sample number	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s
2-E17-19	15FEB89		<10	900	178	<30	21,700	22,500	<5
2-E17-20	15FEB89		<10	<500	165	<30	18,700	19,700	<5
2-E24-2	02DEC88		<10	<500	.	<30	.	11,000	<5
	13FEB89		<10	<500	92	<30	10,000	9,670	<5
2-E24-16	14FEB89		<10	<500	239	47	13,100	13,000	<5
	14FEB89	1	13	<500	223	35	12,100	13,500	<5
2-E24-17	13FEB89		<10	<500	175	40	12,200	13,300	6
2-E24-18	14FEB89		<10	500	376	41	9,600	9,630	6
2-E25-36	14FEB89		<10	<500	195	35	5,620	6,170	<5

Well name	Collection Date	Duplicate sample number	MANGESE ppb 5/50s	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000	OPXYLE ppb 5/440p	FPOTASS ppb 100/.	POTASUM ppb 100/.	FSILICO ppb 50/.
2-E17-19	15FEB89		6	14	<10	316,000	<5	6,850	6,330	17,300
2-E17-20	15FEB89		<5	11	<10	225,000	<5	7,980	7,400	19,100
2-E24-2	02DEC88		.	.	<10	66,400	.	5,190	.	.
	13FEB89		7	<10	<10	69,800	#3	4,810	4,820	17,200
2-E24-16	14FEB89		<5	23	<10	113,000	<5	5,430	5,420	17,200
	14FEB89	1	7	19	<10	113,000	<5	5,600	5,070	17,700
2-E24-17	13FEB89		10	21	12	107,000	<5	6,220	5,470	19,400
2-E24-18	14FEB89		10	34	13	57,300	<5	5,750	5,610	18,600
2-E25-36	14FEB89		7	14	<10	3,400	<5	4,770	4,290	17,800

TABLE 9.4. (contd)

Well name	Collection Date	Duplicate sample number	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.
2-E17-19	15FEB89		16,700	32,600	34,400	384	393	34,600	22,100
2-E17-20	15FEB89		18,500	22,500	24,100	363	360	33,200	21,500
2-E24-2	02DEC88		.	.	15,500	182	.	26,700	20,800
	13FEB89		17,800	16,000	15,800	177	176	23,300	19,800
2-E24-16	14FEB89		17,300	18,000	18,200	242	237	26,300	20,700
	14FEB89	1	16,300	16,900	18,700	250	235	27,000	.
2-E24-17	13FEB89		17,800	17,900	20,200	254	221	28,100	20,800
2-E24-18	14FEB89		18,600	17,700	18,100	164	169	25,600	21,000
2-E25-36	14FEB89		16,600	13,500	14,900	111	106	24,200	19,100

Well name	Collection Date	Duplicate sample number	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	U pCi/L 0.5/600d	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E17-19	15FEB89		261,000	0.85	4.550	20	20	11	<5
2-E17-20	15FEB89		4,600,000	1.30	3.760	18	20	16	12
2-E24-2	02DEC88		.	.	.	31	.	.	11
	13FEB89		1,370,000	<0.10	3.170	35	34	10	<5
2-E24-16	14FEB89		3,050,000	1.30	3.440	28	31	9	6
	14FEB89	1	.	.	3.480	28	28	16	8
2-E24-17	13FEB89		2,990,000	1.00	2.960	32	31	11	<5
2-E24-18	14FEB89		1,430,000	1.70	3.280	18	19	8	9
2-E25-36	14FEB89		5,260	0.90	0.931	37	34	6	12

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

10.0 216-A-29 DITCH

S. P. Luttrell

The ground water beneath the 216-A-29 ditch has been monitored by a RCRA interim-status well network since November 1988. This project is currently in the background stage of monitoring; two sets of samples have been collected. A ground-water monitoring plan has been prepared for this facility.

The 216-A-29 ditch (Figure 10.1) is an earthen ditch, approximately 6 ft wide and 6500 ft long, that has been in use since 1955. It receives discharge from the PUREX Plant chemical sewer line.

There are five wells in the monitoring network for the 216-A-29 ditch (see Figure 10.1). Well 299-E25-32 is the upgradient well, and wells 299-E25-26, 299-E25-28, 299-E25-34, and 299-E25-35 are the downgradient monitoring wells (see Figure 10.1). Wells 299-E25-26, 299-E25-28, and 299-E25-32 are also in the Grout Treatment Facility ground-water monitoring network. The sampling schedule for wells around the 216-A-29 ditch is shown in Table 10.1. The water level in well 299-E25-10, in addition to the monitoring wells, has been measured on one occasion.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or hydrogeologic characterization activities were conducted during the quarter.

WATER LEVELS

Water levels were measured when samples were collected in February, and supplemental measurements were also made in February (Table 10.2).

WATER CHEMISTRY DATA

Ground-water samples were collected from wells around the 216-A-29 ditch February 24, 27, and 28, 1989. Analytical results are summarized in Table 10.3. The results for constituents with at least one detected value are provided in Table 10.4. (The results for the December 15, 1988 sample

from well 299-E25-26 are also included.) Major observations from the analyses received to date are the following:

- Tritium was reported to be 69,900 pCi/L in well 299-E25-35.
- Conductivity is three to six times higher in well 299-E25-35 than in any other well in the 216-A-29 monitoring network. The pH is lower in well 299-E25-35 than in any other well in the 216-A-29 monitoring network.
- Major anions and cations, as well as nitrate, are elevated in well 299-E25-35 in comparison with the other wells in the network.
- No constituent exceeds the 40 CFR 265, Appendix III, standards.

9 1 1 3 8 3 1 1 6 0

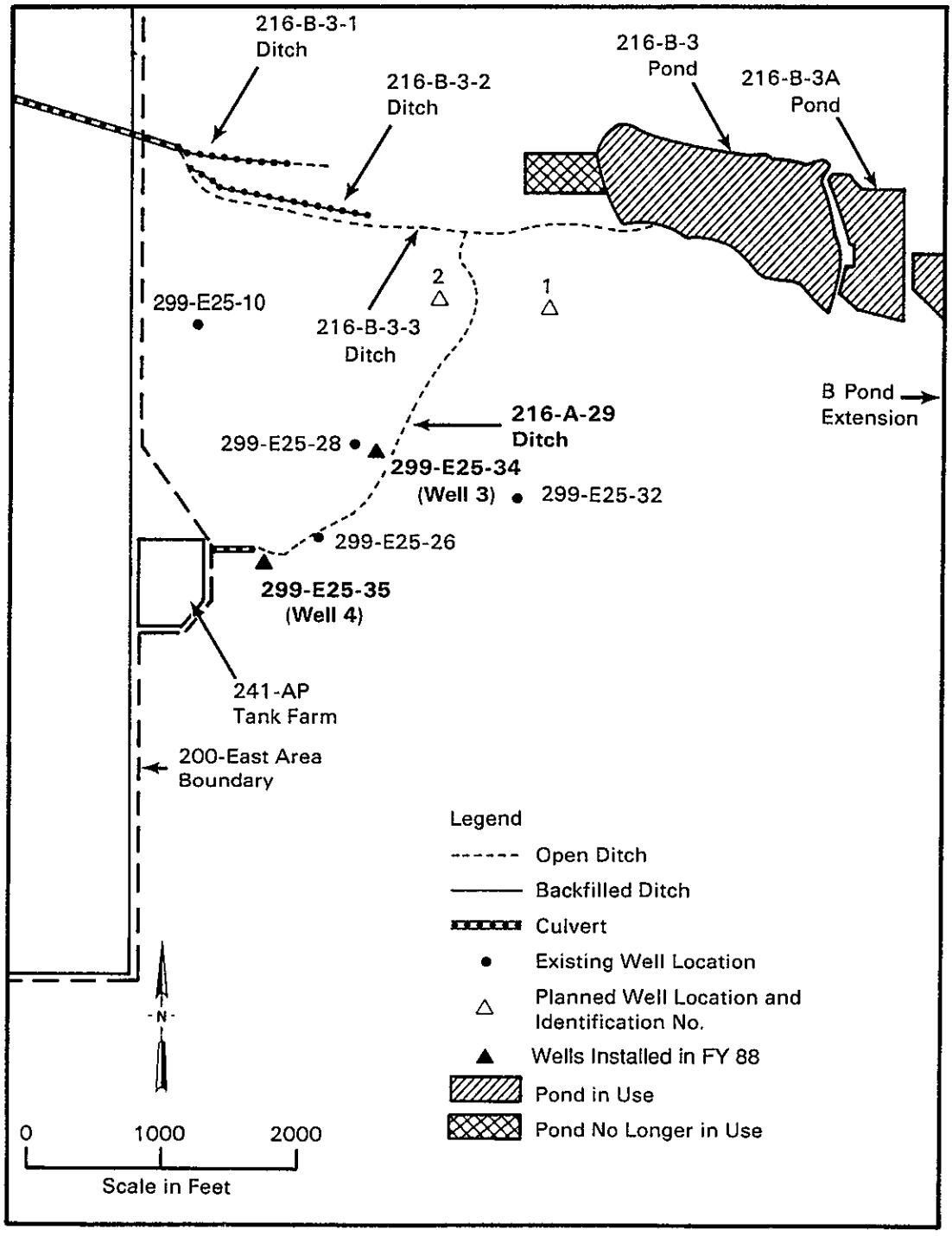

FIGURE 10.1. Monitoring Well Locations for the 216-A-29 Ditch

TABLE 10.1. Sampling Schedule for the 216-A-29 Ditch

Well	1988 Oct	1988 Nov	1988 Dec	1989 Projected Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
299-E25-26			X		S			S			OL	
299-E25-28		X			S			S			OLR	
299-E25-32		XR			S			SRV			OL	
299-E25-34		X			XRV			X			L	
299-E25-35		X			X			X			L	

L = sampled for the long list of constituents (WAC 173-303-9905).
OL = sampled for the long list of constituents (overlap with another project).
R = quality control replicates were collected.
S = sampled for the short list of constituents (overlap with another project).
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 10.3).

TABLE 10.2. Water-Level Data for Wells Near the 216-A-29 Ditch

Well Number	Casing Elevation, ft above MSL[a]	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]
299-E25-10	655.84	2/23/89	249.88	405.96
299-E25-26	668.55	2/23/89	262.09	406.46
		2/28/89	264.04	404.51
299-E25-28	662.44	2/23/89	255.91	406.53
		2/24/89	256.72	405.72
299-E25-32A	669.19	2/23/89	262.58	406.61
		2/24/89	260.22	408.97
299-E25-34	662.87	2/23/89	256.45	406.42
		2/27/89	255.30	407.57
299-E25-35	674.39	2/23/89	268.48	405.91
		2/28/89	266.55	407.84

(a) MSL = mean sea level

TABLE 10.3. Constituent List and Summary of Sampling Results for the 216-A-29 Ditch
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
D88	CONDLAB	umho	.	5	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	23	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	23	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	5	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	28	0	.			Total organic carbon
H42	TOXLDL	ppb	10	28	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	6	6 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	8	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	6	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	8	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	2	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	8	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	8	8 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	8	3	50	EPA		Chromium
A10	SILVER	ppb	10	8	8 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	8	2	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	7	7 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	8	8 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	7	7 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	7	7 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	7	7 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	8	8 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	7	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	7	6	4000	EPA		Fluoride
H13	2,4-D	ppb	2	7	7 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	7	7 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	8	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	8	8 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	8	8 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	8	8 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	8	2	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	7	7 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	8	8 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	8	8 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	6	0	1	EPA	xxx	Turbidity, nephelometric

TABLE 10.3. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
A11	SODIUM	ppb	200	8	0	.			Sodium
A17	MANGESE	ppb	5	8	7	50	EPAS		Manganese
A19	IRON	ppb	30	8	1	300	EPAS		Iron
C73	SULFATE	ppb	500	7	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	7	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	8	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	8	8 ***	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	8	5	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	7	7 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Standard	Water Standards Agency	Exceeded	Full name
108	TRITIUM	pCi/L	500	4	0	20000	EPA	xxx	Tritium (H-3)
197	TC-99	pCi/L	15	2	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	8	8 ***	.			Beryllium
A03	STRONUM	ppb	20	8	0	.			Strontium
A04	ZINC	ppb	5	8	3	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	8	0	.			Calcium
A12	NICKEL	ppb	10	8	4	.			Nickel
A13	COPPER	ppb	10	8	6	1300	EPAP		Copper
A14	VANADUM	ppb	5	8	0	.			Vanadium
A15	ANTIONY	ppb	100	8	8 ***	.			Antimony
A16	ALUMNUM	ppb	150	8	8 ***	.			Aluminum
A18	POTASUM	ppb	100	8	0	.			Potassium
A50	MAGNES	ppb	50	8	0	.			Magnesium
C76	PHOSPHA	ppb	1000	7	7 ***	.			Phosphate
H16	TC	ppb	1000	8	0	.			Total carbon
H18	FZINC	ppb	5	8	4	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	8	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	8	8 ***	.			Nickel, filtered
H26	FCOPPER	ppb	10	8	7	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	8	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	8	8 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	8	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	8	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	8	8 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	8	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	8	8 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	7	7 ***	.			Bromide
H67	NITRITE	ppb	1000	7	7 ***	.			Nitrite
H86	FBORON	ppb	10	7	1	.			Boron, filtered
H87	FCOBALT	ppb	20	7	7 ***	.			Cobalt, filtered
H88	FLITHI	ppb	10	7	7 ***	.			Lithium, filtered
H89	FMOLY	ppb	40	7	7 ***	.			Molybdenum, filtered
H90	FSILICO	ppb	50	7	0				Silicon, filtered
H91	FTIN	ppb	30	7	7 ***				Tin, filtered
H92	FTITAN	ppb	60	7	7				Titanium, filtered

TABLE 10.3. (contd)

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
H93	FZIRCON	ppb	50	7	7 ***	.			Zirconium, filtered
P01	BORON	ppb	10	7	0	.			Boron
P02	COBALT	ppb	20	7	7 ***	.			Cobalt
P03	LITHIUM	ppb	10	7	7 ***	.			Lithium
P04	MOLY	ppb	40	7	7 ***	.			Molybdenum
P05	SILICON	ppb	50	7	0	.			Silicon
P06	TIN	ppb	30	7	7 ***	.			Tin
P07	TITAN	ppb	60	7	7 ***	.			Titanium
P08	ZIRCON	ppb	50	7	7 ***	.			Zirconium

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A61	TETRANE	ppb	5	8	8 ***	5	EPA		Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	6	6 ***	5	EPA		Benzene
A64	METHONE	ppb	10	8	8 ***	.			Methyl ethyl ketone
A66	TOLUENE	ppb	5	6	6 ***	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	8	8 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	8	8 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	8	8 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	8	8 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	8	8 ***	440	EPAP		Xylene-o,p
A80	CHLFORM	ppb	5	8	8 ***	100	EPA		Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	6	6 ***	.			1,1-Dichloroethane
A90	1,2-DIC	ppb	5	6	6 ***	5	EPA		1,2-Dichloroethane
A91	TRANDCE	ppb	5	6	6 ***	70	EPAP		trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	8	8 ***	.			Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	6	6 ***	2	EPA		Vinyl chloride
B14	M-XYLE	ppb	5	8	8 ***	440	EPAP		Xylene-m
C80	AMMONIU	ppb	50	6	6 ***	.			Ammonium ion
H15	2,4,5-T	ppb	2	6	6 ***	.			2,4,5-T
H62	LHYDRAZ	ppb	30	6	6 ***	.			Hydrazine, low DL
H68	HEXONE	ppb	10	8	8 ***	.			Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	6	6 ***	.			Acetone by VOA
I28	TAF	ppb	10	6	6 ***	.			Tetrahydorfuran
L63	14DBEN	ppb	5	6	6 ***	75	EPA		1,4-Dichlorobenzene [p-Dichlorobenzene]

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 10.4. Constituents with at Least One Detected Value for the 216-A-29 Ditch December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E25-26	15DEC88		175	.	.	8.10	#700	#5
		1	175	.	.	8.10	#500	#4
		2	175	.	.	8.10	#600	#4
		3	173	.	.	8.10	#600	#7
2-E25-26	28FEB89		193	178	8.23	8.20	#600	#3
		1	193	.	.	8.30	#600	#5
		2	194	.	.	8.40	#600	#1
		3	192	.	.	8.30	#500	#4
2-E25-28	24FEB89		100	176	8.20	8.80	#800	#6
		1	100	.	.	8.80	#800	#5
		2	100	.	.	8.80	#700	#2
		3	100	.	.	8.80	#600	#1
2-E25-32	04JAN89		151	.	.	8.30	#500	#4
		1	150	.	.	8.30	#700	#2
		2	150	.	.	8.30	#700	#1
		3	150	.	.	8.30	#800	#3
2-E25-32	24FEB89		100	168	8.20	8.70	#600	#2
		1	100	.	.	8.80	#600	#3
		2	100	.	.	8.70	#600	#5
		3	100	.	.	8.70	#600	#6
2-E25-34	13DEC88		165	.	.	7.90	.	.
2-E25-34	27FEB89		180	655	8.10	8.10	#500	#2
		1	.	.	.	.	#500	#7
		2	.	.	.	.	#600	#5
		3	.	.	.	.	#600	#0
2-E25-35	27FEB89		605	628	7.86	7.50	#400	#3
		1	.	.	.	.	#400	#5
		2	.	.	.	.	#500	#6
		3	.	.	.	.	#500	#8

TABLE 10.4. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicat sample number	ALPHA pCi/L 4/15	ALPHAHI pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.
2-E25-26	15DEC88		*0.0325	.	6	8	11	16	*1.040	.	.
	28FEB89		.	1.160	7	7	9	12	*1.840	15	12
2-E25-28	24FEB89		.	*0.886	10	10	14	14	*0.633	13	29
2-E25-32	04JAN89		1.4100	.	<5	<5	12	13	6.770	15	<10
	24FEB89		.	1.470	<5	<5	14	14	3.000	13	11
2-E25-34	27FEB89		.	*1.090	9	9	19	19	2.700	13	18
	27FEB89	1	.	*0.641	7	9	17	20	*1.690	11	20
2-E25-35	27FEB89		.	3.670	11	11	33	32	5.370	37	33

Well name	Collection Date	Duplicat sample number	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	COPPER ppb 10/1300p	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s
2-E25-26	15DEC88		19,800	17,900	2,800	<10	69	<10	<500	72
	28FEB89		20,400	18,400	2,800	<10	<10	13	<500	50
2-E25-28	24FEB89		18,800	18,500	2,800	<10	52	<10	<500	<30
2-E25-32	04JAN89		18,500	19,000	2,800	40	<10	<10	<500	185
	24FEB89		20,100	18,800	2,900	24	<10	<10	<500	82
2-E25-34	27FEB89		19,000	19,000	2,800	27	<10	<10	<500	169
	27FEB89	1	20,300	18,000	.	13	<10	<10	.	104
2-E25-35	27FEB89		63,200	62,700	7,200	27	<10	<10	600	144

Well name	Collection Date	Duplicate sample number	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	MANGESE ppb 5/50s	NICKEL ppb 10/.	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.
2-E25-26	15DEC88		49	5,250	5,450	<5	<10	1,400	3,940	3,950
	28FEB89		<30	5,240	5,740	<5	<10	1,400	4,410	4,060
2-E25-28	24FEB89		<30	5,570	5,580	<5	<10	900	3,800	3,830
2-E25-32	04JAN89		<30	5,060	4,890	<5	20	800	4,270	4,420
	24FEB89		<30	5,380	5,730	<5	13	700	4,740	4,450
2-E25-34	27FEB89		<30	5,640	5,620	<5	15	1,100	4,170	4,100
	27FEB89	1	38	5,320	6,040	<5	<10	.	4,510	3,830
2-E25-35	27FEB89		39	24,800	24,900	6	11	7,800	5,960	5,710

Well name	Collection Date	Duplicat sample number	RADIUM pCi/L 1/5	FSILICO ppb 50/.	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s
2-E25-26	15DEC88		*0.0541	.	.	9,110	8,990	99	95	14,400
	28FEB89		*-0.0412	15,800	14,400	9,660	10,600	113	102	14,800
2-E25-28	24FEB89		*0.0012	16,300	15,800	10,900	10,900	102	102	12,400
2-E25-32	04JAN89		*0.0497	12,000	12,400	7,220	6,970	105	109	12,000
	24FEB89		*0.0625	12,000	11,200	6,850	7,310	121	113	13,000
2-E25-34	27FEB89		0.5020	14,700	15,000	10,300	10,500	106	106	13,400
	27FEB89	1	0.2140	16,100	14,200	9,680	11,400	113	101	.
2-E25-35	27FEB89		0.1400	17,800	17,000	43,700	45,100	345	347	201,000

TABLE 10.4. (contd)

Well name	Collection Date	Duplicate sample number	TC ppb 1000/.	TC-99 pCi/L 15/900r	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E25-26	15DEC88		.	.	.	0.30	29	27	49	53
	28FEB89		16,700	.	.	0.15	29	32	26	19
2-E25-28	24FEB89		17,900	.	.	0.10	41	41	16	11
2-E25-32	04JAN89		.	.	670	.	18	20	<5	<5
	04JAN89	R	.	1.99	.	.	.	.	.	.
	24FEB89		16,700	.	.	0.55	20	16	<5	<5
	24FEB89	R	.	0.54	.	.	.	.	.	.
2-E25-34	27FEB89		17,300	.	922	0.70	38	38	<5	<5
	27FEB89	1	17,500	.	989	.	38	35	8	<5
2-E25-35	27FEB89		29,800	.	69,900	1.20	20	21	10	9

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

11.0 216-A-36B CRIB

S. P. Luttrell

The ground water beneath the 216-A-36B crib has been monitored by a RCRA interim-status well network since May 1988. This project is currently in the background stage of monitoring. Three sample sets have been collected; however, the first of these is not considered to be representative of ground water and therefore will not be included to establish background. A ground-water monitoring plan has been prepared for this facility.

The 216-A-36B crib is the southern 500-ft section of what was once a 600-ft-long crib (Figure 11.1). It is 12 ft wide and 12 ft deep and was separated from the 216-A-36A crib in 1966 by a grout curtain. The 216-A-36B crib received ammonia scrubber distillate from the PUREX Plant from September 1965 to 1972, then after 10 years of retirement was reactivated from November 1982 until October 1987. The crib has not been used since 1987.

Five new monitoring wells installed in 1988, combined with two preexisting wells near the crib, make up the ground-water monitoring system (see Figure 11.1). Well 299-E17-17 is the upgradient well, and wells 299-E17-5, 299-E17-9, 299-E17-14, 299-E17-15, 299-E17-16, and 299-E17-18 are the downgradient wells (see Figure 11.1). Because of a long (~150 ft) perforated interval in well 299-E17-6, this well is used only to characterize the ground-water chemistry and is not used to determine water potentials. Comparison of ground-water analyses from this well and the nearby well 299-E17-18, completed in the upper 15 ft of the aquifer, provides an indication of the vertical extent of contaminants in the aquifer. Water levels are also measured at nearby well 299-E17-13. The sampling schedule for the wells in the monitoring network is shown in Table 11.1.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or hydrogeologic characterization activities were conducted during the quarter.

WATER LEVELS

Water-level measurements not related to sample collection were made in March (Table 11.2).

WATER CHEMISTRY DATA

No ground-water samples were collected during the reporting period, although they were scheduled to be collected in March. The sampling schedule was interrupted because purge water disposal issues had not been resolved.

The analytical results for samples collected in December 1988 are summarized in Table 11.3. The results for constituents with at least one detected value are provided in Table 11.4. Major observations of the analyses are the following:

- Nitrate exceeded the 40 CFR 265, Appendix III, standard of 45 ppm in wells 299-E17-5 (128 ppm), 299-E17-9 (136 ppm), 299-E17-14 (195 ppm), 299-E17-15 (345 ppm), and 299-E17-17 (91.5 ppm).
- Total beta was reported to be 1,290 pCi/L in well 299-E17-15, 846 pCi/L in well 299-E17-14, 577 pCi/L in well 299-E17-5, and 208 pCi/L in well 299-E17-17, all exceeding the 40 CFR 265, Appendix III, screening level of 50 pCi/L. Total beta was less than 50 pCi/L in samples from all other wells.
- Tritium was reported to range from 36,200 pCi/L to 4,550,000 pCi/L in the monitoring wells (including well 299-E17-17). All the wells exceeded the 40 CFR 141 standard of 20,000 pCi/L.
- Several other radionuclides, including ruthenium-106, strontium-90, and iodine-129, exceeded the primary drinking water standard or radionuclide standards (EPA 1976). Strontium-90 was reported to be 15.9 pCi/L in well 299-E17-14.

These constituents will be analyzed in the next sampling period. The results will be evaluated to confirm or refute the results given and determine possible trends.

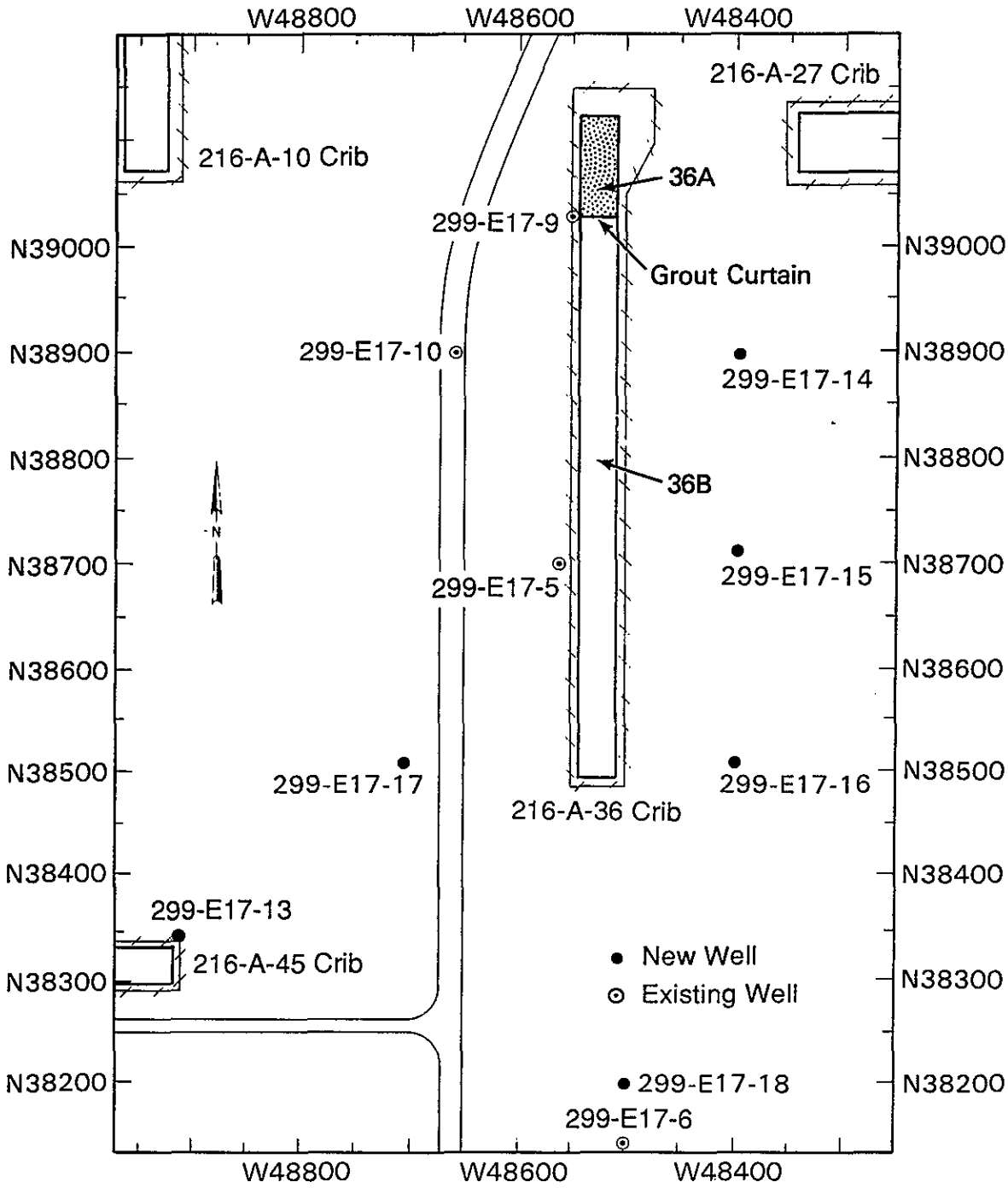

FIGURE 11.1. Monitoring Well Locations for the 216-A-36B Crib

TABLE 11.1. Sampling Schedule for the 216-A-36B Crib

Well	1988 Oct	1988 Nov	1988 Dec	1989 Projected Jan	Feb	Mar[a]	Apr	May	Jun	Jul	Aug	Sep
299-E17- 5			X			L			X			X
299-E17- 6			S			S			S			S
299-E17- 9			X			L			X			X
299-E17-10									X[b]			X
299-E17-14			X			L			XRV			X
299-E17-15			X			LRV			X			X
299-E17-16			XRV			L			X			X
299-E17-17			X			L			X			X
299-E17-18			X			L			X			XR

(a) The March sample set was not collected because purge water disposal issues had not been resolved.
(b) Planned pending remediation.
L = sampled for the long list of constituents (WAC 173-303-9905).
R = quality control replicates were collected.
S = sampled for the short list of constituents (overlap with another project).
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 11.3).

TABLE 11.2. Water-Level Data for Wells Near the 216-A-36B Crib

Well Number	Casing Elevation, ft above MSL[a]	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]
299-E17-5	718.69	3/7/89	313.35	405.34
299-E17-6	720.10	3/7/89	314.66	405.44
299-E17-10	714.74	3/7/89	309.25	405.49
299-E17-13	719.25	3/7/89	313.85	405.40
299-E17-14	722.18	3/7/89	316.67	405.51
299-E17-16	720.58	3/10/89	315.21	405.37
299-E17-17	719.92	3/7/89	314.55	405.37
299-E17-18	720.65	3/7/89	315.19	405.46

(a) MSL = mean sea level

TABLE 11.3. Constituent List and Summary of Sampling Results for the 216-A-36-B Crib
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards	Agency	Exceeded	Full name
191	CONDFLD	umho	1	33	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	33	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	1	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	1000	32	0	.			Total organic carbon
H42	TOXLDL	ppb	20	32	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	8	7	1	EPA	xxx	Coliform bacteria
111	BETA	pCi/L	8	9	0	50	EPA	xxx	Gross beta
181	RADIUM	pCi/L	1	9	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	9	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	9	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	9	9 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	9	3	50	EPA		Chromium
A10	SILVER	ppb	10	9	9 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	9	1	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	8	8 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	9	9 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	8	8 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	8	8 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	8	8 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	8	8 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	9	5	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	10	1	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	10	4	4000	EPA		Fluoride
H13	2,4-D	ppb	2	8	8 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	8	8 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	10	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	10	9	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	10	10 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	10	10 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	9	1	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	7	7 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	9	9 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	9	9 ***	50	EPA		Lead, filtered

TABLE 11.3. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	9	0	.			Sodium
A17	MANGESE	ppb	5	9	6	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	9	1	300	EPAS	xxx	Iron
C57	PHENOL	ppb	10	8	8 ***	.			Phenol
C73	SULFATE	ppb	500	10	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	10	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	10	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	10	6	50	EPAS	xxx	Manganese, filtered
H31	FIRON	ppb	30	10	8	300	EPAS	xxx	Iron, filtered

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	9	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	9	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	9	0	30	EPAR	xxx	Ruthenium-106
081	I-129	pCi/L	15	9	0	1	EPAR	xxx	Iodine-129
108	TRITIUM	pCi/L	500	9	0	20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	9	0	8	EPA	xxx	Strontium-90
197	TC-99	pCi/L	15	9	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	9	9 ***	.			Beryllium
A03	STRONUM	ppb	20	9	0	.			Strontium
A04	ZINC	ppb	5	9	2	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	9	0	.			Calcium
A12	NICKEL	ppb	10	9	5	.			Nickel
A13	COPPER	ppb	10	9	6	1300	EPAP		Copper
A14	VANADUM	ppb	5	9	1	.			Vanadium
A15	ANTIONY	ppb	100	9	9 ***	.			Antimony
A16	ALUMNUM	ppb	150	9	9 ***	.			Aluminum
A18	POTASUM	ppb	100	9	0	.			Potassium
A50	MAGNES	ppb	50	9	0	.			Magnesium
C76	PHOSPHA	ppb	1000	10	10 ***	.			Phosphate
H16	TC	ppb	1000	10	0	.			Total carbon
H18	FZINC	ppb	5	10	6	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	10	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	10	9	.			Nickel, filtered
H26	FCOPPER	ppb	10	10	8	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	10	1	.			Vanadium, filtered
H28	FALUMIN	ppb	150	10	10 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	10	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	10	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	10	10 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	10	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	10	10 ***	.			Antimony, filtered
H58	ALKALIN	ppb	20000	1	0	.			Total alkalinity, as CaCO3
H66	BROMIDE	ppb	1000	9	9 ***	.			Bromide
H67	NITRITE	ppb	1000	9	9 ***	.			Nitrite

TABLE 11.3. (contd)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	9	9 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	9	9 ***	5	EPA	Benzene
A63	DIOXANE	ppb	500	9	9 ***	.		Dioxane
A64	METHONE	ppb	10	9	9 ***	.		Methyl ethyl ketone
A65	PYRIDIN	ppb	500	9	8	.		Pyridine
A66	TOLUENE	ppb	5	9	9 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	9	9 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	9	9 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	9	9 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	9	9 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	9	9 ***	440	EPAP	Xylene-o,p
A72	ACROLIN	ppb	10	9	9 ***	.		Acrolein
A73	ACRYILE	ppb	10	9	9 ***	.		Acrylonitrile
A74	BISTHER	ppb	5	9	9 ***	.		Bis(chloromethyl) ether
A75	BROMONE	ppb	5	9	9 ***	.		Bromoacetone
A76	METHBRO	ppb	10	9	9 ***	.		Methyl bromide
A77	CARBIDE	ppb	10	9	9 ***	.		Carbon disulfide
A78	CHLBENZ	ppb	5	9	9 ***	60	EPAP	Chlorobenzene
A79	CHLTHER	ppb	5	9	9 ***	.		2-Chloroethyl vinyl ether
A80	CHLFORM	ppb	5	9	9 ***	100	EPA	Chloroform [Trichloromethane]
A81	METHCHL	ppb	10	9	9 ***	.		Methyl chloride [Chloromethane]
A82	CHMTHER	ppb	10	9	9 ***	.		Chloromethyl methyl ether
A83	CROTONA	ppb	10	9	9 ***	.		Crotonaldehyde
A84	DIBRCHL	ppb	10	9	9 ***	0	EPAP	1,2-Dibromo-3-chloropropane
A85	DIBRETH	ppb	10	9	9 ***	.		1,2-Dibromoethane
A86	DIBRMET	ppb	10	9	9 ***	.		Dibromomethane
A87	DIBUTEN	ppb	10	9	9 ***	.		1,4-Dichloro-2-butene
A88	DICDIFM	ppb	10	9	9 ***	.		Dichlorodifluoromethane
A89	1,1-DIC	ppb	5	9	9 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	9	9 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	9	9 ***	70	EPAP	trans-1,2-Dichloroethene
A92	DICETHY	ppb	10	9	9 ***	7	EPA	1,1-Dichloroethylene
A93	METHYCH	ppb	5	9	8	.		Methylene chloride [Dichloromethane]
A94	DICPANE	ppb	5	9	9 ***	6	EPAP	1,2-Dichloropropane
A95	DICPENE	ppb	5	9	9 ***	.		1,3-Dichloropropene
A96	NNDIEHY	ppb	10	9	9 ***	.		N,N-diethylhydrazine
A99	HYDRSUL	ppb	10	9	9 ***	.		Hydrogen sulfide
B01	IODOMET	ppb	10	9	9 ***	.		Iodomethane
B02	METHACR	ppb	10	9	9 ***	.		Methacrylonitrile
B03	METHTHI	ppb	10	9	9 ***	.		Methanethiol
B04	PENTACH	ppb	10	9	9 ***	.		Pentachloroethane
B05	1112-tc	ppb	10	9	9 ***	.		1,1,1,2-Tetrachlorethane
B06	1122-tc	ppb	5	9	9 ***	.		1,1,2,2-Tetrachlorethane
B08	BROMORM	ppb	5	9	9 ***	100	EPA	Bromoform [Tribromomethane]
B09	TRCMEOL	ppb	10	9	9 ***	.		Trichloromethanethiol
B10	TRCMFLM	ppb	10	9	9 ***	.		Trichloromonofluoromethane
B11	TRCPANE	ppb	10	9	9 ***	.		Trichloropropane

TABLE 11.3. (contd)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B12	123-trp	ppb	10	9	9 ***	.		1,2,3-Trichloropropane
B13	VINYIDE	ppb	10	9	9 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	9	9 ***	440	EPAP	Xylene-m
B15	DIETHY	ppb	10	9	9 ***	.		Diethylarsine
B19	ACETILE	ppb	3000	9	9 ***	.		Acetonitrile
B61	12-dben	ppb	10	8	8 ***	.		1,2-Dichlorobenzene
B62	13-dben	ppb	10	8	8 ***	.		1,3-Dichlorobenzene
B63	14-dben	ppb	10	8	8 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
B89	HEXCBEN	ppb	10	8	8 ***	.		Hexachlorobenzene
C04	METACRY	ppb	10	9	9 ***	.		Methyl methacrylate
C26	PENTCHB	ppb	10	8	8 ***	.		Pentachlorobenzene
C37	TETRCHB	ppb	10	8	8 ***	.		1,2,4,5-Tetrachlorobenzene
C43	TRICHLB	ppb	10	8	8 ***	.		1,2,4-Trichlorobenzene
C53	HYDRAZI	ppb	3000	8	8 ***	.		Hydrazine
C54	HEXACHL	ppb	10	8	8 ***	.		Hexachlorophene
C55	NAPHTHA	ppb	10	8	8 ***	.		Naphthalene
C56	123TRI	ppb	10	8	8 ***	.		1,2,3-Trichlorobenzene
C58	135TRI	ppb	10	8	8 ***	.		1,3,5-Trichlorobenzene
C59	1234TE	ppb	10	8	8 ***	.		1,2,3,4-Tetrachlorobenzene
C60	1235TE	ppb	10	8	8 ***	.		1,2,3,5-Tetrachlorobenzene
C70	CYANIDE	ppb	10	1	1 ***	.		Cyanide
C71	FORMALN	ppb	500	9	9 ***	.		Formalin
C79	KEROSEN	ppb	10000	8	8 ***	.		Kerosene
C80	AMMONIU	ppb	50	10	8	.		Ammonium ion
C90	PARALDE	ppb	2000	8	8 ***	.		Paraldehyde
C94	ACRYIDE	ppb	10000	8	8 ***	0	EPAP	Acrylamide
C95	ALLYLAL	ppb	2500	8	8 ***	.		Allyl alcohol
C97	CHLACET	ppb	16000	8	8 ***	.		Chloroacetaldehyde
C98	CHLPROP	ppb	4000	8	8 ***	.		3-Chloropropionitrile
H03	ETHCARB	ppb	5000	8	8 ***	.		Ethyl carbamate
H04	ETHCYAN	ppb	2000	8	8 ***	.		Ethyl cyanide
H05	ETHOXID	ppb	10	9	9 ***	.		Ethylene oxide
H06	ETHMETH	ppb	10	9	9 ***	.		Ethyl methacrylate
H09	ISOBUTY	ppb	1000	8	8 ***	.		Isobutyl alcohol
H11	PROPYLA	ppb	10000	8	8 ***	.		n-Propylamine
H12	PROPYNO	ppb	8000	8	8 ***	.		2-Propyn-1-ol
H15	2,4,5-T	ppb	2	6	6 ***	.		2,4,5-T
H68	HEXONE	ppb	10	9	9 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	9	6	.		Acetone by VOA
I09	BUTANOL	ppb	5000	8	8 ***	.		1-Butanol
I10	PROPANL	ppb	5000	8	8 ***	.		2-Propanol
I21	TRIBUPH	ppb	10	8	8 ***	.		Tributylphosphoric acid
I28	TAF	ppb	10	9	9 ***	.		Tetrahydorfuran
I67	ETHANOL	ppb	5000	8	8 ***	.		Ethanol
I98	UNKALI	ppb	0	1	0	.		Unknown aliphatic HC
I99	UNKNOWN	ppb	0	1	0	.		Unknown
L20	MBP	ppb	5000	8	8 ***	.		Monobutylphosphate
L21	DBP	ppb	5000	8	8 ***	.		Dibutylphosphate

TABLE 11.3. (contd)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 11.4. Constituents with at Least One Detected Value for the 216-A-36B Crib
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 1000/.	TOXLDL ppb 20/.
2-E17-5	20DEC88		436	.	7.90	#500	#4
		1	434	.	7.90	#500	#0
		2	434	.	7.90	#500	#1
		3	434	.	7.90	#500	#-1
2-E17-6	20DEC88		325	.	7.70	#200	#3
		1	325	.	7.70	#300	#5
		2	324	.	7.70	#300	#-2
		3	324	.	7.80	#200	#4
2-E17-9	20DEC88		471	.	7.80	#400	#6
		1	470	.	7.90	#400	#11
		2	471	.	7.90	#300	25
		3	472	.	7.80	#400	#7
2-E17-9	28DEC88		472	7.80	7.80	#300	.
2-E17-14	21DEC88		461	.	7.40	#600	#3
		1	461	.	7.40	#500	#5
		2	462	.	7.40	#500	#2
		3	463	.	7.50	#600	#2
2-E17-15	21DEC88		429	.	7.60	#400	#4
		1	429	.	7.60	#400	#4
		2	429	.	7.60	#400	#2
		3	429	.	7.60	#500	#1
2-E17-16	21DEC88		198	.	7.90	#700	#-1
		1	199	.	7.90	#600	#5
		2	200	.	7.90	#600	#3
		3	202	.	7.90	#600	#1
2-E17-17	21DEC88		351	.	7.90	#400	#-1
		1	354	.	7.90	#400	#2
		2	353	.	7.90	#400	#0
		3	350	.	7.90	#400	#-1
2-E17-18	21DEC88		190	.	7.50	.	#4
		1	190	.	7.60	#400	#1
		2	191	.	7.60	#400	#5
		3	191	.	7.60	#400	#7

TABLE 11.4. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	AMMONIU ppb 50/.	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000
2-E17-5	20DEC88		<10	.	2.040	<50	6	7	43	43
2-E17-6	20DEC88		#7	.	1.330	<50	<5	<5	61	68
2-E17-9	20DEC88		10	.	1.630	<50	12	12	57	61
	28DEC88		.	104,000	.	<50	.	.	.	72
2-E17-14	21DEC88		<10	.	6.080	<50	6	7	44	44
2-E17-15	21DEC88		<10	.	*0.962	52	7	7	47	61
2-E17-16	21DEC88		<10	.	2.110	<50	11	10	24	21
	21DEC88	1	20	.	1.040	<50	10	10	21	23
2-E17-17	21DEC88		<10	.	2.750	67	5	6	44	45
2-E17-18	21DEC88		<10	.	1.430	<50	9	10	33	33

Well name	Collection Date	Duplicate sample number	BETA pCi/L 8/50	FCADMIU ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r
2-E17-5	20DEC88		577.00	<2	49,400	56,300	3,600	<10	22.100
2-E17-6	20DEC88		5.61	<2	32,400	34,200	3,000	<10	*-0.784
2-E17-9	20DEC88		37.30	<2	52,200	57,400	6,100	<10	*0.207
	28DEC88		.	<2	58,000	.	6,000	.	.
2-E17-14	21DEC88		846.00	<2	59,400	61,400	3,800	13	34.100
2-E17-15	21DEC88		1,290.00	<2	101,000	66,000	3,800	21	55.300
2-E17-16	21DEC88		8.63	<2	24,700	23,400	6,700	15	*2.250
	21DEC88	1	10.70	<2	26,700	21,700	6,700	13	*2.350
2-E17-17	21DEC88		208.00	<2	38,300	37,300	4,100	20	15.300
2-E17-18	21DEC88		8.19	3	26,400	24,000	3,000	17	*-5.380

Well name	Collection Date	Duplicate sample number	COLIFRM MPN 2.2/1	COPPER ppb 10/1300p	FCOPPER ppb 10/1300p	CS-137 pCi/L 20/200r	FLUORID ppb 500/4000	I-129 pCi/L 15/1r	IRON ppb 30/300s
2-E17-5	20DEC88		9.2	<10	<10	*-3.42	500	13.700	<30
2-E17-6	20DEC88		<2.2	<10	<10	*2.53	<500	*-0.232	362
2-E17-9	20DEC88		<2.2	<10	<10	*2.61	600	20.400	43
	28DEC88		.	.	<10	.	500	.	.
2-E17-14	21DEC88		<2.2	13	<10	0.00	500	11.500	74
2-E17-15	21DEC88		<2.2	27	19	*-3.64	700	12.700	199
2-E17-16	21DEC88		<2.2	<10	<10	*-1.64	<500	4.070	83
	21DEC88	1	.	<10	<10	*-1.44	<500	*1.780	76
2-E17-17	21DEC88		<2.2	23	13	*5.96	<500	14.500	113
2-E17-18	21DEC88		<2.2	<10	<10	*5.22	500	2.880	91

TABLE 11.4. (contd)

Well name	Collection Date	Duplicate sample number	FIRON ppb 30/300s	LEADGF ppb 5/50	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.
2-E17-5	20DEC88		47	<5	15,000	15,300	<5	<5	<10	<10
2-E17-6	20DEC88		346	<5	11,200	12,400	91	90	<10	<10
2-E17-9	20DEC88		<30	<5	15,400	17,000	<5	<5	<10	<10
	28DEC88		<30	.	.	18,800	<5	.	.	.
2-E17-14	21DEC88		<30	7	17,300	16,800	5	<5	<10	10
2-E17-15	21DEC88		<30	7	19,000	30,000	8	8	#3	16
2-E17-16	21DEC88		<30	<5	9,190	8,650	<5	<5	<10	<10
	21DEC88	1	<30	6	7,980	9,420	<5	<5	<10	<10
2-E17-17	21DEC88		<30	<5	12,200	12,000	6	5	<10	11
2-E17-18	21DEC88		<30	6	8,000	8,210	<5	<5	<10	10

Well name	Collection Date	Duplicate sample number	FNICKEL ppb 10/.	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.	PYRIDIN ppb 500/.	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r
2-E17-5	20DEC88		<10	128,000	7,400	6,850	<500	*0.1060	304.00
2-E17-6	20DEC88		<10	<500	6,680	5,790	<500	0.2460	*22.30
2-E17-9	20DEC88		<10	136,000	7,220	6,010	#7	*0.0650	*34.50
	28DEC88		<10	146,000	7,860	.	.	.	.
2-E17-14	21DEC88		<10	195,000	7,150	6,560	<500	*0.1080	438.00
2-E17-15	21DEC88		11	345,000	8,210	6,660	<500	*0.0990	885.00
2-E17-16	21DEC88		<10	12,100	4,600	4,870	<500	*0.0446	*-18.00
	21DEC88	1	<10	12,700	4,820	4,270	<500	*0.1000	*-40.40
2-E17-17	21DEC88		<10	91,500	6,850	6,660	<500	*0.0100	94.10
2-E17-18	21DEC88		<10	8,300	5,360	5,150	<500	*0.0535	*3.13

Well name	Collection Date	Duplicate sample number	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.
2-E17-5	20DEC88		22,400	24,500	3.9800	266	265	30,000	20,000
2-E17-6	20DEC88		14,600	17,400	*-0.0331	209	188	20,200	30,000
2-E17-9	20DEC88		23,700	28,900	3.5700	296	272	39,600	22,000
	28DEC88		.	32,500	.	338	.	38,700	22,700
2-E17-14	21DEC88		25,100	26,300	15.9000	311	319	30,300	19,000
2-E17-15	21DEC88		31,500	44,800	6.5600	462	318	34,200	20,000
2-E17-16	21DEC88		21,800	19,400	3.5200	121	132	30,100	18,000
	21DEC88	1	18,500	20,600	2.6900	132	115	30,700	18,000
2-E17-17	21DEC88		24,600	24,700	*-0.2420	205	204	28,300	20,000
2-E17-18	21DEC88		19,500	19,600	*-0.0489	136	133	25,100	21,600

TABLE 11.4. (contd)

Well name	Collection Date	Duplicate sample number	TC-99 pCi/L 15/900r	TRITIUM pCi/L 500/20000	UNKALI ppb 0/.	UNKNOWN ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E17-5	20DEC88		312.000	187,000	.	.	20	21	8	<5
2-E17-6	20DEC88		*-0.504	2,120	2	1	<5	<5	<5	<5
2-E17-9	20DEC88		126.000	4,550,000	.	.	26	23	10	<5
	28DEC88		.	.	.	.	26	.	.	14
2-E17-14	21DEC88		288.000	217,000	.	.	21	17	<5	5
2-E17-15	21DEC88		110.000	247,000	.	.	19	19	14	5
2-E17-16	21DEC88		*-0.503	35,200	.	.	30	32	9	<5
	21DEC88	1	12.700	36,200	.	.	35	28	9	<5
2-E17-17	21DEC88		238.000	630,000	.	.	24	19	11	9
2-E17-18	21DEC88		7.300	86,600	.	.	24	25	5	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

THIS PAGE INTENTIONALLY
LEFT BLANK

THIS PAGE INTENTIONALLY
LEFT BLANK

12.0 216-B-3 POND

S. P. Luttrell

The ground water beneath the 216-B-3 Pond (B Pond) has been monitored by a RCRA interim-status well network since November 1988. This project is currently in the background stage of monitoring; two sample sets have been collected. A ground-water monitoring plan has been prepared for this facility.

B Pond consists of a series of interconnected surface ponds covering an area of approximately 102 acres to the east of the 200-East Area (Figure 1.1). The pond receives large volumes (approximately 6 x 10^9 gal in 1987) of waste water from facilities in the 200-East Area.

Four new wells installed in 1988, in conjunction with three pre-existing wells, make up the current monitoring network for B Pond (see Figure 12.1). The background wells are 299-E18-1 and 299-E32-4, and the downgradient wells are 699-42-40A, 699-42-42B, 699-43-42J, 699-43-43, and 699-44-42 (shown in Figure 12.1). Wells BP-1, BP-2, BP-4, BP-5, BP-6, and BP-9 will be installed and added to the network in 1989. In addition, wells 299-E25-32A, 699-39-39,-699-40-33A, and 699-45-42 are used for water-level measurements. Well 299-E18-1 is also monitored for the 2101-M Pond, and well 299-E32-4 is also monitored for the 200 Areas Low-Level Burial Grounds. The sampling schedule for the wells in the monitoring network is shown in Table 12.1.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or hydrogeologic characterization activities were conducted during the quarter.

WATER LEVELS

Water levels were measured when samples were collected in February, and supplemental measurements were made in February and March (see Table 12.2).

WATER CHEMISTRY DATA

Ground-water samples were collected from wells around B Pond on February 15, 17, and 24, 1989. Samples were collected from well 299-E32-4 on December 28, 1988. The analytical results are summarized in Table 12.3. The results for constituents with at least one detected value are provided in Table 12.4. Major observations of the analyses received to date are the following:

- Tritium was reported to be 72,800 pCi/L in well 699-42-42B, which is consistent with the results from the previous quarter.
- Total organic carbon in well 699-44-42 averaged 1800 ppb, an increase from 675 ppb in the previous quarter, and is higher than in samples from the other wells in the 216-B-3 monitoring network.
- No constituent exceeds the 40 CFR 265, Appendix III, standards.
- Nitrate remains elevated in well 699-42-42B (6.4 ppm) in relation to the other wells near B Pond.

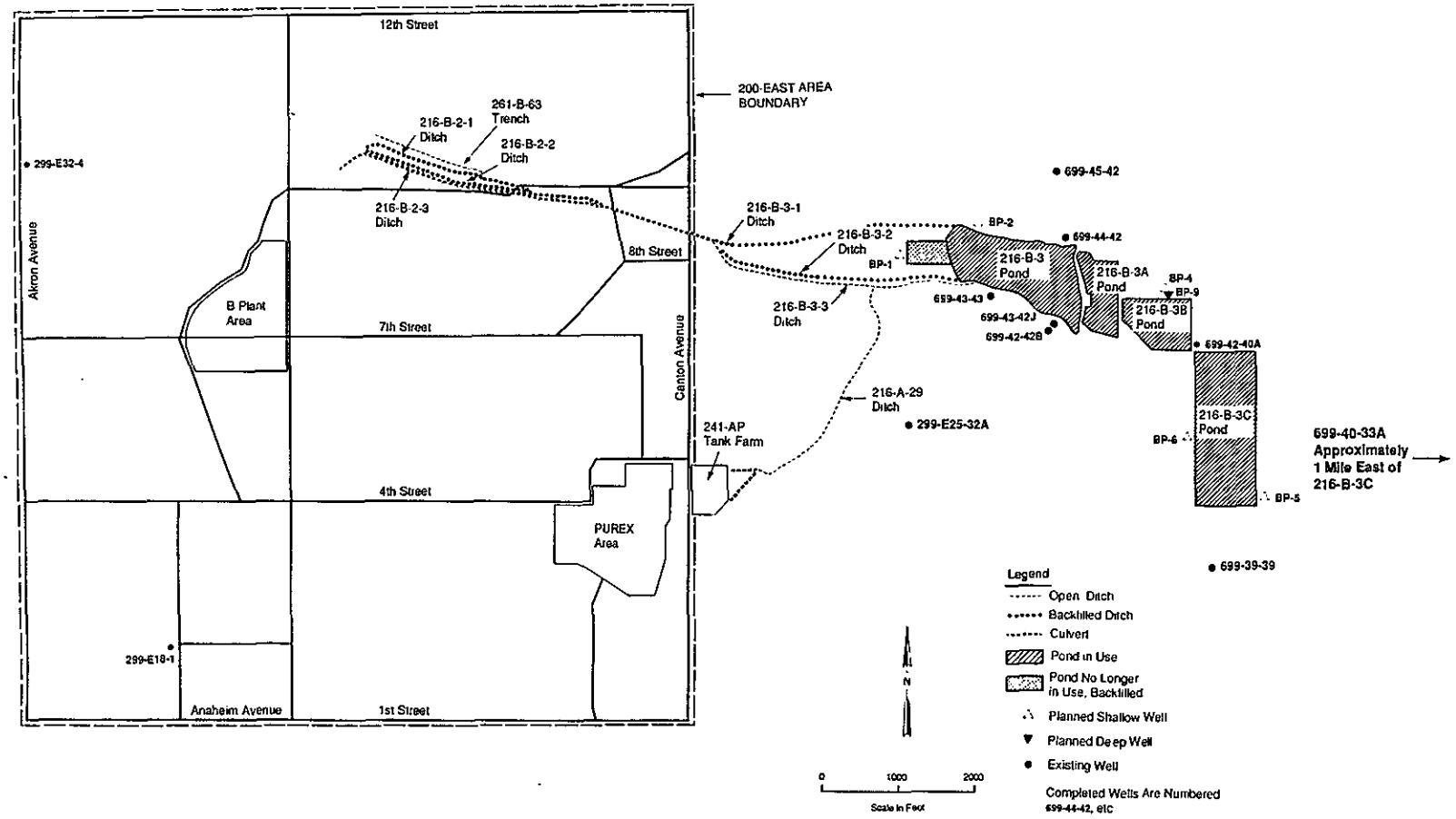

FIGURE 12.1. Monitoring Well Locations for the 216-B-3 Pond

TABLE 12.1. Sampling Schedule for the 216-B-3 Pond

	1988			1989 Projected								
Well	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May[a]	Jun	Jul	Aug	Sep
299-E18-1		X			XRV			X			L	
299-E32-4					S			S			OL	
699-42-40A		XRV			X			X			L	
699-42-42B		X			X			XRV			L	
699-43-42J		X			X			X			LRV	
699-43-43		X			X			X			L	
699-44-42		X			X			X			L	
BP-1								X			L	
BP-2								X			L	
BP-4								X			L	
BP-5								X			L	
BP-6								X			L	
BP-9								X			L	

(a) The new wells may not be completed in May to be sampled as scheduled.
L = sampled for the long list of constituents (WAC 173-303-9905).
OL = sampled for the long list of constituents (overlap with another project).
R = quality control replicates were collected.
S = sampled for the short list of constituents (overlap with another project).
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 12.3).

TABLE 12.2. Water-Level Data for Wells Near the 216-B-3 Pond

Well Number	Casing Elevation, ft above MSL[a]	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]
299-E18-1	720.24	2/15/89	314.65	405.59
299-E25-32A	669.19	2/23/89	262.58	406.61
		3/28/89	262.77	406.42
699-39-39	536.65	2/23/89	116.73	419.92
		3/28/89	116.77	419.88
699-40-33A	518.05	2/23/89	106.47	411.58
		3/28/89	106.40	411.65
699-42-40A	545.53	2/15/89	122.27	423.26
		2/23/89	122.41	423.12
		3/28/89	122.50	423.03
699-42-42B	583.23	2/23/89	165.62	417.61
		3/28/89	165.65	417.58
699-43-42J	581.68	2/23/89	162.01	419.67
		3/28/89	162.01	419.67
699-43-43	579.37	2/23/89	164.04	415.33
		2/24/89	164.04	415.33
		3/28/89	164.04	415.33
699-44-42	579.22	2/17/89	158.00	421.22
		2/23/89	157.95	421.27
		3/28/89	157.92	421.30
699-45-42	577.33	2/23/89	158.58	418.75
		3/28/89	158.77	418.56

(a) MSL = mean sea level

TABLE 12.3. Constituent List and Summary of Sampling Results for the 216-B-3 Pond
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
088	CONDLAB	umho	.	13	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	20	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	20	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	13	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	28	0	.			Total organic carbon
H42	TOXLDL	ppb	10	28	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	7	7 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	8	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	7	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	7	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	1	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	8	1	1000	EPA		Barium
A07	CADMIUM	ppb	2	8	6	10	EPA		Cadmium
A08	CHROMUM	ppb	10	8	2	50	EPA		Chromium
A10	SILVER	ppb	10	8	8 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	8	3	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	7	7 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	8	7	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	7	7 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	7	7 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	7	7 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	7	7 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	8	8 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	8	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	8	7	4000	EPA		Fluoride
H13	2,4-D	ppb	2	7	7 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	7	7 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	8	1	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	8	7	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	8	7	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	8	8 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	8	3	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	7	7 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	8	7	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	8	8 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	6	0	1	EPA	xxx	Turbidity, nephelometric

TABLE 12.3. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	8	0	.			Sodium
A17	MANGESE	ppb	5	8	4	50	EPAS		Manganese
A19	IRON	ppb	30	8	0	300	EPAS		Iron
C73	SULFATE	ppb	500	8	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	8	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	8	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	8	6	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	8	5	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	7	7 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
104	U	pCi/L	0.5	4	0	600	DOE		Uranium
108	TRITIUM	pCi/L	500	8	0	20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	1	0	8	EPA		Strontium-90
197	TC-99	pCi/L	15	1	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	8	8 ***	.			Beryllium
A03	STRONUM	ppb	20	8	0	.			Strontium
A04	ZINC	ppb	5	8	3	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	8	0	.			Calcium
A12	NICKEL	ppb	10	8	3	.			Nickel
A13	COPPER	ppb	10	8	8 ***	1300	EPAP		Copper
A14	VANADUM	ppb	5	8	2	.			Vanadium
A15	ANTIONY	ppb	100	8	8 ***	.			Antimony
A16	ALUMNUM	ppb	150	8	8 ***	.			Aluminum
A18	POTASUM	ppb	100	8	0	.			Potassium
A50	MAGNES	ppb	50	8	0	.			Magnesium
C76	PHOSPHA	ppb	1000	8	8 ***	.			Phosphate
H16	TC	ppb	1000	8	0	.			Total carbon
H18	FZINC	ppb	5	8	4	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	8	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	8	7	.			Nickel, filtered
H26	FCOPPER	ppb	10	8	8 ***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	8	1	.			Vanadium, filtered
H28	FALUMIN	ppb	150	8	8 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	8	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	8	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	8	8 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	8	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	8	8 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	7	7 ***	.			Bromide
H67	NITRITE	ppb	1000	7	7 ***	.			Nitrite

TABLE 12.3. (contd)

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H86	FBORON	ppb	10	7	1	.		Boron, filtered
H87	FCOBALT	ppb	20	7	7 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	7	7 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	7	7 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	7	0	.		Silicon, filtered
H91	FTIN	ppb	30	7	7 ***	.		Tin, filtered
H92	FTITAN	ppb	60	7	7 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	7	7 ***	.		Zirconium, filtered
P01	BORON	ppb	10	7	2	.		Boron
P02	COBALT	ppb	20	7	7 ***	.		Cobalt
P03	LITHIUM	ppb	10	7	7 ***	.		Lithium
P04	MOLY	ppb	40	7	7 ***	.		Molybdenum
P05	SILICON	ppb	50	7	0	.		Silicon
P06	TIN	ppb	30	7	7 ***	.		Tin
P07	TITAN	ppb	60	7	7 ***	.		Titanium
P08	ZIRCON	ppb	50	7	7 ***	.		Zirconium

Constituent List=WAC 173-303-9905 Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	8	8 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	7	7 ***	5	EPA	Benzene
A64	METHONE	ppb	10	8	8 ***	.		Methyl ethyl ketone
A66	TOLUENE	ppb	5	7	7 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	8	8 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	8	8 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	8	8 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	8	8 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	8	8 ***	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	8	8 ***	100	EPA	Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	7	7 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	7	7 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	7	7 ***	70	EPAP	trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	8	7	.		Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	7	7 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	8	8 ***	440	EPAP	Xylene-m
C70	CYANIDE	ppb	10	1	1 ***	.		Cyanide
C80	AMMONIU	ppb	50	8	8 ***	.		Ammonium ion
H15	2,4,5-T	ppb	2	6	6 ***	.		2,4,5-T
H62	LHYDRAZ	ppb	30	7	7 ***	.		Hydrazine, low DL
H68	HEXONE	ppb	10	8	8 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	7	7 ***	.		Acetone by VOA
I28	TAF	ppb	10	7	7 ***	.		Tetrahydorfuran
I98	UNKALI	ppb	0	1	0	.		Unknown aliphatic HC
L63	14DBEN	ppb	5	7	7 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]

TABLE 12.3. (contd)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 12.4. Constituents with at Least One Detected Value for the 216-B-3 Pond
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E18-1	15FEB89		537	514	7.90	7.00	#200	#5
		1	534	512	7.80	7.00	#200	#5
		2	532	510	7.70	6.90	#200	#0
		3	531	517	7.80	6.90	#200	#5
2-E32-4	28DEC88		364	423	8.00	7.80	#200	#2
		1	365	422	8.00	7.90	#200	#6
		2	365	422	8.00	7.90	#200	#6
		3	366	422	8.00	7.90	#200	#9
6-42-40A	15FEB89		161	164	8.10	8.40	#800	#7
		1	161	.	.	8.40	#800	#6
		2	162	.	.	8.40	#800	#6
		3	162	.	.	8.40	#800	#6
6-42-42B	24FEB89		230	242	8.00	7.60	#500	#5
		1	230	.	.	7.60	#400	#3
		2	230	.	.	7.70	#500	#5
		3	230	.	.	7.70	#500	#7
6-43-42J	24FEB89		239	222	8.00	8.10	#500	#5
		1	239	.	.	8.10	#700	#8
		2	240	.	.	8.10	#600	#4
		3	240	.	.	8.10	#500	#5
6-43-43	24FEB89		.	195	8.10	.	#600	#1
		1	.	.	.	.	#600	#1
		2	.	.	.	.	#500	#8
		3	.	.	.	.	#500	#6
6-44-42	17FEB89		.	222	8.10	.	#1800	#5
		1	.	.	.	.	#1900	#6
		2	.	.	.	.	#1800	#5
		3	.	.	.	.	#1700	#2

TABLE 12.4. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ALPHA pCi/L 4/15	ALPHAHI pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.
2-E18-1	15FEB89		.	4.870	<5	<5	29	31	6.85	33	38
2-E32-4	28DEC88		2.09	.	<5	<5	67	70	6.50	.	.
6-42-40A	15FEB89		.	2.320	<5	<5	<6	<6	*1.32	<10	<10
6-42-42B	24FEB89		.	*0.769	6	6	28	26	*1.64	14	17
6-43-42J	24FEB89		.	2.340	8	8	13	12	4.52	14	16
6-43-43	24FEB89		.	*0.302	7	7	14	13	3.99	14	20
	24FEB89	1	.	*0.406	7	7	12	13	4.23	12	13
6-44-42	17FEB89		.	1.560	13	12	14	15	3.89	<10	12

Well name	Collection Date	Duplicate sample number	FCADMIU ppb 2/10	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	FCHROMI ppb 10/50	CHROMUM ppb 10/50	FLUORID ppb 500/4000
2-E18-1	15FEB89		<2	<2	57,600	55,700	6,900	<10	22	<500
2-E32-4	28DEC88		<2	<2	40,300	43,200	8,700	<10	38	600
6-42-40A	15FEB89		<2	<2	21,700	20,700	3,100	<10	<10	<500
6-42-42B	24FEB89		<2	2	20,700	22,400	3,600	<10	37	<500
6-43-42J	24FEB89		3	2	24,800	25,000	3,000	<10	41	<500
6-43-43	24FEB89		<2	<2	22,600	24,600	2,900	<10	34	<500
	24FEB89	1	<2	<2	22,600	25,400	2,900	10	23	<500
6-44-42	17FEB89		<2	<2	22,300	21,700	3,300	<10	<10	<500

Well name	Collection Date	Duplicate sample number	IRON ppb 30/300s	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.
2-E18-1	15FEB89		162	<30	13,900	14,400	<5	<5	<5	<10	<10
2-E32-4	28DEC88		197	<30	13,300	14,000	<5	5	#2	21	<10
6-42-40A	15FEB89		130	53	5,230	5,680	5	8	<5	<10	<10
6-42-42B	24FEB89		221	<30	7,720	7,130	<5	7	<5	22	<10
6-43-42J	24FEB89		216	33	6,350	6,380	5	8	<5	29	12
6-43-43	24FEB89		132	<30	5,810	5,430	<5	<5	<5	20	<10
	24FEB89	1	98	31	5,950	5,370	<5	<5	<5	16	<10
6-44-42	17FEB89		44	<30	6,020	6,230	<5	<5	<5	<10	<10

Well name	Collection Date	Duplicate sample number	NITRATE ppb 500/45000	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5	FSELENI ppb 5/10	SELENUM ppb 5/10	FSILICO ppb 50/.	SILICON ppb 50/.
2-E18-1	15FEB89		11,400	5,800	5,570	0.2470	7	7	14,000	13,600
2-E32-4	28DEC88		24,200	6,400	6,080	*0.0520	<5	<5	.	.
6-42-40A	15FEB89		600	2,490	2,190	*0.0811	<5	<5	3,950	3,830
6-42-42B	24FEB89		6,400	3,880	4,130	0.5080	<5	<5	18,000	19,200
6-43-42J	24FEB89		1,800	5,370	5,190	0.2440	<5	<5	15,900	16,000
6-43-43	24FEB89		700	5,750	5,990	*0.0074	<5	<5	13,400	14,500
	24FEB89	1	700	5,600	6,140	.	<5	<5	13,300	14,900
6-44-42	17FEB89		1,400	5,080	4,980	0.2300	<5	<5	16,300	15,800

TABLE 12.4. (contd)

Well name	Collection Date	Duplicate sample number	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r
2-E18-1	15FEB89		25,800	27,100	.	241	240	149,000	23,800	.
2-E32-4	28DEC88		26,500	28,500	*-0.0512	215	209	55,900	24,900	*4.5
6-42-40A	15FEB89		3,540	4,040	.	104	101	13,500	17,700	.
6-42-42B	24FEB89		20,200	19,600	.	150	162	18,400	23,100	.
6-43-42J	24FEB89		13,100	13,500	.	121	121	12,600	23,900	.
6-43-43	24FEB89		7,860	7,510	.	110	120	11,000	20,500	.
	24FEB89	1	8,050	7,290	.	110	121	11,000	20,500	.
6-44-42	17FEB89		16,500	16,900	.	128	125	14,000	22,700	.

Well name	Collection Date	Duplicate sample number	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	U pCi/L 0.5/600d	UNKALI ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E18-1	15FEB89		*-55.7	1.40	.	.	6	<5	23	30
2-E32-4	28DEC88		1,890.0	.	2.460	6	12	19	12	12
6-42-40A	15FEB89		*-25.4	0.25	0.703	.	<5	<5	<5	7
6-42-42B	24FEB89		72,800.0	0.70	1.360	.	31	32	52	31
6-43-42J	24FEB89		2,620.0	1.50	1.510	.	54	54	10	<5
6-43-43	24FEB89		338.0	0.50	.	.	32	37	<5	<5
	24FEB89	1	432.0	.	.	.	32	37	7	<5
6-44-42	17FEB89		1,140.0	0.40	.	.	47	47	<5	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

13.0 2101-M POND

M. A. Chamness

The ground water near the 2101-M Pond has been monitored by a RCRA interim-status well network since August 1988. This project is currently in the background stage of monitoring; three sample sets have been collected. A closure plan is being prepared for this site by Westinghouse Hanford Company.

The 2101-M Pond is located west-southwest of the 2101-M Building in the southwest portion of the 200-East Area (Figure 13.1). The pond has received waste water from the 2101-M Building heating and air conditioning system from 1953 to the present. In 1981, laboratory sinks were plumbed into the discharge line from the 2101-M Building to the pond. From 1981 until mid-1985, these laboratories may have discharged dangerous wastes into the pond.

There are four wells in the monitoring network for the 2101-M Pond (see Figure 13.1). Well 299-E18-1 is the upgradient well, and wells 299-E18-2, 299-E18-3, and 299-E18-4 are the downgradient wells. Well 299-E18-1 is also used as an upgradient well for the 216-B-3 Pond (see Section 12.0). Table 13.1 shows the sampling schedule for the wells in the monitoring network.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No further drilling activities are currently planned for this site.

WATER LEVELS

In addition to the quarterly ground-water sampling, water levels are measured in the four monitoring wells. Table 13.2 provides the water-level data to date.

Samples were collected from each of the four monitoring wells on February 15 and 16, 1989. All samples were collected after approximately three borehole volumes of water had been purged from the well using dedicated HydroStar® sampling pumps.

The analytical data from the wells are summarized in Table 13.3. The data for constituents that had at least one value reported above the detection limit are presented in Table 13.4.

The ground-water chemistry is discussed below.

WATER CHEMISTRY DATA

The third set of quarterly samples has been taken, as required in 40 CFR 265.92. Chromium, iron, and turbidity were each at levels above standards in at least one of the four wells. Chromium was found at concentrations at or above the 40 CFR 141 standard in wells 299-E18-2 and 299-E18-3 in unfiltered samples. Iron was above the 40 CFR 143 standard in all wells except 299-E18-1 for unfiltered samples. As discussed in Section 1.0 Introduction, these metals are thought to be present as a result of the drilling process and/or the materials used in the final well construction. Turbidity was measured only in one well, 299-E18-1, where it was found to slightly exceed the standard in 40 CFR 265, Appendix III. Turbidity is only required to be monitored in surface water, but was measured in this case as an indicator of particulate content (see Section 1.0 Introduction).

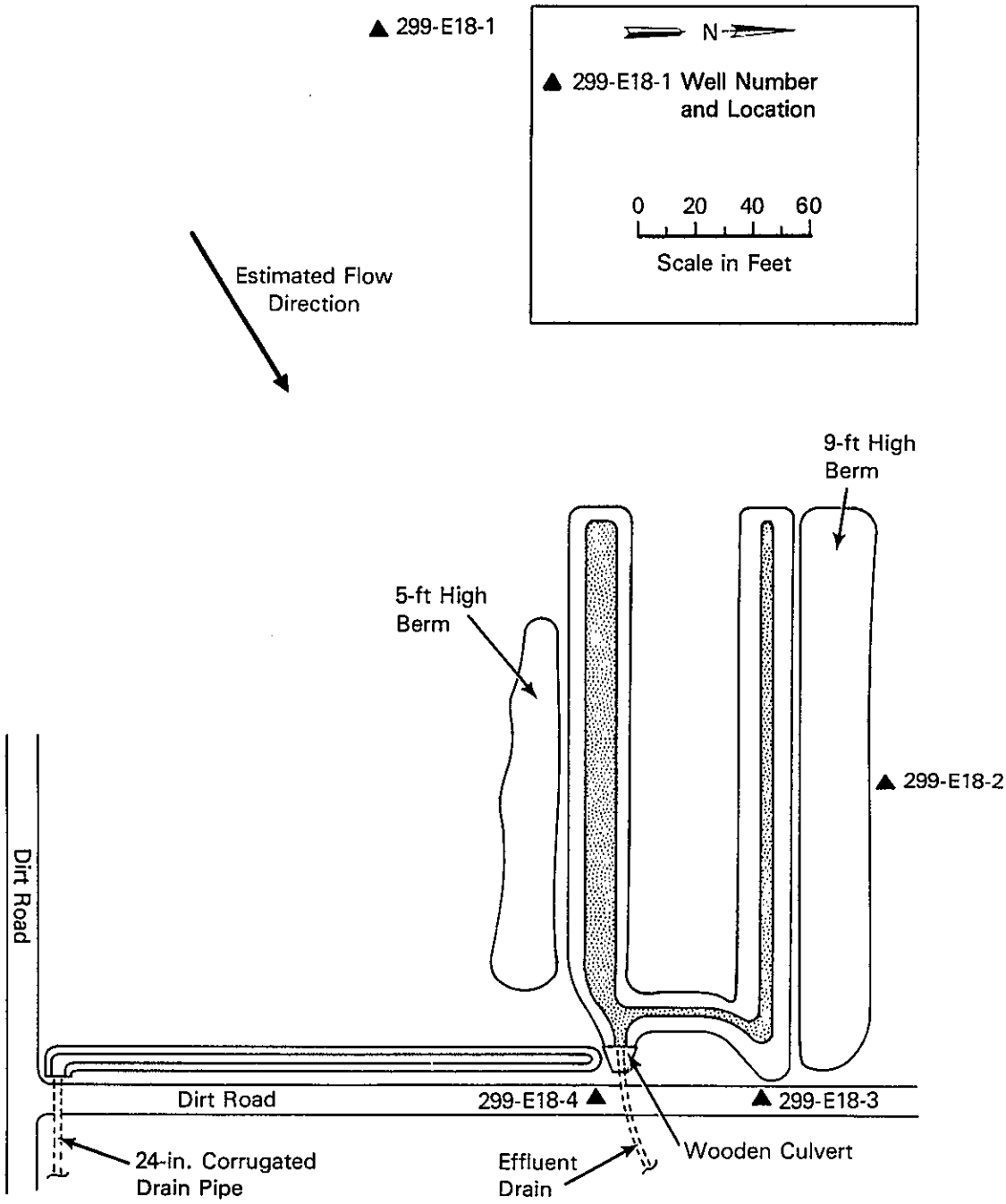

FIGURE 13.1. Monitoring Well Locations for the 2101-M Pond

TABLE 13.1. Sampling Schedule for the 2101-M Pond

	1988			1989 Projected								
Well	Oct	Nov[a]	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
299-E18-1		LRV			X			X				
299-E18-2		L			XRV			X				
299-E18-3		L			X			XRV				
299-E18-4		L			X			X				

(a) All wells were sampled twice this month, once for L, once for volatile organic constituents.
L = sampled for the long list of constituents (WAC 173-303-9905).
R = quality control replicates were collected.
V = volatile organic analyses blanks were collected.
X = sampled for the regular list of constituents (see Table 13.3).

TABLE 13.2. Water-Level Elevation Data for Wells Near the 2101-M Pond[a]

Well Number	Top of Casing Elevation, ft above MSL[b]	Correction Factor[c]	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL
299-E18-1	720.24	+0.06	10/06/88	314.29	406.01
			10/14/88	314.24	406.06
			10/26/88	314.32	405.98
			11/14/88	314.49	405.81
			12/08/88	314.21	406.09
			02/09/89	314.47	405.83
			02/21/89	314.56	405.74
299-E18-2	721.21	+0.22	10/06/88	315.52	405.91
			10/14/88	315.52	405.91
			10/26/88	315.55	405.88
			11/14/88[d]	315.69	405.74
			12/08/88	315.47	405.96
			02/09/89	315.75	405.68
			02/21/89	315.84	405.59
299-E18-3	722.04	+0.03	10/06/88	--[e]	--[e]
			10/14/88	316.13	405.94
			10/26/88	316.10	405.97
			11/14/88	316.21	405.86
			12/08/88[d]	316.02	406.05
			02/09/89[d]	316.31	405.76
			02/21/89	316.39	405.68
299-E18-4	721.57	+0.0	10/06/88	315.59	405.98
			10/14/88	315.66	405.91
			10/26/88	315.62	405.95
			11/14/88	315.74	405.83
			12/08/88	315.53	406.04
			02/09/89	315.81	405.76
			02/21/89	315.91	405.66

(a) Measurements collected at times other than during sampling. All measurements were taken with the same steel tape and within a short time. Measurements are taken until two are within 0.02 ft.
(b) MSL = mean sea level.
(c) Correction factors are based on inclinometer measurements that determined a minimum value from the vertical for the boreholes. This correction factor was added to the elevation of the borehole to provide the corrected water-level elevations given in the last column.
(d) Measured only once.
(e) Unable to make measurements.

TABLE 13.3. Constituent Lists and Summary of Sampling Results for the 2101-M Pond
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
088	CONDLAB	umho	.	16	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	16	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	16	0	6.5-8.5	EPAS		pH, field
207	PH-LAB		0.01	16	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	16	0	.			Total organic carbon
H42	TOXLDL	ppb	10	16	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Standards Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	4	4 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	5	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	5	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	5	0	5	EPA		Total radium
A06	BARIUM	ppb	6	5	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	5	5 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	5	0	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	5	5 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	5	1	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	5	5 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	5	4	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	4	4 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	4	4 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	4	4 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	4	4 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	4	4 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	4	4 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	4	4 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	5	5 ***	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	4	2	45000	EPA		Nitrate
C74	FLUORID	ppb	500	4	3	4000	EPA		Fluoride
H13	2,4-D	ppb	2	4	4 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	4	4 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	5	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	5	4	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	5	5 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	5	5 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	5	1	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	5	5 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	5	4	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	5	5 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	1	0	1	EPA	xxx	Turbidity, nephelometric

TABLE 13.3. (contd)

Constituent List=Water Quality Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	5	0	.			Sodium
A17	MANGESE	ppb	5	5	1	50	EPAS		Manganese
A19	IRON	ppb	30	5	0	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	4	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	4	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	5	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	5	5 ***	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	5	2	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	4	4 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
108	TRITIUM	pCi/L	500	1	0	20000	EPA		Tritium (H-3)
A01	BERYLUM	ppb	5	5	5 ***	.			Beryllium
A03	STRONUM	ppb	20	5	0	.			Strontium
A04	ZINC	ppb	5	5	0	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	5	0	.			Calcium
A12	NICKEL	ppb	10	5	1	.			Nickel
A13	COPPER	ppb	10	5	3	1300	EPAP		Copper
A14	VANADUM	ppb	5	5	1	.			Vanadium
A15	ANTIONY	ppb	100	5	5 ***	.			Antimony
A16	ALUMNUM	ppb	150	5	5 ***	.			Aluminum
A18	POTASUM	ppb	100	5	0	.			Potassium
A50	MAGNES	ppb	50	5	0	.			Magnesium
C76	PHOSPHA	ppb	1000	4	4 ***	.			Phosphate
H16	TC	ppb	1000	1	0	.			Total carbon
H18	FZINC	ppb	5	5	0	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	5	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	5	4	.			Nickel, filtered
H26	FCOPPER	ppb	10	5	4	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	5	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	5	5 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	5	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	5	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	5	5 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	5	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	5	5 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	4	4 ***	.			Bromide
H67	NITRITE	ppb	1000	4	4 ***	.			Nitrite

TABLE 13.3. (contd)

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H86	FBORON	ppb	10	5	1	.		Boron, filtered
H87	FCOBALT	ppb	20	5	5 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	5	5 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	5	5 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	5	0	.		Silicon, filtered
H91	FTIN	ppb	30	5	5 ***	.		Tin, filtered
H92	FTITAN	ppb	60	5	5 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	5	5 ***	.		Zirconium, filtered
P01	BORON	ppb	10	5	1	.		Boron
P02	COBALT	ppb	20	5	5 ***	.		Cobalt
P03	LITHIUM	ppb	10	5	5 ***	.		Lithium
P04	MOLY	ppb	40	5	5 ***	.		Molybdenum
P05	SILICON	ppb	50	5	0	.		Silicon
P06	TIN	ppb	30	5	5 ***	.		Tin
P07	TITAN	ppb	60	5	5 ***	.		Titanium
P08	ZIRCON	ppb	50	5	5 ***	.		Zirconium

Constituent List=WAC 173-303-9905 Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	1	1 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	1	1 ***	5	EPA	Benzene
A64	METHONE	ppb	10	1	1 ***	.		Methyl ethyl ketone
A66	TOLUENE	ppb	5	1	1 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	1	1 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	1	1 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	1	1 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	1	1 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	1	1 ***	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	1	1 ***	100	EPA	Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	1	1 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	1	1 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	1	1 ***	70	EPAP	trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	1	1 ***	.		Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	1	1 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	1	1 ***	440	EPAP	Xylene-m
C80	AMMONIU	ppb	50	1	1 ***	.		Ammonium ion
H15	2,4,5-T	ppb	2	4	4 ***	.		2,4,5-T
H62	LHYDRAZ	ppb	30	1	1 ***	.		Hydrazine, low DL
H68	HEXONE	ppb	10	1	1 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	1	1 ***	.		Acetone by VOA
I28	TAF	ppb	10	1	1 ***	.		Tetrahydorfuran
L63	14DBEN	ppb	5	1	1 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]

TABLE 13.3. (contd)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 13.4. Constituents with at Least One Detected Value for the 2101-M Pond
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E18-1	15FEB89		537	514	7.90	7.00	#200	#5
		1	534	512	7.80	7.00	#200	#5
		2	532	510	7.70	6.90	#200	#0
		3	531	517	7.80	6.90	#200	#5
2-E18-2	16FEB89		256	252	8.10	8.00	#500	#4
		1	256	263	8.10	8.00	#700	#3
		2	256	256	8.10	8.00	#900	#5
		3	256	258	8.10	8.00	#1000	#3
2-E18-3	16FEB89		207	235	8.20	8.00	#800	#8
		1	206	232	8.20	8.00	#800	#5
		2	205	224	8.20	8.00	#500	12
		3	205	230	8.10	8.00	#600	11
2-E18-4	15FEB89		248	228	8.10	7.00	#600	#8
		1	248	263	8.10	7.00	#600	#9
		2	248	261	8.00	7.00	#600	#9
		3	248	242	8.00	7.00	#600	#8

TABLE 13.4. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ALPHAHI pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.	FCADMIU ppb 2/10
2-E18-1	15FEB89		4.870	<5	<5	29	31	6.85	33	38	<2
2-E18-2	16FEB89		1.720	6	6	60	59	5.46	24	16	<2
	16FEB89	1	*1.200	6	6	61	62	*1.78	13	34	<2
2-E18-3	16FEB89		2.420	13	12	62	63	5.12	14	<10	2
2-E18-4	15FEB89		*0.879	11	10	51	52	5.85	<10	14	<2

Well name	Collection Date	Duplicate sample number	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	COPPER ppb 10/1300p	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s
2-E18-1	15FEB89		57,600	55,700	6,900	22	<10	<10	<500	162
2-E18-2	16FEB89		25,300	25,700	4,900	50	12	<10	700	303
	16FEB89	1	26,800	25,400	.	79	<10	<10	.	423
2-E18-3	16FEB89		29,800	29,600	6,500	104	<10	<10	<500	858
2-E18-4	15FEB89		27,400	27,800	9,500	42	13	11	<500	325

Well name	Collection Date	Duplicate sample number	FIRON ppb 30/300s	MAGNES ppb 50/.	FMAGNES ppb 50/.	MANGESE ppb 5/50s	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000	FPOTASS ppb 100/.
2-E18-1	15FEB89		<30	13,900	14,400	<5	<10	<10	11,400	5,800
2-E18-2	16FEB89		39	7,190	7,150	8	28	<10	<500	5,100
	16FEB89	1	40	7,220	7,510	9	40	<10	.	5,350
2-E18-3	16FEB89		41	8,320	8,270	18	54	13	<500	5,310
2-E18-4	15FEB89		<30	7,930	7,850	10	21	<10	800	5,390

Well name	Collection Date	Duplicate sample number	POTASUM ppb 100/.	RADIUM pCi/L 1/5	FSELENI ppb 5/10	SELENUM ppb 5/10	FSILICO ppb 50/.	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.
2-E18-1	15FEB89		5,570	0.247	7	7	14,000	13,600	25,800	27,100	241
2-E18-2	16FEB89		5,210	0.222	<5	<5	19,600	19,800	19,200	18,700	146
	16FEB89	1	5,220	0.343	<5	<5	20,700	19,600	19,000	19,800	153
2-E18-3	16FEB89		5,500	0.302	<5	<5	19,000	19,600	6,560	6,460	156
2-E18-4	15FEB89		5,370	0.275	<5	<5	17,200	17,100	11,400	9,640	145

TABLE 13.4. (contd)

Well name	Collection Date	Duplicate sample number	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E18-1	16FEB89		240	149,000	23,800	*-55.7	1.4	6	<5	23	30
2-E18-2	16FEB89		146	31,600	.	.	.	24	29	27	11
	16FEB89	1	147	.	.	.	.	27	20	22	20
2-E18-3	16FEB89		161	12,500	.	.	.	31	32	22	5
2-E18-4	16FEB89		150	22,100	.	.	.	22	22	9	6

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

14.0 GROUT TREATMENT FACILITY

S. S. Teel

The ground water near the Grout Treatment Facility (GTF) has been monitored by a RCRA interim-status well network since 1988. This project is currently in the background stage of monitoring; however, indicator parameter evaluation will begin next quarter. A Part B Permit Application was submitted to the Washington State Department of Ecology in November 1988 (DOE 1988b). A ground-water monitoring plan is currently being prepared for the facility.

The GTF will be used for the treatment and disposal of liquid mixed waste (DOE 1988b). The wastes will be mixed with a cementitious grout material and then poured into concrete-lined vaults where they will solidify. Field data collection in support of this project began in 1984. Treatment and disposal of a nondangerous mixture of phosphate/sulfate waste began in August 1988 (DOE 1988b). The site is scheduled to begin processing mixed wastes in 1991.

There are currently five wells in the RCRA monitoring network for the GTF. Wells 299-E25-25 and 299-E25-32A are upgradient wells; wells 299-E25-29A, 299-E25-31, and 299-E25-33 are downgradient wells. Ground-water samples are also collected and analyzed from eight site characterization wells: 299-E25-18, 299-E25-20, 299-E25-22, 299-E25-24, 299-E25-26, 299-E25-27, 299-E25-28, and 299-E25-30A. These additional wells are sampled to monitor the effects of nearby waste-disposal facilities and to monitor the base of the unconfined aquifer (299-E25-28). The locations of the wells in the monitoring network are shown in Figure 14.1. Table 14.1 shows the sampling schedule for these wells.

Wells 299-E25-20 and 299-E25-24 were added to the sampling network during the past quarter. These existing wells were added for additional monitoring near the 216-A-37-1 and 216-A-37-2 cribs.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No drilling or hydrologic characterization occurred during the reporting period. Drilling of two additional ground-water monitoring wells is scheduled to begin during the third quarter of 1989. Planning activities related to this activity began during the past quarter.

WATER LEVELS

Water-level measurements were made both before sample collection and on a monthly basis. Table 14.2 lists the water-level data collected before sample collection. Measurements were made at all wells except 299-E25-25, 299-E25-29A, and 299-E25-31 during the January sampling, and at wells 299-E25-25 and 299-E25-33 during the March sampling.

Monthly water-level measurements are obtained from all of the GTF ground-water monitoring wells and several other Hanford Site wells including 299-E25-9, 299-E25-34, 299-E25-35, 299-E26-2, 699-42-40B, 699-43-42A, 699-37-43. Table 14.3 lists the water-level data collected monthly. Figure 14.2 presents a water-table map constructed from data collected on March 27, 1989. Data for well 299-E25-28 were not used on this map because this well is completed at the bottom of the unconfined aquifer, a different completion interval than those of the other wells in the network.

The water-table map shown in Figure 14.2 suggests that the direction of ground-water flow beneath the GTF is to the southwest. This is consistent with data reported in the Part B Permit Application (DOE 1988b).

WATER CHEMISTRY DATA

Quarterly sampling is being conducted to establish background levels for ground-water constituents. Two sets of samples were collected during the quarter. The first set included only the five RCRA monitoring wells. Wells 299-E25-25, 299-E25-29A, 299-E25-31, and 299-E25-32A were sampled on January 3 and 4, 1989. Well 299-E25-33 was sampled on January 31, 1989. All five of these wells were originally scheduled for sampling in December. Well 299-E25-33 required extensive modifications before sampling could occur.

9 1 1 1 3 9 1 2 0 7

These modifications were necessary as a result of an expansion of the Waste Management Area that involved excavating around the well, removing approximately 25 ft of casing, and building a stairway from the new Waste Management Area edge to the well for safe access. The other four wells were affected by a delay in the sampling schedule.

The second sampling involved all 13 wells in the network and took place on February 24, 27, 28, and March 2, 1989. All of the samples were collected after approximately three borehole volumes of water had been purged. A summary of the analytical data from the wells is provided in Table 14.4. The data for constituents that had at least one detected value are presented in Table 14.5.

Discussion of Results

The analytical results in Tables 14.4 and 14.5 show elevated levels for some constituents. Chromium (in unfiltered samples) in wells 299-E25-25 (59 ppb - January sampling), 299-E25-29A (149 ppb - January sampling) and 299-E25-30A (190/85 ppb - January/February samplings) exceeds the standard of 50 ppb listed in 40 CFR 265, Appendix III. However, chromium concentrations in wells 299-E25-25 and 299-E25-29A had decreased to below detection and 24 ppb, respectively, in the February sampling. Chromium concentrations in well 299-E25-30A appear to be steadily decreasing with time. The filtered chromium values for all wells were below the 40 CFR 265 standard. However, it is not known the degree to which the observed chromium concentrations are representative of the ground water at the site. Section 1.0 Introduction contains a discussion of this problem.

Nitrate in well 299-E25-20 (195 ppm - February sampling) exceeds the standard of 45 ppm listed in 40 CFR 265, Appendix III. This is the first time that this well has been sampled. This elevated value is not caused by operations at the GTF, but results from the disposal of liquids used in chemical processing activities in the 200-East Area. The well is adjacent to an active waste disposal facility, the 216-A-37-1 crib. Additional constituents that are higher than those in the other wells include barium, filtered barium, beta, calcium, filtered calcium, magnesium, filtered magnesium, potassium, filtered potassium, strontium, and filtered strontium.

Tritium in well 299-E25-29A (36,700 pCi/L - January sampling) occurred above the standard of 20,000 pCi/L in 40 CFR 141. This tritium value is also a result of 200-East Area process waste disposal (see above).

Iron (unfiltered) concentrations for the January sampling in wells 299-E25-25 (474 ppb), 299-E25-29A (661 ppb), 299-E25-30A (790 ppb), and 299-E25-33 (686 ppb) are higher than the other wells. All of these wells showed significant decreases for this constituent during the February/March sampling.

Well 299-E25-30A continues to show relatively higher values, compared to the other wells, for several constituents including arsenic, filtered arsenic, nickel, vanadium, filtered vanadium, phosphate, sodium, and filtered sodium. However, concentrations of all of the above constituents have decreased compared to the October 1989 data.

Six wells showed TOX concentrations above the detection limit for the first quarter of 1989. Only two of these six wells repeated TOX values above the detection limit during the second quarter 1989 samplings: 299-E25-29A and 299-E25-31. Both of these wells had previously shown TOX values above detection (before FY 1989).

October 1988 samples from wells 299-E25-25, 299-E25-27, 299-E25-29A, and 299-E25-33 are currently being analyzed for acid/base/neutrals to determine the cause of the detected TOX.

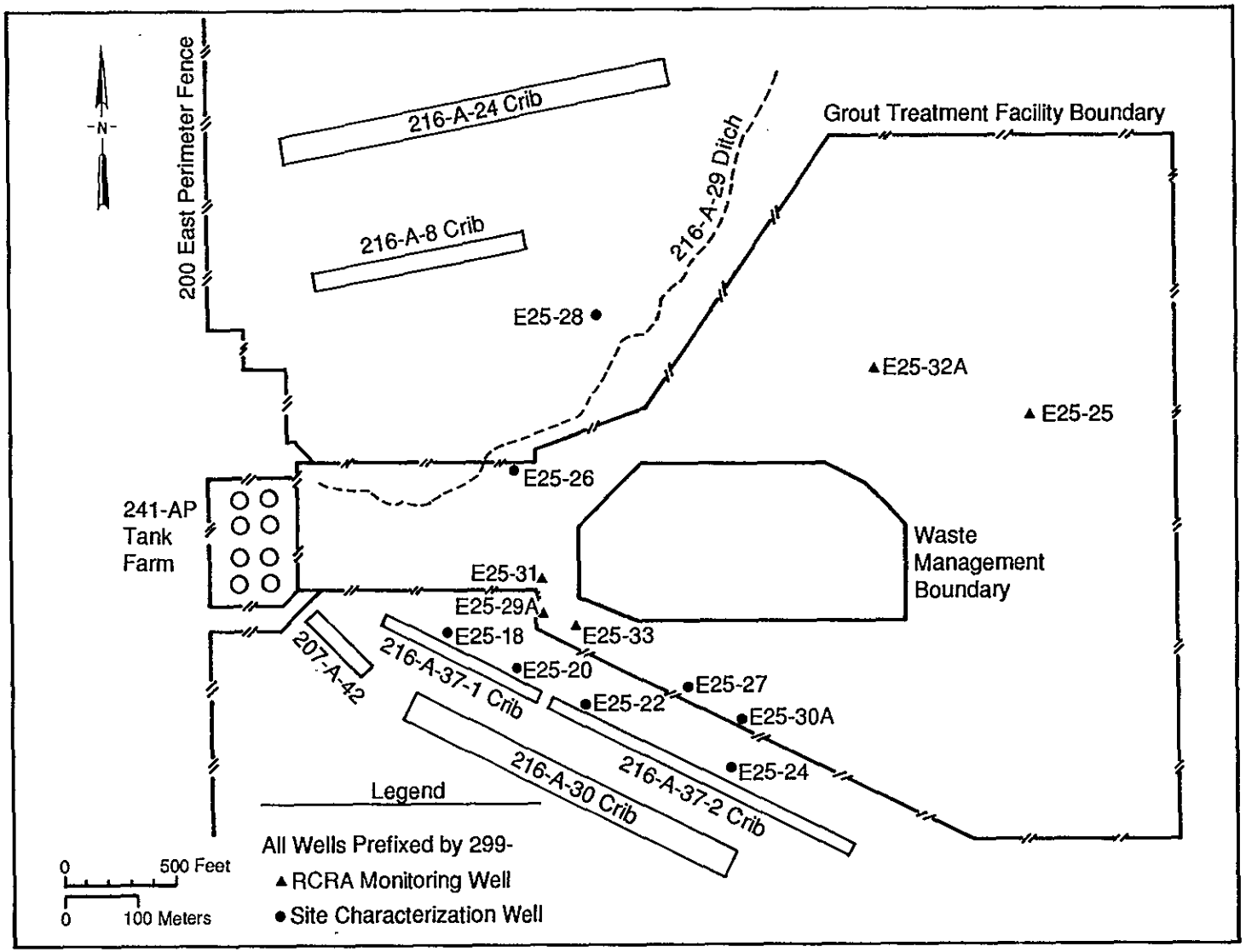

FIGURE 14.1. Monitoring Well Locations for the Grout Treatment Facility

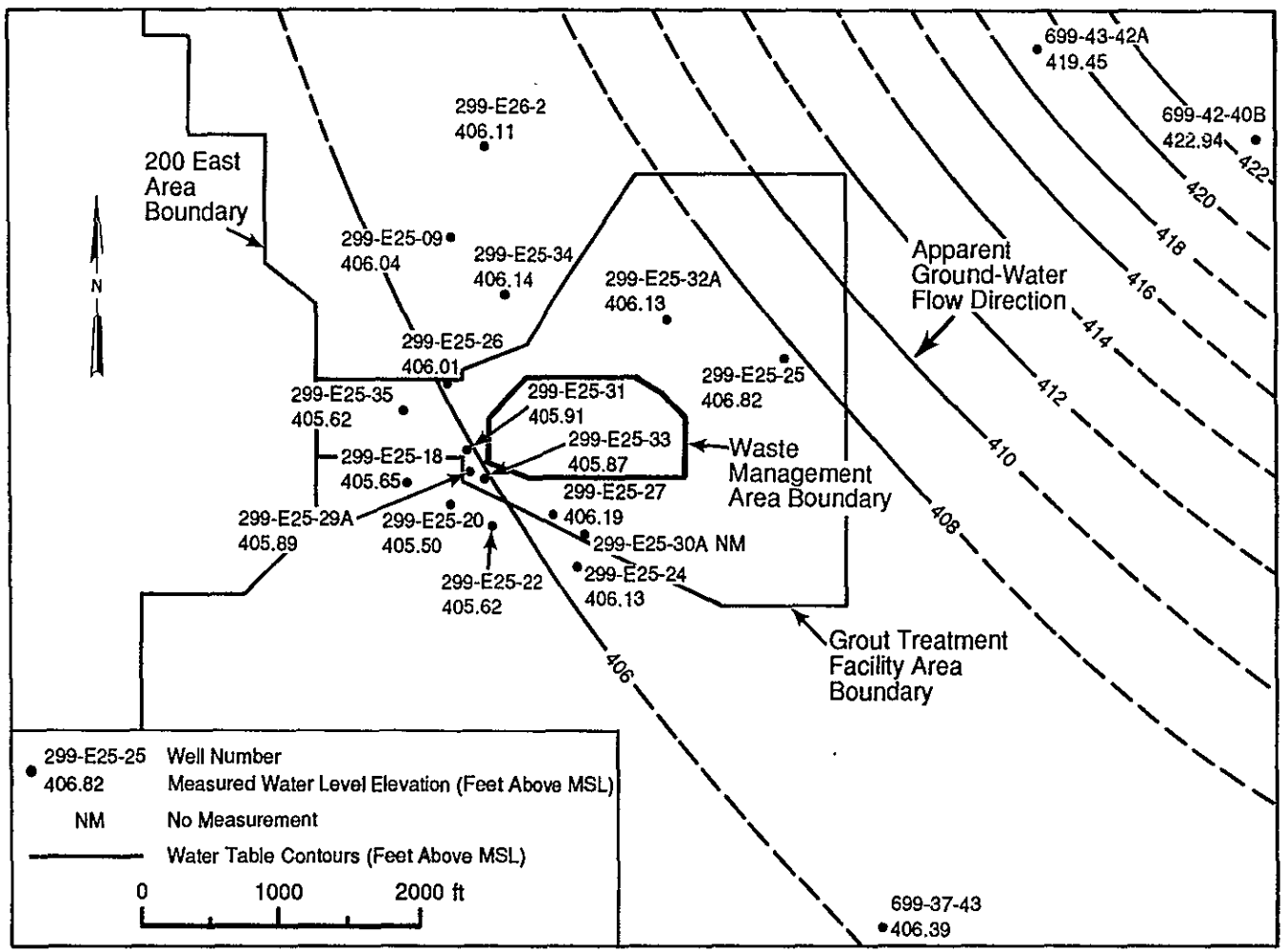

FIGURE 14.2. Water-Level Elevations Near the Grout Treatment Facility, March 1989

TABLE 14.1. Sampling Schedule for the Grout Treatment Facility

Well	1988			1989 Projected								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
299-E25-18	L1					X			X			X
299-E25-20						X			X			X
299-E25-22	L2					X			X			X
299-E25-24						X			X			X
299-E25-25	L3			X		X			X			X
299-E25-26	L4					X			X			X
299-E25-27	L4V					X			X			X
299-E25-28	L4					X			X			XR
299-E25-29	L3			X		X			X			X
299-E25-30	L4					XR			XX			X
299-E25-31	L3			X		X			X			X
299-E25-32	L3			X		X			XR			X
299-E25-33	L3			X		X			X			X

R = quality control replicates were collected.
X = sampled for the regular list of constituents (see Table 14.4).
L1 = List 1, samples collected for filtered/unfiltered arsenic, chronium, and selenium; and for technetium-99.
L2 = List 2, samples collected for constituents in List 1 and in Table 14.6.
L3 = List 3, samples collected for constituents in Table 14.7.
L4 = List 4, samples collected for constituents in List 1, Table 14.6, and pH (field), specific conductance (field), total organic carbon, and total organic halogen.

TABLE 14.2. Water-Level Data Taken Before Sample Collection at the Grout Treatment Facility, January Through March 1989

Well Name	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]	Casing Elevation, ft above MSL
299-E25-18	2/28/89	273.53	405.52	679.05
299-E25-18	2/28/89	273.53	405.52	679.05
299-E25-20	2/28/89	270.92	405.38	676.30
299-E25-20	2/28/89	270.92	405.38	676.30
299-E25-22	2/28/89	268.65	405.37	674.02
299-E25-22	2/28/89	268.64	405.38	674.02
299-E25-24	2/28/89	273.12	406.43	679.55
299-E25-24	2/28/89	273.12	406.43	679.55
299-E25-25	1/3/89	NM[b]	NM	669.42
299-E25-25	2/28/89	NM	NM	669.42
299-E25-26	2/28/89	264.04	404.48	668.52
299-E25-26	2/28/89	264.05	404.47	668.52
299-E25-27	2/28/89	268.28	407.80	676.08
299-E25-27	2/28/89	268.28	407.80	676.08
299-E25-28	2/24/89	256.72	405.72	662.44
299-E25-28	2/24/89	256.72	405.72	662.44
299-E25-29A	1/3/89	NM	NM	672.62
299-E25-29A	2/27/89	266.50	406.12	672.62
299-E25-29A	2/27/89	266.49	406.13	672.62
299-E25-30A	2/27/89	271.78	406.42	678.20
299-E25-30A	2/27/89	271.77	406.43	678.20
299-E25-31	1/3/89	NM	NM	672.53
299-E25-31	2/27/89	266.08	406.45	672.53
299-E25-31	2/27/89	266.09	406.44	672.53
299-E25-32A	1/4/89	262.52	406.67	669.19
299-E25-32A	1/4/89	262.51	406.68	669.19
299-E25-32A	2/24/89	260.22	408.97	669.19
299-E25-32A	2/24/89	260.22	408.97	669.19
299-E25-33	1/31/89	243.90	406.13	650.03
299-E25-33	1/31/89	243.90	406.13	650.03
299-E25-33	3/2/89	NM	NM	650.03

(a) MSL = mean sea level.
(b) NM = no measurement taken.

TABLE 14.3. Monthly Water-Level Data Collected During the First Quarter of 1989 for the Grout Treatment Facility

Well Name	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]	Casing Elevation, ft above MSL
299-E25-9	1/31/89	250.77	406.40	657.17
299-E25-9	2/27/89	251.00	406.17	657.17
299-E25-9	3/27/89	251.13	406.04	657.17
299-E25-18	1/31/89	273.00	406.05	679.05
299-E25-18	2/27/89	273.14	405.91	679.05
299-E25-18	3/27/89	273.40	405.65	679.05
299-E25-20	1/31/89	270.39	405.91	676.30
299-E25-20	2/27.89	270.53	405.77	676.30
299-E25-20	3/27/89	270.80	405.50	676.30
299-E25-22	1/31/89	268.02	406.03	674.05
299-E25-22	2/27/89	268.20	405.85	674.05
299-E25-22	3/27/89	268.43	405.62	674.05
299-E25-24	1/31/89	273.01	406.54	679.55
299-E25-24	2/27/89	273.22	406.33	679.55
299-E25-24	3/27/89	273.42	406.13	679.55
299-E25-25	1/31/89	262.30	407.12	669.42
299-E25-25	2/27/89	262.47	406.95	669.42
299-E25-25	3/27/89	262.60	406.82	669.42
299-E25-26	1/31/89	262.05	406.50	668.55
299-E25-26	2/28/89	262.35	406.17	668.52
299-E25-26	3/27/89	262.51	406.01	668.52
299-E25-27	1/31/89	269.51	406.59	676.10
299-E25-27	2/1/89	269.68	406.42	676.10
299-E25-27	2/27/89	269.69	406.39	676.08
299-E25-27	3/27/89	269.98	406.10	676.08
299-E25-27	3/27/89	269.84	406.24	676.08
299-E25-27	3/28/89	269.89	406.19	676.08
299-E25-29A	1/31/89	266.77	406.07	672.84
299-E25-29A	2/28/89	267.00	405.86	672.86
299-E25-29A	3/27/89	266.97	405.89	672.86
299-E25-30A	1/31/89	NM[b]	---	678.20
299-E25-30A	2/27/89	NM	---	678.20
299-E25-30A	3/27/89	NM	---	678.20
299-E25-31	1/31/89	266.39	406.14	672.53
299-E25-31	2/27/89	NM	---	672.53
299-E25-31	3/27/89	266.62	405.91	672.53
299-E25-32A	2/28/89	263.82	406.22	670.04
299-E25-32A	3/27/89	263.91	406.13	670.04
299-E25-33	1/31/89	NM	---	650.03
299-E25-33	2/27/89	243.99	406.04	650.03
299-E25-33	3/27/89	244.16	405.87	650.03
299-E25-34	1/31/89	256.28	406.59	662.87

TABLE 14.3. (contd)

Well Name	Date	Depth to Water, ft	Water-Level Elevation, ft above MSL[a]	Casing Elevation, ft above MSL
299-E25-34	2/27/89	256.57	406.30	662.87
299-E25-34	3/27/89	256.73	406.14	662.87
299-E25-35	1/31/89	268.33	406.06	674.39
299-E25-35	2/28/89	268.63	405.76	674.39
299-E25-35	3/27/89	268.77	405.62	674.39
299-E26-2	1/31/89	228.80	406.50	635.30
299-E26-2	2/27/89	229.07	406.23	635.30
299-E26-2	3/27/89	229.19	406.11	635.30
699-37-43	1/31/89	283.85	406.73	690.58
699-37-43	2/27/89	284.03	406.55	690.58
699-37-43	3/27/89	284.19	406.39	690.58
699-42-40B	1/31/89	NM	---	546.46
699-42-40B	2/27/89	NM	---	546.46
699-42-40B	3/27/89	123.52	422.94	546.46
699-43-42A	1/31/89	144.94	419.54	564.48
699-43-42A	2/27/89	145.07	419.41	564.48
699-43-42A	3/27/89	145.03	419.45	564.48

(a) MSL = mean sea level.
(b) NM = no measurement taken.

TABLE 14.4- Constituent List and Summary of Sampling Results for the Grout Treatment Facility
December 1988 through February 1989

Constituent List=Contamination Indicator Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
088	CONDLAB	umho	.	3	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	76	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	76	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	3	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	76	0	.			Total organic carbon
H42	TOXLDL	ppb	10	76	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	16	16 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	21	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	14	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	21	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	7	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	21	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	21	21 ***	10	EPA		Cadmium
A08	CHROMUM	ppb	10	21	9	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	21	21 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	21	4	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	20	20 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	21	21 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	20	20 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	20	20 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	20	20 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	20	20 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	20	20 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	20	20 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	20	20 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	21	20	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	21	0	45000	EPA	xxx	Nitrate
C74	FLUORID	ppb	500	21	16	4000	EPA		Fluoride
H13	2,4-D	ppb	2	20	20 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	20	20 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	21	0	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	21	21 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	21	18	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	21	21 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	21	4	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	20	20 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	21	21 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	21	21 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	4	0	1	EPA		Turbidity, nephelometric

TABLE 14.4. (contd)

Constituent List=Water Quality Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	21	0	.			Sodium
A17	MANGESE	ppb	5	21	14	50	EPAS		Manganese
A19	IRON	ppb	30	21	2	300	EPAS	xxx	Iron
C73	SULFATE	ppb	500	21	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	21	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	21	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	21	19	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	21	16	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	20	20 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
108	TRITIUM	pCi/L	500	6	0	20000	EPA	xxx	Tritium (H-3)
197	TC-99	pCi/L	15	10	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	21	21 ***	.			Beryllium
A03	STRONUM	ppb	20	21	0	.			Strontium
A04	ZINC	ppb	5	21	8	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	21	0	.			Calcium
A12	NICKEL	ppb	10	21	11	.			Nickel
A13	COPPER	ppb	10	21	19	1300	EPAP		Copper
A14	VANADUM	ppb	5	21	0	.			Vanadium
A15	ANTIONY	ppb	100	21	21 ***	.			Antimony
A16	ALUMNUM	ppb	150	21	20	.			Aluminum
A18	POTASUM	ppb	100	21	0	.			Potassium
A50	MAGNES	ppb	50	21	0	.			Magnesium
C76	PHOSPHA	ppb	1000	21	19	.			Phosphate
H16	TC	ppb	1000	3	0	.			Total carbon
H18	FZINC	ppb	5	21	12	5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	21	0	.			Calcium, filtered
H25	FNICKEL	ppb	10	21	20	.			Nickel, filtered
H26	FCOPPER	ppb	10	21	20	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	21	0	.			Vanadium, filtered
H28	FALUMIN	ppb	150	21	21 ***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	21	0	.			Potassium, filtered
H32	FMAGNES	ppb	50	21	0	.			Magnesium, filtered
H33	FBERYLL	ppb	5	21	21 ***	.			Beryllium, filtered
H35	FSTRONT	ppb	20	21	0	.			Strontium, filtered
H36	FANTIMO	ppb	100	21	21 ***	.			Antimony, filtered
H66	BROMIDE	ppb	1000	21	21 ***	.			Bromide
H67	NITRITE	ppb	1000	21	21 ***	.			Nitrite

TABLE 14.4. (contd)

Constituent List=Site Specific and Other Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H86	FBORON	ppb	10	20	1	.		Boron, filtered
H87	FCOBALT	ppb	20	20	20 ***	.		Cobalt, filtered
H88	FLITHI	ppb	10	20	19	.		Lithium, filtered
H89	FMOLY	ppb	40	20	20 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	20	0	.		Silicon, filtered
H91	FTIN	ppb	30	20	20 ***	.		Tin, filtered
H92	FTITAN	ppb	60	20	20 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	20	20 ***	.		Zirconium, filtered
P01	BORON	ppb	10	20	1	.		Boron
P02	COBALT	ppb	20	20	20 ***	.		Cobalt
P03	LITHIUM	ppb	10	20	20 ***	.		Lithium
P04	MOLY	ppb	40	20	20 ***	.		Molybdenum
P05	SILICON	ppb	50	20	0	.		Silicon
P06	TIN	ppb	30	20	20 ***	.		Tin
P07	TITAN	ppb	60	20	20 ***	.		Titanium
P08	ZIRCON	ppb	50	20	20 ***	.		Zirconium

Constituent List=WAC 173-303-9905 Constituents

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A61	TETRANE	ppb	5	4	4 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	3	3 ***	5	EPA	Benzene
A64	METHONE	ppb	10	4	4 ***	.		Methyl ethyl ketone
A66	TOLUENE	ppb	5	3	3 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	4	4 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	4	4 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	4	4 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	4	4 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	4	4 ***	440	EPAP	Xylene-o,p
A80	CHLFORM	ppb	5	4	4 ***	100	EPA	Chloroform [Trichloromethane]
A89	1,1-DIC	ppb	5	3	3 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	3	3 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	3	3 ***	70	EPAP	trans-1,2-Dichloroethene
A93	METHYCH	ppb	5	4	4 ***	.		Methylene chloride [Dichloromethane]
B13	VINYIDE	ppb	10	3	3 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	4	4 ***	440	EPAP	Xylene-m
C80	AMMONIU	ppb	50	3	3 ***	.		Ammonium ion
H15	2,4,5-T	ppb	2	19	19 ***	.		2,4,5-T
H62	LHYDRAZ	ppb	30	3	3 ***	.		Hydrazine, low DL
H68	HEXONE	ppb	10	4	4 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	3	3 ***	.		Acetone by VOA
I28	TAF	ppb	10	3	3 ***	.		Tetrahydorfuran
L63	14DBEN	ppb	5	3	3 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]

TABLE 14.4. (contd)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE 14.5. Constituents with at Least One Detected Value for the Grout Treatment Facility
December 1988 through February 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E25-18	28FEB89		258	.	.	8.10	#600	#3
		1	258	.	.	8.10	#500	#5
		2	257	.	.	8.10	#500	#2
		3	258	.	.	8.10	#600	#3
2-E25-20	28FEB89		690	.	.	7.80	#500	#2
		1	690	.	.	7.80	#400	#1
		2	690	.	.	7.80	#400	#1
		3	689	.	.	7.90	#400	#5
2-E25-22	28FEB89		217	.	.	8.20	#500	#1
		1	217	.	.	8.20	#600	#1
		2	217	.	.	8.20	#600	#2
		3	217	.	.	8.30	#600	#2
2-E25-24	28FEB89		328	.	.	8.00	#500	#2
		1	324	.	.	7.90	#400	#1
		2	325	.	.	7.90	#400	#-1
		3	324	.	.	7.90	#400	#1
2-E25-25	03JAN89		164	.	.	8.50	#700	#9
		1	171	.	.	8.60	#500	#4
		2	172	.	.	8.50	#600	#5
		3	171	.	.	8.50	#500	#3
2-E25-25	28FEB89		170	.	.	8.70	#900	#6
		1	170	.	.	8.70	#900	#7
		2	169	.	.	8.70	#700	#9
		3	169	.	.	8.70	#700	#6
2-E25-26	15DEC88		175	.	.	8.10	#700	#5
		1	175	.	.	8.10	#500	#4
		2	175	.	.	8.10	#600	#4
		3	173	.	.	8.10	#600	#7
2-E25-26	28FEB89		193	178	8.23	8.20	#600	#3
		1	193	.	.	8.30	#600	#5
		2	194	.	.	8.40	#600	#1
		3	192	.	.	8.30	#500	#4
2-E25-27	28FEB89		172	.	.	8.20	#600	#1
		1	172	.	.	8.20	#600	#2
		2	172	.	.	8.20	#700	#1
		3	172	.	.	8.20	#600	#1

TABLE 14.5. (contd)

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E25-28	24FEB89		100	176	8.20	8.80	#800	#6
		1	100	.	.	8.80	#800	#5
		2	100	.	.	8.80	#700	#2
		3	100	.	.	8.80	#600	#1
2-E25-29	03JAN89		237	.	.	8.30	#600	34
		1	236	.	.	8.40	#600	47
		2	237	.	.	8.30	#600	40
		3	238	.	.	8.30	#500	20
2-E25-29	27FEB89		297	.	.	8.40	#800	312
		1	279	.	.	8.40	#700	374
		2	273	.	.	8.40	#800	308
		3	270	.	.	8.30	#800	371
2-E25-30	27FEB89		473	.	.	8.00	#800	11
		1	468	.	.	8.00	#800	10
		2	467	.	.	8.00	#500	12
		3	467	.	.	8.00	#500	13
2-E25-31	03JAN89		254	.	.	8.30	#1200	587
		1	254	.	.	8.30	#1200	512
		2	254	.	.	8.30	#1200	498
		3	254	.	.	8.90	#1300	512
2-E25-31	27FEB89		237	.	.	7.90	#700	159
		1	236	.	.	7.80	#800	196
		2	236	.	.	7.80	#700	112
		3	236	.	.	7.80	#700	143
2-E25-32	04JAN89		151	.	.	8.30	#500	#4
		1	150	.	.	8.30	#700	#2
		2	150	.	.	8.30	#700	#1
		3	150	.	.	8.30	#800	#3
2-E25-32	24FEB89		100	168	8.20	8.70	#600	#2
		1	100	.	.	8.80	#600	#3
		2	100	.	.	8.70	#600	#5
		3	100	.	.	8.70	#600	#6
2-E25-33	31JAN89		309	.	.	8.10	#700	#4
		1	308	.	.	8.10	#600	#3
		2	309	.	.	8.10	#600	#2
		3	309	.	.	8.10	#600	#1
2-E25-33	02MAR89		398	.	.	8.70	#600	#1
		1	399	.	.	8.70	#400	#5
		2	398	.	.	8.70	#500	#2
		3	398	.	.	8.70	#300	#1

TABLE 14.5. (contd)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ALPHA pCi/L 4/15	ALPHAHI pCi/L 4/15	ALUMNUM ppb 150/.	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50
2-E25-18	28FEB89		.	*1.110	<150	11	11	13	13	6.830
2-E25-20	28FEB89		.	1.570	<150	7	7	57	62	13.300
2-E25-22	28FEB89		.	*1.150	<150	9	10	12	13	5.170
2-E25-24	28FEB89		.	*-0.187	<150	19	19	24	24	7.990
2-E25-25	03JAN89		*0.6940	.	<150	<5	<5	15	13	5.690
	28FEB89		.	*0.196	<150	<5	<5	10	14	3.590
2-E25-26	15DEC88		*0.0325	.	<150	6	8	11	16	*1.040
	28FEB89		.	1.160	<150	7	7	9	12	*1.840
2-E25-27	28FEB89		.	*-0.102	<150	6	6	10	10	*2.120
2-E25-28	24FEB89		.	*0.886	<150	10	10	14	14	*0.633
2-E25-29	03JAN89		*1.1200	.	<150	12	13	18	23	3.930
	27FEB89		.	*1.500	<150	14	14	23	22	4.800
2-E25-30	27FEB89		.	1.880	<150	28	27	17	16	5.190
	27FEB89	1	.	*-0.156	<150	28	27	15	15	6.400
2-E25-31	03JAN89		*0.0941	.	<150	9	9	27	30	5.560
	03JAN89	1	*0.8050	.	<150	9	9	25	26	6.780
	27FEB89		.	*0.639	<150	10	9	30	31	5.300
2-E25-32	04JAN89		1.4100	.	<150	<5	<5	12	13	6.770
	24FEB89		.	1.470	<150	<5	<5	14	14	3.000
2-E25-33	31JAN89		2.6800	.	203	9	9	32	29	4.730
	02MAR89		.	1.780	<150	8	8	36	34	4.890

Well name	Collection Date	Duplicat sample number	BORON ppb 10/.	FBORON ppb 10/.	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	FCHROMI ppb 10/50	CHROMUM ppb 10/50	COPPER ppb 10/1300p
2-E25-18	28FEB89		13	18	24,800	25,200	3,300	<10	<10	<10
2-E25-20	28FEB89		44	47	66,800	59,200	5,100	<10	<10	<10
2-E25-22	28FEB89		17	21	19,900	18,700	3,100	<10	<10	<10
2-E25-24	28FEB89		14	16	20,900	20,500	1,000	<10	<10	<10
2-E25-25	03JAN89		<10	11	18,100	18,900	2,900	<10	59	<10
	28FEB89		17	14	18,500	17,400	3,100	<10	<10	<10
2-E25-26	15DEC88		.	.	19,800	17,900	2,800	<10	<10	69
	28FEB89		15	12	20,400	18,400	2,800	<10	<10	<10
2-E25-27	28FEB89		11	15	17,100	17,200	3,100	<10	<10	<10
2-E25-28	24FEB89		13	29	18,800	18,500	2,800	<10	<10	52
2-E25-29	03JAN89		11	15	25,600	21,700	2,800	<10	149	<10
	27FEB89		17	20	23,500	24,400	2,900	<10	24	<10
2-E25-30	27FEB89		33	40	11,800	11,800	1,700	32	190	<10
	27FEB89	1	36	30	11,200	11,000	1,700	<10	85	<10
2-E25-31	03JAN89		11	13	24,700	21,900	2,700	11	36	<10
	03JAN89	1	17	13	20,900	20,900	2,800	<10	33	<10
	27FEB89		15	21	22,800	20,800	2,700	<10	12	<10
2-E25-32	04JAN89		15	<10	18,500	19,000	2,800	<10	40	<10
	24FEB89		13	11	20,100	18,800	2,900	<10	24	<10
2-E25-33	31JAN89		23	19	26,400	29,600	4,200	10	37	<10
	02MAR89		20	19	31,800	34,400	4,100	<10	16	<10

TABLE 14.5. (contd)

Well name	Collection Date	Duplicat sample number	FCOPPER ppb 10/1300p	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	LEADGF ppb 5/50	FLITHI ppb 10/.	MAGNES ppb 50/.	FMAGNES ppb 50/.
2-E25-18	28FEB89		<10	<500	44	<30	<5	<10	7,280	7,320
2-E25-20	28FEB89		<10	700	83	<30	<5	10	16,800	17,900
2-E25-22	28FEB89		<10	<500	<30	<30	<5	<10	5,490	5,840
2-E25-24	28FEB89		<10	700	75	<30	<5	<10	4,760	4,880
2-E25-25	03JAN89		<10	<500	474	<30	<5	<10	5,210	4,980
	28FEB89		<10	<500	269	<30	<5	<10	5,230	5,460
2-E25-26	15DEC88		<10	<500	72	49	<5	.	5,250	5,450
	28FEB89		13	<500	50	<30	<5	<10	5,240	5,740
2-E25-27	28FEB89		<10	<500	104	<30	<5	<10	5,430	5,470
2-E25-28	24FEB89		<10	<500	<30	<30	<5	<10	5,570	5,580
2-E25-29	03JAN89		<10	<500	661	90	<5	<10	5,350	6,280
	27FEB89		<10	<500	171	<30	<5	<10	6,610	6,440
2-E25-30	27FEB89		<10	500	790	148	<5	<10	5,370	5,210
	27FEB89	1	<10	<500	385	<30	<5	<10	5,110	4,970
2-E25-31	03JAN89		<10	<500	294	37	<5	<10	5,960	6,680
	03JAN89	1	<10	<500	262	<30	<5	<10	5,740	5,750
	27FEB89		<10	<500	165	<30	<5	<10	6,140	6,680
2-E25-32	04JAN89		<10	<500	185	<30	<5	<10	5,060	4,890
	24FEB89		<10	<500	82	<30	<5	<10	5,380	5,730
2-E25-33	31JAN89		<10	700	686	184	6	<10	7,280	6,940
	02MAR89		<10	600	154	<30	<5	<10	9,280	8,640

Well name	Collection Date	Duplicate sample number	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000	PHOSPHA ppb 1000/.	FPOTASS ppb 100/.	POTASUM ppb 100/.
2-E25-18	28FEB89		<5	<5	<10	<10	29,700	<1000	5,340	5,190
2-E25-20	28FEB89		<5	<5	<10	<10	195,000	<1000	12,300	11,400
2-E25-22	28FEB89		<5	<5	<10	<10	3,800	<1000	5,300	4,920
2-E25-24	28FEB89		<5	6	<10	<10	1,100	<1000	7,980	7,750
2-E25-25	03JAN89		<5	8	34	<10	700	<1000	4,210	4,520
	28FEB89		<5	6	<10	<10	700	<1000	4,120	4,020
2-E25-26	15DEC88		<5	<5	<10	<10	1,400	<1000	3,940	3,950
	28FEB89		<5	<5	<10	<10	1,400	<1000	4,410	4,060
2-E25-27	28FEB89		<5	<5	<10	<10	2,200	<1000	4,000	3,980
2-E25-28	24FEB89		<5	<5	<10	<10	900	<1000	3,800	3,830
2-E25-29	03JAN89		<5	15	78	<10	6,800	<1000	4,950	4,210
	27FEB89		<5	<5	17	<10	8,800	<1000	4,930	4,920
2-E25-30	27FEB89		6	18	98	17	3,600	8500	6,950	7,070
	27FEB89	1	<5	9	40	<10	3,500	8400	6,760	6,750
2-E25-31	03JAN89		<5	<5	23	<10	7,100	<1000	5,440	4,890
	03JAN89	1	<5	<5	15	<10	7,100	<1000	4,810	4,710
	27FEB89		<5	<5	<10	<10	8,900	<1000	5,250	4,850
2-E25-32	04JAN89		<5	<5	20	<10	800	<1000	4,270	4,420
	24FEB89		<5	<5	13	<10	700	<1000	4,740	4,450
2-E25-33	31JAN89		6	14	19	<10	8,600	<1000	4,840	5,300
	02MAR89		<5	<5	<10	<10	11,900	<1000	5,200	5,510

TABLE 14.5. (contd)

Well name	Collection Date	Duplicat sample number	RADIUM pCi/L 1/5	FSILICO ppb 50/.	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s
2-E25-18	28FEB89		*-0.0112	18,200	18,500	17,400	18,000	132	131	26,900
2-E25-20	28FEB89		*-0.0435	28,300	25,600	52,600	56,700	336	309	73,500
2-E25-22	28FEB89		0.1830	19,400	18,300	15,400	16,800	111	103	21,300
2-E25-24	28FEB89		*0.0500	31,000	30,200	22,300	23,100	125	122	22,700
2-E25-25	03JAN89		*-0.0147	11,100	11,500	6,730	6,230	109	114	11,700
	28FEB89		*0.0368	9,550	9,190	5,500	5,710	114	107	13,000
2-E25-26	15DEC88		*0.0541	.	.	9,110	8,990	99	95	14,400
	28FEB89		*-0.0412	15,800	14,400	9,660	10,600	113	102	14,800
2-E25-27	28FEB89		*0.0320	13,600	13,600	9,450	9,690	103	102	17,300
2-E25-28	24FEB89		*0.0012	16,300	15,800	10,900	10,900	102	102	12,400
2-E25-29	03JAN89		0.2730	20,700	17,500	21,400	26,000	125	107	36,100
	27FEB89		0.4980	18,600	18,700	24,800	24,500	122	126	35,800
2-E25-30	27FEB89		0.5170	26,100	27,400	85,600	80,000	133	137	62,600
	27FEB89	1	0.3420	24,800	25,500	81,700	74,800	126	127	58,100
2-E25-31	03JAN89		*-0.0447	18,200	16,500	19,400	21,500	120	105	25,200
	03JAN89	1	0.3830	15,500	15,800	18,500	18,700	101	101	25,100
	27FEB89		0.5370	18,000	16,800	19,100	20,500	119	111	27,100
2-E25-32	04JAN89		*0.0497	12,000	12,400	7,220	6,970	105	109	12,000
	24FEB89		*0.0625	12,000	11,200	6,850	7,310	121	113	13,000
2-E25-33	31JAN89		0.1900	19,700	20,300	28,600	26,000	134	143	47,400
	02MAR89		0.2630	19,500	20,600	29,700	28,300	171	175	58,800

Well name	Collection Date	Duplicate sample number	TC ppb 1000/.	TC-99 pCi/L 15/900r	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E25-18	28FEB89		.	.	.	.	32	39	14	8
2-E25-20	28FEB89		.	.	.	.	40	39	15	9
2-E25-22	28FEB89		.	.	.	.	43	42	7	7
2-E25-24	28FEB89		.	.	.	.	132	126	8	<5
2-E25-25	03JAN89		.	.	442	.	14	16	<5	<5
	03JAN89	R	.	0.10	.	.	.	.	.	.
	28FEB89		.	.	.	.	13	11	10	5
	28FEB89	R	.	0.79	.	.	.	.	.	.
2-E25-26	15DEC88		.	.	.	0.30	29	27	49	53
	28FEB89		16,700	.	.	0.15	29	32	26	19
2-E25-27	28FEB89		.	.	.	.	21	25	10	6
2-E25-28	24FEB89		17,900	.	.	0.10	41	41	16	11
2-E25-29	03JAN89		.	.	36,700	.	41	38	<5	<5
	03JAN89	R	.	0.73	.	.	.	.	.	.
	27FEB89		.	.	.	.	33	34	<5	<5
	27FEB89	R	.	1.14	.	.	.	.	.	.
2-E25-30	27FEB89		.	.	.	.	81	84	<5	<5
	27FEB89	1	.	.	.	.	80	78	<5	<5
2-E25-31	03JAN89		.	.	18,600	.	35	32	9	7
	03JAN89	1	.	.	16,600	.	30	33	9	<5
	03JAN89	R	.	2.44	.	.	.	.	.	.
	27FEB89		.	.	.	.	33	27	13	<5
	27FEB89	R	.	0.32	.	.	.	.	.	.

TABLE 14.5. (contd)

Well name	Collection Date	Duplicate sample number	TC ppb 1000/.	TC-99 pCi/L 15/900r	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E25-32	04JAN89		.	.	670	.	18	20	<5	<5
	04JAN89	R	.	1.99	.	.	.	.	.	.
	24FEB89		16,700	.	.	0.55	20	16	<5	<5
	24FEB89	R	.	0.54	.	.	.	.	.	.
2-E25-33	31JAN89		.	.	19,800	.	28	33	13	<5
	31JAN89	R	.	0.70	.	.	.	.	.	.
	02MAR89		.	.	.	.	27	29	<5	<5
	02MAR89	R	.	0.10	.	.	.	.	.	.

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE 14.6. List 2 Constituents for the Grout Treatment Facility

Total Carbon
Metals Analyzed by the Inductively Coupled Plasma Method
Ions
Nitrite
Ammonium
Gamma Scan
Tritium

TABLE 14.7. List 4 Constituents for the Grout Treatment Facility

pH (Field)
Specific Conductance (Field)
Total Organic Carbon
Total Organic Halogen
Arsenic (filtered/unfiltered)
Chromium (filtered/unfiltered)
Selenium (filtered/unfiltered)
Technetium-99
Barium
Cadmium
Fluoride
Lead
Mercury
Nitrate
Silver
Endrin
Lindane
Methoxychlor
Toxaphene
2,4-D
2,4,5-TP Silvex
Radium
Gross Alpha
Gross Beta
Coliform Bacteria
Chloride
Iron
Manganese
Phenols
Sodium
Sulfate
Total Carbon
Metals Analyzed by the Inductively Coupled Plasma Method
Ions
Nitrite
Ammonium
Gamma Scan
Tritium

THIS PAGE INTENTIONALLY
LEFT BLANK

15.0 REFERENCES

40 CFR 141. U.S. Environmental Protection Agency, "National Primary Drinking Water Regulations." U.S. Code of Federal Regulations.

40 CFR 143. U.S. Environmental Protection Agency, "National Secondary Drinking Water Regulations." U.S. Code of Federal Regulations.

40 CFR 261. U.S. Environmental Protection Agency, "Identification and Listing of Hazardous Waste." U.S. Code of Federal Regulations.

40 CFR 265. U.S. Environmental Protection Agency, "Interim Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities." U.S. Code of Federal Regulations.

50 FR 46936. U.S. Environmental Protection Agency, "Proposed Maximum Containment Level Goals." Federal Register.

ASTM. 1987. "Standard Terminology for Statistical Methods." E456-83a in Annual Book of ASTM Standards, Vol. 1402. American Society for Testing and Materials, Philadelphia, Pennsylvania.

Cline, C. S., J. T. Rieger, J. R. Raymond, and P. A. Eddy. 1985. Ground-water Monitoring at the Hanford Site, January-December 1984. PNL-5408, Pacific Northwest Laboratory, Richland, Washington.

DOE. 1986. Revised Ground-Water Monitoring Compliance Plan for the 300 Area Process Trenches. PNL-6671, prepared by the Pacific Northwest Laboratory for the U.S. Department of Energy, Richland, Washington.

DOE. 1988a. Final Status Post-Closure Permit Application for the 183-H Solar Evaporation Basins. Prepared by Westinghouse Hanford Company for the U.S. Department of Energy, Richland, Washington.

DOE. 1988b. Grout Treatment Facility Dangerous Waste Permit Application. 88-27, prepared by Westinghouse Hanford Company for the U.S. Department of Energy, Richland, Washington.

EPA. 1976. National Primary Drinking Water Regulations. EPA-570/9-76-003, U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1986a. Resource Conservation and Recovery Act (RCRA) Ground-Water Monitoring Technical Enforcement Guidance Document. OWSER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1986b. Test Methods for Evaluating Solid Waste. SW-846, 3rd edition, U.S. Environmental Protection Agency, Washington, D.C.

Fruland, R. M., D. J. Bates, and R. E. Lundgren, eds. 1989a. Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period July 1 to September 30, 1988. PNL-6789, Pacific Northwest Laboratory, Richland, Washington.

Fruland, R. M., D. J. Bates, and R. E. Lundgren, eds. 1989b. Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period October 1 to December 31, 1988. PNL-6844, Pacific Northwest Laboratory, Richland, Washington.

Liikala, T. L., R. L. Aaberg, N. J. Aimo, D. J. Bates, T. J. Gilmore, E. J. Jensen, G. V. Last, P. L. Oberlander, K. B. Olsen, K. R. Oster, L. R. Roome, J. C. Simpson, S. S. Teel, and E. J. Westergard. 1988. Geohydrologic Characterization of the Area Surrounding the 183-H Solar Evaporation Basins. PNL-6728, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1986. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period May 1 to September 30, 1986. PNL-6466, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1987a. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period October 1 to December 31, 1986. Volumes 1, 2, and 3. PNL-6465, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1987b. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period January 1 to March 31, 1987. Volumes 1, 2, and 3. PNL-6467, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1987c. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report of the Period April 1 to June 30, 1987. PNL-6468, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1987d. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period July 1 to September 30, 1987. PNL-6469, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1988a. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Annual Progress Report for 1987. PNL-6678, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1988b. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period October 1 to December 31, 1987. PNL-6536, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1988c. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period January 1 to March 31, 1988. PNL-6581, Pacific Northwest Laboratory, Richland, Washington.

PNL. 1988d. Ground-Water Monitoring Compliance Projects for Hanford Site Facilities: Progress Report for the Period April 1 to June 30, 1988. PNL-6675, Pacific Northwest Laboratory, Richland, Washington.

Resource Conservation and Recovery Act of 1976. Public Law 94-580, as amended. 90 Stat. 2795 (Title 42).

Stanley, T. W., and S. S. Verner. 1983. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. EPA-600/4-83-004, U.S. Environmental Protection Agency, Washington, D.C.

Swanson, L. C., D. C. Weekes, S. P. Luttrell, R. M. Mitchell, D. S. Landeen, A. R. Johnson, and R. C. Roos. 1988. Grout Treatment Facility Environmental Baseline and Site Characterization Report. WHC-EP-0150, Westinghouse Hanford Company, Richland, Washington.

WAC 173-303. Washington State Department of Ecology, "Dangerous Waste Regulations." Washington Administrative Code.

WAC 173-304. Washington State Department of Ecology, "Minimum Functional Standards for Solid Waste Handling." Washington Administrative Code.

WAC 248-54. Washington State Department of Social and Health Services, "Public Water Supplies." Washington Administrative Code.

Weekes, D. C., S. P. Luttrell, and M. R. Fuchs. 1987. Interim Hydrologic Characterization Report and Ground-Water Monitoring System for the Non-radioactive Dangerous Waste Landfill, Hanford Site, Washington. WHC-EP-0021, Westinghouse Hanford Company, Richland, Washington.

DISTRIBUTION

No. of Copies

OFFSITE

2 DOE/Office of Scientific and Technical Information

ONSITE

2 DOE Richland Operations Office

E. A. Bracken
M. W. Tiernan

13 Westinghouse Hanford Company

T. B. Bergman
J. C. Caggiano
K. R. Fecht
M. J. Hartman
R. L. Jackson
V. G. Johnson
A. G. Law
J. L. Lindberg
D. L. Lund
H. E. McGuire
J. A. Serkowski
L. C. Swanson
Public Reading Room

No. of Copies

25 Pacific Northwest Laboratory

D. J. Bates
M. A. Chamness
J. W. Falco
M. D. Freshley
R. M. Fruland
T. J. Gilmore
J. M. Hales
S. H. Hall
P. C. Hays
G. V. Last
R. E. Lundgren
S. P. Luttrell
P. J. Mitchell
R. Schalla
R. L. Skaggs
R. M. Smith
J. A. Stottlemyre
S. S. Teel
R. E. Wildung
Publishing Coordination
Technical Report Files (5)

9 1 1 3 9 1 2 3 0