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Ground-Water Monitoring Compliance Projects for Hanford Site Facilities

Progress Report for the Period July 1 to September 30, 1987

November 1987

Prepared for the U.S. Department of Energy
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Pacific Northwest Laboratory
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GROUND-WATER MONITORING COMPLIANCE PROJECTS FOR HANFORD SITE FACILITIES

PROGRESS REPORT

FOR THE PERIOD JULY 1 TO SEPTEMBER 30, 1987

November 1987

Prepared by the
Pacific Northwest Laboratory
for the U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352

SUMMARY

This report documents the progress of four Hanford Site ground-water monitoring projects for the period from July 1 to September 30, 1987. The four disposal facilities are the 300 Area Process Trenches, 183-H Solar Evaporation Basins, 200 Area Low-Level Burial Grounds, and Nonradioactive Dangerous Waste (NRDW) Landfill. This report is the fifth in a series of periodic status reports; the first four cover the period from May 1, 1986, to June 30, 1987. This report satisfies the requirements of Section 17B(3) of the Consent Agreement and Compliance Order issued by the State of Washington, Department of Ecology (WDOE), to the U.S. Department of Energy (USDOE), Richland Operations Office.

The four ground-water monitoring projects discussed in this report have been designed according to the applicable ground-water monitoring requirements specified in the Resource Conservation and Recovery Act (RCRA), 40 CFR 265.90 [U.S. Environmental Protection Agency (USEPA) 1984], and WAC 173-303 of Washington State's regulations (WDOE 1986).

During this reporting period, field activities consisted of completing repairs on five monitoring wells originally present around the 183-H Basins and completing construction of 25 monitoring wells around the 200 Area Burial Grounds. The 14 wells in the 200 East Area were completed by Kaiser Engineers Hanford (KEH) and the 11 wells in the 200 West Area were completed by ONWEGO Well Drilling. The NRDW Landfill interim characterization report was submitted to the WDOE and the USEPA in August 1987.

Analytical results for the 300 Area, 183-H, and the NRDW Landfill indicate no deviations from previously established trends. Results from the NRDW Landfill indicate that the facility has no effect on the ground-water quality beneath the facility, except for the detection of coliform bacteria. A possible source of this contamination is the solid-waste landfill (SWL) adjacent to the NRDW Landfill. Ground-water monitoring data for the NRDW and SWL will be evaluated together in the future.

Aquifer testing was completed in the 25 new wells surrounding the 200 Area burial grounds. The data collected and the geologist's logs will be presented in the next quarterly report.

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B.1 183-H Solar Evaporation Basins Assessment Program: June Through August 1987 Data for Constituents with at Least One Value Above Detection Limits B.2

INTRODUCTION

This report covers recent progress on the Pacific Northwest Laboratory's (PNL's) ground-water monitoring projects for four Hanford Site facilities: the 300 Area Process Trenches, 183-H Solar Evaporation Basins, 200 Area Low-Level Burial Grounds, and Nonradioactive Dangerous Waste (NRDW) Landfill. This report documents the progress of the four projects in the period from July 1 to September 30, 1987. The four ground-water monitoring projects were designed according to the applicable ground-water monitoring requirements contained in the Resource Conservation and Recovery Act (RCRA), 40 CFR 265.90 [U.S. Environmental Protection Agency (USEPA) 1984], and WAC 173-303 of Washington State's regulations (WDOE 1986).

Detailed plans for these four monitoring projects have been provided in separate documents (USDOE 1986a,d,e; 1987b). For preparation of this document, it has been assumed that the reader would already have a basic knowledge of the projects.

This report is the fifth in a series of periodic progress reports. The previous reports (USDOE 1986c; 1987a,c,e) cover the period from May 1, 1986, to June 30, 1987.

The report contains a chapter for each of the four projects. In general, each chapter is divided into two sections: 1) drilling and hydrogeologic characterization and 2) routine sampling and analysis of the ground water. Raw data and some limited interpretive remarks are included. Interpretations should be considered preliminary, pending collection of additional periodic ground-water monitoring data and additional time to evaluate the existing data. Detailed interpretations, with illustrative figures such as geologic cross sections and water-table maps, will be contained in the characterization reports. Supporting information for this report is included in the appendices.

300 AREA PROCESS TRENCHES

Previously issued reports (USDOE 1986c,e; 1987a,c,e) contain information on the progress made and the data obtained by the RCRA Compliance Ground-Water Monitoring Project for the 300 Area Process Trenches during the period from May 1985 through June 30, 1987. This report includes information on subsequent activities and data.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Construction of monitoring wells and aquifer testing have been described in previous quarterly reports; therefore they are not discussed further. Other types of hydrogeologic data collection and analysis activities are discussed in the following paragraphs.

Hydrogeologic Characterization Effort

Nonroutine field data collection is complete, and geologic and hydrostratigraphic data are being evaluated. Routine data collection has included collection of continuous data for surface water and ground water using data loggers and monthly measurement of water levels in the network of 49 wells in the 300 Area.

Frequent water-level monitoring has continued at the surface-water monitoring station on the Columbia River, shown in Figure 1 as SWS-1, and in monitoring wells 1-10, 1-13, 1-16A, and 1-17A. Electrical conductivity and temperature sensors were added to the river station and well 1-10 in July, and a temperature probe was added to well 1-16A in August. The conductivity and temperature probes were added to determine the impact of liquid discharges to the process trenches and changes in river stage on the variation in temperature and conductivity in the ground-water system. Pressure transducers and data loggers were installed in wells 1-15 and 1-18A in August. Currently, all seven data loggers record measurements every half hour.

Initial and boundary condition files were created for transient simulation of the ground-water flow system using the Coupled Fluid, Energy, and Solute Transport (CFEST) code. The model currently being applied to simulate

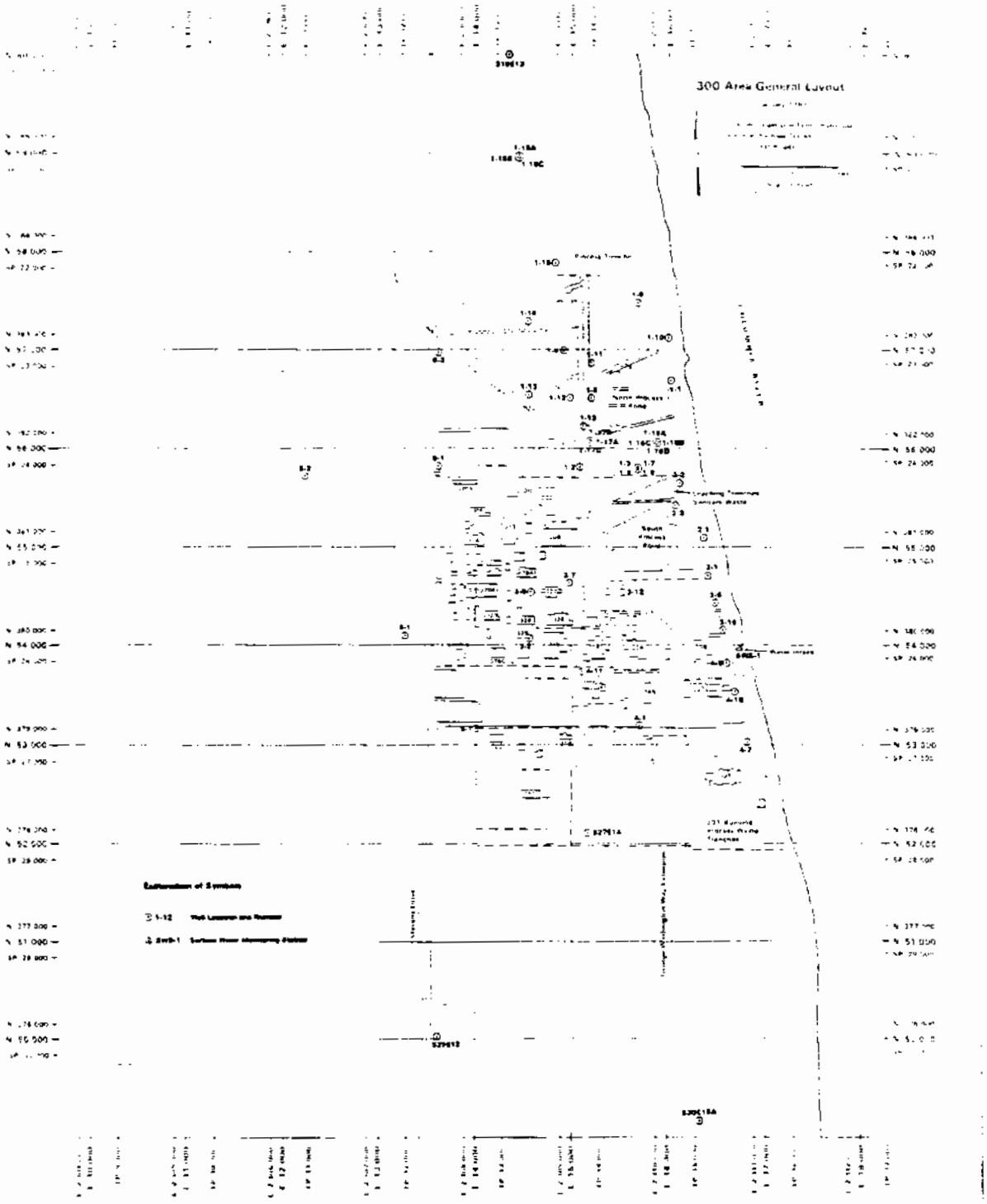


FIGURE 1. Monitoring Locations for the 300 Area Process Trenches

transient flow near the process trenches has three layers, defined as 1) the Hanford Formation, 2) the upper portion of the middle member of the Ringold Formation, and 3) the lower portion of the middle member of the Ringold Formation. A time step of one day is sufficient to account for changes in the ground-water levels in response to changing river stage. The results also indicated that the hydraulic conductivity of layers 2 and 3 can be represented by a constant value, but the upper layer is best represented by at least two regions of differing hydraulic conductivity.

ROUTINE SAMPLING AND ANALYSIS OF THE GROUND WATER

The ground water from the 300 Area Process Trenches has been sampled and analyzed monthly since June 1985. Recent activities under this effort, which include changing to bimonthly sampling, are discussed in the following subsection. A discussion of the results is presented later in this section. Raw analytical data for ground-water samples collected from wells in the 300 Area are listed in Appendix A.

Collection and Analysis

Bimonthly sampling began last quarter; therefore the network of 34 monitoring wells was sampled only during August in this quarter. For purposes of comparison, the results of the June sampling are also presented.

Analyses of field samples by an independent laboratory confirmed the results from U.S. Testing (UST).

Discussion of Results

Analytical data obtained from samples collected in the 300 Area during June and August 1987 are included in this report (see Appendix A) and discussed in the following paragraphs.

The results of sample analyses during the reporting period were generally consistent with those reported previously except for certain volatile organic analyses (VOAs). The samples continued to show the presence of metals, anions, radionuclides, and a few volatile organics. Some of the data are discussed in detail below and are also shown on plots presented later in this section.

To prevent the plots of each constituent from becoming too cluttered, which would make data interpretation difficult, the wells have been separated into four groups: wells immediately adjacent to the trenches, wells immediately downgradient from the trenches, other wells generally to the north of the trenches, and other wells generally to the south of the trenches (Figure 2). This grouping of wells was based on proximity to one another in relation to the process trenches and ground-water flow patterns in the 300 Area.

The plotting symbols are the third part of the well name for all wells starting with "3-1", the second and third part of the well name for others that start with "3-", and a special abbreviation for the 699 wells. The well groupings and abbreviations are presented in Table 1.

All results obtained for samples collected during June and August 1987 are summarized in Table 2. Those constituents that were undetected are marked by three asterisks in the column marked "Below Detection." Any constituents having at least one value exceeding the regulatory standard or a screening limit are marked with three X's in the column labeled "Exceed."

In general, gross alpha levels in most wells in the network either remained at levels similar to those detected during the previous quarter or continued to decline. The only well that displayed an increase in gross alpha activity is well 1-4, in which activity increased from 27.1 pCi/L in April to 39.6 pCi/l in August. Gross alpha levels were above the drinking water standard (DWS) limit of 15 pCi/L in samples from the following wells during June and/or August: 1-1, 1-3, 1-4, 1-5, 1-7, 1-8, 1-11, 1-12, 1-14, 1-17A, 1-19, and 4-7 (Figure 3).

TABLE 1. 300 Area Well Groups and Abbreviations

Adjacent	Down Gradient	North	South
3-1-4 => 4	3-1-1 => 1	3-1-6 => 6	3-2-1 => 21
3-1-5 => 5	3-1-2 => 2	3-1-10 => 10	3-3-7 => 37
3-1-11 => 11	3-1-3 => 3	3-1-13 => 13	3-3-10=> 310
3-1-12 => 12	3-1-7 => 7	3-1-14 => 14	3-4-1 => 41
3-1-17A => 17A	3-1-8 => 8	3-1-15 => 15	3-4-7 => 47
3-1-17B => 17B	3-1-9 => 9	3-1-18A => 18A	3-4-11=> 411
3-1-17C => 17C	3-1-16A => 16A	3-1-18B => 18B	3-8-2 => 82
3-1-19 => 19	3-1-16B => 16B	3-1-18C => 18C	6-S30E15A=> S30
	3-1-16C => 16C	6-S19-E13 => S19	

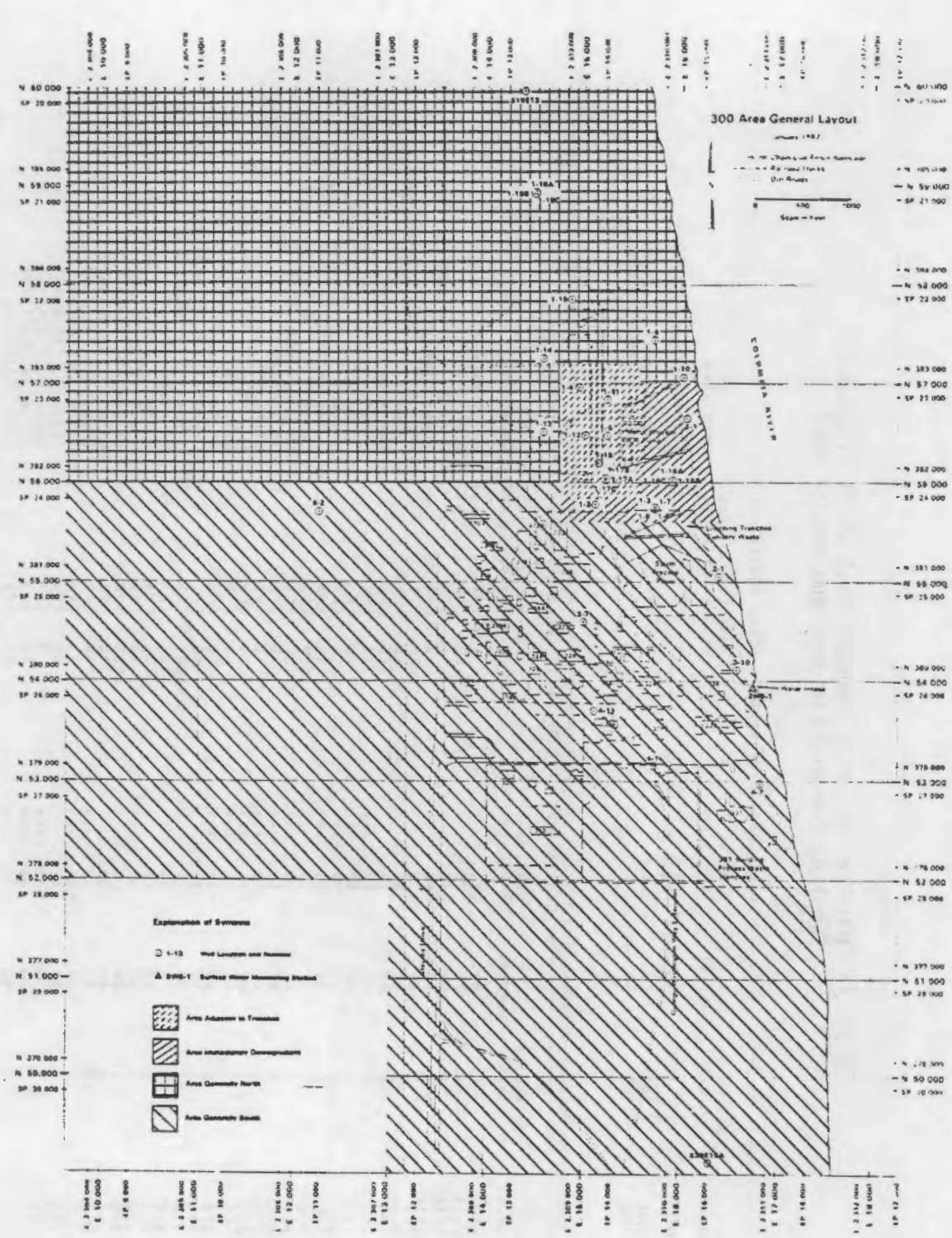


FIGURE 2. Monitoring Well Groups for the 300 Area Process Trenches

TABLE 2. 300 Area Process Trenches Assessment Program: Sampling Summary for June and August 1987

Constituent List-Contamination Indicators

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Regulatory Limits Limit	Agency	Exceed	Long name
191	COMDFLD	UMHO	1	74	0				Specific conductance
199	PHFIELD		0.1	74	0				pH
C68	TOX	PPB	100	69	4				Total organic halogen
C69	TOC	PPB	1000	69	0				Total organic carbon

Constituent List-Drinking Water Standards

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
109	COLIFRM	MPN	2.2	69	63		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	8	71	0		50	EPA	xxx	Gross beta
181	RADIUM	PCI/L	1	69	49		5	EPA		Radium
212	LOALPHA	PCI/L	4	71	13		15	EPA	xxx	Gross alpha
A06	BARIUM	PPB	6	69	0		1000	EPA		Barium
A07	CADMIUM	PPB	2	69	67		10	EPA		Cadmium
A08	CHROMIUM	PPB	10	69	58		50	EPA		Chromium
A10	SILVER	PPB	10	69	69	***	50	EPA		Silver
A20	ARSENIC	PPB	6	61	60		50	EPA		Arsenic
A21	MERCURY	PPB	0.1	39	39	***	2	EPA		Mercury
A22	SELENIUM	PPB	5	61	61	***	10	EPA		Selenium
A33	ENDRIN	PPB	1	51	51	***	0.2	EPA		Endrin
A34	METHLOR	PPB	1	51	51	***	100	EPA		Methoxychlor
A35	TOXAENE	PPB	1	51	51	***	5	EPA		Toxaphene
A36	a-BHC	PPB	1	51	51	***	4	EPA		Alpha-BHC
A37	b-BHC	PPB	1	51	51	***	4	EPA		Beta-BHC
A38	g-BHC	PPB	1	51	51	***	4	EPA		Gamma-BHC
A39	d-BHC	PPB	1	51	51	***	4	EPA		Delta-BHC
A51	LEADGF	PPB	6	69	67		50	EPA		Lead (graphite furnace)
C72	NITRATE	PPB	500	71	14		45000	EPA		Nitrate
C74	FLUORID	PPB	500	71	45		1400	EPA	xxx	Fluoride
H13	2,4-D	PPB	1	51	51	***	100	EPA		2,4-D
H14	2,4,5TP	PPB	1	51	51	***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	PPB	6	69	0		1000	EPA		Barium, filtered
H21	FCADMIU	PPB	2	69	60		10	EPA		Cadmium, filtered
H22	FCHROMI	PPB	10	69	69	***	50	EPA		Chromium, filtered
H23	FSILVER	PPB	10	69	69	***	50	EPA		Silver, filtered
H37	FARSENI	PPB	5	67	64		50	EPA		Arsenic, filtered
H38	FMERCUR	PPB	0.1	38	38	***	2	EPA		Mercury, filtered
H39	FSELENI	PPB	5	68	68	***	10	EPA		Selenium, filtered
H41	FLEAD	PPB	5	68	68	***	50	EPA		Lead, filtered

TABLE 2. (contd)

Constituent List-Quality Characteristics

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
A11	SODIUM	PPB	100	69	0					Sodium
A17	MANGESE	PPB	5	69	46					Manganese
A19	IRON	PPB	50	69	23					Iron
C67	PHENOL	PPB	10	2	2	***				Phenol
C73	SULFATE	PPB	500	71	5					Sulfate
C75	CHLORID	PPB	500	71	0					Chloride
H24	FSODIUM	PPB	100	69	0					Sodium, filtered
H29	FMANGAN	PPB	5	69	50					Manganese, filtered
H31	FIRON	PPB	50	69	51					Iron, filtered
H57	LPHENOL	PPB	1	49	49	***				Phenol, low DL

Constituent List=Site Specific

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
010	CO 60	PCI/L	22.5	2	2	***	100	EPA		Cobalt-60
024	CS-137	PCI/L	20	2	2	***	200	EPA		Cesium-137
034	RU 106	PCI/L	172.5	2	2	***	30	EPA		Ruthenium-106
121	SR 90	PCI/L	5	2	2	***	8	EPA		Strontium-90
124	U-CHEM	UG/L	0.725	1	0					Natural uranium
A04	ZINC	PPB	5	69	28					Zinc
A06	CALCIUM	PPB	50	69	0					Calcium
A12	NICKEL	PPB	10	69	64					Nickel
A13	COPPER	PPB	10	69	63		1300	EPAP		Copper
A16	ALUMNUM	PPB	150	69	67					Aluminum
A50	MAGNES	PPB	0	69	0					Magnesium
A61	TETRANE	PPB	10	77	75		5	EPAP		Tetrachloroethane
A64	METHONE	PPB	10	77	77	***				Methyl ethyl ketone
A67	1,1,1-T	PPB	10	77	74		200	EPAP		1,1,1-trichloroethane
A68	1,1,2-T	PPB	10	77	76					1,1,2-trichloroethane
A69	TRICENE	PPB	10	77	61		5	EPAP	xxx	Trichloroethylene
A70	PERCENE	PPB	10	77	71					Perchloroethylene
A71	OPXYLE	PPB	10	77	77	***	440	EPAP		Xylene-o,p
B14	M-XYLE	PPB	10	77	77	***	440	EPAP		Xylene-m
C70	CYANIDE	PPB	10	68	68	***				Cyanide
C78	SULFIDE	PPB	1000	69	69	***				Sulfide
CB0	AMMONIU	PPB	50	71	46					Ammonium ion
H18	FZINC	PPB	5	69	40					Zinc, filtered
H19	FCALCIU	PPB	50	69	0					Calcium, filtered
H25	FNICKEL	PPB	10	69	67					Nickel, filtered
H26	FCOPPER	PPB	10	69	66		1300	EPAP		Copper, filtered
H28	FALUMIN	PPB	150	69	69	***				Aluminum, filtered
H32	FMAGNES	PPB	0	69	0					Magnesium, filtered

TABLE 2. (contd)

Constituent List=Tag-alongs

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
A14	VANADUM	PPB	5	69	36					Vanadium
A18	POTASUM	PPB	100	69	0					Potassium
A80	CHLFORM	PPB	10	77	29					Chloroform
A93	METHYCH	PPB	10	77	68					Methylene chloride
C76	PHOSPHA	PPB	1000	71	71	***				Phosphate
H27	FVANADI	PPB	5	69	40					Vanadium, filtered
H30	FPOTASS	PPB	100	69	0					Potassium, filtered

Constituent List=WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
A01	BERYLAM	PPB	5	2	2	***				Beryllium
A02	OSMIUM	PPB	300	2	2	***				Osmium
A03	STRONUM	PPB	300	2	2	***				Strontium
A15	ANTIONY	PPB	100	2	2	***				Antimony
A24	THIOURA	PPB	200	2	2	***				Thiourea
A25	ACETREA	PPB	200	2	2	***				1-acetyl-2-thiourea
A26	CHLOREA	PPB	200	2	2	***				1-(o-chlorophenyl) thiourea
A27	DIETROL	PPB	200	2	2	***				Diethylstilbesterol
A28	ETHYREA	PPB	200	2	2	***				Ethylenethiourea
A29	NAPHREA	PPB	200	2	2	***				1-naphthyl-2-thiourea
A32	PHENREA	PPB	200	2	2	***				N-phenylthiourea
A40	DDD	PPB	1	2	2	***				DDD
A41	DDE	PPB	1	2	2	***				DDE
A42	DDT	PPB	1	2	2	***				DDT
A43	HEPTLOR	PPB	1	2	2	***	0	EPAP		Heptachlor
A44	HEPTIDE	PPB	1	2	2	***	0	EPAP		Heptchlor epoxide
A46	DIELRIN	PPB	1	2	2	***				Dieldrin
A47	ALDRIN	PPB	1	2	2	***				Aldrin
A48	CHLDANE	PPB	1	2	2	***	0	EPAP		Chlordane
A49	ENDO1	PPB	1	2	2	***				Endosulfan I
A52	ENDO2	PPB	1	2	2	***				Endosulfan II
A62	BENZENE	PPB	10	16	16	***	5	EPAP		Benzene
A63	DIOXANE	PPB	600	16	16	***				Dioxane
A65	PYRIDIN	PPB	600	16	16	***				Pyridine
A66	TOLUENE	PPB	10	16	13		2000	EPAP		Toluene
A72	ACROLIN	PPB	10	16	16	***				Acrolein
A73	ACRYLE	PPB	10	16	16	***				Acrylonitrile
A74	BISTHER	PPB	10	16	16	***				Bis(chloromethyl) ether
A75	BROMONE	PPB	10	16	16	***				Bromoacetone
A76	METHBRO	PPB	10	16	16	***				Methyl bromide
A77	CARBIDE	PPB	10	16	16	***				Carbon disulfide
A78	CHLBENZ	PPB	10	16	16	***				Chlorobenzene
A79	CHLTHER	PPB	10	16	16	***				2-chloroethyl vinyl ether
A81	METHCHL	PPB	10	16	16	***				Methyl chloride
A82	CHMTHER	PPB	10	16	16	***				Chloromethyl methyl ether
A83	CROTONA	PPB	10	16	16	***				Crotonaldehyde
A84	DIBRCHL	PPB	10	16	16	***				1,2-dibromo-3-chloropropane

TABLE 2. (contd)

Constituent List=WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
A85	DIBRETH	PPB	10	15	15	***				1,2-dibromoethane
A86	DIBRMET	PPB	10	16	16	***				Dibromomethane
A87	DIBUTEN	PPB	10	15	15	***				1,4-dichloro-2-butene
A88	DICDIFM	PPB	10	15	15	***				Dichlorodifluoromethane
A89	1,1-DIC	PPB	10	15	15	***				1,1-dichloroethane
A90	1,2-DIC	PPB	10	15	15	***	5	EPAP		1,2-dichloroethane
A91	TRANDCE	PPB	10	18	10		70	EPAP	xxx	Trans-1,2-dichloroethene
A92	DICETHY	PPB	10	15	15	***	7	EPAP		1,1-dichloroethylene
A94	DICPANE	PPB	10	15	15	***	5	EPAP		1,2-dichloropropane
A95	DICPENE	PPB	10	15	15	***				1,3-dichloropropene
A96	NNDIEHY	PPB	10	15	15	***				N,N-diethylhydrazine
A97	1,1-DIM	PPB	3000	2	2	***				1,1-dimethylhydrazine
A98	1,2-DIM	PPB	3000	2	2	***				1,2-dimethylhydrazine
A99	HYDRSUL	PPB	10	15	15	***				Hydrogen sulfide
B01	IODOMET	PPB	10	15	15	***				Iodomethane
B02	METHACR	PPB	10	15	15	***				Methacrylonitrile
B03	METHTHI	PPB	10	15	15	***				Methanethiol
B04	PENTACH	PPB	10	15	15	***				Pentachloroethane
B05	1112-tc	PPB	10	15	15	***				1,1,1,2-tetrachloroethane
B06	1122-tc	PPB	10	15	15	***				1,1,2,2-tetrachloroethane
B08	BROMORM	PPB	10	15	15	***				Bromoform
B09	TRCMEDL	PPB	10	15	15	***				Trichloromethanethiol
B10	TRCMFLM	PPB	10	15	15	***				Trichloromonofluoromethane
B11	TRCPANE	PPB	10	15	15	***				Trichloropropane
B12	123-trp	PPB	10	15	15	***				1,2,3-trichloropropane
B13	VINYIDE	PPB	10	15	15	***	1	EPAP		Vinyl chloride
B15	DIETHY	PPB	10	15	15	***				Diethylarsine
B19	ACETTLE	PPB	3000	2	2	***				Acetonitrile
B20	ACETOPH	PPB	10	2	2	***				Acetophenone
B21	WARFRIN	PPB	10	2	2	***				Warfarin
B22	ACEFENE	PPB	10	2	2	***				2-acetylaminofluorene
B23	AMINBYL	PPB	10	2	2	***				4-aminobyphenyl
B24	AMIISOX	PPB	10	2	2	***				5-(aminomethyl)-3-isoxazolol
B25	AMITROL	PPB	10	2	2	***				Amitrole
B26	ANILINE	PPB	10	2	2	***				Aniline
B27	ARAMITE	PPB	10	2	2	***				Aramite
B28	AURAMIN	PPB	10	2	2	***				Auramine
B29	BENZCAC	PPB	10	2	2	***				Benz[c]acridine
B30	BENZAAN	PPB	10	2	2	***				Benz[a]anthracene
B31	BENDICM	PPB	10	2	2	***				Benzene, dichloromethyl
B32	BENTHOL	PPB	10	2	2	***				Benzenethoil
B33	BENDINE	PPB	10	2	2	***				Benzidine
B34	BENZBFL	PPB	10	2	2	***				Benzo[b]fluoranthene
B35	BENZJFL	PPB	10	2	2	***				Benzo[j]fluoranthene
B36	PBENZQU	PPB	10	2	2	***				P benzoquinone
B37	BENZCHL	PPB	10	2	2	***				Benzyl chloride
B38	BIS2CHM	PPB	10	2	2	***				Bis(2-chloroethoxy) methane
B39	BIS2CHE	PPB	10	2	2	***				Bis(2-chloroethyl) ether
B40	BIS2EPH	PPB	10	2	2	***				Bis(2-ethylhexyl) phthalate
B41	BROPHEN	PPB	10	2	2	***				4-bromophenyl phenyl ether
B42	BUTBENP	PPB	10	2	2	***				Butyl benzyl phthalate
B43	BUYDINP	PPB	10	2	2	***				2-sec-butyl-4,6-dinitrophenol

TABLE 2. (contd)

Constituent List=WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
B44	CHALETH	PPB	10	2	2	***				Chloroalkyl ethers
B45	CHLANIL	PPB	10	2	2	***				P-chloroaniline
B46	CHLCRES	PPB	10	2	2	***				P-chloro-m-cresol
B47	CHLEPOX	PPB	10	2	2	***				1-chloro-2,3-epoxypropane
B48	CHLNAPH	PPB	10	2	2	***				2-chloronaphthalene
B49	CHLPHEN	PPB	10	2	2	***				2-chlorophenol
B50	CHRYSEN	PPB	10	2	2	***				Chrysene
B51	CRESOLS	PPB	10	2	2	***				Cresols
B52	CYCHDIN	PPB	10	2	2	***				2-cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	PPB	10	2	2	***				Dibenz[a,h]acridine
B54	DIBAJAC	PPB	10	2	2	***				Dibenz[a,j]acridine
B55	DIBAHAN	PPB	10	2	2	***				Dibenz[a,h]anthracene
B56	DIBCGCA	PPB	10	2	2	***				7H-dibenzo[c,g]carbazole
B57	DIBAEPY	PPB	10	2	2	***				Dibenzo[a,e]pyrene
B58	DIBAHPY	PPB	10	2	2	***				Dibenzo[a,h]pyrene
B59	DIBAIPY	PPB	10	2	2	***				Dibenzo[a,i]pyrene
B60	DIBPHTH	PPB	10	2	2	***				Di-n-butyl phthalate
B61	12-dben	PPB	10	2	2	***				1,2-dichlorobenzene
B62	13-dben	PPB	10	2	2	***				1,3-dichlorobenzene
B63	14-dben	PPB	10	2	2	***				1,4-dichlorobenzene
B64	DICHBEN	PPB	10	2	2	***				3,3'-dichlorobenzidine
B65	24-dchp	PPB	10	2	2	***				2,4-dichlorophenol
B66	26-dchp	PPB	10	2	2	***				2,6-dichlorophenol
B67	DIEPHTH	PPB	10	2	2	***				Diethyl phthalate
B68	DIHYSAF	PPB	10	2	2	***				Dihydrosafrole
B69	DIMETHB	PPB	10	2	2	***				3,3'-dimethoxybenzidine
B70	DIMEAMB	PPB	10	2	2	***				P-dimethylaminoazobenzene
B71	DIMBENZ	PPB	10	2	2	***				7,12-dimethylbenz[a]anthracene
B72	DIMEYLB	PPB	10	2	2	***				3,3'-dimethylbenzidine
B73	THIONOX	PPB	10	2	2	***				Thiofanox
B74	DIMPHAM	PPB	10	2	2	***				Alpha,alpha-dimethylphenethylamine
B75	DIMPHEN	PPB	10	2	2	***				2,4-dimethylphenol
B76	DIMPHTH	PPB	10	2	2	***				Dimethyl phthalate
B77	DINBENZ	PPB	10	2	2	***				Dinitrobenzene
B78	DINCRES	PPB	10	2	2	***				4,6-dinitro-o-cresol and salts
B79	DINPHEN	PPB	10	2	2	***				2,4-dinitrophenol
B80	24-dint	PPB	10	2	2	***				2,4-dinitrotoluene
B81	26-dint	PPB	10	2	2	***				2,6-dinitrotoluene
B82	DIOPHTH	PPB	10	2	2	***				Di-n-octyl phthalate
B83	DIPHAMI	PPB	10	2	2	***				Diphenylamine
B84	DIPHHYD	PPB	10	2	2	***				1,2-diphenylhydrazine
B85	DIPRNIT	PPB	10	2	2	***				Di-n-propylnitrosamine
B86	ETHMINE	PPB	10	2	2	***				Ethyleneimine
B87	ETHMETS	PPB	10	2	2	***				Ethyl methanesulfonate
B88	FLUORAN	PPB	10	2	2	***				Fluoranthene
B89	HEXCBEN	PPB	10	2	2	***				Hexachlorobenzene
B90	HEXCBUT	PPB	10	2	2	***				Hexachlorobutadiene
B91	HEXCCYC	PPB	10	2	2	***				Hexachlorocyclopentadiene
B92	HEXCETH	PPB	10	2	2	***				Hexachloroethane
B93	INDENOP	PPB	10	2	2	***				Indeno(1,2,3-cd)pyrene
B94	ISOSOLE	PPB	10	2	2	***				Isosafrole
B95	MALDILE	PPB	10	2	2	***				Malononitrile

TABLE 2. (contd)

Constituent List-WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
B96	MELPHAL	PPB	10	2	2	***				Melphalan
B97	METHAPY	PPB	10	2	2	***				Methapyrilene
B98	METHNYL	PPB	10	2	2	***				Metholonyl
B99	METAZIR	PPB	10	2	2	***				2-methylaziridine
C01	METCHAN	PPB	10	2	2	***				3-methylcholanthrene
C02	METBISC	PPB	10	2	2	***				4,4'-methylenebis(2-chloroaniline)
C03	METACTO	PPB	10	2	2	***				2-methyllactonitrile
C04	METACRY	PPB	10	15	15	***				Methyl methacrylate
C05	METMSUL	PPB	10	2	2	***				Methyl methanesulfonate
C06	METPROP	PPB	10	2	2	***				2-methyl-2-(methylthio) propionaldehyde-
C07	METHTOU	PPB	10	2	2	***				Methylthiouracil
C08	NAPHQUI	PPB	10	2	2	***				1,4-naphthoquinone
C09	1-napha	PPB	10	2	2	***				1-naphthylamine
C10	2-napha	PPB	10	2	2	***				2-naphthylamine
C11	NITRANI	PPB	10	2	2	***				P-nitroaniline
C12	NITBENZ	PPB	10	2	2	***				Nitrobenzine
C13	NITPHEN	PPB	10	2	2	***				4-nitrophenol
C14	NNIBUTY	PPB	10	2	2	***				N-nitrosodi-n-butylamine
C15	NNIDIEA	PPB	10	2	2	***				N-nitrosodiethanolamine
C16	NNIDIEY	PPB	10	2	2	***				N-nitrosodiethylamine
C17	NNIDIME	PPB	10	2	2	***				N-nitrosodimethylamine
C18	NNIMETH	PPB	10	2	2	***				N-nitrosomethylethylamine
C19	NNIURET	PPB	10	2	2	***				N-nitroso-N-methylurethane
C20	NNIVINY	PPB	10	2	2	***				N-nitrosomethylvinylamine
C21	NNIMORP	PPB	10	2	2	***				N-nitrosomorpholine
C22	NNINICO	PPB	10	2	2	***				N-nitrosonornicotine
C23	NNIPIPE	PPB	10	2	2	***				N-nitrosopiperidine
C24	NITRPYR	PPB	10	2	2	***				Nitrosopyrrolidine
C25	NITRTOL	PPB	10	2	2	***				5-nitro-o-toluidine
C26	PENTCHB	PPB	10	2	2	***				Pentachlorobenzene
C27	PENTCHN	PPB	10	2	2	***				Pentachloronitrobenzene
C28	PENTCHP	PPB	10	2	2	***	220	EPAP		Pentachlorophenol
C29	PHENTIN	PPB	10	2	2	***	220	EPAP		Phenacetin
C30	PHENIME	PPB	10	2	2	***				Phenylenediamine
C31	PHTHEST	PPB	10	2	2	***				Phthalic acid esters
C32	PICOLIN	PPB	10	2	2	***				2-picoline
C33	PRONIDE	PPB	10	2	2	***				Pronamide
C34	RESERPI	PPB	10	2	2	***				Reserpine
C35	RESORCI	PPB	10	2	2	***				Resorcinol
C36	SAFROL	PPB	10	2	2	***				Safrol
C37	TETRCHB	PPB	10	2	2	***				1,2,4,5-tetrachlorobenzene
C38	TETRCHP	PPB	10	2	2	***				2,3,4,6-tetrachlorophenol
C40	THIURAM	PPB	10	2	2	***				Thiuram
C41	TOLUDIA	PPB	10	2	2	***				Toluenediamine
C42	OTOLHYD	PPB	10	2	2	***				O-toluidine hydrochloride
C43	TRICHLB	PPB	10	2	2	***				1,2,4-trichlorobenzene
C44	245-trp	PPB	10	2	2	***				2,4,5-trichlorophenol
C45	246-trp	PPB	10	2	2	***				2,4,6-trichlorophenol
C46	TRIPHOS	PPB	10	2	2	***				O,O,O-triethyl phosphorothioate
C47	SYMTRIN	PPB	10	2	2	***				Sym-trinitrobenzene
C48	TRISPHO	PPB	10	2	2	***				Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	PPB	10	2	2	***				Benzo[a]pyrene
C50	CHLNAPZ	PPB	10	2	2	***				Chlornaphazine

TABLE 2. (contd)

Constituent List=WAC 173-303-9906

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Long name
C61	BIS2ETH	PPB	10	2	2	***				Bis(2-chloroisopropyl)ether
C62	HEXAENE	PPB	10	2	2	***				Hexachloropropene
C63	HYDRAZI	PPB	3000	2	2	***				Hydrazine
C64	HEXACHL	PPB	10	2	2	***				Hexachlorophene
C65	NAPHTHA	PPB	10	2	2	***				Naphthalene
C66	123TRI	PPB	10	2	2	***				1,2,3-trichlorobenzene
C68	135TRI	PPB	10	2	2	***				1,3,5-trichlorobenzene
C69	1234TE	PPB	10	2	2	***				1,2,3,4-tetrachlorobenzene
C60	12351E	PPB	10	2	2	***				1,2,3,5-tetrachlorobenzene
C61	TETEPYR	PPB	100	2	2	***				Tetraethylpyrophosphate
C62	CHLLATE	PPB	100	2	2	***				Chlorobenzilate
C63	CARBPHT	PPB	2	2	2	***				Carbophenothion
C64	DISULFO	PPB	2	2	2	***				Disulfoton
C65	DIMETHO	PPB	5	2	2	***				Dimethoate
C66	METHPAR	PPB	2	2	2	***				Methyl parathion
C67	PARATHI	PPB	2	2	2	***				Parathion
C71	FORMALN	PPB	500	15	15	***				Formalin
C79	KEROSEN	PPB	10000	2	2	***				Kerosene
C81	ETHYGLY	PPB	10000	2	2	***				Ethylene glycol
C86	DIOXIN	PPB	0.1	2	2	***				Dioxin
C87	CITRUSR	PPB	1000	2	2	***				Citrus red
C88	CYANORB	PPB	3000	2	2	***				Cyanogen bromide
C89	CYANCHL	PPB	3000	2	2	***				Cyanogen chloride
C90	PARALDE	PPB	3000	2	2	***				Paraldegyde
C91	STRYCHN	PPB	50	2	2	***				Strychnine
C92	MALHYDR	PPB	500	2	2	***				Maleic hydrizide
C93	NICOTIN	PPB	100	2	2	***				Nicotinic acid
C94	ACRYIDE	PPB	3000	2	2	***	0	EPAP		Acrylamide
C95	ALLYLAL	PPB	3000	2	2	***				Allyl alcohol
C96	CHLORAL	PPB	3000	2	2	***				Chloral
C97	CHLACET	PPB	3000	2	2	***				Chloroacetaldehyde
C98	CHLPROP	PPB	3000	2	2	***				3-chloropropionitrile
C99	CYANOGN	PPB	3000	2	2	***				Cyanogen
H01	DICPROP	PPB	3000	2	2	***				Dichloropropanol
H03	ETHCARB	PPB	3000	2	2	***				Ethyl carbamate
H04	ETHCYAN	PPB	3000	2	2	***				Ethyl cyanide
H05	ETHOXID	PPB	3000	2	2	***				Ethylene oxide
H06	ETHMETH	PPB	3000	15	15	***				Ethyl methacrylate
H07	FLUOROA	PPB	3000	2	2	***				Fluoroacetic acid
H08	GLYCIDY	PPB	3000	2	2	***				Glycidylaldehyde
H09	ISOBUTY	PPB	3000	2	2	***				Isobutyl alcohol
H10	METZINE	PPB	3000	2	2	***				Methyl hydrazine
H11	PROPYLA	PPB	3000	2	2	***				N-propylamine
H12	PROPYNO	PPB	3000	2	2	***				2-propyn-1-ol
H15	2,4,5-T	PPB	1	2	2	***				2,4,5-T
H33	FBERYLL	PPB	5	3	3	***				Beryllium, filtered
H34	FOSMIUM	PPB	300	3	3	***				Osmium, filtered
H35	FSTRONT	PPB	300	3	2					Strontium, filtered
H36	FANTIMO	PPB	100	3	3	***				Antimony, filtered

*** - Indicates all samples were below detection limits
xxx - Indicates that regulatory limits were exceeded
EPA - based on limits given in 40CFR 265, Appendix III, EPA Interim Primary Drinking Water Standards
EPAP - based on proposed Maximum Contaminant Levels

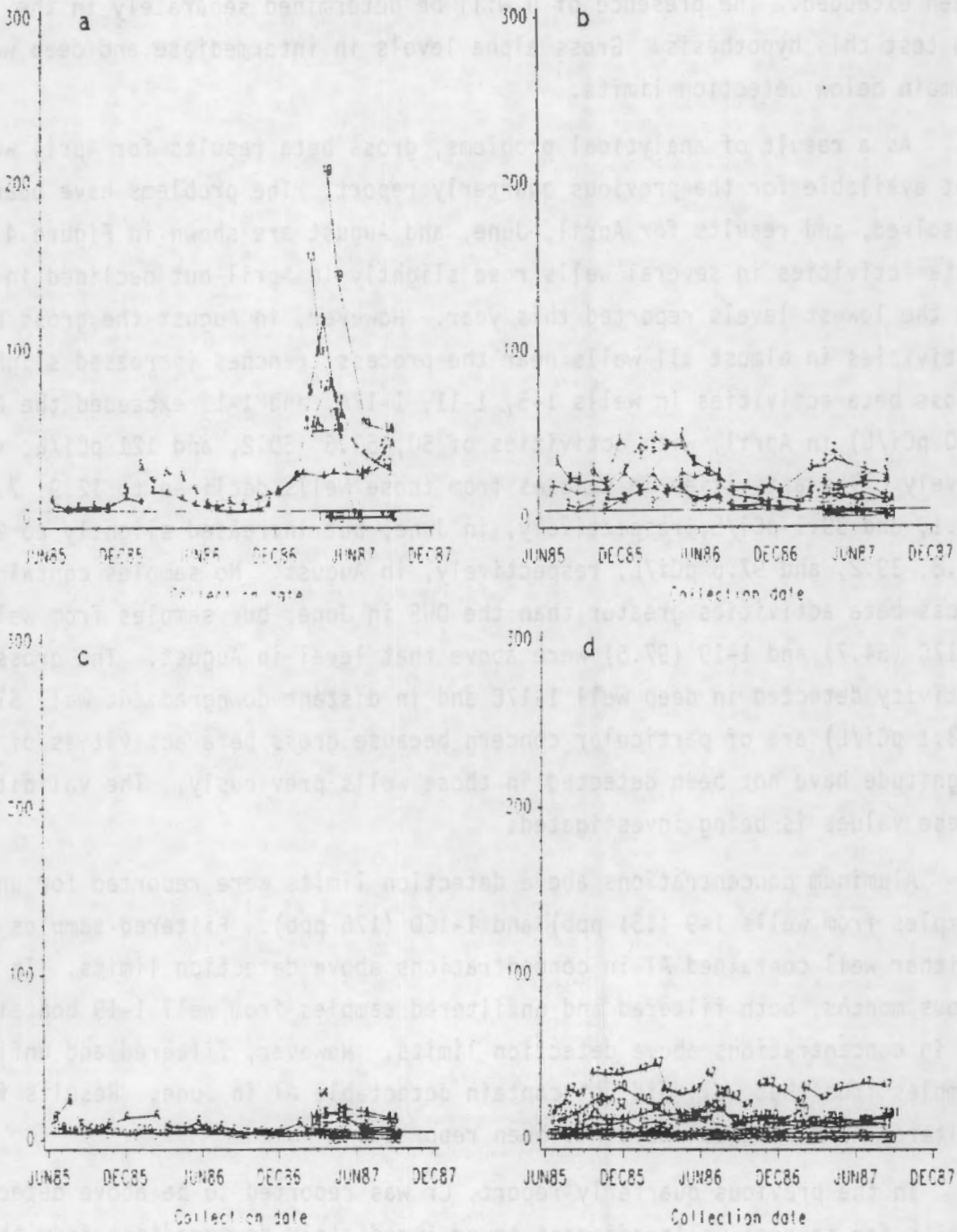


FIGURE 3. Gross Alpha in 300 Area Process Trenches Monitoring Wells, June 1985 Through August 1987, a) Adjacent, b) Immediately Downgradient, c) Generally to the North, d) Generally to the South.

However, most of the alpha activity is probably due to U, which must be excluded from the alpha count to determine whether the drinking water standard has been exceeded. The presence of U will be determined separately in the future to test this hypothesis. Gross alpha levels in intermediate and deep wells remain below detection limits.

As a result of analytical problems, gross beta results for April were not available for the previous quarterly report. The problems have been resolved, and results for April, June, and August are shown in Figure 4. Gross beta activities in several wells rose slightly in April but declined in June to the lowest levels reported this year. However, in August the gross beta activities in almost all wells near the process trenches increased slightly. Gross beta activities in wells 1-5, 1-11, 1-17A, and 1-19 exceeded the DWS (50 pCi/L) in April, with activities of 50, 50.6, 50.2, and 121 pCi/L, respectively. The activities in samples from those wells declined to 12.9, 7.62, 31.1, and 39.1 pCi/L, respectively, in June, but increased slightly to 27.7, 24.8, 39.2, and 97.6 pCi/L, respectively, in August. No samples contained gross beta activities greater than the DWS in June, but samples from wells 1-17C (54.7) and 1-19 (97.6) were above that level in August. The gross beta activity detected in deep well 1-17C and in distant downgradient well S19-E13 (43.1 pCi/L) are of particular concern because gross beta activities of such magnitude have not been detected in those wells previously. The validity of these values is being investigated.

Aluminum concentrations above detection limits were reported for unfiltered samples from wells 1-9 (151 ppb) and 1-16D (175 ppb). Filtered samples from neither well contained Al in concentrations above detection limits. In previous months, both filtered and unfiltered samples from well 1-19 contained Al in concentrations above detection limits. However, filtered and unfiltered samples from that well did not contain detectable Al in June. Results for filtered Al for August have not been reported.

In the previous quarterly report, Cr was reported to be above detection limits for several wells adjacent to or immediately downgradient from the process trenches (1-9, 1-12, 1-16B, 1-16C, 1-17B, 1-18B, 1-18C, 1-19, and S19E13) during March and/or April. Chromium continues to be detected in the unfiltered samples from several wells. From April to June, Cr concentrations

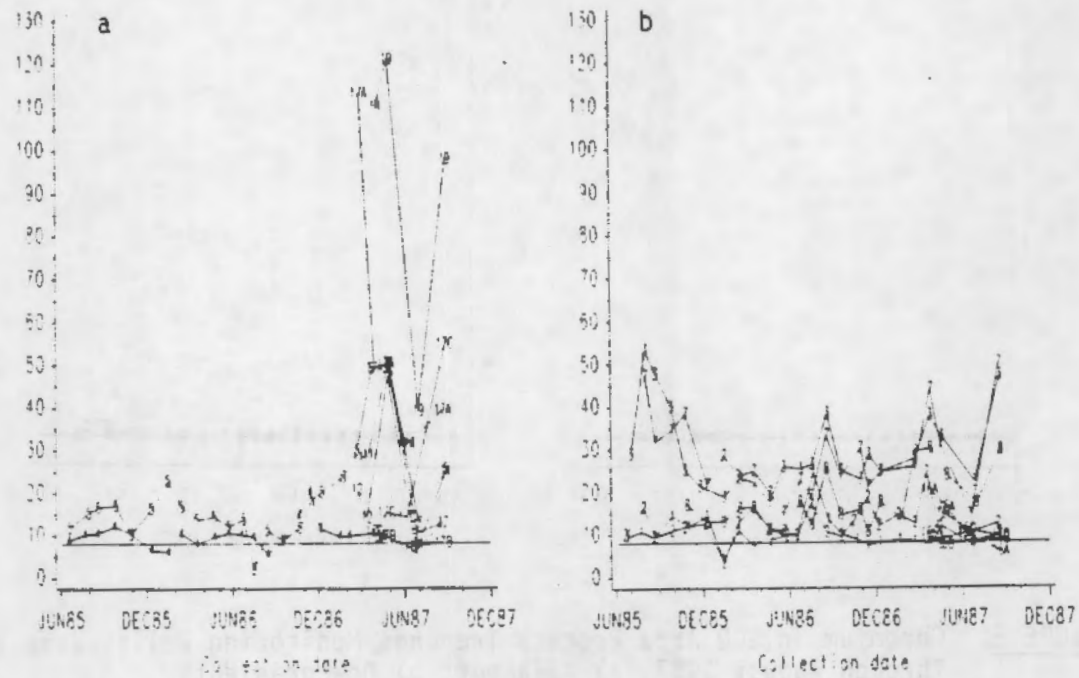


FIGURE 4. Gross Beta in 300 Area Process Trenches Monitoring Wells, June 1985 Through August 1987, a) Adjacent, b) Downgradient.

increased in well 1-9 from 13 to 18 ppb, in well 1-16C from 20 to 33 ppb, in well 1-17B from 14 to 19 ppb, and in well 4-11 from below detection limits to 14 ppb. These results are shown in Figure 5. Chromium in well 1-19 has remained less than the April high of 34 ppb, as shown in Figure 5a. These values are all below the DWS of 50 ppb. Results for filtered Cr have not been reported for August.

In June, coliform bacteria was reported in samples from the following wells: 1-2 (9.2 mpn), 3-10 (5.1 mpn), 4-7 (2.2 mpn), and 8-2 (16.0 mpn). It was detected only in well 2-1 (2.2 mpn) in August.

In general, nitrate levels appear to be declining or remaining constant in all wells in the network. Although nitrate in well 1-15 increased from 5,280 in March to 16,900 ppb in April and 22,900 ppb in June, it decreased slightly in August to 19,300 ppb (Figure 6). Prior to the August sampling,

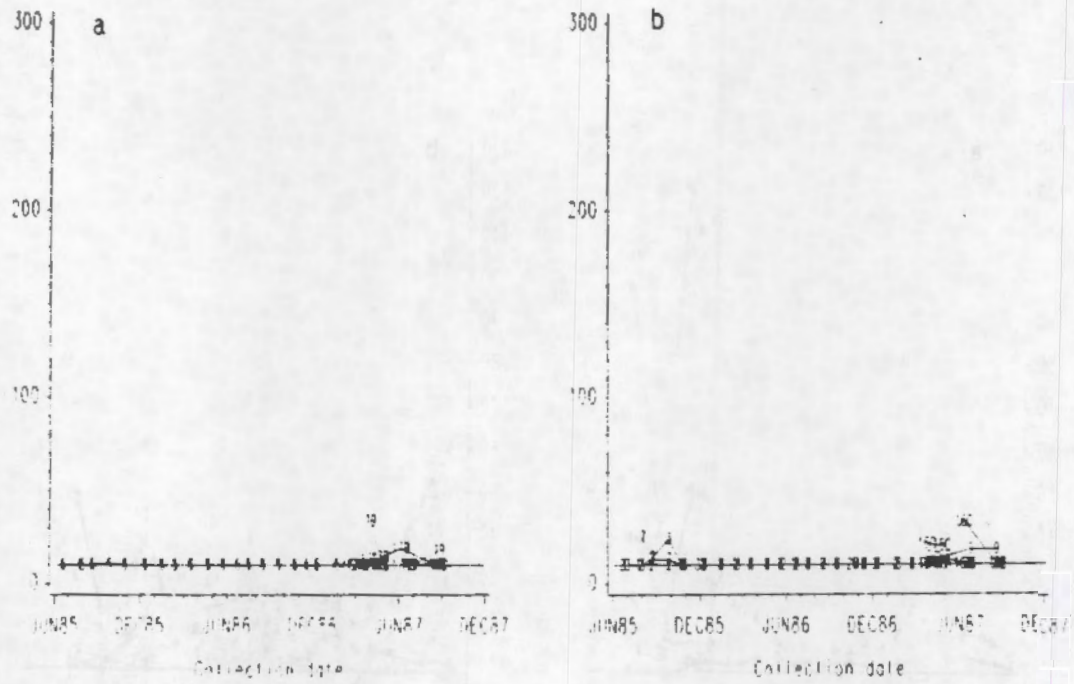


FIGURE 5. Chromium in 300 Area Process Trenches Monitoring Wells, June 1985 Through August 1987, a) Adjacent, b) Downgradient.

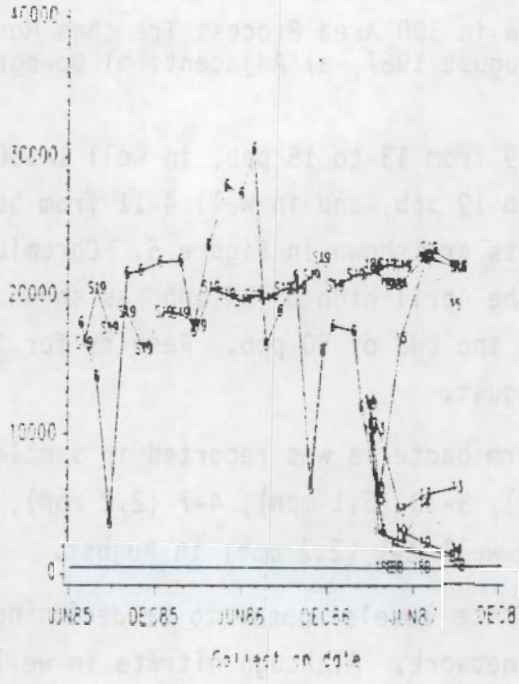


FIGURE 6. Nitrate in Monitoring Wells to the North of the 300 Area Process Trenches, June 1985 Through August 1987

well 1-16C was the only deep well in the network that had contained detectable nitrate (1140 ppb in March, 563 ppb in April, and 1800 ppb in June). The nitrate concentration in well 1-16C in August declined to below the detection limit.

The water chemistry of wells completed in the intermediate and deep portions of the unconfined aquifer is usually different from that of adjacent shallow wells. Concentrations of several constituents (i.e., ammonium, Ba, Cr, fluoride, Fe, Mn, K, Na, and sulfate) in the deeper wells are generally significantly different from those in the shallow wells, except for well 1-19. Differences in the concentrations of these constituents can presumably be accounted for by corresponding differences in the portions of the unconfined and confined aquifers being sampled. For example, concentrations of fluoride are consistently higher in samples from all intermediate and deep wells, regardless of their location relative to the process trenches (Figure 7). This pattern suggests that these constituents are contributed to the lower portions of the unconfined aquifer and the confined aquifer from a source other than the trenches. The concentrations of fluoride in samples from intermediate and deep wells (1-9, 1-16B, 1-16C, 1-17B, 1-17C, 1-18B, and 1-18C) continue to be greater than the detection limit and near or above the DWS. The Interim Primary DWS for fluoride is 1400 to 2400 ppb, depending on water temperature. Although the levels of fluoride rose in these wells in June, they declined slightly in August. Fluoride concentrations above detection limits were reported for several shallow wells near the process trenches. Wells that contained detectable fluoride in June and/or August include 1-3 (660 ppb, 523 ppb), 1-7 (580 ppb, 541 ppb), 1-8 (715 ppb, 568 ppb), 1-10 (556 ppb, <500 ppb), 1-12 (500 ppb, <500 ppb), 1-16A (632 ppb, <500 ppb), 1-17A (663 ppb, <500ppb), and 1-19 (580 ppb, <500 ppb). The fluoride concentrations in wells north of the trenches and in distant shallow wells to the south were below detection limits (Figure 7c and 7d).

During March and April, methylene chloride was reported above detection limits in wells 3-7 (3000 ppb) and 3-10 (300 ppb). None was detected in any wells in June but it was detected in wells 1-4 (3040 ppb), 4-1 (130 ppb), and S19-E13 (230 ppb) in August.

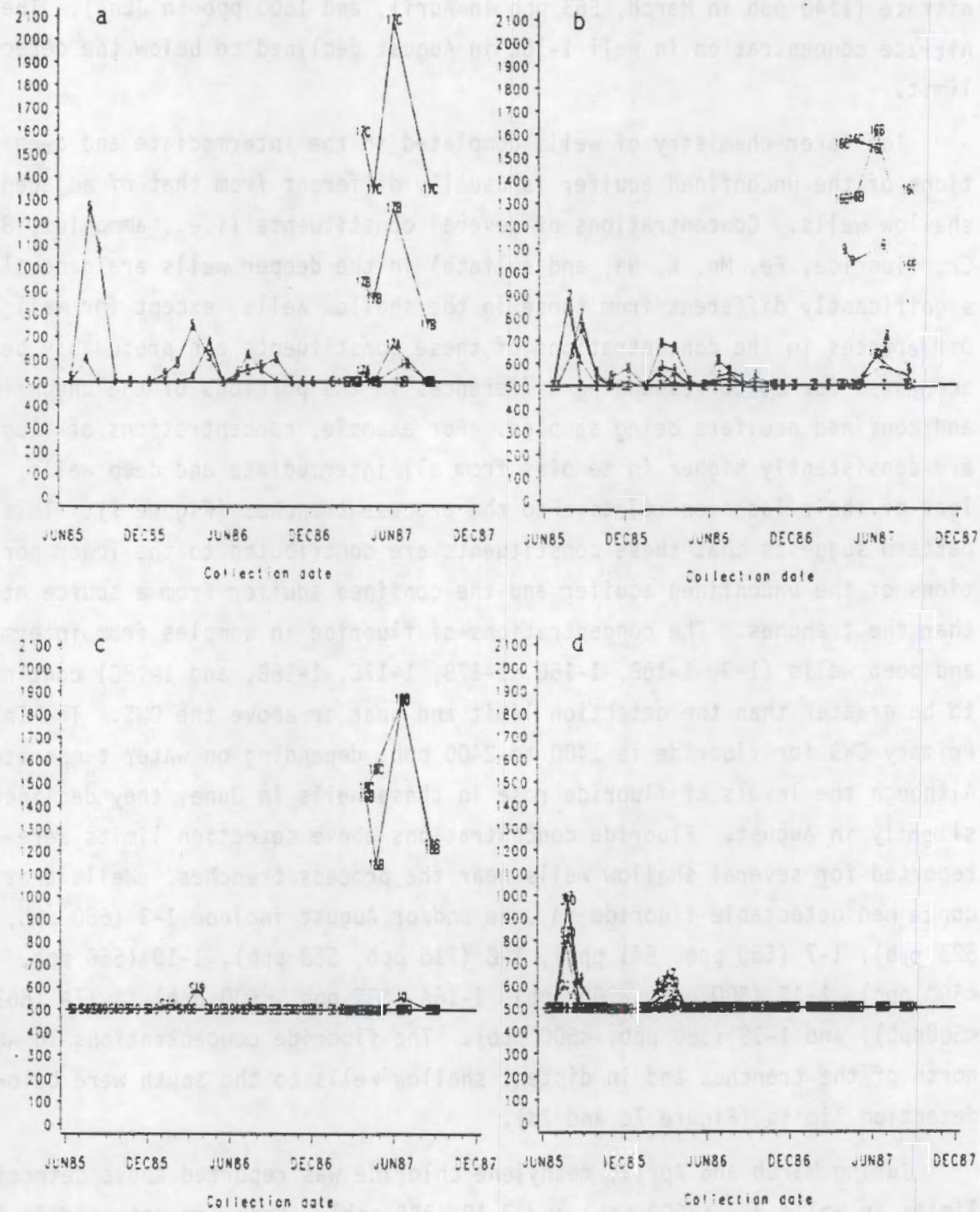


FIGURE 7. Fluoride in 300 Area Process Trenches Monitoring Wells, June 1985 Through August 1987, a) Adjacent, b) Downgradient, c) North, d) South.

Samples from wells in the 1-16 and 1-17 clusters were analyzed twice in June for volatile organics. Trichloroethylene (TCE) was first reported in March in intermediate depth well 1-16B at 20 ppb, and it rose slightly to 22 ppb in April. Two samples in June contained 20 and 24 ppb, and a sample in August had 19 ppb (Figure 8). All of these values for TCE are above the EPA-proposed maximum concentration limit of 5 ppb for drinking water.

A degradation isomer of TCE, 1,2-dichloroethylene (1,2-DCE), has been detected consistently in samples from intermediate depth wells 1-16B and 1-17B. The recommended maximum concentration limit for 1,2-DCE is 70 ppb. Concentrations of 1,2-DCE in both early and late June samples from intermediate depth wells 1-16B and 1-17B were essentially unchanged from those measured in April. The concentration in August in well 1-16B was 63 ppb and that in 1-17B was 26 ppb, reduced from June concentrations in well 1-16B of 67 and 72 ppb and in

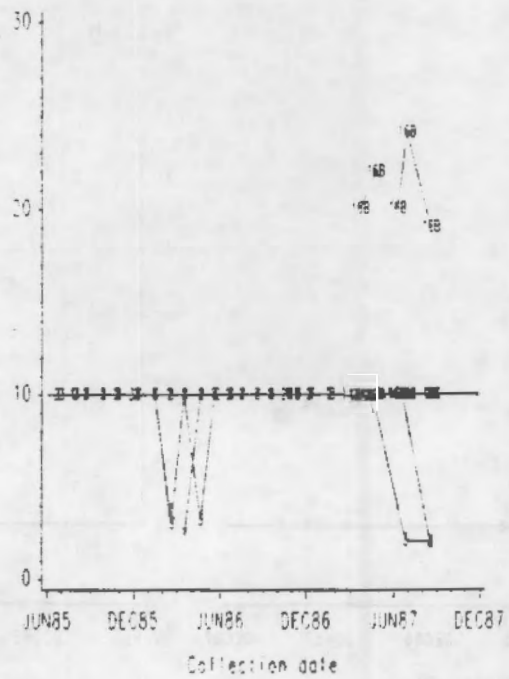


FIGURE 8. Trichloroethylene in Monitoring Wells Downgradient from the 300 Area Process Trenches, June 1985 Through August 1987

well 1-17B of 27 and 28 ppb and from April concentrations of 71 ppb in 1-16B and 31 ppb in 1-17B (Figure 9). By minimizing purging time, significant downward gradients and concomitant flow were prevented; therefore the late June concentrations in deep wells 1-16C and 1-16D were reduced below detection limits. Although well 1-16C contained 20 ppb 1,2-DCE for the first time in early June, the concentration had returned to below detection limits in late June. Samples from neither well 1-16A nor 1-17A, nor any other shallow wells, have shown 1,2-DCE to be present.

The concentrations of 1,2-DCE in wells 1-16B and 1-17B are of particular concern. Water levels in well 1-16C declined 20 feet from February (the month in which the well was installed) to May 1987. This deep well is screened in the confined aquifer. No similar large decline in water levels has been noted in the other deep wells in the vicinity. The ground-water chemistry data

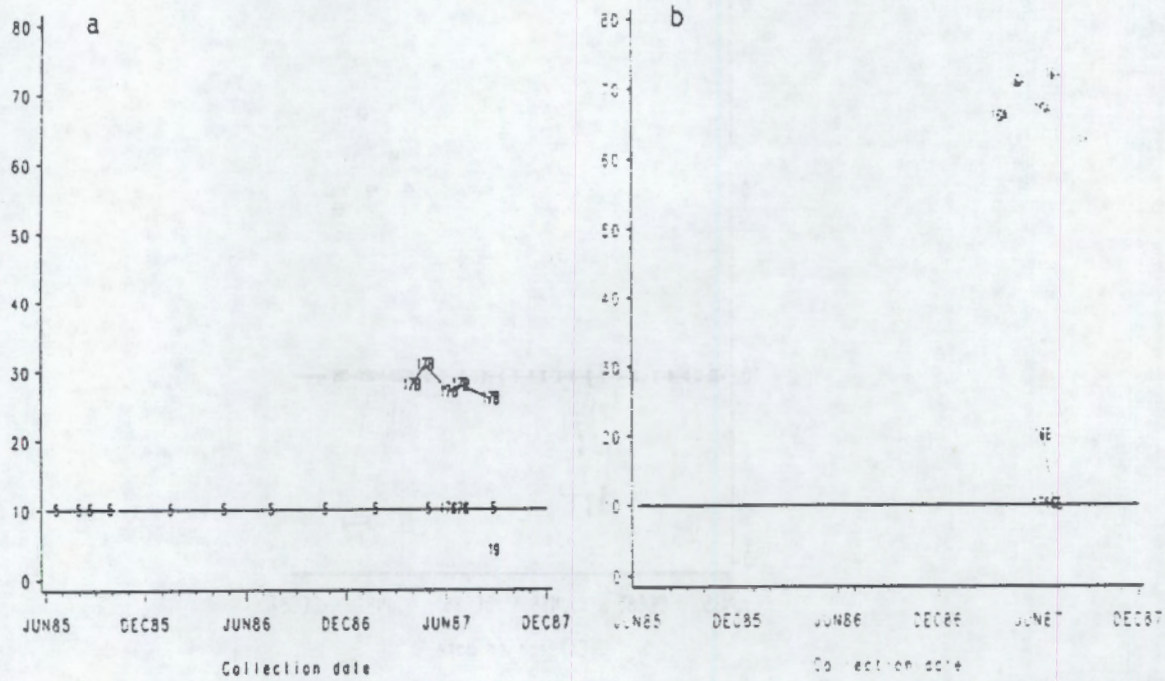


FIGURE 9. Trans-1,2-DCE in Monitoring Wells a) Adjacent to or b) Downgradient of the 300 Area Process Trenches

from the special early June sampling of well 1-16C show the presence of 1,2-DCE, which had previously only been detected in intermediate-depth wells screened in the bottom of the unconfined aquifer. The sampling data for June also indicate the presence of low concentrations of chloroform in well 1-16C. Chloroform has otherwise only been detected in shallow wells in the unconfined aquifer. Both chloroform and 1,2-DCE were detected in well 1-16C, which is screened in the confined aquifer; these two constituents are indigenous to different intervals of the unconfined aquifer. Apparently all intervals of the local unconfined aquifer have been hydraulically interconnected as a result of inadequate sealing of well 1-16D. Alternatives for regaining hydraulic isolation between the unconfined and confined aquifers in this area were evaluated, and a method was selected. As a temporary measure to prevent the flow of 1,2-DCE and TCE down into the confined aquifer, purging of well 1-16C to obtain a sample of the water in the confined aquifer is limited to approximately 0.1 borehole volumes.

The presence of particulate material in several of the newer wells in the network (e.g., 1-9, 1-16C, 1-16D, 1-17B, 1-19, and 4-11) is indicated by the detection of Al and Cr in unfiltered samples from the wells. Although the exact nature of the particulate material is unknown, it may be a product of formation sediment in the wells, surficial metal from the stainless steel casing and screen, or introduction of material during the drilling process. The presence of Cr in the new intermediate wells but not in shallow wells had previously been attributed to differences in the water chemistry for the intervals of the unconfined aquifer being sampled. A similar assumption was made to account for chromium in deep wells 1-16C and 1-9, which are screened in the confined aquifer. However, Cr has only been detected in the unfiltered samples, indicating that it is due to particulate material in the wells. Given that in-line filters are used, it is unlikely that the Cr precipitated in the discharge line before filtering. In addition, the sampling pumps and discharge risers have been passivated and would neither release nor adsorb significant amounts of Cr.

SUMMARY

In summary, gross alpha and gross beta concentrations either remained at levels similar to those detected during the previous quarter or have continued to decline with minor fluctuations from month to month. Although aluminum is no longer detected, chromium continues to be detected in the unfiltered samples from several wells at concentrations below the DWS of 50 ppb. Nitrate levels appear to be declining or remaining constant in all wells except for well 1-15, which has been fluctuating near but below the DWS.

The wells completed in the bottom (intermediate portion) of the unconfined aquifer and in the confined aquifer (deep interval) generally have a different water chemistry than adjacent shallow wells. These wells generally have concentrations of several constituents (i.e., ammonium, Ba, Cr, fluoride, Fe, Ma, K, Na, and sulfate) that are significantly different from the shallow wells, except for well 1-19. Differences in the concentrations of these constituents can presumably be accounted for by differences in the portion of the unconfined aquifer and the confined aquifer being sampled. The most significant indicator of the chemical difference is fluoride, which is near or slightly above the DWS in some of the deeper wells.

Organic contamination is limited to the intermediate wells adjacent or immediately downgradient of the process trenches, where trichloroethene (TCE) and its common degradation isomer, 1,2-dichloroethene (1,2-DCE) have been found. Concentrations of TCE are four times greater than the maximum concentration limit (MCL) of 5 ppb for drinking water, and 1,2-DCE has been detected consistently in samples from intermediate-depth wells near its MCL of 70 ppb. The presence of 1,2-DCE in the confined aquifer around well cluster 1-16 indicates that hydraulic interconnection likely exists via nearby observation well 1-16D. Well 1-16D will be abandoned in early 1988.

183-H SOLAR EVAPORATION BASINS

Work described in the previous quarterly report (USDOE 1987e) focused on Phase III drilling of three monitoring wells, completion of all planned well development and aquifer testing, and routine monitoring of the ground water. This document reports on subsequent activities and data collected for the period from July through September 1987.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Remedial work on the five original monitoring wells was completed during the quarter. This work entailed pouring concrete pads and installing protective steel posts around each of the well casings. In addition, KEH surveyed horizontal and vertical controls for these wells and the Phase III wells. As was done for the Phase II wells, the well number and Hanford Site coordinates were stamped on the brass survey marker located in the concrete pad for each well. The casing elevation was stamped on the north side of each casing. Horizontal and vertical controls for all 100-H Area wells monitored as part of this project are presented in Table 3. The 100-H Area map entitled "ASBUILT WELL LOCATIONS" was updated to reflect these changes and is included as Figure 10.

Locking hasps have been installed on all of the well casings. Keyed padlocks have been ordered and will be installed on the wells when they arrive.

Hydrogeologic Characterization Effort

Sediment analyses for samples collected during Phase III drilling were completed. Grain size distribution, soil moisture content, soil moisture retention, bulk density, and bulk porosity were analyzed. The data will be reported in the final characterization report for the area surrounding the 183-H Basins, which is scheduled to be completed in February 1988.

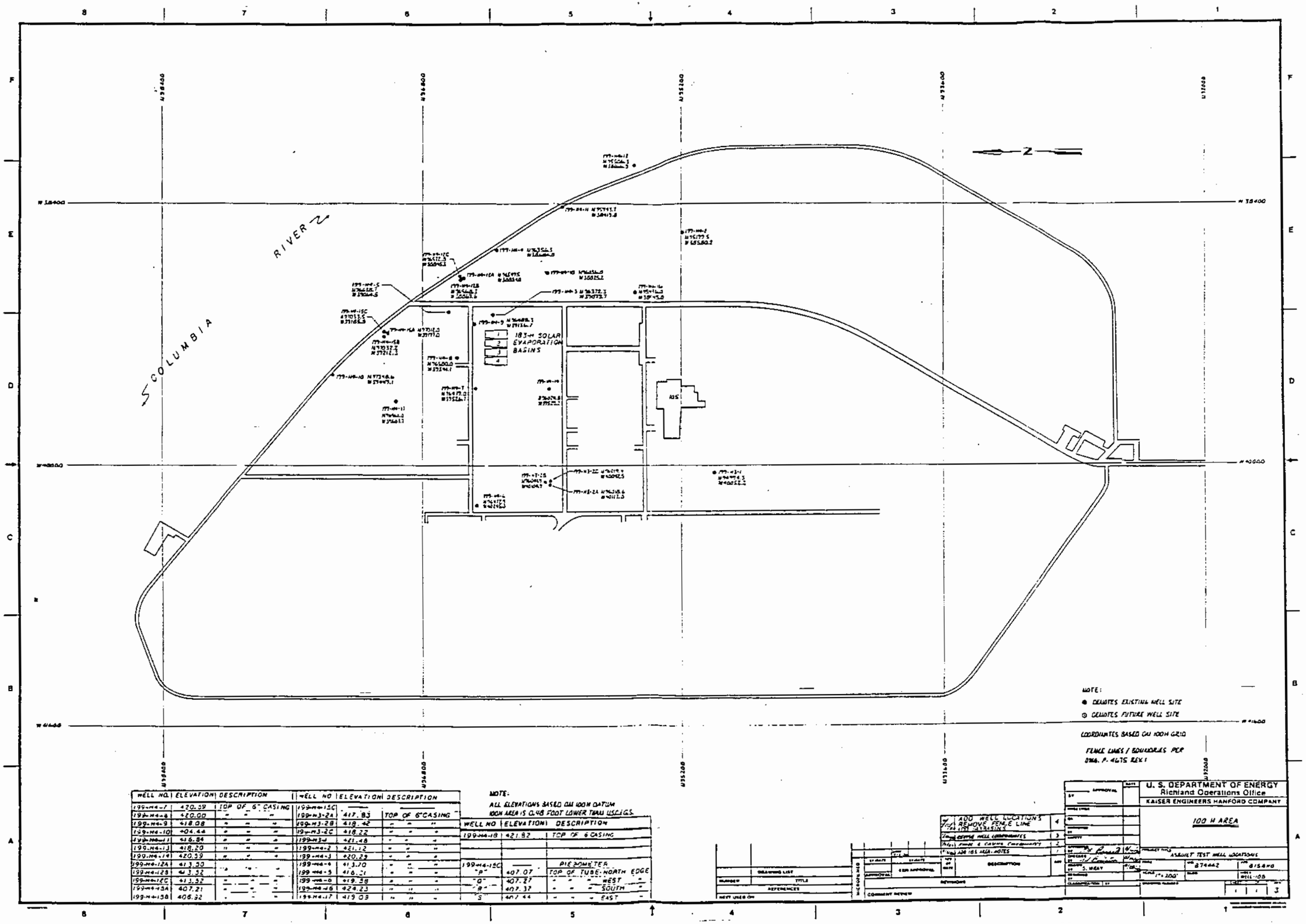
Water levels continue to be measured biweekly in 24 wells surrounding the 183-H Basins. The data are correlated with continuous river-level data from the Hanford Generating Plant (HGP) located at the 100-N Area. As shown in Figure 11, changes in water-table elevation in all wells corresponded to changes in river stage.

TABLE 3. Horizontal and Vertical Controls for the 183-H Solar Evaporation Basins Monitoring Wells, Hanford Coordinate System

Well Number	Coordinates	Elevation (ft)
199-H3-1	N 94,994.3 W 40,052.2	421.48
199-H3-2A	N 96,016.6 W 40,117.0	417.83
199-H3-2B	N 96,041.9 W 40,104.9	418.42
199-H3-2C	N 96,019.4 W 40,092.5	418.22
199-H4-3	N 96,372.3 W 39,079.7	420.29
199-H4-4	N 96,356.3 W 38,684.8	413.70
199-H4-5	N 96,638.7 W 39,064.5	416.21
199-H4-6	N 96,472.9 W 40,245.0	419.58
199-H4-7	N 96,479.0 W 39,526.7	420.59
199-H4-8	N 96,580.0 W 39,341.1	420.00
199-H4-9	N 96,488.3 W 39,136.2	418.08
199-H4-10	N 97,348.6 W 39,449.1	404.44
199-H4-11	N 95,943.7 W 38,419.8	416.84
199-H4-12A	N 96,549.5 W 38,854.0	413.50
199-H4-12B	N 96,568.3 W 38,869.6	413.52

TABLE 3. (contd)

Well Number	Coordinates	Elevation (ft)
199-H4-12C	N 96,572.8 W 38,845.3	413.52
199-H4-13	N 95,506.3 W 38,166.9	418.40
199-H4-14	N 96,024.8 W 39,529.2	420.59
199-H4-15A	N 97,012.0 W 39,197.0	407.21
199-H4-15B	N 97,032.2 W 39,212.3	406.92
199-H4-15C (P)	N 97,033.5 W 39,185.8	407.07
(Q)	N 97,033.5 W 39,185.8	407.27
(R)	N 97,033.5 W 39,185.8	407.37
(S)	N 97,033.5 W 39,185.8	407.44
199-H4-16	N 95,496.0 W 38,945.8	424.23
199-H4-17	N 96,961.0 W 39,607.7	419.09
199-H4-18	N 96,036.8 W 38,825.2	421.82



WELL NO	ELEVATION	DESCRIPTION	WELL NO	ELEVATION	DESCRIPTION
199-H4-7	420.59	TOP OF 6" CASING	199-H4-15C	—	—
199-H4-8	420.00	" " "	199-H3-2A	417.83	TOP OF 6" CASING
199-H4-9	418.08	" " "	199-H3-2B	418.42	" " "
199-H4-10	404.44	" " "	199-H3-2C	418.22	" " "
199-H4-11	416.84	" " "	199-H3-3	421.48	" " "
199-H4-13	418.20	" " "	199-H4-2	421.12	" " "
199-H4-14	420.59	" " "	199-H4-3	420.29	" " "
199-H4-12A	413.50	" " "	199-H4-4	413.70	" " "
199-H4-12B	413.52	" " "	199-H4-5	416.21	" " "
199-H4-12C	413.52	" " "	199-H4-6	419.38	" " "
199-H4-15A	407.21	" " "	199-H4-16	424.23	" " "
199-H4-15B	406.32	" " "	199-H4-17	419.03	" " "

NOTE:
ALL ELEVATIONS BASED ON 100H DATUM
100H AREA IS 0.48 FOOT LOWER THAN USC&GS.

WELL NO	ELEVATION	DESCRIPTION
199-H4-18	421.82	TOP OF 6" CASING
199-H4-15C		PIEZOMETER
"P"	407.07	TOP OF TUBE-NORTH EDGE
"Q"	407.27	" " " WEST "
"R"	407.37	" " " SOUTH "
"S"	407.44	" " " EAST "

REVISIONS	
ADD WELL LOCATIONS & REMOVE FENCE LINE AROUND BASINS	4
REVISE WELL COORDINATES	3
REVISE FENCE & CANVAS EMPLACEMENT	2
ADD 183-H AREA NOTES	1

DRAWING NO	874442
SCALE	1" = 200'
WELL NO	815H8
WELL-108	

FIGURE 10. 183-H Project Ground-Water Monitoring Well Locations

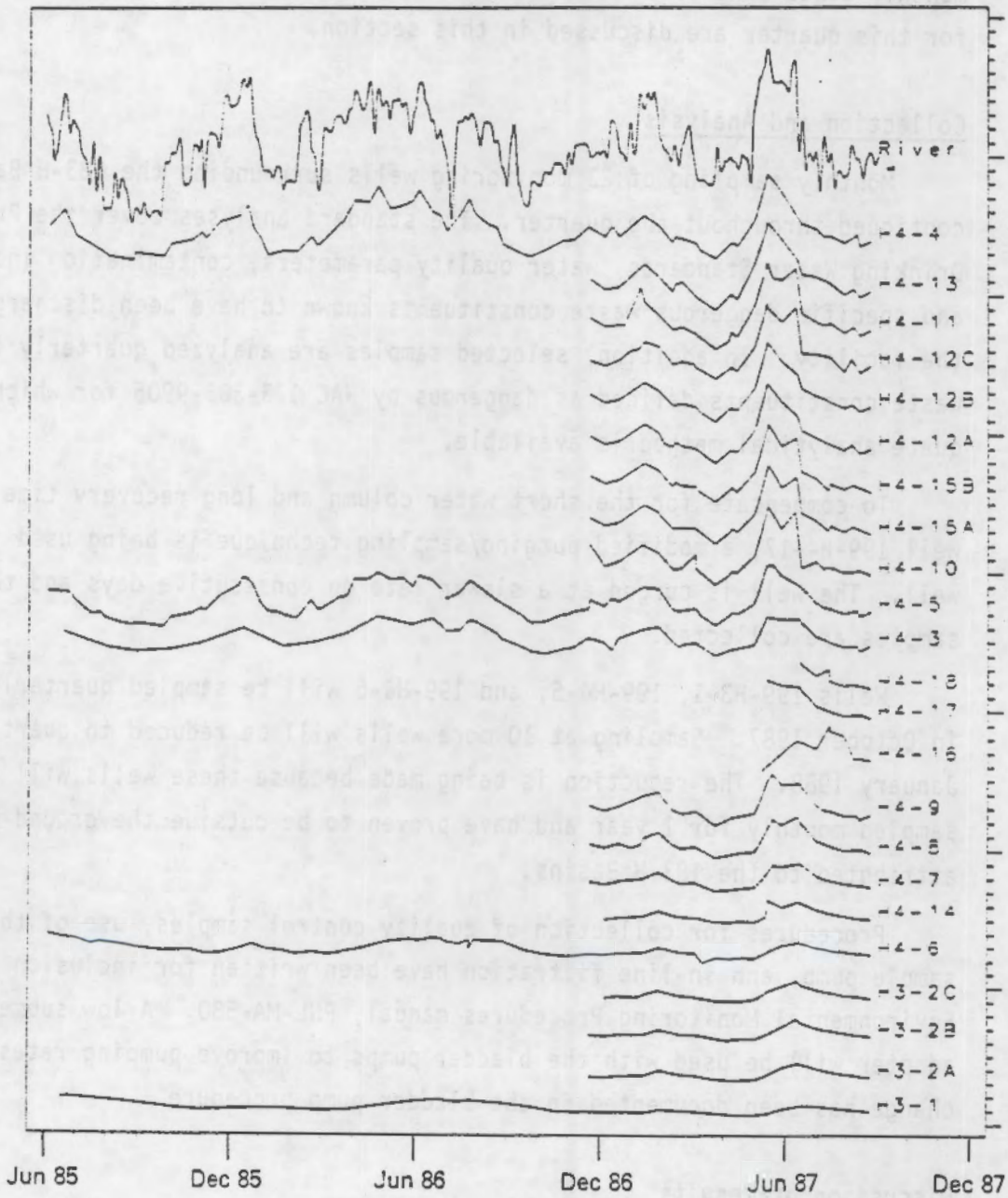


FIGURE 11. Relative Water Levels in the Columbia River and 183-H Monitoring Wells

ROUTINE SAMPLING AND ANALYSIS OF GROUND WATER

The ground water around the 183-H Basins has been sampled and analyzed monthly since June 1985. The results of ground-water monitoring activities for this quarter are discussed in this section.

Collection and Analysis

Monthly sampling of 23 monitoring wells surrounding the 183-H Basins continued throughout the quarter. The standard analyses cover the Primary Drinking Water Standards, water quality parameters, contamination indicators, and specific dangerous waste constituents known to have been discharged to the facility. In addition, selected samples are analyzed quarterly for those waste constituents defined as dangerous by WAC 173-303-9905 for which an adequate analytical method is available.

To compensate for the short water column and long recovery time in well 199-H4-17, a modified purging/sampling technique is being used for this well. The well is purged at a slower rate on consecutive days and then the samples are collected.

Wells 199-H3-1, 199-H4-5, and 199-H4-6 will be sampled quarterly starting in October 1987. Sampling at 10 more wells will be reduced to quarterly in January 1988. The reduction is being made because these wells will have been sampled monthly for 1 year and have proven to be outside the ground-water plume attributed to the 183-H Basins.

Procedures for collection of quality control samples, use of the Hydrostar sample pump, and in-line filtration have been written for inclusion in PNL's Environmental Monitoring Procedures manual, PNL-MA-580. A low submergence adapter will be used with the bladder pumps to improve pumping rates. This change has been documented in the bladder pump procedure.

Discussion of Results

All sample analyses for the period from June through August 1987 are summarized in Table 4. This table has the same format as Table 2. Appendix B contains data for constituents that were found to be above detection limits in at least one analysis.

TABLE 4. 183-H Solar Evaporation Basins Assessment Program: Sampling Summary for June, July, and August 1987

Constituent List=Contamination Indicators

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
191	CONDFLD	UMHO	1	68	0					Specific conductance
199	PHFIELD		0.1	68	0					pH
C68	TOX	PPB	100	68	0					Total organic halogen
C69	TOC	PPB	1000	68	0					Total organic carbon

Constituent List=Drinking Water Standards

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
109	COLIFRM	MPN	2.2	68	63		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	8	70	2		50	EPA	xxx	Gross beta
181	RADIUM	PCI/L	1	68	41		5	EPA		Radium
212	LOALPHA	PCI/L	4	70	5		15	EPA	xxx	Gross alpha
A06	BARIUM	PPB	5	68	0		1000	EPA		Barium
A07	CADMIUM	PPB	2	68	65		10	EPA		Cadmium
A08	CHROMUM	PPB	10	68	5		50	EPA	xxx	Chromium
A10	SILVER	PPB	10	68	67		50	EPA		Silver
A20	ARSENIC	PPB	5	68	59		50	EPA		Arsenic
A21	MERCURY	PPB	0.1	68	68	***	2	EPA		Mercury
A22	SELENUM	PPB	5	68	68	***	10	EPA		Selenium
A33	ENDRIN	PPB	1	2	2	***	0.2	EPA		Endrin
A34	METHLOR	PPB	1	2	2	***	100	EPA		Methoxychlor
A35	TOXAFNE	PPB	1	2	2	***	5	EPA		Toxaphene
A36	a-BHC	PPB	1	2	2	***	4	EPA		Alpha-BHC
A37	b-BHC	PPB	1	2	2	***	4	EPA		Beta-BHC
A38	g-BHC	PPB	1	2	2	***	4	EPA		Gamma-BHC
A39	d-BHC	PPB	1	2	2	***	4	EPA		Delta-BHC
A51	LEADGF	PPB	5	67	64		50	EPA		Lead (graphite furnace)
C72	NITRATE	PPB	500	70	0		45000	EPA	xxx	Nitrate
C74	FLUORID	PPB	500	70	60		1400	EPA		Fluoride
H13	2,4-D	PPB	1	2	2	***	100	EPA		2,4-D
H14	2,4,5TP	PPB	1	2	2	***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	PPB	6	68	0		1000	EPA		Barium, filtered
H21	FCADMIU	PPB	2	68	66		10	EPA		Cadmium, filtered
H22	FCHROMI	PPB	10	68	6		50	EPA	xxx	Chromium, filtered
H23	FSILVER	PPB	10	68	68	***	50	EPA		Silver, filtered
H37	FARSENI	PPB	5	66	58		50	EPA		Arsenic, filtered
H38	FMERCUR	PPB	0.1	67	66		2	EPA		Mercury, filtered
H39	FSELENI	PPB	5	65	65	***	10	EPA		Selenium, filtered
H41	FLEAD	PPB	5	66	65		50	EPA		Lead, filtered

TABLE 4. (contd)

Constituent List=Site Specific tag-alongs

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
A01	BERYLLAM	PPB	5	68	68	***				Beryllium
A02	OSMIUM	PPB	300	68	68	***				Osmium
A15	ANTIONY	PPB	100	68	68	***				Antimony
A61	TETRANE	PPB	10	70	69		5	EPAP		Tetrachloromethane
A64	METHONE	PPB	10	70	70	***				Methyl ethyl ketone
A68	1,1,2-T	PPB	10	70	70	***				1,1,2-trichloroethane
A69	TRICENE	PPB	10	70	70	***	5	EPAP		Trichloroethylene
A71	OPXYLE	PPB	10	70	70	***	440	EPAP		Xylene-o,p
B14	M-XYLE	PPB	10	70	70	***	440	EPAP		Xylene-m
C76	PHOSPHA	PPB	1000	70	70	***				Phosphate
H33	FBERYLL	PPB	5	68	68	***				Beryllium, filtered
H34	FOSMIUM	PPB	300	68	68	***				Osmium, filtered
H36	FANTIMO	PPB	100	68	68	***				Antimony, filtered

Constituent List=WAC 173-303-9906

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
A23	THALLIUM	PPB	10	2	2	***				Thallium
A24	THIOUREA	PPB	200	2	2	***				Thiourea
A25	ACETREA	PPB	200	2	2	***				1-acetyl-2-thiourea
A26	CHLOREA	PPB	200	2	2	***				1-(o-chlorophenyl) thiourea
A27	DIETROL	PPB	200	2	2	***				Diethylstilbesterol
A28	ETHYREA	PPB	200	2	2	***				Ethylenethiourea
A29	NAPHREA	PPB	200	2	2	***				1-naphthyl-2-thiourea
A32	PHENREA	PPB	200	2	2	***				N-phenylthiourea
A40	DDD	PPB	1	2	2	***				DDD
A41	DDE	PPB	1	2	2	***				DDE
A42	DDT	PPB	1	2	2	***				DDT
A43	HEPTLOR	PPB	1	2	2	***	0	EPAP		Heptachlor
A44	HEPTIDE	PPB	1	2	2	***	0	EPAP		Heptchlor epoxide
A46	DIELRIN	PPB	1	2	2	***				Dieldrin
A47	ALDRIN	PPB	1	2	2	***				Aldrin
A48	CHLDANE	PPB	1	2	2	***	0	EPAP		Chlordane
A49	ENDS1	PPB	1	2	2	***				Endosulfan I
A52	ENDS2	PPB	1	2	2	***				Endosulfan II
A62	BENZENE	PPB	10	2	2	***	5	EPAP		Benzene
A63	DIOXANE	PPB	500	2	2	***				Dioxane
A65	PYRIDIN	PPB	500	2	2	***				Pyridine
A66	TOLUENE	PPB	10	2	2	***	2000	EPAP		Toluene
A72	ACROLIN	PPB	10	2	2	***				Acrolein
A73	ACRYILE	PPB	10	2	2	***				Acrylonitrile
A74	BISTHER	PPB	10	2	2	***				Bis(chloromethyl) ether
A75	BROMOAC	PPB	10	2	2	***				Bromoacetone
A76	METHBRO	PPB	10	2	2	***				Methyl bromide
A77	CARBIDE	PPB	10	2	2	***				Carbon disulfide
A78	CHLBENZ	PPB	10	2	2	***				Chlorobenzene
A79	CHLTHER	PPB	10	2	2	***				2-chloroethyl vinyl ether
A81	METHCHL	PPB	10	2	2	***				Methyl chloride
A82	CHMTHER	PPB	10	2	2	***				Chloromethyl methyl ether
A83	CROTONA	PPB	10	2	2	***				Crotonaldehyde

TABLE 4. (contd)

Constituent List=Quality Characteristics

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
A11	SODIUM	PPB	100	68	0					Sodium
A17	MANGESE	PPB	5	68	43					Manganese
A19	IRON	PPB	60	68	23					Iron
C57	PHENOL	PPB	10	2	2	***				Phenol
C73	SULFATE	PPB	600	70	0					Sulfate
C76	CHLORID	PPB	600	70	0					Chloride
H24	FSODIUM	PPB	100	68	0					Sodium, filtered
H29	FMANGAN	PPB	5	68	50					Manganese, filtered
H31	FIRON	PPB	60	68	66					Iron, filtered

Constituent List=Site Specific

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
010	CO 60	PCI/L	22.5	2	1		100	EPA		Cobalt-60
024	CS-137	PCI/L	20	2	2	***	200	EPA		Cesium-137
034	RU 106	PCI/L	172.5	2	2	***	30	EPA		Ruthenium-106
121	SR 90	PCI/L	5	2	0		8	EPA		Strontium-90
124	U-CHEM	UG/L	0.725	2	0					Natural uranium
A03	STRONUM	PPB	300	68	47					Strontium
A04	ZINC	PPB	5	68	17					Zinc
A05	CALCIUM	PPB	50	68	0					Calcium
A12	NICKEL	PPB	10	68	66					Nickel
A13	COPPER	PPB	10	68	66		1300	EPAP		Copper
A14	VANADUM	PPB	5	68	12					Vanadium
A16	ALUMNUM	PPB	150	68	60					Aluminum
A18	POTASUM	PPB	100	68	0					Potassium
A50	MAGNES	PPB	0	68	0					Magnesium
A67	1,1,1-T	PPB	10	70	68		200	EPAP		1,1,1-trichloroethane
A70	PERCENE	PPB	10	70	62					Perchloroethylene
A80	CHLFORM	PPB	10	70	11					Chloroform
A93	METHYCH	PPB	10	70	70	***				Methylene chloride
C80	AMMONIU	PPB	50	69	53					Ammonium ion
H18	FZINC	PPB	5	68	21					Zinc, filtered
H19	FCALCIU	PPB	50	68	0					Calcium, filtered
H25	FNICKEL	PPB	10	68	56					Nickel, filtered
H26	FCOPPER	PPB	10	68	64		1300	EPAP		Copper, filtered
H27	FVANADI	PPB	5	68	19					Vanadium, filtered
H28	FALUMIN	PPB	150	68	60					Aluminum, filtered
H30	FPOTASS	PPB	100	68	0					Potassium, filtered
H32	FMAGNES	PPB	0	68	0					Magnesium, filtered
H35	FSTRONI	PPB	300	68	48					Strontium, filtered

TABLE 4. (contd)

Constituent List=WAC 173-303-9906

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
A84	DIBRCHL	PPB	10	2	2	***				1,2-dibromo-3-chloropropane
A85	DIBRETH	PPB	10	2	2	***				1,2-dibromoethane
A86	DIBRMET	PPB	10	2	2	***				Dibromomethane
A87	DIBUTEN	PPB	10	2	2	***				1,4-dichloro-2-butene
A88	DICDIFM	PPB	10	2	2	***				Dichlorodifluoromethane
A89	1,1-DIC	PPB	10	2	2	***				1,1-dichloroethane
A90	1,2-DIC	PPB	10	2	2	***	5	EPAP		1,2-dichloroethane
A91	TRANDCE	PPB	10	2	2	***	70	EPAP		Trans-1,2-dichloroethene
A92	DICETHY	PPB	10	2	2	***	7	EPAP		1,1-dichloroethylene
A94	DICPANE	PPB	10	2	2	***	6	EPAP		1,2-dichloropropane
A95	DICPENE	PPB	10	2	2	***				1,3-dichloropropene
A96	NNDIETHY	PPB	10	2	2	***				N,N-diethylhydrazine
A97	1,1-DIM	PPB	3000	2	2	***				1,1-dimethylhydrazine
A98	1,2-DIM	PPB	3000	2	2	***				1,2-dimethylhydrazine
A99	HYDRSUL	PPB	10	2	2	***				Hydrogen sulfide
B01	IODOMET	PPB	10	2	2	***				Iodomethane
B02	METHACR	PPB	10	2	2	***				Methacrylonitrile
B03	METHTHI	PPB	10	2	2	***				Methanethiol
B04	PENTACH	PPB	10	2	2	***				Pentachloroethane
B05	1112-tc	PPB	10	2	2	***				1,1,1,2-tetrachloroethane
B06	1122-tc	PPB	10	2	2	***				1,1,2,2-tetrachloroethane
B08	BROMORM	PPB	10	2	2	***				Bromoform
B09	TRCMEOL	PPB	10	2	2	***				Trichloromethanethiol
B10	TRCMFLM	PPB	10	2	2	***				Trichloromonofluoromethane
B11	TRCPANE	PPB	10	2	2	***				Trichloropropane
B12	123-trp	PPB	10	2	2	***				1,2,3-trichloropropane
B13	VINYIDE	PPB	10	2	2	***	1	EPAP		Vinyl chloride
B15	DIETHY	PPB	10	2	2	***				Diethylarsine
B19	ACETILE	PPB	3000	2	2	***				Acetonitrile
B20	ACETOPH	PPB	10	2	2	***				Acetophenone
B21	WARFRIN	PPB	10	2	2	***				Warfarin
B22	ACEFENE	PPB	10	2	2	***				2-acetylaminofluorene
B23	AMINOYL	PPB	10	2	2	***				4-aminobyphenyl
B24	AMIISOX	PPB	10	2	2	***				5-(aminomethyl)-3-isoxazolol
B25	AMITROL	PPB	10	2	2	***				Amitrole
B26	ANILINE	PPB	10	2	2	***				Aniline
B27	ARAMITE	PPB	10	2	2	***				Aramite
B28	AURAMIN	PPB	10	2	2	***				Auramine
B29	BENZCAC	PPB	10	2	2	***				Benz[c]acridine
B30	BENZAAN	PPB	10	2	2	***				Benz[a]anthracene
B31	BENDICM	PPB	10	2	2	***				Benzene, dichloromethyl
B32	BENTHOL	PPB	10	2	2	***				Benzenethoil
B33	BENDINE	PPB	10	2	2	***				Benzidine
B34	BENZBFL	PPB	10	2	2	***				Benzo[b]fluoranthene
B35	BENZJFL	PPB	10	2	2	***				Benzo[j]fluoranthene
B36	PBENZQU	PPB	10	2	2	***				P benzoquinone
B37	BENZCHL	PPB	10	2	2	***				Benzyl chloride
B38	BIS2CHM	PPB	10	2	2	***				Bis(2-chloroethoxy) methane
B39	BIS2CHE	PPB	10	2	2	***				Bis(2-chloroethyl) ether
B40	BIS2EPH	PPB	10	2	2	***				Bis(2-ethylhexyl) phthalate
B41	BROPHEN	PPB	10	2	2	***				4-bromophenyl phenyl ether
B42	BUTBENP	PPB	10	2	2	***				Butyl benzyl phthalate
B43	BUTDINP	PPB	10	2	2	***				2-sec-butyl-4,6-dinitrophenol

TABLE 4. (contd)

Constituent List=WAC 173-303-9906

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
B44	CHALETH	PPB	10	2	2	***				Chloroalkyl ethers
B45	CHLANIL	PPB	10	2	2	***				P-chloroaniline
B46	CHLCRES	PPB	10	2	2	***				P-chloro-m-cresol
B47	CHLEPOX	PPB	10	2	2	***				1-chloro-2,3-epoxypropane
B48	CHLNAPH	PPB	10	2	2	***				2-chloronaphthalene
B49	CHLPHEN	PPB	10	2	2	***				2-chlorophenol
B50	CHRYSEN	PPB	10	2	2	***				Chrysene
B51	CRESOLS	PPB	10	2	2	***				Cresols
B52	CYCHDIN	PPB	10	2	2	***				2-cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	PPB	10	2	2	***				Dibenz[a,h]acridine
B54	DIBAJAC	PPB	10	2	2	***				Dibenz[a,j]acridine
B55	DIBAHAN	PPB	10	2	2	***				Dibenz[a,h]anthracene
B56	DIBCGCA	PPB	10	2	2	***				7H-dibenzo[c,g]carbazole
B57	DIBAEPY	PPB	10	2	2	***				Dibenzo[a,e]pyrene
B58	DIBAHPY	PPB	10	2	2	***				Dibenzo[a,h]pyrene
B59	DIBAIPY	PPB	10	2	2	***				Dibenzo[a,i]pyrene
B60	DIBPHTH	PPB	10	2	2	***				Di-n-butyl phthalate
B61	12-dben	PPB	10	2	2	***				1,2-dichlorobenzene
B62	13-dben	PPB	10	2	2	***				1,3-dichlorobenzene
B63	14-dben	PPB	10	2	2	***				1,4-dichlorobenzene
B64	DICHBEN	PPB	10	2	2	***				3,3'-dichlorobenzidine
B65	24-dchp	PPB	10	2	2	***				2,4-dichlorophenol
B66	26-dchp	PPB	10	2	2	***				2,6-dichlorophenol
B67	DIEPHTH	PPB	10	2	2	***				Diethyl phthalate
B68	DIHYSAF	PPB	10	2	2	***				Dihydrosafrole
B69	DIMETHB	PPB	10	2	2	***				3,3'-dimethoxybenzidine
B70	DIMEAMB	PPB	10	2	2	***				P-dimethylaminoazobenzene
B71	DIMBENZ	PPB	10	2	2	***				7,12-dimethylbenz[a]anthracene
B72	DIMEYLB	PPB	10	2	2	***				3,3'-dimethylbenzidine
B73	THIONOX	PPB	10	2	2	***				Thiofanox
B74	DIMPHAM	PPB	10	2	2	***				Alpha,alpha-dimethylphenethylamine
B75	DIMPHEN	PPB	10	2	2	***				2,4-dimethylphenol
B76	DIMPHTH	PPB	10	2	2	***				Dimethyl phthalate
B77	DINBENZ	PPB	10	2	2	***				Dinitrobenzene
B78	DINCRES	PPB	10	2	2	***				4,6-dinitro-o-cresol and salts
B79	DINPHEN	PPB	10	2	2	***				2,4-dinitrophenol
B80	24-dint	PPB	10	2	2	***				2,4-dinitrotoluene
B81	26-dint	PPB	10	2	2	***				2,6-dinitrotoluene
B82	DIOPHTH	PPB	10	2	2	***				Di-n-octyl phthalate
B83	DIPHAMI	PPB	10	2	2	***				Diphenylamine
B84	DIPHHYD	PPB	10	2	2	***				1,2-diphenylhydrazine
B85	DIPRNIT	PPB	10	2	2	***				Di-n-propylnitrosamine
B86	ETHMINE	PPB	10	2	2	***				Ethyleneimine
B87	ETHMETS	PPB	10	2	2	***				Ethyl methanesulfonate
B88	FLUORAN	PPB	10	2	2	***				Fluoranthene
B89	HEXCBEN	PPB	10	2	2	***				Hexachlorobenzene
B90	HEXCBUT	PPB	10	2	2	***				Hexachlorobutadiene
B91	HEXCCYC	PPB	10	2	2	***				Hexachlorocyclopentadiene
B92	HEXCETH	PPB	10	2	2	***				Hexachloroethane
B93	INDENOP	PPB	10	2	2	***				Indeno(1,2,3-cd)pyrene
B94	ISOSOLE	PPB	10	2	2	***				Isosafrole
B95	MALONIL	PPB	10	2	2	***				Malononitrile

TABLE 4. (contd)

Constituent List=WAC 173-303-9906

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
B96	MELPHAL	PPB	10	2	2	***				Melphalan
B97	METHAPY	PPB	10	2	2	***				Methapyrilene
B98	METHNYL	PPB	10	2	2	***				Metholonyl
B99	METAZIR	PPB	10	2	2	***				2-methylaziridine
C01	METCHAN	PPB	10	2	2	***				3-methylcholanthrene
C02	METDISC	PPB	10	2	2	***				4,4'-methylenebis(2-chloroaniline)
C03	METACIO	PPB	10	2	2	***				2-methyllactonitrile
C04	METACRY	PPB	10	2	2	***				Methyl methacrylate
C05	METMSUL	PPB	10	2	2	***				Methyl methanesulfonate
C06	METPROP	PPB	10	2	2	***				2-methyl-2-(methylthio) propionaldehyde-
C07	METHIOU	PPB	10	2	2	***				Methylthiouracil
C08	NAPHQUI	PPB	10	2	2	***				1,4-naphthoquinone
C09	1-napha	PPB	10	2	2	***				1-naphthylamine
C10	2-napha	PPB	10	2	2	***				2-naphthylamine
C11	NITRANI	PPB	10	2	2	***				P-nitroaniline
C12	NITBENZ	PPB	10	2	2	***				Nitrobenzine
C13	NITPHEN	PPB	10	2	2	***				4-nitrophenol
C14	NNIBUTY	PPB	10	2	2	***				N-nitrosodi-n-butylamine
C15	NNIDIEA	PPB	10	2	2	***				N-nitrosodiethanolamine
C16	NNIDIEY	PPB	10	2	2	***				N-nitrosodiethylamine
C17	NNIDIME	PPB	10	2	2	***				N-nitrosodimethylamine
C18	NNIMETH	PPB	10	2	2	***				N-nitrosomethylethylamine
C19	NNIURET	PPB	10	2	2	***				N-nitroso-N-methylurethane
C20	NNIVINY	PPB	10	2	2	***				N-nitrosomethylvinylamine
C21	NNIMORP	PPB	10	2	2	***				N-nitrosomorpholine
C22	NNINICO	PPB	10	2	2	***				N-nitrosonornicotine
C23	NNIPIPE	PPB	10	2	2	***				N-nitrosopiperidine
C24	NITRPYR	PPB	10	2	2	***				Nitrosopyrrolidine
C25	NITROL	PPB	10	2	2	***				5-nitro-o-toluidine
C26	PENTCHB	PPB	10	2	2	***				Pentachlorobenzene
C27	PENTCHN	PPB	10	2	2	***				Pentachloronitrobenzene
C28	PENTCHP	PPB	10	2	2	***	220	EPAP		Pentachlorophenol
C29	PHENTIN	PPB	10	2	2	***	220	EPAP		Phenacetin
C30	PHENINE	PPB	10	2	2	***				Phenylenediamine
C31	PHTHEST	PPB	10	2	2	***				Phthalic acid esters
C32	PICOLIN	PPB	10	2	2	***				2-picoline
C33	PRONIDE	PPB	10	2	2	***				Pronamide
C34	RESERPI	PPB	10	2	2	***				Reserpine
C35	RESORCI	PPB	10	2	2	***				Resorcinol
C36	SAFROL	PPB	10	2	2	***				Safrol
C37	TETRCHB	PPB	10	2	2	***				1,2,4,5-tetrachlorobenzene
C39	TETRCHP	PPB	10	2	2	***				2,3,4,6-tetrachlorophenol
C40	THIURAM	PPB	10	2	2	***				Thiuram
C41	TOLUDIA	PPB	10	2	2	***				Toluenediamine
C42	OTOLHYD	PPB	10	2	2	***				O-toluidine hydrochloride
C43	TRICHLB	PPB	10	2	2	***				1,2,4-trichlorobenzene
C44	245-trp	PPB	10	2	2	***				2,4,5-trichlorophenol
C45	246-trp	PPB	10	2	2	***				2,4,6-trichlorophenol
C46	TRIPHOS	PPB	10	2	2	***				O,O,O-triethyl phosphorothioate
C47	SYMTRIN	PPB	10	2	2	***				Sym-trinitrobenzene
C48	TRISPHO	PPB	10	2	2	***				Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	PPB	10	2	2	***				Benzo[a]pyrene

TABLE 4. (contd)

Constituent List=WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
C50	CHLNAPZ	PPB	10	2	2	***				Chlornaphazine
C51	BIS2ETH	PPB	10	2	2	***				Bis(2-chloroisopropyl)ether
C52	HEXAENE	PPB	10	2	2	***				Hexachloropropene
C53	HYDRAZI	PPB	3000	2	2	***				Hydrazine
C54	HEXACHL	PPB	10	2	2	***				Hexachlorophene
C55	NAPHTHA	PPB	10	2	2	***				Naphthalene
C56	123TRI	PPB	10	2	2	***				1,2,3-trichlorobenzene
C58	135TRI	PPB	10	2	2	***				1,3,5-trichlorobenzene
C59	1234TE	PPB	10	2	2	***				1,2,3,4-tetrachlorobenzene
C60	1236TE	PPB	10	2	2	***				1,2,3,5-tetrachlorobenzene
C61	TETEPYR	PPB	100	2	2	***				Tetraethylpyrophosphate
C62	CHLLATE	PPB	100	2	2	***				Chlorobenzilate
C63	CARBPHT	PPB	2	2	2	***				Carbophenothion
C64	DISULFO	PPB	2	2	2	***				Disulfoton
C65	DIMETHO	PPB	5	2	2	***				Dimethoate
C66	METHPAR	PPB	2	2	2	***				Methyl parathion
C67	PARATHI	PPB	2	2	2	***				Parathion
C70	CYANIDE	PPB	10	2	2	***				Cyanide
C71	FORMALN	PPB	500	2	2	***				Formalin
C77	PERCHLO	PPB	1000	2	2	***				Perchlorate
C79	KEROSEN	PPB	10000	2	2	***				Kerosene
C87	CITRUSR	PPB	1000	2	2	***				Citrus red
C88	CYANBRO	PPB	3000	2	2	***				Cyanogen bromide
C89	CYANCHL	PPB	3000	2	2	***				Cyanogen chloride
C90	PARALDE	PPB	3000	2	2	***				Paraldegyde
C91	STRYCHN	PPB	50	2	2	***				Strychnine
C92	MALHYDR	PPB	500	2	2	***				Maleic hydrizide
C93	NICOTIN	PPB	100	2	2	***				Nicotinic acid
C94	ACRYIDE	PPB	3000	2	2	***	0	EPAP		Acrylamide
C95	ALLYLAL	PPB	3000	2	2	***				Allyl alcohol
C96	CHLORAL	PPB	3000	2	2	***				Chloral
C97	CHLACET	PPB	3000	2	2	***				Chloroacetaldehyde
C98	CHLPROP	PPB	3000	2	2	***				3-chloropropionitrile
C99	CYANOGN	PPB	3000	2	2	***				Cyanogen
H01	DICPROP	PPB	3000	2	2	***				Dichloropropanol
H03	ETHCARB	PPB	3000	2	2	***				Ethyl carbamate
H04	ETHCYAN	PPB	3000	2	2	***				Ethyl cyanide
H05	ETHOXID	PPB	3000	2	2	***				Ethylene oxide
H06	ETHMETH	PPB	3000	2	2	***				Ethyl methacrylate
H07	FLUOROA	PPB	3000	2	2	***				Fluoroacetic acid
H08	GLYCIDY	PPB	3000	2	2	***				Glycidylaldehyde
H09	ISOBUTY	PPB	3000	2	2	***				Isobutyl alcohol
H10	METHINE	PPB	3000	2	2	***				Methyl hydrazine
H11	PROPYLA	PPB	3000	2	2	***				N-propylamine
H12	PROPYNO	PPB	3000	2	2	***				2-propyn-1-ol
H15	2,4,5-T	PPB	1	2	2	***				2,4,5-T
H40	THALLI	PPB	10	2	2	***				Thallium, filtered

*** - Indicates all samples were below detection limits
xxx - Indicates that regulatory limits were exceeded
EPA - based on limits given in 40CFR 265, Appendix III, EPA Interim Primary Drinking Water Standards
EPAP - based on proposed Maximum Contaminant Levels

As indicated in previous quarterly reports, concentrations of gross alpha, gross beta, nitrate, Na, and Cr appear to be the most indicative of contamination from the 183-H Basins. This is illustrated in Figures 12 through 16 in which concentration is plotted as a function of well number. Those wells located upgradient of the basins are plotted on the left and those downgradient are plotted on the right.

Constituent concentrations in the wells located between the 183-H Basins and the Columbia River are directly correlated with changes in the water table and river stage. As the water-table elevation increases, constituent concentrations are diluted. Conversely, as the water-table elevation decreases, constituent concentrations increase. This trend has been observed in all wells, including 199-H4-3, which however showed a reverse trend until September 1986.

Concentrations of several constituents are significantly increasing over time in well 199-H4-6. Chromium concentrations above the DWS of 50 ppb have been reported. Nitrate concentrations have been reported near the DWS of 45,000 ppb.

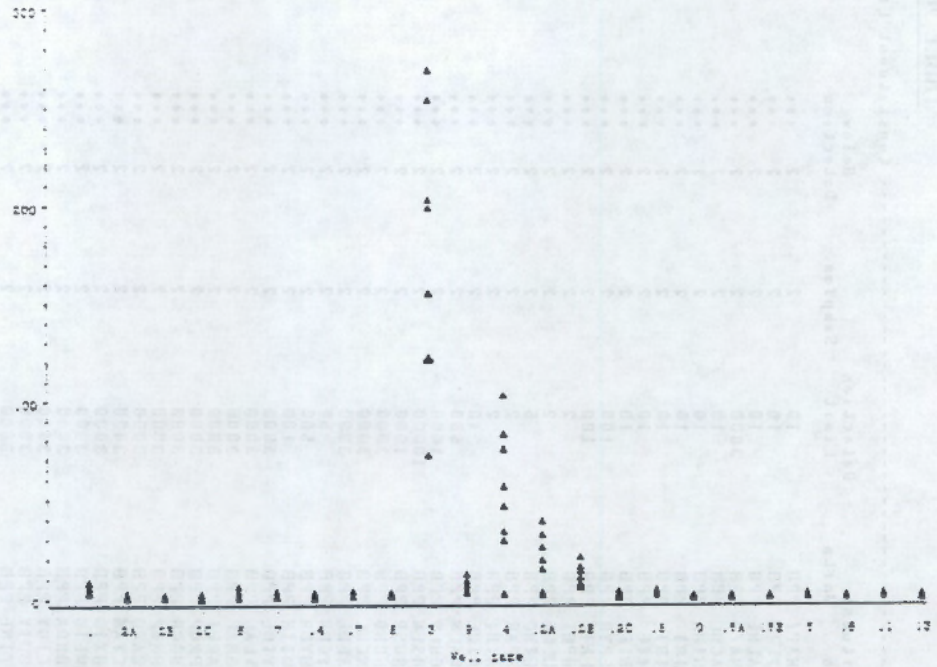


FIGURE 12. Gross Alpha Concentrations in 183-H Monitoring Wells

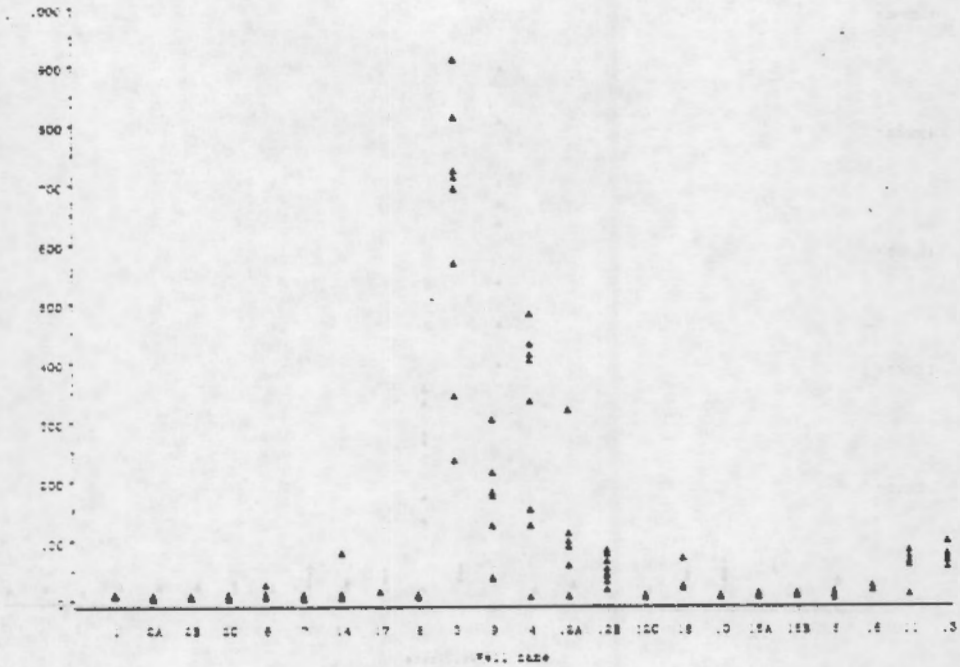


FIGURE 13. Gross Beta Concentrations in 183-H Monitoring Wells

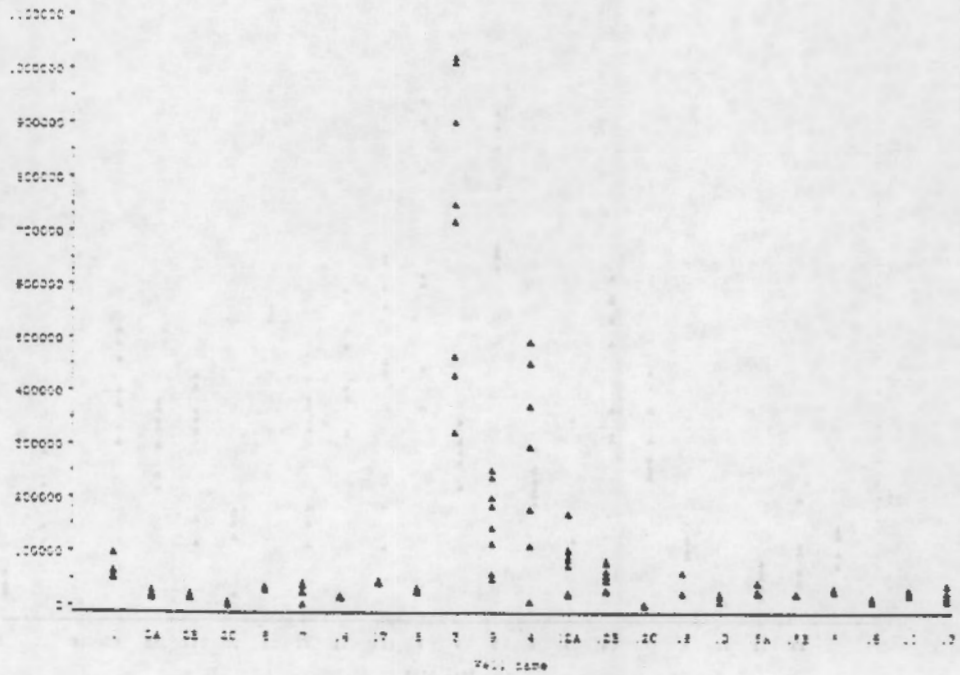


FIGURE 14. Nitrate Concentrations in 183-H Monitoring Wells

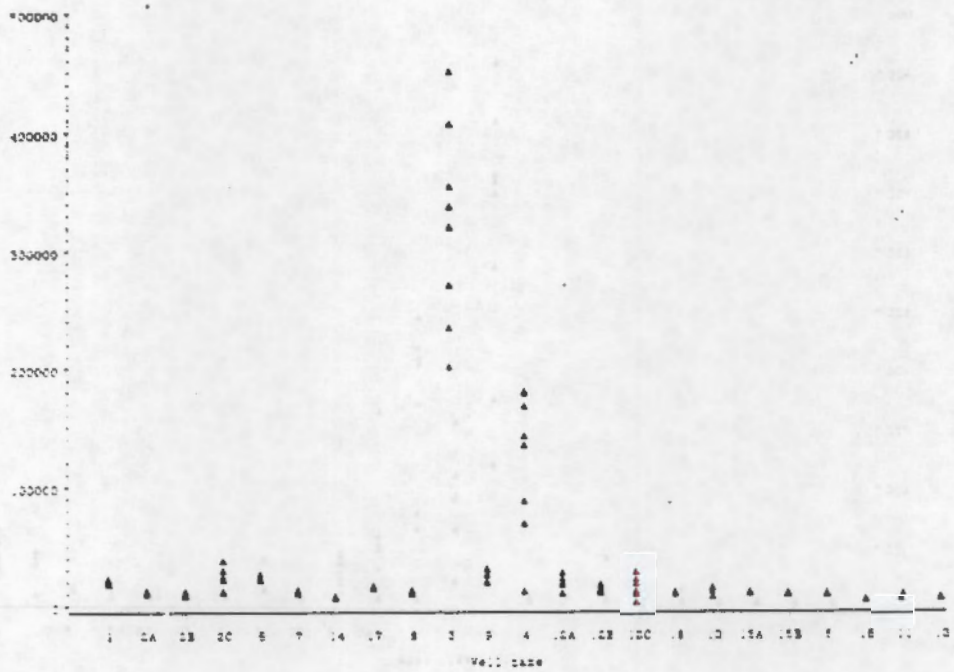


FIGURE 15. Sodium Concentrations in 183-H Monitoring Wells

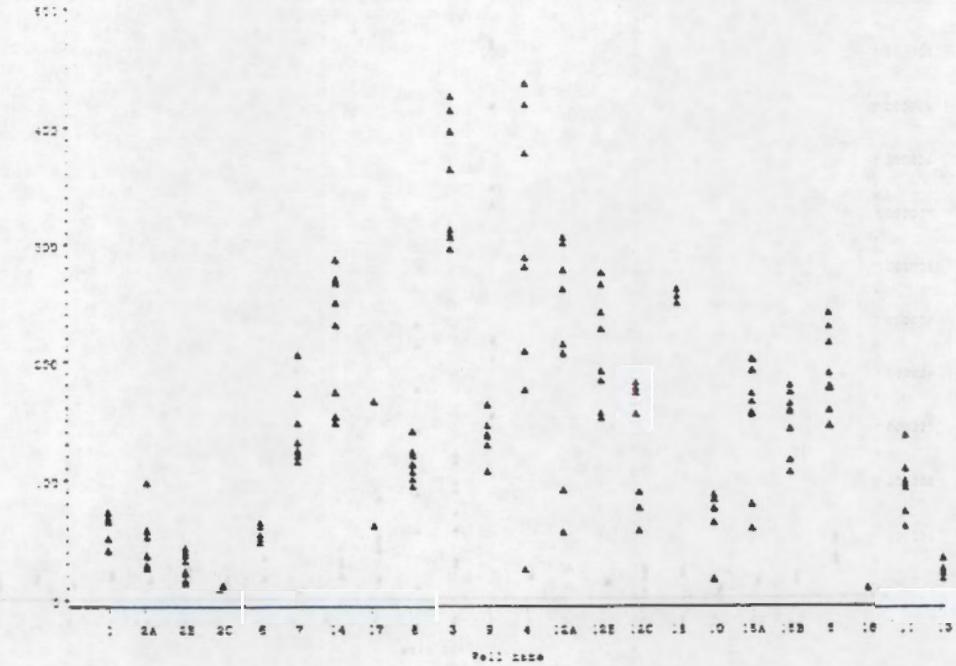


FIGURE 16. Chromium Concentrations in 183-H Monitoring Wells

Well development and aquifer testing conducted in wells 199-H3-2C and 199-H4-12C during April 1987 have resulted in decreased concentrations of several constituents in those wells. The constituents are Al, ammonium, As, Cl, Fe, Mn, and Na.

Quality Assurance/Quality Control

Results of quarterly blind standards and interlaboratory comparisons were received. Analytical results for VOAs, anions, and metals show good agreement between UST and PNL. Metals which were formerly analyzed by Hanford Environmental Health Foundation (HEHF) are now being analyzed by PNL.

Intralaboratory (duplicate) samples have been added to the quality control program recently. Duplicate samples will be collected from the same wells sampled for interlaboratory comparisons.

The Hanford Site Environmental Monitoring Program Quality Assurance (QA) plan OHE-1, Revision 0, replaced QA plan ED-41, Revision 1, effective July 31, 1987. This new plan provides for minimum common QA requirements for the Hanford Environmental Monitoring and Compliance projects. Project-specific requirements will be covered in supplementary QA plan OHE-1D, Revision 0, which is being drafted.

200 AREA LOW-LEVEL BURIAL GROUNDS

Major efforts conducted this quarter involved completion of 25 wells surrounding the burial grounds in 200 East and West Areas.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Well Drilling Effort

200-East Area - Drilling was initiated by KEH, on June 24, 1987. The drilling scheduled was shortened from that originally planned, by working two 8-hour shifts per day, 6 days per week. By September 30, 14 wells had been completed. A summary of pertinent information for these wells is presented in Table 5. Figure 17 illustrates the locations of the 200-East Area wells. Note that the well numbers for wells 299-E33-29 and 299-E33-28 have been reversed from previously transmitted figures. This switch was made because well 299-E33-28 had been wrongly noted as well 299-E33-29 on all drill logs.

TABLE 5. Completion Summary for 200-East Area Wells

Well Number	Completion Date	Drill Depth (ft)	Depth to Basalt (ft)	Screened Interval (ft)	Depth to Water (ft)
E27-8	08-24-87	257	256.5	226 - 246	229.5
E27-9	08-21-87	245	244	220 - 240	221
E27-10	08-19-87	240	240	212.5 - 232.5	216.5
E28-26	In Progress				
E28-27	09-30-87	301.5	---	270 - 290	273
E32-2	09-19-87	288.5	288	258.5 - 278.5	263
E32-3	09-17-87	304	---	267 - 287	270
E32-4	09-28-87	310	---	277.5 - 297.5	280
E33-28	In Progress				
E33-29	09-21-87	290	290	263 - 283	265.5
E33-30	09-26-87	280	280	255 - 275	256.5
E34-2	09-10-87	241.5	241	224 - 240	223.5
E34-3	08-12-87	214	213	193.5 - -213.5	203
E34-4	08-13-87	177	175.5	157 - 177	175.5
E34-5	08-15-87	192	190	170.5 - 190.5	182.5
E34-6	08-10-87	195	195	175 - 195	191

Note: All well numbers are proceeded by 299-.

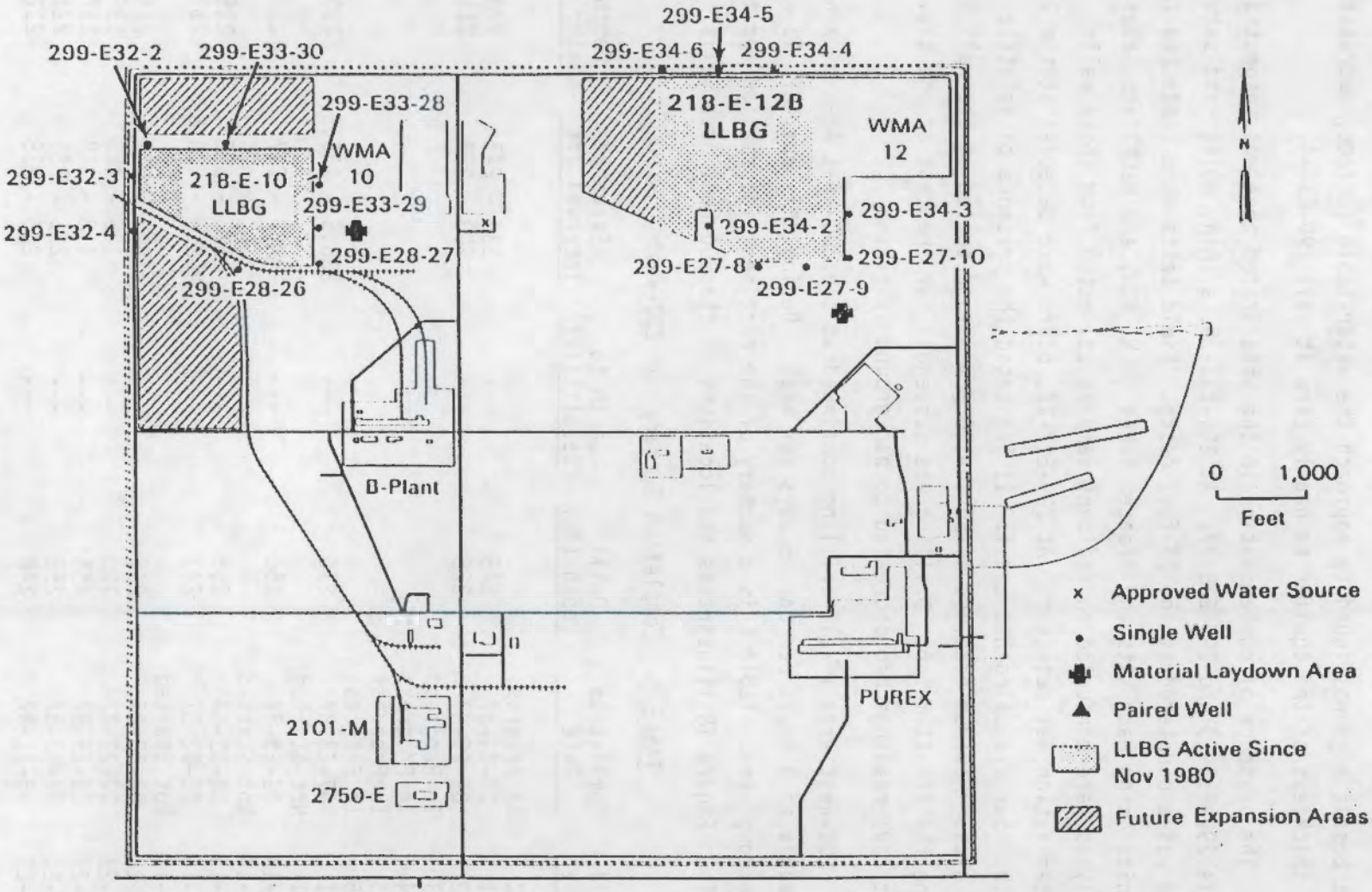


FIGURE 17. Location Map of Monitoring Wells in the 200-East Area

A basalt high was encountered in the northeast portion of 200-East Area. This basalt high was found to approach the water-table surface, decreasing the thickness of the aquifer to nearly zero at well 299-E34-4.

The presence of contamination in the unsaturated zone was suspected in wells 299-E33-29 and 299-E28-27. At 299-E33-29, a thin, moist, and saturated zone was encountered at the 75-foot depth. Field tests were conducted for cyanide using Hach kits and Dreager tubes (HCN, KCN, and NaCN) and laboratory analyses were conducted on sediment samples collected from these wells. No contamination was detected. At 299-E28-27, odors were detected at the 210-foot depth. Surveys using HNU and TIP II indicated the presence of volatile organics. Maximum readings of 80 to 120 ppm were detected at the well head using the TIP II meter. Drilling was suspended for the rest of the day. The next day, readings had decreased to background levels.

200-West Area - Well drilling continued at the 200-West Area on a work schedule of 8 hours per day, 5 days per week. During this quarter, 11 wells were completed. Table 6 is a summary of the pertinent information for these wells. Figure 18 illustrates the locations of the 200-West Area wells.

TABLE 6. Completion Summary for 200-West Area Wells

Well Number	Completion Date	Drill Depth (ft)	Depth to Basalt (ft)	Screened Interval (ft)	Depth to Water (ft)
W6-2	In Progress				
W7-1	07-24-87	245	---	233 - 243	220
W7-2	09-29-87	228	---	203 - 223	211
W7-3	In Progress				
W7-4	In Progress				
W7-5	In Progress				
W7-6	In Progress				
W8-1	07-23-87	270	---	236.5 - 256.5	220
W9-1	Not Started				
W10-13	09-25-87	250	---	227 - 247	230
W10-14	Not Started				
W15-15	08-03-87	255	---	225 - 255	226
W15-16	08-02-87	243	---	208.5 - 238.5	213
W15-17	Not Started				
W15-18	08-03-87	246	---	207 - 237	216
W18-21	07-21-87	228	---	195 - 225	196
W18-22	09-29-87	455	---	418 - 448	197
W18-23	07-03-87	255	---	221 - 251	225
W18-24	08-11-87	240	---	205 - 235	212

Note: All well numbers are procaeded by 299-.

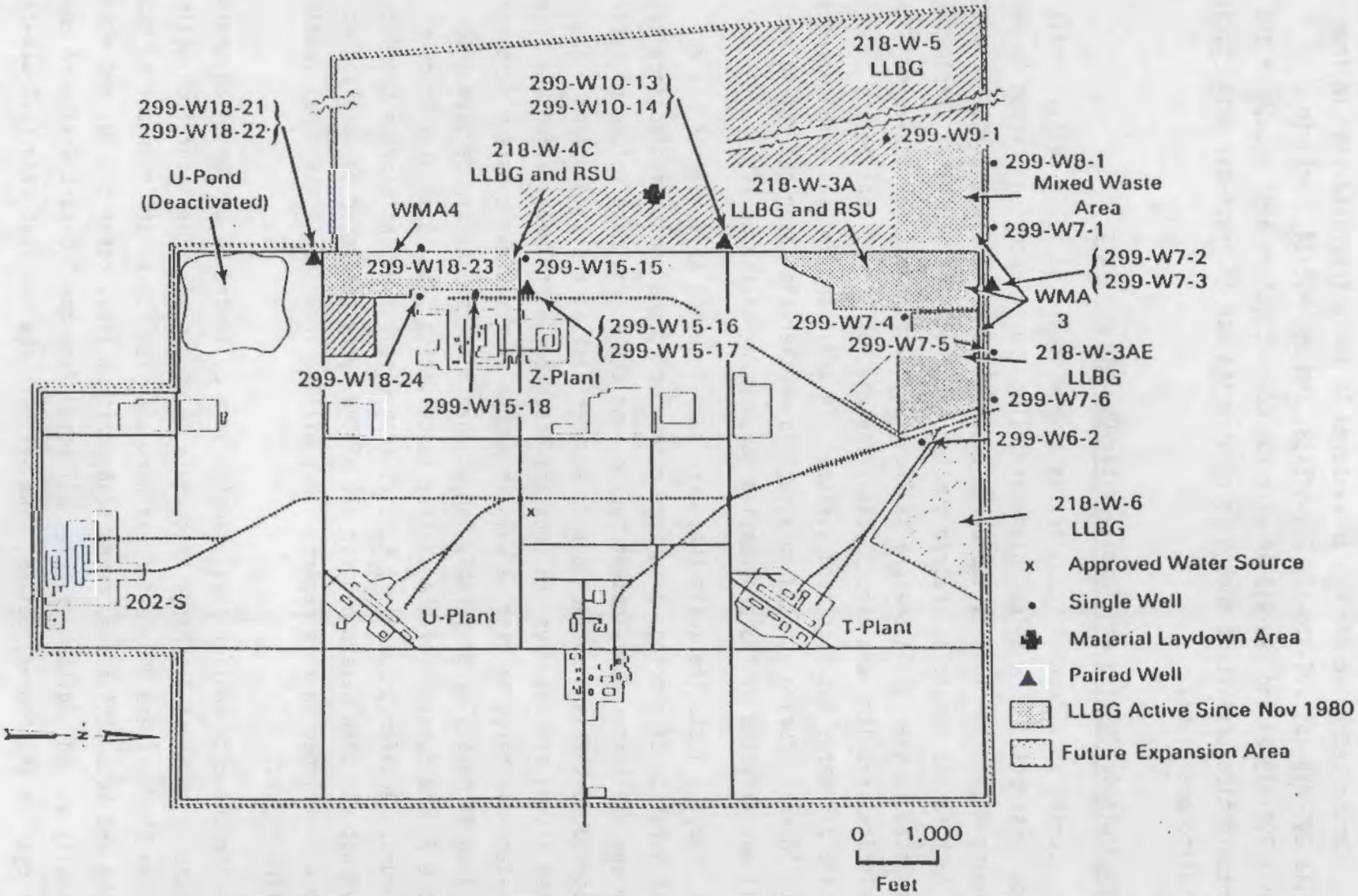


FIGURE 18. Location Map of Monitoring Wells in the 200-West Area

Carbon tetrachloride was encountered in the unsaturated zone in four wells 299-W15-16, 299-W15-17, 299-W15-18, and 299-W18-24. Only in wells 299-W18-24 and 299-W15-16 were the concentrations high enough or the contamination persistent enough to require the use of fresh-air masks during drilling operations.

Geohydrologic Testing and Initial Water-Quality Analyses

During this quarter, aquifer tests were conducted in 24 wells. Wells were constructed with 8-inch diameter casing and telescoping screens to permit pumping with high-capacity submersible pumps and to stress the aquifer systems as much as was feasible. Before pumping each well, bailed water samples were submitted to the UST laboratory in Richland, Washington, for analysis. The analytical results were used to determine whether it was appropriate to dispose of the discharge water to land surface. In addition, samples were collected from 18 wells during pumping to ascertain whether the water quality in each well was affected by the progressive development of the well.

Table 7 lists the wells that were pumped during this quarter and for each duration of pumping, discharge rates during the constant-discharge tests and the preliminary development period, and the approximate volume of water disposed to the land surface during aquifer testing and development. The dates listed are the days the constant-discharge tests were performed. During constant-discharge testing, a well is pumped at a maximum constant rate for as long as possible, preferably longer than 8 hours. As can be seen from Table 7, the duration of the aquifer tests varied from 25 minutes to over 9 hours. Aquifer properties, such as transmissivities and storage coefficients, have not yet been determined for all of the tests conducted to date and so are not included in this report. They will be included in the final characterization report.

Before each aquifer test, samples were collected by bailer to determine whether a constant-discharge test could be conducted. The water from wells in the 200-West and 200-East Areas were analyzed for volatile organics, gross alpha and beta activities, gamma scan, tritium (^3H), total Sr, Pu, and occasionally U. In addition, samples collected from the 200-East Area were analyzed for cyanide and semi-volatiles. Two wells in the 200-West Area (299-W15-17

TABLE 7. 200 Area Aquifer Testing Summary

Well	Date of Test	Test Duration (h)	Discharge Rate (gpm)	Test Volume (gal)	Duration Development (min)	Discharge Rate (gpm)	Development Volume (gal)	Total Volume Pumped (gal)
299-E27-8	8/19/87	6.6	192	75,800	105	107-197	14,200	90,000
299-E27-9	8/15/87	9.53	170	97,200	150	68-172	17,800	115,000
299-E27-10	8/11/87	8	105	50,400	90	86-103	8,300	58,700
299-E28-27	9/29/87	4	130	32,600	90	55-135	10,200	42,800
299-E32-2	9/8/87	7	127	53,300	240	20-142	18,200	71,500
299-E32-3	9/2/87	8	150	72,000	240	20-150	18,700	90,700
299-E32-4	9/21/87	4	27	6,500	140	25	3,500	10,000
299-E33-29	9/17/87	3	145	26,100	230	25-144	21,500	47,600
299-E33-30	9/24/87	3.63	160	34,900	145	34-156	18,100	53,000
299-E34-2	8/7/87	3.75	107	24,100	77	25-60	2,600	26,700
299-E34-3	8/5/87	3(a)	60	10,800	120	4-40	2,800	13,600
299-E34-5	7/21/87	25 min(b)	12	300	100	15-40	3,400	3,700
299-W7-1	7/15/87	8	17.5	8,400	60	28.4	1,700	10,100
299-W7-2	9/16/87	7	10	4,800	100	10	1,800	6,600
299-W8-1	7/11/87	6	8.7	3,100	30	25	800	3,900
299-W10-13	9/14/87	8	30	14,400	120	30	3,600	18,000
299-W15-15	8/21/87	6	20	7,200	120	20	2,400	9,600
299-W15-16	8/20/87	7	80	33,600	120	10-80	7,200	40,800
299-W15-17	9/20/87	6	6	1,800	60	20	1,200	3,000
299-W15-18	7/21/87	7.5	87	39,200	---	---	---	39,200
299-W18-21	7/14/87	8	58	27,800	70	38	2,700	30,500
299-W18-22	8/26/87	8	51	24,500	180	50-75	10,800	35,300
299-W18-23	6/22/87	8	110	52,800	1st-120 2nd-183	1st-108 2nd-108	32,700	85,500
299-W18-24	7/17/87	7.5	100	45,000	--- 37	89 ---	3,300	48,300

(a) Generator problem
(b) Pump broken

and 299-W18-22) and one well in the 200-East Area (299-E34-2) were analyzed for the complete suite of constituents described in Appendix VIII of 40 CFR 261 and listed in WAC 173-303-9905. If contaminants in the discharge water were less than 10% of the designated WAC 173-303 hazardous waste guidelines or 1/25 of the Derived Concentration Guides for radionuclides, then water was discharged to the ground surface. Hazardous chemical concentrations for all wells tested during this quarter were below the established guidelines. A summary of the analyses for the more important detected hazardous chemicals is presented in Table 8. The complete results of the preliminary analyses will be reported next quarter.

Samples were collected during the development and constant-discharge tests at 18 wells to determine the effects of pumping on the quality of water from these wells and to document the efficiency of the pretest development. Samples collected during aquifer testing were analyzed for the same constituents as the preliminary bailed samples. In some cases, concentrations of key constituents increased, and in other cases concentrations decreased. Table 9 lists those wells sampled during testing and the number of samples collected. The results will be presented next quarter.

TABLE 8. Summary of Pre-Test Analyses for Important Contaminants Around the 200 Area Burial Grounds

	Chloroform ppb (none)(a)	Chromium ppb (50)	H-3 pCi/L (20,000)	Lead ppb (50)	Alpha pCi/L (15)	Tetrane ppb (5)	Beta pCi/L (50)
299-W7-1	<10(b)	---(c)	<2σ(d)	---	3.3	<10	21
299-W7-2	---	---	---	---	<2σ	---	8.5
299-W7-3	<10	---	<2σ	---	29	<10	20
299-W8-1	<10	---	<2σ	---	<2σ	<10	26
299-W10-13	<10	---	<2σ	---	5.4	16	14
299-W10-14	---	---	<2σ	---	11	---	37
299-W15-15	260	---	<2σ	---	5.1	1,710	15
299-W15-16	22	---	<2σ	---	<2σ	<10	59
299-W15-17	28	91	<2σ	44	3.7	<10	13
299-W15-18	230	---	<2σ	---	<2σ	1,450	11
299-W18-21	24	---	<2σ	---	23	43	36
299-W18-22	<10	100	<2σ	249	5.5	<10	18
299-W18-23(e)	---	---	---	---	---	---	---
299-W18-24	680	---	<2σ	---	<2σ	1,380	---
299-E27-8	<10	---	4,600	---	<2σ	<10	17
299-E27-9	<10	---	6,900	---	1.5	<10	8.5
299-E27-10	<10	---	14,200	---	7.0	<10	15
299-E28-27	---	---	10,600	---	4.2	---	13
299-E32-2	<10	---	9,400	---	<2σ	<10	17
299-E32-3	<10	---	5,000	---	<2σ	<10	12
299-E32-4	<10	---	<2σ	---	23	<10	76
299-E33-29	<10	---	4,000	---	<2σ	<10	31
299-E33-30	<10	---	3,800	---	<2σ	<10	29
299-E34-2	<10	<10	<2σ	<5	<2σ	<10	55
299-E34-3	<10	---	4,200	---	5.0	<10	14
299-E34-5	<10	---	<2σ	---	8.4	<10	27
299-E34-6	<10	---	<2σ	---	<2σ	<10	15

(a) Drinking water limit or MCL
(b) <10 indicates that the analyses was less than the contractual detection limit for the analysis
(c) A "---" indicates that the analysis was not performed
(d) <2σ indicates that 2 times the counting error was greater than the analysis
(e) No sample was collected for this well prior to the aquifer test.

TABLE 9. 200 Area Sampling and Analysis Summary

Well(a)	Number of Pre-Test Samples	Number of Development Samples	Comments
E27-8	1		
E27-9	1	3	
E27-10	1		
E28-27	1	3	
E32-2	1	3	
E32-3	1	3	
E32-4	1		
E33-29	1	2	
E33-30	1	2	
E34-2	1(b)	2	
E34-3	1		
E34-5	1		
E34-6	1		
W7-1	1	3	
W7-2	1	2	
W7-3	1		Deep well, sampled at depth of shallow well 299-W7-2
W8-1	1		
W10-13	1	3	
W10-14	1		Deep well, gross α,β,γ analyses conducted on sample collected at depth of shallow well 299-W10-13
W15-15	1	3	
W15-16	1	3	
W15-17	1(b)	3	Deep well
W15-18	1	3	
W18-21	1	2	
W18-22	1(b)	3	Deep well
W18-23	0	3	
W18-24	1	3	

(a) All well numbers are proceeded by 299-
(b) Appendix VIII analyses conducted on preliminary sample

NONRADIOACTIVE DANGEROUS WASTE LANDFILL

Activities conducted in this reporting period include completion of the fourth quarterly round of sampling and analysis at the Nonradioactive Dangerous Waste (NRDW) Landfill for five shallow monitoring wells. Two deep monitoring wells were sampled for the third time. In addition, the interim characterization report prepared by WHC was submitted to the U.S. Department of Energy, Richland Operations (DOE-RL), the WDOE, and the USEPA.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

The interim characterization report, which includes drilling and hydrogeologic data, as well as analytical results from water samples, was submitted to DOE-RL and the WDOE. DOE-RL requested the WDOE to prepare feedback on the report.

ROUTINE SAMPLING AND ANALYSIS OF GROUND WATER

All seven monitoring wells around the NRDW were sampled in July 1987. Locations of these wells and their assigned Hanford well numbers are shown in Figure 19. Quadruplicate samples were collected from upgradient wells 699-26-35A, 699-26-34, and 699-26-35C (the deep well) and analyzed for conductivity, pH, total organic halogens (TOX), and total organic carbon (TOC). In the next fiscal year, all wells will be sampled in quadruplicate for these constituents. New pumps that meet RCRA standards will be obtained to replace the Grundfus pumps originally purchased for the NRDW wells, but damaged by sediment during initial use.

Table 10 presents a summary of the analytical data collected for the July sampling and indicates which parameters were above regulatory limits. The data generally agree with those reported previously. Coliform bacteria was again the only parameter to exceed regulatory limits. The source of the coliform bacteria is assumed to be sewage buried at the Solid Waste Landfill (SWL) adjacent to the NRDW.

Table 11 contains data for constituents that were above detection limits in at least one analysis. This table is organized by constituent groupings.

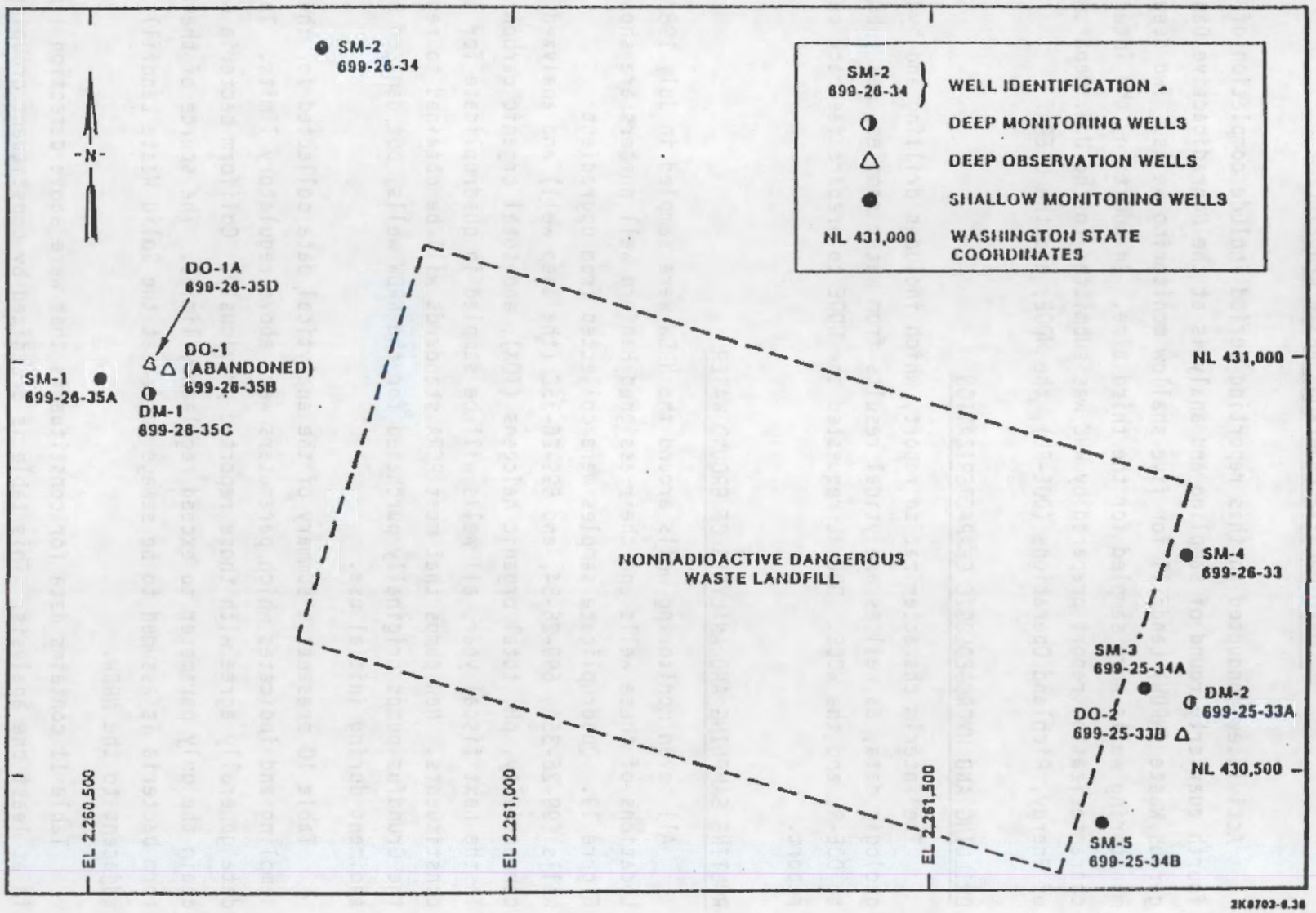


FIGURE 19. Nonradioactive Dangerous Waste Landfill Well Location Map

TABLE 10. Nonradioactive Dangerous Waste Landfill Interim Status Detection Level Program: Sampling Summary for July 1987

Constituent List=Contamination Indicators

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
191	CONDFLD	UMHO	1	16	0					Specific conductance
199	PHFIELD		1	16	0					pH
C68	TOX	PPB	100	16	0					Total organic halogen
C69	TOC	PPB	1000	16	0					Total organic carbon

Constituent List=Drinking Water Standards

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	7	6		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	8	7	0		50	EPA		Gross beta
101	RADIUM	PCI/L	1	7	7	***	5	EPA		Radium
212	TOALPHA	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	6		50	EPA		Chromium
A10	SILVER	PPB	10	7	7	***	50	EPA		Silver
A20	ARSENIC	PPB	5	7	6		50	EPA		Arsenic
A21	MERCURY	PPB	.1	7	7	***	2	EPA		Mercury
A22	SELENUM	PPB	5	7	7	***	10	EPA		Selenium
A33	ENDRIN	PPB	1	7	7	***	.2	EPA		Endrin
A34	METHLOR	PPB	1	7	7	***	100	EPA		Methoxychlor
A36	TOXAERC	PPB	1	7	7	***	5	EPA		Toxaphene
A36	a-BHC	PPB	1	7	7	***	4	EPA		Alpha-BHC
A37	b-BHC	PPB	1	7	7	***	4	EPA		Beta-BHC
A38	g-BHC	PPB	1	7	7	***	4	EPA		Gamma-BHC
A39	d-BHC	PPB	1	7	7	***	4	EPA		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	0		1400	EPA		Fluoride
H13	2,4-D	PPB	1	7	7	***	100	EPA		2,4-D
H14	2,4,5TP	PPB	1	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	7	***	50	EPA		Arsenic, filtered
H38	FMERCUR	PPB	.1	7	7	***	2	EPA		Mercury, filtered
H39	FSELENI	PPB	5	7	7	***	10	EPA		Selenium, filtered
H41	FLEAD	PPB	5	7	7	***	50	EPA		Lead, filtered

TABLE 10. (contd)

Constituent List=Quality Characteristics

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A11	SODIUM	PPB	100	7	0		.		Sodium
A17	MANGESE	PPB	5	7	5		.		Manganese
A19	IRON	PPB	50	7	5		.		Iron
C67	PHENOL	PPB	10	7	7	***	.		Phenol
C73	SULFATE	PPB	600	7	0		.		Sulfate
C76	CHLORID	PPB	500	7	0		.		Chloride
H24	FSODIUM	PPB	100	7	0		.		Sodium, filtered
H29	FMANGAN	PPB	5	7	5		.		Manganese, filtered
H31	FIRON	PPB	50	7	7	***	.		Iron, filtered
H67	LPHENOL	PPB	1	7	7	***	.		Phenol, low DL

Constituent List=Site Specific

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A06	CALCIUM	PPB	50	7	0		.		Calcium
A18	POTASUM	PPB	100	7	0		.		Potassium
A60	MAGNES	PPB	0	7	0		.		Magnesium
H18	TC	PPB	.	7	0		.		Total carbon
H19	FCALCIU	PPB	50	7	0		.		Calcium, filtered
H30	FPOTASS	PPB	100	7	0		.		Potassium, filtered
H32	FMAGNES	PPB	0	7	0				Magnesium, filtered

Constituent List=Site Specific Lag-along

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A04	ZINC	PPB	5	7	2		.		Zinc
A12	NICKEL	PPB	10	7	6		.		Nickel
A13	COPPER	PPB	10	7	7	***	1300	EPAP	Copper
A14	VANADUM	PPB	5	7	0		.		Vanadium
A16	ALUMNUM	PPB	150	7	7	***	.		Aluminum
C76	PHOSPHA	PPB	1000	7	7	***	.		Phosphate
H18	FZINC	PPB	5	7	3		.		Zinc, filtered
H25	FNICKEL	PPB	10	7	7	***	.		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

TABLE 10. (contd)

Constituent List:Organics

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A61	TETRANE	PPB	10	7	7	***	5	EPAP	Tetrachloroethane
A62	BENZENE	PPB	10	7	7	***	5	EPAP	Benzene
A63	DIOXANE	PPB	500	7	7	***	.		Dioxane
A64	METHONE	PPB	10	7	7	***	.		Methyl ethyl ketone
A65	PYRIDIN	PPB	500	7	7	***	.		Pyridine
A66	TOLUENE	PPB	10	7	7	***	2000	EPAP	Toluene
A67	1,1,1-T	PPB	10	7	6		200	EPAP	1,1,1-trichloroethane
A68	1,1,2-T	PPB	10	7	7	***	.		1,1,2-trichloroethane
A69	TRICENE	PPB	10	7	7	***	5	EPAP	Trichloroethylene
A70	PERCENE	PPB	10	7	7	***	.		Perchloroethylene
A71	OPXYLE	PPB	10	7	7	***	440	EPAP	Xylene-o,p
A72	ACROLIN	PPB	10	7	7	***	.		Acrolein
A73	ACRYLIE	PPB	10	7	7	***	.		Acrylonitrile
A74	DISTHER	PPB	10	7	7	***	.		Bis(chloromethyl) ether
A75	BROMONE	PPB	10	7	7	***	.		Bromoacetone
A76	METHBRO	PPB	10	7	7	***	.		Methyl bromide
A77	CARBIDE	PPB	10	7	7	***	.		Carbon disulfide
A78	CHLBENZ	PPB	10	7	7	***	.		Chlorobenzene
A79	CHLTHER	PPB	10	7	7	***	.		2-chloroethyl vinyl ether
A80	CHLFORM	PPB	10	7	7	***	.		Chloroform
A81	METHCHL	PPB	10	7	7	***	.		Methyl chloride
A82	CHMTHER	PPB	10	7	7	***	.		Chloromethyl methyl ether
A83	CROTONA	PPB	10	7	7	***	.		Crotonaldehyde
A84	DIBRCHL	PPB	10	7	7	***	.		1,2-dibromo-3-chloropropane
A85	DIBRETH	PPB	10	7	7	***	.		1,2-dibromoethane
A86	DIBRMET	PPB	10	7	7	***	.		Dibromomethane
A87	DIBUTEN	PPB	10	7	7	***	.		1,4-dichloro-2-butene
A88	DICDIFM	PPB	10	7	7	***	.		Dichlorodifluoromethane
A89	1,1-DIC	PPB	10	7	7	***	.		1,1-dichloroethane
A90	1,2-DIC	PPB	10	7	7	***	5	EPAP	1,2-dichloroethane
A91	TRANDCE	PPB	10	7	7	***	70	EPAP	trans-1,2-dichloroethene
A92	DICETHY	PPB	10	7	7	***	7	EPAP	1,1-dichloroethylene
A93	METHYCH	PPB	10	7	0		.		Methylene chloride
A94	DICPANE	PPB	10	7	7	***	5	EPAP	1,2-dichloropropane
A95	DICPENE	PPB	10	7	7	***	.		1,3-dichloropropene
A96	NNDIETH	PPB	10	7	7	***	.		N,N-diethylhydrazine
A99	HYDRSUL	PPB	10	7	7	***	.		Hydrogen sulfide
B01	IODOMET	PPB	10	7	7	***	.		Iodomethane
B02	METHACR	PPB	10	7	7	***	.		Methacrylonitrile
B03	METHTBI	PPB	10	7	7	***	.		Methanethiol
B04	PENTACH	PPB	10	7	7	***	.		Pentachloroethane
B05	1112-tc	PPB	10	7	7	***	.		1,1,1,2-tetrachloroethane
B06	1122-tc	PPB	10	7	7	***	.		1,1,2,2-tetrachloroethane
B08	BROMOFM	PPB	10	7	7	***	.		Bromoform
B09	TRCMEOL	PPB	10	7	7	***	.		Trichloroethanethiol
B10	TRCMFLM	PPB	10	7	7	***	.		Trichloromonofluoromethane
B11	TRCPANE	PPB	10	7	7	***	.		Trichloropropane
B12	123-trp	PPB	10	7	7	***	.		1,2,3-trichloropropane
B13	VINYIDE	PPB	10	7	7	***	1	EPAP	Vinyl chloride
B14	M-XYLE	PPB	10	7	7	***	440	EPAP	Xylene-m

TABLE 10. (contd)

Constituent List-Organics

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
D16	DIETHY	PPB	10	7	7	***	.		Diethylamine
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	***	.		1,4-dichlorobenzene
B89	HEXCBEN	PPB	10	7	7	***	.		Hexachlorobenzene
C04	METACRY	PPB	10	7	7	***	.		Methyl methacrylate
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
C64	HEXACHL	PPB	10	7	7	***	.		Hexachlorophene
C55	NAPHTHA	PPB	10	7	7	***	.		Naphthalene
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
C71	FORMALN	PPB	600	7	7	***	.		Formalin
C79	KEROSEN	PPB	10000	7	7	***	.		Kerosene
H08	ETHMETH	PPB	3000	7	7	***	.		Ethyl methacrylate

*** - Indicates all samples were below detection limits
xxx - Indicates that regulatory limits were exceeded
EPA - based on limits given in 40CFR 255, Appendix III, EPA Interim Primary Drinking Water Standards
EPAP - based on proposed Maximum Contaminant Levels

TABLE 11. Nonradioactive Dangerous Waste Landfill Interim Status Detection Level Program: July 1987 Data for Constituents with at Least One Value Above Detection Limits

Constituent List=Contamination Indicators

Constituent Code	Name	Units	Replicate	Up-Gradient (Deep) 26-35A	26-34	26-35C	Down-gradient (Deep) 25-34B	25-34A	26-33	25-33A
191	CONDFLD	UMHO		342	288	359	357	347	330	371
			1	341	279	357	.	.	.	.
			2	340	279	358	.	.	.	.
			3	340	280	357	.	.	.	
199	PHFIELD			7.4	6.9	7.0	7.4	7.4	7.5	7.8
			1	7.5	7.0	7.0	.	.	.	.
			2	7.5	7.0	7.1	.		.	
			3	7.5	7.0	7.1	.	.	.	
068	TOX	PPB (a)		6.5	3.9	203	11.7	5.5	31.1	5.1
			1	8.2	7.8	230	.			
			2	1.3	3.4	230	.		.	
			3	2.8	7.4	229	.	.		
069	TOC	PPB (a)		495	441	344	335	354	375	378
			1	395	356	377	.			
			2	378	440	510	.			
			3	352	500	298	.		.	

Constituent List=Drinking Water Standards

Constituent Code	Name	Units	Up-Gradient (Deep) 26-35A	26-34	26-35C	Down-gradient (Deep) 25-34B	25-34A	26-33	25-33A
109	COLIFRM	MPN	<2.2	<2.2	15	<2.2	<2.2	<2.2	<2.2
111	BETA	PCI/L	25.7	21.3	15.5	25.2	21.6	23.5	9.74
212	LDALPHA	PCI/L	2.91	2.75	1.21	1.94	2.06	2.85	2.54
A05	BARIUM	PPB	34	30	6	34	35	35	23
-23	FBARIUM	PPB	33	28	54	34	37	34	23
A08	CHRMIUM	PPB	<10	<10	10	<10	<10	<10	<10
A20	ARSENIC	PPB	<5	<5	<5	<5	5	<5	<5
C72	NITRATE	PPB	22,800	24,500	19,400	23,900	24,100	24,000	5,750
C74	FLUORID	PPB	674	704	555	685	673	653	638

Constituent List=Quality Characteristics

Constituent Code	Name	Units	Up-Gradient (Deep) 26-35A	26-34	26-35C	Down-gradient (Deep) 25-34B	25-34A	25-33	25-33A
A11	SODIUM	PPB	22,100	22,500	19,700	23,800	23,500	23,200	38,600
H24	FSODIUM	PPB	22,000	21,800	19,900	21,700	22,700	21,700	37,300
A17	MANGESE	PPB	<5	<5	103	<5	<5	<5	5
H29	FMANGAN	PPB	<5	<5	100	<5	<5	<5	5
A19	IRON	PPB	245	<50	<50	<50	<50	<50	56
C73	SULFATE	PPB	42,100	37,500	74,400	39,800	40,100	36,800	53,700
C75	CHLORID	PPB	8,010	6,650	9,490	7,510	7,630	7,010	6,650

TABLE 11. (contd)

Constituent List=Site Specific

Constituent Code	Name	Units	Up-Gradient 26-35A	26-34	(Deep) 26-35C	Down-gradient 25-34B	25-34A	26-33	(Deep) 25-33A
A05	CALCIUM	PPB	31,000	28,500	36,500	34,200	35,300	33,600	30,800
H19	FCALCIU	PPB	30,900	26,600	37,800	30,400	30,600	26,900	28,200
A18	POTASSUM	PPB	5,940	5,740	5,810	6,350	6,180	6,020	5,770
H30	FPOTASS	PPB	5,980	55,900	5,940	5,750	5,910	5,540	5,780
A50	MAGNES	PPB	10,500	9,690	12,000	10,400	10,400	1,000	8,450
H32	FMAGNES	PPB	10,600	9,370	11,900	10,300	10,400	9,380	8,810
H15	TC	PPB	27,900	25,100	28,500	28,300	27,600	25,500	25,300

Constituent List=Site Specific tag-alongs

Constituent Code	Name	Units	Up-Gradient 26-35A	26-34	(Deep) 26-35C	Down-gradient 25-34B	25-34A	25-33	(Deep) 25-33A
A04	ZINC	PPB	8	<5	<5	9	7	9	9
H18	FZINC	PPB	<5	<5	<5	7	5	7	5
A12	NICKEL	PPB	<10	<10	<10	<10	<10	<10	10
A14	VANADIUM	PPB	23	24	9	22	30	30	11
H27	FVANADI	PPB	23	25	7	23	23	23	11

Constituent List=Organics

Constituent Code	Name	Units	Up-Gradient 26-35A	26-34	(Deep) 26-35C	Down-gradient 25-34B	25-34A	25-33	(Deep) 25-33A
A67	1,1,1-T	PPB (a)	ND	ND	ND	2.5	ND	ND	ND
A93	METHYCH	PPB (a)	ND	ND	360	ND	ND	ND	ND

(a) Values reported below contractual detection limit indicate presence of the constituent, although the reported level may not be reliable. ND is used when there is no indication of any presence.

In the new fiscal year, ground-water monitoring of the NRDW Landfill, the SWL, and nearby Hanford Site wells will be coordinated and evaluated to better understand how past activities at the SWL and NRDW Landfill have affected the ground-water system in the vicinity of the Hanford Site Central Landfill.

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APPENDIX A

RAW ANALYTICAL DATA FOR GROUND-WATER SAMPLES COLLECTED FROM WELLS IN THE 300 AREA

APPENDIX A

RAW ANALYTICAL DATA FOR GROUND-WATER SAMPLES COLLECTED FROM WELLS IN THE 300 AREA

The following table presents raw data for those constituents that were detected at least once in the June and August 1987 samples. The columns are labeled with the name of the constituent, the units the constituent is measured in, and regulatory limits, if any. The regulatory limits given are Interim Primary Drinking Water Standards or proposed Recommended Maximum Contaminant Levels (marked with an asterisk *). If no data are available, a period is printed.

The following codes have been used in marking the data:

< - Data were below contractual detection limit

- Data were below contractual detection limit but a value was reported

* - Radioactive data for which the reported result was less than the 2-σ counting error

TABLE A.1. 300 Area Process Trenches Assessment Program: June and August 1987 Data for Constituents with at Least One Value Above Detection Limits

Well name	Collection Date	Duplicat sample number	1,1,1-T PPB 200*	1,1,2-T PPB	ALUMINUM PPB	AMMONIU PPB	ARSENIC PPB 50	BARSENI PPB 50	BARIUM PPB 1000	BBARIUM PPB 1000	BETA PCI/L 50
3-1-1	24JUN87		<10.0	<10	<150	<50	<5	<5	32	30	7.85
	17AUG87		<10.0	<10	<150	<50	<5	<5	32	32	9.64
3-1-2	24JUN87		<10.0	<10	<150	<50	<5	<5	18	20	10.50
	14AUG87		<10.0	<10	<150	<50	<5	<5	22	22	12.30
3-1-3	26JUN87		<10.0	<10	<150	<50	<5	<5	22	23	22.10
	18AUG87		<10.0	<10	<150	<50	<5	<5	21	21	46.90
3-1-4	24JUN87		<10.0	<10	<150	<50	<5	<5	15	15	6.00
	14AUG87		4.3	<10	<150	<50	<5	<5	21	19	12.20
3-1-5	30JUN87		<10.0	<10	<150	<50	<5	<5	22	23	12.90
	26AUG87		<10.0	<10	<150	<50		<5	52	53	23.00
	26AUG87	1	<10.0	<10	.	<50	.	.		56	27.70
3-1-6	19JUN87		<10.0	<10	<150	70	<5	<5	19	14	5.15
	17AUG87		<10.0	<10	<150	<50	<5	<5	22	22	8.37
3-1-7	19JUN87		<10.0	<10	<150	67	<5	.	21	.	14.30
	17AUG87		<10.0	<10	<150	<50	<5	<5	22	22	49.90
3-1-8	30JUN87		<10.0	<10	<150	<50	<5	<5	30	30	17.10
	20AUG87		<10.0	<10	<150	<50	<5	<5	31	25	29.60
3-1-9	24JUN87		<10.0	<10	151	158	<5	<5	122	122	7.93
	15AUG87		2.0	<10	<150	125	<5	<5	119	120	10.10
3-1-10	18JUN87		<10.0	<10	<150	73	<5	<5	21	21	5.52
	19AUG87		<10.0	<10	<150	<50	<5	<5	28	25	4.86
3-1-11	30JUN87		<10.0	<10	<150	<50	<5	<5	21	20	7.62
	26AUG87		<10.0	<10	<150	<50	.	<5	42	45	24.60
3-1-12	18JUN87		<10.0	<10	<150	102	<5	<5	19	23	10.10
	20AUG87		<10.0	<10	<150	<50	<5	<5	20	15	12.50
3-1-13	18JUN87		<10.0	<10	<150	78	<5	<5	23	21	5.62
	25AUG87		<10.0	<10	<150	<50	.	<5	32	24	11.60
	25AUG87	1	<10.0	<10	.	<50	.	.	.	29	7.58
3-1-14	18JUN87		<10.0	<10	<150	88	<5	<5	21	21	3.94
	25AUG87		<10.0	<10	<150	<50	.	<5	24	24	9.16
3-1-15	18JUN87		<10.0	<10	<150	75	<5	<5	49	43	9.51
	19AUG87		<10.0	<10	<150	<50	<5	<5	46	42	13.10
3-1-15A	29JUN87		<10.0	<10	<150	<50	<5	<5	28	27	9.97
	29JUN87		<10.0	<10	.	.	.	.	.	.	.
	19AUG87		<10.0	<10	<150	<50	<5	<5	28	28	5.41
3-1-15B	29JUN87		<10.0	<10	<150	100	<5	<5	54	51	7.99
	29JUN87		<10.0	<10	.	.	.	.	.	.	.
	19AUG87		<10.0	<10	<150	97	<5	<5	58	55	8.55
3-1-15C	29JUN87		<10.0	<10	<150	138	<5	<5	61	53	10.90
	29JUN87		<10.0	<10	.	.	.	.	.	.	.
	19AUG87		<10.0	<10	<150	135	<5	<5	58	57	9.20
3-1-15D	29JUN87		<10.0	<10	175	83	<5	.	60	.	14.80
3-1-17A	24JUN87		<10.0	<10	<150	<50	<5	<5	28	29	31.10
	25JUN87		<10.0	<10	.	.	.	.	.	.	.
	20AUG87		<10.0	<10	<150	<50	<5	<5	22	16	39.20
3-1-17B	25JUN87		<10.0	<10	<150	102	<5	<5	62	65	7.27
	25JUN87		<10.0	<10	.	.	.	.	.	.	.
	20AUG87		<10.0	<10	<150	125	<5	<5	53	59	8.08
3-1-17C	25JUN87		<10.0	<10	<150	68	<5	<5	53	77	14.20
	25JUN87		<10.0	<10	.	.	.	.	.	.	.
	25AUG87		<10.0	<10	<150	90	.	<5	54	60	54.70
3-1-18A	18JUN87		<10.0	<10	<150	63	<5	<5	50	48	14.90
	24AUG87		<10.0	<10	<150	<50	<5	5	48	48	14.10
3-1-18B	18JUN87		<10.0	<10	<150	125	<5	<5	41	42	9.20
	24AUG87		<10.0	<10	<150	100	<5	<5	48	44	10.50
3-1-18C	18JUN87		<10.0	<10	<150	190	<5	<5	65	64	7.83
	24AUG87		<10.0	<10	<150	110	<5	<5	71	68	8.68
3-1-19	30JUN87		<10.0	<10	<150	<50	<5	<5	22	22	35.10
	26AUG87		<10.0	<10	<150	<50	.	<5	51	48	97.50
3-2-1	24JUN87		<10.0	<10	<150	<50	<5	<5	39	39	9.62
	14AUG87		<10.0	<10	<150	<50	<5	<5	44	42	14.10
3-3-7	24JUN87		<10.0	<10	<150	<50	<5	<5	42	40	7.41
	13AUG87		<10.0	<10	<150	<50	<5	<5	43	20	14.20
3-3-10	25JUN87		<10.0	<10	<150	<50	<5	<5	42	45	8.17
	13AUG87		<10.0	<10	<150	<50	<5	<5	44	49	5.03
3-4-1	25JUN87		<10.0	<10	<150	<50	<5	<5	39	42	8.71
	13AUG87		<10.0	<10	<150	<50	<5	<5	43	41	9.58
3-4-7	25JUN87		<10.0	<10	<150	<50	<5	<5	45	45	13.70
	13AUG87		<10.0	<10	<150	<17	<5	<5	45	45	13.70
3-4-11	25JUN87		<10.0	<10	<150	<50	<5	<5	41	43	9.69
	25AUG87		<10.0	<10	<150	<50	.	<5	40	41	8.87
3-3-2	19JUN87		<10.0	<10	<150	70	5	<5	43	39	7.40
	18AUG87		<10.0	2	<150	<50	<5	5	45	42	8.59
6-519-E13	25JUN87		5.5	<10	<150	<50	<5	<5	51	53	9.95
	27AUG87		<10.0	<10	<150	<50	.	6	52	49	43.10
6-520E15A	25JUN87		<10.0	<10	<150	<50	<5	<5	61	63	6.38
	17AUG87		<10.0	<10	<150	<50	<5	<5	61	53	5.37

TABLE A.1. (contd)

Well name	Collection Date	Duplicat sample number	FCADMIU PPB 10	CADMIUM PPB 10	FCALCIU PPB	CALCIUM PPB	CHLFORM PPB	CHLORID PPB	CHROMIUM PPB 50	COLIFRM MPN 1	CONDFLD UMHO
3-1-1	24JUN87		<2	<2	20,300	21,700	19.0	10,800	<10	<2.2	145
	17AUG87		<2	<2	15,400	15,400	16.0	9,450	<10	<2.2	135
3-1-2	24JUN87		<2	<2	26,200	24,600	14.0	11,100	<10	9.2	211
	14AUG87		<2	<2	17,600	19,700	15.0	8,650	<10	<2.2	177
3-1-3	26JUN87		<2	<2	18,200	19,100	21.3	11,600	<10	<2.2	157
	15AUG87		<2	<2	16,300	15,700	21.0	11,100	<10	<2.2	151
3-1-4	24JUN87		<2	<2	18,400	17,100	20.0	8,130	<10	<2.2	154
	14AUG87		<2	<2	14,200	15,200	18.0	7,000	<10	<2.2	147
3-1-5	30JUN87		<2	<2	15,700	18,300	25.0	6,310	<10	<2.2	142
	25AUG87		<2	<2	56,700	46,000	17.0	115,000	<10	<2.2	456
	25AUG87	1	<2	.	57,300	.	16.0	114,000	.	.	.
3-1-6	19JUN87		<2	<2	15,900	18,000	25.0	5,400	<10	<2.2	136
	17AUG87		<2	<2	18,500	18,300	16.0	6,010	<10	<2.2	137
3-1-7	19JUN87		.	<2	.	21,600	12.0	20,400	<10	<2.2	207
	17AUG87		<2	<2	15,600	18,200	19.0	11,200	<10	<2.2	152
3-1-8	30JUN87		<2	<2	17,400	17,500	18.0	12,600	<10	<2.2	208
	20AUG87		<2	<2	15,700	14,400	<10.0	10,200	<10	<2.2	209
3-1-9	24JUN87		<2	<2	17,700	17,100	<10.0	9,250	18	<2.2	238
	15AUG87		2	<2	15,700	15,300	<10.0	10,300	18	<2.2	250
3-1-10	18JUN87		<2	<2	18,100	17,300	23.0	7,350	<10	<2.2	152
	19AUG87		<2	<2	15,200	14,900	24.0	8,330	<10	<2.2	143
3-1-11	30JUN87		<2	<2	15,600	18,200	24.7	5,460	<10	<2.2	133
	26AUG87		<2	<2	35,400	38,000	20.0	61,800	11	<2.2	407
3-1-12	18JUN87		<2	<2	17,200	16,400	24.0	6,350	<10	<2.2	149
	20AUG87		2	<2	16,700	14,300	20.0	6,160	<10	<2.2	134
3-1-13	18JUN87		<2	<2	25,100	24,500	16.0	11,400	<10	<2.2	222
	26AUG87		<2	2	25,300	24,300	14.0	9,730	12	<2.2	193
	25AUG87	1	<2	.	24,900	.	14.0	9,630	.	.	.
3-1-14	18JUN87		<2	<2	27,800	25,000	15.0	13,700	<10	<2.2	224
	25AUG87		<2	<2	18,200	18,100	16.0	5,720	18	<2.2	154
3-1-15	15JUN87		<2	<2	44,400	46,000	<10.0	27,600	<10	<2.2	577
	19AUG87		2	<2	39,200	35,100	<10.0	17,900	<10	<2.2	331
3-1-15A	05JUN87		<2	<2	22,500	22,500	15.0	13,300	<10	<2.2	.
	29JUN87		.	.	.	.	20.5	.	.	.	138
	19AUG87		2	<2	15,700	15,800	24.0	10,700	<10	<2.2	159
3-1-15B	05JUN87		<2	<2	21,500	18,900	<10.0	12,100	<10	<2.2	320
	29JUN87		.	.	.	.	<10.0	.	.	.	247
	19AUG87		2	<2	17,100	15,400	<10.0	11,200	<10	<2.2	256
3-1-15C	05JUN87		<2	<2	15,900	15,900	<10.0	13,100	33	<2.2	302
	29JUN87		.	.	.	.	<10.0	.	.	.	257
	19AUG87		<2	<2	11,400	11,300	<10.0	11,100	<10	<2.2	330
3-1-15D	29JUN87		.	9	.	13,500	<10.0	11,100	<10	<2.2	254
3-1-17A	04JUN87		<2	<2	23,300	21,200	19.0	28,900	<10	<2.2	210
	26JUN87		.	.	.	.	25.0	.	.	.	159
	20AUG87		2	<2	15,300	14,100	19.0	13,500	<10	<2.2	151
3-1-17B	05JUN87		<2	<2	18,500	18,700	<10.0	9,760	19	<2.2	248
	26JUN87		.	.	.	.	<10.0	.	.	.	229
	20AUG87		2	<2	15,500	14,500	<10.0	9,210	10	<2.2	295
3-1-17C	05JUN87		<2	<2	10,700	11,400	<10.0	11,600	<10	<2.2	294
	26JUN87		.	.	.	.	<10.0	.	.	.	313
	20AUG87		<2	<2	8,570	8,980	<10.0	10,600	<10	<2.2	319
3-1-18A	18JUN87		<2	<2	41,100	42,200	<10.0	17,900	<10	<2.2	437
	24AUG87		<2	<2	37,500	36,900	<10.0	18,900	<10	<2.2	385
3-1-18B	18JUN87		<2	<2	11,500	11,100	<10.0	11,000	<10	<2.2	374
	24AUG87		2	<2	10,100	11,400	<10.0	11,000	30	<2.2	314
3-1-18C	18JUN87		<2	<2	12,000	12,000	<10.0	10,900	<10	<2.2	401
	24AUG87		<2	<2	10,200	10,600	<10.0	11,300	24	<2.2	344
3-1-19	30JUN87		<2	<2	15,900	16,600	20.4	8,670	10	<2.2	157
	26AUG87		<2	<2	33,700	34,600	16.0	77,100	18	<2.2	402
3-2-1	24JUN87		<2	<2	21,600	20,800	12.0	17,600	<10	2.2	184
	14AUG87		<2	<2	16,700	17,400	13.0	9,570	<10	2.2	181
3-3-7	24JUN87		<2	<2	35,700	38,500	5.1	16,300	<10	<2.2	308
	13AUG87		<2	<2	19,400	35,100	25.0	15,100	<10	<2.2	315
3-3-10	25JUN87		<2	<2	27,800	25,400	12.0	9,020	<10	5.1	141
	13AUG87		<2	<2	25,400	23,500	12.0	7,440	<10	<2.2	202
3-4-1	25JUN87		<2	<2	39,500	38,600	7.0	13,400	<10	<2.2	183
	13AUG87		<2	<2	34,200	37,700	<10.0	11,700	<10	<2.2	276
3-4-7	25JUN87		<2	<2	37,600	38,100	5.1	12,100	<10	2.2	198
	13AUG87		<2	<2	32,600	32,600	6.0	13,100	<10	<2.2	291
3-4-11	25JUN87		<2	<2	40,300	40,500	5.0	13,700	14	<2.2	209
	25AUG87		<2	<2	33,900	34,600	5.0	10,000	<10	<2.2	286
3-8-2	19JUN87		<2	<2	40,100	40,600	<10.0	11,500	<10	15.0	329
	18AUG87		2	<2	36,100	35,300	<10.0	10,500	<10	<2.2	256
6-S19-E13	25JUN87		<2	<2	42,400	42,200	<10.0	17,700	<10	<2.2	258
	27AUG87		<2	<2	38,800	37,200	<10.0	18,500	<10	<2.2	291
6-S30E15A	25JUN87		<2	<2	52,900	52,600	3.8	6,510	<10	<2.2	259
	17AUG87		<2	<2	50,100	52,200	4.0	5,550	<10	<2.2	374

TABLE A.1. (contd)

Well name	Collection Date	Duplicat sample number	COPPER PPB 1300*	FCOPPER PPB 1300*	FLUORID PPB 1400	IRON PPB	FIRON PPB	LEADGF PPB 50	LGALPHA PCI/L 15	MAGNES PPB	FMAGNES PPB
3-1-1	24JUN87		<10	<10	<500	110	<50	<5	19.80	4,250	4,100
	17AUG87		<10	<10	<500	91	<50	<5	12.70	3,520	3,470
3-1-2	24JUN87		<10	<10	<500	54	56	5	14.20	5,340	5,650
	14AUG87		<10	<10	<500	58	<50	<5	9.92	4,740	4,420
3-1-3	25JUN87		<10	<10	680	115	113	<5	28.60	3,770	3,620
	18AUG87		<10	<10	523	<50	<50	<5	24.30	3,530	3,530
3-1-4	24JUN87		<10	<10	<500	70	<50	<5	25.70	3,710	3,960
	14AUG87		<10	<10	<500	82	<50	<5	39.60	3,570	3,520
3-1-5	30JUN87		<10	<10	<500	105	<50	<5	37.80	3,530	3,290
	28AUG87		<10	<10	<500	<50	76	<5	25.20	11,000	13,200
	25AUG87	1		11	<500		<50		31.50		13,100
3-1-6	19JUN87		<10	<10	<500	<50	<50	<5	7.37	3,460	3,460
	17AUG87		<10	<10	<500	71	<50	<5	12.70	3,910	4,060
3-1-7	19JUN87		62		580	55		<5	22.40	4,370	
	17AUG87		<10	<10	541	78	61	<5	30.20	3,530	3,550
3-1-8	30JUN87		<10	<10	715	<50	<50	<5	20.90	5,230	5,360
	22AUG87		<10	<10	568	<50	<50	<5	20.70	5,230	5,160
3-1-9	24JUN87		<10	<10	1110	598	229	<5	*-0.23	7,300	7,450
	15AUG87		<10	<10	581	427	281	<5	* 0.92	7,280	7,240
3-1-10	18JUN87		<10	<10	558	<50	71	<5	6.70	3,750	3,960
	19AUG87		<10	<10	<500	<50	<50	<5	6.95	3,630	3,490
3-1-11	30JUN87		<10	<10	<500	55	<50	<5	27.30	4,120	3,720
	28AUG87		13	12	<500	51	<50	<5	33.70	9,430	9,250
3-1-12	18JUN87		<10	<10	500	<50	<50	<5	26.00	3,590	3,710
	22AUG87		<10	<10	<500	<50	<50	<5	32.20	3,500	3,730
3-1-13	18JUN87		<10	<10	<500	<50	<50	<5	14.00	5,540	5,670
	25AUG87		<10	<10	<500	75	<50	<5	11.30	6,190	6,360
	25AUG87	1		<10	<500		<50		11.50		6,260
3-1-14	19JUN87		<10	<10	<500	114	<50	<5	16.40	5,410	5,700
	25AUG87		13	<10	<500	<50	<50	<5	12.50	4,120	4,110
3-1-15	18JUN87		<10	<10	<500	78	<50	<5	3.99	11,800	11,600
	19AUG87		<10	<10	<500	60	<50	<5	6.32	10,700	10,800
3-1-15A	05JUN87		<10	<10	832	224	<50	<5	10.00	4,230	4,020
	29JUN87										
	19AUG87		<10	<10	<500	<50	<50	<5	10.30	3,380	3,420
3-1-15B	09JUN87		<10	<10	1810	120	<50	<5	2.74	6,330	6,760
	29JUN87										
	19AUG87		<10	<10	1020	120	85	<5	2.15	6,420	6,360
3-1-15C	09JUN87		<10	<10	1330	203	<50	<5	4.20	5,250	4,530
	29JUN87										
	19AUG87		<10	<10	1550	105	82	<5	* 0.27	5,120	4,960
3-1-15D	29JUN87		<10		1770	1130		<5	*-0.20	5,420	
3-1-17A	24JUN87		15	12	563	<50	<50	<5	1.75	4,400	4,700
	28JUN87										
	20AUG87		24	<10	<500	115	<50	<5	44.60	3,380	3,460
3-1-17B	05JUN87		<10	<10	1250	215	137	<5	* 0.08	6,510	6,520
	28JUN87										
	20AUG87		<10	<10	748	154	131	<5	* 0.52	6,250	6,490
3-1-17C	05JUN87		<10	<10	2360	<50	<50	<5	*-0.48	4,990	4,630
	28JUN87										
	25AUG87		<10	<10	1340	64	75	<5	* 0.68	4,550	4,460
3-1-18A	18JUN87		<10	<10	<500	159	<50	<5	3.51	11,900	11,700
	24AUG87		<10	<10	<500	55	<50	<5	2.13	12,000	12,200
3-1-18B	18JUN87		<10	<10	1870	175	143	<5	* 0.57	4,590	5,160
	24AUG87		<10	<10	1210	371	173	<5	*-0.45	5,590	5,080
3-1-18C	18JUN87		<10	<10	1860	111	84	<5	* 0.15	5,230	5,110
	24AUG87		<10	<10	1230	158	88	<5	* 0.03	5,290	5,070
3-1-19	30JUN87		<10	<10	580	1500	<50	<5	56.50	3,960	3,830
	28AUG87		13	11	<500	2270	<50	<5	52.40	8,500	8,520
3-2-1	24JUN87		<10	<10	<500	196	<50	<5	9.58	4,630	4,780
	14AUG87		<10	<10	<500	94	<50	<5	8.77	4,220	4,280
3-3-7	24JUN87		<10	<10	<500	<50	<50	<5	10.30	8,460	7,670
	13AUG87		<10	<10	<500	<50	<50	<5	9.58	6,660	4,580
3-3-10	25JUN87		<10	<10	<500	287	69	<5	10.70	5,940	6,220
	13AUG87		<10	<10	<500	230	101	<5	15.80	9,860	8,480
3-4-1	25JUN87		<10	<10	<500	<50	<50	<5	11.60	7,890	8,070
	13AUG87		<10	<10	<500	<50	<50	<5	12.70	8,550	8,010
3-4-7	25JUN87		<10	<10	<500	<50	<50	<5	34.20	7,330	7,770
	13AUG87		<10	<10	<500	<50	<50	<5	32.70	7,560	7,720
3-4-11	25JUN87		<10	<10	<500	75	<50	<5	11.90	8,580	8,660
	28AUG87		<10	<10	<500	<50	<50	<5	16.10	8,280	8,100
3-8-2	19JUN87		<10	<10	<500	<50	<50	5	2.34	9,100	9,260
	15AUG87		<10	<10	<500	71	<50	<5	1.15	9,070	8,860
5-S19-E13	25JUN87		<10	<10	<500	78	<50	<5	2.61	12,800	12,900
	27AUG87		<10	<10	<500	114	<50	<5	2.40	12,500	12,400
5-S20E15A	25JUN87		<10	<10	<500	<50	<50	<5	1.46	12,100	12,300
	17AUG87		<10	<10	<500	60	<50	<5	* 1.08	11,800	11,600

TABLE A.1. (contd)

Well name	Collection Date	Duplicat sample number	FMANGAN PPB	MANGESE PPB	METHYCH PPB	NICKEL PPB	FNICKEL PPB	NITRATE PPB 45000	PERCENE PPB	PHFIELD	FPOTASS PPB
3-1-1	24JUN87		<5	<5	<10	<10	<10	3,910	<10	6.8	2,210
	17AUG87		<5	6	<10	<10	<10	1,570	<10	6.8	2,030
3-1-2	24JUN87		<5	<5	<10	<10	<10	6,480	<10	6.4	3,160
	14AUG87		<5	<5	<10	<10	<10	3,410	<10	7.2	2,750
3-1-3	26JUN87		<5	<5	<10	<10	<10	2,580	<10	6.4	2,110
	16AUG87		<5	<5	<10	<10	<10	2,920	3	6.8	2,140
3-1-4	24JUN87		<5	<5	<10	<10	<10	2,080	<10	6.1	1,990
	14AUG87		<5	<5	3040	<10	<10	899	<10	6.8	2,180
3-1-5	30JUN87		<5	<5	<10	<10	<10	997	<10	6.4	1,800
	26AUG87		<5	<5	21	<10	<10	1,290	<10	6.5	3,960
	26AUG87	1	<5	.	18	.	<10	1,410	<10	.	3,900
3-1-6	19JUN87		<5	<5	<10	<10	<10	1,470	<10	6.7	2,100
	17AUG87		<5	<5	<10	<10	<10	1,130	<10	6.8	2,220
3-1-7	19JUN87			<5	<10	<10	.	2,340	<10	6.8	.
	17AUG87		<5	<5	<10	<10	<10	2,200	3	5.8	2,180
3-1-8	30JUN87		9	8	<10	<10	<10	1,550	<10	7.2	3,710
	25AUG87		14	11	<10	<10	<10	1,330	<10	7.0	4,110
3-1-9	24JUN87		58	71	<10	<10	<10	<500	<10	7.0	5,930
	18AUG87		65	55	<10	<10	11	<500	<10	7.2	5,940
3-1-10	18JUN87		<5	<5	<10	<10	<10	2,170	<10	6.6	2,400
	19AUG87		<5	<5	<10	<10	<10	1,250	<10	6.6	2,270
3-1-11	30JUN87		<5	<5	<10	<10	<10	1,210	<10	6.4	1,460
	26AUG87		<5	<5	18	<10	<10	1,330	<10	6.6	2,840
3-1-12	18JUN87		<5	<5	<10	<10	<10	1,920	<10	6.4	1,930
	20AUG87		<5	5	<10	<10	12	1,360	<10	6.4	2,190
3-1-13	18JUN87		<5	<5	<10	<10	<10	5,590	<10	7.1	3,400
	25AUG87		<5	5	<6	<10	<10	6,200	<10	7.3	3,940
	25AUG87	1	<5	.	<10	.	<10	6,250	<10	.	3,910
3-1-14	18JUN87		<5	<5	<10	<10	<10	5,340	<10	6.5	3,010
	25AUG87		<5	5	<10	<10	<10	1,670	<10	7.1	2,780
3-1-15	18JUN87		<5	<5	<10	<10	<10	22,600	<10	7.2	5,910
	19AUG87		<5	<5	<10	<10	<10	19,300	<10	7.3	5,420
3-1-15A	05JUN87		<5	5	<10	<10	<10	7,010	<10	.	2,800
	29JUN87		.	.	<10	.	.	.	<10	6.1	.
	19AUG87		<5	<5	<10	10	<10	2,270	<10	7.0	2,340
3-1-15B	09JUN87		92	84	<10	<10	<10	<500	<10	7.4	5,470
	29JUN87		.	.	<10	.	.	.	<10	6.4	.
	19AUG87		58	60	<10	<10	<10	<500	<10	7.5	5,170
3-1-15C	09JUN87		41	46	<10	19	<10	1,800	<10	7.4	5,400
	29JUN87		.	.	<10	.	.	.	<10	6.5	.
	19AUG87		53	53	<10	<10	<10	<500	<10	7.6	6,440
3-1-15D	29JUN87		.	64	<10	<10	.	<500	<10	6.5	.
3-1-17A	04JUN87		<5	<5	<10	<10	<10	2,180	<10	6.6	2,180
	26JUN87		.	.	<10	.	.	.	<10	5.8	.
	20AUG87		<5	<5	<10	<10	<10	1,570	3	6.3	2,020
3-1-17B	05JUN87		87	59	10	16	<10	<500	<10	7.2	5,960
	26JUN87		.	.	<10	.	.	.	<10	6.9	.
	20AUG87		56	59	<10	<10	<10	<500	<10	7.4	5,820
3-1-17C	08JUN87		25	28	<10	<10	<10	<500	<10	7.6	10,800
	26JUN87		.	.	<10	.	.	.	<10	7.2	.
	25AUG87		22	23	<10	<10	<10	<500	<10	8.1	10,700
3-1-18A	18JUN87		<5	<5	<10	<10	<10	22,600	<10	7.7	5,560
	24AUG87		<5	<5	<10	<10	<10	22,000	<10	7.5	5,370
3-1-18B	18JUN87		45	46	<10	<10	<10	<500	<10	7.9	6,580
	24AUG87		43	51	<10	15	<10	<500	<10	7.4	5,550
3-1-18C	18JUN87		46	51	<10	<10	<10	<500	<10	8.0	5,250
	24AUG87		48	51	<10	<10	<10	<500	<10	7.7	6,560
3-1-19	30JUN87		5	191	<10	<10	<10	1,250	<10	5.3	1,840
	25AUG87		10	33	3	11	<10	1,500	7	6.5	3,070
3-2-1	24JUN87		<5	<5	<10	<10	<10	10,100	<10	5.3	3,230
	14AUG87		<5	<5	22	<10	<10	8,870	<10	5.5	3,060
3-3-7	24JUN87		<5	<5	<10	<10	<10	16,500	<10	6.8	4,760
	13AUG87		<5	<5	<10	<10	<10	14,800	<10	7.2	1,760
3-3-10	25JUN87		3	<5	<10	<10	<10	17,200	<10	5.8	3,530
	13AUG87		<5	<5	<10	<10	<10	9,420	<10	6.4	3,470
3-4-1	25JUN87		<5	<5	<10	<10	<10	15,800	<10	6.4	4,700
	13AUG87		<5	<5	130	<10	<10	15,800	<10	7.0	4,520
3-4-7	25JUN87		<5	<5	<10	<10	<10	19,600	<10	5.3	4,430
	13AUG87		<5	<5	13	<10	<10	14,900	<10	7.1	4,330
3-4-11	25JUN87		<5	<5	<10	<10	<10	17,500	<10	7.0	4,930
	26AUG87		<5	<5	<10	<10	<10	14,300	<10	7.1	4,260
3-8-2	19JUN87		<5	<5	<10	<10	<10	24,200	<10	7.2	5,820
	18AUG87		<5	<5	<10	<10	<10	22,600	4	7.0	5,150
6-S19-E13	25JUN87		<5	<5	<10	<10	<10	23,400	5	5.8	6,500
	27AUG87		<5	<5	230	<10	<10	22,100	<10	7.0	6,330
5-S30E15A	25JUN87		<5	<5	<10	<10	<10	12,700	<10	6.6	5,320
	17AUG87		<5	<5	<10	<10	<10	15,000	<10	7.0	5,720

TABLE A.1. (contd)

Well name	Collection Date	Duplicat sample number	POTASSIUM PPB	RADIUM PCI/L 5	SODIUM PPB	FSODIUM PPB	FSTRONT PPB	SULFATE PPB	TETRANE PPB 5e	TOC PPB	TOLUENE PPB 2000e
3-1-1	24JUN87		2,340	* 0.034	9,810	9,580	.	27,400	<10	# 825	.
	17AUG87		2,160	* 0.034	9,570	9,370	.	15,200	<10	# 624	.
3-1-2	24JUN87		3,030	0.000	10,500	10,900	.	25,200	<10	# 768	.
	14AUG87		2,840	* 0.024	10,100	9,690	.	18,700	# 3	# 749	.
3-1-3	28JUN87		2,050	*-0.018	14,500	14,700	.	19,700	<10	# 921	.
	18AUG87		2,190	* 0.040	14,100	13,800	.	14,600	<10	# 738	.
3-1-4	24JUN87		1,910	* 0.074	8,820	9,030	.	20,400	<10	# 920	.
	14AUG87		2,090	* 0.005	7,350	8,020	.	13,600	<10	# 901	.
3-1-5	30JUN87		2,160	*-0.008	10,100	9,480	.	18,700	<10	1330	.
	28AUG87		3,870	0.191	14,100	17,000	<300	12,300	<10	# 759	# 2
	26AUG87	1	.	.	.	17,600	314	12,300	<10	.	.
3-1-6	19JUN87		2,150	* 0.003	7,410	7,190	.	17,900	<10	# 904	.
	17AUG87		2,200	* 0.028	6,640	6,750	.	13,600	<10	# 718	.
3-1-7	19JUN87		2,360	* 0.064	15,100	.	.	19,600	<10	# 799	.
	17AUG87		2,280	* 0.039	14,600	14,200	.	15,200	<10	# 698	.
3-1-8	30JUN87		4,190	*-0.018	21,400	20,600	.	18,900	<10	1490	.
	20AUG87		4,360	* 0.005	22,300	21,600	.	15,600	<10	# 666	.
3-1-9	24JUN87		5,830	0.274	52,900	56,600	.	1,200	<10	# 358	.
	18AUG87		5,590	* 0.080	54,300	51,900	.	508	<10	# 253	.
3-1-10	18JUN87		2,310	*-0.034	8,470	8,940	.	19,800	<10	# 903	.
	19AUG87		2,430	* 0.089	7,990	7,650	.	14,200	<10	# 643	.
3-1-11	30JUN87		1,740	0.160	5,730	5,240	.	18,500	<10	1160	.
	26AUG87		2,740	0.144	20,500	19,600	.	13,600	<10	# 858	.
3-1-12	15JUN87		1,920	* 0.017	9,150	9,410	.	18,500	<10	# 905	.
	27AUG87		2,150	*-0.001	9,210	9,380	.	14,200	<10	# 713	.
3-1-13	18JUN87		3,520	* 0.043	9,600	9,250	.	25,700	<10	# 813	.
	25AUG87		3,710	0.270	11,500	11,600	.	14,200	<10	# 579	.
	25AUG87	1	.	.	.	11,600	.	23,300	<10	.	.
3-1-14	18JUN87		2,870	*-0.042	9,400	9,780	.	25,200	<10	# 765	.
	25AUG87		2,520	* 0.046	8,160	8,100	.	14,500	<10	# 724	.
3-1-15	18JUN87		6,040	* 0.019	21,700	21,300	.	47,900	<10	# 530	.
	19AUG87		5,650	*-0.054	21,100	20,500	.	45,300	<10	# 365	.
3-1-15A	05JUN87		2,560	0.244	11,100	11,300	.	19,500	<10	# 599	<10
	29JUN87		.	.	.	.	.	.	<10	.	<10
	19AUG87		2,270	* 0.078	11,200	11,300	.	15,000	<10	# 514	.
3-1-15B	09JUN87		5,050	0.278	52,600	50,400	.	4,660	<10	# 365	<10
	29JUN87		.	.	.	.	.	.	<10	.	<10
	19AUG87		5,200	0.156	52,800	51,200	.	5,860	<10	# 538	.
3-1-15C	09JUN87		5,570	0.151	49,100	44,000	.	12,000	<10	# 525	<10
	29JUN87		.	.	.	.	.	.	<10	.	<10
	19AUG87		6,560	* 0.059	62,100	58,900	.	<500	<10	# 272	.
3-1-15D	29JUN87		6,650	0.178	61,400	.	.	694	<10	# 568	<10
3-1-17A	04JUN87		2,050	* 0.092	14,700	15,600	.	20,000	<10	# 861	<10
	28JUN87		.	.	.	.	.	.	<10	.	<10
	20AUG87		2,230	*-0.018	13,300	12,200	.	13,900	<10	# 757	.
3-1-17B	05JUN87		6,130	0.226	51,500	51,100	.	4,540	<10	# 297	<10
	28JUN87		.	.	.	.	.	.	<10	.	<10
	20AUG87		5,900	* 0.077	48,700	46,100	.	4,340	<10	# 362	.
3-1-17C	05JUN87		11,200	0.168	65,600	64,600	.	<500	<10	# 291	<10
	28JUN87		.	.	.	.	.	.	<10	.	<10
	25AUG87		11,200	* 0.115	67,200	64,200	.	<500	<10	# 212	.
3-1-18A	18JUN87		5,930	* 0.088	21,900	21,700	.	48,200	<10	# 401	.
	24AUG87		6,630	0.158	23,200	22,600	.	49,100	<10	# 357	.
3-1-18B	18JUN87		6,140	* 0.002	60,400	62,600	.	<500	<10	# 303	.
	24AUG87		7,460	* 0.061	70,600	63,200	.	<500	<10	# 303	.
3-1-18C	18JUN87		6,900	0.218	65,900	61,800	.	1,910	<10	# 457	.
	24AUG87		7,270	* 0.129	66,700	64,600	.	2,180	<10	# 520	.
3-1-19	30JUN87		1,980	* 0.023	11,300	12,400	.	15,000	<10	1650	.
	26AUG87		2,930	0.204	17,800	17,500	.	17,600	<10	# 963	# 3
3-2-1	24JUN87		3,130	* 0.061	12,700	12,900	.	18,600	<10	# 754	.
	14AUG87		2,910	* 0.061	12,400	13,300	.	18,000	<10	# 698	.
3-3-7	24JUN87		5,210	* 0.041	21,500	19,900	.	31,700	<10	# 579	.
	13AUG87		4,680	* 0.125	20,200	3,100	.	35,500	<10	# 754	.
3-3-10	25JUN87		3,120	* 0.038	10,800	12,200	.	25,700	<10	# 706	.
	13AUG87		3,090	0.193	11,000	12,500	.	23,900	<10	# 589	.
3-4-1	25JUN87		4,420	*-0.033	16,300	17,500	.	28,200	<10	# 592	.
	13AUG87		4,820	* 0.116	17,700	17,700	.	29,900	<10	# 507	.
3-4-7	25JUN87		4,100	* 0.012	17,700	18,700	.	33,600	<10	# 729	.
	13AUG87		4,340	0.147	18,300	18,900	.	32,100	<10	# 479	.
3-4-11	25JUN87		4,940	0.151	17,700	17,900	.	30,000	<10	# 548	.
	26AUG87		4,700	* 0.031	17,100	15,400	.	27,100	<10	# 326	.
3-8-2	19JUN87		5,420	0.185	18,800	18,400	.	28,700	<10	# 682	.
	18AUG87		5,120	* 0.047	18,800	18,300	.	29,900	# 3	# 564	.
6-S19-E13	25JUN87		6,370	* 0.156	22,700	23,100	.	48,300	<10	# 553	.
	27AUG87		6,310	* 0.090	22,300	21,800	<300	52,400	<10	# 465	# 3
6-S30E15A	25JUN87		6,120	0.250	12,900	13,600	.	19,600	<10	1170	.
	17AUG87		5,760	* 0.003	12,700	12,600	.	18,700	<10	# 533	.

TABLE A.1. (contd)

Well name	Collection Date	Duplicate sample number	TOX PPB	TRANDCE PPB 70%	TRICENE PPB 5%	U-CHEM UG/L	FVANADI PPB	VANADIUM PPB	ZINC PPB	FZINC PPB
3-1-1	24JUN87		33.3	.	<10.0	.	<5	<5	15	<5
	17AUG87		24.7	.	<10.0	.	8	<5	8	5
3-1-2	24JUN87		31.0	.	<10.0	.	<5	<5	<5	8
	14AUG87		53.3	.	<10.0	.	<5	5	9	<5
3-1-3	26JUN87		33.7	.	2.1	.	8	7	8	<5
	18AUG87		29.9	.	2.0	34.8	<5	5	7	5
3-1-4	24JUN87		36.7	.	<10.0	.	<5	<5	6	7
	14AUG87		4770.0	.	<10.0	.	<5	<5	9	6
3-1-5	30JUN87		48.9	.	<10.0	.	<5	8	<5	<5
	26AUG87		49.8	<10	<10.0	.	7	5	6	<5
	26AUG87	1	.	.	<10.0	.	6	.	.	5
3-1-6	19JUN87		41.7	.	<10.0	.	<5	<5	6	<5
	17AUG87		29.7	.	<10.0	.	10	5	5	13
3-1-7	19JUN87		23.4	.	<10.0	.	.	<5	154	.
	17AUG87		36.5	.	2.0	.	9	8	5	7
3-1-8	30JUN87		21.6	.	<10.0	.	5	<5	<5	<5
	20AUG87		25.7	.	<10.0	.	<5	<5	5	18
3-1-9	24JUN87		0.1	.	<10.0	.	<5	<5	15	<5
	18AUG87		2.2	.	<10.0	.	<5	<5	7	<5
3-1-10	18JUN87		34.4	.	<10.0	.	<5	<5	<5	<5
	19AUG87		40.4	.	<10.0	.	6	<5	<5	<5
3-1-11	30JUN87		46.1	.	<10.0	.	<5	<5	<5	<5
	26AUG87		53.1	.	<10.0	.	<5	5	5	5
3-1-12	18JUN87		46.3	.	<10.0	.	<5	<5	<5	<5
	20AUG87		35.0	.	<10.0	.	<5	<5	5	<5
3-1-13	19JUN87		36.3	.	<10.0	.	<5	5	<5	<5
	25AUG87		19.0	.	<10.0	.	6	8	8	44
	25AUG87	1	.	.	<10.0	.	7	.	.	6
3-1-14	18JUN87		31.0	.	<10.0	.	<5	<5	<5	<5
	25AUG87		26.5	.	<10.0	.	5	9	10	<5
3-1-15	18JUN87		5.1	.	<10.0	.	<5	10	<5	<5
	19AUG87		7.4	.	<10.0	.	11	6	<5	<5
3-1-15A	05JUN87		23.6	<10	<10.0	.	<5	<5	<5	14
	29JUN87		.	<10	<10.0	.	.	.	.	.
	19AUG87		45.7	.	<10.0	.	<5	8	12	13
3-1-15B	09JUN87		52.3	57	20.0	.	<5	<5	13	9
	29JUN87		.	72	24.1	.	.	.	.	.
	19AUG87		59.7	53	19.0	.	8	<5	9	5
3-1-15C	09JUN87		33.3	20	10.0	.	<5	<5	10	<5
	29JUN87		.	<10	<10.0	.	.	.	.	.
	19AUG87		<100.0	.	<10.0	.	<5	<5	<5	<5
3-1-15D	29JUN87		<100.0	<10	<10.0	.	.	<5	12	.
3-1-17A	04JUN87		53.5	<10	<10.0	.	<5	<5	<5	7
	26JUN87		.	<10	<10.0	.	.	.	.	.
	20AUG87		46.2	.	<10.0	.	5	<5	11	<5
3-1-17B	05JUN87		17.7	27	<10.0	.	<5	<5	10	7
	26JUN87		.	28	<10.0	.	.	.	.	.
	20AUG87		14.8	26	<10.0	.	<5	<5	9	<5
3-1-17C	05JUN87		10.8	<10	<10.0	.	<5	<5	5	<5
	26JUN87		.	<10	<10.0	.	.	.	.	.
	25AUG87		<100.0	.	<10.0	.	<5	<5	<5	<5
3-1-18A	18JUN87		1.3	.	<10.0	.	13	14	<5	<5
	24AUG87		3.4	.	<10.0	.	13	14	7	<5
3-1-18B	18JUN87		<100.0	.	<10.0	.	<5	<5	5	<5
	24AUG87		1.4	.	<10.0	.	<5	<5	13	5
3-1-18C	18JUN87		15.0	.	<10.0	.	<5	5	5	<5
	24AUG87		3.7	.	<10.0	.	<5	<5	7	<5
3-1-19	30JUN87		56.0	.	2.5	.	<5	8	<5	<5
	26AUG87		46.5	4	2.0	.	5	7	<5	<5
3-2-1	24JUN87		22.9	.	<10.0	.	<5	<5	8	<5
	14AUG87		23.8	.	2.0	.	<5	8	10	<5
3-3-7	24JUN87		10.6	.	2.9	.	8	8	<5	6
	13AUG87		45.0	.	<10.0	.	8	10	<5	9
3-3-10	25JUN87		20.0	.	<10.0	.	<5	<5	4	5
	13AUG87		29.7	.	<10.0	.	8	<5	11	7
3-4-1	25JUN87		15.7	.	6.1	.	6	8	<5	<5
	13AUG87		68.1	.	<10.0	.	8	10	<5	<5
3-4-7	25JUN87		8.0	.	4.0	.	<5	7	<5	<5
	13AUG87		21.8	.	4.0	.	6	7	<5	5
3-4-11	25JUN87		8.5	.	5.1	.	8	8	<5	6
	26AUG87		14.2	.	5.0	.	12	11	178	14
3-8-2	19JUN87		8.6	.	<10.0	.	10	11	<5	<5
	18AUG87		7.5	.	<10.0	.	17	18	6	<5
6-S19-E18	25JUN87		27.9	.	<10.0	.	18	16	<5	9
	27AUG87		135.0	<10	<10.0	.	16	14	<5	<5
6-S20E15A	25JUN87		21.9	.	<10.0	.	<5	<5	44	102
	17AUG87		5.5	.	<10.0	.	<5	5	38	81

APPENDIX B

RAW ANALYTICAL DATA FOR GROUND-WATER SAMPLES COLLECTED FROM WELLS IN THE 183-H AREA

APPENDIX B

RAW ANALYTICAL DATA FOR GROUND-WATER SAMPLES COLLECTED FROM WELLS IN THE 183-H AREA

The following table presents raw data for those constituents that were detected at least once in the June, July, and August 1987 samples. The columns are labeled with the name of the constituent, the units the constituent is measured in, and regulatory limits, if any. The regulatory limits given are Interim Primary Drinking Water Standards or proposed Recommended Maximum Contaminant Levels (marked with an asterisk *). If no data are available, a period is printed.

The following codes have been used in marking the data:

< - Data were below contractual detection limit

- Data were below contractual detection limit but a value was reported

* - Radioactive data for which the reported result was less than the 2-σ counting error

TABLE B.1. 183-H Solar Evaporation Basins Assessment Program: June Through August 1987 Data for Constituents with at Least One Value Above Detection Limits

Well name	Collection Date	Duplicate sample number	1,1,1-T PPB 200*	ALUMIN PPB	ALUMNUM PPB	AMMONIU PPB	ARSENIC PPB 50	FARSENI PPB 50	BARIUM PPB 1000	FBARIUM PPB 1000
1-H3-1	16JUN87		<10.0	<150	<150	105	<5	<5	37	40
	13JUL87		<10.0	<150	<150	<50	<5	<5	51	49
	12AUG87		# 2.0	<150	<150	<50	<5	<5	49	47
1-H3-2A	11JUN87		<10.0	<150	<150	<50	<5	<5	33	31
	14JUL87		<10.0	<150	<150	<50	<5	<5	33	34
	06AUG87		<10.0	<150	<150	<50	<5	<5	29	23
1-H3-2B	11JUN87		<10.0	<150	<150	<50	<5	<5	34	32
	15JUL87		<10.0	<150	<150	<50	<5	<5	40	38
	05AUG87		<10.0	<150	<150	<50	<5	<5	35	37
1-H3-2C	11JUN87		<10.0	<150	<150	118	5	<5	23	30
	14JUL87		<10.0	<150	<150	70	<5	<5	22	23
	04AUG87		<10.0	<150	<150	89	<5	<5	22	18
1-H4-3	15JUN87		<10.0	<150	<150	<50	5	8	30	24
	10JUL87		# 7.4	<150	902	<50	<5	<5	91	86
	11AUG87		# 5.0	<150	321	.	<5	5	38	36
	11AUG87	1	# 5.0	<150		<50		.	.	52
1-H4-4	15JUN87		<10.0	<150	<150	54	5	<5	54	36
	08JUL87		<10.0	<150	<150	<50	<5	<5	56	68
	11AUG87		120.0	<150	<150	<50	<5	<5	65	71
	11AUG87	1	110.0	<150	.	<50		.		73
1-H4-5	15JUN87		<10.0	<150	<150	72	5	5	58	61
	08JUL87		<10.0	<150	<150	57	<5	<5	59	63
	11AUG87		# 2.0	<150	<150	<50	5	7	57	61
1-H4-6	18JUN87		<10.0	<150	<150	85	<5	<5	55	52
	08JUL87		<10.0	<150	<150	72	<5	<5	51	47
	10AUG87		# 6.0	<150	<150	96	<5	<5	52	48
1-H4-7	15JUN87		<10.0	<150	<150	<50	<5	<5	43	48
	07JUL87		<10.0	<150	<150	<50	<5	<5	39	39
	10AUG87		<10.0	<150	<150	<50	<5	<5	37	40
1-H4-8	12JUN87		<10.0	<150	924	<50	<5	<5	47	39
	07JUL87		<10.0	<150	<150	<50	<5	<5	47	42
	10AUG87		<10.0	<150	<150	<50	<5	<5	43	46
1-H4-9	15JUN87		<10.0	.	248	<50	5	.	49	.
	07JUL87		<10.0	<150	<150	<50	<5	<5	81	52
	10AUG87		<10.0	<150	<150	<50	5	<5	83	87
1-H4-10	10JUN87		<10.0	<150	<150	<50	<5	<5	37	46
	07JUL87		<10.0	<150	<150	<50	<5	<5	72	60
	07AUG87		<10.0	<150	<150	<50	<5	<5	56	71
1-H4-11	10JUN87		<10.0	341	908	<50	<5	<5	45	39
	08JUL87		<10.0	<150	<150	<50	<5	<5	40	39
	07AUG87		<10.0	<150	<150	<50	<5	<5	35	41
1-H4-12A	12JUN87		<10.0	<150	<150	51	<5	<5	33	33
	09JUL87		<10.0	<150	<150	<50	<5	<5	68	67
	05AUG87		<10.0	<150	<150	<50	<5	<5	71	69
1-H4-12B	12JUN87		<10.0	<150	<150	<50	<5	<5	73	72
	09JUL87		<10.0	<150	<150	<50	<5	<5	92	99
	05AUG87		<10.0	<150	<150	<50	<5	<5	106	96
1-H4-12C	10JUN87		<10.0	<150	<150	209	7	5	7	13
	09JUL87		<10.0	<150	<150	74	<5	7	10	11
	05AUG87		<10.0	<150	<150	<50	5	7	10	8
1-H4-13	12JUN87		<10.0	<150	<150	<50	<5	<5	23	20
	15JUL87		<10.0	<150	<150	<50	<5	<5	31	31
	07AUG87		<10.0	<150	<150	<50	<5	<5	25	24
1-H4-14	12JUN87		<10.0	<150	<150	<50	<5	<5	21	19
	13JUL87		<10.0	<150	<150	<50	<5	<5	22	27
	07AUG87		# 2.0	<150	<150	<50	<5	<5	21	24
1-H4-15A	11JUN87		<10.0	<150	<150	<50	<5	5	75	77
	13JUL87		<10.0	<150	<150	57	<5	<5	89	89
	06AUG87		<10.0	<150	<150	<50	<5	<5	91	80
1-H4-15B	11JUN87		<10.0	<150	<150	<50	<5	<5	109	107
	13JUL87		<10.0	<150	<150	<50	<5	<5	110	111
	06AUG87		<10.0	<150	<150	<50	<5	<5	117	106
1-H4-16	10JUN87		<10.0	<150	<150	<50	<5	<5	29	33
	15JUL87		<10.0	<150	<150	<50	<5	<5	26	22
	07AUG87		# 3.0	<150	<150	<50	<5	<5	21	24
1-H4-17	15JUN87		<10.0	.	1910	145	<5	.	79	.
	10AUG87		<10.0	<150	10100	<50	<5	<5	153	88
1-H4-18	15JUN87		<10.0	602	622	74	<5	<5	48	44
	14JUL87		<10.0	<150	<150	<50	<5	<5	42	39
	06AUG87		<10.0	<150	<150	<50	<5	<5	36	37

TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	BETA PCI/L 50	BCADMIU PPB 10	CADMIUM PPB 10	BCALCIU PPB	CALCIUM PPB	CHLFORM PPB	CHLORID PPB	BCHROMI PPB 50
1-H3-1	16JUN87		7.61	<2	<2	55,300	56,100	12.0	9,040	31
	13JUL87		9.70	<2	<2	69,500	70,900	# 7.0	11,400	46
	12AUG87		9.54	<2	<2	61,500	62,300	# 5.0	13,000	50
1-H3-2A	11JUN87		6.13	<2	<2	65,000	62,400	16.0	10,400	69
	14JUL87		6.82	<2	<2	50,200	47,300	19.0	7,760	51
	06AUG87		9.41	2	<2	38,400	35,900	25.0	6,790	46
1-H3-2B	11JUN87		6.60	<2	<2	51,600	52,000	20.0	8,710	38
	15JUL87		7.16	<2	<2	50,400	52,400	20.0	8,100	37
	06AUG87		6.16	<2	<2	41,800	38,500	24.0	7,100	40
1-H3-2C	11JUN87		4.72	<2	<2	28,600	25,600	<10.0	3,240	<10
	14JUL87		3.56	<2	<2	25,200	24,200	# 5.1	2,870	<10
	04AUG87		3.98	<2	<2	20,000	20,300	# 4.8	2,470	<10
1-H4-3	15JUN87		344.00	<2	<2	15,200	15,600	22.0	8,960	304
	10JUL87		611.00	<2	<2	52,400	52,900	15.4	10,600	366
	11AUG87	.	780.00	<2	<2	29,100	29,100	16.0	10,500	305
	11AUG87	1	603.00	<2	.	29,500	.	17.0	10,300	300
1-H4-4	16JUN87		153.00	<2	<2	33,100	37,700	<10.0	4,460	176
	08JUL87		335.00	<2	<2	41,300	41,200	16.4	6,130	283
	11AUG87		397.00	<2	<2	42,000	38,100	12.0	6,750	323
	11AUG87	1	430.00	<2	.	40,400	.	12.0	5,710	312
1-H4-5	16JUN87		* 3.17	<2	<2	57,400	57,600	21.0	6,440	196
	08JUL87		11.70	<2	<2	66,300	59,200	21.4	7,040	164
	11AUG87		16.40	<2	<2	57,700	53,800	17.0	7,350	156
1-H4-6	15JUN87		10.40	<2	<2	69,700	67,700	<10.0	13,300	37
	08JUL87		12.70	<2	<2	64,100	59,200	# 8.7	15,200	41
	12AUG87		28.30	<2	2	57,700	53,600	# 8.0	15,500	35
1-H4-7	15JUN87		4.54	<2	<2	55,800	58,700	21.0	9,590	95
	07JUL87		6.14	<2	<2	58,700	55,100	19.0	9,100	115
	10AUG87		* 3.39	<2	<2	49,900	47,200	21.0	6,200	125
1-H4-8	12JUN87		6.18	<2	<2	73,700	66,400	16.0	9,190	112
	07JUL87		7.24	<2	<2	64,700	70,300	16.0	8,780	102
	10AUG87		8.47	<2	<2	57,100	56,300	15.0	9,310	98
1-H4-9	15JUN87		40.20	.	2	.	67,900	19.0	8,390	
	07JUL87		181.00	<2	2	113,000	108,000	16.0	9,320	119
	10AUG87		305.00	<2	<2	91,400	85,400	16.0	10,600	115
1-H4-10	10JUN87		7.71	<2	<2	29,700	27,400	<10.0	2,070	18
	07JUL87		6.38	<2	<2	39,200	43,600	<10.0	5,640	66
	07AUG87		8.17	<2	<2	36,200	35,700	<10.0	5,810	82
1-H4-11	10JUN87		56.50	<2	<2	43,300	44,000	19.0	3,750	92
	08JUL87		84.20	<2	<2	49,600	50,900	30.9	4,900	134
	07AUG87		80.50	<2	<2	47,500	41,600	32.0	5,160	114
1-H4-12A	12JUN87		8.57	<2	<2	41,600	40,100	<10.0	3,590	93
	09JUL87		59.90	<2	<2	61,500	67,600	<10.0	8,700	203
	05AUG87		60.30	<2	<2	56,500	56,600	21.0	8,890	197
1-H4-12B	12JUN87		19.50	<2	<2	51,500	50,300	12.0	5,090	158
	09JUL87		33.00	<2	<2	52,800	57,100	19.4	6,760	198
	05AUG87		41.70	<2	<2	55,800	55,100	23.0	6,800	197
1-H4-12C	10JUN87		7.10	<2	<2	29,700	27,000	<10.0	4,350	54
	09JUL87		7.93	<2	<2	29,700	26,300	# 5.3	2,980	74
	05AUG87		8.18	2	<2	23,700	23,300	# 8.0	2,530	147
1-H4-13	12JUN87		58.20	<2	<2	33,700	36,100	19.0	2,960	23
	15JUL87		77.90	<2	<2	41,900	42,200	29.0	4,550	25
	07AUG87		77.40	<2	<2	33,700	31,400	33.0	4,530	26
1-H4-14	12JUN87		5.25	<2	<2	43,400	42,400	33.0	4,640	253
	13JUL87		4.55	<2	<2	40,300	40,500	35.0	4,830	253
	07AUG87		10.10	<2	<2	36,300	34,100	37.0	4,880	251
1-H4-15A	11JUN87		10.20	<2	<2	53,900	53,600	<10.0	5,710	74
	13JUL87		7.47	<2	<2	51,400	51,700	13.0	5,850	156
	06AUG87		5.54	<2	<2	43,500	42,700	14.0	5,520	147
1-H4-15B	11JUN87		7.63	<2	<2	48,300	49,200	<10.0	5,770	99
	13JUL87		7.59	<2	<2	48,800	47,300	11.0	5,470	149
	05AUG87		13.20	<2	<2	41,200	41,600	12.0	5,150	153
1-H4-16	10JUN87		25.10	<2	<2	49,500	46,300	34.0	5,650	<10
	15JUL87		16.70	<2	<2	40,800	42,200	34.0	5,800	<10
	07AUG87		17.50	<2	<2	38,500	34,700	37.0	6,230	<10
1-H4-17	15JUN87		15.30	.	<2	.	71,300	13.0	8,600	.
	10AUG87		16.10	<2	<2	57,900	59,300	13.0	8,360	33
1-H4-18	15JUN87		71.70	<2	<2	61,100	58,500	29.0	5,450	252
	14JUL87		20.90	<2	<2	49,700	49,000	29.0	5,240	257
	06AUG87		25.40	<2	<2	39,400	38,200	33.0	4,750	242

TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	CHROMIUM PPB 50	CO 60 PCI/L 100	COLIFRM MPN 1	CONDFLD UMHO	COPPER PPB 1300*	FCOPPER PPB 1300*	FLUORID PPB 1400	IRON PPB
1-H3-1	18JUN87		42	.	<2.2	483	<10	<10	<500	<50
	13JUL87		52	5.63	<2.2	553	<10	<10	549	53
	12AUG87		58	.	<2.2	544	<10	<10	<500	<50
1-H3-2A	11JUN87		98	.	<2.2	455	<10	<10	<500	213
	14JUL87		58	.	<2.2	252	<10	<10	<500	96
	06AUG87		53	.	<2.2	314	<10	<10	<500	89
1-H3-2B	11JUN87		44	.	<2.2	363	<10	<10	<500	52
	15JUL87		41	.	<2.2	268	<10	<10	<500	<50
	06AUG87		38	.	<2.2	319	<10	<10	<500	<50
1-H3-2C	11JUN87		<10	.	<2.2	251	27	<10	528	165
	14JUL87		<10	.	<2.2	167	<10	<10	500	<50
	04AUG87		<10	.	<2.2	212	13	<10	<500	<50
1-H4-3	16JUN87		309	.	<2.2	1,102	10	<10	<500	496
	10JUL87		397	+-2.10	<2.2	2,020	48	46	1380	1150
	11AUG87		306	.	<2.2	1,521	25	25	<500	415
	11AUG87	1	.	.	.	.	.	22	<500	.
1-H4-4	16JUN87		209	.	<2.2	573	<10	<10	<500	691
	08JUL87		261	.	<2.2	752	<10	<10	755	53
	11AUG87		269	.	<2.2	921	<10	<10	546	128
	11AUG87	1	.	.		.		<10	543	.
1-H4-5	16JUN87		215	.	<2.2	410	<10	<10	<500	<50
	08JUL87		158	.	<2.2	375	<10	<10	<500	69
	11AUG87		145	.	<2.2	401	<10	<10	<500	50
1-H4-6	16JUN87		56	.	<2.2	562	<10	<10	<500	285
	08JUL87		62	.	<2.2	472	<10	<10	<500	296
	12AUG87		65	.	<2.2	544	<10	<10	<500	315
1-H4-7	15JUN87		121	.	16.0	505	<10	<10	<500	178
	07JUL87		124	.	16.0	406	<10	<10	<500	100
	10AUG87		116	.	16.0	328	<10	<10	<500	<50
1-H4-8	12JUN87		114	.	<2.2	403	<10	<10	<500	1650
	07JUL87		124	.	<2.2	414	<10	<10	<500	100
	10AUG87		95	.	16.0	358	13	<10	<500	52
1-H4-9	15JUN87		159	.	<2.2	476	<10	.	<500	452
	07JUL87		130	.	<2.2	712	<10	<10	514	103
	10AUG87		108	.	<2.2	749	<10	<10	<500	79
1-H4-10	10JUN87		17	.	<2.2	207	11	<10	<500	<50
	07JUL87		77	.	<2.2	294	10	<10	<500	74
	07AUG87		75	.	<2.2	235	<10	<10	<500	<50
1-H4-11	10JUN87		97	.	<2.2	273	13	11	<500	1600
	08JUL87		137	.	<2.2	296	<10	<10	<500	88
	07AUG87		99	.	<2.2	246	<10	<10	<500	202
1-H4-12A	12JUN87		92	.	<2.2	272	<10	<10	<500	81
	09JUL87		215	.	<2.2	417	<10	<10	<500	<50
	05AUG87		207	.	16.0	434	<10	<10	<500	<50
1-H4-12B	12JUN87		158	.	<2.2	331	<10	<10	<500	<50
	09JUL87		194	.	<2.2	363	<10	<10	<500	<50
	05AUG87		192	.	<2.2	376	<10	<10	<500	<50
1-H4-12C	10JUN87		58	.	<2.2	271	<10	<10	<500	124
	09JUL87		77	.	<2.2	229	<10	<10	<500	141
	05AUG87		157	.	<2.2	221	<10	<10	<500	79
1-H4-13	12JUN87		54	.	<2.2	209	<10	<10	<500	105
	15JUL87		26	.	<2.2	210	<10	<10	<500	<50
	07AUG87		21	.	<2.2	166	<10	<10	<500	<50
1-H4-14	12JUN87		287	.	<2.2	257	10	<10	<500	221
	13JUL87		270	.	<2.2	284	<10	<10	<500	<50
	07AUG87		257	.	<2.2	206	<10	<10	<500	52
1-H4-15A	11JUN87		80	.	<2.2	372	<10	<10	<500	314
	13JUL87		157	.	<2.2	389	<10	<10	<500	549
	06AUG87		155	.	<2.2	324	<10	<10	<500	<50
1-H4-15B	11JUN87		107	.	<2.2	337	<10	<10	<500	124
	13JUL87		143	.	<2.2	337	<10	<10	<500	96
	06AUG87		157	.	<2.2	298	<10	<10	<500	<50
1-H4-16	10JUN87		10	.	<2.2	263	11	<10	<500	98
	15JUL87		<10	.	<2.2	199	<10	<10	<500	<50
	07AUG87		<10	.	<2.2	190	<10	<10	<500	<50
1-H4-17	15JUN87		52	.	<2.2	471	11	.	<500	2930
	10AUG87		166	.	<2.2	523	30	<10	<500	15000
1-H4-18	15JUN87		258	.	<2.2	396	<10	<10	<500	1320
	14JUL87		262	.	<2.2	239	<10	<10	<500	427
	05AUG87		250	.	<2.2	307	<10	<10	<500	<50

TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	FIRON PPB	FLEAD PPB 50	LEADGF PPB 50	LOALPHA PCI/L 15	MAGNES PPB	FMAGNES PPB	FMANGAN PPB	MANGESE PPB
1-H3-1	16JUN87		<50	<5	<5	3.460	16,200	15,100	<5	<5
	13JUL87		<50	<5	<5	4.200	17,300	17,300	<5	<5
	12AUG87		<50	<5	<5	4.440	19,400	18,900	<5	<5
1-H3-2A	11JUN87		53	<5	<5	2.910	13,200	12,800	<5	<5
	14JUL87		<50	<5	<5	2.440	10,900	11,400	<5	<5
	06AUG87		<50	<5	<5	1.460	9,890	10,100	<5	<5
1-H3-2B	11JUN87		<50	<5	<5	1.660	11,300	10,900	68	60
	15JUL87		<50	<5	<5	1.410	11,700	11,200	85	56
	06AUG87		<50	<5	<5	1.010	10,400	11,100	53	59
1-H3-2C	11JUN87		84	<5	<5	* 0.669	8,670	9,670	38	33
	14JUL87		<50	<5	<5	* 0.722	8,410	8,800	23	22
	04AUG87		<50	<5	<5	* 0.290	8,450	8,210	11	12
1-H4-3	15JUN87		<50	<5	<5	122.000	2,680	2,590	<5	5
	10JUL87		<50	<5	<5	199.000	9,310	9,230	<5	16
	11AUG87		<50	<5	8	193.000	5,740	5,500	5	8
	11AUG87	1	<50	.	.	205.000	.	5,360	<5	.
1-H4-4	16JUN87		<50	<5	<5	34.400	6,390	5,740	<5	<5
	08JUL87		<50	<5	<5	83.400	6,780	6,690	<5	<5
	11AUG87		<50	<5	<5	63.600	6,860	7,290	<5	<5
	11AUG87	1	<50	.	.	50.500	.	7,230	<5	.
1-H4-5	15JUN87		<50	<5	<5	2.770	11,000	10,700	<5	<5
	08JUL87		<50	<5	<5	3.710	10,600	11,800	<5	<5
	11AUG87		<50	<5	<5	2.280	11,100	11,500	<5	<5
1-H4-6	15JUN87		<50	<5	<5	3.990	15,500	15,700	46	59
	08JUL87		55	<5	<5	4.330	15,400	14,800	54	77
	12AUG87		58	<5	<5	2.230	14,300	15,200	72	50
1-H4-7	15JUN87		<50	<5	<5	2.310	13,300	12,900	<5	5
	07JUL87		<50	<5	<5	2.350	12,700	13,100	<5	<5
	10AUG87		<50	<5	<5	1.970	11,200	11,700	<5	<5
1-H4-8	12JUN87		107	<5	<5	1.910	11,300	11,700	<5	52
	07JUL87		<50	<5	<5	3.850	11,800	10,900	<5	<5
	10AUG87		<50	<5	<5	3.030	11,500	11,700	<5	<5
1-H4-9	15JUN87		.	.	<5	3.460	12,900	.	.	12
	07JUL87		<50	<5	<5	5.200	20,200	21,500	<5	<5
	10AUG87		<50	<5	<5	7.740	19,300	21,400	<5	<5
1-H4-10	10JUN87		<50	<5	<5	0.901	6,220	6,470	<5	<5
	07JUL87		<50	<5	<5	1.510	10,300	9,390	<5	<5
	07AUG87		<50	<5	<5	2.220	9,850	9,960	<5	<5
1-H4-11	10JUN87		630	<5	<5	2.800	8,670	8,260	19	54
	08JUL87		<50	<5	<5	2.200	7,580	7,470	<5	<5
	07AUG87		<50	<5	<5	3.300	7,080	7,980	<5	<5
1-H4-12A	12JUN87		<50	<5	<5	4.060	7,320	7,540	<5	<5
	09JUL87		<50	<5	<5	15.500	11,100	10,400	<5	<5
	05AUG87		<50	<5	5	20.200	11,000	10,900	<5	<5
1-H4-12B	12JUN87		<50	<5	<5	6.160	8,310	8,460	<5	<5
	09JUL87		<50	<5	<5	8.250	10,100	10,700	<5	<5
	05AUG87		<50	<5	<5	8.040	11,100	10,900	<5	<5
1-H4-12C	10JUN87		<50	<5	<5	1.830	10,900	11,300	35	33
	09JUL87		93	<5	<5	1.180	11,400	13,000	23	22
	05AUG87		<50	<5	<5	1.320	11,800	11,200	12	12
1-H4-13	12JUN87		<50	<5	<5	* 0.529	6,140	5,560	<5	<5
	15JUL87		<50	<5	<5	1.040	7,100	7,160	<5	<5
	07AUG87		<50	<5	<5	1.450	6,320	6,550	<5	<5
1-H4-14	12JUN87		<50	<5	<5	* 0.725	7,970	8,210	<5	<5
	13JUL87		96	<5	<5	1.550	8,030	7,950	<5	<5
	07AUG87		<50	<5	<5	1.360	7,890	8,390	<5	<5
1-H4-15A	11JUN87		124	<5	<5	1.830	11,300	11,300	<5	7
	13JUL87		75	<5	<5	2.030	10,800	10,600	<5	<5
	06AUG87		<50	<5	<5	1.030	10,600	10,500	<5	<5
1-H4-15B	11JUN87		98	<5	<5	1.830	11,100	10,700	<5	<5
	13JUL87		<50	<5	<5	1.500	10,900	11,200	<5	<5
	06AUG87		<50	5	.	1.470	11,300	11,000	<5	<5
1-H4-16	10JUN87		<50	<5	<5	0.983	5,510	5,800	10	12
	15JUL87		<50	<5	<5	1.440	5,170	4,990	<5	<5
	07AUG87		<50	<5	<5	1.430	5,060	5,550	<5	<5
1-H4-17	15JUN87		.	.	<5	4.300	14,100	.	.	277
	10AUG87		200	<5	18	1.840	17,900	13,900	19	325
1-H4-18	15JUN87		1100	<5	<5	5.030	10,400	10,100	81	53
	14JUL87		<50	<5	<5	3.220	8,570	8,530	5	15
	06AUG87		<50	<5	<5	2.300	7,990	8,020	<5	<5

TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	FMERCUR PPB 2	NICKEL PPB	FNICKEL PPB	NITRATE PPB 45000	PERCENE PPB	PHFIELD	FPOTASS PPB	POTASIUM PPB
1-H3-1	16JUN87		<0.1	<10	<10	54,600	<10.0	7.4	5,980	6,130
	13JUL87		<0.1	<10	<10	82,500	<10.0	6.9	5,910	5,810
	12AUG87		<0.1	<10	<10	66,100	‡ 3.0	7.3	6,530	6,270
1-H3-2A	11JUN87		<0.1	14	<10	29,900	<10.0	7.7	4,960	5,170
	14JUL87		<0.1	<10	<10	22,300	<10.0	7.2	4,780	4,370
	06AUG87		<0.1	<10	<10	23,300	<10.0	7.1	4,490	4,670
1-H3-2B	11JUN87		<0.1	<10	<10	24,400	<10.0	7.9	4,620	5,090
	15JUL87		<0.1	<10	<10	22,800	<10.0	7.5	5,260	5,030
	06AUG87		<0.1	<10	<10	23,400	<10.0	7.5	4,970	4,980
1-H3-2C	11JUN87		<0.1	<10	<10	3,770	<10.0	7.7	5,160	4,820
	14JUL87		<0.1	<10	<10	3,410	<10.0	7.2	4,800	4,420
	04AUG87		<0.1	<10	<10	3,870	<10.0	7.4	4,490	4,610
1-H4-3	15JUN87		<0.1	12	12	429,000	<10.0	7.5	4,250	4,460
	10JUL87		<0.1	43	38	1,020,000	<10.0	7.9	7,640	7,910
	11AUG87		<0.1	29	28	750,000	‡ 3.0	7.1	6,170	6,240
	11AUG87	1	.		31	748,000	‡ 2.0	.	6,000	.
1-H4-4	16JUN87		<0.1	10	<10	160,000	<10.0	7.6	4,850	5,110
	08JUL87		<0.1	10	10	296,000	‡ 2.3	7.4	5,190	5,340
	11AUG87		<0.1	11	17	369,000	52.0	6.9	5,990	5,680
	11AUG87	1	.	.	15	374,000	52.0	.	5,830	.
1-H4-5	16JUN87		<0.1	<10	<10	30,300	<10.0	7.4	5,160	4,990
	08JUL87		<0.1	<10	<10	29,500	<10.0	7.2	5,620	4,890
	11AUG87		<0.1	<10	<10	36,600	‡ 2.0	6.8	4,690	4,760
1-H4-6	16JUN87		<0.1	<10	<10	38,500	<10.0	7.4	6,330	6,440
	08JUL87		<0.1	<10	<10	38,200	<10.0	7.2	6,350	7,290
	12AUG87		<0.1	<10	<10	38,400	‡ 4.0	7.6	6,450	6,260
1-H4-7	15JUN87		<0.1	<10	<10	39,500	<10.0	7.2	5,500	5,840
	07JUL87		<0.1	<10	<10	29,500	<10.0	6.9	5,070	5,770
	10AUG87		<0.1	<10	<10	29,500	<10.0	7.1	5,350	5,190
1-H4-8	12JUN87		<0.1	<10	<10	36,600	<10.0	7.2	5,200	4,810
	07JUL87		<0.1	<10	<10	31,000	<10.0	6.9	5,260	5,200
	10AUG87		<0.1	<10	<10	34,700	<10.0	7.1	5,090	4,920
1-H4-9	15JUN87			<10	.	62,000	<10.0	7.1		5,160
	07JUL87		<0.1	<10	<10	202,000	<10.0	6.7	7,090	6,590
	10AUG87		<0.1	<10	<10	253,000	<10.0	7.4	6,880	6,140
1-H4-10	10JUN87		<0.1	<10	<10	10,400	<10.0	7.1	2,930	2,860
	07JUL87		<0.1	<10	<10	19,300	<10.0	6.5	4,410	4,600
	07AUG87		<0.1	<10	<10	20,100	<10.0	6.9	4,900	4,340
1-H4-11	10JUN87		<0.1	<10	<10	27,200	<10.0	7.3	2,990	2,780
	08JUL87		<0.1	<10	<10	30,700	<10.0	7.3	2,820	2,690
	07AUG87		<0.1	<10	<10	32,600	<10.0	7.5	2,800	2,210
1-H4-12A	12JUN87		<0.1	<10	<10	26,600	<10.0	7.3	4,100	4,200
	09JUL87		<0.1	<10	<10	77,400	<10.0	7.4	5,020	5,120
	05AUG87		<0.1	<10	<10	87,500	<10.0	7.0	5,160	5,260
1-H4-12B	12JUN87		<0.1	<10	<10	31,800	<10.0	7.3	4,390	4,370
	09JUL87		<0.1	<10	<10	49,300	<10.0	7.4	5,030	4,860
	05AUG87		<0.1	<10	<10	56,400	<10.0	6.9	5,180	5,200
1-H4-12C	10JUN87		<0.1	22	17	2,540	<10.0	7.2	5,280	5,250
	09JUL87		<0.1	22	23	3,720	<10.0	7.3	5,380	4,660
	05AUG87		<0.1	21	19	5,320	<10.0	6.9	4,770	4,720
1-H4-13	12JUN87		<0.1	<10	<10	12,100	<10.0	6.9	2,030	2,250
	15JUL87		<0.1	<10	<10	23,000	<10.0	6.6	2,380	2,100
	07AUG87		<0.1	<10	<10	21,500	<10.0	7.0	2,170	2,030
1-H4-14	12JUN87		<0.1	11	<10	19,900	<10.0	7.4	4,000	4,010
	13JUL87		<0.1	<10	<10	17,100	<10.0	6.5	4,030	4,010
	07AUG87		<0.1	<10	<10	17,900	<10.0	7.6	4,140	3,950
1-H4-15A	11JUN87		<0.1	<10	<10	45,000	<10.0	7.1	5,230	5,050
	13JUL87		<0.1	<10	<10	26,400	<10.0	6.5	5,140	5,460
	06AUG87		.	<10	<10	29,600	<10.0	6.7	5,370	5,330
1-H4-15B	11JUN87		<0.1	<10	<10	24,600	<10.0	7.3	5,130	5,390
	13JUL87		<0.1	<10	<10	23,200	<10.0	6.2	5,170	5,090
	06AUG87		<0.1	<10	<10	24,400	<10.0	6.7	5,210	5,420
1-H4-16	10JUN87		<0.1	<10	<10	18,900	<10.0	7.2	3,010	2,920
	15JUL87		<0.1	<10	<10	15,500	<10.0	7.3	2,780	2,670
	07AUG87		<0.1	<10	<10	18,800	<10.0	7.6	2,610	2,570
1-H4-17	15JUN87		<0.1	<10	.	43,800	<10.0	6.9	.	7,370
	10AUG87		<0.1	63	15	47,600	<10.0	7.2	7,520	8,950
1-H4-18	15JUN87		<0.1	10	21	63,800	<10.0	7.2	4,310	4,590
	14JUL87		<0.1	<10	<10	25,000	<10.0	7.0	3,920	4,140
	05AUG87		<0.1	<10	<10	26,500	<10.0	7.1	3,870	4,090

TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	RADIUM PCI/L 5	SILVER PPB 50	SODIUM PPB	FSODIUM PPB	SR 90 PCI/L 8	FSTRONT PPB	STRONIUM PPB	SULFATE PPB
1-H3-1	16JUN87		*-0.043	<10	18,900	18,800	.	369	399	60,100
	13JUL87		* 0.139	<10	19,000	19,500	0.471	426	424	74,900
	12AUG87		*-0.045	<10	20,700	20,900	.	450	446	85,500
1-H3-2A	11JUN87		* 0.074	<10	13,000	12,200	.	<300	308	73,900
	14JUL87		0.289	<10	11,900	12,850	.	<300	<300	50,700
	06AUG87		* 0.101	<10	13,500	12,300	.	<300	<300	45,600
1-H3-2B	11JUN87		* 0.112	<10	10,500	10,000	.	<300	<300	55,600
	15JUL87		* 0.046	<10	10,400	10,200	.	<300	<300	51,300
	06AUG87		0.280	<10	10,100	10,000	.	<300	<300	49,300
1-H3-2C	11JUN87		* 0.069	<10	12,650	13,400	.	<300	<300	24,000
	14JUL87		0.205	<10	11,800	12,300	.	<300	<300	21,500
	04AUG87		*-0.011	<10	12,300	11,600	.	<300	<300	18,800
1-H4-3	16JUN87		* 0.029	<10	235,000	239,000	.	<300	<300	68,200
	10JUL87		0.323	<10	450,000	442,000	0.971	312	314	129,000
	11AUG87		0.277	11	320,000	310,000	.	<300	<300	116,000
	11AUG87	1	.	.	.	314,000	.	<300	.	115,000
1-H4-4	18JUN87		*-0.035	<10	88,200	84,800	.	<300	<300	44,400
	08JUL87		0.135	<10	135,000	137,000	.	<300	<300	66,200
	11AUG87		0.179	<10	143,000	145,000	.	<300	<300	70,700
	11AUG87	1	.	.	.	148,000	.	<300	.	70,300
1-H4-5	16JUN87		* 0.024	<10	10,800	11,600	.	<300	301	56,000
	08JUL87		* 0.001	<10	11,300	12,900	.	339	<300	63,300
	11AUG87		* 0.098	<10	11,300	11,300	.	301	<300	64,900
1-H4-6	16JUN87		* 0.133	<10	25,000	24,800	.	358	361	116,000
	08JUL87		*-0.006	<10	27,700	25,200	.	343	367	105,000
	12AUG87		* 0.082	<10	23,500	24,100	.	361	339	95,100
1-H4-7	15JUN87		0.378	<10	14,000	13,700	.	313	326	102,000
	07JUL87		0.260	<10	13,300	13,200	.	320	312	64,900
	10AUG87		0.253	<10	11,800	11,900	.	<300	<300	64,300
1-H4-8	12JUN87		* 0.027	<10	10,500	12,000	.	325	301	68,700
	07JUL87		* 0.122	<10	13,900	13,300	.	<300	321	65,900
	10AUG87		0.247	<10	12,900	13,300	.	315	<300	71,500
1-H4-9	15JUN87		* 0.032	<10	19,800	.	.	.	315	70,100
	07JUL87		* 0.110	<10	31,000	34,100	.	522	466	79,300
	10AUG87		* 0.275	<10	27,800	30,200	.	534	480	97,200
1-H4-10	10JUN87		*-0.019	<10	7,590	7,630	.	<300	<300	21,700
	07JUL87		* 0.046	<10	15,800	14,800	.	<300	<300	37,300
	07AUG87		*-0.028	<10	14,700	14,700	.	<300	<300	42,300
1-H4-11	10JUN87		0.339	<10	10,100	9,380	.	<300	<300	32,900
	08JUL87		* 0.143	<10	8,020	7,940	.	<300	<300	38,700
	07AUG87		* 0.008	<10	7,220	7,770	.	<300	<300	40,500
1-H4-12A	12JUN87		* 0.043	<10	11,100	11,500	.	<300	<300	32,400
	09JUL87		0.244	<10	17,500	17,200	.	303	320	50,000
	05AUG87		* 0.081	<10	19,500	18,800	.	318	325	55,700
1-H4-12B	12JUN87		0.329	<10	11,900	11,600	.	<300	<300	47,100
	09JUL87		0.481	<10	12,300	12,900	.	309	<300	50,800
	05AUG87		* 0.036	<10	13,900	12,900	.	315	328	55,200
1-H4-12C	10JUN87		* 0.104	<10	11,500	11,200	.	<300	<300	28,200
	09JUL87		0.190	<10	4,860	5,630	.	<300	<300	25,300
	05AUG87		*-0.069	<10	4,920	4,730	.	<300	<300	25,100
1-H4-13	12JUN87		* 0.046	<10	6,340	5,590	.	<300	<300	27,700
	15JUL87		0.182	<10	8,640	7,370	.	<300	<300	32,300
	07AUG87		* 0.032	<10	8,370	8,810	.	<300	<300	33,300
1-H4-14	12JUN87		* 0.132	<10	7,280	7,270	.	<300	<300	39,200
	13JUL87		0.200	<10	7,590	7,820	.	<300	<300	38,500
	07AUG87		* 0.054	<10	7,550	7,960	.	<300	<300	40,700
1-H4-15A	11JUN87		* 0.079	<10	11,100	11,700	.	<300	<300	52,300
	13JUL87		* 0.133	<10	11,400	10,900	.	<300	<300	46,400
	06AUG87		0.160	<10	11,400	10,900	.	<300	<300	46,300
1-H4-15B	11JUN87		0.178	<10	10,600	10,100	.	<300	<300	47,700
	13JUL87		0.192	<10	9,810	10,100	.	<300	<300	43,200
	06AUG87		0.166	<10	11,300	10,100	.	<300	<300	46,100
1-H4-16	10JUN87		0.420	<10	5,260	5,360	.	<300	<300	28,900
	15JUL87		* 0.131	<10	4,600	4,830	.	<300	<300	27,300
	07AUG87		* 0.101	<10	4,440	4,700	.	<300	<300	29,800
1-H4-17	15JUN87		0.586	<10	15,200	.	.	.	309	81,400
	10AUG87		1.300	<10	17,200	18,200	.	337	356	81,500
1-H4-18	15JUN87		0.240	<10	11,900	11,300	.	<300	<300	45,400
	14JUL87		0.310	<10	10,600	10,200	.	<300	<300	38,900
	06AUG87		*-0.005	<10	10,200	9,380	.	<300	<300	39,170

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TABLE B.1. (contd)

Well name	Collection Date	Duplicate sample number	TETRANE PPB Se	TOC PPB	TOX PPB	U-CHEM UG/L	FVANADI PPB	VANADIUM PPB	ZINC PPB	FZINC PPB
1-H3-1	16JUN87		<10	# 781	# 21.8	.	9	12	<5	8
	13JUL87		<10	1170	# 7.7	5.82	10	11	<5	6
	12AUG87		<10	6440	# 12.0	.	10	9	<5	7
1-H3-2A	11JUN87		<10	# 822	# 21.4	.	8	<5	6	<5
	14JUL87		<10	# 877	# 17.2	.	10	10	<5	<5
	05AUG87		<10	# 642	# 27.3	.	10	9	<5	<5
1-H3-2B	11JUN87		<10	# 831	# 17.4	.	<5	7	58	5
	15JUL87		<10	# 728	# 17.6	.	9	9	<5	5
	05AUG87		<10	1020	# 15.4	.	5	<5	<5	<5
1-H3-2C	11JUN87		<10	# 556	# 7.0	.	14	13	35	20
	14JUL87		<10	# 551	# 2.5	.	20	20	14	10
	04AUG87		<10	# 404	# 2.0	.	18	15	13	8
1-H4-3	15JUN87		<10	# 945	# 40.7	.	12	14	6	8
	10JUL87		<10	1050	# 27.1	209.00	<5	<5	11	<5
	11AUG87		# 2	1360	# 22.6	.	11	8	<5	<5
	11AUG87	1	<10	.	.	.	8	.	.	<5
1-H4-4	16JUN87		<10	# 750	# 17.7	.	5	9	65	37
	08JUL87		<10	1240	# 25.8	.	<5	<5	56	49
	11AUG87		<10	# 946	# 20.6	.	5	8	79	68
	11AUG87	1	<10	.	.	.	7	.	.	61
1-H4-5	16JUN87		<10	# 815	# 29.8	.	5	7	55	42
	08JUL87		<10	1050	# 20.8	.	8	10	57	52
	11AUG87		<10	# 629	# 24.1	.	<5	9	53	55
1-H4-6	15JUN87		<10	1200	# 15.4	.	10	10	154	107
	08JUL87		<10	1210	# 18.3	.	8	6	170	124
	12AUG87		<10	1850	# 9.9	.	<5	8	159	148
1-H4-7	16JUN87		<10	# 938	# 23.8	.	10	7	48	36
	07JUL87		<10	# 919	# 30.0	.	5	9	20	16
	10AUG87		<10	1220	# 18.1	.	9	10	15	9
1-H4-8	12JUN87		<10	1050	# 25.4	.	8	12	18	11
	07JUL87		<10	1120	# 22.7	.	5	5	<5	<5
	10AUG87		<10	# 950	# 18.7	.	11	10	15	<5
1-H4-9	15JUN87		<10	# 904	# 27.2	.	.	<5	12	.
	07JUL87		<10	1060	# 31.7	.	<5	7	5	<5
	10AUG87		<10	1020	# 25.2	.	<5	8	<5	<5
1-H4-10	10JUN87		<10	# 811	# 2.4	.	<5	<5	11	5
	07JUL87		<10	# 582	# 15.1	.	8	8	9	6
	07AUG87		<10	# 775	# 20.0	.	9	10	<5	<5
1-H4-11	10JUN87		<10	# 966	# 29.9	.	<5	5	13	9
	08JUL87		<10	# 939	# 37.8	.	<5	<5	<5	<5
	07AUG87		<10	# 703	# 25.3	.	<5	8	28	<5
1-H4-12A	12JUN87		<10	# 745	# 6.4	.	8	8	9	5
	09JUL87		<10	1040	# 19.6	.	<5	<5	<5	<5
	05AUG87		<10	1000	# 15.0	.	7	6	6	<5
1-H4-12B	12JUN87		<10	# 839	# 20.2	.	6	9	24	20
	09JUL87		<10	# 980	# 25.4	.	<5	<5	11	10
	05AUG87		<10	1010	# 19.1	.	7	6	7	8
1-H4-12C	10JUN87		<10	# 616	# 11.8	.	12	10	27	18
	09JUL87		<10	# 509	# 17.6	.	11	10	16	9
	05AUG87		<10	2020	# 6.9	.	22	19	7	7
1-H4-13	12JUN87		<10	# 959	# 28.4	.	<5	<5	27	19
	15JUL87		<10	# 782	# 25.0	.	8	7	12	12
	07AUG87		<10	# 610	# 32.3	.	<5	5	8	9
1-H4-14	12JUN87		<10	# 800	# 39.3	.	<5	5	15	10
	13JUL87		<10	# 783	# 32.2	.	10	7	5	<5
	07AUG87		<10	# 811	# 31.3	.	7	10	<5	7
1-H4-15A	11JUN87		<10	# 968	# 4.5	.	9	7	6	6
	13JUL87		<10	# 783	# 8.2	.	10	10	<5	<5
	05AUG87		<10	# 761	# 9.3	.	11	9	<5	<5
1-H4-15B	11JUN87		<10	# 586	# 7.1	.	8	9	55	45
	13JUL87		<10	# 730	# 16.5	.	14	8	40	35
	05AUG87		<10	# 661	# 9.2	.	8	9	27	25
1-H4-16	10JUN87		<10	# 956	# 38.6	.	<5	<5	15	5
	15JUL87		<10	# 620	# 33.7	.	5	7	5	<5
	07AUG87		<10	# 778	# 37.2	.	5	6	<5	5
1-H4-17	15JUN87		<10	# 775	# 19.7	.	.	8	17	.
	10AUG87		<10	1300	# 12.8	.	8	32	46	<5
1-H4-18	15JUN87		<10	# 667	# 32.6	.	<5	9	115	37
	14JUL87		<10	# 789	# 27.9	.	<5	10	24	9
	05AUG87		<10	# 692	# 21.4	.	5	<5	5	7