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GROUND-WATER MONITORING COMPLIANCE PROJECTS FOR HANFORD SITE FACILITIES

PROGRESS REPORT

FOR THE PERIOD APRIL 1 TO JUNE 30, 1987

August 1987

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Prepared by the
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and Westinghouse Hanford Company
for the U.S. Department of Energy
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SUMMARY

This report documents the progress of four Hanford Site ground-water monitoring projects for the period from April 1 to June 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 fourth in a series of periodic status reports; the first three cover the periods May 1 to September 30, 1986; October 1 to December 31, 1986; and January 1 to March 31, 1987. This report satisfies the requirements of Section 17B(3) of the Consent Agreement and Compliance Order.

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 in WAC 173-303-400 of Washington State's regulations (Washington State Department of Ecology 1986).

During this reporting period, three Phase III monitoring wells were completed and added to the routine ground-water monitoring network at 183-H. An interim site characterization report (USDOE 1987d) for 183-H was completed and submitted to the state and the USEPA in May 1987. The NRDW Landfill interim characterization report is in the final stages of clearance and the 300 Area report is in the review process. A drilling contract for 19 wells located around the 200 West Area Burial Grounds was awarded to ONWEGO Well Drilling in May 1987. Kaiser Engineers Hanford (KEH) was given approval to purchase four cable tool drilling rigs and complete the 16 wells located around the 200 East Area Burial Grounds. Drilling in both the East and West Areas was initiated during this reporting period.

Analytical results for the three sites for which wells have been drilled 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. Fluctuations in concentrations of specific parameters at the 300 Area site are generally attributed to specific activities conducted in the 300 Area. Variations in specific parameter concentrations in

wells in the vicinity of the 183-H facility are attributed to water table fluctuations associated with river stage. Spatial distributions of detected chemical constituents during this report period have remained unchanged from previously reported data for 183-H.

Aquifer testing was completed in nine newly constructed wells at 183-H. Two wells that contained insufficient water were not tested. Injection testing was not attempted because these wells are used for chemical monitoring and preserving the chemical integrity was deemed more important, at this time, than determining the hydraulic properties of the aquifer at those locations. One aquifer test was completed in the first well drilled to depth at the 200 Area low-level burial grounds.

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INTRODUCTION

This report covers recent progress on 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 April 1 to June 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 in WAC 173-303 of Washington State's regulations (Washington State Department of Ecology 1986). An interim characterization report for the 183-H Solar Evaporation Basins has been completed. Draft interim characterization reports for the NRDW Landfill and the 300 Area Process Trenches are in technical review and are in the final stages of completion, respectively. Drilling and hydrogeologic characterization has begun at the 200 Area Low-Level Burial Grounds.

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

This report is the fourth in a series of periodic progress reports. The previous reports (USDOE 1986c, 1987a,c) cover the period from May 1, 1986 to March 31, 1987.

This 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

The previously issued quarterly reports (USDOE 1986c, 1987a,c) 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 June 1985 through March 31, 1987. This report includes information on subsequent activities and data for the period April 1 through June 30, 1987.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Monitoring well construction activities and aquifer testing have been reported 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.

Well Drilling Effort

The installation and aquifer testing of the monitoring wells was reported in the previous quarterly report (USDOE 1987c).

Hydrogeologic Characterization Effort

Nonroutine field data collection is complete, but evaluation of geologic and hydrostratigraphic data is continuing. Data collection has included collection of continuous data for surface water and ground water using data loggers, the regular monthly water-level measurements of the network of 49 wells in the 300 Area, and resurvey of the older monitoring wells to a common datum. Evaluation of data included completion of analysis of aquifer results, model simulation of the aquifer, and analysis of data for the interim characterization report.

The data logger at the surface-water monitoring station on the Columbia River (SWS-1), which is shown in Figure 1, and the four data loggers in monitoring wells 1-10, 1-13, 1-16A, and 1-17A continue to furnish records of water-level fluctuations in the river. Currently, all data loggers record water levels at half-hour intervals.

The addition ofelectrical conductivity sensors and temperature sensors to the data loggers in three wells near the river and process trenches is planned,

FIGURE 1. Location Map for Water-Level and Monitoring Wells and the Surface-Water Monitoring Station in the 300 Area

to determine the extent that river stage influences ground-water chemistry. The data loggers are currently configured to record water levels only. The data loggers used in the 300 Area have the three-channel capability needed for the additional sensors. Only the shallow portion of the unconfined aquifer near the river and the river itself will be monitored for the next few months.

A survey to determine the gradient in the Columbia River between the process trenches and the new surface-water station, SWS-1, was conducted at a near-low river stage (88,700 cfs). The purpose was to ascertain the influence of the McNary Dam pool on the river gradient along the 300 Area shoreline. The survey indicated that the gradient in the Columbia River at low water levels is sufficiently steep (i.e., 0.5 ft/mile) to justify construction of a second continuous surface-water monitoring station near well 1-10. This second station will be installed next fiscal year.

The results of a new horizontal and vertical survey of all older monitoring wells were received in May from Kaiser Engineers Hanford (KEH). Old survey reports were reviewed by KEH and PNL staff because of suspected, and now confirmed, errors in older surveys. These errors resulted primarily from the use of survey monuments that were not corrected to the United States Coast and Geodetic Survey (now National Geodetic Survey) datum in the 300 Area.

Analysis and documentation of aquifer test results were completed by early June, for incorporation in the Interim Characterization Report.

For modeling the unconfined aquifer, the system will be represented by three layers rather than two. The upper layer will still represent the Hanford Formation, but the middle member of the Ringold Formation will now be represented by two layers. The new third layer (also known as the intermediate zone) is defined as the 10 feet above the top of the Ringold clays. It was evident in drilling logs that the sediments in this layer are more compact than those in the upper layers, and aquifer testing results showed that hydraulic conductivities were much lower than in all other regions of the aquifer. The geologists and hydrologists involved agreed that this lower portion of the middle Ringold Formation should be defined differently from the upper portion.

Input files related to the layering and aquifer properties were created for the Coupled Fluid and Energy Solute (CFEST) code. These files were modified as needed to represent the three-layered system as accurately as possible. Additional discharge data for the process trenches and sanitary waste leaching trenches were collected for the weeks from March 1986 to present. Initial and boundary condition files were created for a steady-state case.

Steady-state simulations were performed to determine the sensitivity of the ground-water flow model to changes in hydraulic conductivities. The different conductivities used in the model did not result in noticeable changes in the predicted distribution of hydraulic head. It would be necessary to use physically unreasonable hydraulic conductivities in the model to cause the steady-state ground-water flow system to respond differently.

Several transient simulations were performed to determine the most appropriate time step for transient applications of the model and the most appropriate values for specific storage and hydraulic conductivities in each layer. The transient simulations indicated that application of the three-layer model would be costly, because large amounts of CPU time would be required on the computer. The number of layers in the model was therefore reduced to two, which resulted in a more reasonable length of time to obtain a solution. The two layers are defined as 1) the Hanford Formation and 2) the upper portion of the middle member of the Ringold Formation, which extends from 10 feet above the top of the Ringold clays.

The results of the transient simulations indicated that 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 the lower layer may be represented by a constant value, but that the upper layer is best represented by at least two regions of differing hydraulic conductivity. The results also indicated that a uniform specific storage of 0.01 is reasonable.

ROUTINE SAMPLING AND ANALYSIS OF THE GROUND WATER

Routine sampling and analysis of the ground water has been conducted for the 300 Area Process Trenches on a monthly basis 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 in the second subsection. Raw analytical data for ground-water samples collected from wells in the 300 Area are contained in Appendix A.

Collection and Analysis

Sampling of the network of 34 monitoring wells took place during April and June. Bimonthly sampling began this quarter; therefore no samples were collected in May. Except for some early volatile organic analysis (VOA) results of the June sampling of two well clusters, the results of the June sampling will be presented in the next quarterly report. Well clusters 1-16 and 1-17 were sampled again in late June for enhanced volatile organics. These clusters were first sampled on June 5 and 9, during the regular scheduled sampling, and later on June 29 and 26, respectively. Special preparations and instructions were made for sampling well 1-16D by bailer.

Written procedures for quality-control samples (including the new transfer blanks) were reviewed and circulated for comment and approval. The procedures for collection of samples for RCRA, CERCLA, SARA, and other compliance/hazardous material monitoring were approved in June. Also, procedures for "Sample Collection Using the Hydrostar Pump" and "In-line Sample Filtration" were approved in June.

Analyses of field samples by an independent laboratory confirmed the results from U.S. Testing (UST). Work continued on adding new blind standards to existing samples. Work on automating interlaboratory comparisons will continue next quarter.

Discussion of Results

The results of sample analyses during the reporting period were generally consistent with those reported previously, except for certain VOAs. The results for samples collected in June 1987, near the end of the reporting period, will be included in the next progress report. In general, 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. The groups are 1) wells immediately adjacent to the trenches, 2) wells immediately downgradient from the trenches, 3) other wells generally to the north of the trenches, and 4) other wells generally to the south of the trenches (Figure 2). The wells were grouped based on their proximity to one another in relation to the process trenches and ground-water flow patterns in the 300 Area. An example of the ground-water flow pattern for one point in time is shown in Figure 3. Although this flow pattern (or any other) is not typical of the unconfined aquifer because of the system's transient nature, it is generally representative of many flow patterns that form 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 short abbreviation for the wells that start with "6-", as follows:

Adjacent	Downgradient	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	

Table 1 is a summary of all results obtained for samples collected during March and April 1987. For those constituents that were undetected during this period, three asterisks appear in the column marked "Below Detection." The column otherwise contains the number of samples with levels below detection

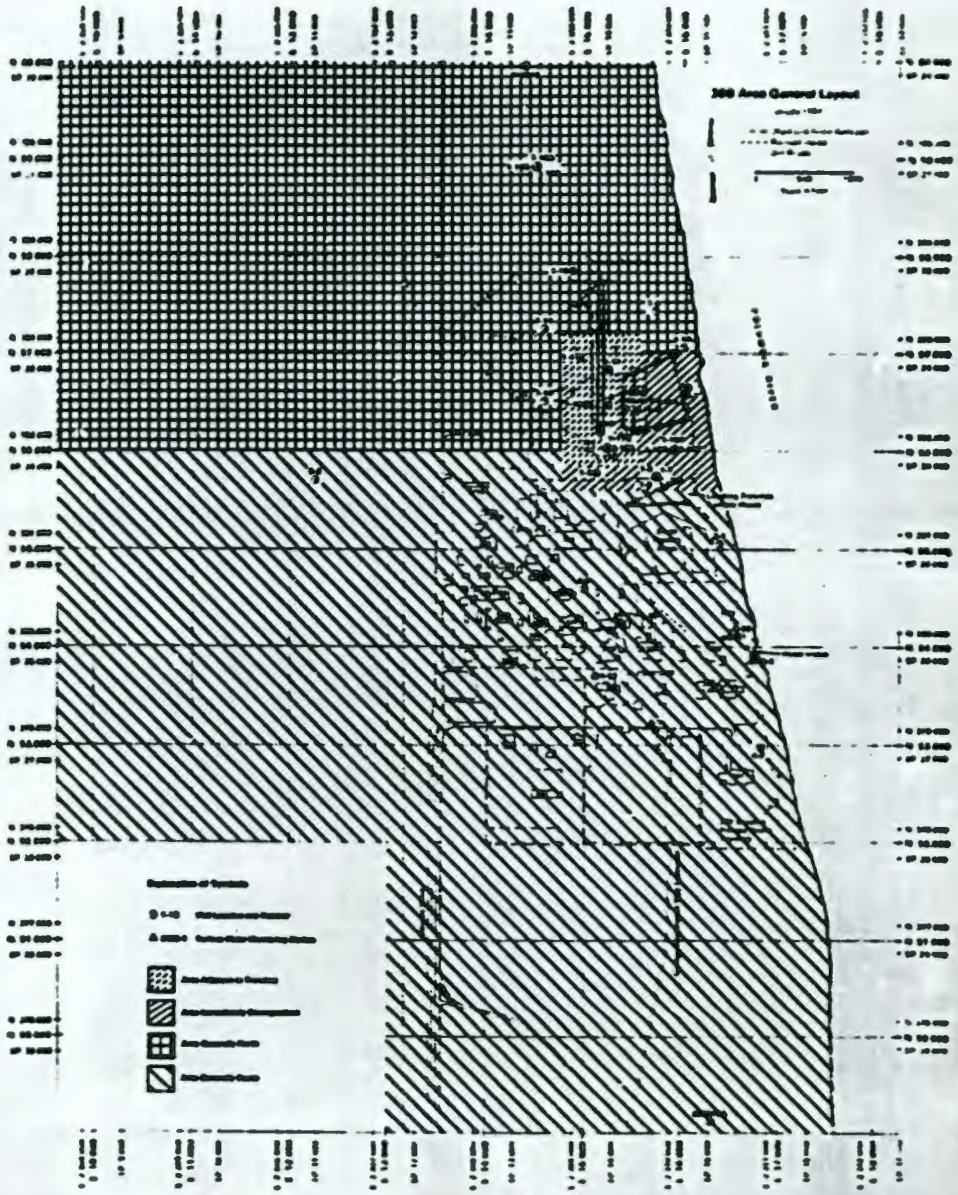

FIGURE 2. Areas of Four Groups of RCRA Monitoring Wells

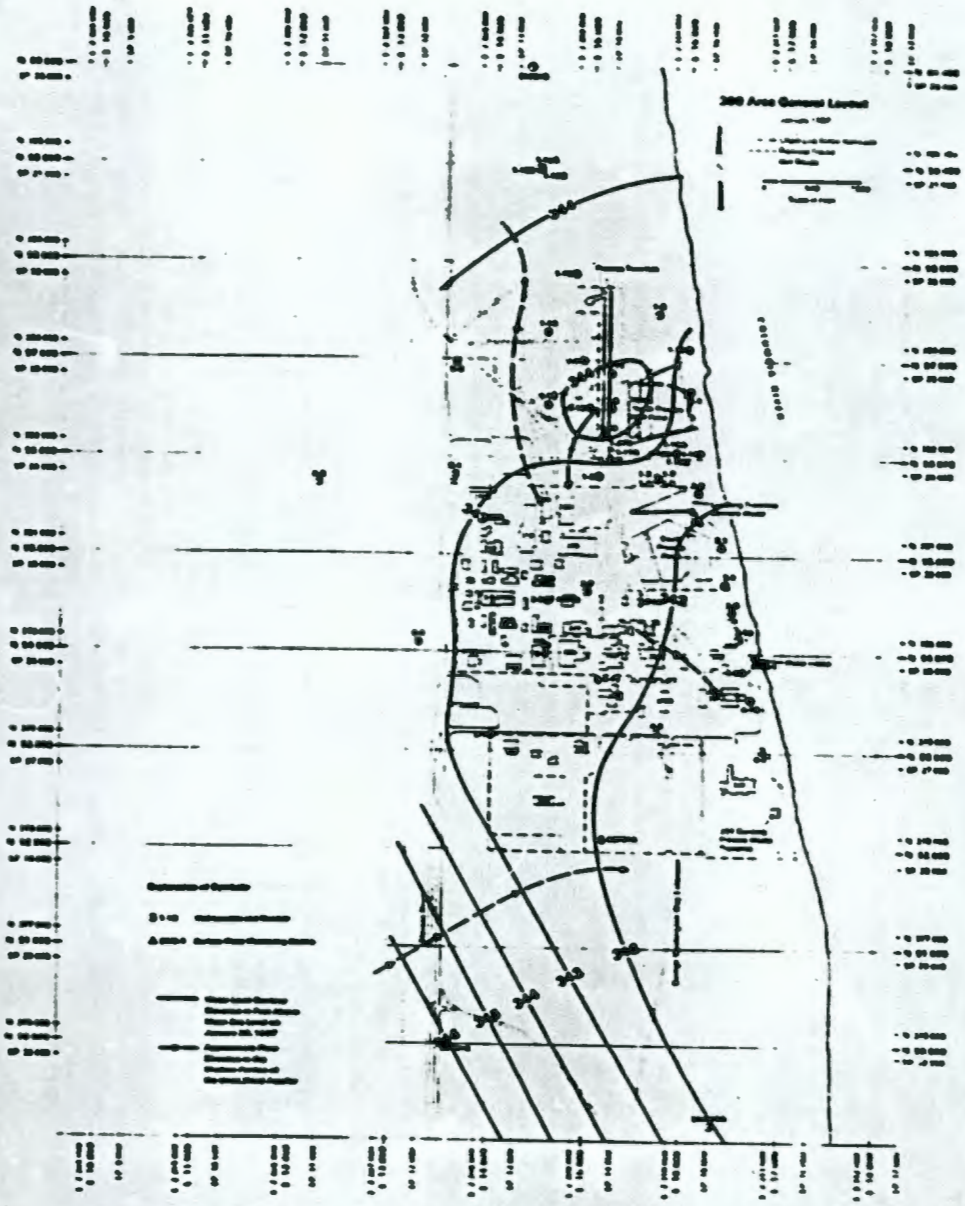

FIGURE 3. An Example of Ground-Water Flow Patterns in the 300 Area

TABLE 1. Summary of Results from Samples Taken in Wells Surrounding the 300 Area Process Trenches, March-April 1987

Constituent List-Contamination Indicators

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
101	CONDUCT	UMHO	1	68	0					Specific conductance
109	PH		.1	68	0					pH
C68	TOX	PPB	100	68	65					Total organic halogen
C69	TOC	PPB	1000	68	68	***				Total organic carbon

Constituent List-Drinking Water Standards

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	68	65		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	0	53	0		50	EPA	xxx	Gross beta
101	RADIUM	PCI/L	1	53	53		5	EPA		Radium
212	LOALPHA	PCI/L	4	56	12		15	EPA	xxx	Gross alpha
A06	BARIUM	PPB	0	68	0		1000	EPA		Barium
A07	CADMIUM	PPB	2	68	68	***	10	EPA		Cadmium
A08	CHROMIUM	PPB	10	68	62		50	EPA		Chromium
A10	SILVER	PPB	10	68	68	***	50	EPA		Silver
A26	ARSENIC	PPB	5	68	64		50	EPA		Arsenic
A21	MERCURY	PPB	.1	68	68	***	2	EPA		Mercury
A22	SELENIUM	PPB	5	68	68	***	10	EPA		Selenium
A33	ENDRIN	PPB	1	16	16	***	.2	EPA		Endrin
A34	METHLOR	PPB	1	16	16	***	100	EPA		Methoxychlor
A35	TOXAPHE	PPB	1	16	16	***	5	EPA		Toxaphene
A36	a-BHC	PPB	1	16	16	***	4	EPA		Alpha-BHC
A37	b-BHC	PPB	1	16	16	***	4	EPA		Beta-BHC
A38	g-BHC	PPB	1	16	16	***	4	EPA		Gamma-BHC
A39	d-BHC	PPB	1	16	16	***	4	EPA		Delta-BHC
A61	LEADGF	PPB	5	68	67		50	EPA		Lead (graphite furnace)
C72	NITRATE	PPB	500	68	12		45000	EPA		Nitrate
C74	FLUORID	PPB	500	68	53		1400	EPA	xxx	Fluoride
N13	2,4-D	PPB	1	16	16	***	100	EPA		2,4-D
N14	2,4,5TP	PPB	1	16	16	***	10	EPA		2,4,5-TP silvex
N20	FBARIUM	PPB	0	68	0		1000	EPA		Barium, filtered
N21	FCADMIU	PPB	2	68	68	***	10	EPA		Cadmium, filtered
N22	FCHROMI	PPB	10	68	64		50	EPA		Chromium, filtered
N23	FSILVER	PPB	10	68	68	***	50	EPA		Silver, filtered
N37	FARSENI	PPB	5	68	68		50	EPA		Arsenic, filtered
N38	FMERCUR	PPB	.1	64	64	***	2	EPA		Mercury, filtered
N39	FSELENI	PPB	5	68	68	***	10	EPA		Selenium, filtered
N41	FLEAD	PPB	5	68	68	***	50	EPA		Lead, filtered

TABLE 1. (contd)

Constituent List-Quality Characteristics

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
A11	SODIUM	PPB	100	66	0		.			Sodium
A17	MANGESE	PPB	.5	66	46		.			Manganese
A19	IRON	PPB	50	66	28		.			Iron
C67	PHENOL	PPB	10	2	2	***	.			Phenol
C73	SULFATE	PPB	500	66	3		.			Sulfate
C75	CHLORID	PPB	500	66	1		.			Chloride
H24	FSODIUM	PPB	100	66	0		.			Sodium, filtered
H29	FMANGAN	PPB	5	66	46		.			Manganese, filtered
H31	FIRON	PPB	50	66	47		.			Iron, filtered
H67	LPHENOL	PPB	1	10	10	***	.			Phenol, low DL

Constituent List-Site Specific

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
810	CO	PCI/L	22.6	2	1		.			Cobalt-60
824	CS-137	PCI/L	20	2	2	***	.			Cesium-137
834	RU	PCI/L	172.5	2	2	***	.			Ruthenium-106
121	SR	PCI/L	5	2	1		.			Strontium-90
124	U-CHEM	UG/L	.725	2	0		.			Natural uranium
A04	ZINC	PPB	5	66	23		.			Zinc
A05	CALCIUM	PPB	50	66	0		.			Calcium
A12	NICKEL	PPB	10	66	63		.			Nickel
A13	COPPER	PPB	10	66	35		1300	EPAP		Copper
A16	ALUMNUM	PPB	150	66	61		.			Aluminum
A56	MAGNES	PPB	0	66	0		.			Magnesium
A61	TETRANE	PPB	10	66	66	***	5	EPAP		Tetrachloroethane
A64	METHONE	PPB	10	66	66	***	.			Methyl ethyl ketone
A67	1,1,1-T	PPB	10	66	67		200	EPAP		1,1,1-trichloroethane
A68	1,1,2-T	PPB	10	66	66	***	.			1,1,2-trichloroethane
A69	TRICENE	PPB	10	66	66		5	EPAP	xxx	Trichloroethylene
A70	PERCENE	PPB	10	66	67		.			Perchloroethylene
A71	OPXYLE	PPB	10	66	66	***	440	EPAP		Xylene-o,p
B14	M-XYLE	PPB	10	66	66	***	440	EPAP		Xylene-m
C70	CYANIDE	PPB	10	66	66	***	.			Cyanide
C78	SULFIDE	PPB	1000	66	66	***	.			Sulfide
C88	AMMONIU	PPB	50	63	55		.			Ammonium ion
H18	FZINC	PPB	5	66	37		.			Zinc, filtered
H19	FCALCIU	PPB	50	66	0		.			Calcium, filtered
H25	FNICKEL	PPB	10	66	65		.			Nickel, filtered
H28	FCOPPER	PPB	10	66	35		1300	EPAP		Copper, filtered
H30	FALUMIN	PPB	150	66	64		.			Aluminum, filtered
H32	FMAGNES	PPB	0	66	0		.			Magnesium, filtered

TABLE 1. (contd)

Constituent List=Tag-along

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
A14	VANADUM	PPB	5	88	44		.			Vanadium
A16	POTASUM	PPB	100	88	8		.			Potassium
A88	CHLFORM	PPB	10	88	38		.			Chloroform
A93	METHYCN	PPB	10	88	88		.			Methylene chloride
C78	PHOSPHA	PPB	1000	88	88	***	.			Phosphate
H27	FVANADI	PPB	5	88	41		.			Vanadium, filtered
H3.	FPOTASS	PPB	100	88	8		.			Potassium, filtered

Constituent List=WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full 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
A23	THALIUM	PPB	10	2	2	***	.			Thallium
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	***	8	EPAP		Heptachlor
A44	HEPTIDE	PPB	1	2	2	***	8	EPAP		Heptchlor epoxide
A46	DIELRIN	PPB	1	2	2	***	.			Dieldrin
A47	ALDRIN	PPB	1	2	2	***	.			Aldrin
A48	CHLDANE	PPB	1	2	2	***	8	EPAP		Chlordane
A49	END01	PPB	1	2	2	***	.			Endosulfan I
A52	END02	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	ACRYLE	PPB	10	2	2	***	.			Acrylonitrile
A74	BISTHER	PPB	10	2	2	***	.			Bis(chloromethyl) ether
A75	BROMONE	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
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

TABLE 1. (contd)

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
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	8	2		70	EPAP	xxx	Trans-1,2-dichloroethene
A92	DICETHY	PPB	10	2	2	***	7	EPAP		1,1-dichloroethylene
A94	DICPANE	PPB	10	2	2	***	8	EPAP		1,2-dichloropropane
A95	DICPENE	PPB	10	2	2	***	.			1,3-dichloropropene
A96	NNDIETY	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	METNTNI	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	BROMFRM	PPB	10	2	2	***	.			Bromoform
B09	TRCMEBL	PPB	10	2	2	***	.			Trichloromethanethiol
B10	TRCMFLM	PPB	10	2	2	***	.			Trichlorofluoromethane
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	DIETNY	PPB	10	2	2	***	.			Diethylamine
B19	ACETILE	PPB	3000	2	2	***	.			Acetonitrile
B20	ACETOPN	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	AMITSOX	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	***	.			Benzenethiol
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 1. (contd)

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
B44	CHALETH	PPB	10	2	2	ooo		.	Chloroalkyl ethers
B45	CHLANIL	PPB	10	2	2	ooo		.	P-chloroaniline
B46	CHLCRES	PPB	10	2	2	ooo		.	P-chloro-m-cresol
B47	CHLEPOX	PPB	10	2	2	ooo		.	1-chloro-2,3-epoxypropane
B48	CHLNAPH	PPB	10	2	2	ooo		.	2-chloronaphthalene
B49	CHLPHEN	PPB	10	2	2	ooo		.	2-chlorophenol
B50	CHRYSEN	PPB	10	2	2	ooo		.	Chrysene
B51	CRESOLS	PPB	10	2	2	ooo		.	Cresols
B52	CYCHDIN	PPB	10	2	2	ooo		.	2-cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	PPB	10	2	2	ooo		.	Dibenz[a,h]acridine
B54	DIBAJAC	PPB	10	2	2	ooo		.	Dibenz[a,j]acridine
B55	DIBAHAN	PPB	10	2	2	ooo		.	Dibenz[a,h]anthracene
B56	DIBCGCA	PPB	10	2	2	ooo		.	7H-dibenzo[c,g]carbazole
B57	DIBAEPY	PPB	10	2	2	ooo		.	Dibenzo[a,e]pyrene
B58	DIBAHPY	PPB	10	2	2	ooo		.	Dibenzo[a,h]pyrene
B59	DIBAIPY	PPB	10	2	2	ooo		.	Dibenzo[a,i]pyrene
B60	DIBPHTH	PPB	10	2	2	ooo		.	Di-n-butyl phthalate
B61	12-dben	PPB	10	2	2	ooo		.	1,2-dichlorobenzene
B62	13-dben	PPB	10	2	2	ooo		.	1,3-dichlorobenzene
B63	14-dben	PPB	10	2	2	ooo		.	1,4-dichlorobenzene
B64	DICHBEN	PPB	10	2	2	ooo		.	3,3'-dichlorobenzidine
B65	24-dchp	PPB	10	2	2	ooo		.	2,4-dichlorophenol
B66	26-dchp	PPB	10	2	2	ooo		.	2,6-dichlorophenol
B67	DIEPHTH	PPB	10	2	2	ooo		.	Diethyl phthalate
B68	DIHYSAF	PPB	10	2	2	ooo		.	Dihydrosafrole
B69	DIMETHB	PPB	10	2	2	ooo		.	3,3'-dimethoxybenzidine
B70	DIMEAMB	PPB	10	2	2	ooo		.	P-dimethylaminoazobenzene
B71	DIMBENZ	PPB	10	2	2	ooo		.	7,12-dimethylbenz[a]anthracene
B72	DIMEYLB	PPB	10	2	2	ooo		.	3,3'-dimethylbenzidine
B73	THIONOX	PPB	10	2	2	ooo		.	Thiofanox
B74	DIMPHAM	PPB	10	2	2	ooo		.	Alpha,alpha-dimethylphenethylamine
B75	DIMPHEN	PPB	10	2	2	ooo		.	2,4-dimethylphenol
B76	DIMPHTH	PPB	10	2	2	ooo		.	Dimethyl phthalate
B77	DINBENZ	PPB	10	2	2	ooo		.	Dinitrobenzene
B78	DINCRES	PPB	10	2	2	ooo		.	4,6-dinitro-o-cresol and salts
B79	DINPHEN	PPB	10	2	2	ooo		.	2,4-dinitrophenol
B80	24-dint	PPB	10	2	2	ooo		.	2,4-dinitrotoluene
B81	26-dint	PPB	10	2	2	ooo		.	2,6-dinitrotoluene
B82	DIOPHTH	PPB	10	2	2	ooo		.	Di-n-octyl phthalate
B83	DIPHAMI	PPB	10	2	2	ooo		.	Diphenylamine
B84	DIPHHYD	PPB	10	2	2	ooo		.	1,2-diphenylhydrazine
B85	DIPRNIT	PPB	10	2	2	ooo		.	Di-n-propylnitrosamine
B86	ETHMINE	PPB	10	2	2	ooo		.	Ethylenimine
B87	ETHMETS	PPB	10	2	2	ooo		.	Ethyl methanesulfonate
B88	FLUORAN	PPB	10	2	2	ooo		.	Fluoranthene
B89	HEXCBEN	PPB	10	2	2	ooo		.	Hexachlorobenzene
B90	HEXCBUT	PPB	10	2	2	ooo		.	Hexachlorobutadiene
B91	HEXCCYC	PPB	10	2	2	ooo		.	Hexachlorocyclopentadiene
B92	HEXCETH	PPB	10	2	2	ooo		.	Hexachloroethane
B93	INDENOP	PPB	10	2	2	ooo		.	Indeno(1,2,3-cd)pyrene
B94	ISOSOLE	PPB	10	2	2	ooo		.	Isosafrole
B95	MALONILE	PPB	14	2	2	ooo		.	Malononitrile
B96	MELPHAL	PPB	10	2	2	ooo		.	Melphalan

TABLE 1. (contd)

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
B97	METHAPY	PPB	10	2	2	***	.			Methapyrilene
B99	METHNYL	PPB	10	2	2	***	.			Metholenyl
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	METACTB	PPB	10	2	2	***	.			2-methylactonitrile
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-O-(methylcarbamoyl)oxime
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	***	.			Nitrobenzene
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	PENTCNB	PPB	10	2	2	***	.			Pentachlorobenzene
C27	PENTCNN	PPB	10	2	2	***	.			Pentachloronitrobenzene
C28	PENTCNP	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	PROMIDE	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	TETRCNB	PPB	10	2	2	***	.			1,2,4,5-tetrachlorobenzene
C38	TETRCNP	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	TRICNLB	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
C51	BIS2ETH	PPB	10	2	2	***	.			Bis(2-chloroisopropyl)ether
C52	HEXAENE	PPB	10	2	2	***	.			Hexachloropropene

TABLE 1. (contd)

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
C63	HYDRAZI	PPM	3000	2	2	ooo	.		Hydrazine
C64	HEXACHL	PPB	10	2	2	ooo	.		Hexachlorophene
C65	NAPHTHA	PPB	10	2	2	ooo	.		Naphthalene
C66	123TRI	PPB	10	2	2	ooo	.		1,2,3-trichlorobenzene
C68	135TRI	PPB	10	2	2	ooo	.		1,3,5-trichlorobenzene
C69	1234TE	PPB	10	2	2	ooo	.		1,2,3,4-tetrachlorobenzene
C70	1235TE	PPB	10	2	2	ooo	.		1,2,3,5-tetrachlorobenzene
C81	TETEPYR	PPB	100	2	2	ooo	.		Tetraethylpyrophosphate
C82	CHLLATE	PPB	100	2	2	ooo	.		Chlorobenzilate
C83	CARBPHT	PPB	2	2	2	ooo	.		Carbophenothion
C84	DISULFO	PPB	2	2	2	ooo	.		Disulfoton
C85	DIMETHO	PPB	5	2	2	ooo	.		Dimethoate
C86	METHPAR	PPB	2	2	2	ooo	.		Methyl parathion
C87	PARATHI	PPB	2	2	2	ooo	.		Parathion
C71	FORMALY	PPB	500	2	2	ooo	.		Formalin
C79	KEROSEN	PPB	10000	2	2	ooo	.		Kerosene
C81	ETHYGLY	PPB	10000	2	2	ooo	.		Ethylene glycol
C86	DIOXIN	PPB	.1	2	2	ooo	.		Dioxin
C87	CITRUSR	PPB	1000	2	2	ooo	.		Citrus red
C88	CYANBRO	PPB	3000	2	2	ooo	.		Cyanogen bromide
C89	CYANCHL	PPB	3000	2	2	ooo	.		Cyanogen chloride
C90	PARALDE	PPB	3000	2	2	ooo	.		Paraldehyde
C91	STRYCHN	PPB	50	2	2	ooo	.		Strychnine
C92	MALHYDR	PPB	500	2	2	ooo	.		Maleic hydrizide
C93	NICOTIN	PPB	100	2	2	ooo	.		Nicotinic acid
C94	ACRYIDE	PPB	3000	2	2	ooo	0	EPAP	Acrylamide
C95	ALLYLAL	PPB	3000	2	2	ooo	.		Allyl alcohol
C96	CHLORAL	PPB	3000	2	2	ooo	.		Chloral
C97	CHLACET	PPB	3000	2	2	ooo	.		Chloroacetaldehyde
C98	CHLPROP	PPB	3000	2	2	ooo	.		3-chloropropionitrile
C99	CYANOGN	PPB	3000	2	2	ooo	.		Cyanogen
H01	DICPROP	PPB	3000	2	2	ooo	.		Dichloropropanol
H03	ETHCARB	PPB	3000	2	2	ooo	.		Ethyl carbonate
H04	ETHCYAN	PPB	3000	2	2	ooo	.		Ethyl cyanide
H05	ETHOXID	PPB	3000	2	2	ooo	.		Ethylene oxide
H06	ETHMETH	PPB	3000	2	2	ooo	.		Ethyl methacrylate
H07	FLUOROA	PPB	3000	2	2	ooo	.		Fluoroacetic acid
H08	GLYCIDY	PPB	3000	2	2	ooo	.		Glycidylaldehyde
H09	ISOBUTY	PPB	3000	2	2	ooo	.		Isobutyl alcohol
H10	METZINE	PPB	3000	2	2	ooo	.		Methyl hydrazine
H11	PROPYLA	PPB	3000	2	2	ooo	.		N-propylamine
H12	PROPYNO	PPB	3000	2	2	ooo	.		2-propyn-1-ol
H16	2,4,5-T	PPB	1	2	2	ooo	.		2,4,5-T
H33	BERYLL	PPB	5	2	2	ooo	.		Beryllium, filtered
H34	OSMIUM	PPB	300	2	2	ooo	.		Osmium, filtered
H35	STRONT	PPB	300	2	2	ooo	.		Strontium, filtered
H36	ANTIMO	PPB	100	2	2	ooo	.		Antimony, filtered
H40	THALLI	PPB	10	2	2	ooo	.		Thallium, filtered

ooo - Indicates all samples were below detection limits
xxx - Indicates that regulatory limits were exceeded
EPA - based on limits given in 40CFR 286, Appendix III, EPA Interim Primary Drinking Water Standards
EPAP - based on proposed Maximum Contaminant Levels

limits. Any constituents having at least one value above the regulatory standard or a screening limit are marked with three Xs in the column labeled "Limits Exceeded." The results presented in the plots are for those constituents that exhibited a pattern not generally consistent with the results obtained in previous months from the 300 Area monitoring network.

In March, gross alpha levels continued to rise in well 1-5, to a level of 119 pCi/L, and in new well 1-17A, to 79.1 pCi/L. Also, well 1-19, which was included as part of the RCRA monitoring network for the first time in March, gave an initial gross alpha reading of 208 pCi/L. Concurrent rises in gross alpha levels seem to be occurring in wells near the trenches (Figure 4), in some of the wells immediately downgradient (Figure 5), and in well 1-4, which is generally north (Figure 6). Initial readings from the intermediate and deep wells in clusters 1-16 and 1-17 show very low levels of gross alpha, indicating negligible vertical movement. In general, gross alpha levels, which had been increasing in wells adjacent to the process trenches and in wells near the Trenches during the previous two months, began decreasing in April. The most marked decreases in alpha levels, shown in Figure 4, occurred in wells 1-5 (119.0 pCi/L to 55.5 pCi/L), 1-11 (99.4 pCi/L to 70.9 pCi/L), 1-17A (79 pCi/L to 62.2 pCi/L), and 1-19 (208 pCi/L to 145 pCi/L). In wells further downgradient, gross alpha increased in wells 1-3 (30.2 pCi/L to 34.7 pCi/L), 1-7 (33.9 pCi/L to 40.5 pCi/L), and 1-13 (6.81 to 13.2 pCi/L) (Figures 5 and 6). The following wells had gross alpha levels above the drinking water screening limit of 15 pCi/L: 1-1, 1-3, 1-4, 1-5, 1-7, 1-8, 1-11, 1-12, 1-14, 1-15, 1-17A, 1-19, and 4-7 (Figures 4, 5, 6, and 7). However, most of the alpha activity is probably from uranium and radon, which are to be excluded from the alpha count to determine whether the drinking water standard has been exceeded. Gross alpha levels in intermediate and deep wells remain below detection.

Because of analytical problems, gross beta results are incomplete for April. In March, levels continued to rise in well 1-5, reaching 48.9 pCi/L, just below the drinking water screening limit of 50 pCi/L, while levels in well 1-17A dropped to 49.1 pCi/L. New well 1-19 had an initial reading of 110 pCi/L. Downgradient wells 1-2, 1-3, 1-7, and 1-8 are showing rising

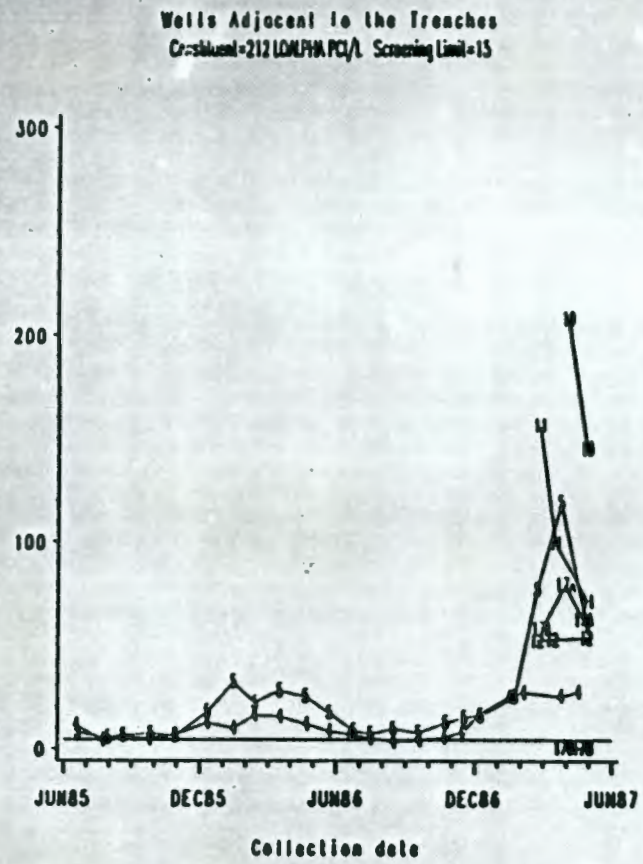

FIGURE 4. Gross Alpha Concentrations in Samples from Monitoring Wells Adjacent to the 300 Area Process Trenches, June 1985 through April 1987

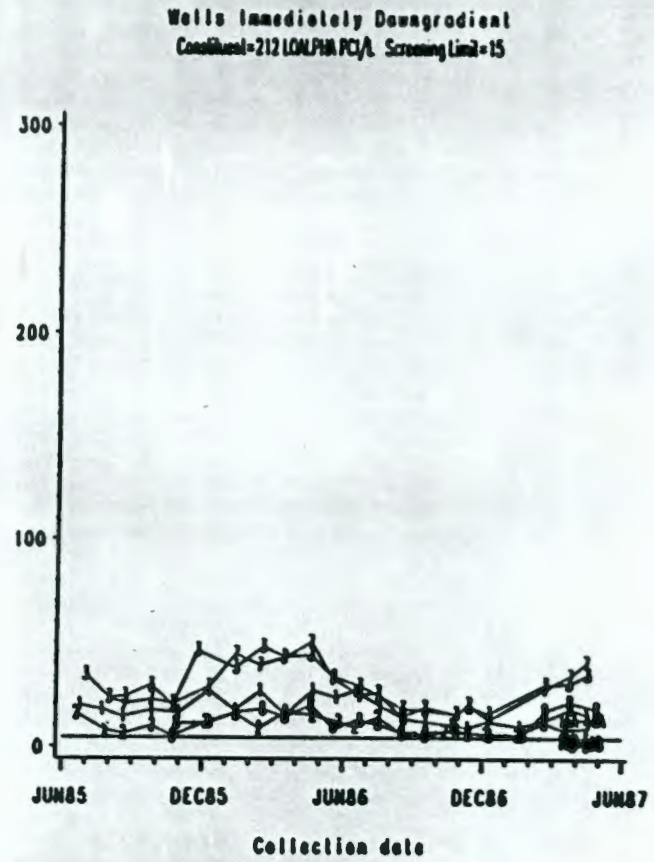

FIGURE 5. Gross Alpha Concentrations in Samples from Monitoring Wells Immediately Downgradient of the 300 Area Process Trenches, June 1985 through April 1987

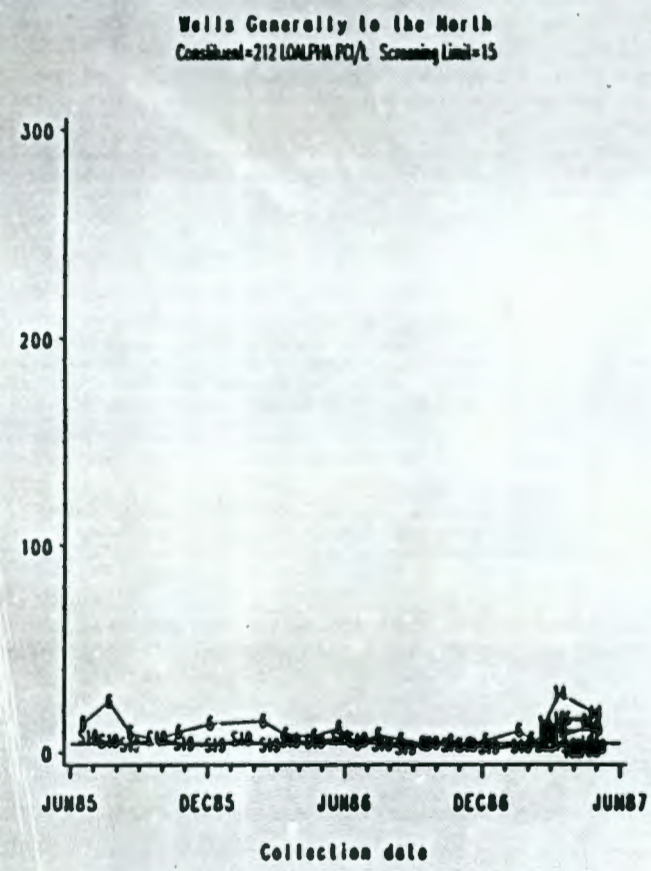

FIGURE 6. Gross Alpha Concentrations in Samples from Monitoring Wells North of the 300 Area Process Process Trenches, June 1985 April 1987

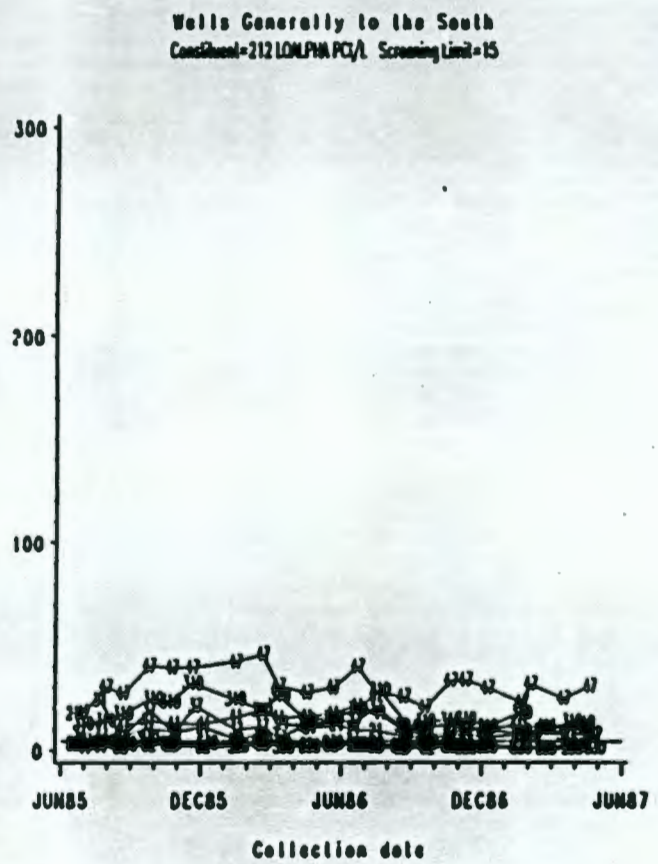

FIGURE 7. Gross Alpha in Samples Concentrations from Monitoring Wells South of the 300 Area Process Trenches, June 1985 through April 1987

concentrations, possibly due to the cleaning operations in the trenches during February; all remain below the screening limit.

Although a relatively high reading was reported in well 6-S30E15A in March, the level of radium in this well has returned to typical levels. Levels of radium have increased in some wells that are adjacent to the trenches or immediately downgradient (Figures 8 and 9).

Arsenic was reported above detection limits in the filtered samples from wells 1-3 (20 ppb), 1-18A (7 ppb), 4-11 (6 ppb), and 6-S19-E13 (7 ppb) but was not detected in unfiltered samples from the same wells. Therefore, the laboratory reanalyzed the samples in question. The results showed no arsenic present in the filtered sample for well 1-3; results for the other samples will be reported at a later date. Arsenic was also detected in both the filtered (10 ppb) and unfiltered (9 ppb) samples from well 8-2.

Chloroform concentrations continued to increase in samples from all shallow monitoring wells near and downgradient of the process trenches, but was not detected in the intermediate and deep wells. This trend has occurred annually during the summer months since monitoring began in June 1985 (Figures 10, 11, 12, and 13). In the past, chloroform concentrations have peaked during July and August and have been distributed approximately as shown in Figure 14. Seasonal variations in operations such as water treatment or seasonal changes in river water temperature or organic content may be factors. Future monitoring and review of existing data on water levels and operation procedures may help to define the cause of these variations.

Chromium was reported above detection in several wells (1-9, 1-12, 1-16B, 1-16C, 1-17B, 1-18B, 1-18C, 1-19, and S19E13) during March and/or April; see Figures 15, 16, 17, and 18. Chromium levels in the wells were near the detection limit of 10 ppb, except in well 1-16C, which contained 20 ppb in April, and well 1-9, which peaked at 34 ppb in March. Both values are below the drinking water standard of 50 ppb.

In March coliform bacteria was reported above the detection limit only in well 2-1, and it was not detected in any wells in April. In general, nitrate

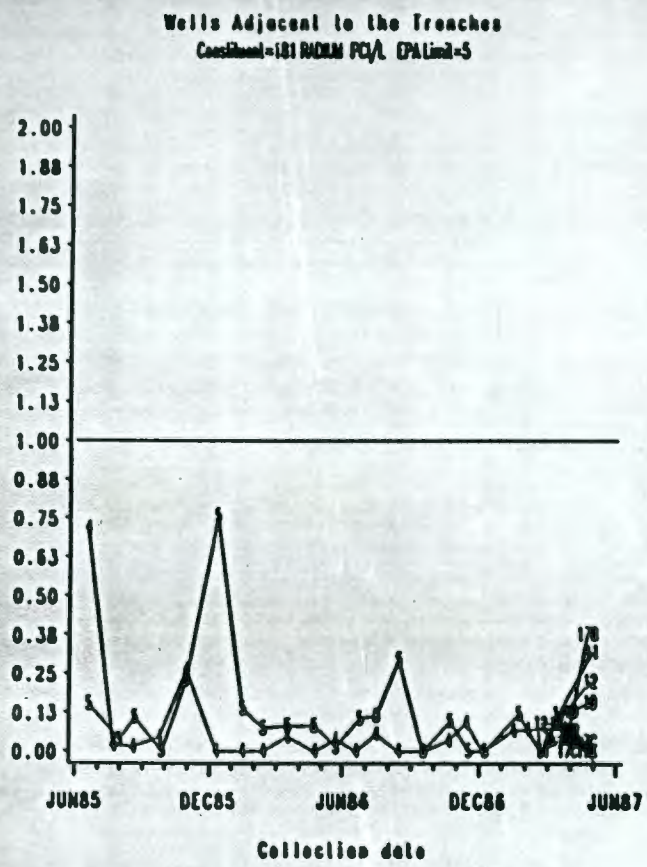

FIGURE 8. Radium Levels in Samples from Monitoring Wells Adjacent to the 300 Area Process Trenches, June 1985 through April 1987

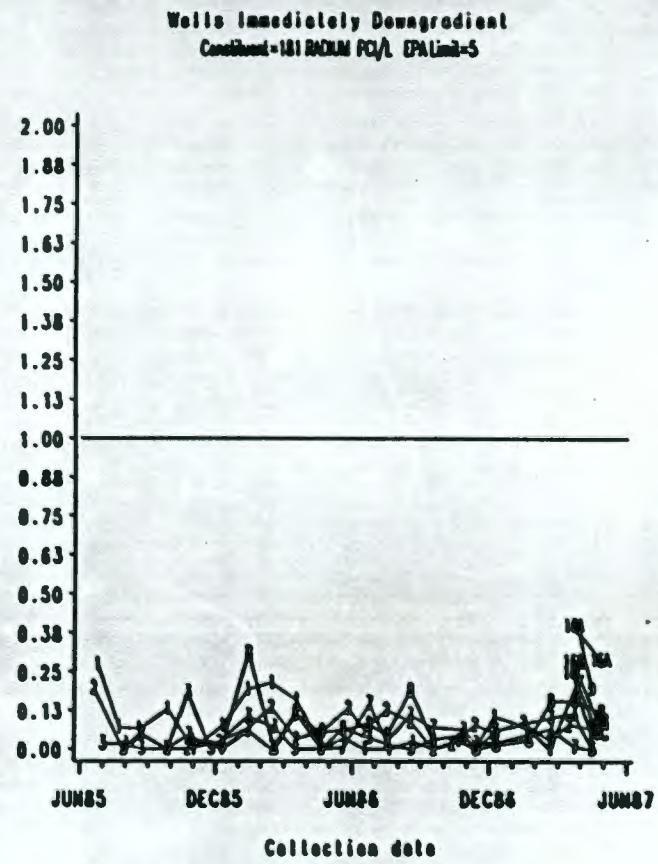

FIGURE 9. Radium Levels in Samples from Monitoring Wells Immediately Downgradient of the 300 Area Process Trenches, June 1985 through April 1987

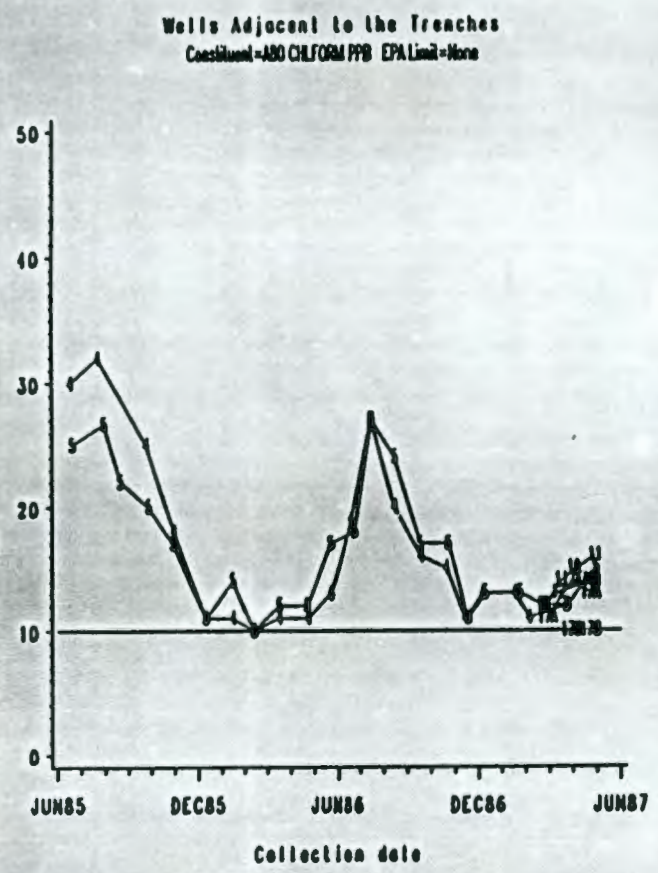

FIGURE 10. Chloroform Concentrations in Samples from Monitoring Wells Adjacent to the 300 Area Process Trenches, June 1985 through April 1987

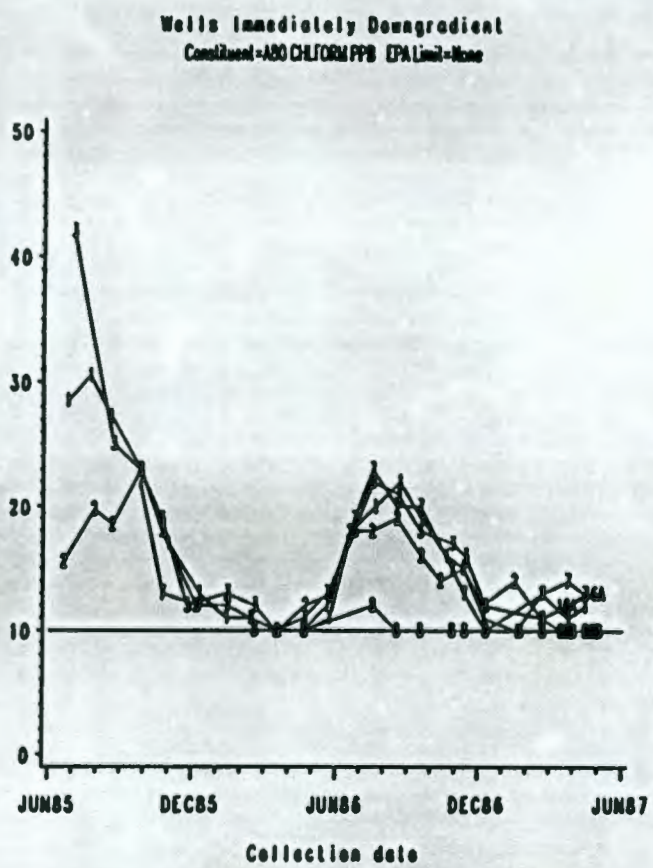

FIGURE 11. Chloroform Concentrations in Samples from Monitoring Wells Immediately Downgradient of the 300 Area Process Trenches, June 1985 through April 1987

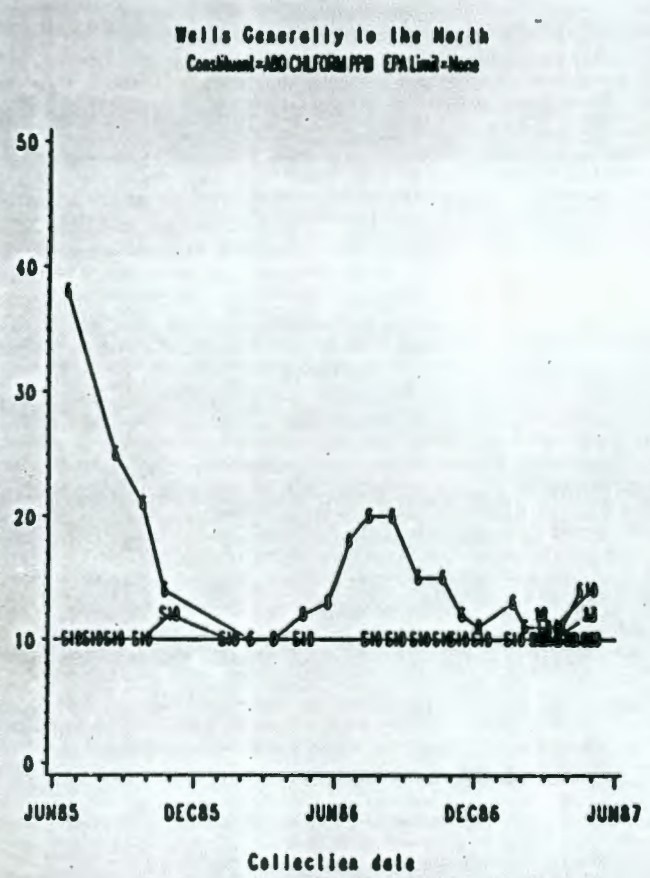

FIGURE 12. Chloroform Concentrations in Samples from Monitoring Wells North of the 300 Area Process Trenches, June 1985 through April 1987

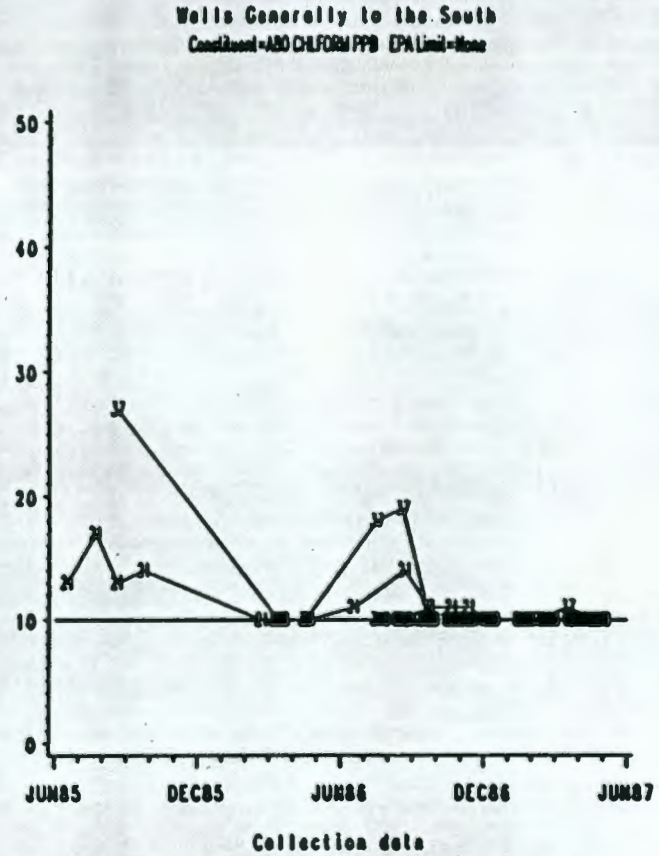

FIGURE 13. Chloroform Concentrations in Samples from Monitoring Wells South of the 300 Area Process Trenches, June 1985 through April 1987

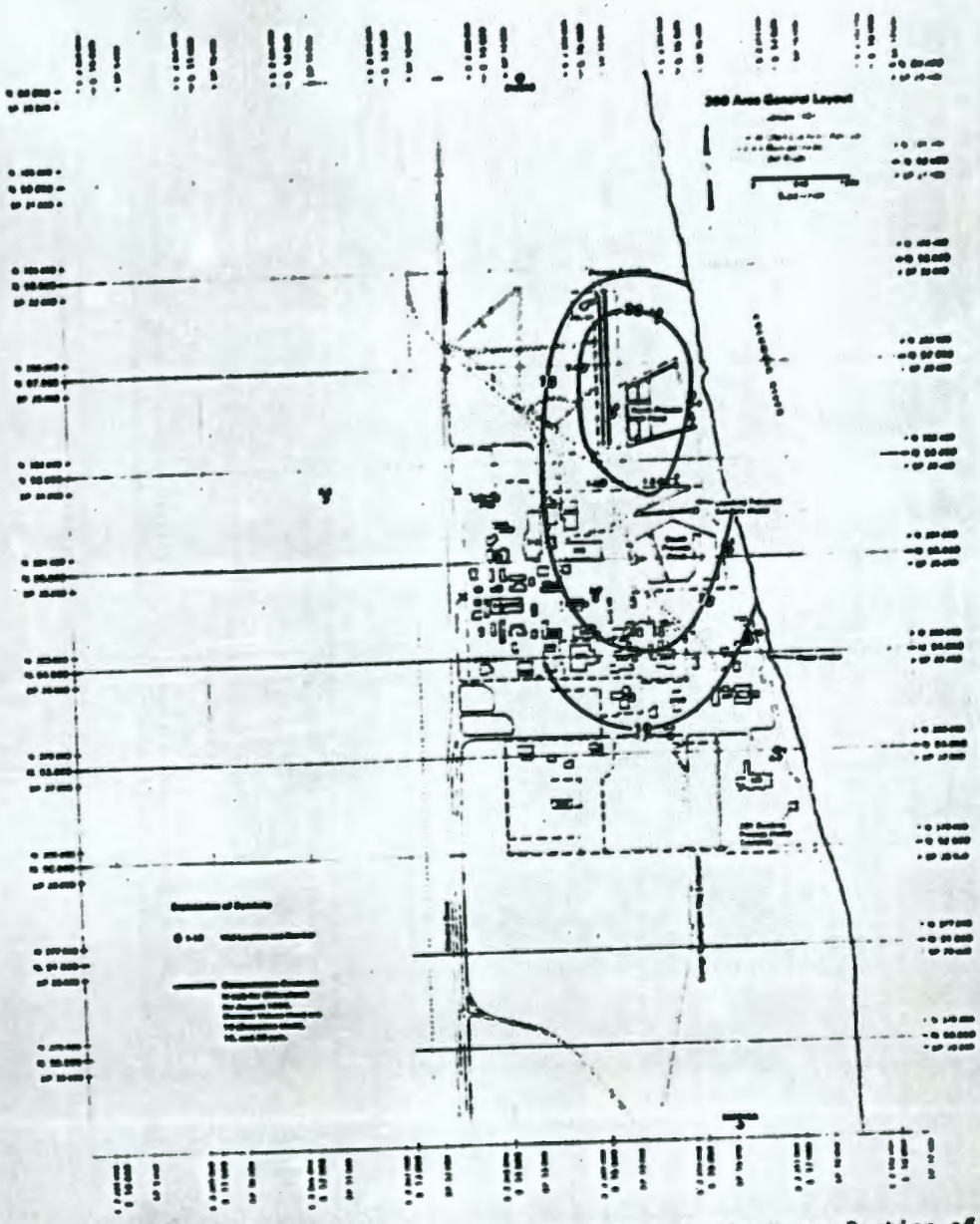

FIGURE 14. Typical Areal Extent of Chloroform in the Upper Portion of the Unconfined Aquifer

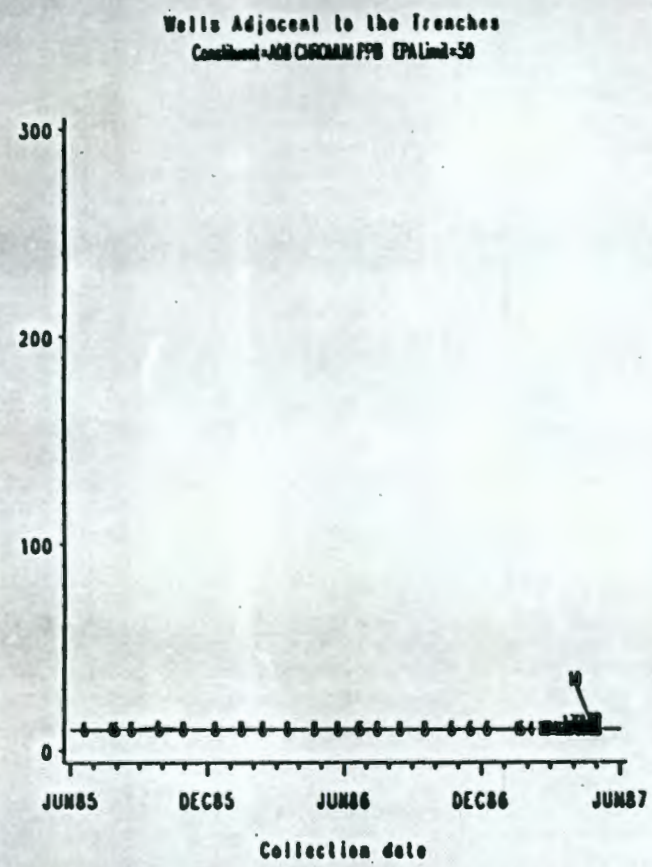

FIGURE 15. Chromium Concentrations in Samples from Monitoring Wells Adjacent to the 300 Area Process Trenches, June 1985 through April 1987

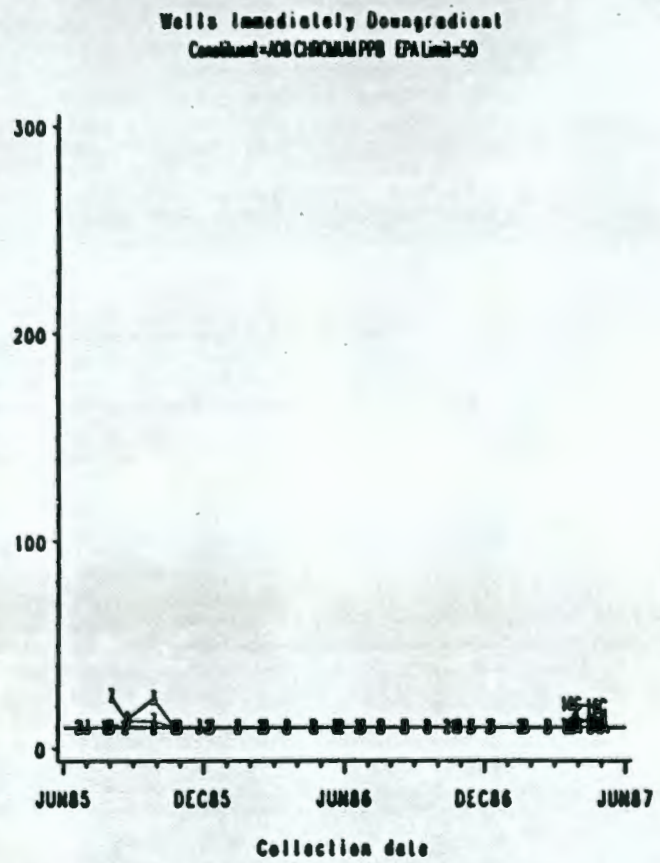

FIGURE 16. Chromium Concentrations in Samples from Monitoring Wells Immediately Downgradient of the 300 Area Process Trenches, June 1985 through April 1987

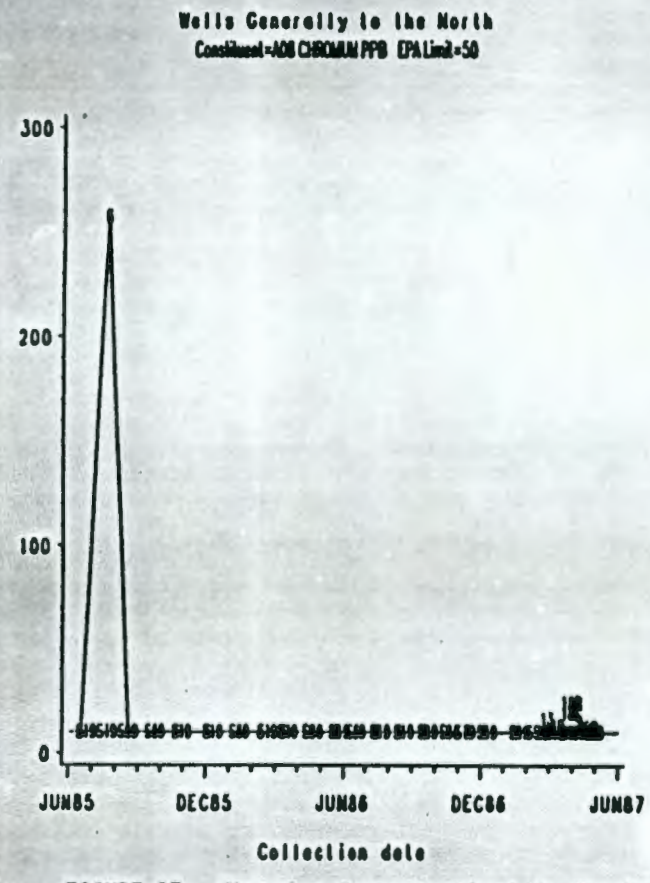

FIGURE 17. Chromium Concentrations in Samples from Monitoring Wells North of the 300 Area Process Trenches, June 1985 through April 1987

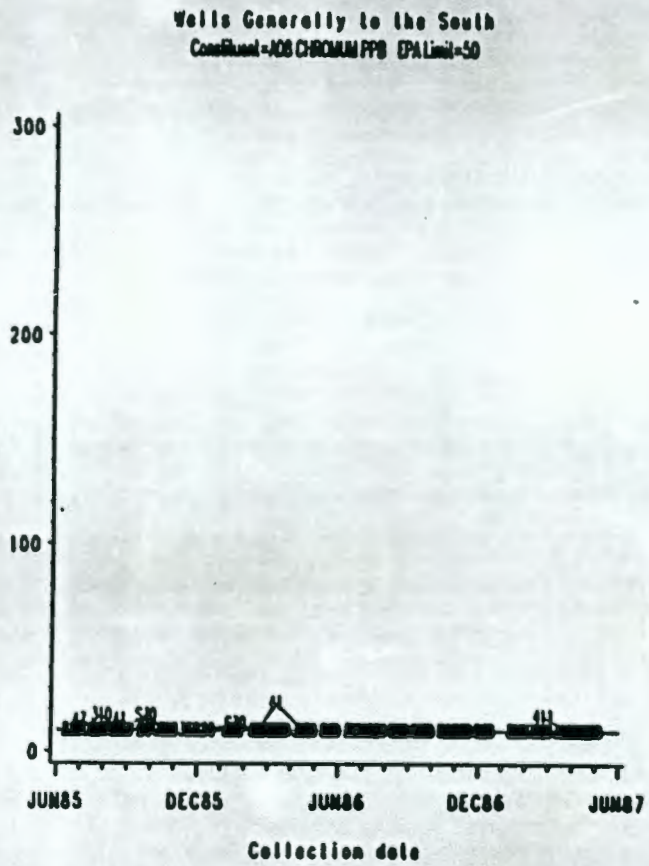

FIGURE 18. Chromium Concentrations in Samples from Monitoring Wells South of the 300 Area Process Trenches, June 1985 through April 1987

levels appear to be declining or remaining constant in all wells in the network, with the exception of well 1-15, where nitrate increased from 5,280 to 16,900 ppb in April.

The wells completed in the intermediate and deep portions of the unconfined aquifer generally have a water chemistry that differs from adjacent shallow wells. The deeper wells generally have concentrations of several constituents (i.e., ammonium, barium, chromium, fluoride, iron, manganese, potassium, sodium, and sulfate) that are 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 differences in the portions of the unconfined aquifer and the confined aquifer being sampled. For example, the concentrations of fluoride are consistently higher in all intermediate and deep wells, regardless of their location relative to the process trenches (Figures 19, 20, 21, and 22). This suggests that the contribution of these constituents to the lower portions of the unconfined aquifer and to the confined aquifer is attributable to a source other than the trenches. The concentrations of fluoride in 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 drinking water standard. The levels of fluoride and the other constituents will be evaluated closely in the future so that more substantive conclusions may be drawn.

Several organic compounds were detected in wells during March and April. Specifically, methylene chloride was reported above detection limits in samples from wells 3-7 (3000 ppb) and 3-10 (300 ppb), as shown in Figure 23. The concentration of methylene chloride in samples from both wells is usually below detection limits, but it was detected in both wells in March and April 1986. Perchloroethylene (PCE) in well 8-2, reported above detection limits in March, was not detected in April. Trichloroethylene (TCE) in samples from well 1-16B, which was first reported in March at 20 ppb, rose slightly to 22 ppb in April. Both values are above the proposed maximum concentration limit of 5 ppb for drinking water. Although the concentration of 1,1,1-trichloroethane (1,1,1-TCA) in samples from well 8-2 was reported to be 83 ppb in March, it was not detected in April. Trans-1,2-dichloroethylene (trans-1,2-DCE) has been

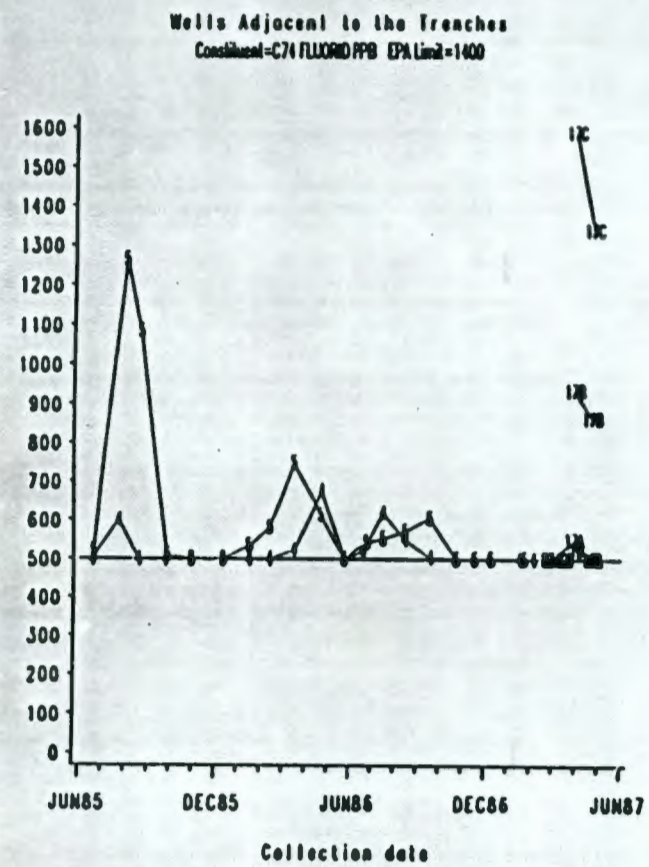

FIGURE 19. Fluoride Concentrations in Samples from Monitoring Wells Adjacent to the 300 Area Process Trenches, June 1985 through April 1987

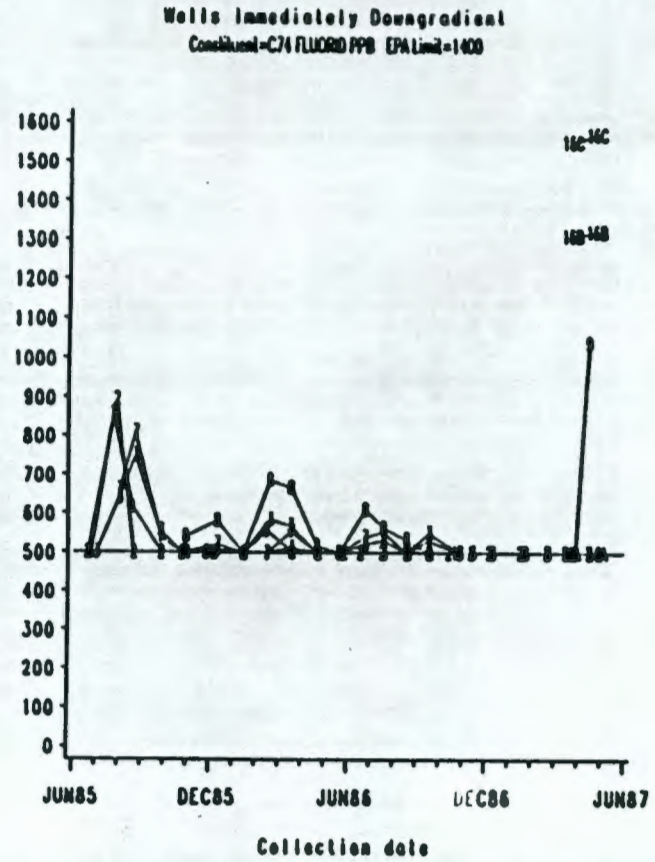

FIGURE 20. Fluoride Concentrations in Samples from Monitoring Wells Immediately Downgradient of the 300 Area Process Trenches, June 1985 through April 1987

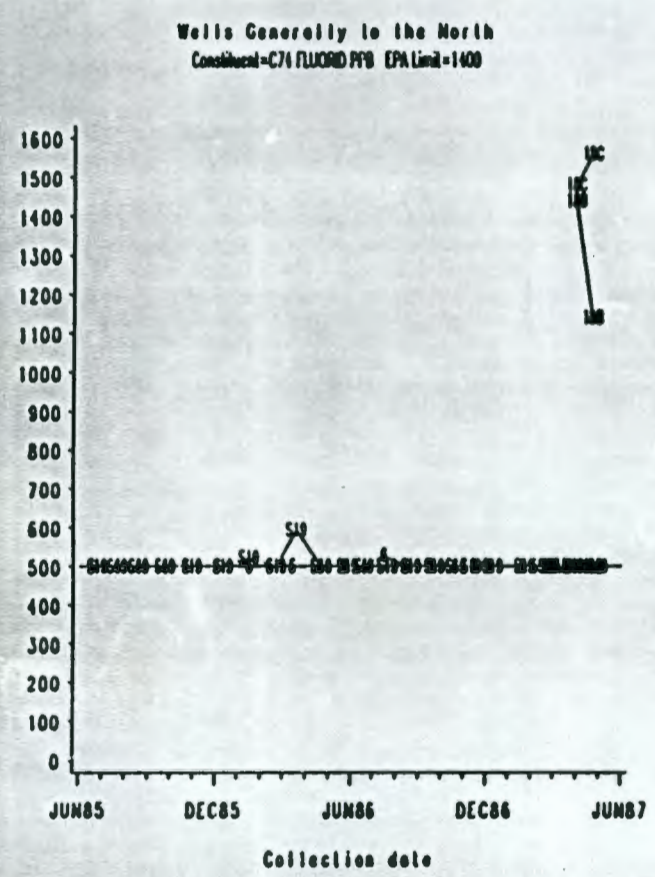

FIGURE 21. Fluoride Concentrations in Samples from Monitoring Wells North of the 300 Area Process Trenches, June 1985 through April 1987

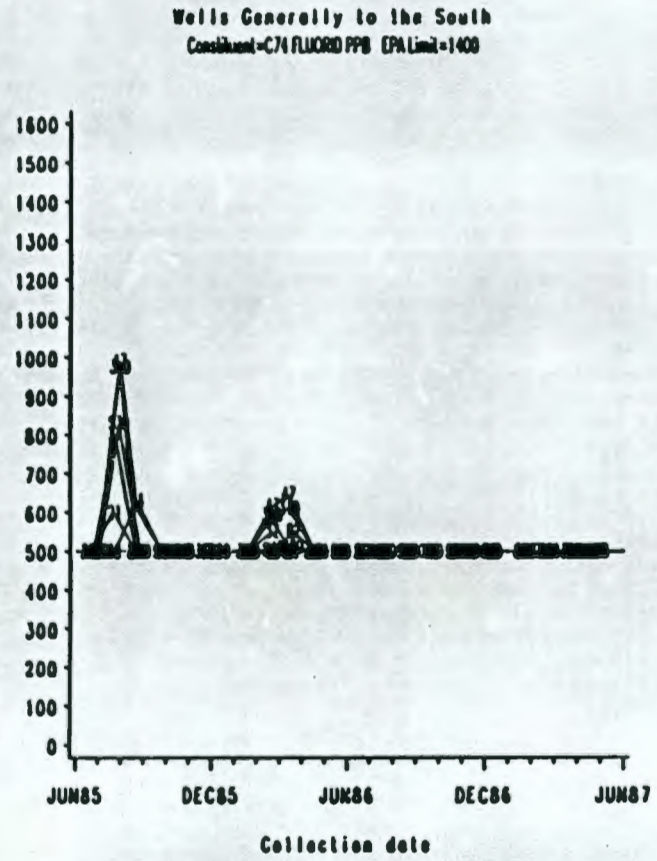

FIGURE 22. Fluoride Concentrations in Samples from Monitoring Wells South of the 300 Area Process Trenches, June 1985 through April 1987

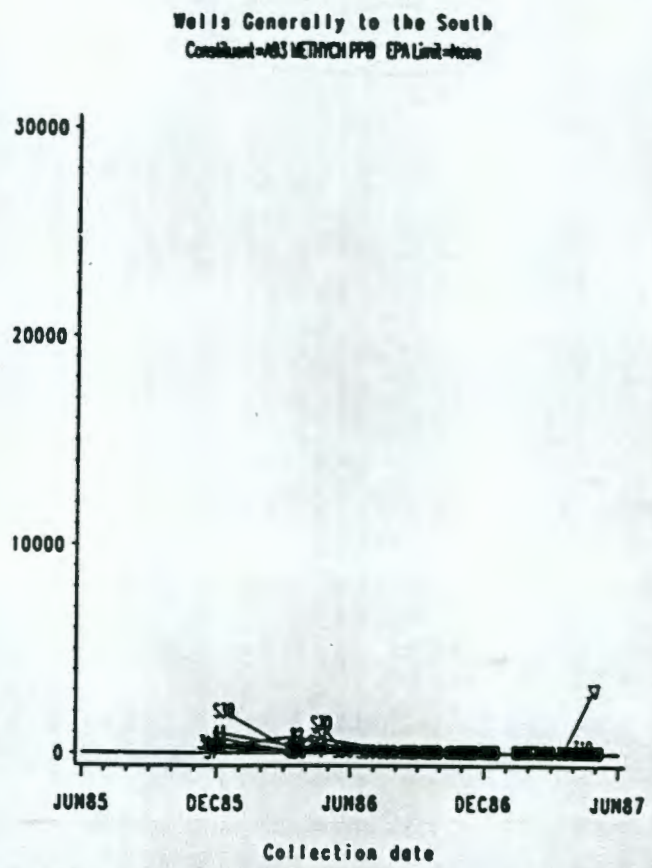

FIGURE 23. Methylene Chloride Concentrations in Samples from Monitoring Wells South of the 300 Area PRocess Trenches, June 1985 through April 1987

identified in samples from wells 1-16B and 1-17B. Concentrations detected in 1-16B and 1-17B in March were 66 and 28 ppb, respectively. In April, 71 and 31 ppb were detected in 1-16B and 1-17B, respectively. The recommended maximum contaminant level for trans-1,2-DCE is 70 ppb. Total organic halogen concentrations were above detection limits in wells 3-10 (225 ppb) and 4-7 (369 ppb). The high concentrations of methylene chloride detected in 3-7 could account for the level of TOX detected in samples from that well (Figure 24).

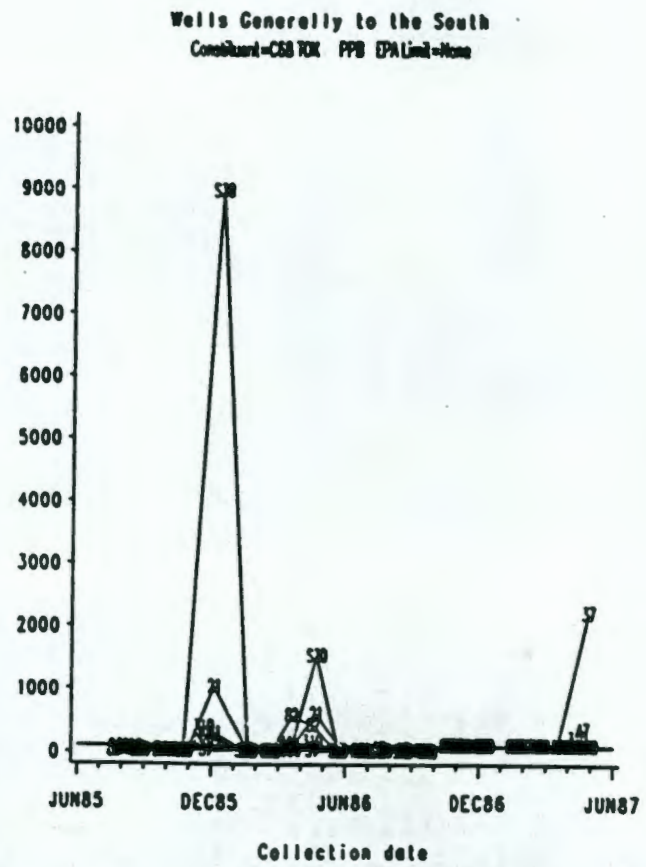

FIGURE 24. TOX Concentrations in Samples from Monitoring Wells South of the 300 Area PRocess Trenches, June 1985 through April 1987

The high concentrations of methylene chloride in wells 3-7 and 3-10 and the presence of trans-1,2-DCE in wells 1-16B and 1-17B are of particular concern. Results from the analysis of blanks submitted with samples from wells 3-7 and 3-10 do not indicate inadvertent contamination of samples with methylene chloride in the field or laboratory. Subsequent analyses will verify the levels of methylene chloride detected. The laboratory routinely reports the presence of up to 5 compounds seen in the analyses that are not included in the group of volatile organic compounds requested. Thus, the presence of trans-1,2-DCE was first noted by the laboratory in March samples and subsequently

also in April samples. To further verify the presence of this compound, two samples will be taken from each well in clusters 1-16 and 1-17 during June and analyzed for the extended volatile organic compound list which includes trans-1,2-DCE. Current results for trans-1,2-DCE are summarized in Table 2.

Examination of the water-level data tables in the interim characterization report resulted in the discovery of a dramatic decline of 20 feet in the water level in well 399-1-16C from February (the month in which it was installed) to May 1987. This deep well is screened in the confined aquifer. No large decline in water levels has been noted in the other deep wells in other well clusters. An examination of the ground-water chemistry data from the special, early June sampling of well 1-16C shows the presence of trans-1,2-DCE, which has only been detected previously 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. Otherwise, chloroform has only been detected in shallow wells in the unconfined aquifer. Thus, both chloroform and trans-1,2-DCE were detected in this well (1-16C) screened

TABLE 2. Concentrations (ppb) of Trans-1,2-dichloroethylene in the Vicinity of the 300 Area Process Trenches During 1987

Well No.	March	April	June
1-8	D[a]	D	-[b]
1-16A	-	-	D
1-16B	66	71	67
1-16C	-	-	20
1-17A	-	-	D
1-17B	28	31	27
1-17C	-	-	D
1-18A	-	-	-
1-18B	D	D	-
1-18C	-	-	-

(a) D = less than detection limit (10 ppb).
(b) - = not samples for constuent of interest.

in the confined aquifer; however, these constituents are indigenous for two different intervals of the unconfined aquifer. Apparently all intervals of the unconfined aquifer have been hydraulically interconnected locally as a result of inadequate sealing of well 1-16C or (more likely) of adjacent well 1-16D. Data are being collected to confirm the identification of well 1-16D as the improperly sealed well. Alternatives for regaining hydraulic isolation between the unconfined and confined aquifers in this area are being investigated. During the sampling of wells 1-16C and 1-16D for special volatile organics analyses in June, the wells were purged approximately 0.1 equivalent volume to obtain a representative sample of the water in the confined aquifer and intermediate zone and to avoid creating a downward vertical gradient.

A draft of the Interim Characterization Report has been typed and is scheduled for peer review in late July. Originally, it was to be published this quarter. Because of difficulty in completing all of the figures, it has been rescheduled for release to the State and the USEPA for comments during the next quarter.

183-H SOLAR EVAPORATION BASINS

Work described in the previous quarterly report (USDOE 1987c) focused on issuance of the 183-H interim characterization report and completion of Phase III site characterization. Both activities were completed in this quarter and are described in this report. The document Interim Characterization Report for the Area Surrounding the 183-H Basins (USDOE 1987d) was issued to the State and USEPA in May 1987.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

Phase III expansion of the ground-water monitoring network around 183-H has been described in previous reports (USDOE 1987c,d). This work entailed drilling three additional monitoring wells, completing all planned aquifer tests, and incorporating the additional wells into the routine monitoring network. This work was accomplished during this reporting period.

Well Drilling Effort

The three additional wells were completed by May 26, 1987. The locations of these and all other 100-H Area wells are shown in Figure 25. Well construction summaries and geologists', geophysical, and construction logs for these new wells are contained in Appendix C. Well 199-H4-16 was drilled, tested, and immediately sampled for selected constituents. As these samples were analyzed, well 199-H4-17 was drilled. The analysis of ground water from well 199-H4-16 indicated that the well was outside the contamination plume from 183-H and so well 199-H4-18 was drilled between 183-H and well 199-H4-16. All of the wells were completed in the unconsolidated Hanford Formation sediments above the Ringold Formation.

Hydrogeologic Characterization Effort

Between April 20 and May 22, 1987, additional aquifer tests were conducted in nine wells. A summary of hydrologic testing around 183-H to date is presented in Table 3. Those wells tested during this reporting period are designated with an asterisk in front of the well name. Slug tests were conducted in piezometers 199-H4-15(R) and (Q) and those data are still being analyzed.

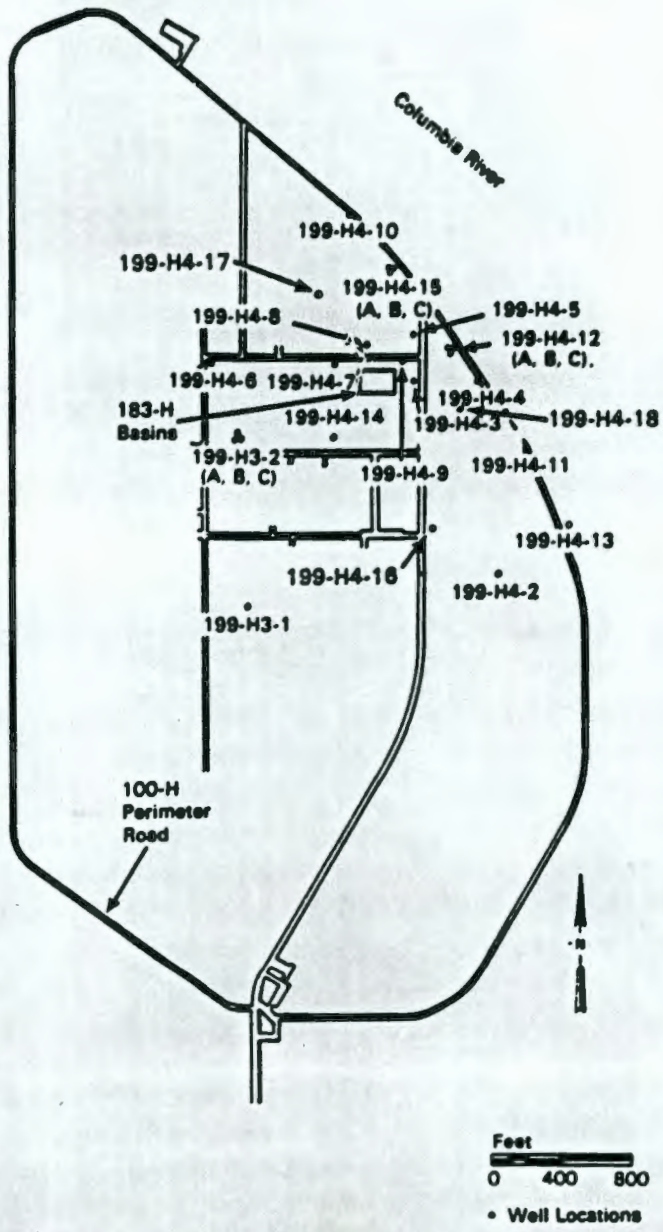

FIGURE 25. Locations of 100-H Area Monitoring Wells

TABLE 3. Summary of Hydrologic Testing and Characterization in 100-H Area

Well Name	Screened Interval	Formation	Height Water Col	Transm. (ft sq/d)	Hydraulic Con. (ft/d)	Date Tested
199-H3-2A	36-51	Uncon Seds	10	19,000	1,900	10/27/86
*199-H3-2B	50-55	Uncon Seds	16	1,100	220	04/20/87
*199-H3-2C	100-110	Ringold	70	600	60	04/23/87
199-H4-7	38-53	Uncon Seds	10	375	37	05/04/87
199-H4-8	38-48	Uncon Seds	4	-	-	-
199-H4-9	36-46	Uncon Seds	3	-	-	-
199-H4-10	23-38	Uncon Seds	10	53,500	5,900	09/18/86
199-H4-11	38-58	Uncon Seds	190	1,070	71	10/06/86
199-H4-12A	33-48	Uncon Seds	10	2,670	213	10/20/86
*199-H4-12B	45-50	Uncon Seds	13	95	19	04/27/87
*199-H4-12C	72-82	Ringold	46	1,400	140	04/28/87
100-H4-13	37-52	Uncon Seds	10	4,240	24	04/30/87
199-H4-14	38-53	Uncon Seds	10	1,050	app. (250)	12/02/86
199-H4-15A	27-42	Uncon Seds	10	2,340	195	11/06/86
*199-H4-15B	37-42	Uncon Seds	12	5,500	460	04/24/87
199-H4-15(S)	78-80	Ringold	50	-	-	-
*199-H4-15(R)	194-196	Ringold	160	High	-	05/08/87
*199-H4-15(Q)	295-297	Ringold	293	Low	-	05/08/87
199-H4-15(P)	325-327	Ringold	327	-	-	-
*199-H4-16	43-58	Uncon Seds	10	4,410	350	04/27/87
199-H4-17	35-45	Uncon Seds	4	-	-	-
*199-H4-18	40-50	Uncon Seds	7	535	76	05/22/87

The results presented in Table 3 for the nine tests conducted most recently are preliminary and may be revised for the final report.

Major findings to date, based on the preliminary data, are

1) Portions of the Ringold Formation are as permeable as the unconsolidated sediments at the three locations tested. These locations were selected because high permeability was suspected based on observed geologic properties. The permeable zones tested within

the Ringold Formation are 40 to 50 ft below the contact between the unconsolidated sediments and the Ringold Formation that is assumed to be a low-permeability boundary.

2) The distributions of transmissivity and hydraulic conductivity values are log normal and span 2.5 orders of magnitude. The average transmissivity is 1,862 ft^2/d but it ranges from 8,900 to 400 ft^2/d within one standard deviation.

3) The upper and lower portions of the unconsolidated sediments demonstrate permeability contrasts over 1.5 orders of magnitude at the same well cluster.

ROUTINE SAMPLING AND ANALYSIS OF GROUND WATER

The ground water around 183-H has been routinely sampled and analyzed monthly since June 1985. The results of ground-water monitoring activities for the current quarter are discussed in the following two subsections.

Collection and Analysis

Monthly sampling of 5 original and 15 Phase II monitoring wells was continued throughout the quarter. In addition, the 3 new Phase III wells were sampled for the first time in June 1987. This total of 23 wells are now sampled monthly for the 183-H project. Most of the ground-water samples were analyzed for the standard list of constituents (see Table 2 in USDOE 1986d). To satisfy regulatory requirements and to ensure that no contaminants were overlooked, additional analyses (listed in Table 3 of USDOE 1986d) were performed once during the quarter for upgradient well 199-H3-1 and downgradient well 199-H4-3.

A special sample was collected from well 199-H4-16 shortly after reaching total depth for the well. The sample was collected to support a decision on where to locate well 199-H4-18. Analyses included total beta, total alpha, nitrate, and metals, which were determined by inductively coupled plasma (ICP) to obtain chromium and sodium concentrations.

Discussion of Results

Analytical data obtained from samples collected for the 183-H project between March and May 1987 are included in this report. Results for samples collected in June will be included in the next progress report. Complete analyses could not be obtained in time to be incorporated in this report.

Analytical results from this reporting period are comparable to the data reported previously. In general, elevated levels of sodium, chromium, nitrate, total beta, total alpha, and chloroform are present in the contamination plume attributed to the 183-H facility.

A summary of all sample analyses for March through May 1987 is presented in Table 4. For those constituents that were undetected during this period, three asterisks appear in the column labeled "Below Detection." Otherwise, the column contains a count of samples below the limit. Any constituent having at least one value above the regulatory standard or a screening limit are marked with three Xs in the column labeled "Limits Exceed." The actual analytical data are presented in Appendix B.

Paired Figures 26 and 27, 28 and 29, and 30 and 31 show the levels of conductivity, sodium, and nitrate, respectively, in selected wells through May 1987. These figures are presented to show that concentrations of various chemical constituents in well 199-H4-3 have decreased from a February 1987 high. As reported in previous quarterly reports (USDOE 1987a,c) and in the interim characterization report (USDOE 1987d), these trends are related to fluctuations in the elevation of the water table in response to river stage. Water-table elevations for selected wells and smoothed water levels in the Columbia River near the 100-N Area are presented in Figures 32 and 33, respectively.

Analyses of the water sample collected from well 199-H4-16 showed that concentrations of key parameters used to define the extent of the 183-H contaminant plume (i.e., sodium, nitrate, total beta, and total alpha) were similar to those found in upgradient wells. Based on these data, well 199-H4-16 was determined to be outside the 183-H contaminant plume and, therefore, well 199-H4-18 was drilled between well 199-H4-16 and 183-H. Data from 199-H4-18 should provide additional resolution of the extent of the contaminant plume. These data will be presented in the next quarterly report.

TABLE 4. Summary of Results from Samples Taken in Wells in the 100-H Area, March-May 1987

Constituent List-Contamination Indicators

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Regulatory Limits Limit	Agency	Exceed	Full name
191	CONDUCT	UMHO	1	88	0	.			Specific conductance
199	PH		.1	88	0	.			pH
C68	TOX	PPB	100	88	55	.			Total organic halogen
C69	TOC	PPB	1000	88	53	.			Total organic carbon

Constituent List-Drinking Water Standards

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
100	COLIFRM	MPN	2.2	88	50		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	0	81	0		50	EPA	xxx	Gross beta
181	RADIUM	PCI/L	1	80	10		5	EPA		Radium
212	LOALPHA	PCI/L	4	81	4		15	EPA	xxx	Gross alpha
A06	BARIUM	PPB	0	81	0		1000	EPA		Barium
A07	CADMIUM	PPB	2	81	81	•••	10	EPA		Cadmium
A08	CHROMUM	PPB	10	81	3		50	EPA	xxx	Chromium
A10	SILVER	PPB	10	81	81	•••	50	EPA		Silver
A20	ARSENIC	PPB	5	88	53		50	EPA		Arsenic
A21	MERCURY	PPB	.1	88	88	•••	2	EPA		Mercury
A22	SELENUM	PPB	5	88	88	•••	10	EPA		Selenium
A33	ENDRIN	PPB	1	38	38	•••	.2	EPA		Endrin
A34	METHLOR	PPB	1	38	38	•••	100	EPA		Methoxychlor
A35	TOXAENE	PPB	1	38	38	•••	5	EPA		Toxaphene
A36	a-BHC	PPB	1	38	38	•••	4	EPA		Alpha-BHC
A37	b-BHC	PPB	1	38	38	•••	4	EPA		Beta-BHC
A38	g-BHC	PPB	1	38	38	•••	4	EPA		Gamma-BHC
A39	d-BHC	PPB	1	38	38	•••	4	EPA		Delta-BHC
A51	LEADGF	PPB	5	88	59		50	EPA		Lead (graphite furnace)
C72	NITRATE	PPB	500	81	0		45000	EPA	xxx	Nitrate
C74	FLUORID	PPB	500	88	58		1400	EPA		Fluoride
H13	2,4-D	PPB	1	38	38	•••	100	EPA		2,4-D
H14	2,4,5TP	PPB	1	38	38	•••	10	EPA		2,4,5-TP silvex
H20	FBARIUM	PPB	0	88	0		1000	EPA		Barium, filtered
H21	FCADMIU	PPB	2	88	88	•••	10	EPA		Cadmium, filtered
H22	FCHROMI	PPB	10	88	1		50	EPA	xxx	Chromium, filtered
H23	FSILVER	PPB	10	88	88	•••	50	EPA		Silver, filtered
H37	FARSENI	PPB	5	88	54		50	EPA		Arsenic, filtered
H38	FMERCUR	PPB	.1	88	88	•••	2	EPA		Mercury, filtered
H39	FSELENI	PPB	5	88	59		10	EPA		Selenium, filtered
H41	FLEAD	PPB	5	88	59		50	EPA		Lead, filtered

TABLE 4. (contd)

Constituent List-Quality Characteristics

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceed	Full name
A11	SODIUM	PPB	100	61	0		.		Sodium
A17	MANGESE	PPB	5	61	33		.		Manganese
A19	IRON	PPB	50	61	23		.		Iron
C57	PHENOL	PPB	10	2	2	***	.		Phenol
C73	SULFATE	PPB	500	60	0		.		Sulfate
C75	CHLORID	PPB	500	60	0		.		Chloride
H24	FSODIUM	PPB	100	60	0		.		Sodium, filtered
H29	FMANGAN	PPB	5	60	43		.		Manganese, filtered
H31	FIRON	PPB	50	60	51		.		Iron, filtered
H57	LPHENOL	PPB	1	38	38	***	.		Phenol, low DL

Constituent List-Site Specific

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceed	Full name
018	CO	PCI/L	22.5	2	2	***	.		Cobalt-60
024	CS-137	PCI/L	20	2	2	***	.		Cesium-137
034	RU	PCI/L	172.5	2	2	***	.		Ruthenium-106
121	SR	PCI/L	5	2	1		.		Strontium-90
124	U-CHEM	UG/L	.725	2	0		.		Natural uranium
A03	STRONUM	PPB	300	60	44		.		Strontium
A04	ZINC	PPB	5	61	14		.		Zinc
A05	CALCIUM	PPB	50	61	0		.		Calcium
A12	NICKEL	PPB	10	61	51		.		Nickel
A13	COPPER	PPB	10	61	40		1300	EPAP	Copper
A14	VANADUM	PPB	5	61	0		.		Vanadium
A16	ALUMNUM	PPB	150	61	46		.		Aluminum
A18	POTASUM	PPB	100	61	0		.		Potassium
A50	MAGNES	PPB	0	61	0		.		Magnesium
A67	1,1,1-T	PPB	10	60	60	***	200	EPAP	1,1,1-trichloroethane
A70	PERCENE	PPB	10	60	60	***	.		Perchloroethylene
A80	CHLFORM	PPB	10	60	17		.		Chloroform
A93	METHYCN	PPB	10	60	52		.		Methylene chloride
C86	AMMONIU	PPB	50	60	47		.		Ammonium ion
H18	FZINC	PPB	5	60	32		.		Zinc, filtered
H19	FCALCIU	PPB	50	60	0		.		Calcium, filtered
H25	FNICKEL	PPB	10	60	52		.		Nickel, filtered
H26	FCOPPER	PPB	10	60	55		1300	EPAP	Copper, filtered
H27	FVANADI	PPB	5	60	15		.		Vanadium, filtered
H28	FALUMIN	PPB	150	60	55		.		Aluminum, filtered
H30	FPOTASS	PPB	100	60	0		.		Potassium, filtered
H32	FMAGNES	PPB	0	60	0		.		Magnesium, filtered
H35	FSTRONT	PPB	300	60	44		.		Strontium, filtered

TABLE 4. (contd)

Constituent List-Tag-along

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceed	Full name
A61	BERYLAM	PPB	5	60	60	***	.		Beryllium
A62	BSMIUM	PPB	300	60	60	***	.		Barium
A15	ANTIONY	PPB	100	60	60	***	.		Antimony
A61	TETRANE	PPB	10	60	60	***	5	EPAP	Tetrachloromethane
A64	METNONE	PPB	10	60	66	***	.		Methyl ethyl ketone
A66	1,1,2-T	PPB	10	60	60	***	.		1,1,2-trichloroethane
A69	TRICENE	PPB	10	60	60	***	5	EPAP	Trichloroethylene
A71	OPXYLE	PPB	10	66	60	***	440	EPAP	Xylene-o,p
B14	M-XYLE	PPB	10	60	60	***	440	EPAP	Xylene-m
C70	PHOSPHA	PPB	1000	60	60	***	.		Phosphate
N33	FBERYLL	PPB	5	60	60	***	.		Beryllium, filtered
N34	FBSMIUM	PPB	300	60	60	***	.		Barium, filtered
N36	FANTIMO	PPB	100	60	60	***	.		Antimony, filtered

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceed	Full name
A23	THALIUM	PPB	10	2	2	***	.		Thallium
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	***	8	EPAP	Heptachlor
A44	HEPTIDE	PPB	1	2	2	***	8	EPAP	Heptchlor epoxide
A46	DIELRIN	PPB	1	2	2	***	.		Dieldrin
A47	ALDRIN	PPB	1	2	2	***	.		Aldrin
A48	CHLOANE	PPB	1	2	2	***	8	EPAP	Chlordane
A49	END01	PPB	1	2	2	***	.		Endosulfan I
A52	END02	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
A68	TOLUENE	PPB	10	2	2	***	2000	EPAP	Toluene
A72	ACROLIN	PPB	10	2	2	***	.		Acrolein
A73	ACRYLE	PPB	10	2	2	***	.		Acrylonitrile
A74	BISTHER	PPB	10	2	2	***	.		Bis(chloromethyl) ether
A75	BROMONE	PPB	10	2	2	***	.		Bromoacetone
A76	METNBRO	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-WAC 173-303-9905

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

TABLE 4. (contd)

Constituent List-WAC 173-303-9905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
844	CHALETH	PPB	10	2	2	***		.		Chloroalkyl ethers
845	CHLANIL	PPB	10	2	2	***		.		P-chloroaniline
846	CHLCRES	PPB	10	2	2	***		.		P-chloro-m-cresol
847	CHLEPOX	PPB	10	2	2	***		.		1-chloro-2,3-epoxypropane
848	CHLNAPH	PPB	10	2	2	***		.		2-chloronaphthalene
849	CHLPHEN	PPB	10	2	2	***		.		2-chlorophenol
850	CHRYSEN	PPB	10	2	2	***		.		Chrysene
851	CRESOLS	PPB	10	2	2	***		.		Cresols
852	CYCHDIN	PPB	10	2	2	***		.		2-cyclohexyl-4,6-dinitrophenol
853	DIBAHAC	PPB	10	2	2	***		.		Dibenz[a,h]acridine
854	DIBAJAC	PPB	10	2	2	***		.		Dibenz[a,j]acridine
855	DIBAHAN	PPB	10	2	2	***		.		Dibenz[a,h]anthracene
856	DIBCGCA	PPB	10	2	2	***		.		7H-dibenzo[c,g]carbazole
857	DIBAEPY	PPB	10	2	2	***		.		Dibenzo[a,e]pyrene
858	DIBAHPY	PPB	10	2	2	***		.		Dibenzo[a,h]pyrene
859	DIBAIPY	PPB	10	2	2	***		.		Dibenzo[a,i]pyrene
860	DIBPHTN	PPB	10	2	2	***		.		Di-n-butyl phthalate
861	12-dben	PPB	10	2	2	***		.		1,2-dichlorobenzene
862	13-dben	PPB	10	2	2	***		.		1,3-dichlorobenzene
863	14-dben	PPB	10	2	2	***		.		1,4-dichlorobenzene
864	DICNBEN	PPB	10	2	2	***		.		3,3'-dichlorobenzidine
865	24-dchp	PPB	10	2	2	***		.		2,4-dichlorophenol
866	26-dchp	PPB	10	2	2	***		.		2,6-dichlorophenol
867	DIEPHTN	PPB	10	2	2	***		.		Diethyl phthalate
868	DIHYSAF	PPB	10	2	2	***		.		Dihydrosafrole
869	DIMETHB	PPB	10	2	2	***		.		3,3'-dimethoxybenzidine
870	DIMEANB	PPB	10	2	2	***		.		P-dimethylaminoazobenzene
871	DIMBENZ	PPB	10	2	2	***		.		7,12-dimethylbenz[a]anthracene
872	DIMEYLB	PPB	10	2	2	***		.		3,3'-dimethylbenzidine
873	THIONOX	PPB	10	2	2	***		.		Thiofanox
874	DIMPHAM	PPB	10	2	2	***		.		Alpha,alpha-dimethylphenethylamine
875	DIMPHEN	PPB	10	2	2	***		.		2,4-dimethylphenol
876	DIMPHTN	PPB	10	2	2	***		.		Dimethyl phthalate
877	DINBENZ	PPB	10	2	2	***		.		Dinitrobenzene
878	DINCRES	PPB	10	2	2	***		.		4,6-dinitro-o-cresol and salts
879	DINPHEN	PPB	10	2	2	***		.		2,4-dinitrophenol
880	24-dint	PPB	10	2	2	***		.		2,4-dinitrotoluene
881	26-dint	PPB	10	2	2	***		.		2,6-dinitrotoluene
882	DIOPHTN	PPB	10	2	2	***		.		Di-n-octyl phthalate
883	DIPHAMI	PPB	10	2	2	***		.		Diphenylamine
884	DIPHHYD	PPB	10	2	2	***		.		1,2-diphenylhydrazine
885	DIPRNIT	PPB	10	2	2	***		.		Di-n-propylnitrosamine
886	ETHMINE	PPB	10	2	2	***		.		Ethylenimine
887	ETHMETS	PPB	10	2	2	***		.		Ethyl methanesulfonate
888	FLUORAN	PPB	10	2	2	***		.		Fluoranthene
889	HEXCBEN	PPB	10	2	2	***		.		Hexachlorobenzene
890	HEXCBUT	PPB	10	2	2	***		.		Hexachlorobutadiene
891	HEXCCYC	PPB	10	2	2	***		.		Hexachlorocyclopentadiene
892	HEXCETH	PPB	10	2	2	***		.		Hexachloroethane
893	INDENOP	PPB	10	2	2	***		.		Indeno(1,2,3-cd)pyrene
894	ISOSOLE	PPB	10	2	2	***		.		Isosafrole
895	MALONIT	PPB	10	2	2	***		.		Malononitrile
896	MELPHAL	PPB	10	2	2	***		.		Melphalan

TABLE 4. (contd)

Constituent List=WAC 173-303-8905

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceed	Full name
B97	METHAPY	PPB	10	2	2	ooo	.			Methapyrilene
B98	METHNYL	PPB	10	2	2	ooo	.			Methiolenyl
B99	METAZIR	PPB	10	2	2	ooo	.			2-methylaziridine
C01	METCHAN	PPB	10	2	2	ooo	.			3-methylcholanthrene
C02	METBISC	PPB	10	2	2	ooo	.			4,4'-methylenebis(2-chloroaniline)
C03	METACTB	PPB	10	2	2	ooo	.			2-methylacetonitrile
C04	METACRY	PPB	10	2	2	ooo	.			Methyl methacrylate
C05	METMSUL	PPB	10	2	2	ooo	.			Methyl methanesulfonate
C06	METPROP	PPB	10	2	2	ooo	.			2-methyl-2-(methylthio) propionaldehyde-
C07	METHIOU	PPB	10	2	2	ooo	.			Methylthiouracil
C08	NAPHQUI	PPB	10	2	2	ooo	.			1,4-naphthoquinone
C09	1-naphe	PPB	10	2	2	ooo	.			1-naphthylamine
C10	2-naphe	PPB	10	2	2	ooo	.			2-naphthylamine
C11	NITRANI	PPB	10	2	2	ooo	.			P-nitroaniline
C12	NITBENZ	PPB	10	2	2	ooo	.			Nitrobenzene
C13	NITPHEN	PPB	10	2	2	ooo	.			4-nitrophenol
C14	NNIBUTY	PPB	10	2	2	ooo	.			N-nitrosodi-n-butylamine
C15	NNIDIEA	PPB	10	2	2	ooo	.			N-nitrosodiethanolamine
C16	NNIDIEY	PPB	10	2	2	ooo	.			N-nitrosodiethylamine
C17	NNIDIME	PPB	10	2	2	ooo	.			N-nitrosodimethylamine
C18	NNIMETH	PPB	10	2	2	ooo	.			N-nitrosomethylethylamine
C19	NNIURET	PPB	10	2	2	ooo	.			N-nitroso-N-methylurethane
C20	NNIVINY	PPB	10	2	2	ooo	.			N-nitrosomethylvinylamine
C21	NNIMORP	PPB	10	2	2	ooo	.			N-nitrosomorpholine
C22	NNINICO	PPB	10	2	2	ooo	.			N-nitrosonornicotine
C23	NNIPIPE	PPB	10	2	2	ooo	.			N-nitrosopiperidine
C24	NITRPYR	PPB	10	2	2	ooo	.			Nitrosopyrrolidine
C25	NITRTOL	PPB	10	2	2	ooo	.			5-nitro-o-toluidine
C26	PENTCHB	PPB	10	2	2	ooo	.			Pentachlorobenzene
C27	PENTCHN	PPB	10	2	2	ooo	.			Pentachloronitrobenzene
C28	PENTCHP	PPB	10	2	2	ooo	220	EPAP		Pentachlorophenol
C29	PHENTIN	PPB	10	2	2	ooo	220	EPAP		Phenacetin
C30	PHENINE	PPB	10	2	2	ooo	.			Phenylenediamine
C31	PHTHEST	PPB	10	2	2	ooo	.			Phthalic acid esters
C32	PICOLIN	PPB	10	2	2	ooo	.			2-picoline
C33	PRONIDE	PPB	10	2	2	ooo	.			Pronamide
C34	RESERPI	PPB	10	2	2	ooo	.			Reserpine
C35	RESORCI	PPB	10	2	2	ooo	.			Resorcinol
C36	SAFROL	PPB	10	2	2	ooo	.			Safrol
C37	TETRCHB	PPB	10	2	2	ooo	.			1,2,4,5-tetrachlorobenzene
C38	TETRCHP	PPB	10	2	2	ooo	.			2,3,4,6-tetrachlorophenol
C40	THIURAM	PPB	10	2	2	ooo	.			Thiuram
C41	TOLUDIA	PPB	10	2	2	ooo	.			Toluenediamine
C42	OTOLHYD	PPB	10	2	2	ooo	.			O-toluidine hydrochloride
C43	TRICHLB	PPB	10	2	2	ooo	.			1,2,4-trichlorobenzene
C44	245-trp	PPB	10	2	2	ooo	.			2,4,5-trichlorophenol
C45	246-trp	PPB	10	2	2	ooo	.			2,4,6-trichlorophenol
C46	TRIPHOS	PPB	10	2	2	ooo	.			O,O,O-triethyl phosphorothioate
C47	SYMTRIN	PPB	10	2	2	ooo	.			Sym-trinitrobenzene
C48	TRISPHO	PPB	10	2	2	ooo	.			Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	PPB	10	2	2	ooo	.			Benzo[a]pyrene
C50	CHLNAPZ	PPB	10	2	2	ooo	.			Chloronaphazine
C51	DIS2ETH	PPB	10	2	2	ooo	.			Bis(2-chloroisopropyl)ether
C52	HEXAEME	PPB	10	2	2	ooo	.			Hexachloropropene

TABLE 4. (contd)

Constituent List-WAC 173-303-9906

Code	Constituent Name	Units	Detection Limit	Samples	Below Detection	Regulatory Limits Limit	Agency	Exceed	Full name
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
C70	1235TE	PPB	10	2	2 ***			.	1,2,3,5-tetrachlorobenzene
C71	TETEPYR	PPB	100	2	2 ***			.	Tetraethylpyrophosphate
C72	CHLLATE	PPB	100	2	2 ***			.	Chlorobenzilate
C73	CARBPHT	PPB	2	2	2 ***			.	Carbophenothion
C74	DISULFS	PPB	2	2	2 ***			.	Disulfoton
C75	DIMETHO	PPB	5	2	2 ***			.	Dimethoate
C76	METHPAR	PPB	2	2	2 ***			.	Methyl parathion
C77	PARATHI	PPB	2	2	2 ***			.	Parathion
C78	CYANIDE	PPB	10	2	2 ***			.	Cyanide
C79	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 ***			.	Paraldehyde
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 ***			8	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 carbonate
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	FLUORSA	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
H40	FTHALLI	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

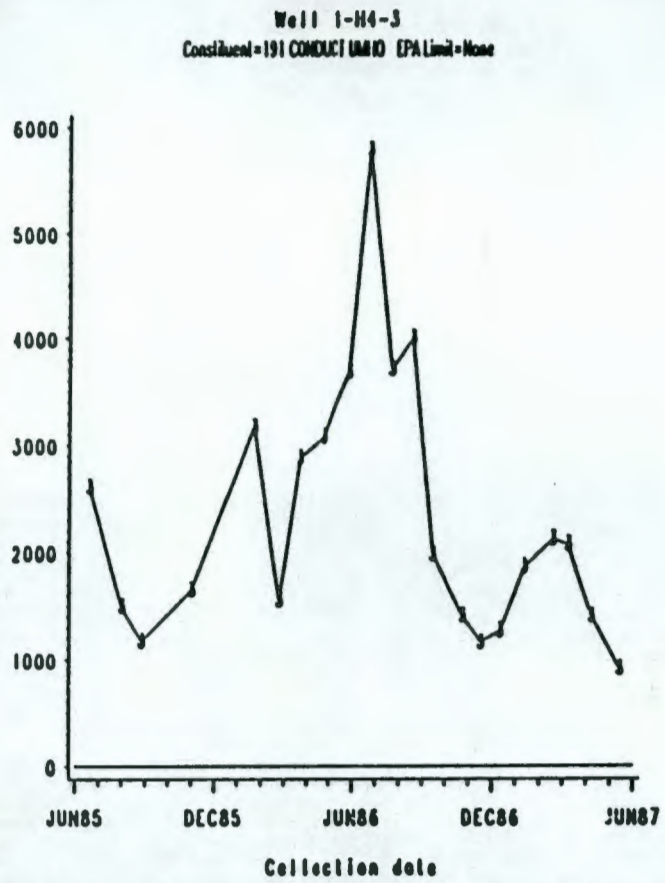

FIGURE 26. Conductivity Levels at Well 1-H4-3, June 1985 to June 1987

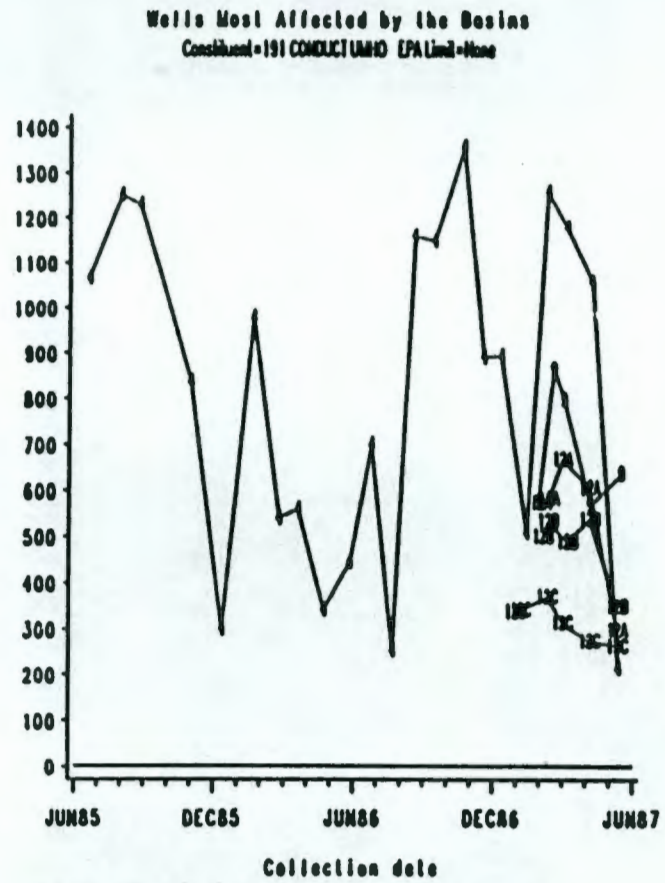

FIGURE 27. Conductivity Levels at Wells Most Affected by the Basins, June 1985 to June 1987

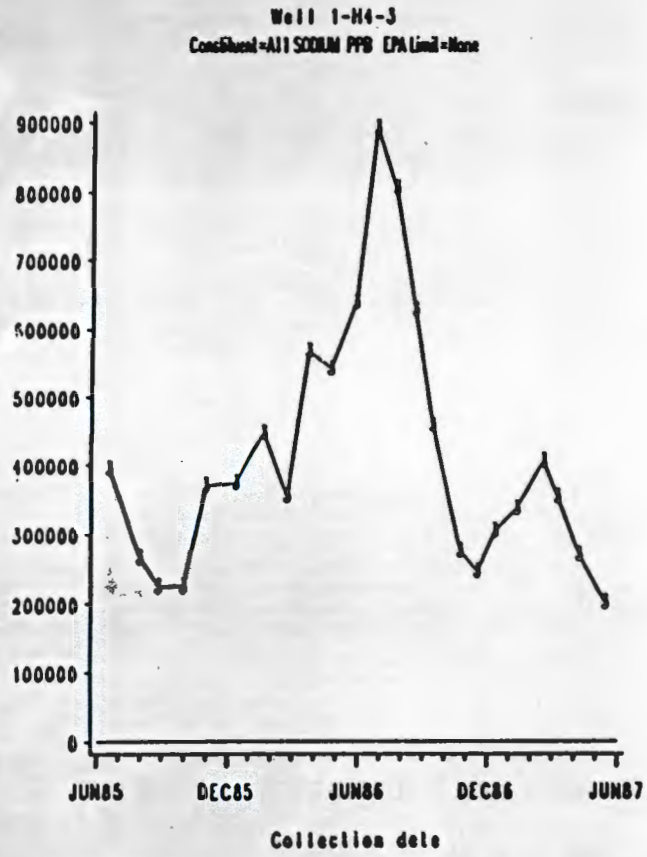

FIGURE 28. Sodium Levels in Samples from Well 1-H4-3, June 1985 to June 1987

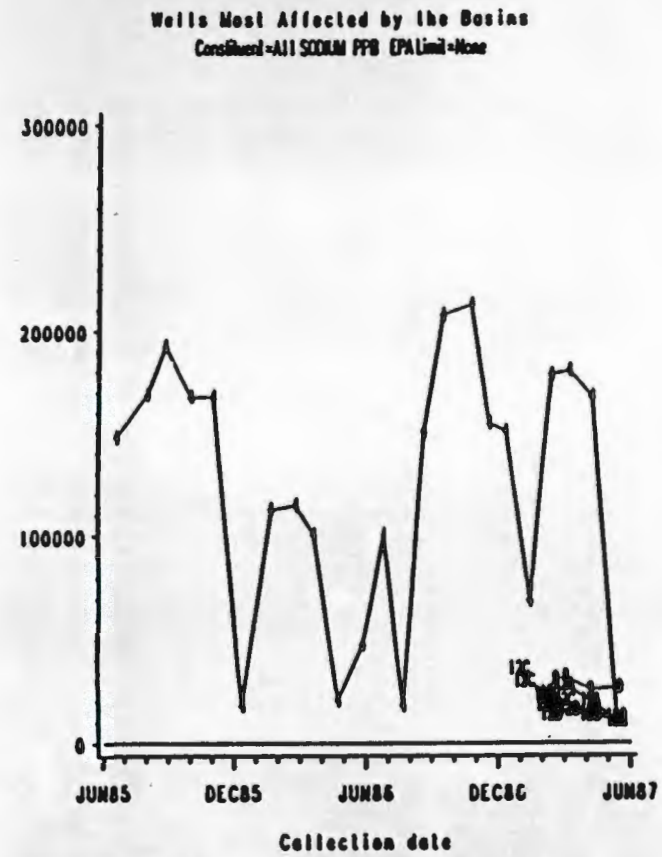

FIGURE 29. Sodium Levels in Samples from Wells Most Affected by the Basins, June 1985 to June 1987

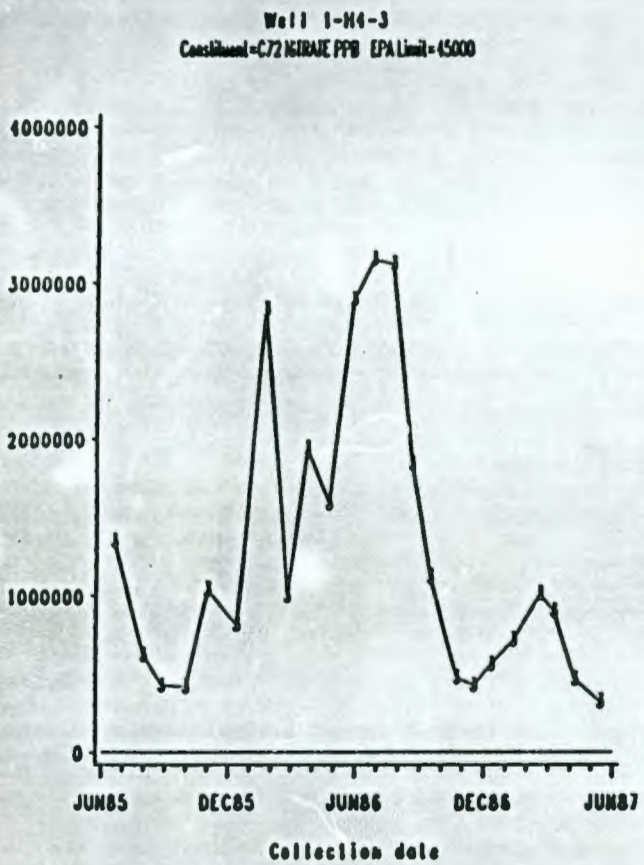

FIGURE 30. Nitrate Levels in Samples from Well 1-H4-3, June 1985 to June 1987

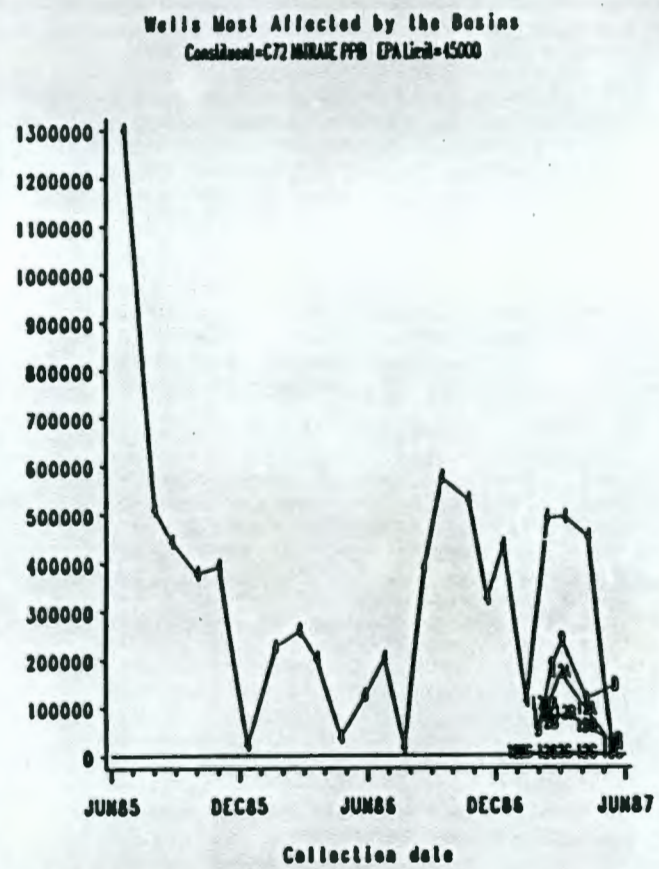

FIGURE 31. Nitrate Levels in Samples from Wells Most Affected by the Basins, June 1985 to June 1987

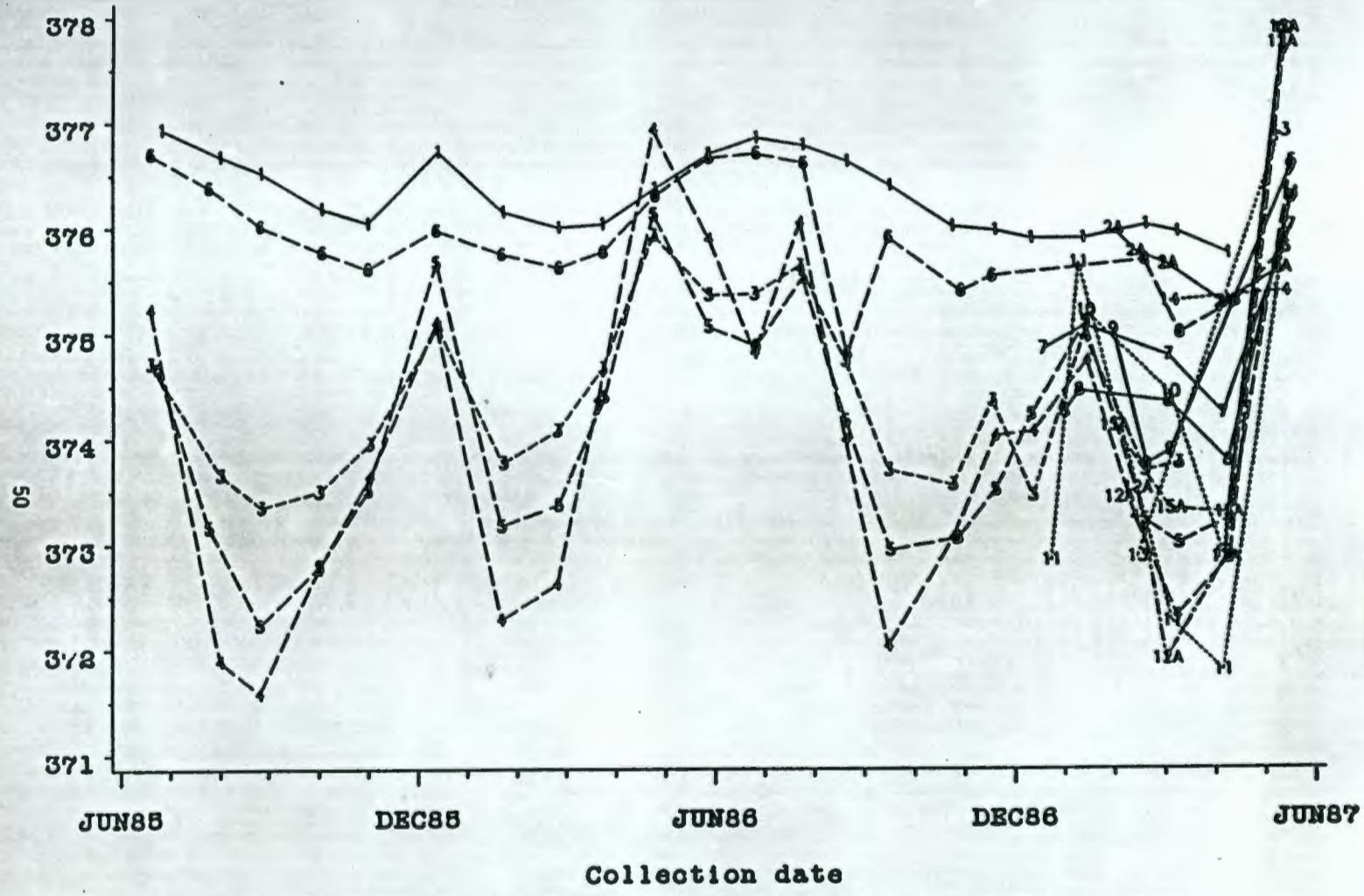

FIGURE 32. Water Table Elevations (ft above MSL) for Selected Wells, June 1985 to June 1987

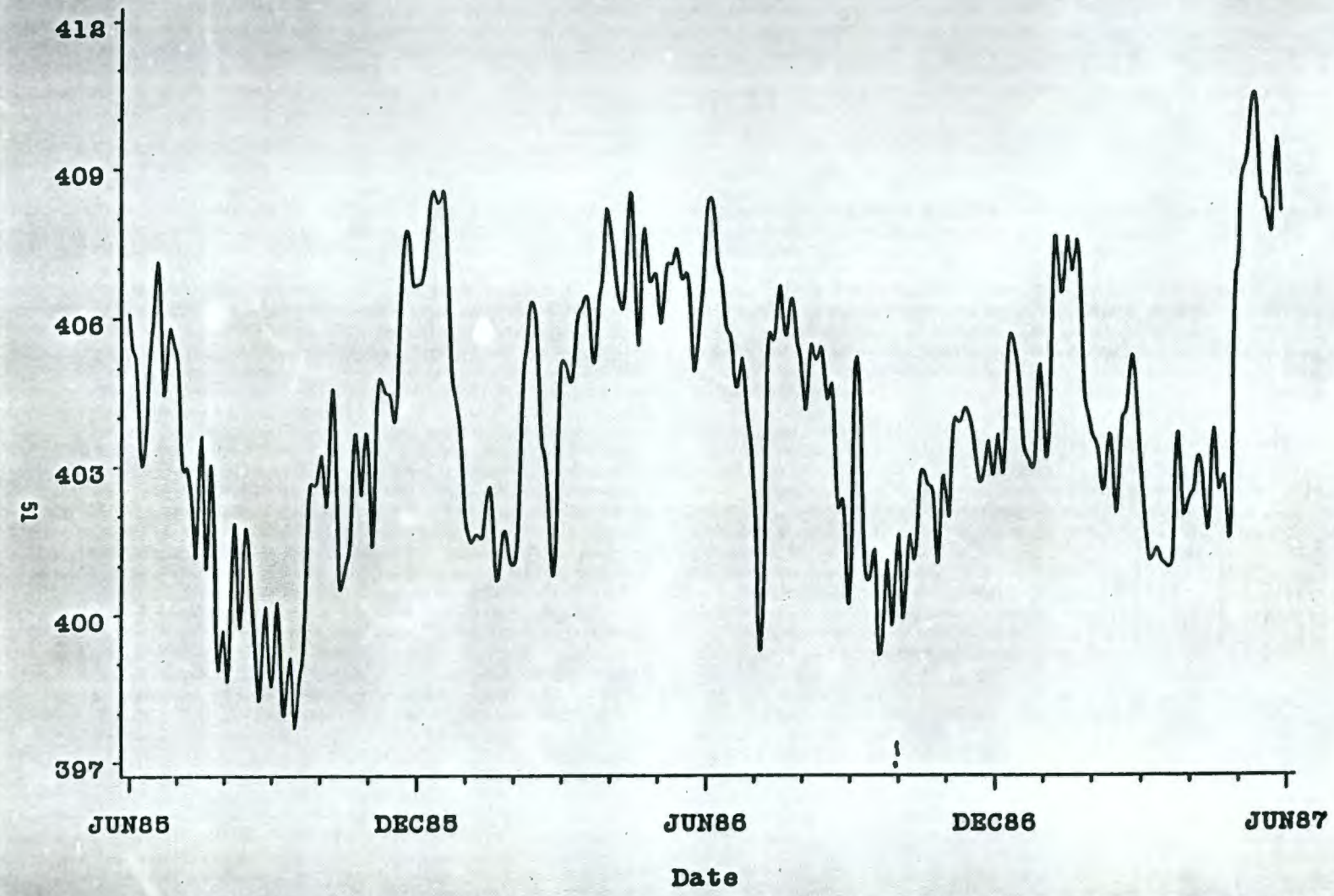

FIGURE 33. Water Levels (ft above MSL) in the Columbia River at the 100-N Area, June 1985 to June 1987. The curve represents "smoothed" daily averages of two-hour readings.

200 AREA LOW-LEVEL BURIAL GROUNDS

During the previous quarter, work centered around establishment of drilling contracts. During this quarter, contracts were awarded and drilling began.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

A drilling contract for installation of monitoring wells in the 200 West Area was awarded to ONWEGO Well Drilling in May 1987. Drilling commenced soon afterward, and by mid-June seven cable-tool drilling rigs were in operation. By the end of June, one shallow well (299-W18-23) had been completed, another (299-W8-1) had reached total depth (TD), three had reached approximately 90% of TD, and two reached approximately 75% of TD. Figures 34 and 35 show the locations of all wells that will be drilled as part of this project. Table 5 provides a list of temporary and permanent well numbers for each well.

All four drilling contracts for well installation in the 200 East Area were canceled in mid-June, and Kaiser Engineers Hanford (KEH) was given permission to purchase and man four cable-tool rigs of their own. By late June, drilling with two of the KEH rigs had been initiated.

Hydrogeologic Characterization Effort

Sediment samples from the well drilling efforts have been analyzed for physical properties as they are brought in from the field daily.

Geophysical logging of well 299-W18-23 was completed.

One constant-discharge aquifer test was completed in well 299-W18-23. Our preliminary estimate of the transmissivity is approximately 30,000 ft^2/day.

Well logs and aquifer test data for wells completed in this project will be presented in the next quarterly report.

ROUTINE SAMPLING AND ANALYSIS OF GROUND WATER

No routine sampling has been conducted; however, well 299-W18-23 was sampled before and during the aquifer test. Analysis of these special samples has indicated the presence of carbon tetrachloride to approximately 1,300 ppb.

TABLE 5. Numbers Assigned to 200 Area RCRA Project Wells

200 East RCRA Monitoring Wells

Temporary Well Numbers	Permanent Well Numbers
E-1	299-E34-02
E-2	299-E27-08
E-3	299-E27-09
E-4	299-E27-10
E-5	299-E34-03
E-6	299-E34-04
E-7	299-E34-05
E-8	299-E34-06
E-9	299-E28-26
E-10	299-E28-27
E-11	299-E33-28
E-12	299-E33-29
E-13	299-E33-30
E-14	299-E32-02
E-15	299-E32-03
E-16	299-E32-04

200 West RCRA Monitoring Wells

Temporary Well Numbers	Permanent Well Numbers
W-1	299-W18-21
W-2	299-W18-22
W-3	299-W18-23
W-4	299-W18-24
W-5	299-W15-18
W-6	299-W15-15
W-7	299-W15-16
W-8	299-W15-17
W-9	299-W10-13
W-10	299-W10-14
W-11	299-W09-01
W-12	299-W08-01
W-13	299-W07-01
W-14	299-W07-02
W-15	299-W07-03
W-16	299-W07-04
W-17	299-W07-05
W-18	299-W07-06
W-19	299-W06-02

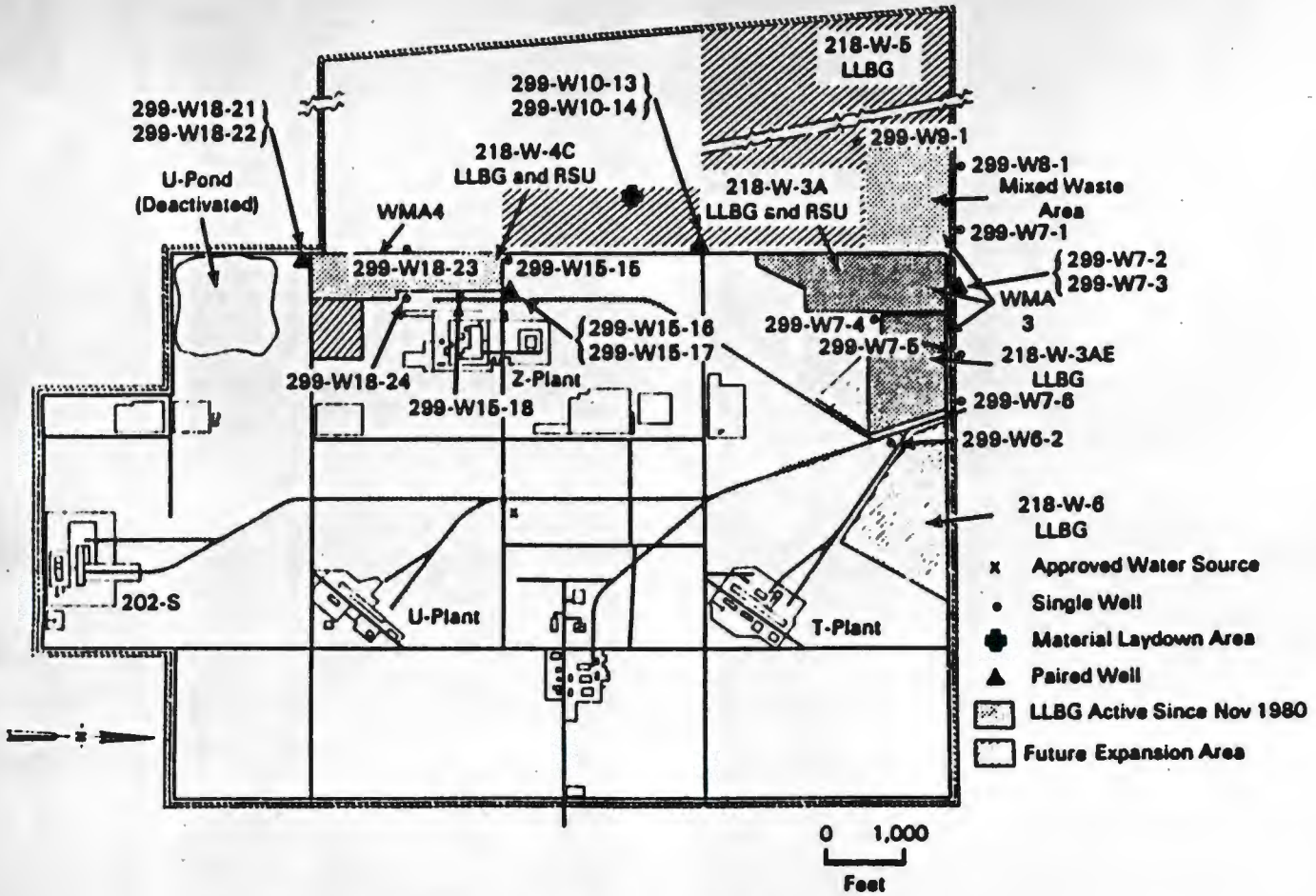

FIGURE 34. Locations of All 200 West Area Wells

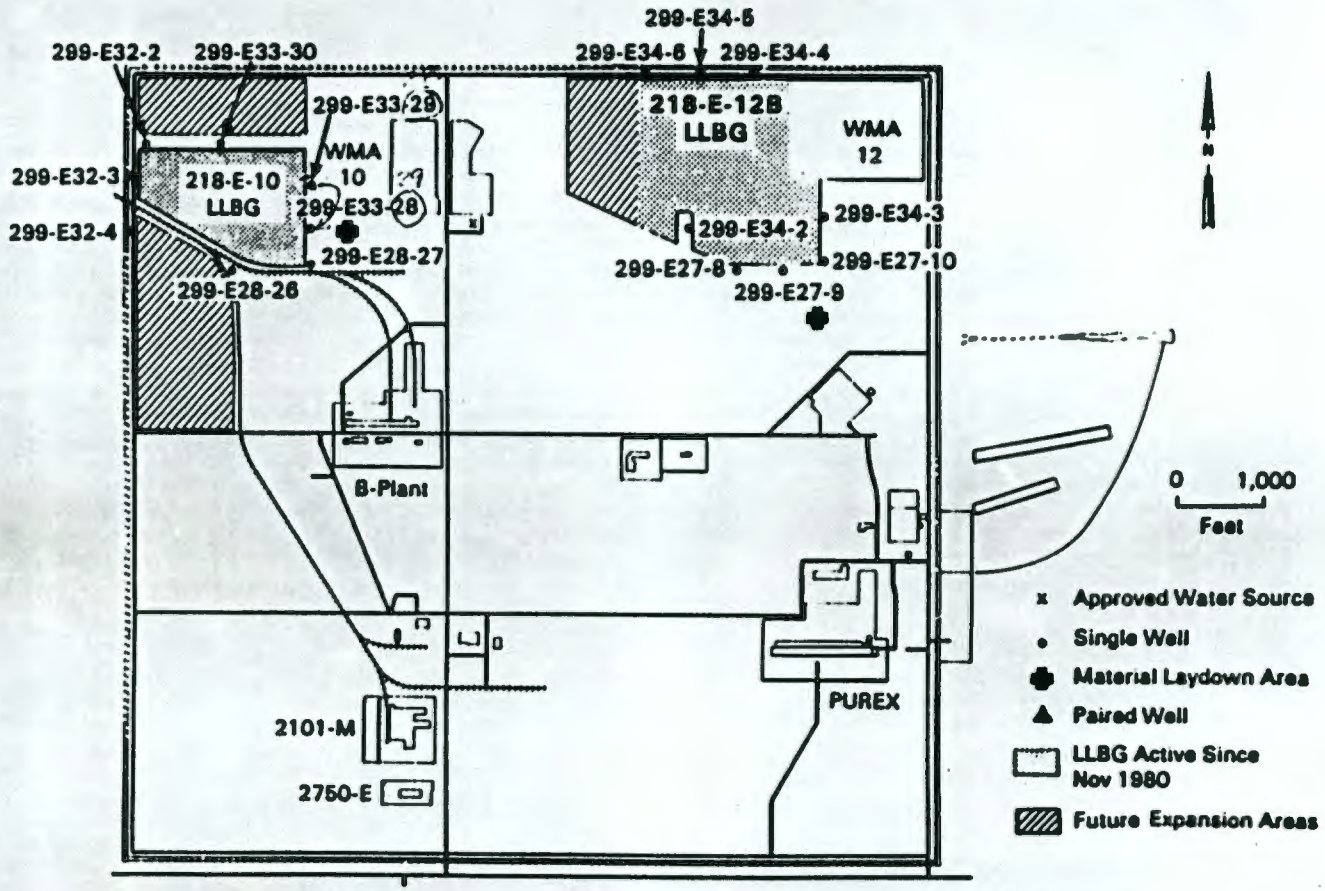

FIGURE 35. Locations of All 200 East Area Wells

NONRADIOACTIVE DANGEROUS WASTE LANDFILL

Activities conducted in this reporting period include completion of the internal review of the interim characterization report prepared by Westinghouse Hanford Company (WHC) and routine quarterly sampling in May 1987.

DRILLING AND HYDROGEOLOGIC CHARACTERIZATION

No additional drilling and hydrogeologic characterization data were collected during this quarter. These data were presented in the previous progress report (USDOE 1987c) and will be discussed in detail in the interim characterization report, scheduled for submittal to the state and USEPA in the next quarter. Internal review of the report has been completed.

ROUTINE SAMPLING AND ANALYSIS OF GROUND WATER

All seven monitoring wells around the NRDW Landfill (see Figure 36) were sampled in May 1987. Quadruplicate samples were collected only from upgradient wells DM-1, SM-1, and SM-2, to be analyzed for conductivity, pH, total organic halogens, and total organic carbon. All samples, with the exception of volatile organics in well DM-2, were collected with electric submersible pumps. The volatile organics sample from well DM-2 was collected using a bladder pump. Bladder pumps removed from the other wells to be repaired have not been returned from the factory.

A summary of analytical data collected for the May sampling is presented in Table 6. The actual analyses are presented in Appendix D. The data agree with previously reported data. A comparison of upgradient and downgradient ground-water chemistry indicates that the landfill does not impact ground-water quality. Coliform bacteria was the only parameter to exceed regulatory limits. This contamination is not attributed to the landfill because three of the four wells in which levels were above regulatory limits (2.2 MPN) were upgradient wells.

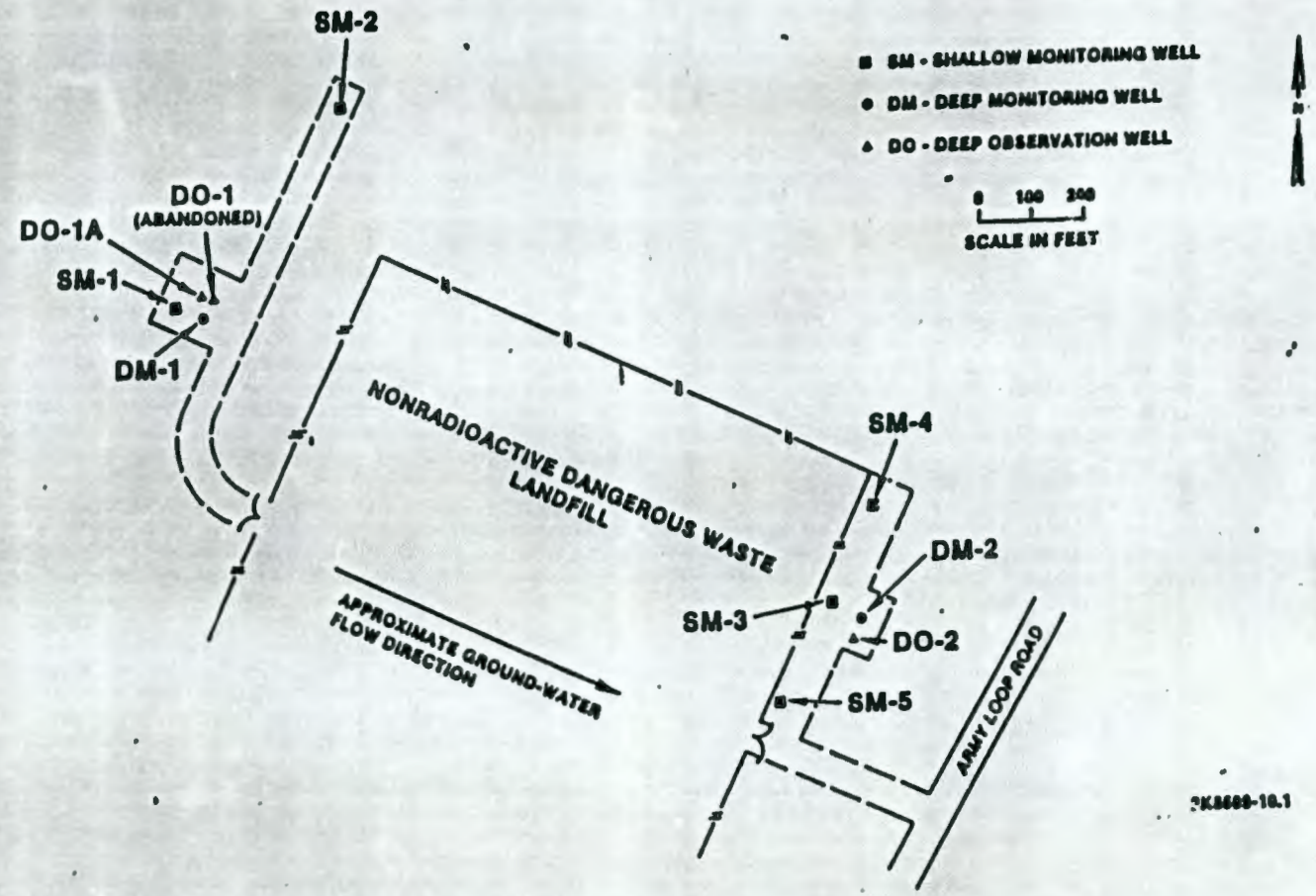

FIGURE 36. Location of NRDW Landfill Monitoring Wells

TABLE 6. Summary of Results from Samples Taken in Wells Around the NRDW Landfill

Constituent List=Contamination Indicators

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
101	CONDUCT	UMHO	1	18	0		.			Specific conductance
109	PH		.1	18	0		.			pH
C68	TOX	PPB	100	18	15		.			Total organic halogen
C69	TOC	PPB	1000	18	15		.			Total organic carbon

Constituent List=Drinking Water Standards

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency	Exceeded	Full name
100	COLIFRM	MPN	2.2	7	3		1	EPA	xxx	Coliform bacteria
111	BETA	PCI/L	0	7	0		50	EPA		Gross beta
101	RADIUM	PCI/L	1	7	0		5	EPA		Radium
212	LOALPHA	PCI/L	4	7	0		15	EPA		Gross alpha
A06	BARIUM	PPB	0	7	0		1000	EPA		Barium
A07	CADMIUM	PPB	2	7	7	***	10	EPA		Cadmium
A08	CHROMUM	PPB	10	7	5		50	EPA		Chromium
A10	SILVER	PPB	10	7	7	***	50	EPA		Silver
A20	ARSENIC	PPB	5	7	4		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
A35	TOXAENE	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	5		50	EPA		Lead (graphite furnace)
C72	NITRATE	PPB	500	7	0		45000	EPA		Nitrate
C74	FLUORID	PPB	500	7	1		1400	EPA		Fluoride
N13	2,4-D	PPB	1	7	7	***	100	EPA		2,4-D
N14	2,4,5TP	PPB	1	7	7	***	10	EPA		2,4,5-TP silvex
N20	FBARIUM	PPB	0	7	0		1000	EPA		Barium, filtered
N21	FCADMIU	PPB	2	7	7	***	10	EPA		Cadmium, filtered
N22	FCHROMI	PPB	10	7	0		50	EPA		Chromium, filtered
N23	FSILVER	PPB	10	7	7	***	50	EPA		Silver, filtered
N37	FARSENI	PPB	5	7	0		50	EPA		Arsenic, filtered
N38	FMERCUR	PPB	.1	7	7	***	2	EPA		Mercury, filtered
N39	FSELENI	PPB	5	7	7	***	10	EPA		Selenium, filtered
N41	FLEAD	PPB	5	7	7	***	50	EPA		Lead, filtered

TABLE 6. (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	4		.		Manganese
A19	IRON	PPB	50	7	3		.		Iron
C57	PHENOL	PPB	10	7	7	***	.		Phenol
C73	SULFATE	PPB	500	7	0		.		Sulfate
C75	CHLORID	PPB	500	7	0		.		Chloride
M24	FSODIUM	PPB	100	7	0		.		Sodium, filtered
M29	FMANGAN	PPB	5	7	4		.		Manganese, filtered
M31	FIRON	PPB	50	7	5		.		Iron, filtered
M57	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
A05	CALCIUM	PPB	50	7	0		.		Calcium
A18	POTASUM	PPB	100	7	0		.		Potassium
A60	MAGNES	PPB	0	7	0		.		Magnesium
M16	TC	PPB	.	7	0		.		Total carbon
M19	FCALCIU	PPB	50	7	0		.		Calcium, filtered
M30	FPOTASS	PPB	100	7	0		.		Potassium, filtered
M32	FMAGNES	PPB	0	7	0		.		Magnesium, filtered

Constituent List-Site Specific tag-alongs

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A04	ZINC	PPB	5	7	0		.		Zinc
A12	NICKEL	PPB	10	7	6		.		Nickel
A13	COPPER	PPB	10	7	6		1300	EPAP	Copper
A14	VANADUM	PPB	5	7	0		.		Vanadium
A16	ALUMNUM	PPB	150	7	6		.		Aluminum
C76	PHOSPHA	PPB	1000	7	7	***	.		Phosphate
M18	FZINC	PPB	5	7	4		.		Zinc, filtered
M25	FNICKEL	PPB	10	7	7	***	.		Nickel, filtered
M26	FCOPPER	PPB	10	7	6		1300	EPAP	Copper, filtered
M27	FVANADI	PPB	5	7	0		.		Vanadium, filtered
M28	FALUMIN	PPB	150	7	7	***	.		Aluminum, filtered

TABLE 6. (contd)

Constituent List-WAC 173-303-8005

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
A81	TETRAME	PPB	10	7	7	***	5	EPAP	Tetrachloromethane
A82	BENZENE	PPB	10	7	7	***	5	EPAP	Benzene
A83	DIOXANE	PPB	500	7	7	***	.		Dioxane
A84	METHONE	PPB	10	7	7	***	.		Methyl ethyl ketone
A85	PYRIDIN	PPB	500	7	7	***	.		Pyridine
A86	TOLUENE	PPB	10	7	7	***	2000	EPAP	Toluene
A87	1,1,1-T	PPB	10	7	7	***	200	EPAP	1,1,1-trichloroethane
A88	1,1,2-T	PPB	10	7	7	***	.		1,1,2-trichloroethane
A89	TRICENE	PPB	10	7	7	***	5	EPAP	Trichloroethylene
A90	PERCENE	PPB	10	7	7	***	.		Perchloroethylene
A91	OPXYLE	PPB	10	7	7	***	440	EPAP	Xylene-o,p
A92	ACROLIN	PPB	10	7	7	***	.		Acrolein
A93	ACNYILE	PPB	10	7	7	***	.		Acrylonitrile
A94	BISTNER	PPB	10	7	7	***	.		Bis(chloromethyl) ether
A95	BROMONE	PPB	10	7	7	***	.		Bromoacetone
A96	METNBRO	PPB	10	7	7	***	.		Methyl bromide
A97	CARBIDE	PPB	10	7	7	***	.		Carbon disulfide
A98	CNLBENZ	PPB	10	7	7	***	.		Chlorobenzene
A99	CNLTNER	PPB	10	7	7	***	.		2-chloroethyl vinyl ether
B00	CNLFORM	PPB	10	7	7	***	.		Chloroform
B01	METNCNL	PPB	10	7	7	***	.		Methyl chloride
B02	CNMTNER	PPB	10	7	7	***	.		Chloromethyl methyl ether
B03	CROTONA	PPB	10	7	7	***	.		Crotonaldehyde
B04	DIBRCNL	PPB	10	7	7	***	.		1,2-dibromo-3-chloropropane
B05	DIBRETH	PPB	10	7	7	***	.		1,2-dibromoethane
B06	DIBRMET	PPB	10	7	7	***	.		Dibromomethane
B07	DIBUTEN	PPB	10	7	7	***	.		1,4-dichloro-2-butene
B08	DICDIFM	PPB	10	7	7	***	.		Dichlorodifluoromethane
B09	1,1-DIC	PPB	10	7	7	***	.		1,1-dichloroethane
B10	1,2-DIC	PPB	10	7	7	***	5	EPAP	1,2-dichloroethane
B11	TRANDCE	PPB	10	7	7	***	70	EPAP	trans-1,2-dichloroethene
B12	DICETHY	PPB	10	7	7	***	7	EPAP	1,1-dichloroethylene
B13	METNYCN	PPB	10	7			.		Methylene chloride
B14	DICPANE	PPB	10	7	7	***	5	EPAP	1,2-dichloropropane
B15	DICPENE	PPB	10	7	7	***	.		1,3-dichloropropene
B16	NNDIEMY	PPB	10	7	7	***	.		N,N-diethylhydrazine
B17	HYDRSUL	PPB	10	7	7	***	.		Hydrogen sulfide
B18	IODOMET	PPB	10	7	7	***	.		Iodomethane
B19	METNACR	PPB	10	7	7	***	.		Methacrylonitrile
B20	METNTNI	PPB	10	7	7	***	.		Methanethiol
B21	PENTACN	PPB	10	7	7	***	.		Pentachloroethane
B22	1112-tc	PPB	10	7	7	***	.		1,1,1,2-tetrachloroethane
B23	1122-tc	PPB	10	7	7	***	.		1,1,2,2-tetrachloroethane
B24	BROMORM	PPB	10	7	7	***	.		Bromoform
B25	TRCMEBL	PPB	10	7	7	***	.		Trichloromethanethiol
B26	TRCMFLM	PPB	10	7	7	***	.		Trichloromonofluoromethane
B27	TRCPANE	PPB	10	7	7	***	.		Trichloropropane
B28	123-trp	PPB	10	7	7	***	.		1,2,3-trichloropropane
B29	VINYIDE	PPB	10	7	7	***	1	EPAP	Vinyl chloride
B30	M-XYLE	PPB	10	7	7	***	440	EPAP	Xylene-m

TABLE 6. (contd)

Constituent List-WAC 173-303-9905

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Regulatory Limits Limit	Agency Exceeded	Full name
B15	DIETHY	PPB	10	7	7	ooo			Diethylamine
B81	12-dben	PPB	10	7	7	ooo			1,2-dichlorobenzene
B82	13-dben	PPB	10	7	7	ooo			1,3-dichlorobenzene
B83	14-dben	PPB	10	7	7	ooo			1,4-dichlorobenzene
B89	HEXCBEN	PPB	10	7	7	ooo			Hexachlorobenzene
C84	METACRY	PPB	10	7	7	ooo			Methyl methacrylate
C26	PENTCHB	PPB	10	7	7	ooo			Pentachlorobenzene
C37	TETRCHB	PPB	10	7	7	ooo			1,2,4,5-tetrachlorobenzene
C43	TRICHLB	PPB	10	7	7	ooo			1,2,4-trichlorobenzene
C54	HEXACHL	PPB	10	7	7	ooo			Hexachlorophene
C55	NAPHTHA	PPB	10	7	7	ooo			Naphthalene
C58	123TRI	PPB	10	7	7	ooo			1,2,3-trichlorobenzene
C68	135TRI	PPB	10	7	7	ooo			1,3,5-trichlorobenzene
C69	1234TE	PPB	10	7	7	ooo			1,2,3,4-tetrachlorobenzene
C88	1235TE	PPB	10	7	7	ooo			1,2,3,5-tetrachlorobenzene
C71	FORMALN	PPB	500	7	7	ooo			Formalin
C79	KEROSEN	PPB	10000	7	7	ooo			Kerosene
H86	ETHMETH	PPB	3000	7	7	ooo			Ethyl methacrylate

ooo - 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

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Washington State Department of Ecology. 1986 (Amended). Dangerous Waste Regulations. Washington Administrative Code, Chapter 173-303, Olympia, Washington.

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 had at least one value above detection limits in the March and April 1987 samples. The column headers for the constituents give 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 value is available, a period is printed.

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300 Area Process Trenches, Data for March and April, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	1,1,1-T PPB 200*	ALUMINF PPB .	ALUMINUM PPB .	AMMONIU PPB .	ARSENIC PPB 50	ARSENIF PPB 50	BARIUM PPB 1000	BARIUMF PPB 1000	BETA PCI/L 50	CALCIUF PPB .
3-1-1	26MAR87	<10	<150	<150	<50	<5	<5	35	29	7.31	22,000
	16APR87	<10	<150	<150	<50	<5	<5	31	31	11.60	22,100
3-1-2	17MAR87	<10	<150	<150	<50	<5	<5	22	21	24.30	23,300
	17APR87	<10	<150	<150	<50	<5	<5	21	22	8.71	26,200
3-1-3	24MAR87	<10	<150	<150	<50	<5	<5	23	24	37.70	25,300
	17APR87	<10	<150	<150	<50	<5	<5	21	12	32.70	18,900
3-1-4	25MAR87	<10	<150	<150	<50	<5	<5	12	12	10.30	20,800
	17APR87	<10	<150	<150	<50	<5	<5	11	18	9.96	21,900
3-1-5	24MAR87	<10	<150	<150	<50	<5	<5	13	12	48.90	20,000
	30APR87	<10	<150	<150	<50	<5	<5	17	18	.	21,100
3-1-6	24MAR87	<10	<150	<150	<50	<5	<5	14	11	8.43	20,600
	15APR87	<10	<150	<150	<50	<5	<5	11	14	6.79	19,200
3-1-7	25MAR87	<10	.	<150	<50	<5	.	24	.	43.80	.
	15APR87	<10	.	<150	<50	<5	.	20	.	31.00	.
3-1-8	25MAR87	<10	<150	<150	<50	<5	<5	30	30	29.90	24,900
	29APR87	<10	<150	<150	<50	<5	<5	28	28	.	19,000
3-1-9	29MAR87	<10	<150	530	134	<5	<5	129	125	8.96	19,200
	16APR87	<10	<150	437	149	<5	<5	122	118	7.37	18,500
3-1-10	13MAR87	<10	<150	<150	<50	<5	<5	24	24	9.73	20,300
	29APR87	<10	<150	<15"	<50	<5	<5	23	23	.	20,600
3-1-11	17MAR87	<10	<150	<15	<50	<5	<5	11	11	28.70	18,400
	29APR87	<10	<150	<150	70	<5	<5	12	11	.	19,200
3-1-12	13MAR87	<10	<150	208	<50	<5	<5	18	17	14.00	20,000
	27APR87	<10	<150	<150	<50	<5	<5	14	19	.	22,000
3-1-13	13MAR87	<10	<150	<150	<50	<5	<5	22	22	13.20	25,300
	27APR87	<10	<150	<150	<50	<5	<5	22	23	.	26,700
3-1-14	13MAR87	<10	<150	<150	<50	<5	<5	18	18	11.20	22,900
	29APR87	<10	<150	<150	<50	<5	<5	11	13	.	23,400
3-1-15	13MAR87	<10	<150	324	<50	<5	<5	21	18	12.40	20,900
	27APR87	<15	<150	<150	<50	<5	<5	44	41	.	43,300
3-1-16A	23MAR87	<10	<150	<150	<50	<5	<5	31	31	20.20	27,200
	27APR87	<10	<150	<150	<50	<5	<5	28	26	.	22,900
3-1-16B	23MAR87	<10	<150	<150	71	<5	<5	50	49	8.55	20,000
	24APR87	<10	<150	<150	85	<5	<5	53	52	7.27	20,900
3-1-16C	23MAR87	<10	<150	<150	103	<5	<5	64	62	9.93	14,700
	24APR87	<10	<150	<150	102	<5	<5	64	64	14.50	15,100
3-1-17A	30MAR87	<10	<150	100	<50	<5	<5	24	20	49.10	18,800
	23APR87	<10	<150	<150	<50	<5	<5	20	19	.	19,600
3-1-17B	30MAR87	<10	<150	<150	<50	<5	<5	62	62	8.25	18,800
	23APR87	<10	<150	<150	96	<5	<5	62	61	9.62	18,300
3-1-17C	29MAR87	<10	<150	<150	96	<5	<5	79	81	10.70	10,900
	23APR87	<10	<150	<150	99	<5	<5	74	79	15.20	10,800
3-1-18A	31MAR87	<10	<150	<150	<50	5	<5	45	44	11.80	43,800
	22APR87	<10	<150	<150	<50	<5	7	46	46	13.20	44,300
3-1-18B	31MAR87	<10	<150	<150	96	<5	<5	37	38	9.77	12,500
	22APR87	<10	<150	<150	<50	<5	<5	40	41	13.90	12,500
3-1-18C	31MAR87	<10	<150	<150	99	<5	<5	64	62	9.09	12,400
	22APR87	<10	<150	<150	86	<5	<5	67	69	7.81	13,100
3-1-19	02APR87	<10	703	1040	<50	<5	<5	28	25	110.00	15,400
	27APR87	<10	173	286	<50	<5	<5	23	21	.	18,700
3-2-1	25MAR87	<10	<150	<150	<50	<5	<5	46	47	11.30	20,000
	21APR87	<10	<150	<150	<50	<5	<5	46	47	.	24,600
3-3-7	18MAR87	<10	<150	<150	<50	<5	<5	30	29	7.91	35,600
	28APR87	<10	<150	<150	<50	<5	<5	34	32	.	38,400
3-3-10	29MAR87	<10	<150	<150	<50	<5	<5	44	46	14.30	33,300
	14APR87	<10	<150	<150	<50	<5	<5	42	46	15.40	31,300
3-4-1	26MAR87	<10	<150	<150	<50	<5	<5	36	34	10.80	39,400
	21APR87	<10	<150	<150	<50	5	<5	32	32	.	41,100
3-4-7	18MAR87	<10	<150	<150	<50	<5	<5	42	39	9.83	38,800
	21APR87	<10	<150	<150	<50	<5	<5	42	38	.	40,100
3-4-11	01APR87	<10	<150	<150	<50	<5	<5	28	28	12.90	37,400
	23APR87	<10	<150	<150	<50	<5	6	32	31	7.78	37,200
3-8-2	29MAR87	83	<150	<150	<50	<5	5	41	41	10.40	44,000
	15APR87	<10	<150	<150	<50	9	10	40	40	8.89	43,300
6-S19-E13	29MAR87	<10	<150	<150	<50	8	5	46	46	10.90	44,300
	30APR87	<10	<150	<150	<50	<5	7	45	46	10.80	43,800
6-S30E15A	29MAR87	<10	<150	<150	<50	<5	<5	58	60	10.60	68,500
	28APR87	<10	<150	<150	<50	<5	<5	58	57	9.54	66,100

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Constituents with at least one value above the Detection Limit

Well name	Collection Date	CALCIUM PPB	CHLFORM PPB	CHLORID PPB	CHROMIF PPB	CHROMUM PPB	CO PCI/L	COLIFRM MPN	CONDUCT UMHO	COPPER PPB	COPPERF PPB
		.	.	.	50	50	.	1	.	1300e	1300e
3-1-1	26MAR87	21,000	11	10,200	<10	<10	.	2.2	173	17	18
	16APR87	21,800	12	10,900	<10	<10	.	2.2	210	13	14
3-1-2	17MAR87	26,000	10	8,570	<10	<10	.	2.2	196	<10	10
	17APR87	24,400	10	7,850	<10	<10	.	2.2	246	14	13
3-1-3	24MAR87	25,300	12	27,600	<10	<10	.	2.2	196	15	18
	17APR87	24,900	13	19,900	<10	<10	-1.80	2.2	266	16	20
3-1-4	25MAR87	21,000	12	7,250	<10	<10	.	2.2	166	21	21
	17APR87	21,200	14	11,100	<10	<10	.	2.2	209	12	12
3-1-5	24MAR87	19,000	12	17,100	<10	<10	.	2.2	166	21	26
	30APR87	21,300	15	12,600	<10	<10	.	2.2	216	13	10
3-1-6	24MAR87	21,000	11	7,700	<10	<10	.	2.2	143	30	30
	15APR87	19,100	14	4,720	<10	<10	.	2.2	156	11	10
3-1-7	25MAR87	26,400	14	27,600	.	<10	.	2.2	240	16	.
	15APR87	22,600	13	17,900	.	<10	.	2.2	219	17	.
3-1-8	25MAR87	24,300	<10	26,500	<10	<10	.	2.2	273	11	11
	29APR87	18,600	<10	14,200	<10	<10	.	2.2	209	15	16
3-1-9	25MAR87	19,100	<10	<500	<10	14	.	2.2	517	<10	<10
	16APR87	21,200	<10	10,600	<10	13	.	2.2	371	<10	10
3-1-10	13MAR87	20,100	11	8,680	<10	13	.	2.2	183	19	18
	29APR87	20,600	14	3,610	<10	<10	.	2.2	161	<10	10
3-1-11	17MAR87	17,600	14	9,570	<10	<10	.	2.2	151	31	27
	29APR87	18,500	16	3,320	<10	<10	.	2.2	151	<10	<10
3-1-12	13MAR87	19,200	13	7,910	<10	<10	.	2.2	183	25	30
	27APR87	21,800	14	14,600	<10	10	.	2.2	197	14	11
3-1-13	13MAR87	25,600	18	7,750	<10	<10	.	2.2	222	<10	10
	27APR87	26,700	12	9,740	<10	<10	.	2.2	212	17	20
3-1-14	13MAR87	22,600	10	6,900	<10	<10	.	2.2	173	15	15
	29APR87	23,400	12	9,930	<10	<10	.	2.2	171	12	13
3-1-15	13MAR87	21,200	10	6,910	<10	<10	.	2.2	191	13	12
	27APR87	44,900	<10	15,600	<10	<10	.	2.2	350	<10	<10
3-1-16A	23MAR87	27,400	12	27,700	<10	<10	.	2.2	228	16	11
	27APR87	23,400	13	15,900	<10	<10	.	2.2	197	16	15
3-1-16B	23MAR87	20,400	<10	11,700	<10	11	.	2.2	312	<10	<10
	24APR87	21,000	<10	9,500	<10	14	.	2.2	365	<10	<10
3-1-16C	23MAR87	15,200	<10	16,200	<10	21	.	2.2	314	<10	<10
	24APR87	14,800	<10	10,900	<10	20	.	2.2	330	<10	<10
3-1-17A	30MAR87	17,500	14	24,300	<10	10	.	2.2	214	25	23
	23APR87	19,800	13	15,300	<10	<10	.	2.2	179	16	22
3-1-17B	30MAR87	18,500	<10	11,500	<10	13	.	2.2	344	<10	<10
	23APR87	19,300	<10	8,800	<10	14	.	2.2	296	<10	<10
3-1-17C	29MAR87	18,700	<10	13,900	<10	<10	.	2.2	434	<10	<10
	23APR87	18,300	<10	10,700	<10	<10	.	2.2	329	<10	<10
3-1-18A	31MAR87	44,000	<10	23,700	<10	<10	.	2.2	424	<10	<10
	22APR87	46,100	<10	18,300	<10	<10	.	2.2	493	<10	<10
3-1-18B	31MAR87	12,000	<10	14,600	18	24	.	2.2	357	<10	<10
	22APR87	12,100	<10	10,600	<10	12	.	2.2	408	<10	<10
3-1-18C	31MAR87	12,500	<10	14,600	<10	19	.	16.0	296	<10	<10
	22APR87	13,500	<10	11,100	<10	<10	.	2.2	407	<10	<10
3-1-19	02APR87	15,400	15	16,800	21	34	.	2.2	182	29	31
	27APR87	18,500	14	12,700	<10	10	.	2.2	182	19	23
3-2-1	26MAR87	25,500	<10	15,200	<10	<10	.	5.1	224	<10	<10
	21APR87	24,300	<10	17,200	<10	<10	.	2.2	211	<10	<10
3-3-7	18MAR87	37,800	11	12,100	<10	<10	.	2.2	328	<10	<10
	28APR87	40,300	<10	9,810	<10	<10	.	2.2	329	<10	<10
3-3-10	25MAR87	31,300	<10	14,200	<10	<10	.	2.2	248	<10	<10
	14APR87	30,600	<10	10,700	<10	<10	.	2.2	246	<10	<10
3-4-1	26MAR87	41,700	<10	13,200	<10	<10	.	2.2	309	<10	<10
	21APR87	40,200	<10	9,180	<10	<10	.	2.2	312	<10	<10
3-4-7	18MAR87	43,200	<10	14,500	<10	<10	.	2.2	386	<10	<10
	21APR87	42,500	<10	11,800	<10	<10	.	2.2	309	<10	<10
3-4-11	01APR87	37,300	<10	12,100	<10	<10	.	2.2	263	<10	<10
	23APR87	37,100	<10	8,470	<10	<10	.	2.2	276	<10	<10
3-8-2	29MAR87	43,600	<10	14,700	<10	<10	.	2.2	333	<10	<10
	15APR87	42,700	<10	10,300	<10	<10	.	2.2	360	<10	<10
6-S19-E13	29MAR87	46,000	<10	22,000	<10	<10	.	2.2	372	<10	<10
	30APR87	41,600	<10	15,600	<10	<10	6.08	2.2	450	<10	<10
6-S30E15A	29MAR87	67,400	<10	6,060	<10	<10	.	2.2	389	<10	<10
	28APR87	67,700	<10	4,810	<10	<10	.	2.2	316	<10	<10

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Constituents with at least one value above the Detection Limit

Well name	Collection Date	FLUORID PPB	IRON PPB	IRONF PPB	LEADDF PPB	LBALPHA PCI/L	MAGNES PPB	MAGNESF PPB	MANGANF PPB	MANGESE PPB	METHYCH PPB
		1400	.	.	50	15	.	.	.	.	.
3-1-1	26MAR87	<500	52	<50	<5	18.100	3,950	4,090	<5	<5	<10
	18APR87	<500	<50	<50	<5	15.400	4,120	4,110	<5	<5	<10
3-1-2	17MAR87	<500	<50	<50	<5	7.870	5,030	4,810	<5	<5	<10
	17APR87	<500	80	<50	<5	8.850	4,950	5,260	<5	<5	<10
3-1-3	24MAR87	<500	52	213	<5	30.200	4,910	4,900	<5	<5	<10
	17APR87	<500	86	<50	<5	34.700	4,720	4,530	<5	<5	<10
3-1-4	25MAR87	<500	123	<50	<5	25.000	4,330	4,250	<5	<5	<10
	17APR87	<500	<50	<50	<5	27.100	4,340	4,460	<5	<5	<10
3-1-5	24MAR87	<500	81	<50	<5	119.000	3,860	3,970	<5	<5	<10
	30APR87	<500	<50	<50	<5	55.500	4,210	4,300	<5	<5	<10
3-1-6	24MAR87	<500	<50	<50	<5	15.700	4,340	4,290	<5	<5	<10
	16APR87	<500	105	<50	<5	14.800	3,930	3,970	<5	<5	<10
3-1-7	25MAR87	<500	261	.	<5	33.900	5,110	.	.	<5	<10
	15APR87	<500	105	.	<5	40.500	4,340	.	.	<5	<10
3-1-8	25MAR87	<500	<50	<50	<5	21.400	8,320	8,390	11	10	<10
	29APR87	<500	<50	<50	<5	18.200	5,430	5,400	32	33	<10
3-1-9	25MAR87	<500	1380	532	<5	8.767	7,700	7,600	80	90	<10
	16APR87	1040	1050	500	<5	8.744	7,690	7,470	74	83	<10
3-1-10	13MAR87	<500	73	<50	<5	18.100	4,210	4,260	<5	<5	<10
	29APR87	<500	<50	<50	<5	18.400	4,310	4,320	<5	<5	<10
3-1-11	17MAR87	<500	<50	<50	<5	98.400	3,680	3,670	<5	<5	<10
	29APR87	<500	<50	<50	<5	70.900	4,180	4,290	<5	<5	<10
3-1-12	13MAR87	<500	390	<50	<5	52.800	4,080	4,230	<5	12	<10
	27APR87	<500	<50	<50	<5	53.300	4,530	4,670	<5	<5	<10
3-1-13	13MAR87	<500	252	<50	<5	8.818	5,500	5,370	<5	<5	<10
	27APR87	<500	62	<50	<5	13.200	5,720	5,710	<5	<5	<10
3-1-14	13MAR87	<500	229	<50	<5	28.100	4,500	4,560	<5	<5	<10
	29APR87	<500	<50	<50	<5	18.800	4,660	4,650	<5	<5	<10
3-1-15	13MAR87	<500	462	<50	<5	15.700	5,250	5,030	<5	7	<10
	27APR87	<500	132	<50	<5	18.600	11,100	10,900	<5	<5	<10
3-1-16A	23MAR87	<500	<50	<50	8	12.900	4,810	4,830	<5	<5	<10
	27APR87	<500	<50	<50	<5	13.000	4,280	4,250	<5	<5	<10
3-1-16B	23MAR87	1310	107	56	<5	3.170	8,730	8,610	86	86	<10
	24APR87	1320	147	98	<5	2.200	7,810	8,900	90	91	<10
3-1-16C	23MAR87	1560	126	<50	<5	2.180	5,420	5,280	46	46	<10
	24APR87	1570	128	<50	<5	1.630	5,370	5,420	49	40	<10
3-1-17A	30MAR87	548	247	187	<5	79.100	3,600	3,780	<5	5	<10
	23APR87	<500	129	<50	<5	82.200	4,030	3,970	<5	<5	<10
3-1-17B	30MAR87	933	174	115	<5	8.930	8,390	8,360	71	73	<10
	23APR87	863	178	118	<5	8.210	8,490	8,350	65	80	<10
3-1-17C	29MAR87	1590	110	83	<5	8.240	4,650	4,650	28	25	<10
	23APR87	1340	132	81	<5	-0.184	4,510	4,570	24	24	<10
3-1-18A	31MAR87	<500	184	82	<5	2.790	11,800	11,600	<5	<5	<10
	22APR87	<500	50	<50	<5	4.150	12,400	12,100	<5	<5	<10
3-1-18B	31MAR87	1440	206	170	<5	-1.040	5,040	5,140	44	46	<10
	22APR87	1140	233	153	<5	8.792	5,530	5,390	46	50	<10
3-1-18C	31MAR87	1480	189	90	<5	-0.089	5,080	5,010	50	56	<10
	22APR87	1560	125	122	<5	8.582	5,410	5,440	46	46	<10
3-1-19	02APR87	523	8300	4870	<5	208.000	3,430	3,330	53	90	<10
	27APR87	<500	4420	2030	<5	146.000	4,210	4,170	46	73	<10
3-2-1	26MAR87	<500	146	<50	<5	7.460	4,990	5,390	<5	<5	<10
	21APR87	<500	94	<50	<5	7.860	5,050	5,080	<5	<5	<10
3-3-7	18MAR87	<500	<50	<50	<5	7.490	7,390	7,410	<5	<5	<10
	28APR87	<500	<50	<50	<5	7.220	8,230	7,990	<5	<5	3000
3-3-18	29MAR87	<500	393	713	<5	13.500	6,710	7,030	19	<5	<10
	14APR87	<500	288	127	<5	13.000	6,250	6,830	18	<5	300
3-4-1	26MAR87	<500	1440	<50	<5	10.900	7,780	7,610	<5	31	<10
	21APR87	<500	<50	<50	<5	10.700	7,800	7,920	<5	<5	<10
3-4-7	18MAR87	<500	<50	<50	<5	24.900	8,070	7,850	<5	<5	<10
	21APR87	<500	<50	<50	<5	30.800	8,140	7,850	<5	<5	<10
3-4-11	01APR87	<500	<50	<50	<5	10.300	7,210	7,230	<5	<5	<10
	23APR87	<500	<50	<50	<5	8.230	7,550	7,440	<5	<5	<10
3-8-2	29MAR87	<500	<50	<50	<5	2.470	9,170	9,190	<5	<5	<10
	15APR87	<500	<50	<50	<5	1.880	9,000	9,200	<5	<5	<10
8-S19-E13	29MAR87	<500	150	<50	<5	2.350	12,900	12,700	<5	<5	<10
	30APR87	<500	<50	<50	<5	2.290	12,220	12,600	<5	<5	<10
8-S30E15A	29MAR87	<500	<50	<50	<5	0.703	12,500	12,600	<5	<5	<10
	28APR87	<500	<50	<50	<5	0.895	12,600	12,500	<5	<5	<10

RCRA Compliance Ground-Water Monitoring Project 8:35 FRIDAY, JULY 17, 198
300 Area Process Trenches, Data for March and April, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	NICKEL PPB	NICKELF PPB	NITRATE PPB	PERCENE PPB	PH	POTASSF PPB	POTASIUM PPB	RADIUM PCI/L	SODIUM PPB	SODIUMF PPB
		.	.	45000	.	.	.	.	0	.	.
3-1-1	26MAR87	<10	<10	5,470	<10	7.8	2,380	2,350	0.20100	9,480	9,830
	16APR87	<10	<10	5,090	<10	7.8	2,370	2,400	0.04210	9,790	9,680
3-1-2	17MAR87	<10	<10	8,730	<10	7.1	2,900	2,960	0.07800	10,100	9,950
	17APR87	<10	<10	4,410	<10	7.2	3,150	2,950	0.06690	10,100	10,900
3-1-3	24MAR87	<10	<10	8,840	<10	8.8	2,440	2,450	0.11500	15,400	15,300
	17APR87	<10	<10	4,730	<10	7.1	2,360	2,470	-0.01440	15,800	258,000
3-1-4	25MAR87	<10	<10	3,300	<10	7.2	1,670	1,750	0.07540	8,460	8,260
	17APR87	<10	<10	4,420	<10	8.9	1,850	1,820	0.02670	9,140	9,420
3-1-8	27MAR87	<10	<10	2,770	<10	8.9	1,810	1,580	0.04230	17,800	16,900
	16APR87	<10	<10	2,130	<10	8.3	1,790	1,890	-0.04620	13,500	13,900
3-1-6	24MAR87	<10	<10	3,050	<10	8.8	1,820	1,780	-0.04610	7,500	7,300
	16APR87	<10	<10	1,990	<10	8.7	1,840	1,810	0.02110	7,640	7,880
3-1-7	25MAR87	<10	.	5,890	<10	8.8	.	2,520	0.00668	15,900	.
	16APR87	<10	.	4,090	<10	8.3	.	2,260	-0.02870	14,600	.
3-1-8	26MAR87	<10	<10	2,860	<10	7.5	4,180	4,150	0.15500	21,500	21,600
	29APR87	<10	<10	1,870	<10	7.5	4,110	4,190	0.12100	22,500	22,100
3-1-9	26MAR87	<10	<10	<500	<10	8.2	5,910	5,910	0.26300	54,700	55,500
	16APR87	<10	<10	<500	<10	7.1	5,830	6,030	0.19600	54,400	53,500
3-1-10	13MAR87	<10	<10	8,030	<10	7.8	2,050	2,100	0.03960	7,570	7,580
	29APR87	<10	<10	3,010	<10	7.0	2,080	2,070	0.06860	8,110	8,170
3-1-11	17MAR87	<10	<10	2,030	<10	7.2	1,230	1,230	0.12200	13,400	13,800
	29APR87	<10	<10	2,510	<10	7.1	1,320	1,310	0.32100	7,180	7,240
3-1-12	13MAR87	<10	<10	3,590	<10	7.1	1,860	1,830	0.08930	11,900	11,800
	27APR87	<10	<10	1,790	<10	8.8	1,990	1,870	0.22600	13,800	13,700
3-1-13	13MAR87	<10	<10	10,300	<10	7.2	3,440	3,550	0.05030	9,300	9,380
	27APR87	<10	<10	4,450	<10	8.9	3,410	3,460	0.11900	9,780	9,870
3-1-14	13MAR87	<10	<10	2,870	<10	7.3	2,230	2,250	-0.01350	7,330	7,150
	29APR87	<10	<10	2,310	<10	7.8	2,270	2,340	0.08230	7,860	7,800
3-1-15	13MAR87	<10	<10	5,280	<10	7.7	3,350	3,460	0.01290	6,990	6,830
	27APR87	<10	<10	16,900	<10	7.8	5,040	5,030	0.15700	17,000	16,400
3-1-16A	23MAR87	<10	<10	13,300	<10	7.1	2,980	3,010	0.40000	12,800	13,000
	27APR87	<10	<10	5,770	<10	8.1	2,460	2,400	0.28600	12,300	12,100
3-1-16B	23MAR87	<10	<10	<500	<10	7.7	5,400	5,500	0.28400	49,900	49,800
	24APR87	10	<10	<500	<10	7.1	5,490	5,580	0.09360	52,400	52,800
3-1-16C	23MAR87	<10	<10	1,140	<10	7.7	6,440	6,580	0.24600	57,900	56,300
	24APR87	12	<10	583	<10	7.1	6,570	6,560	0.05310	56,200	57,800
3-1-17A	30MAR87	<10	<10	3,340	<10	7.2	1,670	1,590	0.05390	17,700	18,500
	23APR87	<10	<10	1,570	<10	8.3	17,300	1,740	-0.00734	17,000	16,700
3-1-17B	30MAR87	<10	<10	<500	<10	7.9	5,780	5,930	0.08400	48,800	48,100
	23APR87	<10	<10	<500	<10	8.9	5,730	5,920	0.37800	47,800	47,900
3-1-17C	29MAR87	<10	<10	<500	<10	8.3	10,200	10,300	-0.01370	67,800	66,100
	23APR87	<10	<10	<500	<10	7.5	9,840	9,920	0.03190	66,400	66,400
3-1-18A	31MAR87	<10	<10	20,800	<10	7.6	5,640	5,720	0.10600	22,700	22,500
	22APR87	<10	<10	20,800	<10	7.4	6,050	6,210	0.04350	23,400	23,400
3-1-18B	31MAR87	12	<10	<500	<10	7.7	6,230	6,180	0.00692	61,400	64,300
	22APR87	<10	<10	<500	<10	8.8	6,610	6,900	0.19600	65,400	64,800
3-1-18C	31MAR87	11	<10	<500	<10	7.6	6,200	6,330	0.12500	66,200	63,800
	22APR87	<10	<10	<500	<10	7.3	6,660	6,680	0.13600	66,300	68,400
3-1-19	02APR87	14	12	2,510	<10	8.8	1,400	1,440	0.12800	19,200	19,500
	27APR87	<10	<10	2,050	<10	8.0	1,700	1,680	0.15800	18,400	18,600
3-2-1	26MAR87	<10	<10	17,400	<10	8.4	3,460	3,100	0.10200	12,100	13,700
	21APR87	<10	<10	17,700	<10	5.9	3,330	3,360	0.10400	13,400	13,600
3-3-7	18MAR87	<10	<10	10,700	<10	7.3	4,010	4,030	0.03990	15,300	15,500
	28APR87	<10	<10	11,500	<10	7.3	4,210	4,230	0.10400	17,200	16,300
3-3-10	29MAR87	<10	<10	27,000	<10	8.4	3,540	3,520	0.30600	12,100	12,400
	14APR87	<10	<10	25,000	<10	8.8	3,860	3,210	0.13200	11,400	12,100
3-4-1	26MAR87	<10	<10	14,400	<10	7.5	4,590	4,390	0.11600	16,100	17,000
	21APR87	<10	<10	15,800	<10	7.4	4,700	4,800	0.02650	17,400	17,500
3-4-7	18MAR87	<10	<10	17,800	<10	7.4	4,290	4,480	0.10400	18,800	18,000
	21APR87	<10	<10	19,400	<10	8.9	4,320	4,560	0.14200	19,200	18,100
3-4-11	01APR87	<10	<10	13,700	<10	7.7	4,130	4,110	-0.01380	15,900	15,900
	23APR87	<10	<10	13,700	<10	7.0	4,280	4,450	0.38900	16,600	16,300
3-8-2	29MAR87	<10	<10	23,200	42	7.7	5,360	5,390	0.14500	19,100	19,100
	15APR87	<10	<10	23,100	<10	7.2	5,500	5,350	0.05280	18,900	19,300
6-S19-E13	29MAR87	<10	<10	22,200	<10	8.0	6,300	6,480	-0.00966	23,000	22,400
	30APR87	<10	<10	22,100	<10	8.9	6,210	6,040	0.00000	21,800	22,500
6-S30E15A	29MAR87	<10	<10	9,900	<10	7.0	6,190	6,260	0.08870	13,400	13,400
	28APR87	<10	<10	10,900	<10	6.4	6,190	6,000	-0.02090	13,500	13,300

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300 Area Process Trenches, Data for March and April, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	SR PCI/L	SULFATE PPB	TOX PPB	TRANSDCE PPB 76+	TRICEME PPB 8+	U-CHEM UG/L	VANADIF PPB	VANADIUM PPB	ZINC PPB	ZINCF PPB
		.	.	.			.	.	.	.	.
3-1-1	26MAR87	.	15,100	<100	.	<10	.	5	5	7	<5
	16APR87	.	15,200	<100	.	<10	.	<5	<5	8	10
3-1-2	17MAR87	.	20,300	<100	.	<10	.	<5	<5	<5	<5
	17APR87	.	18,000	<100	.	<10	.	<5	<5	<5	<5
3-1-3	24MAR87	.	15,900	<100	.	<10	.	<5	<5	<5	<5
	17APR87	8.716	17,900	<100	.	<10	47.88	8	<5	8	<5
3-1-4	25MAR87	.	15,700	<100	.	<10	.	<5	<5	7	5
	17APR87	.	18,000	<100	.	<10	.	<5	<5	8	8
3-1-5	24MAR87	.	15,800	<100	.	<10	.	<5	<5	7	<5
	30APR87	.	17,800	<100	<10	<10	.	<5	<5	10	5
3-1-6	24MAR87	.	15,400	<100	.	<10	.	<5	<5	8	<5
	15APR87	.	15,500	<100	.	<10	.	<5	<5	5	5
3-1-7	25MAR87	.	18,100	<100	.	<10	.	.	<5	8	.
	15APR87	.	15,700	<100	.	<10	.	.	<5	<5	.
3-1-8	25MAR87	.	13,300	<100	.	<10	.	<5	<5	<5	<5
	29APR87	.	18,100	<100	.	<10	.	<5	<5	<5	<5
3-1-9	29MAR87	.	1,200	<100	.	<10	.	<5	<5	33	14
	16APR87	.	1,180	<100	.	<10	.	<5	<5	48	18
3-1-10	13MAR87	.	15,800	<100	.	<10	.	<5	<5	<5	<5
	29APR87	.	19,500	<100	.	<10	.	<5	<5	<5	<5
3-1-11	17MAR87	.	17,800	<100	.	<10	.	<5	<5	11	8
	29APR87	.	17,400	<100	.	<10	.	<5	<5	5	5
3-1-12	13MAR87	.	15,900	<100	.	<10	.	<5	<5	8	10
	27APR87	.	18,800	<100	.	<10	.	<5	<5	5	<5
3-1-13	13MAR87	.	14,200	<100	.	<10	.	8	8	<5	<5
	27APR87	.	18,300	<100	.	<10	.	5	<5	<5	5
3-1-14	13MAR87	.	15,700	<100	.	<10	.	<5	<5	8	7
	29APR87	.	16,100	<100	.	<10	.	<5	<5	<5	8
3-1-15	13MAR87	.	15,800	<100	.	<10	.	5	8	5	<5
	27APR87	.	41,700	<100	.	<10	.	<5	7	8	<5
3-1-16A	23MAR87	.	18,800	<100	.	<10	.	5	5	70	47
	27APR87	.	15,100	<100	.	<10	.	<5	<5	29	25
3-1-16B	23MAR87	.	9,010	<100	88	29	.	<5	<5	29	12
	24APR87	.	8,920	<100	71	22	.	<5	<5	23	13
3-1-16C	23MAR87	.	4,800	<100	.	<10	.	<5	<5	8	<5
	24APR87	.	4,930	<100	.	<10	.	<5	<5	8	<5
3-1-17A	30MAR87	.	15,700	<100	.	<10	.	<5	5	<5	<5
	23APR87	.	17,500	<100	.	<10	.	<5	8	<5	8
3-1-17B	30MAR87	.	43,900	<100	28	<10	.	<5	<5	53	14
	23APR87	.	4,820	<100	31	<10	.	<5	<5	7	<5
3-1-17C	29MAR87	.	<500	<100	.	<10	.	<5	<5	8	5
	23APR87	.	<500	<100	.	<10	.	<5	<5	8	<5
3-1-18A	31MAR87	.	48,900	<100	.	<10	.	12	12	<5	<5
	22APR87	.	48,900	<100	.	<10	.	12	12	<5	<5
3-1-18B	31MAR87	.	<500	<100	.	<10	.	<5	<5	11	11
	22APR87	.	701	<100	.	<10	.	5	<5	7	8
3-1-18C	31MAR87	.	2,230	<100	.	<10	.	<5	<5	22	12
	22APR87	.	1,210	<100	.	<10	.	<5	<5	7	<5
3-1-19	02APR87	.	14,900	<100	.	<10	.	5	8	10	11
	27APR87	.	17,000	<100	.	<10	.	5	<5	8	8
3-2-1	26MAR87	.	25,600	<100	.	<10	.	<5	<5	10	<5
	21APR87	.	23,100	<100	.	<10	.	<5	<5	8	<5
3-3-7	18MAR87	.	29,100	<100	.	<10	.	8	7	<5	<5
	28APR87	.	27,100	2210	.	<10	.	7	9	5	<5
3-3-10	29MAR87	.	28,300	<100	.	<10	.	<5	<5	9	11
	14APR87	.	27,100	225	.	<10	.	<5	<5	6	5
3-4-1	26MAR87	.	28,300	<100	.	<10	.	12	11	10	<5
	21APR87	.	27,700	<100	.	<10	.	7	7	5	<5
3-4-7	18MAR87	.	38,400	<100	.	<10	.	8	8	<5	<5
	21APR87	.	32,600	380	.	<10	.	5	7	5	<5
3-4-11	01APR87	.	28,600	<100	.	<10	.	9	8	<5	<5
	23APR87	.	25,400	<100	.	<10	.	7	9	<5	<5
3-8-2	29MAR87	.	29,400	<100	.	<10	.	12	14	<5	<5
	15APR87	.	28,500	<100	.	<10	.	13	14	<5	<5
8-S19-E13	29MAR87	.	48,500	<100	.	<10	.	13	14	<5	<5
	30APR87	8.432	47,500	<100	<10	<10	5.99	15	14	<5	<5
8-S30E15A	29MAR87	.	18,800	<100	.	<10	.	8	8	43	94
	28APR87	.	17,200	<100	.	<10	.	6	7	52	79

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 had at least one value above detection limits in the March, April, and May 1987 samples. The column headers for the constituents give 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 value is available, a period is printed. This occurs for constituents at 1-H4-16, because only an initial screening sample was taken in May, and for strontium and uranium, which were sampled at only two wells.

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183-H Solar Evaporation Basins Data for March, April and May, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	ALUMINUF PPB	ALUMINUM PPB	AMMONIU PPB	ARSENIC PPB	ARSENIF PPB	BARIUM PPB	BARIUMF PPB	BETA PCI/L	CALCIUF PPB	CALCIUM PPB
		.	.	.	50	50	1000	1000	50	.	.
1-H3-1	10MAR87	<150	<150	<50	<5	<5	48	48	11.00	87,400	79,100
	10APR87	<150	<150	<50	<5	<5	53	51	9.58	81,400	83,300
	15MAY87	<150	<150	<50	<5	<5	57	55	12.20	82,300	83,800
1-H3-2A	04MAR87	<150	<150	<50	<5	<5	27	25	8.11	43,200	43,600
	07APR87	<150	<150	<50	<5	<5	24	23	9.87	42,400	43,900
	12MAY87	<150	<150	<50	<5	<5	22	20	8.90	38,500	38,600
1-H3-2B	09MAR87	<150	<150	<50	<5	<5	42	44	7.66	41,600	42,700
	08APR87	<150	<150	<50	<5	<5	39	38	7.00	43,800	43,900
	12MAY87	<150	<150	<50	<5	<5	30	28	10.90	40,300	43,400
1-H3-2C	09MAR87	799	1580	386	<5	<5	19	17	10.40	23,500	25,100
	08APR87	453	807	335	<5	<5	17	17	12.70	24,200	25,800
	11MAY87	<150	<150	115	<5	<5	23	24	9.22	29,300	29,200
1-H4-3	10MAR87	<150	841	<50	<5	<5	50	47	711.00	34,600	35,500
	08APR87	<150	347	<50	<5	5	29	27	587.00	19,600	20,300
	15MAY87	<150	<150	<50	8	9	20	14	236.00	11,200	11,300
1-H4-4	09MAR87	<150	<150	<50	<5	<5	96	88	481.00	59,100	64,800
	10APR87	<150	<150	<50	5	<5	79	80	431.00	53,700	51,800
	14MAY87	<150	<150	<50	<5	<5	22	27	8.88	25,700	27,000
1-H4-5	10MAR87	<150	<150	<50	<5	<5	52	48	10.20	57,300	58,200
	10APR87	<150	<150	<50	<5	<5	58	55	8.71	59,000	60,300
	19MAY87	<150	<150	68	<5	<5	54	55	5.75	60,200	59,500
1-H4-6	11MAR87	<150	<150	106	<5	<5	45	43	7.66	76,200	78,300
	14APR87	<150	<150	112	<5	<5	48	48	8.75	66,700	67,400
	15MAY87	<150	<150	84	<5	<5	50	45	7.83	64,200	65,400
1-H4-7	04MAR87	<150	<150	<50	<5	<5	30	29	8.80	54,600	54,200
	08APR87	<150	<150	<50	<5	<5	34	34	4.05	50,700	52,900
	18MAY87	<150	<150	84	<5	<5	48	43	12.30	73,400	72,100
1-H4-8	04MAR87	<150	<150	<50	<5	<5	42	40	10.70	60,400	56,300
	09APR87	<150	<150	<50	<5	<5	45	43	8.71	64,000	63,700
	18MAY87	<150	1500	<50	<5	<5	55	48	11.80	70,600	67,900
1-H4-9	05MAR87	<150	<150	<50	5	<5	78	74	178.00	101,000	100,000
	02APR87	<150	<150	<50	9	8	59	62	128.00	84,200	81,200
	18MAY87	<150	178	52	9	9	64	63	184.00	90,900	86,900
1-H4-10	05MAR87	<150	<150	<50	<5	<5	70	70	9.62	48,100	44,200
	06APR87	<150	<150	<50	<5	<5	72	75	8.96	47,000	46,000
	14MAY87	<150	<150	<50	<5	<5	44	42	5.20	29,800	31,200
1-H4-11	05MAR87	<150	<150	<50	<5	<5	30	29	65.30	50,500	49,000	
	06APR87	<150	<150	<50	<5	<5	29	29	87.10	49,000	48,700
	18MAY87	<150	<150	63	<5	<5	31	29	74.30	48,900	47,200
1-H4-12A	03MAR87	<150	258	<50	<5	<5	88	82	320.00	81,100	82,400
	07APR87	<150	<150	<50	<5	<5	74	77	113.00	80,000	80,500
	13MAY87	<150	<150	<50	<5	<5	37	34	7.91	48,700	41,900
1-H4-12B	09MAR87	<150	<150	<50	<5	<5	102	101	85.10	69,700	70,600
	07APR87	<150	<150	<50	<5	<5	99	105	54.60	72,900	73,400
	13MAY87	<150	<150	<50	<5	<5	80	75	78.70	54,000	55,400
1-H4-12C	03MAR87	843	830	255	<5	<5	11	10	9.70	24,400	25,900
	07APR87	299	308	246	<5	<5	10	10	8.51	25,800	25,300
	13MAY87	<150	<150	198	5	5	7	7	7.86	27,600	29,600
1-H4-13	04MAR87	<150	447	<50	<5	<5	30	28	98.20	42,000	41,600
	08APR87	<150	224	<50	<5	<5	26	24	73.20	39,800	40,600
	12MAY87	<150	<150	<50	<5	<5	26	26	58.20	39,900	40,700
1-H4-14	05MAR87	<150	<150	<50	<5	<5	21	22	8.05	41,100	39,700
	08APR87	<150	<150	<50	5	5	22	22	8.67	42,500	43,700
	12MAY87	<150	<150	<50	<5	<5	22	23	12.50	44,700	44,000
1-H4-15A	05MAR87	<150	<150	<50	<5	<5	80	87	9.13	51,200	49,100
	09APR87	<150	<150	<50	<5	<5	77	78	9.66	50,200	48,600
	14MAY87	202	540	<50	<5	<5	67	62	8.08	44,400	42,100
1-H4-15B	09MAR87	<150	<150	<50	<5	<5	96	97	11.00	45,900	48,500
	09APR87	<150	<150	<50	<5	<5	102	100	10.90	51,900	49,800
	14MAY87	<150	<150	<50	<5	<5	107	110	10.90	51,900	49,400
1-H4-16	07MAY87	.	1180	.	.	.	39	.	18.90	.	40,800

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183-H Solar Evaporation Basins Data for March, April and May, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	CHLFORM PPB	CHLORID PPB	CHROMIF PPB	CHROMLM PPB	COLIFRM MPN	CONDUCT UMHO	COPPER PPB	COPPERF PPB	FLUORID PPB	IRON PPB
		.	.	50	50	1	.	1300*	1300*	1400	.
1-H3-1	10MAR87	<10	18,400	64	66	2.2	654	<10	<10	<500	<50
	10APR87	<10	30,800	62	74	2.2	698	<10	<10	<500	52
	15MAY87	<10	9,210	65	70	2.2	627	<10	<10	<500	<50
1-H3-2P	04MAR87	26	7,470	34	50	2.2	355	<10	<10	<500	100
	07APR87	27	7,330	31	38	2.2	328	29	<10	<500	<50
	12MAY87	26	5,530	18	30	2.2	310	<10	<10	<500	67
1-H3-2B	06MAR87	26	6,920	14	23	2.2	363	<10	<10	<500	<50
	08APR87	27	8,970	17	17	2.2	329	<10	<10	<500	54
	12MAY87	25	5,830	18	25	2.2	288	<10	<10	<500	<50
1-H3-2C	06MAR87	24	9,920	<10	12	2.2	300	24	<10	<500	1450
	08APR87	17	7,650	11	<10	2.2	284	28	14	<500	810
	11MAY87	<10	2,640	10	<10	2.2	187	21	22	<500	<50
1-H4-3	10MAR87	22	10,400	348	364	2.2	2070	36	34	<500	1110
	09APR87	24	13,100	299	313	2.2	1407	18	38	543	492
	15MAY87	22	7,250	302	298	2.2	910	10	<10	633	530
1-H4-4	09MAR87	19	7,070	411	437	2.2	1180	<10	<10	<500	84
	10APR87	18	6,650	379	378	2.2	1058	<10	<10	<500	144
	14MAY87	<10	1,280	24	28	2.2	215	<10	<10	<500	<50
1-H4-5	10MAR87	21	8,340	174	179	2.2	463	<10	<10	<500	82
	10APR87	20	8,580	168	177	2.2	414	<10	<10	<500	58
	19MAY87	19	5,340	233	230	2.2	412	<10	<10	<500	<50
1-H4-6	11MAR87	<10	20,300	43	52	2.2	428	<10	<10	<500	280
	14APR87	<10	14,600	38	40	2.2	508	<10	<10	<500	374
	15MAY87	<10	15,800	40	62	2.2	491	<10	<10	<500	287
1-H4-7	04MAR87	22	8,740	142	140	2.2	405	18	<10	<500	118
	08APR87	21	10,100	133	128	2.2	382	17	<10	<500	104
	18MAY87	19	7,460	122	132	18.8	456	<10	<10	<500	183
1-H4-8	04MAR87	18	8,870	183	187	2.2	440	14	<10	<500	71
	08APR87	20	9,860	94	181	2.2	430	16	<10	<500	94
	18MAY87	17	7,520	111	113	2.2	395	11	<10	<500	2580
1-H4-9	05MAR87	19	9,700	147	164	2.2	799	<10	<10	<500	107
	08APR87	17	8,960	184	183	2.2	570	<10	<10	<500	80
	18MAY87	20	9,340	143	146	2.2	630	<10	<10	<500	301
1-H4-10	05MAR87	<10	7,270	80	84	2.2	345	<10	<10	<500	<50
	08APR87	<10	8,340	91	87	2.2	332	14	<10	<500	<50
	14MAY87	<10	1,400	15	18	2.2	235	<10	<10	<500	<50
1-H4-11	06MAR87	28	6,600	73	73	2.2	348	<10	<10	<500	<50
	08APR87	31	5,820	60	61	2.2	300	<10	<10	<500	<50
	18MAY87	30	3,850	106	109	2.2	300	19	<10	<500	187
1-H4-12A	03MAR87	23	8,970	302	306	2.2	670	<10	<10	<500	489
	07APR87	22	9,040	281	282	2.2	608	<10	<10	<500	<50
	13MAY87	<10	2,720	48	57	2.2	299	<10	<10	<500	<50
1-H4-12B	03MAR87	21	8,700	233	242	2.2	491	<10	<10	<500	<50
	07APR87	20	7,540	229	228	2.2	539	<10	<10	<500	<50
	13MAY87	12	4,280	137	152	2.2	361	<10	<10	<500	<50
1-H4-12C	03MAR87	<10	11,000	186	178	2.2	315	<10	38	<500	1120
	07APR87	<10	8,560	194	180	2.2	275	<10	<10	<500	521
	13MAY87	<10	3,330	75	90	2.2	284	10	<10	<500	<50
1-H4-13	04MAR87	32	5,390	18	21	2.2	324	<10	<10	<500	806
	08APR87	32	5,220	22	23	2.2	285	<10	<10	<500	406
	12MAY87	25	3,120	35	35	2.2	275	<10	<10	<500	158
1-H4-14	05MAR87	33	5,280	179	174	2.2	315	28	<10	<500	<50
	08APR87	34	5,480	223	231	2.2	314	17	<10	<500	59
	12MAY87	31	4,140	254	250	2.2	304	15	<10	<500	52
1-H4-15A	05MAR87	15	5,930	202	192	2.2	388	11	<10	<500	94
	09APR87	18	6,280	168	186	2.2	403	12	<10	<500	137
	14MAY87	<10	3,870	62	60	2.2	313	<10	<10	<500	839
1-H4-15B	09MAR87	13	5,510	170	174	2.2	368	<10	<10	<500	<50
	09APR87	15	5,690	171	164	2.2	418	<10	<10	<500	<50
	14MAY87	<10	5,360	121	117	2.2	367	<10	<10	<500	<50
1-H4-18	07MAY87	.	.	.	<10	.	.	12	.	.	2870

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Constituents with at least one value above the Detection Limit

Well name	Collection Date	NICKELF PPB	NITRATE PPB	PH	POTASSF PPB	POTASSM PPB	RADIUM PCI/L	SELENIF PPB	SODIUM PPB	SODIUMF PPB	SR PCI/L
		.	45000	.	.	.	5	10	.	.	.
1-H3-1	10MAR87	<10	84,900	7.70	6,390	6,270	0.0842	<5	20,000	20,500	.
	10APR87	<10	98,000	7.50	6,570	6,800	0.2400	<5	23,100	22,400	0.112
	15MAY87	<10	52,300	7.30	6,520	6,720	0.2190	<5	22,700	22,500	.
1-H3-2A	04MAR87	<10	22,700	7.90	4,500	4,620	0.1860	<5	13,100	12,400	.
	07APR87	<10	17,800	7.40	4,380	4,610	0.0990	<5	11,800	11,500	.
	12MAY87	<10	15,600	7.60	4,290	4,370	0.1580	<5	11,800	11,600	.
1-H3-2B	06MAR87	<10	17,200	7.90	4,650	4,710	0.5540	<5	8,560	8,570	.
	08APR87	<10	16,100	7.90	4,600	4,780	0.4370	<5	8,740	8,370	.
	12MAY87	<10	17,400	7.60	4,530	4,640	0.3000	<5	9,000	8,920	.
1-H3-2C	06MAR87	<10	8,150	7.50	5,300	5,400	0.3370	<5	24,800	24,000	.
	06APR87	<10	5,080	7.70	5,350	5,380	0.2270	<5	22,800	22,700	.
	11MAY87	<10	4,010	7.30	4,830	4,800	0.2336	<5	12,700	12,700	.
1-H4-3	10MAR87	32	981,000	8.20	6,390	6,790	0.1230	<5	354,000	347,000	.
	09APR87	16	465,000	7.70	4,840	4,950	0.3910	<5	271,000	270,000	0.647
	15MAY87	12	323,000	7.40	3,770	3,740	0.3673	<5	202,000	212,000	.
1-H4-4	09MAR87	17	493,000	7.60	6,500	6,900	0.1780	<5	181,000	178,000	.
	10APR87	17	452,000	7.30	6,520	6,090	0.1130	<5	168,000	177,000	.
	14MAY87	<10	9,720	7.70	3,080	3,180	0.0676	<5	12,400	12,100	.
1-H4-5	10MAR87	<10	33,000	7.80	4,400	4,500	0.1760	<5	10,100	9,890	.
	10APR87	<10	28,700	7.30	4,890	4,550	0.0347	<5	11,000	10,800	.
	19MAY87	<10	29,600	7.40	4,610	4,590	0.2940	<5	9,960	9,980	.
1-H4-6	11MAR87	<10	38,100	7.00	5,900	6,130	0.1030	<5	22,300	22,400	.
	14APR87	<10	37,000	7.10	6,610	6,440	0.1770	<5	23,800	25,500	.
	15MAY87	<10	31,500	7.10	6,410	6,580	0.2370	<5	25,800	25,000	.
1-H4-7	04MAR87	<10	27,000	7.90	5,190	5,200	0.2280	<5	11,400	11,300	.
	08APR87	<10	5,090	7.70	5,210	4,950	0.5140	<5	11,200	11,900	.
	18MAY87	<10	44,700	7.60	5,780	6,120	0.3450	<5	13,700	13,000	.
1-H4-8	04MAR87	<10	29,700	7.70	4,700	4,710	0.2500	<5	13,000	13,000	.
	09APR87	<10	27,800	7.20	4,970	4,920	0.2180	<5	13,400	13,400	.
	18MAY87	<10	29,900	7.30	5,100	5,240	0.2780	<5	12,300	12,100	.
1-H4-9	05MAR87	<10	239,000	7.33	6,200	6,310	0.2570	5	32,000	32,000	.
	08APR87	<10	118,000	7.60	5,610	5,780	0.0826	<5	25,900	25,500	.
	18MAY87	<10	145,000	7.50	6,060	5,980	0.0709	<5	26,800	26,100	.
1-H4-10	03MAR87	<10	23,000	8.00	4,500	4,440	0.1020	<5	14,900	15,200	.
	06APR87	<10	29,200	7.00	4,530	4,480	0.1710	<5	15,800	16,100	.
	14MAY87	<10	23,100	7.10	2,830	2,940	0.1110	<5	7,760	7,640	.
1-H4-11	06MAR87	<10	27,400	7.30	2,590	2,620	0.1260	<5	7,270	7,210	.
	06APR87	<10	21,800	7.50	2,590	2,530	0.1280	<5	7,250	7,540	.
	18MAY87	<10	25,400	7.80	2,650	2,760	0.0470	<5	9,220	8,890	.
1-H4-12A	03MAR87	<10	171,000	7.40	5,740	5,880	0.3150	<5	28,100	27,400	.
	07APR87	<10	94,300	7.40	5,750	5,540	0.4340	<5	20,600	21,400	.
	13MAY87	<10	22,900	7.80	3,900	4,050	0.0926	<5	18,700	18,300	.
1-H4-12B	09MAR87	<10	85,900	7.80	5,200	5,410	0.7230	<5	16,200	15,300	.
	07APR87	<10	68,200	7.50	5,420	5,180	0.4080	<5	13,600	14,700	.
	13MAY87	<10	29,300	7.60	4,490	4,620	0.4140	<5	11,000	10,700	.
1-H4-12C	03MAR87	26	5,380	7.40	5,500	5,780	0.4590	<5	20,600	19,600	.
	07APR87	34	4,780	7.10	5,330	5,300	0.2820	<5	14,500	14,500	.
	13MAY87	11	3,610	7.50	5,320	5,480	0.1680	<5	12,700	12,200	.
1-H4-13	04MAR87	<10	29,000	7.60	2,300	2,300	0.2880	<5	7,120	7,160	.
	08APR87	<10	22,000	7.10	2,220	2,310	0.1820	<5	7,350	7,210	.
	12MAY87	<10	18,700	7.20	2,220	2,270	0.3270	<5	6,490	6,360	.
1-H4-14	05MAR87	<10	19,300	7.51	4,090	4,020	0.1180	<5	7,470	7,600	.
	08APR87	<10	18,400	7.60	4,190	4,360	0.1110	<5	8,280	8,020	.
	12MAY87	<10	20,500	7.60	4,250	4,190	0.1110	<5	7,960	8,270	.
1-H4-15A	05MAR87	<10	27,600	7.31	5,490	5,240	0.3070	<5	10,800	11,200	.
	09APR87	<10	25,900	6.60	5,390	5,190	0.3470	<5	10,800	10,900	.
	14MAY87	<10	25,400	7.00	4,780	4,720	0.5560	<5	11,000	11,100	.
1-H4-15B	09MAR87	<10	24,400	7.50	5,310	5,368	0.9270	<5	9,600	9,460	.
	09APR87	<10	23,300	7.30	5,290	5,430	0.3990	<5	11,300	10,600	.
	14MAY87	<10	26,200	7.30	5,450	5,260	0.5190	<5	10,200	10,700	.
1-H4-18	07MAY87	.	10,700	.	.	3,040	.	.	4,730	.	.

RCRA Compliance Ground-Water Monitoring Project 8:04 FRIDAY, JULY 17, 198
183-H Solar Evaporation Basins Data for March, April and May, 1987
Constituents with at least one value above the Detection Limit

Well name	Collection Date	STRONTIF PPB	STRONIUM PPB	SULFATE PPB	TOC PPB	TOX PPB	U-CHEM UG/L	VANADIF PPB	VANADIUM PPB	ZINC PPB	ZINCF PPB
		.	.	.	.	.	.	.	.	.	.
1-H3-1	10MAR87	444	433	78,900	1220	<100	.	7	8	5	8
	16APR87	494	506	81,200	1140	<100	9.11	13	10	<5	<5
	15MAY87	491	506	89,100	1140	<100	.	10	11	<5	<5
1-H3-2A	04MAR87	<300	<300	44,000	658	<100	.	7	8	<5	<5
	07APR87	<300	<300	35,600	790	<100	.	10	10	10	<5
	12MAY87	<300	<300	30,800	792	<100	.	10	13	8	<5
1-H3-2B	06MAR87	<300	<300	41,700	881	<100	.	<5	<5	<5	<5
	04APR87	<300	<300	33,500	633	<100	.	<5	<5	8	<5
	12MAY87	<300	<300	33,900	636	<100	.	5	8	8	5
1-H3-2C	06MAR87	<300	<300	35,500	936	<100	.	18	15	17	8
	06APR87	<300	<300	29,000	787	<100	.	18	18	21	12
	11MAY87	<300	<300	23,000	899	358	.	18	18	71	52
1-H4-3	10MAR87	<300	<300	115,000	1060	<100	.	5	8	7	<5
	09APR87	<300	<300	82,700	1000	<100	288.00	7	12	<5	12
	15MAY87	<300	<300	82,200	864	<100	.	12	14	<5	<5
1-H4-4	09MAR87	328	328	82,900	818	<100	.	<5	5	74	82
	10APR87	<300	<300	68,800	900	<100	.	5	5	79	78
	14MAY87	<300	<300	21,300	757	<100	.	8	7	21	10
1-H4-5	10MAR87	<300	<300	60,100	775	347	.	<5	<5	68	50
	10APR87	<300	<300	57,000	868	<100	.	5	5	48	42
	19MAY87	<300	<300	54,800	723	<100	.	7	<5	78	80
1-H4-6	11MAR87	318	315	90,600	1010	<100	.	<5	5	134	128
	14APR87	351	336	92,400	900	<100	.	8	7	186	144
	15MAY87	344	358	86,200	960	<100	.	8	8	190	247
1-H4-7	04MAR87	<300	<300	61,500	814	<100	.	7	7	12	<5
	08APR87	<300	<300	29,100	900	<100	.	10	8	13	5
	18MAY87	333	361	89,000	928	<100	.	8	8	80	78
1-H4-8	04MAR87	<300	<300	59,200	786	<100	.	7	5	11	<5
	09APR87	<300	<300	58,000	915	<100	.	8	8	13	5
	18MAY87	308	323	82,900	784	<100	.	7	15	15	9
1-H4-9	05MAR87	449	457	77,500	1030	<100	.	5	5	<5	<5
	08APR87	375	363	84,000	851	<100	.	7	7	6	5
	18MAY87	422	426	71,500	921	<100	.	6	9	5	8
1-H4-10	05MAR87	<300	<300	47,200	424	<100	.	7	7	5	<5
	08APR87	<300	<300	43,200	537	<100	.	8	8	12	<5
	14MAY87	<300	<300	23,200	601	<100	.	<5	5	8	<5
1-H4-11	06MAR87	<300	<300	41,000	598	<100	.	<5	<5	<5	<5
	08APR87	<300	<300	38,400	735	<100	.	<5	8	10	<5
	18MAY87	<300	<300	37,300	583	<100	.	<5	7	15	5
1-H4-12A	03MAR87	381	387	57,200	974	<100	.	<5	8	<5	<5
	07APR87	359	357	48,300	853	<100	.	5	5	<5	<5
	13MAY87	<300	<300	29,400	842	<100	.	<5	10	<5	<5
1-H4-12B	09MAR87	324	332	54,100	940	<100	.	<5	<5	<5	<5
	07APR87	336	327	50,600	824	<100	.	<5	5	5	<5
	13MAY87	<300	<300	36,400	719	3200	.	8	8	41	28
1-H4-12C	03MAR87	<300	<300	27,600	863	<100	.	18	20	12	25
	07APR87	<300	<300	24,200	547	<100	.	21	22	5	8
	13MAY87	<300	<300	27,700	603	312	.	14	19	44	33
1-H4-13	04MAR87	<300	<300	34,300	670	<100	.	<5	5	<5	<5
	08APR87	<300	<300	30,000	650	<100	.	8	5	5	<5
	12MAY87	<300	<300	28,900	710	<100	.	5	5	23	17
1-H4-14	05MAR87	<300	<300	41,000	541	<100	.	<5	8	15	<5
	08APR87	<300	<300	41,600	636	<100	.	5	9	11	<5
	12MAY87	<300	<300	38,100	649	<100	.	8	5	23	<5
1-H4-15A	05MAR87	<300	<300	44,800	550	<100	.	8	8	8	<5
	09APR87	<300	<300	45,300	582	<100	.	8	9	9	<5
	14MAY87	<300	<300	32,300	681	<100	.	11	11	8	<5
1-H4-15B	09MAR87	<300	<300	42,600	486	<100	.	9	8	<5	<5
	09APR87	<300	<300	45,500	520	<100	.	8	5	8	<5
	14MAY87	<300	<300	41,700	478	414	.	10	9	79	73
1-H4-16	07MAY87	.	.	.	.	.	.	.	8	9	.

APPENDIX C

WELL CONSTRUCTION SUMMARIES AND GEOLOGISTS', GEOPHYSICAL, AND CONSTRUCTION LOGS FOR NEW WELLS IN THE AREA SURROUNDING THE 183-H SOLAR EVAPORATION BASINS

Battelle Pacific Northwest Laboratories

Well Completion Report/Title III Inspection List

Project RCRA G-W Monitoring	Well Number 199-H4-16
Location 100-H	Temporary Well Number N/A
Driller D. Garcia, B. Hromaw, D. Ludtke	Coordinates
Drilling Co. Onwego Drilling	Casing Elevation
Geologist K R Oster	Ground Elevation

DRILLING METHOD

Rotary Air N/A Mud N/A

Cable Tool D 0'-48' H 48'-101'

Drilling Fluid 100 Area F.S. Drilling Supply Water

Other N/A

COMPLETION DATA

Drilled Depth 101' below land surface

Completion Depth 57.5'

Date Started 4/15/87 Completed 4/30/87

Static Water Level/Date 46.5' / 4/27/87

CASING DATA

Type	Size		
Carbon Steel Casing (Removed)	14" Sch 40 A53	to	10'
Carbon Steel Casing (Removed)	10" Sch 40 A53	to	61'
Stainless Steel Casing 304	6" Sch 10/40 A778	to	42.5'

Approved By K R Oster Date 4/28/87

PERFORATIONS

Type N/A

Depth	Schedule
-	
-	
-	

App. By K R Oster Date 4/28/87

SCREEN

Type 6" SS 304 Screen

Length 15'5"

Slot Size 20 slot

Depths 42.5' - 57.5'

App. By K R Oster Date 4/28/87

ANNULAR SEAL

Type	Interval	Volume
Sand	37.5'-57.5'	6.98 ft³
Bentonite Chips	32.5'-37.5'	1.75 ft³
Granular Bentonite	5.5'-32.5'	9.43 ft³
Concrete	0'-5.5'	1.92 ft³

App. By K R Oster Date 4/30/87

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Density	0' - 100'	4/21/87
Neutron	0' - 100'	4/21/87
Nat. Gamma	0' - 101'	4/21/87
	-	
	-	
	-	
	-	

Approved By K R Oster Date 4/21/87

AQUIFER TESTING

Type of Test Constant Discharge / Recovery

Length of Test Pumped 4.15 hrs / 2.5 hrs Recovery

Volume Pumped 40 gal/min for 249 minutes

Drawdown 8.39' drawdown / 3.96' recovery

Approved By K R Oster Date 4/27/87

OTHER APPLICABLE ITEMS

- ✓ Steam Cleaning
- ✓ Storage of Const. Material
- ✓ Tool Lubricants
- ✓ Concrete Pad
- ✓ Protective Steel Posts
- ✓ Safety Paint
- ✓ Straightness Test
- ✓ Well Development
- N/A Downhole TV Inspection
- N/A Well Abandonment
- ✓ Complete As-Built Diagram, Driller's and Geologist's Logs

Approved By K R Oster Date 5/27/87

Reviewed By J R Raymond Date 7/27/87

A-1800-187 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 199-H4-1C Geologist K.R. Oster Page 1 of 1

Reviewed by [illegible] Date 7/27/87

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
14" Carbon Steel Surface Pipe (Removed)		0		SANDY GRAVEL (Backfill Mtl.)
		10		Gra. SANDY GRAVEL
10" Carbon Steel Casing (Removed)		15		
		20		Slightly moist coarse to
10" SS 304 Casing		25		medium grey SANDY GRAVEL
		30		
		35		
		40		
		45		Moist coarse to medium, grey SANDY GRAVEL.
10" SS 304 (20 slot) Screen		50		Static Water Level @ 48.5'
10" (telescope size) Aquifer Testing Screen		55		
		60		consolidated SANDY GRAVEL with Clay
		65		Top of Ringold Contact @ 60' MUDDY SANDY GRAVEL, [illegible]

Completion Symbols
+ Concrete Seal
/ Granular Bentonite Seal
X Bentonite Pellet Seal
Z Bentonite Slurry Seal
• Artificial Sand Pack
Natural Gravel Pack

Lithologic Symbols
~ Clay
— Silt
· Sand
o Gravel
o Gravel with Weathering Rinds
□ Caliche

DRILL LOG	By L.R Oster	Rig Bucyrus Erie 22W Drive 80 Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/15/87		Depth 0' To 5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Rig was Steam Cleaned on Friday 4/10/87		
				Set up rig on well site	0915	
				Tool lubricant used today is Chevron Poly		
				FM Grease-2		
	4'-5'	D	Slightly Moist	SANDY GRAVEL, 15% V.F.S., 10% F.S., 5% M.S., 10% C.S.,	1055	
				5% V.C.S. 5% granules, 45% Pebbles, 5% small cobbles,		
				with some silt, unconsolidated backfill, Framework is		
				subrounded to rounded clasts of 80% basalt, 10%		
				granite, 5% quartzite, 5% metamorphics, Matrix is		
				moderately sorted, angular to subangular, 85%		
				basalt sand, 15% quartz sand. Dry Color is light brownish		
				grey (2.5Y 6/2), strong reaction in 10% HCl, low moisture		
				content. Moisture and geologic samples are		
				representative of sample but do not include the		
				small cobbles. Weathering rinds are present on ~50% of clasts.		
				Placed 10' of 14" surface pipe in hole	1120	

REMARKS:

L.R. Oster 4/15/87

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Onwego Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/15/87		Depth 5' To 12'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	9'-10'	D	DRY	SANDY GRAVEL, 5% vfs, 5% fs, 15% ms, 15% cs, 5% vcs,	1255	
				5% granules, 40% pebbles, 10% small cobbles.		
				Framework is rounded clasts (where not broken by		
				drive barrel) of 75% basalt, 15% granite, 5%		
				quartzite, 5% metamorphics, Matrix is moderately		
				well sorted, angular to subangular, 60% basaltic,		
				30% quartz, and 10% other sands, Dry color is gray		
				(2.5Y 6/0), Moderate reaction w. 10% HCl, very low moisture		
				content, unconsolidated, several clasts are broken		
				and powdered by drive barrel, weathering rinds are		
				present on ~10% of clasts, Moisture and geologic		
				samples are representative but do not include the		
				small cobbles, lower percentage basalt than previous sample.		
13'9"				Placed 13'9" of 10" casing and drive shoe in hole	1330	
6'1" / 19'10"				Added 6'1" of 10" casing to hole, Total Casing = 19'10"	1415	

REMARKS: Delivered 4'-5' and 9'-10' moisture samples to lab.

K.R. Oster 4/15/87

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Onwego Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/16/87		Depth 12' To 17'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Started Drilling and driving casing (~6' above hole)	0815	Still using Chevron
						Poly FM Grease-2 lubricant.
	14'-15'	D	DRY	SANDY GRAVEL 10% v.f.s, 5% f.s, 15% m.s, 10% c.s, 5%	0900	
				v.c.s, 5% granules, 40% pebbles, 10% small cobbles		
				Sample is well rounded and poorly sorted by river		
				bars land very similar to previous sample.		
				Framework is rounded clasts (when not broken)		
				of 75% Basalt, 15% granite, 5% quartzite, and		
				5% metamorphics, Matrix is moderately well		
				sorted, angular to subangular, 60% basaltic,		
				30% quartz, and 10% other sands, Dry Color		
				is gray (2.5Y 6/0), strong reaction in 10% HCl,		
				very low moisture content, unconsolidated,		
				very few weathering rinds present on unbroken		
				surfaces of clasts. Moisture and geologic samples		
				are representative of whole sample		
				Hit small pocket of moisture at 17'	09:15	

REMARKS:

Karen P. Oster
4/16/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R.Oster	Rig Burgess Erie 2000 Longyear Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/16/87		Depth 17' To 21'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Stopped drilling and driving casing	1010	
				Started drilling and driving casing	1015	
	17'-20'	D	slightly moist	SANDY GRAVEL. 5% vfs, 5% fs, 15% ms, 5% cs, 10% vcs,	1020	
				10% granules 40% pebbles, 10% small cobbles. Sample is		
				ground and powdered by drive barrel but not as much		
				as the previous sample. Framework is subrounded		
				to rounded clasts (when not broken) of 85% basalt,		
				10% granite, and 5% quartzite, metamorphics and others,		
				Matrix is moderately well sorted angular to subangular,		
				70% basaltic, 25% quartz and 5% other sands,		
				Dry Color is gray (7.5YR 6/0), very slight reaction		
				in 10% HCl, low moisture content, (unconsolidated,		
				very few weathering rinds present on unbroken		
				clasts. Overall increase in size of clasts and		
				percentage of basalt from previos sample. Moisture		
				and geologic samples are representative but		
				do not include small cobbles.		
				Stopped drilling and driving casing	1100	

REMARKS:

Karen R. Oster
4/16/87

DRILL LOG	By K.R. Oster	Rig Buggy's Erie 22W Onwego Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/16/87		Depth 21' To 25'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
19'10" 16'9"				Added 6'9" of 10" casing to hole, 26'7" total casing	11 05	
26'7"				Resumed drilling and driving casing	11:25	
	24'-25'	D	slightly Moist	SANDY GRAVEL, 5% vfs, 5% fs, 10% ms, 10% cs, 10% vcs,	12:20	
				10% granules, 40% pebbles, 10% small cobbles. Sample		
				is ground and powdered slightly by drive barrel.		
				Framework is subrounded to rounded clasts		
				(when not broken) of 85% basalt, 10% granite, and		
				5% quartzite, metamorphics and others, Matrix is		
				moderately sorted angular to subangular, 70%		
				basaltic, 25% quartz and 5% other sands, Dry		
				color is grey (7.5YR 6/0), no reaction in 10% HCl,		
				low moisture content, unconsolidated, no visable		
				weathering rinds on unbroken clasts, Overall		
				increase in grainsize. Moisture and geologic		
				samples are representative but do not include		
				small cobbles.		
6'7"				Add 6'7" of 10" casing. Total Casing = 33'2"	1245	
33'2"				Resumed drilling and driving casing	1320	

REMARKS:

K.R. Oster 4/16/87

D Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-86)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Oswego Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/16/87		Depth 25' To 33'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	29'-30'	D	Slightly Moist	SANDY GRAVEL, 5% vfs, 5% fs, 10% ms, 15% cs, 10% vcs,	1410	
				10% granules, 40% pebbles, 5% broken cobbles.		
				Sample is well ground and powdered by drive barrel,		
				Framework is subround to rounded clasts (when not		
				broken) of 85% basalt 10% granite, and 5% quartzite,		
				metamophics and others, Matrix is moderately		
				sorted, angular to subangular, 75% basaltic, 20%		
				quartz and 5% other sands, Dry color is grey		
				(7.5YR 6/0), slight reaction in 10% HCl, low		
				moisture content, unconsolidated, no visable		
				weathering rinds on unbroken clasts, Appears		
				to be the same as previous sample except more		
				broken and powdered by drive barrel. Moisture		
				and geologic samples are representative.		
				Stopped drilling and driving casing.	1440	
				Depth to bottom is 33'		

REMARKS: Delivered 14'-15', 19'-20', 24'-25', and 29'-30' moisture samples to lab.

K.R.Oster
4/16/87

DRILL LOG	By K.R. Oster	Rig Burgess Drill Draw Consultants Williams Rig	Well Number 149-114-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/17/87		Depth 33' To 35'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Started drilling and driving casing	0800	
				Stopped drilling and driving casing	0810	
				Started drilling and driving casing	0820	
33'2"				Stopped drilling and driving casing (Driving cap left behind)	0825	
+7'5" 40'7"				Add 7'5" of 10" casing Total Casing = 40'7"	09:20	
				Started drilling and driving casing	10:15	
	31'-35'	D	Slightly Moist	SANDY GRAVEL 5% vfs, 5% fs, 10% ms, 15% cs, 5% vcs,	1030	
				10% granules, 45% pebbles, 5% small cobbles. Sample		
				is very well ground and powdered by drive barrel.		
				Framework is subrounded to rounded (when not broken)		
				of 85% basalt, 10% granite, and 5% quartzite, metamorphics		
				and others. Matrix is moderately sorted, angular to		
				subangular, 75% basalt, 20% quartz and 5% other sands,		
				Dry color is grey (7.5YR 6/0), slight reaction in 10% HCl,		
				low moisture content, unconsolidated, no visable weathering		
				rinds on clasts. Appears to be very similar to previous sample		
				except more broken and powdered by drive barrel.		
				Moisture and geologic samples are representative,		
				but do not include the small cobbles.		

REMARKS:

K.R. Oster
4/17/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Cameron 40 Horse Pig	Well Number 141-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/17/87		Depth 35' To 40'		Subcontract No. N/A.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	31'-40'	D	Slightly Moist	SANDY GRAVEL, 5% vfs, 5% fs, 10% ms, 15% cs, 10% vcs,	1245	
				10% granules 40% pebbles, 5% cobbles. Sample is		
				very well ground and powdered by drive barrel. Framework		
				is subrounded to rounded (when not broken), 85%		
				basalt, 10% granite, and 5% quartzite, metamorphics		
				and others, Matrix is moderately sorted, angular to		
				subangular, 75% basalt, 20% quartz, and 5% other		
				sands, Dry, color is grey (7.5YR 6/0), moderate		
				reaction in 10% HCl, low moisture content, (unconsolidated),		
				no visable weathering rinds on clasts, Appears to be		
				very similar to previous sample, Moisture and		
				geologic samples are representative but do not		
				include the cobbles.		
40'7" + 7'3" = 47'10"				Added 7'3" of 10" casing. Total Casing = 47'10"	1345	
				Started drilling and driving casing.	1420	
				Stopped drilling and driving casing Depth to	1450	
				Bottom = 40'		

REMARKS: Delivered 34'-35', and 39'-40' moisture samples to lab.

K.R.Oster 4/17/87

DRILL LOG	By L.R. Oster	Rig Burgess Erie 3200 Omaha Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/20/87		Depth 43' To 48'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Started drilling and driving casing.	1005	
	44'-45'	D	Hoist	SANDY GRAVEL 5% small cobbles, 40% pebbles, 15%	1140	
				granules, 10% vcs, 10% cs, 10% ms, 5% fs, 5% vfs,		
				Sample is well ground and powdered by drive barrel,		
				Framework is subrounded to rounded (when not		
				broken) 85% basalt, 5% quartz-rich, 5% granite,		
				5% metamorphics and others, Matrix is moderately		
				sorted, angular to subangular, 75% basalt, 20%		
				quartz and 5% other sands, Dry color is gray,		
				(2.5Y 6/0), slight reaction in 10% HCl, low		
				moisture content (but higher than previous sample),		
				unconsolidated, no visable $CaCO_3$ weathering rinds		
				on clasts, Appears to be similar to previous sample		
				except increase in quartz-rich and decrease in		
				granite clasts, Moisture and geologic samples		
				are representative except do not include small		
				cobbles		
				Hit water @ 47.5'-48' change to Hard Tools.	12:00	Used Chevron Poly FH Grease-2, tool lubricant.

REMARKS:

Laura R. Oster
4/20/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-88)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 20W Universal Yellow Rig	Well Number 119-114-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/20/87		Depth 48' To 55'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
47'10" 10' 7" 58'5"				Add 10'7" of 10" casing. Total Casing = 58'5"	1245	
				Started drilling and driving casing	1335	
	49'-50'	H	Wet	SANDY GRAVEL, 60% broken granules, pebbles, and	1425	
				cobbles, 10% vcs, 5% cs, 5% ms + f.s., 20% mud.		
				Framework clasts are 85% basalt, 10% granite,		
				and 5% metamorphics and others. Matrix sands are		
				60% basalt, 35% quartz, and 5% other sands.		
				Clasts and sands are angular, Wet color is		
				dark grey (5Y 4/1), Dry Color is grey (2.5Y 6/0),		
				slight reaction in 10% HCl, unconsolidated, Appears		
				to be similar to previous sample except more		
				crushed by hard tool. Samples are representative.		
	54'-55'	H	Wet	SANDY GRAVEL 60% broken granules pebbles, and	1500	
				cobbles, 10% vcs, 5% cs, 10% ms+fs, 15% mud,		
				Framework clasts are 85% basalt, 10% granite,		
				and 5% metamorphics and others, Matrix sands are		
				50% basalt, 40% quartz and 10% other sands,		
				Wet color is dark gray (5Y 4/1), Dry Color is		

REMARKS: grey (2.5Y 6/0)

Karen R Oster
4/20/87

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 25W Drilled Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/20/87		Depth 55' To 55'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				slight reaction in 10% HCl, Unconsolidated, Clasts		
				and sands are angular except a few unbroken		
				pebbles are subrounded to rounded. Appears		
				to be similar to previous sample except not		
				as crushed by hard tool. Samples are representative.		

REMARKS: Added 25 gallons of drilling supply water to hole.
Delivered 44'-45' moisture sample to lab.

Karen R. Oster
4/20/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Oregon Hollow Pin	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/21/87		Depth 55' to 60'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				Static Water level = 48.5' (E-tape #3144)	0710	
				Started drilling and driving casing	0700	
				Stopped drilling and driving casing, Added 8'5" of	0945	
58'5" + 8'5" = 66'10"				10" casing, Total casing = 66'10"		
				Started drilling and driving casing.	1035	
	59'-60'	H	Wet	SANDY GRAVEL with clay, 10% broken granules, pebbles	1100	
				and cobbles, 10% vcs, 5% ccs, 5% ms + fs, 20% clay,		
				20% mud, Framework clasts are 85% basalt, 5% granite		
				10% metamorphics and others, Matrix sands are 60% basalt,		
				30% quartz, 10% other minls, Clasts and sands are		
				angular, Wet color is very dark grayish brown (2.5Y 3/2)		
				Dry color is light brownish gray (2.5Y 6/2), sands and		
				gravels have no reaction to 10% HCl, mud and clays		
				have slight reaction to 10% HCl, Consolidated, Top of		
				Ringold contact at 60', chunks of clay are up to		
				1/2" in diameter. Samples are representative.		

REMARKS:

Karen R. Oster
4/21/87

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Conveyo Yellow Pig	Well Number 149-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/21/87		Depth 60' To 61'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	61'	H	Wet	MUDDY SANDY GRAVEL, 35% broken granules, pebbles	1115	
				and cobbles, 10% vcs, 5% ccs, 5% ms+fs, 30% clay,		
				15% mud, Framework clastsare 50% basalt, 30% granite,		
				20% metamorphics and others, Matrix sands are		
				50% basalt, 20% quartz, 20% clay, and 10% other		
				sands, Clasts and sands are angular, Wet Color is		
				Dark greyish brown (2.5Y 4/2), Dry Color is light		
				brownish gray (2.5Y 6/2), Sands and gravels have		
				moderate reaction to 10% HCl, mud and clays have		
				strong reaction to 10% HCl, Consolidated (bottom of		
				casing at 61' and no water comes into hole), Chunks		
				of clay are up to 3" in diameter, Samples are		
				representative, and is Ringold.		
				Stopped drilling and driving casing, bailed out hole	1120	
				in preparation for geophysical logging.		
				Bottom of hole and bottom of casing are at 61'.		
				straightness Test using 20' section of 8" pipe.	1445	

REMARKS: Total of 5 gallons of drilling supply water to hole. Geophysical logging (density, neutron, and natural gamma) 1230-1335 hrs.

Karen R. Oster
4/21/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Omaha Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/22/87		Depth 61' To 61'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Depth to Water = 55' (E-tape #3144) water sealed off by casing	1130	
				Depth to Bottom = 61' (300' STEEL TAPE #4)	1131	
				Poured 1 bag (100 lbs each) 10-20 U.S. sieve size	1150	
				Colorado Silica sand in bottom of hole, measured		
				D/B @ 59' below land surface (300' STEEL TAPE #4)		
				Pulled back casing 3' to expose aquifer, bailed out		
				hole in attempts to get more water flowing		
				into hole.		
				Depth to Bottom = 61' (300' STEEL TAPE #4)	1500	
				Depth to Bottom of casing = 58'		
				Depth to Water = 58' (E-tape #3144)		

REMARKS:

K.R. Oster 4/22/87

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Omnisco Yellow Rig	Well Number 199-H4-1C	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/23/87		Depth 101' To 58.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Calcite, Etc.	Time	Drilling Comments
				Depth to Water = 48.5', Depth to Bottom = 101'	0720	(Below land surface)
				(E-tape #144) (300' STEEL TAPE #4)		
				Add 1 1/4 bags (100 lbs each) 10-20 U.S.	0735	
				sieve size Colorado Silica sand in bottom		
				of hole		
				Depth to bottom = 58'8" (300' STEEL TAPE #4)	0740	
				Set 10' section of 10" (telescope size) SS 304	0750	
				(40 slot) aquifer testing screen in hole measured		
				Depth to bottom = 58.5' below land surface		
				(300' STEEL TAPE #4)		
				Pulled Back 10" carbon steel casing to 19'	0755	
				to expose screen		
				Developed well using dart bailer to clean sand	0835	
				out of well		
				Sand fills in hole with every bailer full.		
				Set small turbine pump and stilling well in hole	1340	
				@ 57'2" below land surface		

REMARKS:

Karen R. Oster
4/23/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (6-85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Onwego Yellow Pig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1878 (PNL)
	Date 4/24/87		Depth 58.5' To 58.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/W = 47.5' below land surface (300'E-tape #3144)	0740	
				Needed different couplings and a longer shaft	0745	
				on pumped, changed them out		
				Turned on turbine pump to develope well. Pumping	1200	
				at about 60 gpm drawdown was to 55' (below		
				land surface) within 1 minute and to 58' (below		
				land surface) within 2 minutes. (300'E-tape #3144)		
				Shutoff turbine pump and took recovery	1430	
				measurements for 1/2 hour.		

REMARKS.

Karen P. Oster
4/24/87

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 20W Driller O Yellow Rig	Well Number 199-H4-K	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/27/87		Depth 58.5' To 58.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				D/W = 47.63' below land surface (300'± tape #3144)	1150	
				Constant Discharge Test, pump on at 1221, discharge	1221	
				at approximately 40 gal/per minute. Measured drawdown		
				56.00 - 47.63' = 8.37' at [illegible]		
				Pump off, measured recovery [illegible]	1230	
				56.00 - 48.04' = 7.96' at [illegible]		

REMARKS:

K.R. Oster
4/27/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R. Oster	Rig Manufacturer [illegible]	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. 1-E-H 18?3 (PNL)
	Date 4/28/87	[illegible]	Depth [illegible] To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Pulled turbine pump	0730	
				Measured D/W = 47.5' (from steel tape #4)	1100	
				Measured D/B = 57.5' from st. (tape #4)		
				Bail [illegible] bottom	1130	
				1 Foot of sand [illegible]	1145	
				[illegible] Decided to [illegible] screen at		
				42.5'-57.5'		
				Installing the flowmeter [illegible] 10 gpm [illegible]		<-Note for Aquifer Test
				Set 15'8" of 6" SS 304 screen (0.080") and 45'5"	1300	6" Johnson Steel
				of 6" SS 304 casing in hole, welded 3 SS 304		Screen 42.5'-57.5'
				centralizers to 6" casing at 43' below land surface		
				Measured D/B = 57.5' (300' STEEL TAPE #4)	1346	
				Poured 5 sacks (100 lbs each) 10-20 U.S. Sieve	1355	
				size Colorado Silica sand, in annulus		
				Bailing inside 6" screen to remove fine sands		
				and settle [illegible] sand [illegible] screen.		
				Try to settle SS casing and screen deeper,		
				Pull 10' of 10" casing	1410	

REMARKS:

K.R. Oster 4/28/87

D - Drive Bowl H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

DRILL LOG	By K.R. Oster	Rig Buckeyes Erie 22W Driller Yellow Rig	Well Number 119.114.16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/29/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Added 2 sacks (100 lbs each) 10-20 U.S. sieve	0730	
				size Colorado silica sand, in annulus		
				measured depth to top of sand pack at 37.5'		
				(300' STEEL TAPE #4)		
				Measured D/W at 47.5' (300' steel tape #3144)	0735	
				Pulled ~8' of 10" casing (carbon steel)	0740	
				Measured D/top of sand pack at 40' (settled 2.5') (300' steel tape #4)	0750	
				Added 1 sack (100 lbs each) 10-20 U.S. sieve	0752	Artificial Sand Pack
				size Colorado silica sand, in annulus measured		37.5'-57.5'
				D/top of sand pack at 37.5' (300' STEEL TAPE #4)	0755	
				Pulled 3' of casing (10" carbon steel)	0800	
				D/top of sand pack = 37.5' (300' STEEL TAPE #4)	0811	
				Added 3 buckets (50 lbs ea) 1/4" Volclay Tablets	0812	Bentonite Pellet
				(bentonite pellets) in annulus, Pulled back 3' of 10"		Seal 32.5'-37.5'
				carbon steel casing, Measured D/top of pellets 33'		
				Added 1 more bucket of bentonite pellets,	1142	
				Measured D/Top of pellets = 32.5' below land surface		
				(300' STEEL TAPE #4)		

REMARKS:

K.R. Oster 4/29/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Unwegu Yellowstone	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/29/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Poured 4 sacks (100lbs ea) granular bentonite	1210	
				(8-20 mesh) in annulus, pulled 10" carbon steel		
				casing back to 25', measured top of granular		
				bentonite seal at 20' below land surface		
				(300' STEEL TILE #4)		
				Pulled 10" carbon steel casing back to 22', poured 1.5 sacks	1410	
				(100lbs ea) granular bentonite (8-20 mesh) in		
				annulus, measured top of granular bentonite		
				seal at 18' below land surface (300' STEEL TILE #4)		

REMARKS:

Karen R. Oster
4/29/87

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Smoky Hollow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 4/30/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Rebuilding and welding on and pulling top on casing	07.15	
				Measured D/Top of Granular Bentonite at 17.5' below ground surface (300' STEEL TAPE #4)	08:[illegible]	
				Pulled 10" carbon steel casing back to 18', Added 1.5 sacks (100 lbs ea) granular bentonite (8-20 mesh) in annulus, measured top of granular bentonite seal at 11' below land surface (300' STEEL TAPE #4)	08:45	
				Pulled 10" carbon steel casing back to 11', Added 1 sack (100 lbs ea) granular bentonite (8-20 mesh) in annulus, measured top of granular bentonite seal at 9' below land surface (300' STEEL TAPE #4)	1215	
				Pulled 10" carbon steel casing out of hole, screwed top section of 16" SS 304 casing back on, Added 3 sacks (100 lbs ea) granular bentonite (8-20 mesh) in annulus, measured top of granular bentonite seal at 5.5' below land surface (300' STEEL TAPE #4)	1249	Granular Bentonite Seal 5.5' - 32.5'

REMARKS:

Karen R. Oster
4/30/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 250W Oregon Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 4/30/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Poured Concrete in annulus from 0'-5.5', used	1330	Concrete Seal
				7 sacks (94 lbs ea)		0'-5.5'
				Redeveloped well for 40 min. using dart bailer.	1350	

REMARKS:

Karen R. Oster
4/30/87

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Onondaga Yellow Rig	Well Number 199-H4-14	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/1/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Cuttings	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/water is 47.5' below land surface (100' tape #314)	0750	
				Rig down and move off well.	0800	
				Steam clean rig, tools and pipe	1200	

REMARKS:

Karen R. Oster

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-031 (6-85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Omaha Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/5/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Poured concrete pad and placed brass plate	0830	
				into it.		

REMARKS:

Karen R. Oster
5/5/87

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Omega Yellow Rig	Well Number 199-H4-16	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/26/87		Depth 57.5' To 57.5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Cemented 4 protective steel posts on corners		
				of cement pad, (one with sleeve) with 4' of posts		
				above ground.		
				Painted posts safety yellow on 5/27/87		

REMARKS:

Kirk R. Oster
5/26/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

ONWEGO DRILLING CO., INC.
DRILL LOG

By: Daniel Zuckerman
Barrel Sudtro
Date: 4-16-87

Rig: Yellow Beast

Hole Number: 199-H4-16

Project or Work Order No.:

Contract No.:

Depth: 13'0" To 33'

casing	depth		soil description	item	amount
13' 9"	13'	33'	LARGE TO SMALL COBBLES, COARSE TO MEDIUM	2	22'
6' 1"			SAND, COARSE TO MEDIUM GRAVEL	4	19'
19' 10"				8	22'
6' 7"			HARD TO DRIVE BARREL, DIFFICULT TO KEEP		
26' 5"			MATERIAL IN BARREL		
6' 7"					
33' 0"					

hours	crew
8	D Luntz
8	B Murray

REMARKS

Kevin P. Oster 4/27/87

air movement

static water

ONWEGO DRILLING CO., INC.

DRILL LOG.

By: DARREL LUDIKE | Rig: YELLOW BR 22m | Date: 4-17-87

Work Number: 194-H4-16 | Depth: 33' to 44'

Project or Work Order No. | Identification No.

casing	depth		soil description	item	amount
33'0"	33'	44'	COBBLES, FINE TO COARSE GRAVELS, FINE TO	2	11'
7'5			COARSE SAND	4	15'
40'5"				3	11'
7'3"					
47'3"					
				hours	crew
				8	D LUDIKE
				8	B MOORMAN

REMARKS.

Karen R. Oster 4/27/87

air movement_____ static water_____

Welling Jones

DRILL LOG	BY David	RIG	WELL NUMBER 199-144-16	COMPUTER NUMBER	PROJECT OR WORK ORDER NO. PNL
	DATE 4-20-87		DEPTH 40 to 55'		SUBCONTRACT NO. KEH 1873

	TOTAL CASING	DEPTH	DRILL METHOD	WET/DRY SAMPLE	LITHOLOGIC DESCRIPTION (% EACH GRAIN SIZE, COLOR, ROUNDNESS, CALICHE, ETC.)	TIME	~~DRILLING COMMENTS~~
	47'10"	43'			from 38' to 48' F-C sand and C. gravels		15'
d	10'7"				48' to 55 m-C sand with C gravels water		10'7"-10" casing
1a	5'5"	56'			bearing at 48'		
					went and worked on well # 199-144-16		
					started, drilled out 5' plug from 38'-43'		
			and then		to 55' welded 10'7" of 10" casing		
					hit water bearing material at 45'		
					cut on drive barrel and welded		
					back on had a 3" crack also cut		
					bottom 1" of drive barrel and weld		Bill Meaner
					bead around bottom inside		
							Total 8 hrs

REMARKS:

Karen R. Oster 5/6/87

ONWEGO DRILLING CO., INC.
DRILL LOG

DARREL LUDFKE	YELLOW	199-H4-16	
Date 4-21-87	BE 27	Depth 53' to 61'	Contract No.

casing	depth		soil description	item	amount
58'3	53'	59'	COURSE TO FINE GRAVELS AND SAND	2	8'
8'5"	59'	61'	CLAY AND GRAVEL (RINGOLD)	4	8'
66'8"				8	3'
			DRILLED FROM 53' TO 61', BAILED WELL		
			CLEAN, BATTELLE HAD WELL LOGGED		
			WIT RINGOLD AT APPROXIMATELY 54'6"		
				hours	crew
				8	DLUDFKE
				8	B MOOMAW

REMARKS

Laura P. Oster 4/27/87

air movement_____ static water_____

ONWEGO DRILLING CO., INC.
DRILL LOG

By: DAREL LUDTKE
Date: 4-22-87
Rig: YELLOW BE 22
Well Number: 199-H4-16
Depth: 61' To
Project or Work Order No.
Contract No.

casing	depth	soil description	item	amount
		HAULED OUT TURBINE PUMP AND 8" DISCHARGE	8	3'6"
		PIPE,	23	2 HRS
		PUT 1 BAG OF SILICA SAND AND PULLED BACK		
		3'6" OF CASING, BAILED ON WELL READY TO SET		
		10" STAINLESS STEEL SCREEN		
		BATTELLE LOGGED WELL		
			hours	crew
			8 HRS	D. LUDTKE
			8 HRS	G. MOORMAN

REMARKS

Karen R. Oster 4/27/87

air measurement

static water

ONWEGO DRILLING CO., INC.

DRILL LOG

Driller: DARREL LUDTKE | Rig: YELLOW BC 22 W | Hole Number: 147-44-16 | Date: 4-23-87 | Depth: 61' To | Project or Hole Order No. | Contract No.

casing	depth		soil description	item	amount
			PUT 14 SACKS OF SAND IN WELL, PULLED PIPE	8	9'
			BACK TO 59', SET STAINLESS SCREEN, PULLED	11	1
			CASING BACK TO 49', BAILED WELL FOR 4½ HRS	17	1¼ SACK
			TO GET SAND OUT, WELL MAKING LOTS OF SAND,	22	6 HRS
			STARTED SETTING TURBINE		
				hours	crew
				8 HRS	D. LUDTKE
				8 HRS	S. LYNUMAN

REMARKS.

Karen R. Oste 4/27/87

air movement_____ static water_____

ONWEGO DRILLING CO., INC.

DRILL LOG

By: [illegible] Rig: YELLOW

DARREL LUDTKE

Date: 4-24-87 13E22W

Work Number: 199-84-16

Depth: 55'6" To

Project or Work Order No.

Contract No.

casing	depth		soil description	item	amount
			FINISHED SETTING TURBINE PUMP, CLEANED	22	8 HRS
			UP DRILL SITE, LAYED OUT 8" DISCHARGE LINE		
			AND SET UP BARRICADES, PUMP WELL FOR		
			3 HRS AT 800 GALLONS PER MINUTE TO DEVELOP		
			IT OUT, IT TOOK ABOUT 1 HR TO GET SAND		
			OUT, PUMP ALMOST LOCKED UP.		
				hours	crew
				8 HRS	D. LUDTKE
				8 HRS	B. MICHAEL

REMARKS

[illegible] 4/27/87

air movement_____ static water_____

ONWEGO DRILLING CO., INC.
DRILL LOG

DARREL LUDTKE	YELLOW	199-H4-16	
Date 4-27-87	BE 22W	Depth 58'6" To	Contract No. KCH-1873

casing	depth	soil description	item	amount
		MADE UP FLANGES FOR FLOW METER, TOOK TO	22	11 HRS
		100H, RIGGED UP FLOW METER, SET OUT DISCHARGE		
		LINE, PUMP TESTED WELL, PUMPED WELL		
		AT 40 GPM		
			hours	crew
			11 HRS	D LUDTKE

REMARKS.

Karen P. Oster
5/5/87

air movement_____ static water_____

ONWEGO DRILLING CO., INC.

DRILL LOG

By: DERREL LUDTKE

Date: 4-28-87

Rig: YELLOW

SE 2.2 W

Well Number: 144-H4-16

Depth: 57' 6" To

Project or Work Order No.:

Contract No.: KEH. 1873

casing	depth		soil description	item	amount
			REMOVED TEST PUMP FROM WELL AND HAULED	8	16' x 10"
			TO LAY DOWN AREA, BAILED WELL, SOME SAND,	16	4 BUCKETS
			SET STAINLESS STEEL SCREEN FROM 57'6" TO 42'6",	17	8 SACKS
			WELDED ON STABILIZERS, SET SS CASING FROM 42'6"		
			TO + 3', USED 8 SACKS OF SAND FROM 57'6" TO 37'6",		
			PLACED 4 BUCKETS OF BENTONITE PELLETS FROM		
			37'6" TO 32'6", PULLED CASING FROM 48' TO 32'		
				hours	crew
				8 HRS	D. LUDTKE
				8 HRS	B. MOORMAN

REMARKS.

Karen P. Oste 5/5/87

ONWEGO DRILLING CO., INC.

DRILL LOG

Driller: DARREL LUDTKE | Date: 4-29-87 | Yellow Bear N | 199-1149-16 | Depth: 57'6" To | Contract No. FCH-1873

casing	depth		soil description	item	amount
			INSTALLED GRANULAR BENTONITE FROM 32' TO 19',	15	5½ SACKS
			PULLED 11' OF CASING, HAD TO GO GET PULLER	8	11' x 10"
			STEAM PIPE HITCHED UP AND WAS NOT COMING		
			OUT,		
				hours	crew
				8 HR	D LUDTKE
				8 HR	B MOOMAW

REMARKS.

Karen P. Oste
5/5/87

air movement_____ static water_____

ONWEGO DRILLING CO., INC.

DRILL LOG

By: Darrel Ludtke | Rig: YELLOW BL 22W | Date: 4-30-87 | Well Number: 199-HH-16 | Depth: 57'6" To | Project or Work Order No. | Contract No. RCH-1873

casing	depth	soil description	item	amount
		PULLED 21' OF 10" CASING, INSTALLED GRANULAR	10	21'
		BENTONITE FROM 19' TO 5' (5½ SACKS), MIXED	15	5½ SACKS
		UP 7 SACKS OF CEMENT AND GROUTED WELL	27	7 SACKS
		FROM 5' TO 0'	22	1 HRS
		BAILED WELL FOR 1 HR		
			hours	crew
			8 HRS	D. LUDTKE
			8 HRS	B. MONTANO

REMARKS.

Karen P. Oste
5/5/87

ONWEGO DRILLING CO., INC. DRILL LOG	DARREL LUDTKE Date 5-1-87	YELLOW BE 22W	144-44-16 144-44-17 Depth 57'6" To	Contract No. KEW-1873

casing	depth	soil description	item	amount
		LOADED UP 90" CASING AND TOOLS, WASHED PIPE,		
		TO 144-44-17, UNLOADED CASING AT WELL SITE,		
		TORE RIG DOWN AND WASHED IT, MOVED TO		
		144-44-17 AND RIGGED UP, CLEANED UP DRILL		
		SITE AT 144-44-16		
			hours	crew
			8 HRS	D. LUDTKE

REMARKS.

Karen P. Oste
5/5/87

air movement_____ static water_____

Well 1997-H34-J6 Drilled Depth _____ Interval Logged 61-0

Log Date 7-21-96 Casing Size 8"

Logged By [illegible] Water Level Depth DRY

Logging Scale/Sensitivity 500 c/s Time Constant 3

Vertical Scale 20'/in Logging Speed 15'/min

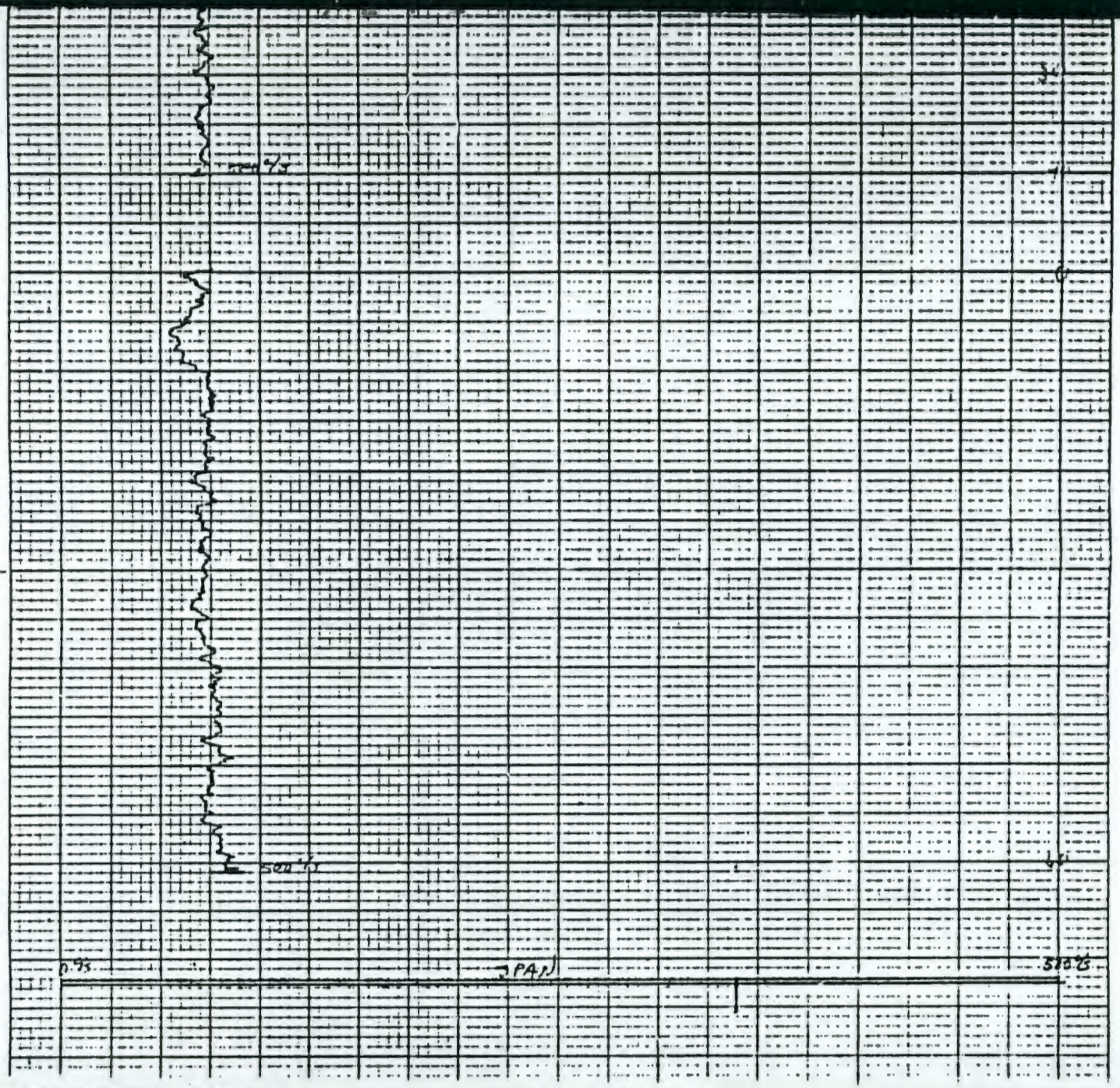
Source Strength N/A Spacer Length N/A

Remarks REF. PROCEDURE GWPG REV. 2
PREPARED 2/7/97

SPAN CHECK

REPEAT SECTION

WESTERN TOOCHO 2127EMC WC 1001 MONTE LT 30108


500 ft
0.95
3 PA.D
500 ft

Well: 199-H4-16 Drilled Depth _____ Interval Logged 60-0'

Log Type: NEUTRON Date: 4-21-87 Casing Size: 8"

Logged By: D.E. Nic Shaw - PHL Water Level Date: DRY

Logging Scale: Sensitivity: 5000 c/s Time Constant: 2

Vertical Scale: 10'/in. Logging Speed: 2'/min.

Source Strength: 20 Ci 241 Am Be Fourier Length: 4"

Remarks: REF. PROCEDURE GW-7 REV. 1
PROBE SERIAL # CN 20 US K7

0 c/s SPAN CHECK 5000 c/s

Repeat Section

0.5
DRAW
60
EAST

Well 195-M4-16 Drilled Depth _____ Interval Logged 10-0'

Title DENSITY LOG 7-21-87 Check Date 8'

Logged D.L. McCleary Time Left Depth DRY

Tool Serial Number 5000 Y Time Constant 2

Vertical Scale 10'/IN Logging Speed 25'/MIN

Source Strength 135 mCi 137Cs Source Depth NA

Remarks: RSO PROCEDURE GW-4 REV 1
PROBE-SKID GG-48

5000 Y

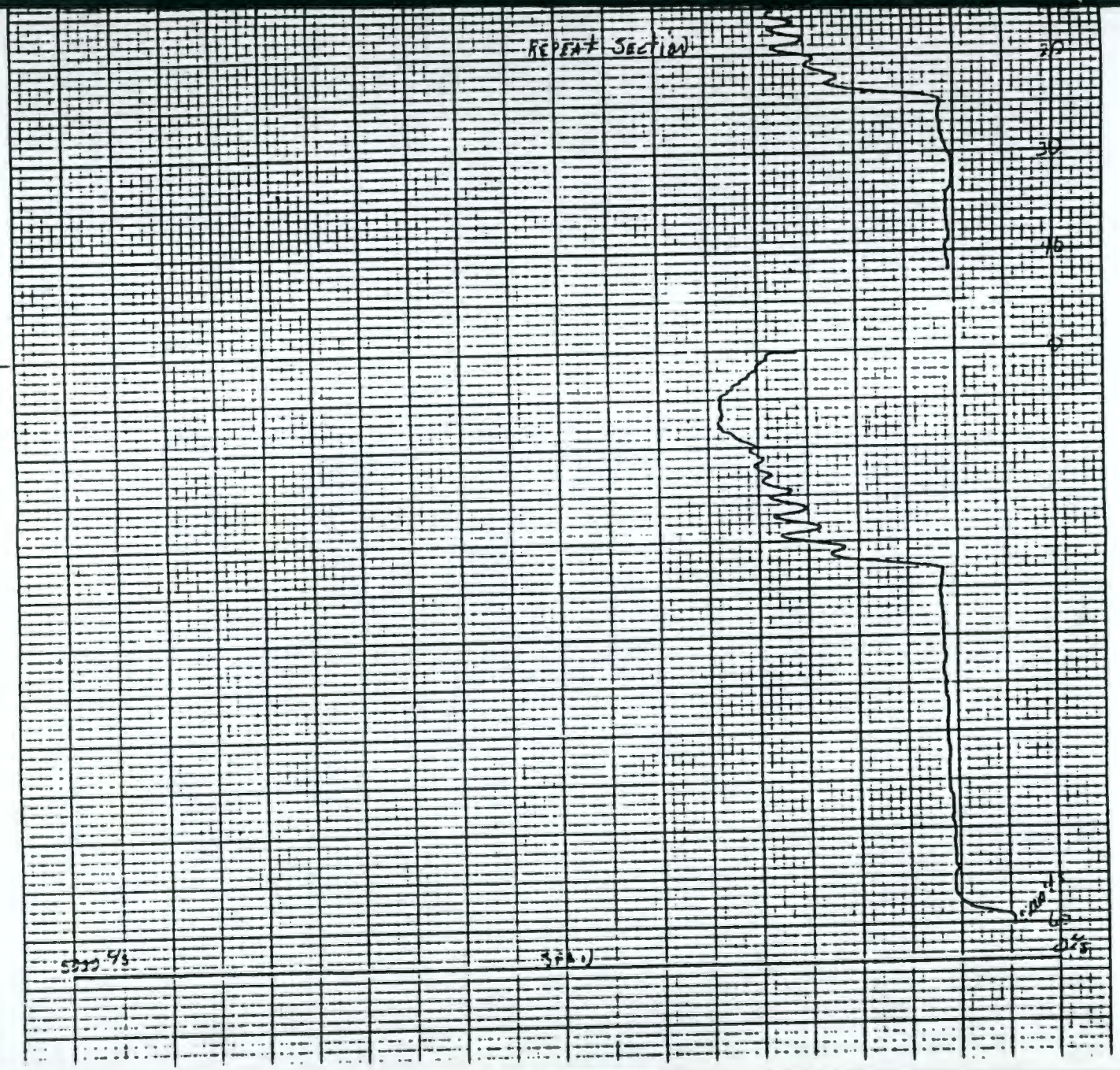
SPAN

DS

0

10

MADE AT JARROW TOOL INC. JARETT DIAGOOU LABORA


REPEAT SECTION
20
30
40
0

Battelle
Pacific Northwest Laboratories

Well Completion Report/Title III Inspection List

Project RCRA (2-1) Monitoring	Well Number 199-H4-17
Location 100-H	Temporary Well Number N/A
Driller D. Ludtke, B. Moomaw	Coordinates
Drilling Co. Onsego Drilling	Casing Elevation
Geologist K.R. Oster	Ground Elevation

DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-18' H 18'-45'10"
Drilling Fluid 100 Area F.S. Drilling Supply Water
Other

COMPLETION DATA

Drilled Depth 46.5'
Completion Depth 45'
Date Started 5/4/87 Completed 5/8/87
Static Water Level/Date 41.5' / 5/7/87

CASING DATA

Type	Size			
Carbon Steel Casing (Removed)	14"	Sch 40	A53	to 10'
Carbon Steel Casing (Removed)	10"	Sch 40	A53	to 45'9"
Stainless Steel Casing 304	6"	Sch 10/40	A778	to 45'

Approved By K.R. Oster Date 5/8/87

PERFORATIONS

Type N/A

Depth	Schedule
-	
-	
-	

App. By K.R. Oster Date 5/8/87

SCREEN

Type 6" SS 304 Screen
Length 10'
Slot Size 20 slot
Depths 35' - 45'
App. By K.R. Oster Date 5/8/87

ANNULAR SEAL

Type	Interval	Volume
Sand	30'-45'	5.23 ft³
Bentonite Pellet	25'-30'	1.75 ft³
Granular Bentonite	5.5'-25'	6.81 ft³
Concrete	0'-5.5'	1.92 ft³

App. By K.R. Oster Date 5/8/87

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Nat X	44' - 2'	5/7/87
Neutron	44' - 3'	5/7/87
Density	44' - 2'	5/7/87
	-	
	-	
	-	
	-	

Approved By K.R. Oster Date 5/7/87

AQUIFER TESTING

Type of Test N/A
Length of Test
Volume Pumped
Drawdown

Approved By K.R. Oster Date 5/8/87

OTHER APPLICABLE ITEMS

- ✓ Steam Cleaning
- ✓ Storage of Const. Material
- ✓ Tool Lubricants
- ✓ Concrete Pad
- ✓ Protective Steel Posts
- ✓ Safety Paint
- ✓ Straightness Test
- ✓ Well Development
- N/A Downhole TV Inspection
- N/A Well Abandonment
- ✓ Complete As-Built Diagram, Driller's and Geologist's Logs

Approved By K.R. Oster Date 5/27/87

Reviewed By J.R. Raymond Date 7/22/87

A-1600-187 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 199-H4-17 Geologist K R Oster Page 1 of 1

Reviewed by [illegible] Date 7/22/87

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
14" Carbon Steel Surface Pipe (Removed)		5		Light brownish gray SANDY GRAVEL (Backfill Mtrl.)
		10		
10" Carbon Steel Casing (Removed)		15		Gray SANDY GRAVEL
		20		Many Boulders from 18'-22'
6" SS 304 Casing		25		Consolidated Gray SANDY GRAVEL
		30		
		35		Consolidated Gray SILTY SANDY GRAVEL
6" SS 304 (20 slot) Screen		40		Static Water Level @ 41.5'
		45		Top of Ringold Contact ± @ 45'
				Consolidated light brownish Gray SILTY SANDY GRAVEL.

Completion Symbols
+ Concrete Seal
/ Granular Bentonite Seal
x Bentonite Pellet Seal
Z Bentonite Slurry Seal
• Artificial Sand Pack
O Natural Gravel Pack

Lithologic Symbols
~ Clay
– Silt
• Sand
o Gravel
O Gravel with weathering Rinds
□ Caliche

A-1800-186 (3/87)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Omnego Yellow Rig	Well Number 119-114-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/4/87		Depth 0' To 5'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Rig, tools and pipe was steam cleaned Fri 5/1/87		
				Set up rig, Lubricant used is Chevron Poly	0845	
				FM Grease-2		
	4'-5'	D	slightly moist	SANDY GRAVEL, 5% large cobbles, 10% small cobbles	0730	
				35% pebbles, 5% granules, 5% vcs, 5% cs, 15% ms,		
				10% fs, 10% vfs with some silt, Framework clasts		
				are subrounded to rounded, of 80% basalt, 10%		
				granite, 5% quartzite, 5% metamophics and others,		
				Matrix is poorly sorted, angular to subangular, 80%		
				basalt sand, 15% quartz sand, 5% other sands, Moist		
				color is brown (10YR 4/3), Dry color is light brownish		
				grey, (2.5Y 6/2), strong reaction in 10% HCl, low		
				moisture content. $CaCO_3$ weathering rinds are present		
				on about 25% of clasts, Moisture and geologic		
				samples are representative but do not include		
				the small and large cobbles, unconsolidated		
				backfill material.		

REMARKS:

Karen R. Oster
5/4/87

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5 85)

DRILL LOG	By K.R. Oster	Rig Business Erie Jobs Omnego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/4/87		Depth 5' To 13'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	9'-10'	D	Slightly moist	SANDY GRAVEL, 5% large cobbles, 5% small cobbles,	1015	
				40% pebbles, 5% granules, 5% vcs, 5% cs, 15% ms,		
				10% fs, 10% vfs, with some silt, Framework clasts		
				are subrounded to rounded of 75% basalt, 10%		
				granite, 10% quartzite, 5% metamorphics and		
				others, Matrix is poorly sorted, angular to subangular,		
				80% basalt sand, 15% quartz sand, 5% other sands,		
				Moist color is brown (10YR 4/3), Dry color is light		
				brownish grey (2.5Y 6/2), strong reaction in 10%		
				HCl, low moisture content, $CaCO_3$ weathering rinds		
				are present on about 25% of clasts, unconsolidated		
				backfill material, Moisture and geologic samples		
				are representative but do not include small		
				and large cobbles.		
				Placed 10' of 14" surface pipe in hole.	1030	
13'8"				Set 13'5" of 10" carbon steel casing and drive	1035	
				shoe in hole		
				Started Drilling and driving casing	1040	

REMARKS:

Karen R. Oster

DRILL LOG	By K.P. Oster	Rig [illegible]	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. LEH-1873 (PNL)
	Date 5/4/87	Operator [illegible]	Depth 13' to 18'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
13'8" 5'10" 19'6"				Added 5'10" of 10" carbon steel casing to hole	1115	Total 10" casing = 19'6"
				Started drilling and driving casing	1200	
	14'-15'	D	Slightly Moist	SANDY GRAVEL, 5% large cobbles, 5% small cobbles,	1320	
				35% pebbles, 5% granules, 5% vcs, 10% cs, 20% ms,		
				10% fs, 5% vfs, Fragmental clasts are subrounded		
				to rounded of 85% basalt, 10% granite, 5%		
				metamorphics and others, Matrix is moderately		
				sorted angular to subangular, 75% basalt sand,		
				20% quartz sand and 5% other sands, Dry Color		
				is gray (2.5Y 6/0), strong reaction in 10% HCl,		
				no visable $CaCO_3$ weathering rinds are present on		
				clasts, Inconsolidated, Moisture and geologic		
				samples are representative but do not include		
				the cobbles.		
	18'			lots of large cobbles and boulders at 18' need	1420	
				to switch to hard tools. "boulder nest."		

REMARKS: Delivered 4'-5', 9'-10', 14'-15' moisture samples to Lab.

Karen P. Oster
5/4/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5 85)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Oniwego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/5/87		Depth 18' To 20'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Changing from drive barrel to hard tools	0715	
				Added 15 gallons of drilling supply water to hole	0755	
				and started drilling and driving casing. Added 5 gallons water		
				stopped drilling and driving casing and	0835	
41'6" 7'2" 26'8"				Added 7'2" of 10" carbon steel casing. Total casing = 26'8"		
				Added 5 gallons drilling supply water to hole	1000	
	19'-20'	H	Wet	SANDY GRAVEL, 60% broken boulders, cobbles,	1001	
				pebbles and granules, 5% vcs, 10% ccs, 15% ms, 10%		
				mud (f.s, vfs, silt that washes away), Framework clasts		
				are subrounded to rounded, (when not crushed by		
				hard tool) and are 80% basalt, 10% granite, and		
				10% metamorphics and others, Matrix sands are		
				very angular to subangular and are 50% basalt sands,		
				30% quartz sand, 20% other sands, Wet color is		
				very dark gray (5Y 3/1), Dry Color is gray (7.5YR 6/0)		
				Poorly sorted, Consolidated boulders, cobbles, gravel sands sands,		
				Moderate reaction in 10% HCl. Appears similar to		
				previous sample except ground and crushed by		
				hard tool. Geologic samples are representative.		

REMARKS:

Karen R. Oster

DRILL LOG	By L.R. Oster	Rig Bucyrus Erie 22W Onwego Hollow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/5/87		Depth 20' To 25'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Added 10 gallons drilling supply water to hole	1112	
	24'-25'	H	Wet	SANDY GRAVEL 50% broken cobbles, pebbles, and	1143	
				granules, 10% vcs, 10% cs, 15% ms, 15% mud (f.s., vfs,		
				silt that washes away). Framework clasts are angular		
				and broken (a few are rounded on one side) and are		
				85% basalt, 10% granite and 5% metamorphics and		
				others, Matrix sands are very angular to subangular,		
				60% basalt sands, 30% quartz sands, 10% other sands,		
				Wet color is Dark gray (7.5YR 4/0), Dry Color is		
				gray (2.5Y 5/0), Poorly sorted, Consolidated cobbles,		
				gravels and sands (Possible boulders that were crushed),		
				Moderate reaction in 10% HCl, Increase in basalt		
				content and amount of sand from previous sample.		
				Geologic samples are representative.		
26'8" 6'6" 33'2"				Added 6'6" of 10" Carbon steel casing, Total Casing = 33'2"	1145	
				Started drilling and driving casing.	1235	
				Added 5 gallons drilling supply water.	1245	

REMARKS:

Karen P. Oster
5/5/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-86)

DRILL LOG	By L.R. Oster	Rig Bucyrus Erie 22W Onwego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/5/87		Depth 25' To 32'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Added 8 gallons drilling supply water to well	1405	
	29'-30'	H	Wet	SANDY GRAVEL, 40% broken cobbles, pebbles, and	1410	
				granules, 10% vcs, 10% cs, 20% ms, 20% mud		
				(fs, vfs, silt that washes away), Framework clasts		
				are angular and broken, a few small pebbles are		
				subrounded, and are 85% basalt, 10% granite,		
				and 5% metamorphic and others, Matrix sands		
				are very angular to subangular, 70% basalt,		
				25% quartz sands, 5% other sands, Wet color is		
				very dark gray (2.5Y 3/0), Dry Color is gray (2.5Y 6/0),		
				Poorly sorted, Consolidated cobbles, gravels, and		
				sands (Possibly some crushed boulders) strong		
				reaction in 10% HCl, Increase in basalt content,		
				and amount of fine sands from previous sample,		
				(overall decrease in grain size), Geologic		
				samples are representative.		

REMARKS: 43 gallons total drilling supply water added to well for today.

Karen R. Oster

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Onusego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/6/87		Depth 32' To 35'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
33½" 6'8" 39'10"				Added 6'8" of 10" carbon steel casing, Total casing = 39'10"	0715	
				started drilling and driving casing. Added 5 gallons drilling supply water	0800	
				Added 3 gallons drilling supply water	0840	
	34'-35'	H	Wet	SILTY SANDY GRAVEL, 35% broken cobbles, pebbles and granules, 5% vcs, 10% cs, 20% ms, 5% fs, 5% vfs, 20% mud (f.s, v.f.s, silt that washes away). Framework clasts are angular and broken, and are 85% basalt, 10% granite, 5% metamorphics and others. Matrix sands are very angular to subangular, 60% basalt sands, 30% quartz sands, 10% other sands. Wet color is very dark grayish brown (2.5Y 3/2) Dry color is gray (10YR 6/1). Poorly sorted, Consolidated cobbles, gravels, sands and silt, weak to moderate reaction in 10% HCl. Decrease in basalt content of sand, overall decrease in grain size, increase in fine sand and silt from previous sample.	0905	

REMARKS: Geologic Samples are representative

Karen R. Oster
5/6/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 031 (5-86)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Onusso Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/6/87		Depth 35' to 40'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
39'10"				Added 2 gallons drilling supply water to hole.	0930	
5'11"				Added 5'11" of 10" Carbon Steel casing, Total casing = 45'9"	1015	
45'9"				Started drilling and driving casing, Added 2 gallons	1130	
				drilling supply water to hole		
				Added 3 gallons drilling supply water to hole.	1215	
				stopped drilling and driving casing.	1230	
				Started drilling and driving casing	1240	
	39'-40'	H	Wet	SILTY SANDY GRAVEL 35% broken pebbles and granules	1250	
				(possibly some cobbles), 5% vcs, 5% cs, 20% ms, 5% fs,		
				5% vfs, 25% mud (f.s, v.f.s., silt that washes away),		
				Framework clasts are angular and broken, and are		
				90% basalt, 5% granite, 5% metamorphics and others,		
				Matrix sands are angular to subangular, 50% basalt		
				sands, 35% quartz sands and 15% other sands, Wet		
				color is dark olive gray (5Y 3/2), Dry Color is gray		
				(5Y 6/1), Poorly sorted, consolidated gravels, sands and		
				silt, weak reaction in 10% HCl, increase in basalt		
				content in clasts, decrease in basalt content in sands,		

REMARKS:

Karen R. Oster

DRILL LOG	By K.R Oster	Rig Busyrus Erie 2210 Omnego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/6/87		Depth 40' To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				overall decrease in grainsize, (more fine sand and silt) from previous sample. Geologic samples are representative.		
				Added 4 gallons drilling supply water to hole.	1255	
	44'-45'	H	Wet	SILTY SANDY GRAVEL with clay, 40% broken pebbles and granules, 5% vcs, 5% cs, 15% ms, 5% fs, 5% vfs, 10% clay, 15% mud (fs, vfs and silt that washes away), Framework clasts are angular and broken (a few pebbles are subrounded), and are 85% basalt, 5% granite, 10% metamorphics and others, Matrix sands are angular to subangular, 50% basalt sands, 35% quartz sands, and 15% other sands, Wet color is very dark grayish brown (2.5Y 3/2), Dry color is light brownish gray (10YR 6/2) Poorly sorted, Consolidated gravels, sands, silt and clay, dried mud and clays have weak to moderate reaction in 10% HCl, Increase in basalt clasts, Increase in clast size, decrease in sand and silt size, change	1315	Top of Ringold Contact @ 45'

REMARKS:

Karen R. Oster
5/6/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-821 (5-86)

DRILL LOG	By L.R. Oster	Rig Bucyrus Erie 22W Onwego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/6/87		Depth 45' To 45'10"		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				in color from previous sample, Clay balls are up to		
				1/2" in diameter, Geologic samples are representative,		
				Hole remains open from 45' to 45'10" confirming		
				Ringold.		
				Stopped drilling and waited for water to	1320	
				equilibrate in hole.		
				Measured D/W = 41'10" below land surface (300' E-tape #3144)	1335	
				Measured D/B = 45' 10" below land surface (300' steel tape #4)	1336.	
				Bailed on well for ~10 minutes - not much water.	1340	

REMARKS: 19 gallons drilling supply water added to hole today.

Karen R. Oster

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Omnego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/7/87		Depth 45'10" To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Geophysical Logging, D/W = 41.5' (E-tape #3144)	0705	
				Hole filled in to 44' D/B.		
				Cleaning out bottom of well with Hard tool and	0835	
				bailer. Added 5 gallons Drilling supply water		
				to stir up hole and make it bail out easier.		
				D/B = 44.5' below land surface (300' steel tape #4)	0935	
				Sand is flowing into hole between top of Ring old		
				and bottom of casing shoe; so added short		
				section of casing to pound casing down to 45'9".		
				below ground surface, (to cose off hole and keep out sand.)		
				straightness test using 20' section of 8" pipe	1150	
				Measured D/B = 46.5' below land surface (300' steel		
				tape #4)		
				Welded on casing puller top	1230	
				Added 2 sacks (100 lbs ea) 10-20 U.S. sieve	1425	
				size Colorado Silica Sand.		
				Measured top of artificial sand @ 45' below land		
				surface (300' steel tape #4)		

REMARKS: Geophysical Logging (density, neutron, natural gamma) 0705-0800
Total of 5 gallons drilling supply water to well today

Karen R. Oster
5/7/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By L.R. Oster	Rig Bucyrus Erie 22W Oswego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/8/87		Depth 45' To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/B = 42.5' below land surface (300' steel tape #4)	0715	
				D/W = 41' below land surface (300' e-tape #3144)	0716	
				Sand heaved in from bottom of hole had to		
				redrill and bail it out.		
				Drillers stopped work to go swab piezotubes @199-H4-15C	0845	
				Resumed drilling and bailing, Added 20 gallons	0930	
				drilling supply water.		
				Measured D/B = 45' below land surface (300' STEEL TAPE #4)	1000	Stainless steel
				Set 10' of 6" SS 304 screen (20 slot) and 40' of		screen 35'-45'
				6" SS 304 casing in hole, welded SS 304 centralizers		
				@ 34' below land surface		
				Poured 3.5 sacks (100 lbs each) 10-20 U.S. sieve	1015	
				size Colorado Silica Sand in annulus, top of artificial		
				sand pack is 34', Pulled 10" carbon steel		
				casing back to 37.5' below land surface, measured		
				top of artificial sand pack @ 34' below land surface		
				(300' STEEL TAPE #4), Added 2 sacks (100 lbs ea) 10-20		
				U.S. sieve size Colorado Silica Sand to annulus		

REMARKS:

Loren R. Oster

DRILL LOG	By K.R. Oster	Rig Burgess Erie 2000 Universal Yellowstone	Well Number 149-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PA'C)
	Date 5/8/87		Depth 45' to 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Measured top of artificial sand pack @ 29.5'		
				below ground surface (300' steel tape #4)		
				Welded on pulling top.	1049	
				Pulled 10" carbon steel casing back to 31'	1125	Artificial Sand
				measured top of artificial sand pack @ 33'		Pack 30'-45'
				below land surface (300' STEEL TAPE #4)		
				Added 1 sack (100 lbs ea) 10-20 U.S. sieve size		
				Colorado silica sand in annulus, measured top		
				of artificial sand @ 30' below land surface.		
				(300' steel tape #4)		
				Poured 2 buckets (50 lbs ea) 1/4" Volclay	1150	
				Tablets (bentonite pellets) in annulus, measured		
				to top of bentonite pellet seal @ 27' below		
				land surface (300' steel tape #4)		
				Welded on pulling top.	1155	
				Pulled 10" carbon steel casing back to 27'	1215	
				below land surface, Added 2 buckets (50 lbs ea)		
				1/4" Volclay tablets (bentonite pellets) in annulus		

REMARKS:

Karen R. Oster
5/8/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Owego Yellow Rig	Well Number 199-114-17	Computer Number N/A	Project or Work Order No. KEH 1873 (PNL)
	Date 5/8/87		Depth 45' To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Measured top of bentonite pellet seal @ 24.5'		
				below land surface (300' steel tape #4).		
				Pulled casing back to 24'8" below land surface,	1230	Bentonite Pellet
				measured top of bentonite pellet seal @ 25'		Seal 25'-30'
				Poured 2 sacks (100 lbs ea) granular bentonite	1255	
				(8-20 mesh) in annulus, pulled 10" carbon		
				steel casing back to 21', measured to top of		
				granular bentonite seal @ 20' below land		
				surface (300' STEEL TAPE #4).		
				Poured 3 sack (100 lbs ea) granular bentonite	1320	
				(8-20 mesh) in annulus, pulled 10" carbon		
				steel casing back to 17.5', measured to top of		
				granular bentonite seal @ 13' below land		
				surface (300' STEEL TAPE #4)		
				Pulled 10" carbon steel casing back to 15',	1340	
				measured to top of granular bentonite seal		
				@ 13' below land surface (300' STEEL TAPE #4)		
				Added 2/3 sack (100 lbs ea) granular bentonite		
				(8-20 mesh) in annulus.		

REMARKS:

Karen R. Oster

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 2250 Drill on Yellow Rig	Well Number 119-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/8/87		Depth 45' To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Calcite, Etc.	Time	Drilling Comments
				Pulled 10" carbon steel casing back to 12',	1400	
Added 1 1/3 sack			granular bentonite	measured top of granular bentonite seal		
				@ 9' below land surface (300' STEEL TAPE #4)		
				Pulled 10" carbon steel casing out of hole,	1415	
				set top section of SS casing back in hole		
				Added 3 sacks (100 lbs ea) granular bentonite	1425	Granular Bentonite
				(8-20 mesh) in annulus, measured to top of		Seal 5.5'-25'
				granular benotite seal @ 4.5' below land		
				surface (300' STEEL TAPE #4) Pulled 14" surface		
				pipe to 16' below ground surface, measured to		
				top of granular bentonite seal @ 16', Added 1		
				sack (100 lbs ea) granular bentonite, measured to		
				top of granular bentonite seal @ 5.5' below land		
				surface (300' STEEL TAPE #4)		
				Poured 6 bags cement (94 lbs ea) in annulus and	1440	Cement Seal
				pulled 14" surface pipe out of hole.		0'-5.5'
				Cut off 6" SS 304 casing at 28" above land surface	1500	
				Bailed well for 45 min @ about 1 gal/min	1530	

REMARKS:
20 gallons drilling supply water added to well Today.

Measured D/W = 41' below land surface (300' E-tape #3144)
Rig Down and MOVE

1630
Karen R Oster,
5/8/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-8000 021 (6-86)

DRILL LOG	By K.R. Oster	Rig Bucyrus Erie 22W Onwego Yellow Rig	Well Number 199-H4-17	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/26/87		Depth 45' To 45'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Poured 4'x4' concrete pad and placed brass		
				marker in it. Cemented 4"x4"x6' (lwithsleeve) posts on		
				cornersof pad with 4' of posts above ground.		
				Painted posts safety yellow on 5/27/87		

REMARKS:

Karen R. Oster

ONWEGO DRILLING CO., INC.
DRILL LOG

By: DARREL LUDTKE
Date: 5-4-87
Rig: YELLOW BEAR
Hole Number: 199-N4-17
Depth: 0' to 17'
Project or Work Order No.:
Contract No.: REH - 1873

casing	depth		soil description	item	amount
13' 8"	0'	14'	GRAVELS, COBBLES, SAND, BACK FILL,		
~~5' 10"~~	14'	17'	GRAVELS COBBLES, SAND, " "		
~~19' 6"~~	17'		BOULDERS, COBBLES GRAVEL,		
			GOT OUT OF BACK FILL AT 17', HAVE		
			TO SWITCH TO HARD TOOLS, LARGE COBBLES		
			OR BOULDERS CAN'T DRIVE BARREL THROUGH		
			THEM		
				hours	crew
				8 HRS	D. LUDTKE
				8 HRS	B. MOOMAW

REMARKS.

Karen P. Oster
5/5/87

air movement _____ static water _____

ONWEGO DRILLING CO., INC.

DRILL LOG

By: DARREL LUDTKE

Rig: YELLOW BEELU

Date: 5-5-87

Well Number: 19-H4-17

Depth: 17' To 32'

Project or Work Order No.:

Contract No.: REH-1873

casing	depth		soil description	item	amount
19'6"	17'	20'	BOULDERS, COBBLES, GRAVEL, SOME SAND	2	15'
7'2"	20'	25'	GRAVELS, SAND, SOME COBBLES	4	13'8"
26'8"	25'	32'	GRAVELS, SAND	8	12'
6'6"			HAD TO SWITCH TO HARD TOOLS BECAUSE OF		
33'2"			LARGE COBBLES OR BOULDERS		
				hours	crew
				8 HRS	D. LUDTKE
				8 HRS	E. MOORMAN

REMARKS.

Karen P. Oster 5/5/87

DRILL LOG	By: [illegible] DARREL LUSTER	Rig: BELLOW BE-22W	Well Number: 199-H4-17	Computer Number	Project or Work Order No.
	Date: 5-6-87		Depth: 32' To 45'		Subcontract No. KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Calcite, Etc.	Time Stem	Drilling Comments
33'2"				DRILLED FROM 32' TO 45', MOSTLY SMALL	2	14'
6'8"				COBBLES GRAVELS AND SAND, HIT BINGOLD	4	13'
39'10"				ABOUT 45', BAILED WELL CLEAN NOT MUCH	8	13'
5'11"				WATER, D/W 41'10", D/B 45'10", READY TO		
45'9"				HAVE WELL LOGGED		
					8 HRS	D. LUOTKE
					8 HRS	B. MOONAW

REMARKS:

Karen P. Oster
5/15/87

D - Down Hand H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By Darrel Ludke / Darrel Ludke	Rig Yellow B22W	Well Number 199-H4-17	Computer Number	Project or Work Order No.
	Date 5-7-87		Depth 45' To		Subcontract No. KRH-1573

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Inner ITEMS	Drilling Comments
48'9"				BATTELLE LOCKED WELL FIRST THING IN	23	1½ HRS (LOCKING WELL)
				THE MORNING,	17	2 SACKS
				WELL FILLED INTO 44', WENT IN WITH		
				HARD TOOLS TO CLEAN OUT BOTTOM, BAILED		
				WELL CLEAN, IT FILLED INTO 44' AGAIN, WELDED		
				ON SHORT PIECE OF 10" PIPE (3'6") AND		
				DROVE PIPE DOWN TO STOP SAND FROM		
				COMING IN ABOVE BIG-OLD, CLEANED WELL		
				OUT TO 46'6", ADDED 2 SACKS SAND, READY		
				TO SET SCREEN, WELDED ON CASING PULLER		
				TOP		
					8 HRS	D. LUDKE
					8 HRS	J. McDONALD

REMARKS:

Darren R. Oster

DRILL LOG	By Darrel Ludeke DARREL LUDEKE	Rig YELLOW BE 22 W	Well Number 199-114-17	Computer Number	Project or Work Order No.
	Date 5-8-87		Depth 46'6" To		Subcontract No.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				HAD TO CLEAN OUT BOTTOM OF WELL,	8	45'9"
				SET 10' OF 6" SS. SCREEN AND 40' OF SS BLANK	9	40'x6"
				PIPE, WELDED ON STABLIZERS AT 40'; PUT IN	10	40'x6"
				6½ SACKS OF SAND AND PULLED CASING BACK	12	10'x6"
				TO 30', PUT IN 4 BUCKETS OF BENTONITE	14	10'x6"
				PELLETS AND PULLED CASING BACK TO 25',	15	10 SACKS
				PUT GANULAR BENTONITE IN ANNULUS AS	16	4 BUCKETS
				CASING WAS BEING PULLED FROM 25' TO 5'	17	6 SACKS
				TOTAL OF 10 SACKS, PULLED 14" SURFACE PIPE	18	6 SACKS
				UP TO 5', MIXED UP 4 SACKS OF CEMENT	22	1 HR BAILING
				GROUT AND POURED IN ANNULUS, PULLED OUT		
				SURFACE PIPE, MIXED UP 2 SACKS OF GROUT		
				TO COMPLETE SEAL TO GROUND LEVEL BAILED		
				WELL FOR 1 HR		
				TORE DOWN RIG AND MOVE TO TOWN		
					10 HRS	D. LUDEKE
					10 HRS	D. McCOMAS

REMARKS:

Darrel P. Ludeke
5/15/87

(1) Three Pound (2) Hand Tool I - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

Well 199-H4-17 Drilled Depth 46 Interval Logged 44-2

Log Type GR-GNNA Date 5-7-87 Casing Size 10"

Logged By D.K. McAlis. PNL Water Level Depth 48'

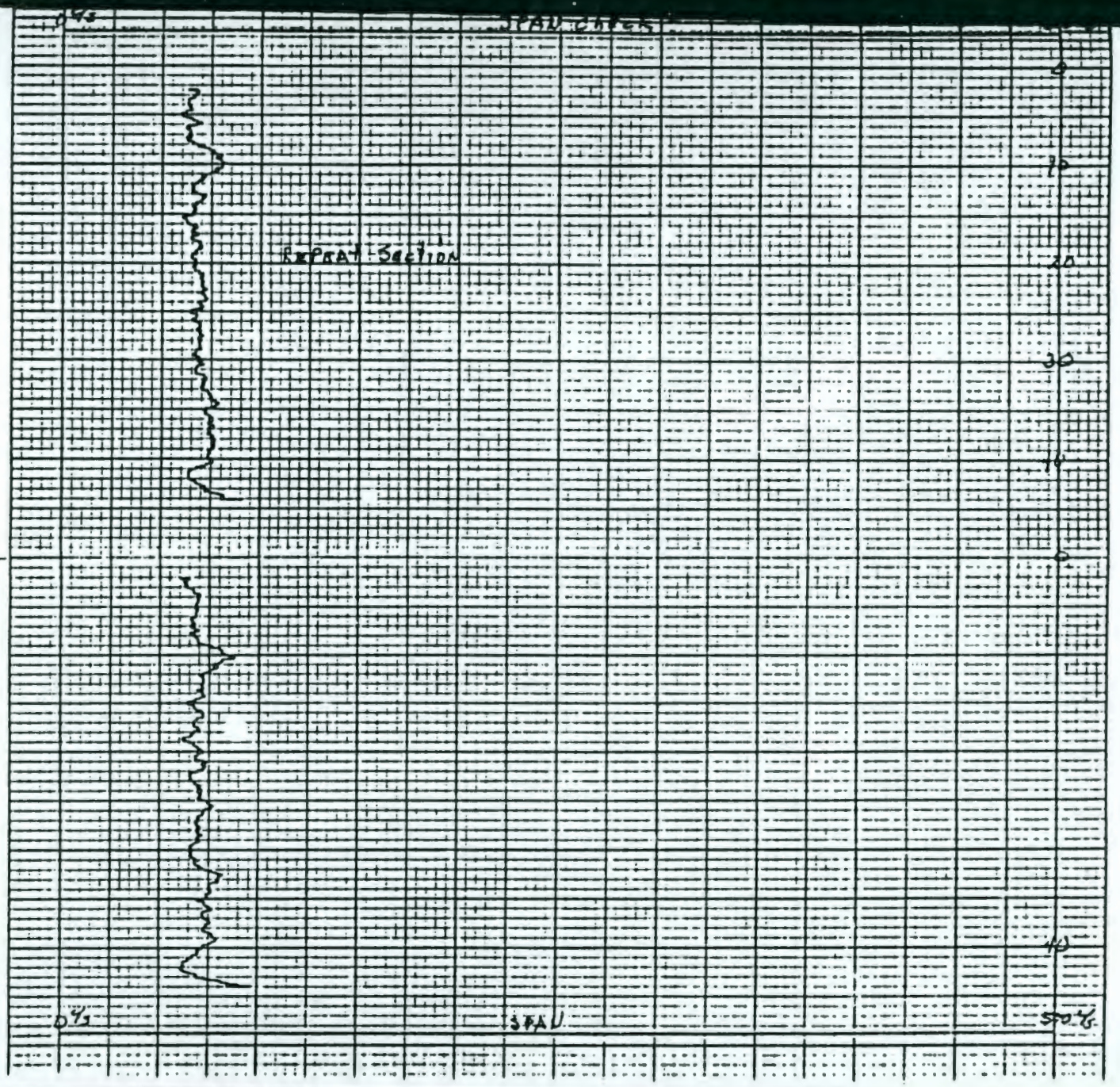
Logging Speed Deadband 300 4/3 Time Constant 3

Vertical Scale 10/in Logging Speed 15/min

Source Strength NA Spacer Length 2'

Remarks REF. PROCEDURE GW-4 REV. 2
PROBE SER-# EC-29497

JPAN Check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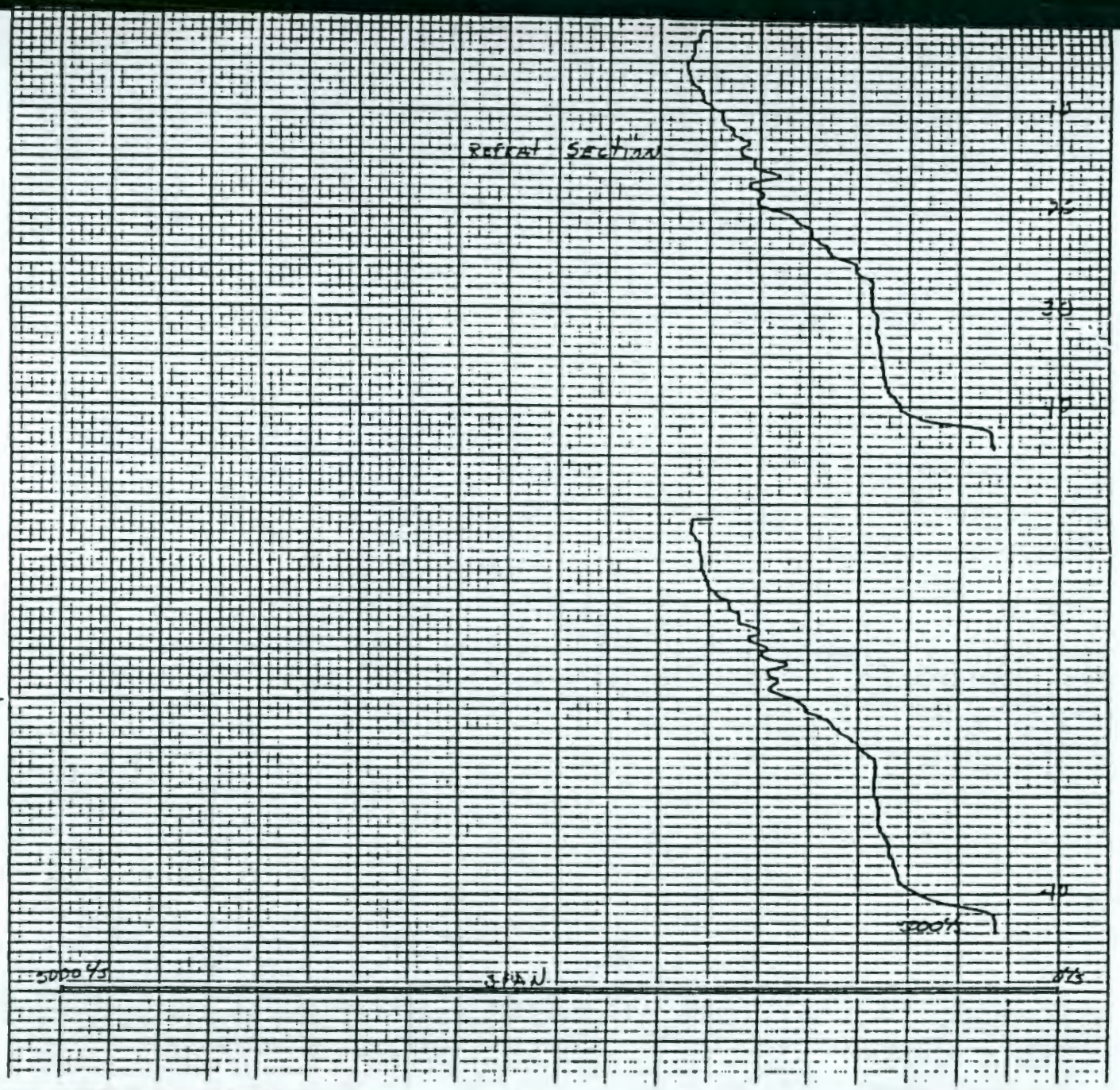
0
10
20
30
40
50 %

Well 194-44-19	Drilled Depth 46'	Interval Logged 32.5-46	
Log Type Density	Date 5-7-87	Casing Size 10"	
Logged By JSP MLC	PNL	Water Level Depth 32	
Logging Device Density	5050 75	Time Constant 5	
Vertical Scale 10'/IN		Logging Speed 25'/min	
Source Strength 125 mCi	10725	Sinker Length NA	
Remarks: Ref. Procedure GW-4 Rev 11			
Probe Serial # GG-48			

5 mm/2

SPAX Check

GRAPH LOG PRINTED BY JUSTRITE MFG. INC. 1984 PRODUCT OF JUSTRITE MFG. INC.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25
35
45
55
65
5000 ft
JAN
5000 ft

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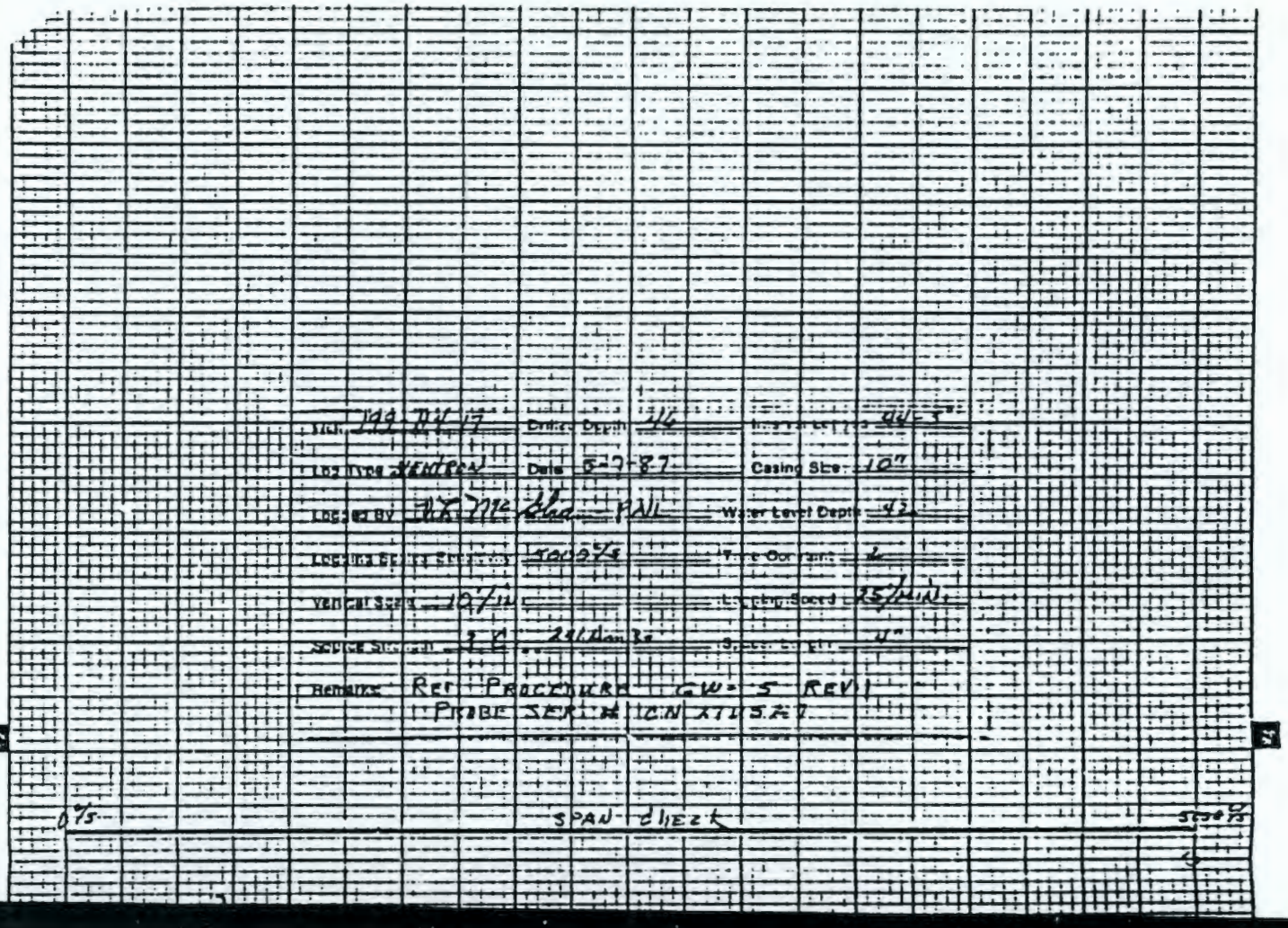

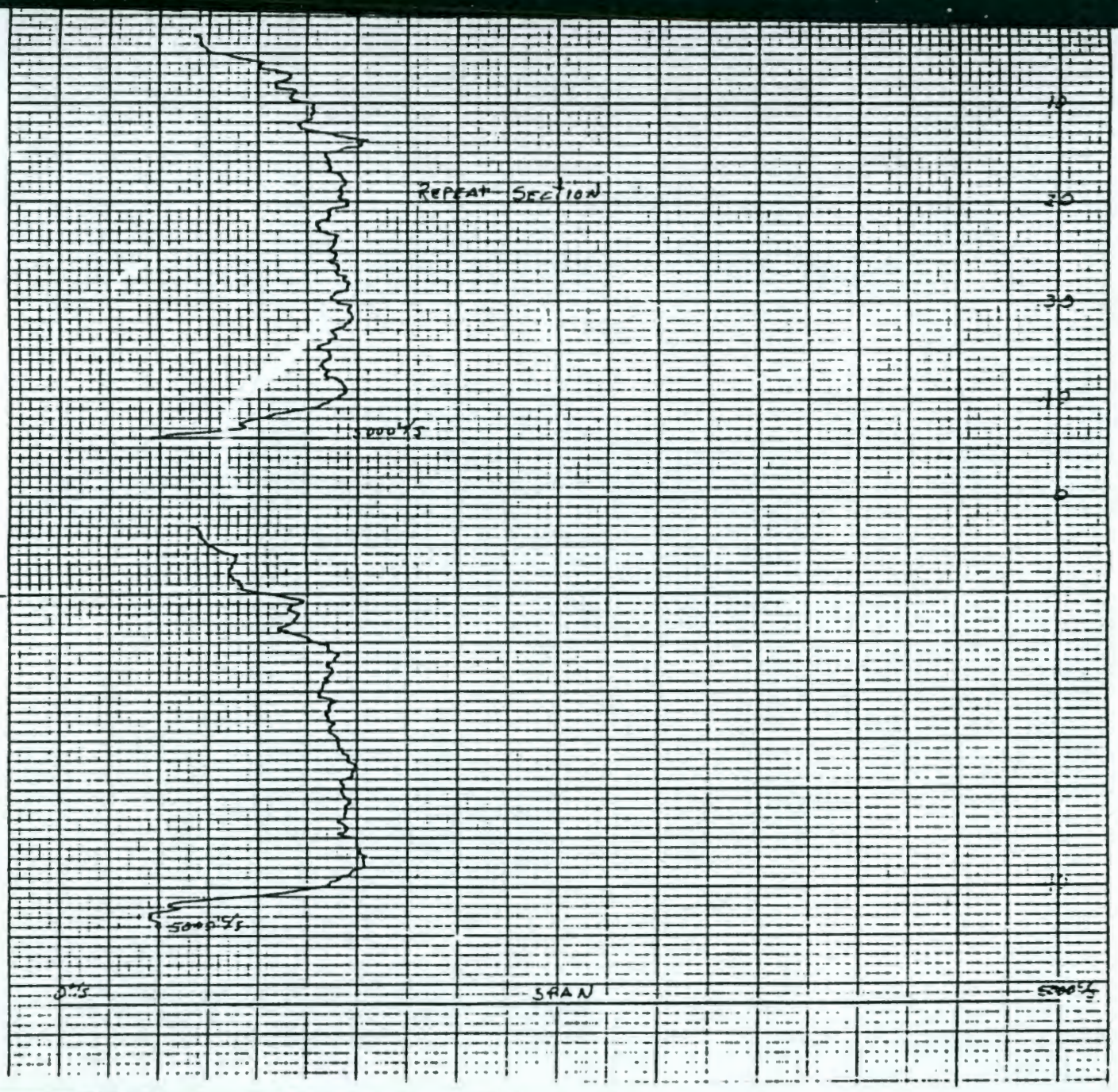
REPEAT SECTION
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5000'/s
0'/s
SPAN
5000'/s
10
20
30
40
0

Battelle
Pacific Northwest Laboratories

Well Completion Report/Title III Inspection List

Project RCRA Ground-Water Monitoring	Well Number 199-H4-18
Location 100-H Area	Temporary Well Number N/A
Driller D. Ludrlee	Coordinates
Drilling Co. Onweno Drilling	Casing Elevation
Geologist K.R. Oster	Ground Elevation

DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-12' H 12'-51'
Drilling Fluid 100 drs F.S. Drilling Supply Water
Other

COMPLETION DATA

Drilled Depth 51'
Completion Depth 50'
Date Started 5/12/87 Completed 5/26/87
Static Water Level/Date 45' / 5/19/87

CASING DATA

Type	Size			
ASTM A53 Carbon Steel	14" Sch40	0' to	12'	(Removed)
ASTM A53 Carbon Steel	10" Sch40	0' to	50'	(Removed)
Stainless Steel Casing 304	6" Sch10/40A778	0' to	40'	

Approved By K.R. Oster Date 5/19/87

PERFORATIONS

Type N/A

Depth	Schedule
-	
-	
-	

App. By K.R. Oster Date 5/19/87

SCREEN

Type 6" SS 304 screen
Length 10'
Slot Size 20 slot
Depths 40' - 50'
App. By K.R. Oster Date 5/19/87

ANNULAR SEAL

Type	Interval	Volume
Sand	34'-50'	5.59 ft³
Bentonite Pellet	28.5-34'	1.92 ft³
Granular Bentonite	4.5'-28.5'	8.38 ft³
Concrete	0'-4.5'	1.57 ft³

App. By K.R. Oster Date 5/21/87

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Nat γ	50'-0'	5/18/87
Neutron	50'-0'	5/18/87
Density	50'-0'	5/18/87
	-	
	-	
	-	
	-	

Approved By K.R. Oster Date 5/18/87

AQUIFER TESTING

Type of Test Constant Discharge/Recovery
Length of Test Pumped 100 min/Recovery 30 min
Volume Pumped 53 gal/min for 40 min, 73 gal/min for 60 min
Drawdown 5.11' drawdown / 4.92' recovery

Approved By Karen R. Oster Date 5/22/87

OTHER APPLICABLE ITEMS

- ✓ Steam Cleaning
- ✓ Storage of Const. Material
- ✓ Tool Lubricants
- ✓ Concrete Pad
- ✓ Protective Steel Posts
- ✓ Safety Paint
- ✓ Straightness Test
- ✓ Well Development
- N/A Downhole TV Inspection
- N/A Well Abandonment
- ✓ Complete As-Built Diagram, Driller's and Geologist's Logs

Approved By Karen R. Oster Date 5/27/87

Reviewed By J.L. Raymond Date 7/20/87

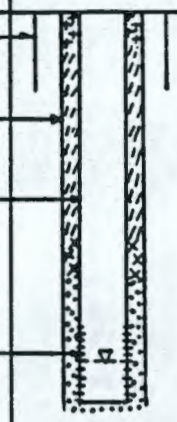
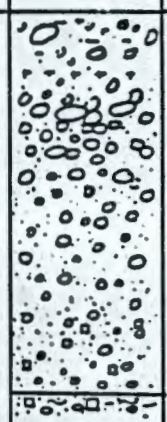
A-1800-187 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 199-H4-18 Geologist K.R. Oakes Page 1 of ___

Reviewed by [signature] Date 7/20/87

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
14" Carbon Steel Surface Pipe (Removed)		0		SANDY GRAVEL, poorly sorted, poorly graded
10" Carbon Steel Casing (Removed)		5		Concrete 6'-7'
16" SS 304 Casing		10		Boulder nest @ 12'
		15		SANDY GRAVEL, poorly sorted
		20		Consdidated, decrease in
		25		overall grain size with depth.
		30		
		35		
		40		SANDY GRAVEL, Cemented and Consolidated
16" SS 304 (20 slot) screen		45		Static water level @ 45'
		50		Top of Ringold Contact @ 49'
				SANDY GRAVEL WITH CLAY AND SOME CALICHE

Completion Symbols

- Concrete
- Granular Bentonite Seal
- Bentonite Pellet Seal
- Artificial Sand Pack
- Natural Gravel Pack

Lithologic Symbols

- Clay
- Silt
- Sand
- Gravel
- Gravel with weathering rinds
- Caliche

A-1800-186 (2/87)

DRILL LOG	By K.R.Oster	Rig Bucyrus Erie 22W Owner O Red Rig	Well Number 199-H4-18	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/11/87		Depth 0' To 0'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				Steam cleaned rig and tools, set up on hole		
				no drilling today.		

REMARKS:

Karen R. Oster
5/11/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By L.R.Oster	Rig Bucyrus Erie 22W Onweso Red Rig	Well Number 149-114-18	Computer Number N/A	Project or Work Order No. KEH-1873(PNL)
	Date 5/21/87		Depth 50' To 50'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Fixed broken crank pin	0715	
				Pulled casing back to 23' below land surface	0900	
				Measured depth to top of granular bentonite		
				at 22' below land surface (300' STEEL TAPE #4)		
				Added 2 sacks (100 lbs ea) granular bentonite		
				8-20 mesh in annulus		
				Pulled 10" casing back to 16' below ground surface	0930	
				Measured depth to top of granular bentonite		
				seal @ 15' below land surface (300' STEEL TAPE #4)		
				Added 2 sacks (100 lbs ea) granular bentonite	1035	
				8-20 mesh in annulus Measured depth to top		
				of granular bentonite seal @ 10' below land		
				surface (300' STEEL TAPE #4)		
				Pulled 10" casing out of hole.	1200	
				Set top section of 6" SS 304 casing in hole	1220	
				Added 5 sacks (100 lbs ea) granular bentonite	1230	Granular Bentonite
				8-20 mesh in annulus, Measured depth to top of		Seal 4.5'-28.5'
				granular bentonite seal @ 4.5' below land surface		
				(300' STEEL TAPE #4)		

REMARKS:

Larry R. Oster
5/21/87

DRILL LOG	By K.P. Oster	Rig Bucyrus's Erie 22W Oriweso Rad Rig	Well Number 199-H4-18	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/21/87		Depth 50' To 50'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Pulled 14" surface pipe to 5' below land surface	1315	
				Mixed 5 bags (90 lbs ea) concrete and 20	1320	Concrete Seal
				gallons drilling supply water and poured in		0'-4.5'
				annulus and removed 14" surface pipe from hole		
				Measured D/water @ 43.5' below land surface	1410	
				(300' E-tape #3144)		
				Bailed well for 10 minutes at about 3-4 gal/min	1415	
				Cement started settling so quit bailing		
				Measured D/w @ 43.25' below land surface		
				(300' E-tape #10998) Measured D/Bottom		
				@ 50' below land surface (300' STEEL TAPE #4)		

REMARKS:

Karen P. Oster
5/21/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

DRILL LOG	By K.R.Oster	Rig Buegrus Eric 22W Answer Red Rig	Well Number 194-H4-18	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/22/87		Depth 50' To 50'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Changed tools	1000	
				Measured D/W @ 43.2' below land surface	1100	
				(300' E-tape # 10998)		
				Set submersible pump @ 48.4' below land surface	1115	
				Set out discharge pipe.	1220	
				Started Pump but elbow joint leaked all over so	1300	
				break it down and attempt to fix it.		
				Changed elbow joint to T joint.		
				Pump on - pumped 5 gal/min for 40 minutes and	1325	
				7 gal/min for 60 min with 48.31'-43.20' = 5.11' of		
				drawdown.		
				Pump off - measured recovery for 30 minutes	1505	
				with 48.31'-43.39' = 4.92' of recovery.		

REMARKS:

Karen R. Oster
5/22/87

DRILL LOG	By K. R. Oster	Rig Bucyrus Erie 22W Cinweso Pad Rig	Well Number 199-H4-18	Computer Number N/A	Project or Work Order No. KEH-1873 (PNL)
	Date 5/26/87		Depth 50' To 50'		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Pulled submersible pump out of well	0730	
				Rigged down and moved off site, cleaned up site.	0830	
				Poured cement pad and placed brass marker in it. Placed 4, 4"x6' posts (1 with sleeve) on corners of pad, cemented in place with 4' above ground.	1400	
				Painted posts safety yellow on 5/27/87.		

REMARKS:

Karen R. Oster
5/26/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (9-85)

DRILL LOG	By DARREL LUDIKE	Rig ~~YELLOW~~ RED BE22W	Well Number 199-114-18	Computer Number	Project or Work Order No.
	Date 5-11-87		Depth To		Subcontract No. KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				LOADED UP PIPE AND TOOLS, TOOK DOWN		
				LENNY'S RIG AND TOOK THEM UP TO SLAB		
				TO WASH, WENT TO IRON AND GOT WATER		
				TRUCK, FILLED UP WATER TANK, WASHED		
				RIG AND RIGGED UP, COULDN'T START		
				DRILLING, SITE HASN'T BEEN OKED, WASHED		
				SURFACE PIPE AND BAILERS AND TOOLS, AND		
				UNLOADED THEM AT SITE		
					9 HRS	D. LUDIKE

REMARKS:

Karen P. Oster
5/15/87

DRILL LOG	By: Darrel Ludeke	Rig: RED	Well Number: 199-114-18	Computer Number:	Project or Work Order No.
	Date: 5-12-87	8C 23 W	Depth: 0' To 11'		Subcontract No.: KRH - 1673

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time STEM	Drilling Comments
11'	11'			0'-5', GRAVELS, COBBLES, SAND, SOME CEMENT,	1	11'
				BACK FILL	3	10'
				5'-7', CEMENT, COBBLES, GRAVELS SAND		
				7-10' SAME AS ABOVE		
				SET 10' OF 14" FOR SURFACE PIPE, HARD		
				TO DRIVE BARREL IF MATERIAL STAYS THIS		
				WAY WILL SWITCH TO HARD TOOLS		
				STARTED WASHING PIPE		
					8 HRS	D. LUDEKE

REMARKS:

Karen T. Oster
5/15/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

DRILL LOG	By Darrel Ludtke DARREL LUDTKE Date 5-13-87	Rig RED BEZZW	Well Number 199-1140-18 Depth 11' To 20'	Computer Number	Project or Work Order No. Subcontract No. REM-1973

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Drill STEM	Drilling Comments
13'5"	11'-20'			11'-20', COBBLES, GRAVELS, SAND,	2	9'
6'7"					4	27'
20'0"				SWITCHED TO HARD TOOLS AT 14'; COULDN'T	8	
7'0"				DRIVE BARREL ANYMORE, MATERIAL BEING		
27'0"				DRILLED WOULDN'T STAY IN BARREL		
				FINISHED WASHING PIPE.		
					HR'S	D. LUDTKE

REMARKS.

Karen P. Oster
5/15/87

DRILL LOG	By Daniel L Oste / DARREL LUDKE	Rig RCD 6822W	Well Number 194-114-18	Computer Number	Project or Work Order No.
	Date 5-14-87		Depth 20' To 35'		Subcontract No. KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time Extra	Drilling Comments
7'0"	20'-35			20'-25' COBBLES GRAVELS SAND	5	15'
5'8"				25'-30' COBBLES GRAVELS SAND	4	12'
32'8"				30'-35' GRAVELS SAND	8	15'
6'4"						
39'0"						
				CAN ONLY DRILL OUT IN FRONT OF		
				CASING A LITTLE WAYS, MATERIAL IS LOOSE		
					9 HRS	D LUDKE

REMARKS:

Karen R. Oste
5/20/87

Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 86)

ONWEGO DRILLING CO., INC.

DRILL LOG

By: DARREL LODTKE | Rig: RED BEZEN | Date: 5-15-87 | Well Number: 199-N44-18 | Depth: 35' To 45' | Project or Work Order No. | Contract No. RCH-1873

casing	depth		soil description	item	amount
39' 0"	35'	40'	GRAVELS SAND	2	10'
5' 8"	40'	45	GRAVELS SAND	4	5' 8"
44' 8"				8	10'
			ABLE TO DRILL A LITTLE OPEN HOLE		
			BUT AS SOON AS I DRIVE CASING IT CAVES		
			IN.		
				hours	crew
				8 HRS	D. LODTKE

REMARKS

Karen R. Oster

5/20/87

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
DARREL LUTTEE	BE22W	199-114-18		
Date 5-18-87		Depth 45' To 50'6"		Subcontract No. KEH-1875

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time FTPM	Drilling Comments
44'8"	46'-50'			GRAVELS, SAND,	2	6'
50'0"					4	6'
54'8"				HIT RINGOLD AT @ 50', BAILED WELL	8	6'
				CLEAN; NOT MUCH WATER ABOUT 5' OF	22	3 HRS
				WATER IN WELL		
				RAN IN 8" CASING X 20' CHECKED		
				WELL FOR STRAIGHTNESS,		
				RAN BATTELLE LOG WELL 2½ HRS		
					8 HRS	OLUDTKE

REMARKS:

Karen P. Oster
5/22/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By Darrel Ludtke DARREL LUDTKE	Rig BEZZW	Well Number 149-H4-18	Computer Number	Project or Work Order No.
	Date 5-20-87		Depth To 50'		Subcontract No. REH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Firm	Drilling Comments
				ADDED 3 SACKS SAND, PULLED PIPE	8	22'
				BACK TO 35', ADDED 4 BUCKETS	17	3 SACKS
				PELLETS, PULLED CASING BACK TO	16	4 BUCKETS
				28', PUT IN 2 BAGS OF GRANULAR BENTONITE	15	2 BAGS
				IN WELL, WORKED ON CLEANING UP SITE		
				PIPE IS PULLING HARD		
					SHEET	D LUDTKE

REMARKS:

Karen P. Oster
5/22/87

DRILL LOG	By: Darrel Ludtke DARREL LUDTKE	Rig: BCZW	Well Number: 199-H4-18	Computer Number	Project or Work Order No.
	Date: 5-19-87		Depth: To 51'		Subcontract No.: KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time ~~Interval~~	Drilling Comments
50'				BAILED WELL CLEAN TO 51'	8	2'
				PUT 1' OF SAND IN BOTTOM, HAULED	17	5 SACKS
				SCREEN AND PIPE TO WELL SITE, SET		
				10' OF SCREEN AND 40' OF S.S. PIPE,		
				CHANGED OUT TOOLS TO PULL PIPE, PUT IN		
				5 SACKS OF SAND FOR SAND PACK, PULLED		
				BACK 2' OF CASING		
					8 HRS	D LUDTKE

REMARKS:

Karen R. Oster
5/22/87

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By: Darrel Ludtke DARREL LUDTKE	Rig: BEZZ W	Well Number: 189-H4-18	Computer Number	Project or Work Order No.
	Date: 5-21-87		Depth: To 50'		Subcontract No. KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time Taken	Drilling Comments
				REPAIRED RIG, PULLED PIPE OUT OF	8	25 FT
				WELL WHILE ADDING 10 SACKS OF	16	10 BAGS
				GRANULATED BENTONITE, REPLACED TOP	18	5 BAGS
				SECTION OF STAINLESS CASING, PULLED	22	1 HR BAILING
				14" SURFACE PIPE BACK TO 5', MIXED		
				UP 5 SACKS OF CEMENT AND COMPLETED		
				SEAL TO GROUND LEVEL, REMOVED		
				SURFACE PIPE, BAILED WELL, WILL		
				TRY TO PUMP TEST TOMORROW.		
					8 HRS	D LUDTKE

REMARKS:

Karen R. Oster
5/22/87

RW.L

DRILL LOG	By: D LUDTKE	Rig: BE22W	Well Number: 199-114-18	Computer Number	Project or Work Order No.
	Date: 5-26-87		Depth: To 50'		Subcontract No.: KEH-1873

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time ITEM	Drilling Comments
				REMOVED TEST PUMP FROM WELL, BAILED	12	4 HRS
				WELL FOR 45 MINUTES, CHANGED OUT TOOLS,	18	4x4 PAD
				RIGGED DOWN, MOVED RIG TO 200 W, CLEANED	19	1
				DRILL SITE, HELPED INSTALL PADS AND	20	1
				POSTS, HAULED DRILLING TOOLS TO 200W, TOOK	21	4
				GENERATOR TO 200W		
					9 HRS	D LUDTKE

REMARKS:

Karen R. Oster
5/26/87

DRILL LOG	By: Darrel Ludtke / DARREL LUDTKE	Rig: BL22N	Well Number: 199-H4-1B	Computer Number	Project or Work Order No.
	Date: 5-22-87		Depth: To 50'		Subcontract No.: KEH 1673

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time Ftm	Drilling Comments
				HAULED OUT GRAVEL AND SAND FOR PADS	D2	5 HRS
				AND POST,		
				PICKED UP PIPE AND INSTALLED PUMP IN		
				WELL, SET UP DISCHARGE PIPE AND GENERATOR,		
				STARTED UP PUMP, PUMPED WELL AT 5 GALLONS		
				AN MINUTE FOR 2 HRS, DECIDED TO INCREASE FLOW		
				TO 6 TO 7 GALLONS A MINUTE, SUCKED WELL		
				DOWN TO INTAKE ON PUMP.		
					10 HRS	D LUDTKE

REMARKS:

Karen P. Oster
5/22/87

Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (6-85)

Well 199-H4-18 Drilled Depth 50' Interval Logged 50-0'

Test Type NAT. GAMMA Date 5-12-87 Casing Size 10"

Logged By [illegible] PNL Water Level Depth 49'

Logging Sonde Sensitivity 500 c/s Time Constant 3

Vertical Scale 10'/in. Logging Speed 15/min.

Source Strength NA Source Length NA

Remarks: REF: PROCEDURE GW-7, REV. 2 [illegible]
PROJ. SPEC. WC-27-A57

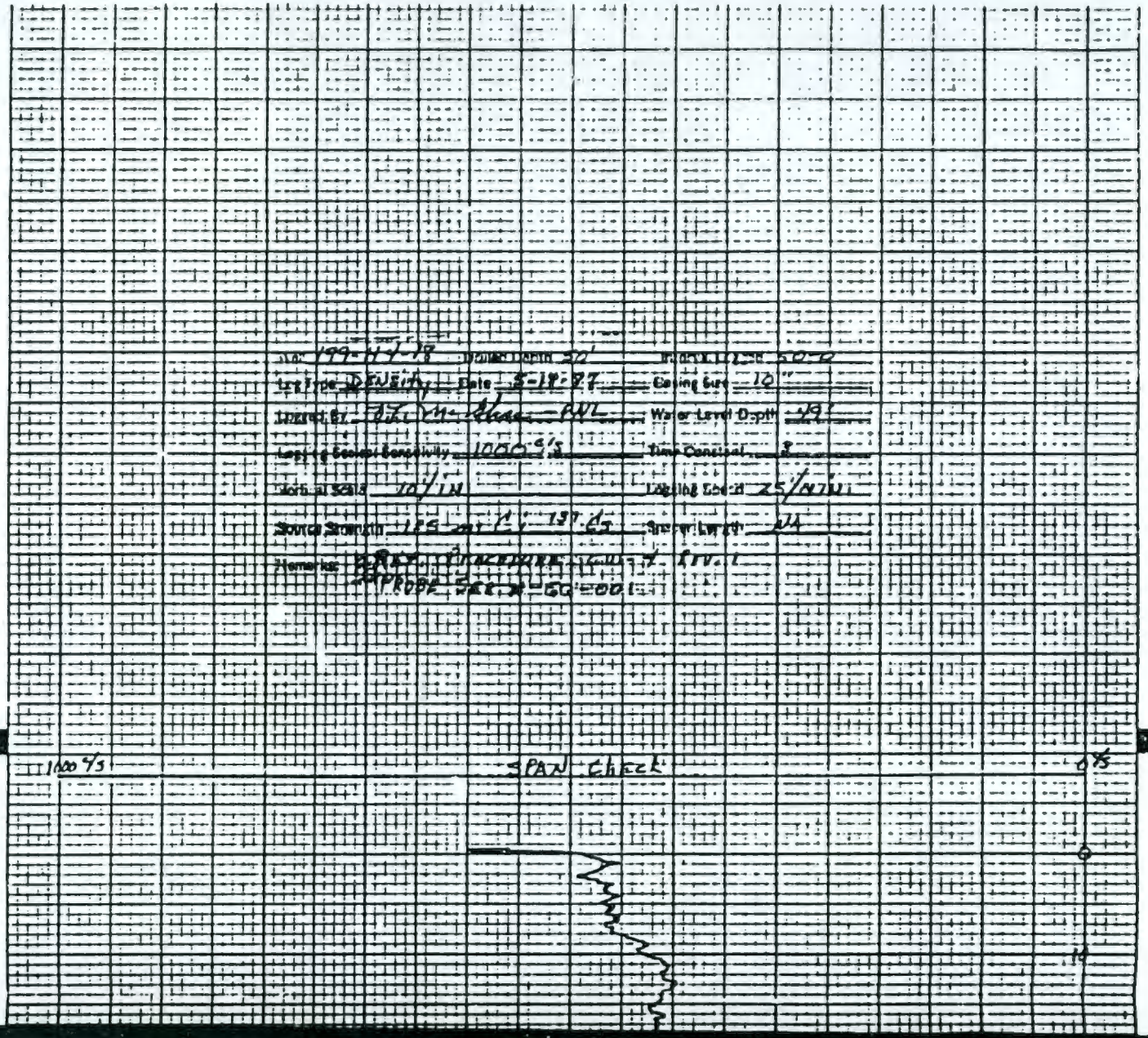
0'

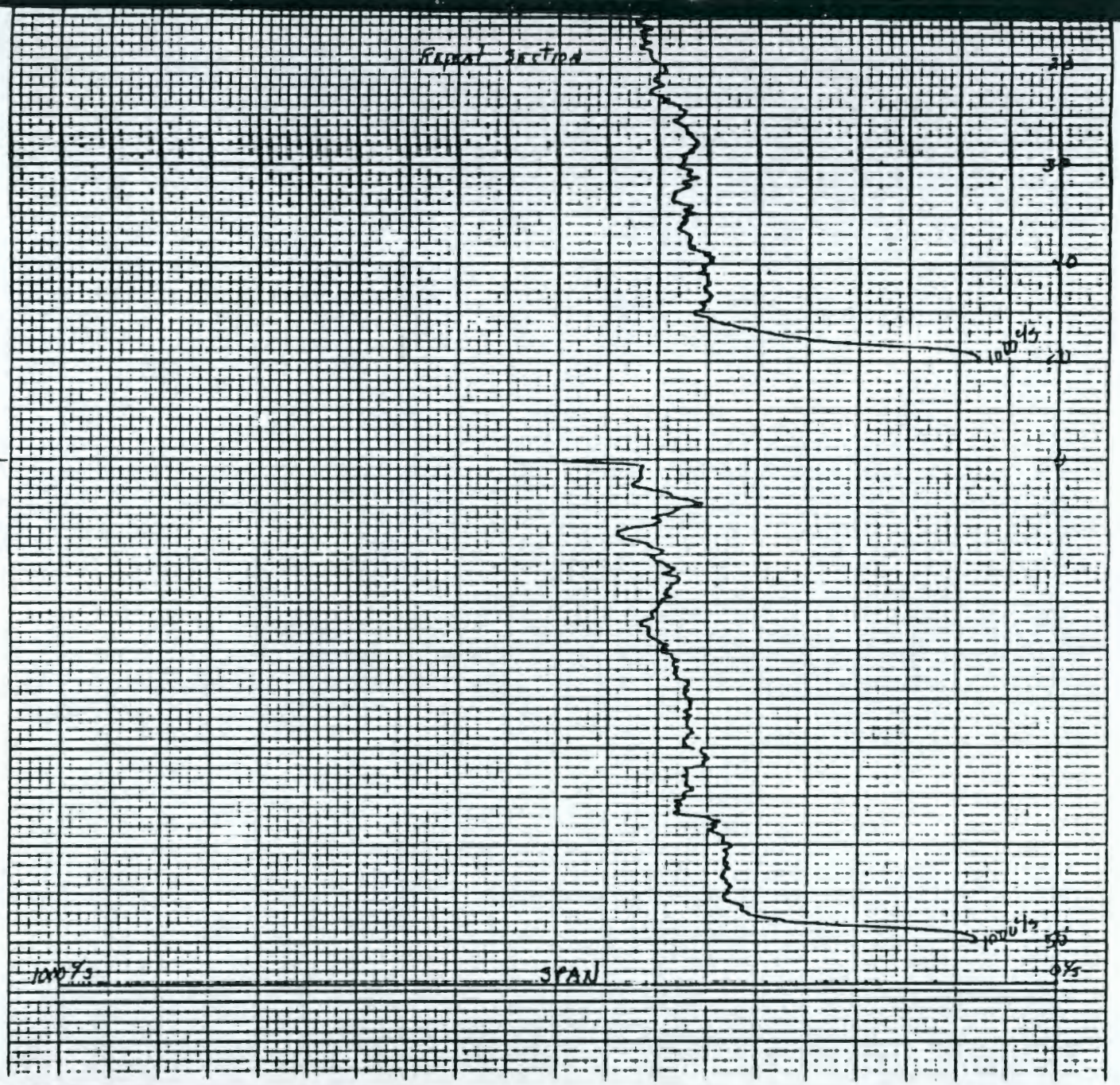
SPAN

50'

10

Radio Signal


Log Type DENSITY
Date 5-18-87
Logging Speed 10
Log Scale 10/IN
Source Strength
Remarks
1000 c/s
SPAN CHECK
0%
10


Repeat Section
25
30
40
100 db/s
50
100 db/s
100 db/s
SPAN

Well 99-14-18 Drilled Depth 50' Interval Logged 50-0'

Log Type NEUTRON Date 8-18-87 Casing Size 7A

Logged By [illegible] Water Level Depth 49

Logging Scale: Sensitivity 5000 cps Time Constant 2

Vertical Scale 10'/in. Logging Speed 25'/min.

Source Strength 3 Ci Am-Be Spacer Length 8"

Remarks: REF: PROCEDURE 1 GW-15 PART 1 UNIT 11
PROBE SERIAL # N 27325 A7

DAS

SPAN check

Repeat section

MADE AT JERSEY CITY, N.J. INC. JERSEY CHEMICAL LABORATORY

STRAIN
STRESS
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APPENDIX D

RAW ANALYTICAL DATA FOR SAMPLES TAKEN FROM THE NONRADIOACTIVE DANGEROUS WASTE LANDFILL

APPENDIX D

RAW ANALYTICAL DATA FOR SAMPLES TAKEN FROM THE NONRADIOACTIVE DANGEROUS WASTE LANDFILL

The following table presents raw data for those constituents that had at least one value above detection limits in the May 1987 samples. The row labels indicate the name of the constituent and the units in which it is measured.

Non-Radioactive Dangerous Waste Landfill Data for May 1987
Constituents with at least one value above the detection limit

Constituent List-Contamination Indicators

Constituent Code	Name	Units	Replicate	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
101	CONDUCT	UMHO		378	371	352	316	387	389	331
			1	378	363	352				
			2	378	358	367				
			3	378	356	358				
108	PH			7.6	7.5	7.5	8.3	7.5	7.6	7.4
			1	7.5	7.5	7.5				
			2	7.8	7.5	7.8				
			3	7.6	7.5	7.6				
C68	TOX	PPB		<100	<100	<100	<100	<100	<100	278
			1	<100	<100	<100				
			2	<100	<100	<100				
			3	<100	<100	<100				
C69	TOC	PPB		292	531	302	489	285	1478	331
			1	315	328	452				
			2	297	515	369				
			3	412	588	378				

Constituent List-Drinking Water Standards

Constituent Code	Name	Units	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
109	COLIFRM	MPN	18	18	18	18	<2.2	<2.2	<2.2
111	BETA	PCI/L	32.5	35.7	38.1	18.8	28.7	32.8	34.8
181	RADIUM	PCI/L	-0.88	0.88	-0.82	0.21	-0.85	0.83	0.88
212	LOALPHA	PCI/L	1.8	4.5	2.4	3.3	3.9	2.2	2.4
A06	BARIUM	PPB	55	44	29	15	34	33	32
M20	FBARIUM	PPB	58	37	27	14	32	38	31
A08	CHROMUM	PPB	18	<18	<18	16	<18	<18	<18
M22	FCHROMI	PPB	<18	13	<18	<18	<18	<18	<18
A28	ARSENIC	PPB	<5	5	<5	8	5	<5	<5
M37	FARSENI	PPB	<5	<5	<5	5	<5	<5	<5
A51	LEADGF	PPB	<5	<5	8	<5	<5	<5	5
C72	NITRATE	PPB	28588	24988	27588	4188	28788	27988	27788
C74	FLUORID	PPB	<588	581	781	882	877	885	732

Non-Radioactive Dangerous Waste Landfill Data for May 1987
Constituents with at least one value above the detection limit

Constituent List=Quality Characteristics

Constituent Code	Name	Units	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
A11	SODIUM	PPB	20800	23100	23200	42000	23200	23700	23200
M24	FSODIUM	PPB	21000	23000	22700	43200	22000	22700	22900
A17	MANGESE	PPB	120	44	<5	9	<5	<5	<5
M29	FMANGAN	PPB	110	11	<5	8	<5	<5	<5
A19	IRON	PPB	70	4010	204	236	<50	<50	<50
M31	FIRON	PPB	<50	60	<50	80	<50	<50	<50
C73	SULFATE	PPB	78500	43100	39100	56000	42100	39100	41400
C75	CHLORIDE	PPB	8040	7070	7100	8900	7550	6900	6810

Constituent List=Site Specific

Constituent Code	Name	Units	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
A05	CALCIUM	PPB	43700	44500	36700	26700	38900	37300	36700
M10	FCALCIU	PPB	40500	38500	37100	27200	38900	35200	37700
A18	POTASUM	PPB	6200	8400	6070	5400	6200	6100	6260
M30	FPOTASS	PPB	6300	6200	6050	5640	6050	6070	6070
A60	MAGNES	PPB	12000	11000	10200	7260	10000	10400	10000
M32	FMAGNES	PPB	12000	10700	10200	7510	10100	9000	10000
M16	TC	PPB	28200	28000	28200	28000	27500	28000	27000

Constituent List=Site Specific tag-along

Constituent Code	Name	Units	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
A04	ZINC	PPB	7	17	6	10	7	6	5
M18	FZINC	PPB	<5	14	5	<5	8	<5	<5
A12	NICKEL	PPB	<10	<10	<10	12	<10	<10	<10
A13	COPPER	PPB	<10	<10	<10	20	<10	<10	<10
M20	FCOPPER	PPB	<10	14	<10	<10	<10	<10	<10
A14	VANADUM	PPB	13	20	20	17	25	25	24
M27	FVANADI	PPB	9	32	20	13	27	22	23
A10	ALUMNUM	PPB	<150	522	<150	<150	<150	<150	<150

Constituent List=WAC 173-303-9905

Constituent Code	Name	Units	Upgradient DM1	Upgradient SM1	Upgradient SM2	Downgradient DM2	Downgradient SM3	Downgradient SM4	Downgradient SM5
A03	METHYCN	PPB	<10	<10	<10	<10	<10	<10	220