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Remedial Investigation of Landfill Pit 8 Lawrence Livermore National Laboratory Site 300

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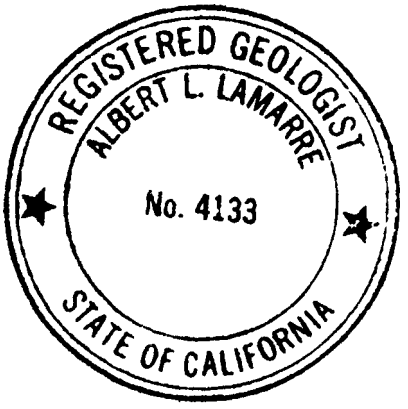
Certification

We certify that the work presented in this report was performed under our supervision. To the best of our knowledge, the data contained herein are true and accurate, and the work was performed in accordance with professional standards.



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Contents

Remedial Investigation of Landfill Pit 8 Lawrence Livermore National Laboratory Site 300

Introduction

This report documents our investigation of the geology and hydrogeology beneath inactive landfill Pit 8 at Lawrence Livermore National Laboratory Site 300. Site 300 is located about 15 miles east of Livermore, California, in rugged, rural terrain on the east side of the Altamont Hills (Fig. 1); this remote facility is used for the testing of explosives and materials to support LLNL's national defense programs. Landfill Pit 8 is located in San Joaquin County in the northeastern portion of Site 300 (Figs. 2 and 3). Since August 1987, trichloroethylene (TCE) has been detected in ground water from one well to a maximum of 6 μg/L. Ground water from a second well has contained lower concentrations of TCE since the last quarter of 1988. We began this investigation in mid-1988 to determine the extent and sources of TCE at the landfill site and to define local hydrogeology. This report presents the results and conclusions of the investigation.

Summary and Conclusions

Pit 8 contains potentially hazardous firing table debris generated during explosives experiments. We have assessed the potential impact of the landfill on vadose zone and ground water chemistry and have studied the geology and ground water flow characteristics at the Pit 8 site. Ground water flow direction, gradient, and velocities have been determined by well installation and monitoring, and hydraulic testing.

No elevated levels of metals or uranium have been detected in borehole core samples. Low concentrations of volatile organic compounds were detected in samples from one borehole, but we believe the results to be spurious.

Extensive ground water sampling and analysis were performed at the Pit 8 site in 1982-83 (Raber and Carpenter, 1983). Ground water samples from one upgradient well contained isotopic ratios indicative of depleted uranium. Subsequent ground water samples from this well have contained natural uranium isotopic ratios. A result of 1.6 μg/L of chlorobenzene detected in a ground water sample collected from one well during the second quarter of 1987 was considered lacking in validity. In subsequent sampling, this compound has not been detected. No other evidence of augmented water quality was found. Ground water sampling continued on a semi-regular basis until the fourth quarter of 1987, when TCE was detected in a ground water sample from a well upgradient of the landfill at a concentration of 5 μg/L. We continued monitoring of halocarbon concentrations in ground water from this well and initiated a comprehensive monitoring program for the Pit 8 area.

We have performed three rounds of sampling and analysis for a full suite of parameters designed to assess whether the landfill has impacted ground water chemistry beneath and adjacent to the landfill. Although the landfill is not a Resource Conservation and Recovery Act (RCRA)

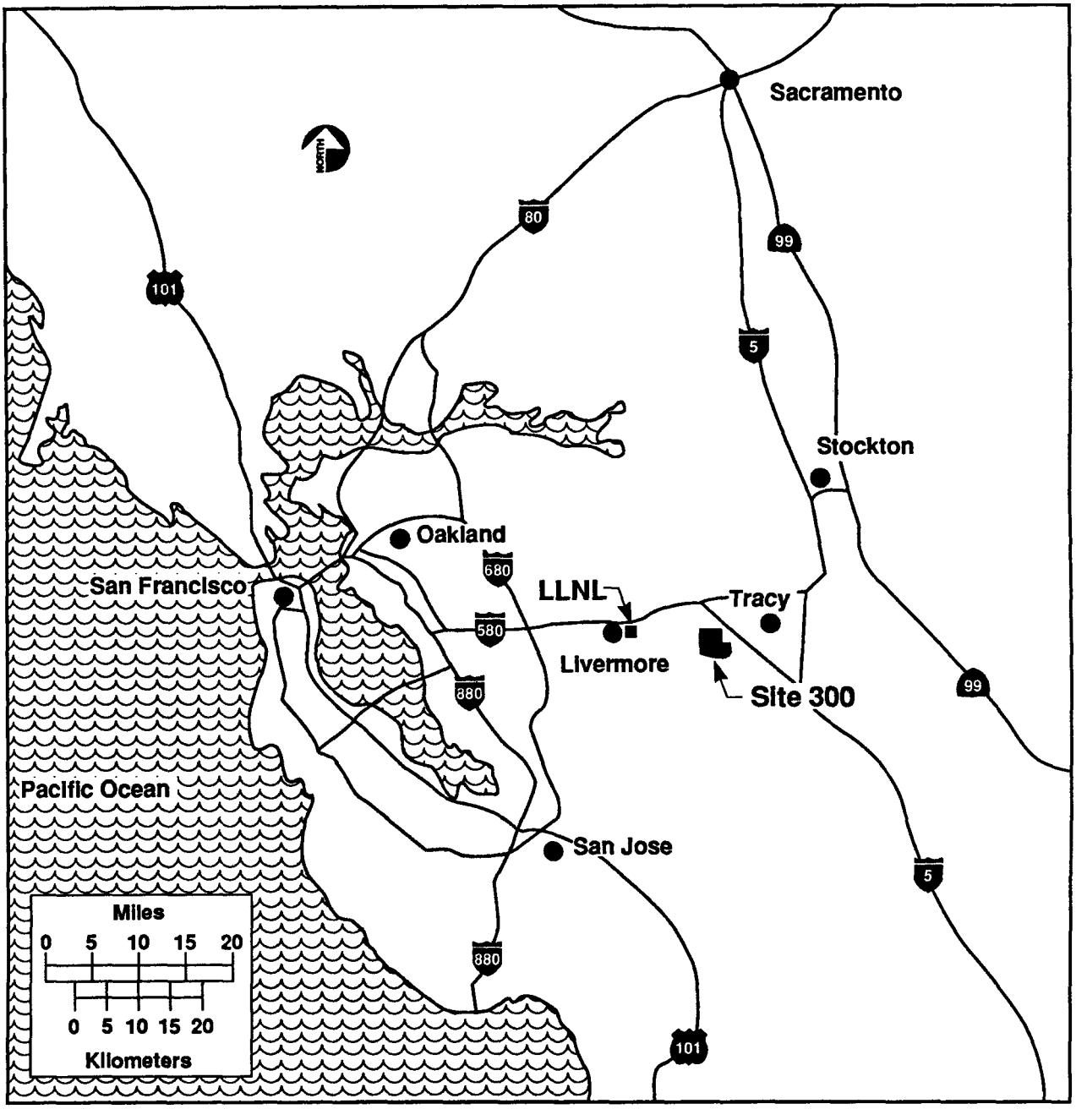


Figure 1. Locations of LLNL and Site 300.

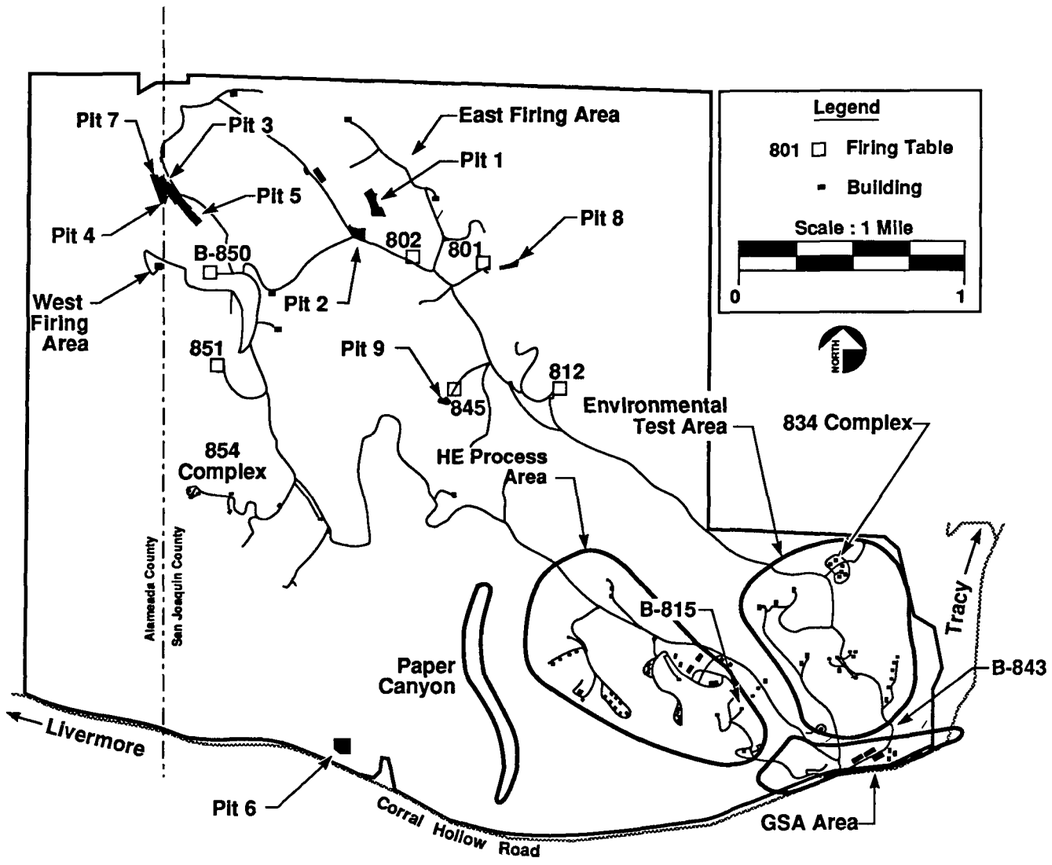
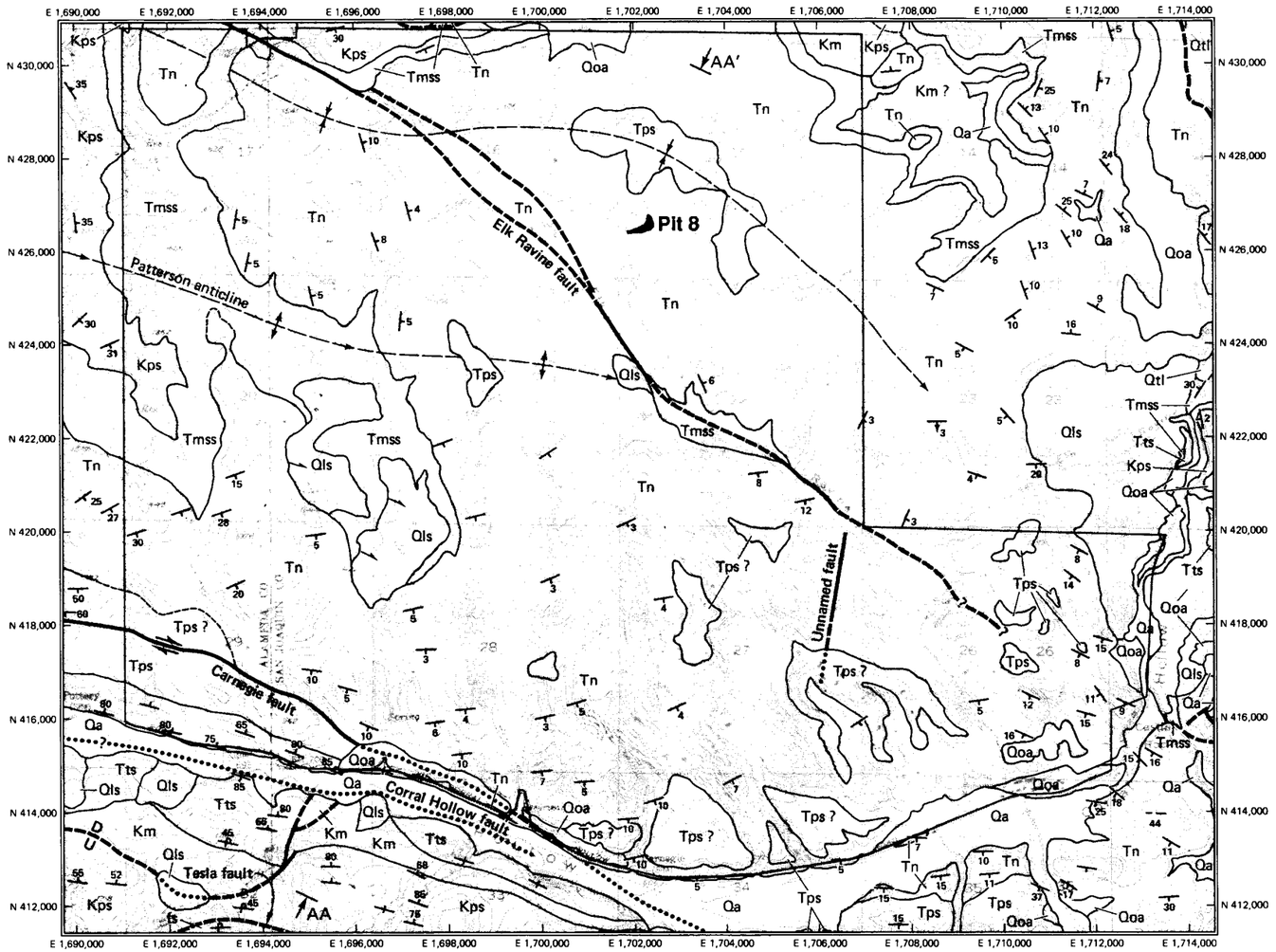


Figure 2. Location of ERD facilities and investgation areas at Site 300.



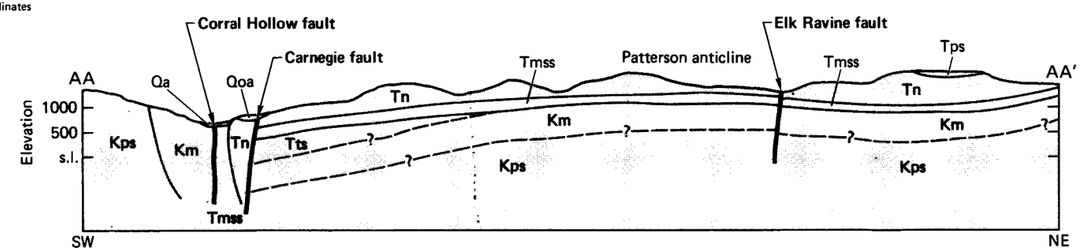


Figure 3. Topographic and geologic map of Site 300 and geologic cross-section AA-AA' (modified from Dibblee, 1980a, Ramond, 1969, and Raber and Carpenter, 1983).

Legend

Qa	Alluvium	Holocene	Quaternary
Qls	Landslide debris		
Qoa	Older alluvium	Pleistocene	
Qtl	Tulare Formation		
Tps	Nonmarine sedimentary rocks	Pliocene	Tertiary
Tn	Neroly Formation	Miocene	
Tmss	Cierbo Formation		
Tts	Tesla Formation	Eocene	
Km	Moreno shale	Upper Cretaceous	Jurassic-Cretaceous
Kps	Panoche Formation		
fs	Franciscan assemblage		

Contact

Dashed where gradational or approximately located.

Fault

Dashed where inferred; dotted where concealed; queried where existence doubtful; double arrows indicate strike-slip movement; U – upthrown side, D – downthrown side, relatively.

Axis of fold

anticline

syncline

Arrow on axis indicates direction of plunge.

Strike and dip of strata

inclined | inclined (approximate) | vertical | overturned

0 ½ 1 Mile

0 2000 4000 6000 Feet

0 500 1000 Metres

landfill, this suite of assessment parameters meets or exceeds sampling and analysis required to comply with RCRA or Solid Waste Assessment Test (SWAT) guidance.

In the three rounds of assessment sampling completed to date, TCE and 1,2-DCA are the only chemicals detected in ground water samples at concentrations in excess of State Action Levels (SAL) or Maximum Contaminant Levels (MCL). Maximum TCE concentrations of 6 µg/L were detected in an upgradient well and 2 µg/L in a well cross-gradient of the pit. The State and Federal MCL for TCE is 5 µg/L. Ground water samples collected from the upgradient well for three consecutive quarters reportedly contained 2 µg/L of 1,2-DCA. This compound, which has a State and Federal MCL of 0.5 µg/L, has not been detected in ground water samples from this well for the past two quarters. No other organic compounds, besides TCE and 1,2-DCA, have been detected, except for three likely spurious results. These results are: 2 µg/L of chloroform detected in a fourth quarter 1988 ground water sample from a downgradient well, 10 µg/L of an 18-carbon fatty acid in a fourth quarter 1988 ground water sample from an upgradient well, and 2 mg/L of a 10– to 20–carbon polymer in a ground water sample collected from the same well during the first quarter of 1989. No tritium was detected in ground water samples; no metals, uranium, or other radiologic parameters or general water quality indicators were detected at greater than background levels.

The presence of TCE in ground water sampled by one upgradient and one cross-gradient well indicates that the source is not the landfill. Ground water samples from other wells have not contained any detectable organic compounds. We are conducting further work to characterize the TCE source. It appears that no other organic compounds, besides TCE, are currently present in ground water beneath Pit 8.

The assessment monitoring program will continue through the end of 1989. At present, there is no evidence for landfill impacts on vadose zone or ground water chemistry.

Background

History of the Pit 8 Site

Pit 8 is located adjacent to the Building 801 firing table, where explosives experiments have been conducted from 1958 to present. Untreated debris from the firing table was disposed of in the pit until a final cover was installed in 1974; debris may contain tritium, uranium-238, lead, and beryllium. The bulk volume of the landfill material is less than 50 cubic yds; the debris was originally dumped on the ground surface and was later levelled and compacted by bulldozer. It was covered with less than 4 ft of locally obtained silt with lesser clay, sand, and gravel. As-built plans were not prepared for the landfill, as the volume of waste was small. A drainage ditch has been constructed around the landfill to protect the cover from erosion and to prevent run-on. The landfill is not lined.

Physical Setting

Pit 8 is located in a narrow ravine several hundred feet northeast of the Building 801 Complex. With the exception of the complex, there are no program facilities in the ravine or the general area. Soils at the landfill site vary in thickness from 3 ft on ravine slopes to 10.5 ft in the ravine bottom. The ravine is blocked by an earthen dam at the western end.

Field Work

We mapped geology, drilled and installed monitoring wells, monitored potentiometric surface elevations and ground water chemistry, and performed a hydraulic test to characterize the hydrogeology at the Pit 8 site.

In 1982, geologic mapping was done over a one square mile area, at a scale of 1 in. to 200 ft, as part of the original site assessment (Raber and Carpenter, 1983). A Brunton compass was used to measure bedding strikes and dips. Outcrops allowed interpretation of the distribution of lithologic units. Contacts were inferred beneath alluvial cover and were correlated with geologic data from the boring logs and geologic cross sections.

Three monitor wells (K8-01, K8-04, and K8-05) and two multiple completion installations (K8-02 and K8-03) were drilled for this study (Fig. 4). Installations K8-01 through K8-03 were installed to meet the requirements of the California Regional Water Quality Control Board–Central Valley Region (CRWQCB-CV) Order 80-184. Wells K8-01 and K8-04 monitor a semi-confined water-bearing zone within Neroly Formation sandstones of unit $Tnbs_1$ and associated conglomerate of unit $Tngl_1$. Lithologic units are described in the following Geology section. Well K8-05 is completed in a perched water-bearing zone within unit $Tnbs_1$. Installations K8-02 and K8-03 were installed with two separate completions at two different intervals in the same borehole; (1) a cased monitor well in the first water-bearing zone (K8-02B and K8-03B), and (2) a barcad sampler in a deeper water-bearing zone (K8-02A and K8-03A). A barcad sampler is a device similar to a bladder pump that requires nitrogen gas to propel a ground water sample to the surface. The nitrogen devolatilizes the sample and the device is not appropriate for sampling for volatile organic compounds (VOCs). Pressure transducers were installed with the barcad samplers; these are no longer operative and cannot provide hydraulic head data. Table 1 is a summary of installation completion details. Boring logs describing well completions and geology are presented in Appendix A. Analytical results of borehole core analyses are tabulated in Appendix B, Table B-1.

Monitor well K8-01 was drilled in June 1982, 40 ft northwest of Pit 8. The well is screened from a depth of 156 to 166 ft to monitor sandstone interbeds within conglomerate of unit $Tngl_1$. The water level soon after completion rose to 140 ft, indicating water-bearing zone confinement. A shallow soil sample from this borehole was analyzed for total beryllium and total uranium. The maximum sustainable yield of this well is about 1 gpm.

Multiple completion K8-02 was drilled in June 1982, approximately 80 ft east of the southeast corner of Pit 8. The first significant ground water was encountered at 167.8 ft in moderately permeable and porous sandstone of unit $Tnbs_1$. The sandstone coarsens with depth to its lower contact with conglomerate at 178 ft. We cased off this water-bearing zone and continued drilling,

Table 1. Pit 8 borehole and well installation data.

Well	Type[a]	California coordinates Northing	Easting	Shiner Elevation (MSL ft)	Point of measurement elevation (MSL ft)	Depth of screened interval[b] (ft)	Depth of sandpack interval[b] (ft)	Well diam.[c] (in.)	Casing depth[b] (ft)	Pump intake depth (ft)	Pump type; HP/Voltage	Completion date
K8-01	MW	426653.9	1702057.6	1128.62	1130.62	155.00-165.00	131.80-169.80	3.50	165.00	155.00	14x4P0 50-3W; 1/2 HP/110V	22-Jun-82
K8-02A	BAR	426514.7	1702703.7	1125.42	1128.42	204.00-208.00	201.00-212.00	0.12	222.40	N/A	N/A	27-Jun-82
K8-02B	MW	426514.7	1702703.7	1125.42	1128.42	176.00-192.00	159.00-196.00	3.00	193.00	189.50	GRUNDFS SPI-9;1/2 HP/220V	27-Jun-82
K8-03A	BAR	426494.1	1701980.6	1096.89	1099.89	168.00-172.00	163.50-173.00	0.12	187.70	N/A	N/A	01-Jul-82
K8-03B	MW	426494.1	1701980.6	1096.89	1099.89	142.50-152.50	136.50-151.50	4.50	153.00	150.50	GRUNDFS SP1-9; 1/2 HP/220V	01-Jul-82
K8-04	MW	426754.2	1702633.6	1130.14	1133.15	183.00-188.00	177.00-180.00	4.50	188.00	187.90	GRUNDFS SP1-9; 1/2 HP/220V	02-Aug-88
K8-05	MW	426712.1	1702651.4	1130.44	1132.45	138.10-148.10	129.50-149.00	4.50	148.10	N/A	N/A	20-Sep-88

[a]MW = monitor well; BAR-Barcad.
[b]Depths are measured from ground surface.
[c]Inside diameter.
[d]Total depth of borehole.
N/A = Not applicable.

encountering a second water-bearing zone within conglomerate and sandstone interbeds of unit $Tngl_1$ extending from 199 to 211.5 ft. A barcad sampler centered at 206.5 ft was installed to monitor this interval. The borehole was subsequently backfilled with bentonite to 196 ft, and 3-in. nominal o.d. PVC screened casing was installed from 176 to 192 ft to monitor the first water-bearing zone. The barcad completion is designated K8-02A; the well is designated K8-02B. Well K8-02B currently yields about 1 gpm. A shallow soil sample from this borehole was collected and analyzed for total beryllium and total uranium.

Multiple completion installation K8-03 was drilled in June and July 1982, south of the southwest corner of Pit 8. The first ground water was encountered at 151 ft within conglomerate of unit $Tngl_1$. The first water-bearing zone was cased off to 156 ft and drilling resumed. The second ground water was encountered at the base of a conglomerate stratum extending from 162 to 170 ft. We installed a barcad sampler (K8-03A) in the 169.2 to 172 ft interval to monitor the second water-bearing zone. We backfilled the borehole with bentonite to 157 ft and installed 3-in. nominal o.d. PVC screened casing from 143 to 153 ft to complete well K8-03B. The well yields in excess of 1 gpm. No borehole core samples were collected for chemical analysis.

During the third quarter of 1988, we completed well K8-04, approximately 75 ft north of Pit 8, to function as a downgradient monitor well. Significant ground water was first encountered at 182.3 ft upon penetration of dense silty sandstone within unit $Tnbs_1$; the water level rose over 15 ft (to 165.8 ft) in several hours, indicating water-bearing zone confinement. The well was screened with 4.5-in. nominal o.d. PVC casing from 182.3 to 187 ft. After development, the well yield is approximately 0.5 gpm. Samples of rock core from this borehole were collected and analyzed for tritium and uranium isotopes.

We encountered a moist sandstone from 147 to 150 ft in drilling borehole K8-04. Consequently, we drilled and completed well K8-05, located 43 ft southeast of K8-04, to monitor any ground water flow in this downgradient perched water-bearing zone. The well is screened with 4.5-in. nominal o.d. PVC casing from 138.2 to 148.2 ft in moist sandstone and overlying siltstone. The perching horizon is a brown claystone with an upper contact at 148.5 ft. It appears that we have depleted this perched zone, as the well has been dry since soon after its completion during the third quarter of 1988. Samples of rock core from this borehole were collected and analyzed for tritium, uranium isotopes, metals, and VOCs.

Water-elevation measurements are collected monthly from the five Pit 8 monitor wells. This has been done since June 1987. All of the Pit 8 installations in place in late 1982 were sampled for a full range of ground water quality parameters as part of the original Site 300 hydrogeologic assessment (Raber and Carpenter, 1983; Carpenter and Peifer, 1983). These parameters included a full spectrum of metals, general mineral parameters, uranium isotopes, gross alpha and beta radioactivity, tritium, total organic carbon, total organic halogen, total Kjedahl nitrogen, and phenolics. Well K8-03B was also sampled for EPA Method 624 and 625 compounds. Results of these analyses are presented in Raber and Carpenter (1983).

Beginning in the first quarter of 1984, but excepting the second quarter of 1984, well K8-01 was sampled on a quarterly basis and analyzed for a variety of ground water quality parameters. Sampling dates and ground water chemical analyses performed since 1984 are summarized in Table 2. During the third quarter of 1987, ground water from wells K8-01 and K8-03B was

Table 2. Ground water sampling at Pit 8.

Report Period	Analytes
1st quarter 1984	
K8-01	Gross α, β, tritium, uranium isotopes
3rd quarter 1984	
K8-01	Gross α, β, tritium
4th quarter 1984	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
1st quarter 1985	
K8-01	Gross α, β, tritium
2nd quarter 1985	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
3rd quarter 1985	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
4th quarter 1985	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
1st quarter 1986	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
2nd quarter 1986	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
3rd quarter 1986	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
4th quarter 1986	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium, lead

Table 2. Ground water sampling at Pit 8 (continued).

Report Period	Analytes
1st quarter 1987	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium
2nd quarter 1987	
K8-01	Ammonia nitrogen, beryllium, nitrite, nitrate, total kjedahl nitrogen, gross α, β, tritium, lead, EPA Method 602
3rd quarter 1987	
K8-01	Ammonia nitrogen, beryllium, alkalinity, chloride, fluoride, iron, lead, manganese, nitrate, nitrite, soidium, sulfate, total kjedahl nitrogen, EPA Method 624, gross α, β, tritium, general mineral
K8-03B	Alkalinity, chloride, fluoride, iron, lead, manganese, nitrate, nitrite, sodium, sulfate, total kjedahl nitrogen, general mineral
4th quarter 1987	
K8-01	Ammonia nitrogen, beryllium, lead, nitrate, nitrite, total kjedahl nitrogen, EPA Method 624, gross α, β, tritium
1st quarter 1988	
K8-01	Ammonia nitrogen, beryllium, lead, nitrate, nitrite, total kjedahl nitrogen, EPA Method 624, gross α, β, tritium
2nd quarter 1988	
K8-01	Ammonia nitrogen, beryllium, lead, nitrate, nitrite, total kjedahl nitrogen, EPA Method 624, gross α, β
K8-02B	Carbonate alkalinity, chloride, fluoride, iron, manganese, nitrate, sodium, sulfate
K8-03B	Carbonate alkalinity, chloride, fluoride, iron, manganese, nitrate, sodium sulfate
3rd quarter 1988	
K8-01	Ammonia nitrogen, beryllium, lead, nitrate, nitrite, total kjedahl nitrogen, EPA Method 624, gross α, β, tritium

Table 2. Ground water sampling at Pit 8 (continued).

Report Period	Analytes
4th quarter 1988	
K8-01	Assessment Parameters[a] EPA Method 601, 602, 625
K8-02B	Assessment Parameters[a] EPA Method 602, 625
K8-03B	Assessment Parameters[a] EPA Method 602, 625
K8-04	Assessment Parameters[a] EPA Method 602, 625
1st quarter 1989	
K8-01	Assessment Parameters[a] EPA Method 625
K8-02B	Assessment Parameters[a]
K8-03B	Assessment Parameters[a]
K8-04	Assessment Parameters[a]
2nd quarter 1989	
K8-01	Assessment Parameters[a] EPA Method 625
K8-02B	Assessment Parameters[a]
K8-03B	Assessment Parameters[a]
K8-04	Assessment Parameters[a]

[a]Assessment Parameters include chemical and physical analyses; quadruplicate samples and analyses of electrical conductivity, TOC, and TOX; EPA Method 624 and Title 22 organic compounds; gross alpha and beta radioactivity; uranium isotopes; radium; tritium; high explosives compounds; and Title 22 metals.

sampled for inorganic chemical analyses. During the fourth quarter of 1987 and the first quarter of 1988, ground water samples from well K8-01 were analyzed for several inorganic parameters, volatile organic compounds, and radionuclides.

Ground water from well K8-01 was again sampled during the second quarter of 1987 and analyzed for the same compounds as in the previous quarter. Ground water samples from wells K8-02B and K8-03B were analyzed during the second quarter of 1988 for several inorganic water quality parameters.

During the third quarter of 1988, ground water samples from well K8-01 were analyzed for several inorganic water-quality parameters, VOCs, and radionuclides. Since the fourth quarter of

1988, we have collected ground water samples from the four wells screened in the first water-bearing zone (K8-01, K8-02B, K8-03B, and K8-04) for analysis of a full suite of chemical assessment parameters. These parameters include tritium, Title 22 metals, Title 22 organic compounds, EPA Method 624 volatile organic compounds, uranium isotopes, radium, gross alpha and beta radioactivity, HE (high-explosives) compounds, total organic halogen, total organic carbon, ammonium nitrogen, alkalinity, chloride, fluoride, nitrate, nitrite, phenolics, sodium, sulfate, and total Kjedahl nitrogen.

A step drawdown hydraulic test was performed at well K8-04 to determine hydraulic conductivity (and ground water flow velocity) in the area. Results are discussed in the Hydrogeology section of this report.

Geology

Geology of Site 300

Site 300 is located within a series of steep canyons and hills overlain by Quaternary alluvium. Bedrock is composed of Plio-Miocene volcaniclastic rock, Cretaceous sedimentary rock, and underlying Jurassic-Cretaceous basement. Alluvium in the area is predominantly terrace deposits, colluvium, and ravine fill. Structure is complex, as several faults and minor folds exist beneath the site. Figure 3 is a geologic map of Site 300; Plate 1 is a geologic map of the Site 300 area and surroundings. Knowledge of the geology of Site 300 is based on the regional geologic mapping of Huey (1948), Raymond (1969), and Dibblee (1980a, b, c, and d), refined by recent LLNL studies (Raber and Carpenter, 1983; Buddemeier, 1985; and Carpenter et al., 1988).

Unconsolidated deposits in the Site 300 area are Pleistocene to Holocene in age and consist of colluvium, alluvium and ravine fill (Qa), terrace alluvium (Qoa), and landslide debris (Qls). Colluvium, alluvium, and ravine fills vary from silty clays to silty gravels of variable thickness of one inch to over 30 ft. Terrace deposits are most extensive in the southern portion of Site 300 and consist of sandy silts and clays grading downwards to sand and locally coarse cobble-and-boulder-bearing gravels.

An unnamed Pliocene unit (Tps) consists of nonmarine conglomerates with cobbles of angular graywacke and chert, sandstones, and green-to-gray clays. This unit occurs on isolated hilltops as remnants of a once continuous blanket of sediment. A small patch of Tulare Formation (Qtl) sandstone crops out immediately west of the site.

The bedrock underlying most of Site 300 consists chiefly of the continental and estuarine, largely volcaniclastic, sedimentary rock of the Miocene Neroly Formation (Tn). The Neroly Formation is up to 450 ft thick and is composed of distinctive blue weathering sandstones and siltstones, coarse conglomerates of well-rounded andesitic and basaltic cobbles, and interbedded tuffaceous shales. Fractures are common. The Neroly Formation is generally conformably underlain by the interbedded, coarse-grained friable sandstones, carbonaceous brown shales, and tuffs of the continental and marine early Miocene Cierbo Formation (Tmss). Sandstones of the Cierbo Formation commonly appear blue-gray to tan-yellow in borehole cuttings and cores are

characterized by a high degree of sorting and presence of well-rounded chert pebbles. The sandstones are micaceous, quartz-rich, and pyritic.

The Tesla Formation (Tts) unconformably underlies the Cierbo Formation and is exposed southwest of Site 300 along the southern margin of the site and probably underlies other portions of the site at depth. The Tesla Formation is a heterogeneous sequence of brackish and marine sedimentary rocks of late Paleocene to early Eocene age.

The Upper Cretaceous Great Valley Sequence underlies Site 300 at depth and is comprised of the Moreno (Km) and Panoche (Kps) Formations. These rocks are exposed only in the northern part of the site. The Moreno Formation is composed of poorly bedded, crumbly, green-to-gray clay shale, or mudstone of marine origin, and conformably overlies the Panoche Formation. The thickness of the Moreno Formation in the vicinity of Site 300 is inferred to be in excess of 1,000 ft. The Panoche Formation is a very thick turbidite sequence of intercalated arkosic sandstone, micaceous shale, and local lenses of cobble conglomerate. Its thickness in the area of Site 300 is unknown (Dibblee and Darrow, 1981).

The Jurassic-Cretaceous Franciscan Assemblage (fc/fs) is exposed in the Diablo Range southwest of Site 300 and is composed of graywacke, chert, and lesser amounts of shale and phyllite. In places, beds are intensely folded, fractured, and sheared.

As shown in Figure 3 and Plate 1, the bedrock structure is dominated by the Patterson Anticline, which crosses Site 300 near mid-site with a west-northwest/east-southeast trend. South of the anticlinal ridge, the bedrock sequence dips towards Corral Hollow. North of the ridge crest, beds dip towards the northeast an average of 10 degrees into the trough of a subsidiary syncline that crosses the northeastern portion of Site 300. Immediately northeast of the trough, beds dip southwest for a short distance before resuming a northeasterly dip. The synclinal axis plunges southeast.

Two principal faults are mapped within Site 300: the Elk Ravine Fault, in the north-central part of the site, and the Carnegie Fault, which crosses the southwestern portion of Site 300. The Carnegie Fault merges to the northwest with the Tesla-Ortigalita Fault, and with the Corral Hollow Fault southeast of Site 300 (Dibblee, 1980b). Neither the Elk Ravine nor Carnegie Faults show evidence of Holocene displacement (Raber and Carpenter, 1983; and Hoffman, 1988). Localized cross-faults and fault splays have recently been identified by trenching and field mapping in the East Firing Area (EFA) (Taffet et al., 1989).

Geology of the Pit 8 Area

Figure 4 is a geologic and topographic map of the Pit 8 area. The pit is located within a narrow ravine bordered by an earthen dam on its west side at the locations of installations K8-01 and K8-03. At the eastern end is a prominent landslide; significant mudflows have been noted in the area in the last twenty years. Surficial materials at Pit 8 consist of colluvial soils and shallow ravine fills. These materials consist of sandy clays and clayey sands with varying amounts of sandstone fragments. Thicknesses vary from about 3 to 10.5 ft. Soils in the area are mapped as Linne clay loam, rock outcrop phase (Lct) (Cole et al., 1943). These soil types are typically dark brownish-gray and calcareous. These soils have good erosion resistance but may experience shrinkage cracking due to clay desiccation. These soils were placed as top cover over the landfill. Visual examination suggests that they are of low permeability. However, past episodes of concentrated runoff have resulted in erosion through the Pit 8 area; a gully up to 6 ft in depth has been incised near the southeast corner of the pit.

Blue sandstone and interbedded siltstones and claystones midway through the Neroly Formation geologic section immediately underlie the landfill area. The landfill is about 1,800 ft northeast of the Elk Ravine Fault shear zone. The pit is 4,000 ft northeast of the Patterson Anticline and 2,000 ft southwest of a subsidiary subparallel syncline; both of these structures plunge southeast. Beds strike an average of N25°W and dips average several degrees northeast in the landfill area, although they are as high as 15° outside the ravine.

A generalized stratigraphic section for the Pit 8 area is presented below.

Unconsolidated Sediments (Qa) and Landslide Deposits (Qls) Holocene

These materials consist chiefly of brown-to-dark-brown sandy and clayey silt grading to silt, sand, and gravel. Fill occurs in the area of the landfill as gravel, sand, and silt. Thicknesses of these materials in the Pit 8 area range from less than 3 to over 15 ft. Greatest thicknesses occur in the valley bottom and decrease up the slopes.

Unnamed Pliocene Unit (Tps) Pliocene Continental Sedimentary Rocks

This unit is composed of red and green claystones, conglomerate, and sandstone. Conglomerates are composed of angular clasts of graywacke and chert. This unit occurs on hilltops north of Pit 8 as remnants of a once continuous blanket of sediments. Local unconformities mark the contact with the underlying Neroly Formation.

Neroly Formation (Tn) Miocene Volcaniclastic Sedimentary Rocks

Upper Claystone ($Tnsc_2$). This is composed of well-lithified light gray-to-pink silty claystone, fine-grained silty sandstone, and interbeds of tuff. This unit has an average true thickness in excess of 50 ft, and crops out on the hills north of the landfill.

Upper Conglomerate ($Tngl_2$). This unit can be traced throughout most of Site 300. Clasts tend to be pebble to small cobble in size and are composed of andesite and basalt. Matrix material is composed of well-cemented sand and silt of low permeability and contains lenses of blue sandstone. This unit crops out prominently north and west of the pit. These rocks have low permeability.

Upper Blue Sandstone ($Tnbs_2$). This unit and the unit below it immediately underly much of the landfill site. It is composed of massive blue sandstone with conglomerate interbeds, and thin interbeds of pebbles, siltstone, and claystone. The sandstone is locally medium-to-coarse grained and contains claystone rip-up clasts. Conglomerate beds are generally several feet thick and are composed of pebbles and small cobbles of andesite and basalt, and rock fragments, including chert, in a fine sand matrix. Thickness of the unit varies from 30 to 80 ft. Sandstones are moderately permeable and porous.

Middle Claystone ($Tnsc_1$). This unit is composed of predominantly well-lithified light-gray-to-pinkish-gray silty claystone, fine-grained blue weathering sandstone, and thin interbeds of siltstone. This unit crops out immediately south of the Building 801 Complex. The sandstone tends to be more common at the base of the unit. Sandstone beds are moderately permeable; finer beds are less so. This unit is an average of 40 to 75 ft thick in the Pit 8 area.

Lower Blue Sandstone ($Tnbs_1$). This unit consists of a section of massive blue sandstone and thin interbeds of siltstone, claystone, and pebbly sandstone generally about 100 ft thick. The sandstones commonly display large-scale cross-bedding and evidence of soft sediment deformation (slump structures and convolute bedding). Sandstone beds are fine to medium-grained and well-cemented, and are moderately permeable. The unit is fractured in places.

Lower Conglomerate ($Tngl_1$). This unit occurs as a lentil within the upper half of unit $Tnbs_1$ in other portions of north Site 300. At Pit 8, this unit, averaging 30 ft in thickness, occurs near the base of unit $Tnbs_1$. This unit contains well-rounded andesite and basalt cobbles in a well-cemented sand matrix. It contains sandstone interbeds and tends to interfinger into the underlying $Tnbs_1$ sandstone. Thickness is variable, as the conglomerate occurs as channel fill. The conglomerate has low primary permeability; fractures, although often present, are often healed.

Basal Claystone ($Tnsc_0$). The lowermost part of the Neroly Formation is dominated by a predominantly bluish-green to yellow-brown and gray weathering claystone-siltstone unit which is typically 25 to 30 ft thick. Minor interbeds of sandstone occur. The only significant permeability in this unit is provided by fractures.

Figure 5 shows the location of geologic cross-section A-A' (Fig.6) through the Pit 8 area, oriented approximately parallel to the average regional dip. Dips shown are approximately true, albeit vertically exaggerated. Beds are almost flat-lying.

Pit 8 is approximately 1,800 ft northeast of the Elk Ravine Fault zone. Figure 6 shows 35 ft of vertical offset at this location along this strike-slip fault. Unit $Tnsc_1$ is a maximum of 75 ft thick; boring K8-04 encountered the full thickness of the unit. Lower conglomerate ($Tngl_1$) conformably overlies unit $Tnbs_1$ in the eastern part of the section, and is an average of over 30 ft thick. To the west, a thin bed of $Tnbs_1$ sandstone underlies $Tngl_1$ conglomerate.

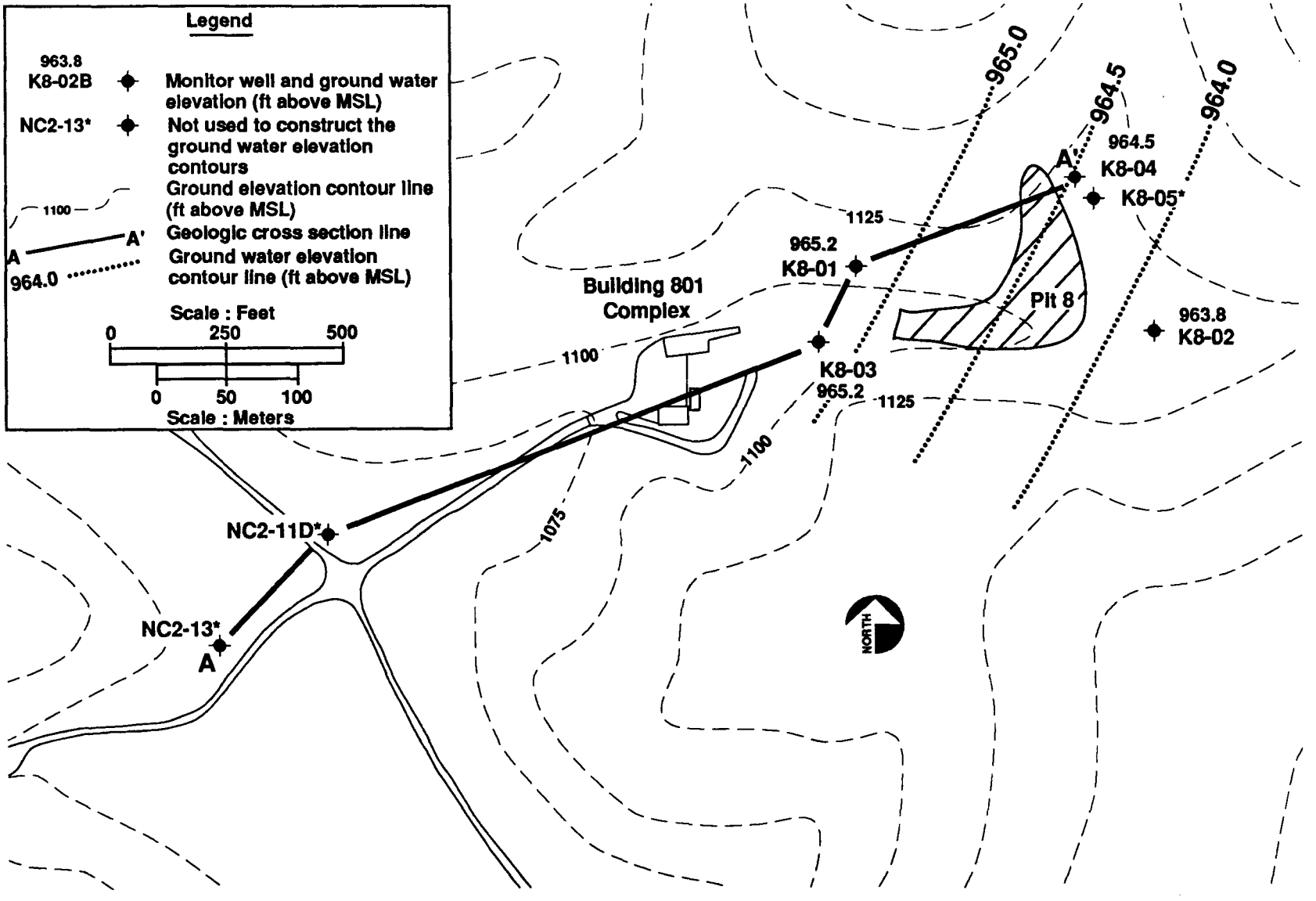


Figure 5. Ground water elevation contours and location of geologic cross-section A-A'.

Legend

Lithologic Units

Quaternary Sediments

Qa	Alluvium, fill; silt, clay, sand and gravel

Tertiary Sedimentary Rocks

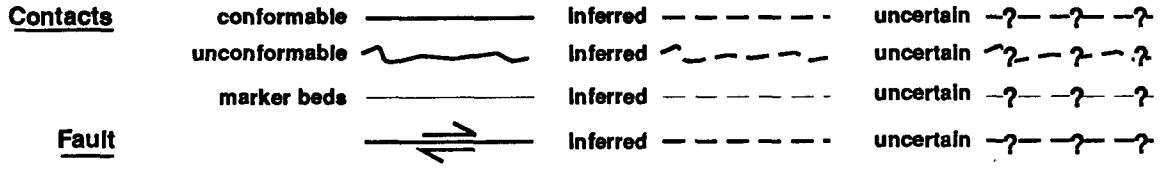
Neroly Formation (Miocene)

$Tnbs_2$	Upper Blue Sandstone; massive blue sandstone, pebble beds and thin interbeds of claystone and siltstone.
$Tnsc_1$	Middle Claystone; interbedded gray silty claystone, siltstone and silty sandstone.
$Tnbs_1$	Lower Blue Sandstone; blue sandstone and interbeds of siltstone, claystone and pebbly sandstone.
$Tngl_1$	Lower Conglomerate; andesite and basalt cobbles in a sand matrix. Occurs as lentil within $Tnbs_1$ unit.
$Tnsc_0$	Basal claystone; blue-green claystone and interbeds of clayey siltstone and minor silty sandstone.

Geologic Symbols

Lithologic patterns

Conglomerate | Sandstone | Claystone | Claystone: Silty | Siltstone: Clayey | Sand: Gravelly | Siltstone | Sandstone: Silty

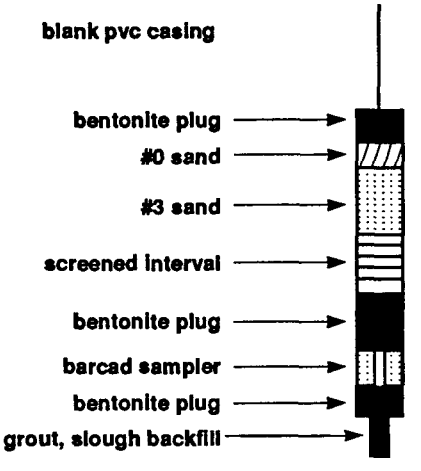


arrows indicate relative sense of vertical movement

Static Water Levels

▼ 1/89

Installation Construction



Legend for Figure 6 (Geologic cross-section A-A').

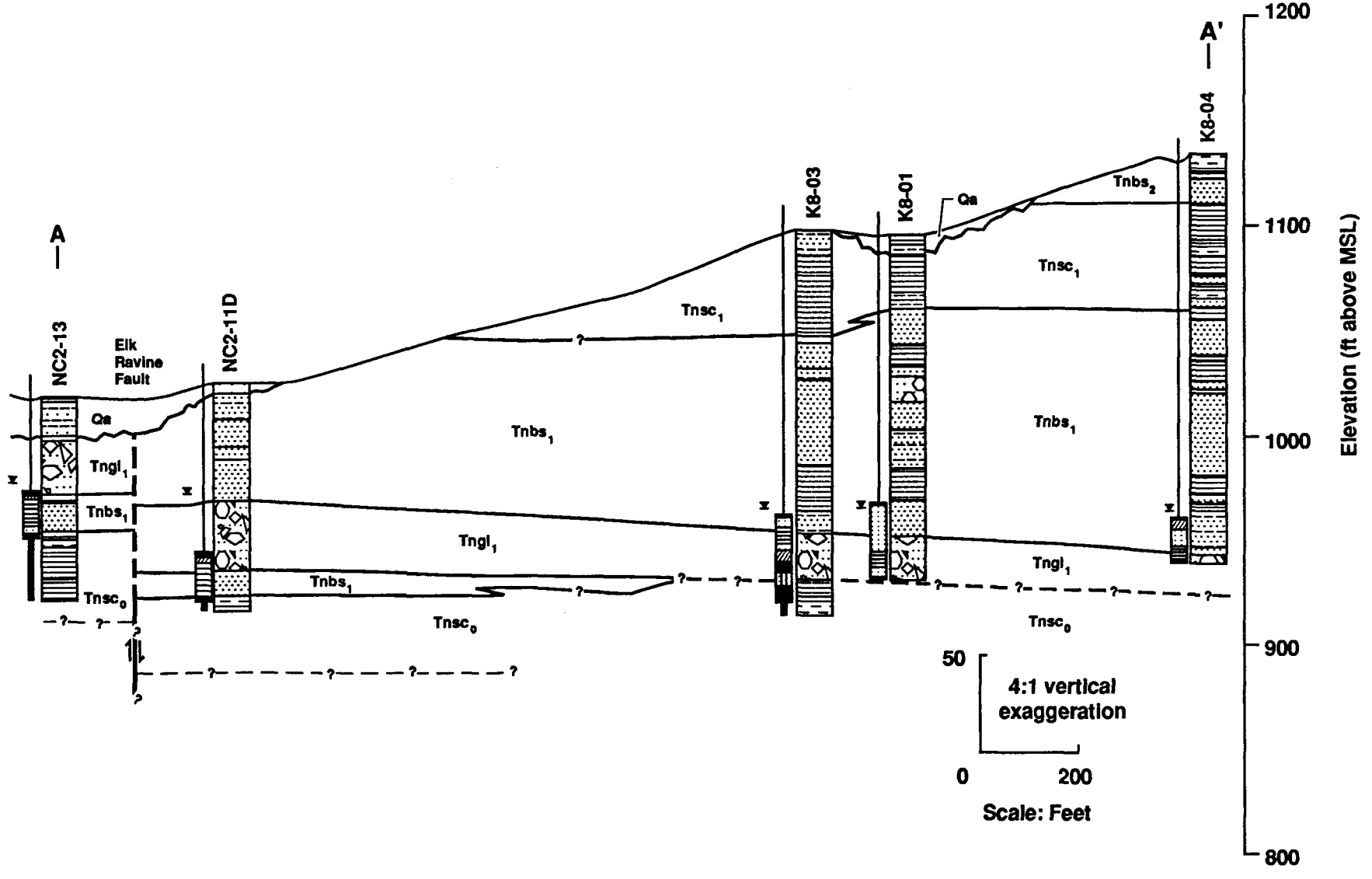


Figure 6. Geologic cross-section A-A'.

Hydrogeology

Hydrogeology of Site 300

The first ground water at Site 300 is generally found within unit $Tnbs_1$. In portions of the site, the first water-bearing zone is perched and of low yield (less than 1 gpm); at other locations, yields may exceed several gpm and conditions are often confined. Depth to ground water varies from 25 ft to in excess of 300 ft. Ground water often follows geologic structure, such as bedding. Thus, north of the Patterson Anticline, ground water tends to flow northeast. South of the anticline, ground water tends to flow to the southeast. Faulting also appears to effect ground water flow, causing ground water mounding and possibly conduit flow in shear zones (Taffet et al., 1989). Fractures often convey flow in otherwise impermeable, fine-grained lithologies.

Hydrogeology of the Pit 8 Area

Water-Bearing Zones

Depth to ground water beneath Pit 8 varies from 130 to 165 ft below ground. Water-elevation data is tabulated in Appendix C, Table C-1. The first water-bearing zone is confined; it occurs in sandstones associated within conglomerate of unit $Tngl_1$ and the sandstones of unit $Tnbs_1$ that are immediately above and below this unit. These sandstones, although moderately permeable, are also fractured. The rocks containing this first water-bearing zone can be correlated with strata of the "main water-bearing zone" observed west and north of Pit 8 within the East Firing Area (EFA) and described in previous reports (Buddemeier et al., 1987; Ruggieri et al., 1988; and Taffet et al., 1989). Claystone and dense, unfractured sandstones of unit $Tnbs_1$ appear to serve as confining layers above the first water-bearing zone. Unfractured conglomerate within unit $Tngl_0$ appears to act as aquitard material. Wells K8-01, K8-02B, K8-03B, and K8-04 are all completed within this water-bearing zone. A deeper water-bearing zone exists within moderately permeable sandstones at the base of units $Tnbs_1$ and $Tngl_1$. This water-bearing zone is monitored by barcad installations K8-02A and K8-03A. No hydraulic head data is available for this deeper zone because the pressure transducers are inoperative. Thus, we do not know the hydraulic gradient or ground water flow direction for this deeper water-bearing zone. Claystones of unit $Tnsc_0$ are aquitard materials below this water-bearing zone.

Rates and Directions of Ground Water Movement

The ground water flow gradient was 0.003 in the direction S60°E during the first quarter of 1989, as determined from the slope of the potentiometric surface within the four wells screened in the first water-bearing zone. With the completion of an additional monitor well (K8-04), we have refined our knowledge of the gradient. This gradient direction is consistent with the migration direction of the ground water tritium plume in the EFA (Ruggieri et al., 1988; Taffet et al., 1989).

The southeastern plunge of the syncline, located northeast of the pit, (Fig. 4 and Plate 1) may influence this flow direction.

A step drawdown pump test was performed on well K8-04 to determine ground water flow velocity. Testing protocols are presented in Buddemeier et al. (1987) and Weiss Associates (1988). Pore water flow velocity was determined by Darcy's Law.

$$V_p = \frac{dh}{dl} \quad \frac{k}{n_e} \qquad (1)$$

where

dh/dl = the hydraulic gradient (0.003),

k = the hydraulic conductivity (L/T), determined by dividing transmissivity by water-bearing zone thickness, and

n_e = the effective porosity (about 0.20).

The hydraulic conductivity from the well K8-04 step drawdown pump test was calculated using the Hantush method (Taffet et al., 1989). The linear pore water velocity for the first water-bearing zone at this location, using Eq. 1, is 20.8 m/yr.

Analytical Results

Soil and Rock Core Samples

Core samples were collected from boreholes K8-01, K8-02, K8-04, and K8-05. Table B-1, Appendix B, is a tabulation of all core sample chemical analytical results. Shallow soil samples collected from boreholes K8-01 and K8-03 contained total uranium and total beryllium at natural concentrations. Core samples were collected from borehole K8-04 for analysis for CAM-WET metals and EPA Method 8010 and 8020 volatile organic compounds. No elevated concentrations of metals were detected. An EPA Method 8010 analysis of a soil sample from 2.0 ft yielded 0.0004 mg/kg of TCE, 0.0003 mg/kg of trichlorofluoromethane, and 0.0003 mg/kg of chloroform. An EPA Method 8020 analysis of the same sample yielded 0.001 mg/kg of benzene, 0.002 mg/kg of ethylbenzene, 0.0017 mg/kg of toluene, and 0.0016 mg/kg of xylene. An EPA Method 8010 analysis of samples from 30.3 and 50.3 ft yielded no detectable Method 8010 compounds. An EPA Method 8020 analysis of a core sample from 12 ft yielded 0.0003 mg/kg of toluene and 0.0009 mg/kg of xylene; a sample from 50.3 ft reportedly contained 0.0006 mg/kg of toluene and 0.0013 mg/kg of xylene. We believe that the low concentrations of VOCs reportedly detected in these samples, within an order of magnitude above the detection limit of 0.0002 mg/kg, are probably spurious. EPA Method 8020 organic compounds, in particular, are often found as laboratory artifacts. Core samples were collected from borehole K8-05 for analysis of EP-Toxicity metals and EPA Method 8010 organic compounds. No metals were found at greater than natural concentrations in a core sample from 148.0 ft. Core samples from 145.5 and 148.0 ft contained no detectable organic compounds.

Ground Water Samples

The extensive ground water sampling performed for the 1982-83 hydrogeologic assessment revealed natural concentration levels for all chemicals detected, with one exception; water from well K8-01 contained isotopic ratios of uranium indicative of depleted uranium (Raber and Carpenter, 1983). Depleted uranium is mostly ^{238}U, as most of the fissionable ^{235}U has been removed from natural uranium. Analytical results from this assessment may be found in Raber and Carpenter, (1983). Ground water analytical results reported since 1984 are tabulated in Appendix B, Table B-2.

Ground water samples collected from well K8-01 during the first, third, and fourth quarters of 1984 contained background levels of radiologic parameters. These and subsequent analyses show uranium isotopic ratios indicative of natural uranium, not depleted uranium.

Background concentrations of nitrogen compounds and beryllium were reported from a fourth quarter 1984 ground water sample collected from well K8-01. A first quarter 1985 ground water sample from the well contained no elevated levels of radiologic parameters, and second, third, and fourth quarter samples of ground water from this well contained radiologic parameters, nitrogen compounds, and beryllium within natural concentration ranges for shallow to moderate depth ground water (Hem, 1985). This was also true for ground water samples collected from well K8-01 for the four quarters of 1986 and the first quarter of 1987. Ground water samples collected from well K8-01 during the second quarter of 1987 contained no beryllium, lead, nitrogen compounds, or radiologic compounds, or contained concentrations at natural levels. An EPA Method 602 analysis yielded 1.6 µg/L of chlorobenzene, which is thought to be a false positive. No other organic compounds were detected. Ground water samples collected from well K8-01 during the third quarter of 1987 contained no radiologic parameters, beryllium, lead, or other general chemical and physical parameters or contained them at background concentrations. An EPA Method 624 analysis detected no organic compounds.

Analyses of ground water samples collected from well K8-01 during the fourth quarter of 1987 yielded no detectable beryllium or lead. Radiologic parameters and nitrogen compounds were all at background levels. TCE at 5 µg/L was detected in an EPA Method 624 analysis; no other organic compounds were detected.

Analytical results of ground water samples collected from well K8-01 during the first quarter of 1988 were analagous to those reported during the fourth quarter of 1987, except that 4 µg/L TCE was detected in an EPA Method 624 analysis.

Ground water samples collected from well K8-01 during the second quarter of 1988 contained general chemical and physical parameters including lead and beryllium, and radiologic parameters at nondetectable or natural levels. EPA Method 624 analysis detected 3 µg/L of 1,2-Dichloroethane (1,2-DCA) and 5 µg/L of TCE. No other organic compounds were detected.

Analyses of ground water samples collected from well K8-01 during the third quarter of 1988 were consistent with those from the previous quarter; 3 µg/L of 1,2-DCA and 6 µg/L of TCE were detected in an EPA Method 624 analysis. No other organic compounds were detected. Inorganic and radiologic parameters were all within natural concentration ranges.

An analysis of a ground water sample from well K8-03B for general chemical and physical parameters yielded no parameters at elevated levels. Analyses for general chemical and physical parameters in ground water samples from wells K8-02B and K8-03B showed no elevated concentrations.

During the fourth quarter of 1988, all Pit 8 monitoring wells, except well K8-05 which was dry, were sampled and analyzed for the following assessment parameters: EPA Method 624/625 organic compounds, Title 22 organic compounds, Title 22 metals, tritium, uranium isotopes, radium, gross alpha and gross beta radioactivity, HE compounds, and general chemical and physical water quality parameters. A ground water sample collected from well K8-01 on October 17, 1988, contained 4.8 μg/L of TCE and 2.2 μg/L of 1,2-DCA. A second ground water sample collected from well K8-01 on November 17, 1988, contained 5 μg/L of TCE and 5 μg/L of 1,2-DCA. This sample also reportedly contained 10 μg/L of an 18-carbon fatty acid. This result is highly questionable. The other three wells, K8-02B, K8-03B, and K8-04, were sampled and analyzed for organic compounds during this quarter for the first time. Ground water from well K8-03B contained 2 μg/L of TCE. We believe the 2 μg/L of chloroform reported from a sample of ground water collected from well K8-02B on October 28, 1988, to be unsupported by associated data because no other organic compounds have ever been detected in ground water samples from this well. Ground water samples from wells K8-02 and K8-04 contained no detectable VOCs. Arsenic, lead, and selenium were observed at natural concentrations in all fourth quarter Pit 8 ground water samples; no other Title 22 metals were detected. Total organic carbon was 1.2 mg/L or less in quadruplicate samples of ground water from the four wells; analyses of total organic halogen all yielded less than 0.025 μg/L from quadruplicate samples. All other general chemical data is well within the range of concentrations to be expected in natural shallow ground water (Hem, 1985). Radiologic data, including uranium isotopes, are also within natural ranges.

During the first quarter of 1989, we again sampled the Pit 8 wells for the full suite of assessment parameters. All wells were sampled except K8-05, which was again dry. Ground water from wells K8-01 and K8-03B continued to show low concentrations of TCE, 4 and 2 μg/L, respectively; no 1,2-DCA was detected. Ground water from well K8-01 was resampled and analyzed for EPA Method 625 compounds in response to the previous quarter's questionable report of 10 μg/L of an 18-carbon fatty acid. Although the fatty acid was not detected this quarter, a semi-quantitative scan indicated 2 mg/L of a 10- to 20-carbon polymer. Arsenic, barium, cadmium, chromium, copper, lead, selenium, and silver were observed at natural concentrations in one or several Pit 8 ground water samples; no other Title 22 Metals were detected. Total organic carbon was 1.1 mg/L or less in quadruplicate sampling and analysis of ground water from the four wells; all analyses of total organic halogen yielded less than 0.025 μg/L in quadruplicate samples. No HE compounds were detected. Radiologic and all general chemical data were well within the range of concentrations in natural shallow ground water (Hem, 1985).

During the second quarter of 1989, ground water from wells K8-01 and K8-03B continued to show low concentrations of TCE: 5 and 2 μg/L, respectively. No other VOCs were detected. Although well K8-01 appears to have sampled ground water that contained low concentrations of 1,2-DCA, this chemical no longer appears to be present in this ground water, for none has been detected for two quarters. Ground water from well K8-01 was resampled and analyzed for EPA Method 625 compounds in response to the previous quarter's questionable report of 10 μg/L of a 10-carbon fatty acid and a semi-quantitative scan from the last quarter of 1988 indicating 2 mg/L of

a 10- to 20-carbon polymer. This quarter, no EPA Method 625 compounds were detected in ground water from the well. This result suggests that past reports from EPA Method 625 analyses were likely false positives. Arsenic, barium, lead, and selenium were observed at natural concentrations in one or several Pit 8 ground water samples; no other Title 22 metals were detected. Total organic carbon was 1.3 mg/L or less in quadruplicate sampling and analysis of ground water from the four wells; all analyses of total organic halogen yielded less than 0.025 µg/L in quadruplicate samples. No HE compounds were detected. Radiologic and all general chemical data were well within the range of concentrations to be expected in natural shallow ground water (Hem, 1985).

Discussion

We have completed a remedial investigation of hydrogeology at landfill Pit 8. We have identified the geology and ground water hydraulics in the Pit 8 area. Depth to water varies from 130 to 165 ft below ground surface; landfill leachate, if present, would have to travel to these depths to reach ground water. The presence of confining layers and shallower low permeability strata would retard this process. A hydraulic test indicates that ground water flows at a rate of about 21 m/yr.

Chemical analysis of soil and rock core revealed no elevated levels of any chemical parameters other than those we believe to be spurious from boreholes K8-04 and K8-05. Low concentrations of TCE, up to 6 µg/L, have been detected in ground water samples from upgradient well K8-01 since the fourth quarter of 1987; a maximum of 2 µg/L of TCE has been detected in upgradient well K8-03B ground water samples since the last quarter of 1988. The presence of 1,2-DCA was observed in ground water samples collected from well K8-01 during the second, third, and fourth quarters of 1988. These results indicate that 1,2-DCA has probably been present in ground water sampled from this well, although no 1,2-DCA has been detected since then in water from this well or in ground water samples from any other wells at Pit 8. No other organic compounds have been detected. No tritium or beryllium have been detected in ground water samples. Radiologic parameters, including uranium isotopes, and metals concentrations of lead, arsenic, and barium were all well within the ranges of natural waters or were not detected.

No chemical parameters, except for TCE and 1,2-DCA in ground water sampled from well K8-01, have been detected at or above SAL, MCL, or STLC levels. TCE was detected in ground water samples from well K8-01 and cross-gradient well K8-03B; it was not detected in ground water samples from downgradient well K8-02B or cross-gradient well K8-04. This distribution strongly suggests that Pit 8 is not augmenting local ground water chemistry.

Assessment monitoring of water levels and ground water chemistry will continue on a quarterly basis through 1989. Additional soil and rock sampling will be done at the Building 801 Complex in an attempt to locate the ground water TCE source area. Results of this investigation will be reported in future Site 300 Environmental Investigation Quarterly Reports. At present, it appears that Pit 8 landfill materials have not affected vadose zone or saturated zone water chemistry.

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D. Carpenter provided geologic background to the project.

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T. Cederwall and R. Nations of LLNL provided data base management.

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J. Clarkson and J. Cupps of LLNL performed analyses of high-explosives compounds.

J. Rego of LLNL performed the tritium analyses.

K. Heyward of LLNL and M. Meamber of KMI prepared the graphics.

J. Witherell of LLNL/TID edited the manuscript.

D. Harms of LLNL and J. Tweed of Bendix provided editorial and clerical support.

K. Toney of Brown and Caldwell prepared geologic boring logs and assembled the preliminary geologic cross-section.

J. Chiu and R. Ferry of Weiss Associates conducted the hydraulic test.

E. Draney, J. Lane, and M. Gonzalez of LLNL provided coordination and operational support at Site 300.

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Appendix A

Well Geologic Logs

2

LOG: MONITORING WELL K8-1

Depth (feet)	Drilling & Sampling Log	% Sample Recovered	Blow Count / R.Q.D. **	Well Completion	Graphic Log
		58	17/16/12		
		75	14/22		
10	RUN 1	70	60/-		
	RUN 2	70	9/-		
	RUN 3	65	23/-		
20	RUN 4	84	33/12		
	RUN 5	60	22/-		
30	RUN 6	87	25/.75'		
	RUN 7	97	78/1.4'		
	RUN 8	66	7/-		
40	RUN 9	83	62/.6'		
	RUN 10	100	42/.65'		
50	RUN 11	100	40/.9'		
	RUN 12	96	72/1.7'		
	RUN 13	100	50/.6'		
60	RUN 14	44	18/.55'		
	RUN 15	20	0/.25'		
70					
80					
	RUN 16	44	13/.3'		
90	RUN 17	68	8/.4'		
	RUN 18	100	75/.8'		
100	RUN 11	98	29/-		
	RUN 20	100	15/.4'		
110	RUN 21	100	88/1.5'		
	RUN 22	90	78/1.1'		
120	RUN 23	96	70/.8'		
	RUN 24	102	63/.5'		
130	RUN 25	80	7/.3'		
	RUN 26	68	27/.9'		
140					
150					
160					
170	T.D. 169.8				

DISCONTINUITY DESCRIPTION

5.9: *Becomes very hard drilling.*
6.4-6.6: Recovered as small fragments. 6.6: Fracture, dip 30°, rough.
7.1: Fracture, dip 25°, rough. 7.2: Fracture, dip 15°, rough. 7.6: Fracture, dip 10°, rough + undulating. 7.9-8.1: Fracture, dip 40°, rough.
8.25-8.35: Fracture, dip 30°, rough + undulating. 8.5: Fracture, dip 20°, rough + undulating. 8.5-8.7: Recovered as small fragments.
9.0: Fracture, dip 10°, rough.
12.6-13.0: Recovered as fragments. 13.2-13.5: Curving fracture, dip 55°-85°. 13.8-14.3: Fracture, dip 70°-85°, rough surface.
14.7: Fracture, dip 45°. 14.7-15.0: Recovered as small fragments.
15.6: Fracture, dip 55°, rough. Top ends in core.
16.0-16.2: Fracture, dip 60°, rough. Fe stains on surface. 16.1-16.3: Fracture, dip 55°, rough. Trace of Fe stain + clay. Strike 90°+ from above fracture.
17.0-17.1: Fracture, dip 45°, rough. 17.1-17.4: Fracture, dip 80°, rough, splits core. Estimated core loss below 17.4 due to blocking & crushing.
18.8: Fracture, dip 10°, rough. Slight Fe stain.
19.0: Fracture, rough, dip 30°.
20.1-20.2: Two rough fractures, dip 50° + 60°. FeO + MnO coating.
21.7-22.3: 3 intersecting fractures, one near vertical curving to edges of core @ 22.3. Two dip 50° + 40°, FeO + MnO staining.
22.6-22.85: Fracture, dip 60°. 22.85-23.7: Core broken into several fragments along several fractures with 60° dip.
25.4-25.6: Rough fracture, dip 85°. 25.5-26.2: Rough undulating fracture dips 30°.
26.0-26.2: Partly healed fracture, dip 65°. Filled with FeO, rough.
26.45-28.0: Several near horizontal fractures, probably mechanical.
28.1-28.3: Rough undulating fracture dips 60°. 28.3-28.6: Rough fracture dips 90°.
29.75-29.8: Fracture, dip 65°, rough surface. *Top ends in core.*
30.3-31.1: Fracture, mostly healed, dip 70°-90°.
30.6-30.7: Fracture (?), dip 30°, rough. Trace of MnO stain. 30.9-31.1: Fracture, dip 55°, very rough. Scattered FeO stain.
31.4-32.0: Core very broken, intersecting joints with 75° dips. Trace of FeO stained voids.
32.1-33.3: Core very broken, intersecting near vertical joints noted. Probable core loss due to blocking.
34.0-34.1: Healed joint (?), dip 30°. 34.6-34.7: FeO stain.
35.0-35.4: 3 bedding planes, dips 12°, 10°, 12°. 35.3-35.6: Healed joint, dip 70°, FeO cement.
37.7: Bedding plane, dip 18°, trace of pyrite.
38.6: Fracture (?), dip 60°. On edge of core + ground. 38.8: & 38.9: Bedding planes, dip 10° + 40°.
40.3-40.4: Fracture, dip 45°, rough, some FeO staining.
41.4-41.3: Parallel healed joints, dip 50°. Top + bottom lost in washed away core. Healing material non-reactive with HCl.
42+: Fracture, dip 85°.
43.5-43.85: Fracture, healed. Dip 60°, filled with oxide stain. 43.7-44.6: Healed fracture as above, dip 75°.
46.45: Fracture (?), dip 8°.
47.05-47.5: Fracture, dip 70°, core broken along fracture. 47.3: Healed fracture, dip 55°, filled with yellow-brown oxide.
50.5: Core more broken up starting here. Abundant mechanical breaks. 50.4-50.9: Series of low-angle fractures, dip 20-23°.
51.6: Fracture, dip 25°, irregular surface. 51.7: Fracture, dip 60°. 51.9: Fracture, dip 30°, rough.
52.1: Fracture, dip 60°.
52.7: Fracture, dip 30°.
53.4-53.7: Fracture, dip 60°.
54.0: Fracture, dip 30°.
56.0-57.2: Core very broken up. Cannot determine location of natural fractures.
57.3: Fracture, dip 25°.
58.9: Fracture, dip 45°, rough surface.
61.1: Fracture dip 20°, rough. Clay coating. 61.7-62.6: Fracture, avg dip 85°. Sheared, slickensides plunge 5° on surface of break. Traces of moisture on surface when first cored.
63.1-63.2: Fracture with slickensides, dip 50°. 63.3-64.4: Zone of parallel fractures, avg dip 85° with slickensides as above.
65.0: Fracture (?), very irregular surface, avg dip 20°. 65.4: Fracture, very irregular, avg dip 15°. 66.9: Fracture, dip 40°.
66.85: Fracture, dip 65°.
67.6: Fracture, dip 50°. 67.9: Fracture, dip 60°, broken up a lot between o7.6-68.0.
68.3: Begin zone of subparallel healed fractures, avg dip 85-90°. 68.7: Beginning of 2 long subparallel open fractures, avg dip 85°. Core becomes progressively more broken along steep-dipping joints below 69.6.
94.7-96+: Core healed by near-vertical clay-filled fracture 1" thick; may be thinning downward. 96.1: Core broken to fragments along near-vertical joints.
99.7-101+: 2 joints, dip 75° + 80° break up core; smooth, possibly intersecting, sand covered.
101.0-102+: Fracture, dip 85°, smooth, sand covered.
102.0-102.3: Two (?) joints, dip 75°, rough.
104.8: Fracture (?), dip 30°. 104.85-105.05: Fracture, dip 70°, rough, sand coated.
105.0-105.2: Fracture, dip 70°.
NUMEROUS MECHANICAL BREAKS
109.0-109.1: Joints (?) chip core, dips 80°, 45°.
109.75-110.1: Fracture, dip 70°, rough.
110.1-110.45: Fracture, dip 75°, irregular. Intersects above; loose sand at intersection, local FeO stain. 110.95-111.25: Fracture, dip 60°.
111.6: Bedding, dip 10°. Parallel laminations in claystone also dip 10°. 111.75-112.2: Core broken on parallel 60° joints.
112.4-112.55: Fracture, dip 40°, sand coating + trace of clay. 112.85-114.1: Core split + broken on 80°-90° dipping joint, feathers out at 112.85+ terminates on cross joint at bottom. Rough, with scattered Fe stains.
114.0-114.6: Fracture, dip 60°, up to 1/8" sandy clay filling.
115.6+115.7: Parallel fractures with clay, wet; avg dip 15°. 115.7: Subhorizontal fracture, trace of Fe stain. 115.8: Intersecting joints dip 50°+60°.
116.5+116.6: Intersecting joints dip 40° + 30°, clay coated.
118.2-118.6: Core split + crushed on 60° + near 90° joints, sand coated. 118.9-119.2: Curving joints, dip 75° + 80°, perpendicular strikes.
119.3-119.6: Fractures, abundant clay; core crushed during drilling.
120.2: Bed (?), dip 10°, Mn stain + sand coating. 120.3-120.7: Healed joint, dip 70°, clay + FeO coating.
122.0-122.1: Bedding (?), dip 15° + 10°, smooth, trace of clay + Mn stain.
123.55: Bedding (?), dip 10° rough, trace of Mn + Fe stains. 123.7: Joint dip 18° rough. Strikes opposite to above.

GEOLOGIC DESCRIPTION

0.0-1.0 Fill: mixture of angular sandstone & claystone fragments & dark brown sandy silt soil.

1.0-5.9 QUATERNARY ALLUVIAL DEPOSITS

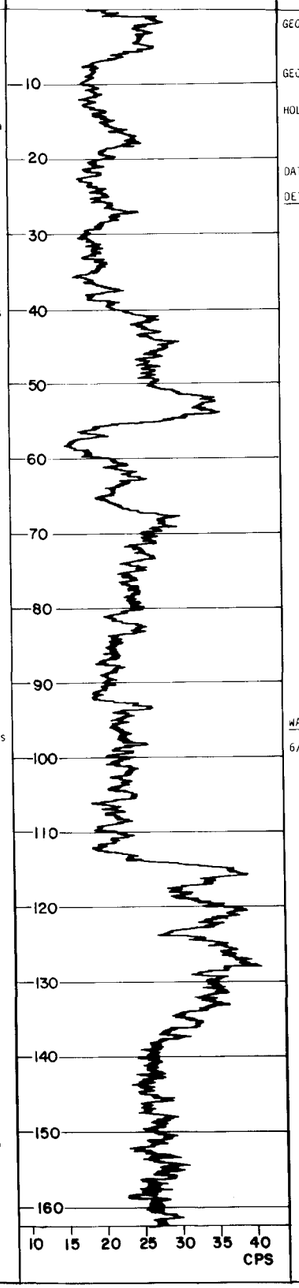
1.0-1.25: Sandy Clay: 70% moderately plastic fines, 30% fine to coarse weathered sand, dark brown, damp.
1.75-1.9: Clayey Sand, gravelly (SC): 35% fine-coarse weathered sand, 20% variable decomposed to moderately weathered angular to rounded gravel, 3/4" maximum diameter, 45% moderately plastic fines. Dark brown + damp; bits of roots.
5.0: Clayey Sand (SC): 45% fine-coarse weathered sand, 10% rounded fine gravel, 45% moderately plastic fines. At 5.4: Clayey gravel, sandy with weathered to decomposed gravel + sand, 25% moderately plastic fines. Dark brown with white blebs having vigorous HCl reaction.

5.9-169.8 TERTIARY SEDIMENTARY ROCKS:

5.9-6.1: Sandy Claystone: Scattered white stringers with slight HCl reaction. Crumbly with slight finger pressure. Light to dark brown, local Fe staining. 6.4-6.9: Light brown Sandy Siltstone. 6.9-8.7: Silty Sandstone, fine-medium, friable. White calcareous coating on fractures.
8.7-9.3: Sandy Claystone: Very fine sand, scattered white non-calcareous fracture fillings.
9.3-12.5: Silty Sandstone: Very friable, dries blue. Core loss zone. Fine to medium grained; grains visibly weathered.
12.5-14.5: Sandy Siltstone: Laminated to thinly-bedded with 1/4 - 1" claystone + very fine silty sandstone interbeds; carbonaceous streaks, grey-brown with yellow-brown Fe oxide after pyrite (?). At 13.8: Tight bedding plane, avg dip 15°, 0.2' of very fine silty sandstone, laminated.
14.5-21.5: Claystone: Highly weathered, chocolate brown, fragments crush with strong finger pressure. Scrapings work to silty clay with low-moderate plasticity. Develops shrinkage cracks on drying. Drilled sticky + blocky. Dries grey-brown.
14.3: Bedding dips 25°.
16.6: Bedding dips 15°.
CORE LOSS 19.8-20.6.
(Increasing sand content 20.7-21.5)
21.5-22.7: Sandy Claystone: Fine-medium sand content increases with depth. Chocolate brown, dries grey-brown. FeO + MnO stain on fracture surfaces; crushes with moderate to strong finger pressure.
22.7-26.2: Silty Sandstone: Friable; grey-brown, dries blue. Becoming very hard with depth.
24.6-24.8: HCl reaction. (CORE LOSS PROBABLY OCCURS 23+-24')
26.2-28.0: Claystone: Increasing sand content with depth. Chocolate brown, dries light brown.
28.0-29.3: Sandstone: Fine friable; grey-brown, dries blue. Crushes with strong finger pressure. Grades to sandy siltstone.
29.3-31.5: Sandy Siltstone: Sandy fraction grades finer + decreases with depth. Chocolate brown, dries light brown. Local sand concentrations FeO staining. Horizontal at 30.1. Becoming clayey with depth. Top bed dips 12°.
31.5-35.0: Silty Claystone: Brown, damp.
(32.5: Siliceous silty interbed, 1/4" dip 100.)
(33.3: Trace of moisture on fracture.)
35.0-36.5: Sandy Siltstone with fine Sandstone interbeds, grey-brown, damp.
36.5-43.3: Sandstone: Fine-medium grained, blue-grey with scattered FeO stains. Silty, slightly friable, locally grades very silty. Beds up to 3" thick.
At 37.3: Bedding dips 15°.
41.0-43.0: Increasingly friable; probable core loss zone; drilled very rapidly.
43.3-55.3: Sandstone: Coarse, friable. Moist brown dries blue-grey. Becoming less friable with depth.
53.1-53.3: Interbed of chocolate brown, fine silty sand.
54.6-54.75: Interbed of reddish-orange fine hard sandstone with small voids.
55.3-67.0: Claystone: Light brown grading darker & sandier with depth. MnO + FeO stain in broken zone.
(58.0-58.3: Clay interbed-slightly sandy, moist. Broken up in removal from core barrel.)
(60.9-61.2: Grey material, reacts with HCl.)
(65: Some oxide staining in core.)
67.0-73.3: Dark brown, coarse Sandstone: Hard, becoming more friable with depth. Moist.
-Scattered pebbles below 68.5. Driller notes hole "tightening" at 69'.
-CORE LOSS below 70.5+.
73.3-85: Coarse Sandstone with rounded pebbles up to 1.5". WET. Dark brown with FeO stains + pebble coatings. Dries dark grey-blue.
Driller reports increasing pebbles with depth. Locally carbonate cemented.
CORE LOSS IN RUN
@ 80: Sandstone with scattered mudstone pebbles. Dark brown, moist, dries bluish-grey.
@ 82: As above; increasing sand, rapid drilling.
85-94.5: Sandstone: Mostly fine to medium, a few small pebbles + possible thin claystone interbeds. Drilled very rapidly, possibly uncemented. Cuttings are moist but no presence of free water.
@ 92: A few sandy siltstone chips; dominantly fine-medium sand cuttings, dark brown gradually grading yellow-brown.
@ 94: Scattered pebbles up to 1/4". Dominantly fine-medium dark brown sand.
94.5-95.5: Sandstone: Fine-medium purplish-brown. Scattered interbeds of coarse blue sandstone, friable with difficulty. Beds dip 15°.
95.5-111.6: Fine Silty Sandstone: Silt content increases with depth. Purplish-brown, locally blue. Friable with difficulty.
CORE LOSS DISTRIBUTED: most below 96' (?)
-Material moist from 99.5-104.5.
101-101.3: Interval contains dark brown claystone mixed with sandstone, nodules and/or disrupted lenses. Some loose fine-medium sand recovered in run.
@ 102: Sandstone grades locally very silty, but chiefly is as above. WET at top + bottom of run.
109.5-109.8: Sandstone grades fine to medium grained.
111.6-128.55: Claystone with scattered Sandy Siltstone interbeds. Hard but can be scratched with fingernail. Dark brown, locally laminated.
-Highly calcareous along fractures from 111.6-112.2. Traces of water on fractures in run.
(112.6-113.7: Sandy Siltstone, brown with yellow laminations. Bottom contact tight, dips 20°.)
(114.7: Abundant Mn oxide; parallel 30° dipping bedding plane (?).)
CORE LOCALLY WET: NO FREE WATER IN HOLE
(118.2-119.0: Fine grained, very silty sandstone. Friable, dark purplish brown. Sharp bottom contact dips 5° or less + irregular.)
Claystone: locally sandy with scattered Fe oxide stains.
(124.95: 1/2" diameter limonite nodules - after pyrite (?).)
(125.0-126.2: Claystone grades bluish grey with scattered brown sandy zones + weathered pyrite nodules.)
(126.2-126.4 & 126.6-126.9: Sandy Siltstone, fine grained, dark brown; beds dip 80.

128.55-134.0: Sandstone: Silty, fine-medium grained, friable with difficulty. Dark brown with orange Fe stains. Top contact sharp, dips 20°.
130.0-131.2: Claystone, brown, dip 15°.
134.0-134.7: Sandy Siltstone: Hard, sand very fine grained. Scratches with fingernail, purplish brown.
134.7-146.0: Sandstone: Dominantly fine to medium-grained + fairly clean. Slight visible porosity; moist, no free water. Grains appear weathered. Friable with moderate pressure. Dark purplish brown, dries grey-blue.
- Below 141', Sandstone has scattered coarse grains + gravels 1/8" maximum size.
- Below 144.5', Sandstone grades to dominantly medium-coarse grained.
- 145.5: 1.5" diameter pebble. 145.8: Bedding plane with Fe staining, dip 10°.
146.0-147.3: Conglomerate: pebbles to 2". Slight surface weathering + on internal fractures. Fine-coarse friable sandstone matrix. Mostly recovered loose pebbles. 147.3-148: Sandstone as at 144.5-146.0. Some loss.

NATURAL GAMMA



NOTES

GEOLOGIC LOGGING: D. Carpenter, D. Peifer, P. Griffith
GEOPHYSICAL LOGGING: G. Metzger, R. Neurath
HOLE LOCATION: West of Pit 8
COORDINATES N: 426,653.93, E: 1,702,057.62
ELEVATION T.O.C. 1098.63 I.P. 1098.07
DATES DRILLED: 6/15 - 22/82

DETAILED NOTES:

* KEY, DRILLING + SAMPLING LOG:
6" hollow stem auger
sample interval; taken with 3" O.D. drive sampler driven by 140 lb. weight falling 30"
Rotary drilled, 6 1/4" tricone bit
RUN 1 — HQ core run

** KEY, BLOW COUNT/RQD LOG:
17/6/2 — Blows per 6 inch interval
60/- — Rock Quality Designation (%) / Max. core length (ft. and tenths)

KEY, WELL COMPLETION:
Fill; caved material, cuttings
Cement grout
Bentonite
#3 Sand
#0 Sand
3 1/2" Potable PVC casing
Slotted section (0.014" slots)

6/22/82: Hole cleaned to 169.8' T.D. with 6 1/4" tricone, & jetted.

WATER LEVEL DATA:

6/22/82: @ 8:00 a.m., water @ 140'+

2

LOG: MONITORING WELL K8-1 (continued)

						DISCONTINUITY DESCRIPTION	GEOLOGIC DESCRIPTION		
						124.6: Bedding (?), dip 10°, sand + clay coatings, smooth. 124.7: Joint, dip 30°, rough, clay + sand coating. 124.8: Bedding (?) dip 10°, clay coated. 125.6: Bedding (?), dip 10°, fine sand, smooth. 126.3: Joint (?), dip 5°, trace of clay. 126.9: Bedding (?), dip 15°. Scattered Fe + Mn oxide stains. 127.3-127.7: Healed joint, MnO stain, dip 85°. 128.7-130.5: Intersecting joints dip 70° + near 90°. Core washed + broken, some loss. Dip at 130.4 = 85°, rough. 130.4: Bedding (?), dip 5°. Mn stain. 133.8: Bedding (?) dip 10°. Some sand + clay coating. 134.0: Bedding, dip 7°. Fe stains after pyrite. 134.5: Joint, dip 30°, sand coating, rough pitted surface. 134.85: Joint, dip 25°, clay + sand coating. 135.5: Bedding (?), dip 5°, sand + clay coating. 135.7: Bedding (?), dip 8°, as above. 138.6 + 139.1: 2 Bedding planes, dip 10°. 139.4: Joint, dip 65°. 139.7: Joint, dip 25°, stepped. 141.1-143.3: Core loss? Recovered as fragments + 1" core. Several visible joints dip 75°, 65°, 30°, 25° + 25°. Loose sand on surfaces. 144.0: Bedding, dip 10°. 144.1: Joint, dip 35°, abundant sand coating. 145.35: Joint dip 15°, rough. 145.5: Joint dip 30°, sand coated. 145.6: 2 intersecting joints dip 45° + 30°. 145.9: Joint, avg dip 35°, sand coated. 146.0: Bedding (?), dip 15°. 147.5-148: Joint, dip 75° rough, sand coated. 147.8: Bedding (?), dip 10°, rough. 149.5-169.8: Not cored.	147.3-148.0: Sandstone: As 144.5-146.0. 148.0-169.8: Drill action indicates Conglomerate with Sandstone interbeds. Fine to coarse sand + pebble chip cuttings. Dark brown. @ 155': cuttings moist. @ 165: Continued rough drillling in conglomerate. Dark grey sandstone matrix. Some sandstone lenses indicated by periods of smoother drilling.		

2

LOG: MONITORING WELL K8-2

Depth (feet) | Drilling & Sampling Logs | % Sample Recovered | Blow Count ** | R.Q.D. | Well Completion | Graphic Log

DISCONTINUITY DESCRIPTION

10.7-10.75 Caliche-filled fracture, dips about 60°, filling about 1/16" thick, some crystal faces noted.

GEOLOGIC DESCRIPTION

0.0-10.5* QUATERNARY ALLUVIAL DEPOSITS

0.0-4.0: Sandy Clay (CL): Moderately plastic, dry dark brown, 20% fine-coarse sand, scattered coarse, subrounded - well rounded, slightly weathered gravel.
4.0-7.9: No recovery.
7.9-9.5: Hard drilling, cuttings indicate abundant caliche nodules & stringers, vigorous reaction w/HCl, slight iron oxide staining on sand grains.
9.5-9.8: Gravelly Sandy Clay (CL): 65% subrounded to angular, moderately weathered gravel, iron oxide & manganese oxides on clasts, 40% fine to coarse sand, abundant caliche as coating nodules & stringers, chocolate brown, dry - damp.
9.8-9.5: No recovery 6.5-7.5: Sandy clay, cuttings, brown, damp.
7.5-9.5: Sandstone, blue, cuttings, hard drilling.
9.5-10.0: Clayey Sand, Brown, cuttings.
10.0-10.7: Sandy Clay (CL): 10% fine - subrounded gravel, 40% moderately plastic fines, 30% fine-coarse sand, vigorous reaction w/HCl, brown, dry.
10.7-10.5+: Sandy Clay as above.

10.5+-?: *TERTIARY SEDIMENTARY ROCK.

10.5+-12.0: Silty Sandstone: Nearly clean with clay interbeds, crushes with moderate to strong finger pressure, local Fe-oxide staining, brown dries blue, damp.
12.0-14.0: Abundant Sandstone, brown, pebble chips in cuttings, sandstone grading to conglomerate.
14.0-16.0: Sandstone, some cemented black fragments.
16.0-20.0: Sandy Siltstone and Claystone, brown.
20.0-25.0: Sandy Siltstone and very fine Silty Sandstone, yellow brown.
25.0-30.0: Yellow brown, weathered Claystone.
30.0-31.0: Grades to brown Claystone.
31.0-35.0: Sandstone, fine grained, silty, dark brown, appears highly weathered.
35.0-46.0: Continuing as above, scattered Claystone fragments below 37', mostly fine - medium weathered Sandstone, very rapid drilling.
46.0-50.0: Slightly HARDER at about 46', predominantly brown Claystone.
50.0-52.0: Brown Claystone.
52.0-55.0: Brown Sandy Claystone.
55.0-61.0: Brown Claystone and Siltstone, fragments break with moderate finger pressure.
61.0-64.0: Claystone and Siltstone.
64.0-70.0: Fine Sandstone, very rapid drilling.
70.0-80.0: Fine to medium Sandstone, brown to dark brown, damp, gradational with above.
80.0-82.0: Rough drilling, coarse grained Sandstone w/scattered Pebbles.
82.0-85.0: Coarse Sandstone w/Pebbles, dark brown, cuttings damp.
85.0-89.0: Sandy Siltstone & very Silty Sandstone.
89.0-90.0: Grading to dark brown Claystone, slower drilling.
90.0-92.0: Brown Claystone.
92.0-93.0: Brown Claystone, harder, purplish brown siliceous chips.
93.0-97.0: Claystone.
97.0-98.0: Sandy Siltstone and Sandstone, fine to medium grained, sand increasing.
98.0-102.0: Fine to medium grained, dark brown Sand.
102.0-103.0: Sandstone, predominantly fine to medium grained, trace of coarse grains, clean appearing, dark yellow-brown.
103.0-104.0: 1'+ brown Claystone bed.
104.0-108.0: Medium Sandstone, some fine and coarse grains, purplish brown, Claystone cuttings.
108.0-110.0: Sandstone, mostly fine to medium grained.
110.0-115.0: Predominantly Sandstone, medium grained, some coarse grains, dark gray-blue.
115.0-118.0: Sandstone, silty, dark brown.
118.0-122.0: Sandstone, fine to medium grained, clean appearance, brown.
122.0-125.5: Predominantly Sandstone, trace of volcanic pebble chips and dark brown Claystone.
125.5-128.0: Conglomerate, chattery drilling.
128.0-131.0: Sandstone, silty, with pebbles, moist, dark brown.
131.0-139.0: Sand, fine to medium grained, moist, dark brown dries blue, chattery drilling at 135'+.
139.0-142.0: Sandstone, fine to medium grained, dark brown, moist.
142.0-144.0: Sand, as above, siliceous chips. Claystone beginning to appear.
144.0-146.0: Claystone cuttings with sand.
146.0-153.0: Claystone with fine sand.

CALIPER | RESISTIVITY | NATURAL GAMMA | S.P. | γ-γ DENSITY LOG

NOTES

GEOLOGIC LOGGING: D. Carpenter
D. Peifer
P. Griffith

GEOPHYSICAL LOGGING: G. Metzger

HOLE LOCATION: E of Pit 8
Coordinates: N 426,514.76, E 1,702,703.75
Elevation: T.O.C 1127.54, I.P. 1125.46

DATES DRILLED: 6/22/82 - 6/27/82

DETAILED NOTES:

*KEY: DRILLING & SAMPLING LOG.

6" Hollow Stem Auger

Sample Interval: Taken with 3" O.D. drive sampler driven by 140 lb. weight falling 30"

Rotary drilled, 6 3/4" Fishtail bit, air, water injection below 150' depth

Run 1 — HQ wireline core run

** KEY: BLOW COUNT/RQD LOG

11/32/63 # Blows per 6" drive

41/065 — Rock Quality Designation % / Max. Core Length (ft. & tenths)

KEY: WELL COMPLETION

Cement Grout
Bentonite
#3 Sand
#0 Sand

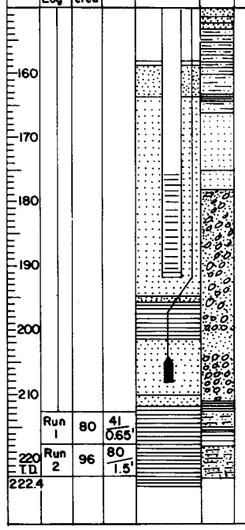
2" coupled Aluminum pipe; Neutron Access Tube, PVC cap on bottom

3 1/2" Potable PVC Casing
Slotted Section (0.014" slots)

Barcad/Transducer Assembly:
Barcad sampler, Transducer (#042) and sand pack in filter "sock".

2

LOG: MONITORING WELL K8-2 (continued)



DISCONTINUITY DESCRIPTION

213.0: Fracture, dips 45°±, smooth surface.
213.2: Fracture, dips 30°, rough surface.
213.2-214.0: Broken zone, core broken into 0.5" chips.
214.1-214.2: Two fractures, intersecting dips 55° & 60°, both w/smooth surfaces.
214.6-215.3: Broken zone along laminations w/leaf fossils on surfaces.
216.4-217.85: Set of slickensided fractures, dip 60°, slickensides plunge down on fracture surfaces.
218.1-218.3: Healed fracture filled with dark organics and pyrite, average dip 30°.
218.6: Joint dips 45°, irregular surface.
218.5-219.1: Core broken on bedding, average dip 15°.
219.8: Joint, dip 25°, rough surface.
221.6-221.7: Healed fracture organic material, dips 30°, bedding plane above, dips 20°.

GEOLOGIC DESCRIPTION

153.0-160.0: Sandy Siltstone and Claystone, interbedded.

160.0-163.0: Sandy Siltstone, cuttings break with moderate finger pressure, some fine Sandstone.

163.0-164.0: Shale, dark gray.
164.0-166.0: Fine Sandy Siltstone with some organics, fragments break with moderate finger pressure.
166.0-175.0: Sandstone, silty, fine, dark gray brown, sandstone becoming coarser 171'±, very rapid drilling.

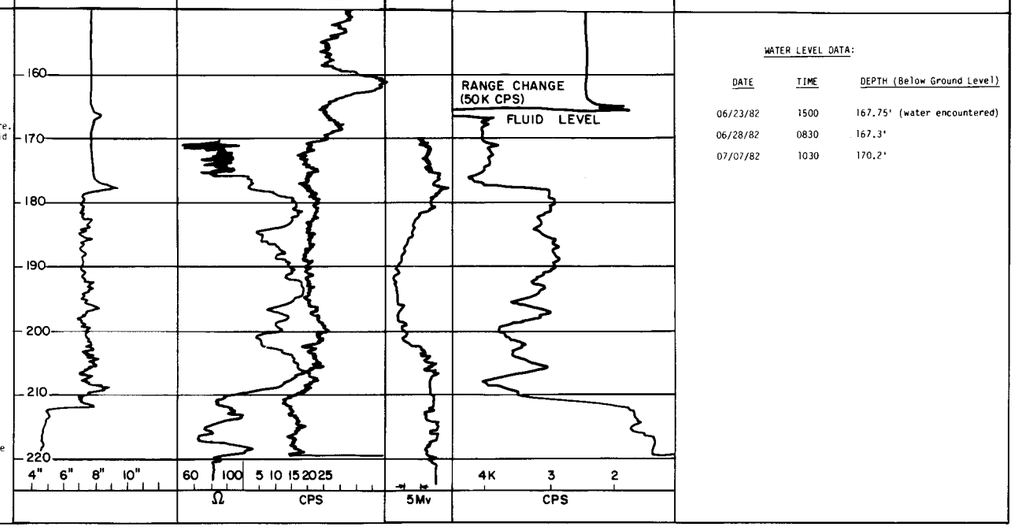
175.0-178.0: Coarse Sand in cuttings.

178.0-197.0: Conglomerate, pebbles fresh to slightly weathered, 1 3/4" max.
Sandstone matrix dark gray brown, fine to coarse grained, drilling rough and slow.

197.0-197.5: Sand bed.
197.5-198.0: Conglomerate.
198.0-198.5: Sand interbed.
198.5-199.0: Clay, sandy, yellow-brown.
199.0-202.0: Conglomerate.
200-202: Sand interbeds.
202.0-203.5: Sand bed.
203.5-209.5: Conglomerate, becoming coarser at 207'±.

209.5-211.0: Sandstone, fine to medium grained, light brown, rapid drilling rate.

211.0-212.7: Shale, gray, very smooth drill action.
212.7-212.9: Sandstone, fine silty, dark gray, wet.
212.9-213.2: Siltstone, fine Sandy, gray, leaf fossil.
213.2-214.0: Sandstone, fine, dark gray, wet.
214.0-214.5: Siltstone, sandy, fine, gray, grading down to less sand.
214.5-215.3: Shale, gray, thin-bedded with leaf fossils and coal stringers, mottled, laminations dip 15°.
215.5-216.1: Claystone, silty, light gray, mottled with thin stringers of organics and voids.
216.1-217.9: Claystone, gray, beds dip 25°, marcasite (?) nodule 3/4" dia.
217.9-220.5: Sandstone, fine grained, Silty, dark gray, friable with difficulty, wet, pyrite lense present.
220.5-222.7: Sandy Siltstone, gray with 1" layer of fine silty sandstone, average dip 25°±, top contact irregular with numerous rip-up clasts, pyrite nodule present at 221.1'.



NOTES

WATER LEVEL DATA:

DATE	TIME	DEPTH (Below Ground Level)
06/23/82	1500	167.75' (water encountered)
06/28/82	0830	167.3'
07/07/82	1030	170.2'

2

LOG: MONITORING WELL K8-3

Depth (feet)	Drilling & Sampling Log*	% Sample Recovered	Blow Count R.Q.D. **	Well Completion	Graphic Log
0					
10	①	31	11/19/25		
	①	98	86		
	①		100/0.6"		
20	①	80	100		
			3.75'		
30					
40					
50					
60					
70					
80					
90					
100					
110					
120					
130					
140					
150	②				
160					
170					
180	Run 1	92	16/0.4'		
	Run 2	80	0/0.3'		
T.D. 187.75'	Run 3	98	0/0.2'		

DISCONTINUITY DESCRIPTION

172.7: Fracture, dips 25° average, irregular surface.
172.4-173.0: Fracture, dips 70°, irregular.
173.0-173.3: Fracture, dips 80°, smooth surface with trace of sand.
173.3-173.4, 174-4.173.7: Joints, avg. dip 75°.
173.4-178.5: Fracture dips between 70-90°, splits core to end, irregular surface with trace of sand and clay; zone of fracturing; several crossing fractures noted with dips 25-30°.
178.9-179.1: Joint intersection, dips 80° and 35°, abundant crushed fragments and clay.
181.4: Two joints with 50° angle to each other, dip 90°; 181.6: Joint, dips 45°.
182.0-182.6: Broken zone.
182.9-183.0: Vertical fracture, irregular surface, begins and ends in core.
183.15-183.45: Fracture, curves in and out of core, average dip vertical, slightly irregular surface.
183.8-184.0: Fracture, dip 90°, smooth surface.
184.2: Fracture, dip 15°.
184.2-184.9: Fracture, dips 90°, smooth.
184.9-185.1: Begins in core at 184.9, dips 70°, smooth surface.
185.7: Vertical fracture, irregular surface, traced to 186.0, possibly ends as healed fracture at bottom of run, some vertical slickensides.

GEOLOGIC DESCRIPTION

0-3.0± FILL
0.0-2.3± Clayey Sand (SC): About 65% fine to medium sand and about 35% moderately plastic fines, dark brown.
2.3±-3.0± Tar and Sandstone clasts with piece of electrical cable.
3.0± - 187.6 TERTIARY SEDIMENTARY ROCKS
3.0-14.5: Sandstone, silty, clayey, fine to medium grained, friable, crushes with moderate to strong finger pressure, gray brown with stringers of caliche, occasional highly weathered 1/4" pebble.
10.0-10.2± Claystone: Localized fine to medium sand. Crushes with moderate to strong finger pressure, brown, damp.
14.5-23.0: Siltstone, fine grained, brown, slightly damp to moist.
23.0-25.0: Siltstone, slightly coarser, slightly darker, moist.
25.0-35.0: Siltstone, brown, slightly moist, some clay chips.
35.0-50.0: Siltstone, slightly coarser, dark gray-brown.
50.0-53.0: Sand, fine grained, dark brown, somewhat pyritic.
53.0-54.5: As above, harder drilling, some andesite chips.
54.5-55.0: Light brown shale.
55.0-65.0: Sandstone, silty, fine grained, brown.
65.0-70.0: Clayey Siltstone, brown, interbedded with dark brown to black coarse Sandstone.
70.0-80.0: Sandstone, andesitic, dark brown, slightly moist to dry (clumps together when compressed).
80.0-85.0: Sandstone, medium to coarse grained, brown, dry, piece of tuff at 82'.
85.0-90.0: Sandstone, medium grained, dark brown, andesitic grains.
90.0-94.5: Sandstone, fine to medium grained, dark brown, slightly moist.
94.5-100.0: Sandstone, fine grained, dark brown, dries to blue gray.
100.0-109.0: Sandstone, as above, medium to fine grained, slightly moist.
109.0-114.0: Sandstone, finer grained, dark brown, slightly cohesive and slightly moist.
114.0-117.0: Sandstone, finer grained than above, moist, slightly more cohesive, dark brown.
117.0-120.0: Siltstone, clayey, light brown, slightly moist.
120.0-123.0: Siltstone, light brown-gray, moist.
123.0-125.0: Siltstone, dark, moderately cohesive.
125.0-128.0: Silty Claystone, reddish-brown, forms chips, damp, not very cohesive.
128.0-129.0: Silty Claystone, light brown.
129.0-133.5: Siltstone, dark gray, moist, harder drilling.
133.5-134.5: Siltstone to fine Sandstone, dark gray, moist.
134.5-135.0: Sandstone, fine, dark gray, moist, cohesive, dries blue.
135.0-139.0: Sandstone and Siltstone, fine grained, blue.
139.0-145.0: Sandstone and Siltstone, fine grained, dark gray, not very cohesive, damp.
145.0-148.0: Siltstone, dark gray, forms hard chips, damp.
148.0-157.0: Conglomerate, rounded pebbles in fine to coarse sand matrix.
157.0-158.0: Sand, fine to coarse grained, purplish brown, some pebbles, slow chattery drilling.
158.0-162.0: Conglomerate, sandstone matrix, very chattery drilling, pebbles to 2" in diameter.
162.0-170.0: Conglomerate, matrix- gray brown sand, rough drilling, hard black basalt(?) pebbles at 162'.
170.0-170.5: Silty Shale, hard, black.
170.5-172.5: Shale, dark gray, slightly chattery drilling.
172.5-172.6: Shale, gray, fine trace of medium grained gray sand and sandstone interbeds.
172.6-179.3: Claystone, dark gray, hard, highly fractured. 174.9-175.6: Sandstone interbed, fine to very fine grained, gray beds dip 10°, claystone has traces of scattered pyrite and occasional black carbonaceous laminations, dip 15°.
179.3-181.3: Sand, silty, fine grained, dark gray, breaks with light finger pressure, loose, assumed core loss zone, contains voids up to 1/2" in diameter.
181.3-186.5: Sandy Siltstone, fine grained, dark gray, poorly lithified, fragments break with light to medium finger pressure, grades to very fine grained silty Sand, sandy beds average 1-3" thick. 184.6: Bedding plane dips 8°.
186.5-187.6: Clay Shale, laminated thin bedded purplish brown to gray, beds dip 5-10°, fissile, abundant leaf fossils on bedding plane. Scattered medium tuffaceous grains.

CALIPER

2" 10 30

RESISTIVITY

Ω 100

NATURAL GAMMA

0 CPS 50

S. P.

FLUID LEVEL
0 Mv 50

γ-γ DENSITY

FLUID LEVEL
RANGE CHANGE
50 K C.P.S. F. S.
5 5K CPS 0

NOTES

Geologic Logging: D. Peifer
J. Sweeney
D. Carpenter
P. Griffin

Geophysical Logging: G. Metzger

Hole Location: On the Berm (Bldg. 801)
Coordinates: N: 426,494.15
E: 1,701,980.60
Elevation: T.O.C. 1097.01
L.P. 1096.74

Dates Drilled: 06/30/82 - 07/01/82

Detailed Notes:

* Key: Drilling & Sampling Log:

8" Hollow Stem auger

(1) Sample interval, 3" O.D. driver sampler driven by 140 lb weight falling 30"

Rotary Drilled:
① a 3/4" Fishtail bit
② 6 1/4" Carbide bit

Run 1 HQ wireline core run

** Key: Blow Count/RQD Log:

11/19/25 #blows per 6" interval
100/3.75" #blows/total length driven
16/0.4' Rock Quality Designation & Max. core length (ft. & tenths)

Key: Well Completion:

Cement grout
Bentonite
#3 Sand
#0 Sand
3 1/2" Potable PVC casing
Slotted section (0.014" slots)

DARCAD ASSEMBLY:
darcad sampler, transducer (#040), and sand pack in filter sock.

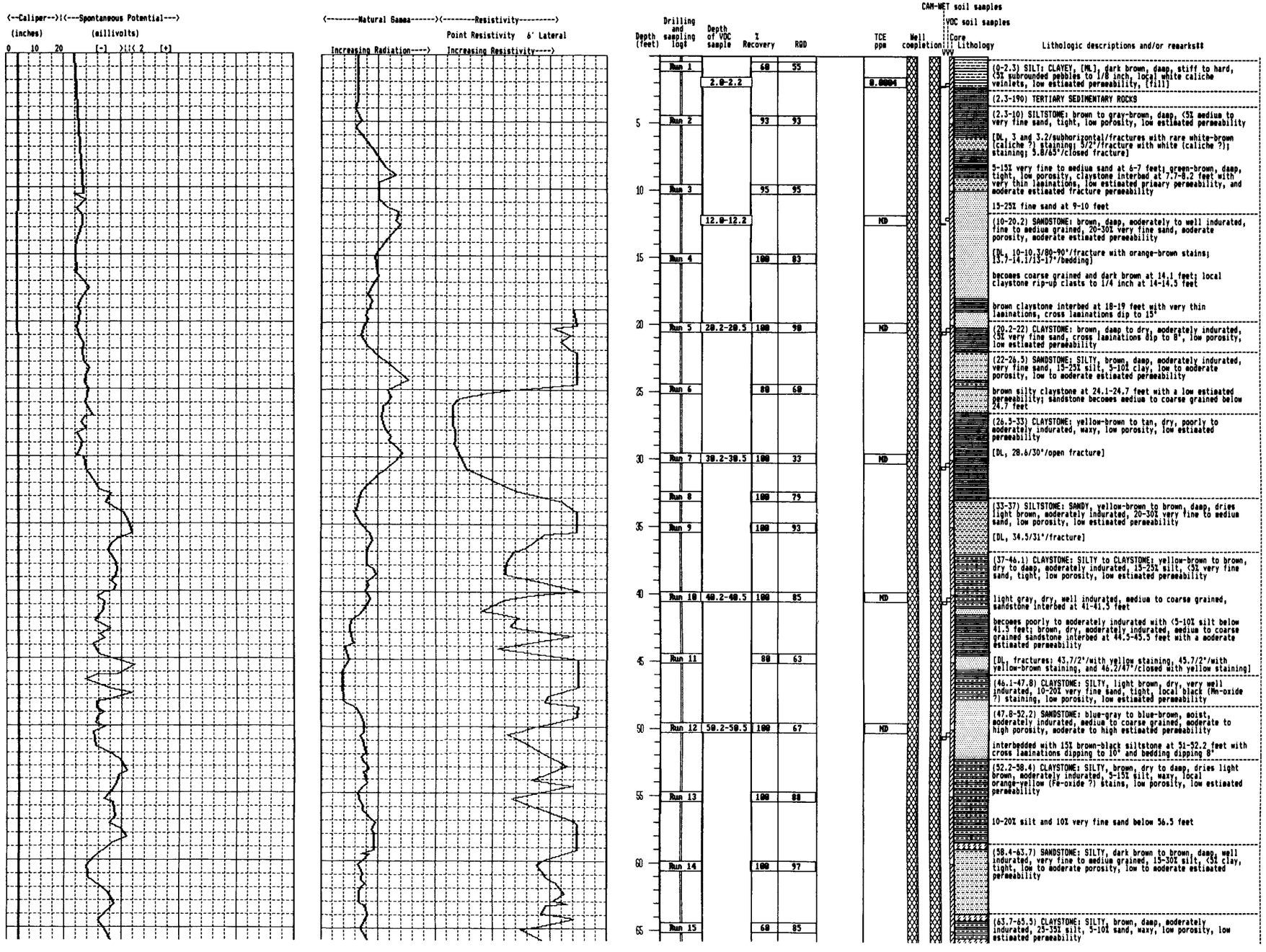
07/02/82: Lost stainless steel rod at about 150'.

Water Level Data

Date	Time	Depth to Water Level (From Ground Level)
7/1/82		Water encountered at 151' while drilling.
7/2/82	10:10	137.9'

2

LOG: MONITOR WELL K8-04



Monitor Well K8-04

Geologic Logging:
M. Wade, Weiss Associates, Oakland, CA

Well Location:
Northeast of Pit 8, Site 300

Coordinates:
N: 426,754.2
E: 1,702,633.6

Elevation: Shiner 1130.14 feet
Top of Protective Casing (TOSP) 1133.15 feet

Geophysical Logging:
Geo-Hydro Data Inc., Tehachapi, CA

Drilling:
D. Wagster, P. C. Exploration Inc.,
Roseville, CA

Dates Drilled: 7/27 to 8/11/88

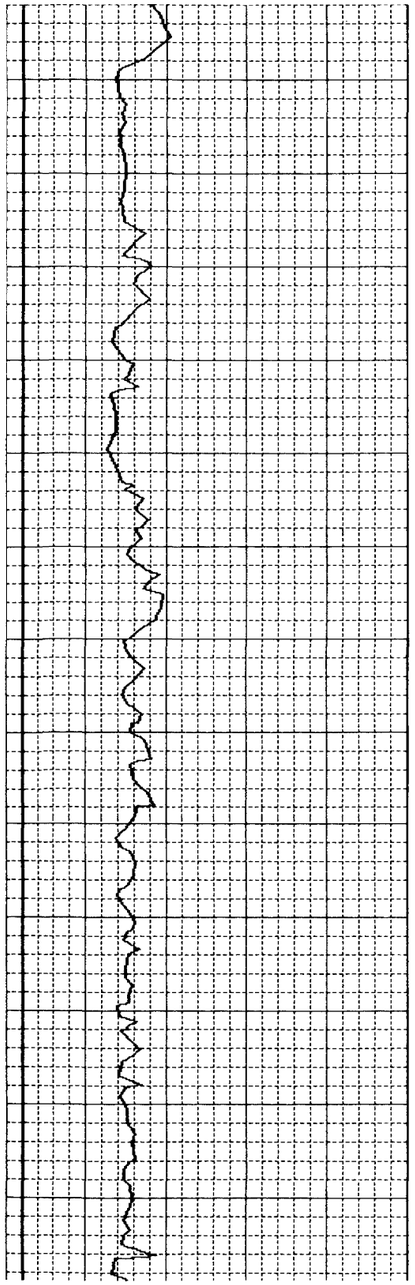
Drilling Method:
4 1/4-inch air-mist rotary, continuous wireline coring, 0-190 feet
9-inch tri-cone rotary, ream, 0-190 feet
install 4 1/2-inch PVC casing with 0.015-inch slots at 183-188 feet

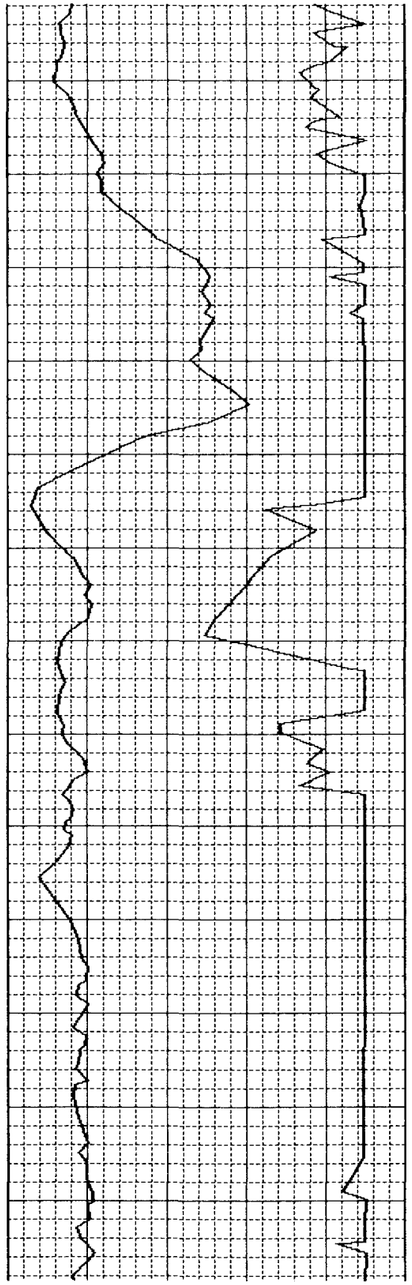
Key: Drilling and Sampling Log

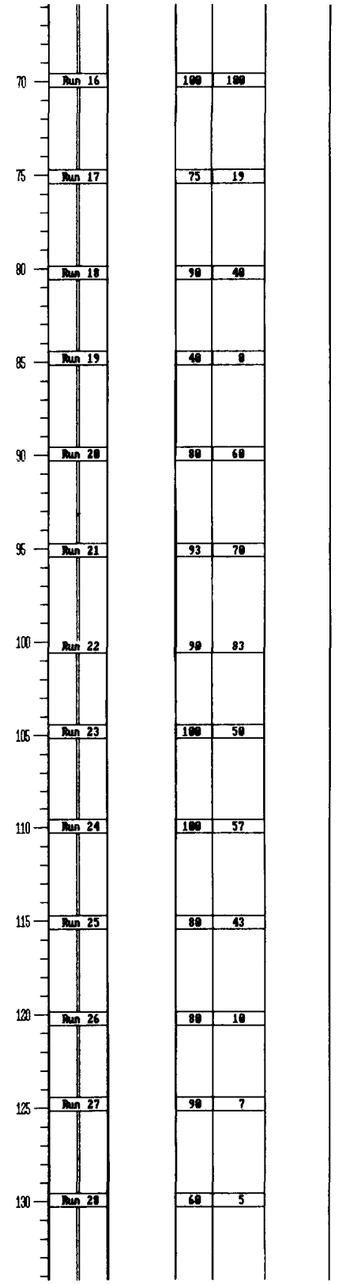
Run 1 Core obtained using Christensen HQ (92 mm) Wireline Coring System. Analytical samples encased in stainless steel sleeves sealed with aluminum foil and inert duct tape.

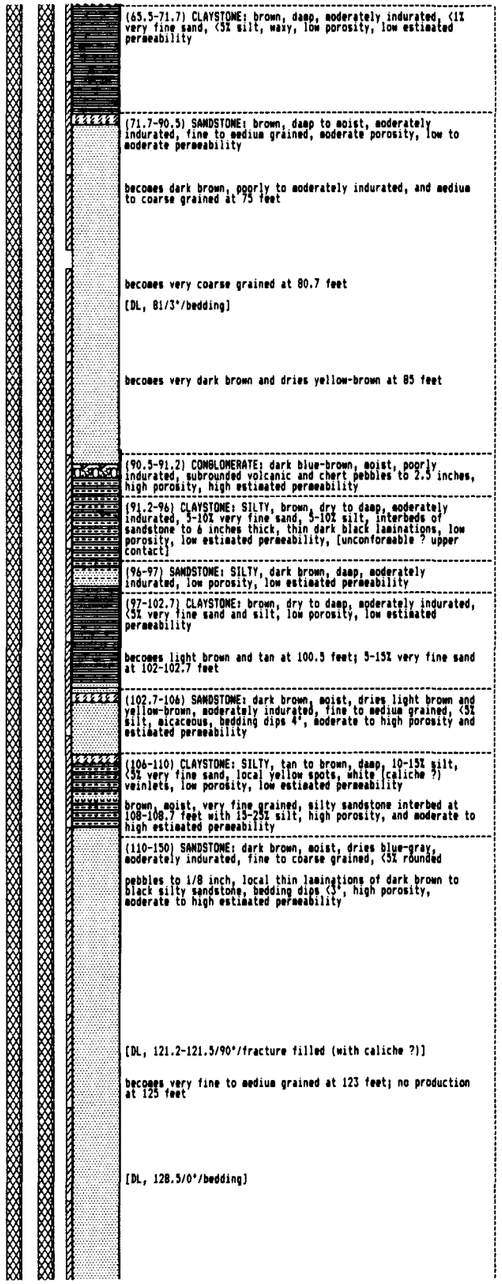
2

LOG: MONITOR WELL K8-04 (CONTINUED)









(65.5-71.7) CLAYSTONE: brown, damp, moderately indurated, <1% very fine sand, <5% silt, waxy, low porosity, low estimated permeability

(71.7-90.5) SANDSTONE: brown, damp to moist, moderately indurated, fine to medium grained, moderate porosity, low to moderate permeability

becomes dark brown, poorly to moderately indurated, and medium to coarse grained at 75 feet

becomes very coarse grained at 80.7 feet

[DL, 81/3°/bedding]

becomes very dark brown and dries yellow-brown at 85 feet

(90.5-91.2) CONGLOMERATE: dark blue-brown, moist, poorly indurated, subrounded volcanic and chert pebbles to 2.5 inches, high porosity, high estimated permeability

(91.2-96) CLAYSTONE: SILTY, brown, dry to damp, moderately indurated, 5-10% very fine sand, 5-10% silt, interbeds of sandstone to 6 inches thick, thin dark black laminations, low porosity, low estimated permeability, [unconformable ? upper contact]

(96-97) SANDSTONE: SILTY, dark brown, damp, moderately indurated, low porosity, low estimated permeability

(97-102.7) CLAYSTONE: brown, dry to damp, moderately indurated, <5% very fine sand and silt, low porosity, low estimated permeability

becomes light brown and tan at 100.5 feet; 5-15% very fine sand at 102-102.7 feet

(102.7-106) SANDSTONE: dark brown, moist, dries light brown and yellow-brown, moderately indurated, fine to medium grained, <5% silt, micaceous, bedding dips 4°, moderate to high porosity and estimated permeability

(104-110) CLAYSTONE: SILTY, tan to brown, damp, 10-15% silt, <5% very fine sand, local yellow spots, white [caliche ?] veinlets, low porosity, low estimated permeability

brown, moist, very fine grained, silty sandstone interbed at 108-108.7 feet with 15-25% silt; high porosity, and moderate to high estimated permeability

(110-150) SANDSTONE: dark brown, moist, dries blue-gray, moderately indurated, fine to coarse grained, <5% rounded

pebbles to 1/8 inch, local thin laminations of dark brown to black silty sandstone, bedding dips <1°, high porosity, moderate to high estimated permeability

[DL, 121.2-121.5/90°/fracture filled (with caliche ?)]

becomes very fine to medium grained at 123 feet; no production at 125 feet

[DL, 128.5/0°/bedding]

Analytical Notes:

ND None detected

The following VOC constituents (excluding chloroform which is a common laboratory artifact) were identifed, by EPA Method 8010, at or above a detection limit of 0.0002 ppm:

2 feet:	0.0003 ppm Trichloroflouromethane
	0.0010 ppm Benzene
	0.0019 ppm Ethylbenzene
	0.0017 ppm Toluene
	0.0016 ppm Xylene isomers
12 feet:	0.0003 ppm Toluene
	0.0009 ppm Xylene isomers
50.2 feet:	0.0006 ppm Toluene
	0.0013 ppm Xylene isomers

Soil samples from 2.2, 12.4, 20.5, 30.5 40.7 and 50.5 feet were analyzed for 17 soluble metals by the CAM-WET. No metals were identified above the STLC in these samples.

‡‡ Where given, percentages of sands, gravels, and fines represent field visual (e.g., volumetric) estimates.

Discontinuity Log,
Notation of Bedding and Fractures:
[DL, depth(s)/dip(s)°/comment(s)]

Ground Water:

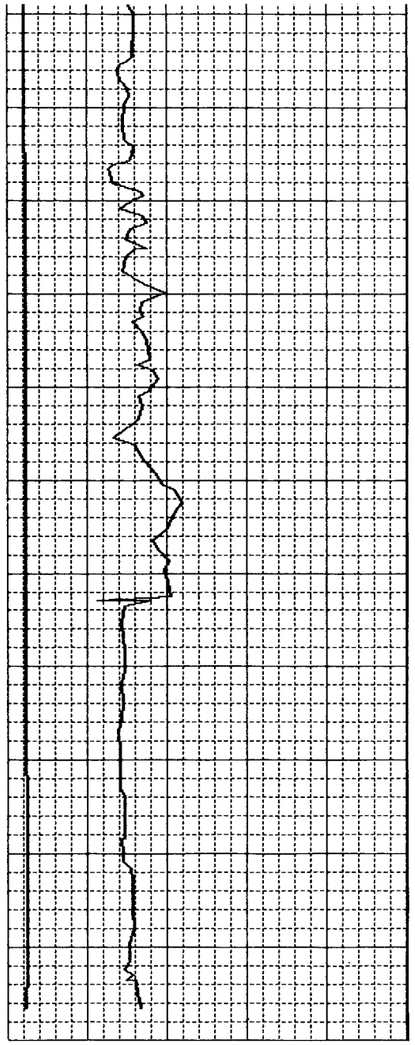
8/11/88 water was 164.3 feet below G.L.
1/31/89 water was 168.85 feet below TOSP.

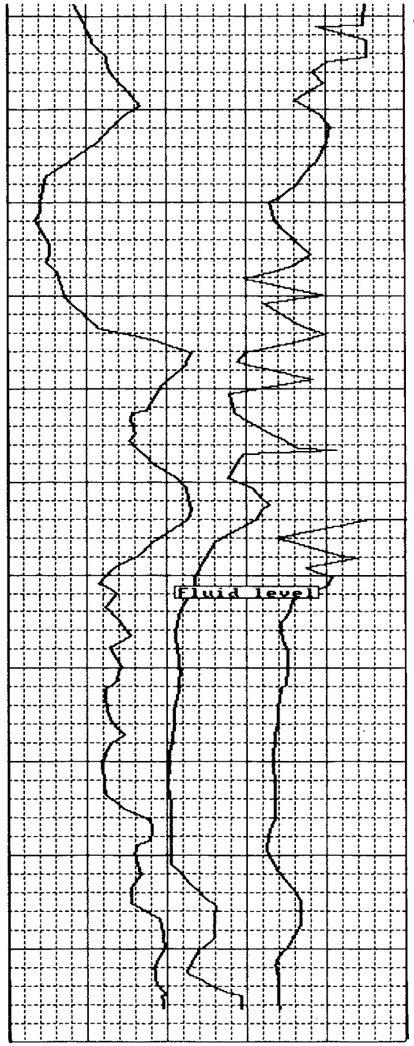
Well Completion:

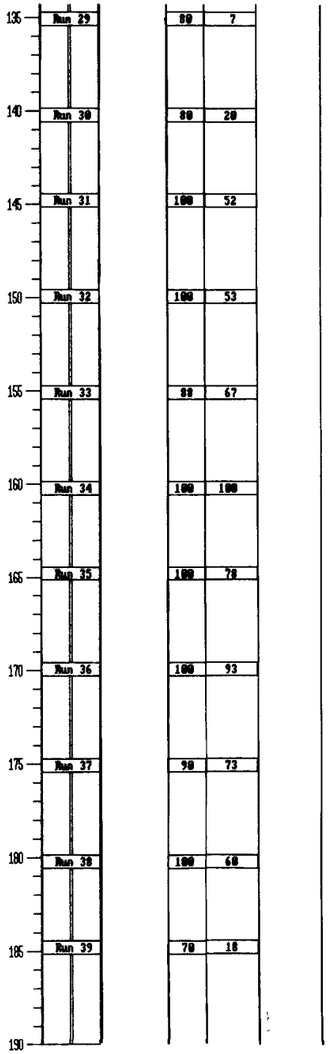
CASING: 4.5 inch I.D. PVC
SLOTTED CASING
FINE SAND: #0 Sand
SAND PACK: #3 Sand
BENTONITE
ANNULAR SEAL: Cement Grout
SLOUGH:MATERIAL

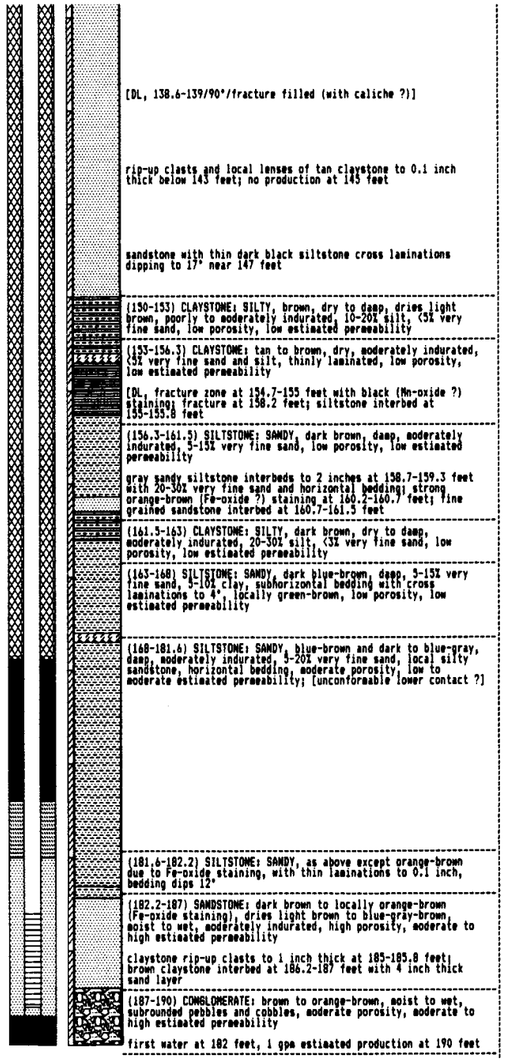
2

LOG: MONITOR WELL K8-04 (CONTINUED)









[DL, 138.6-139/90°/fracture filled (with caliche ?)]

rip-up clasts and local lenses of tan claystone to 0.1 inch thick below 145 feet; no production at 145 feet

sandstone with thin dark black siltstone cross laminations dipping to 17° near 147 feet

(150-153) CLAYSTONE: SILTY, brown, dry to damp, dries light brown, poorly to moderately indurated, 10-20% silt, <5% very fine sand, low porosity, low estimated permeability

(153-156.3) CLAYSTONE: tan to brown, dry, moderately indurated, <5% very fine sand and silt, thinly laminated, low porosity, low estimated permeability

[DL, fracture zone at 154.7-155 feet with black (Mn-oxide ?) staining; fracture at 158.2 feet; siltstone interbed at 155-155.8 feet

(156.3-161.5) SILTSTONE: SANDY, dark brown, damp, moderately indurated, 5-15% very fine sand, low porosity, low estimated permeability

gray sandy siltstone interbeds to 2 inches at 158.7-159.3 feet with 20-30% very fine sand and horizontal bedding; strong orange-brown (Fe-oxide ?) staining at 160.2-160.7 feet; fine grained sandstone interbed at 160.7-161.5 feet

(161.5-163) CLAYSTONE: SILTY, dark brown, dry to damp, moderately indurated, 20-30% silt, <3% very fine sand, low porosity, low estimated permeability

(163-168) SILTSTONE: SANDY, dark blue-brown, damp, 5-15% very fine sand, 5-10% clay, subhorizontal bedding with cross laminations to 4°, locally green-brown, low porosity, low estimated permeability

(168-181.6) SILTSTONE: SANDY, blue-brown and dark to blue-gray, damp, moderately indurated, 5-20% very fine sand, local silty sandstone, horizontal bedding, moderate porosity, low to moderate estimated permeability; [unconformable lower contact ?]

(181.6-182.2) SILTSTONE: SANDY, as above except orange-brown due to Fe-oxide staining, with thin laminations to 0.1 inch, bedding dips 12°

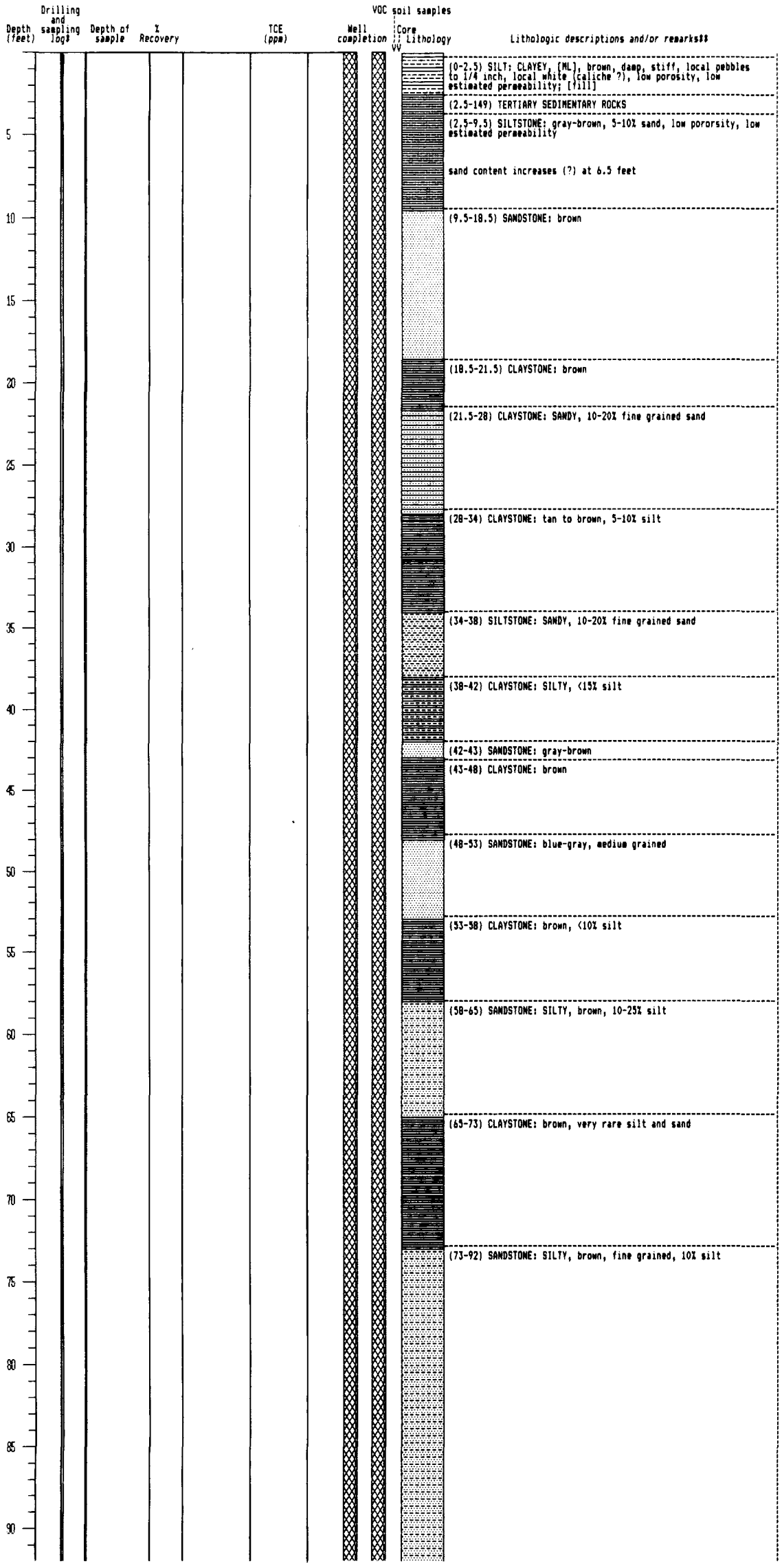
(182.2-187) SANDSTONE: dark brown to locally orange-brown (Fe-oxide staining), dries light brown to blue-gray-brown, moist to wet, moderately indurated, high porosity, moderate to high estimated permeability

claystone rip-up clasts to 1 inch thick at 185-185.8 feet; brown claystone interbed at 186.2-187 feet with 4 inch thick sand layer

(187-190) CONGLOMERATE: brown to orange-brown, moist to wet, subrounded pebbles and cobbles, moderate porosity, moderate to high estimated permeability

first water at 182 feet, 1 gpm estimated production at 190 feet

LOG: MONITOR WELL K8-05



Monitor Well K8-05

Geologic Logging:
M. Wade, Weiss Associates, Oakland, CA
Hole logged from cuttings. See log of Well K8-04 for more detailed litholgic descriptions.

Well Location:
Approximately 43 feet south of Well K8-04, Pit 8 Area, Site 300

Coordinates:
N: 426,712.2
E: 1,702,651.5

Elevation: Shiner 1130.44 feet
Top of Protective Casing (TOSP) 1132.45 feet

Geophysical Logging: See K8-04

Drilling:
D. Wagster, P. C. Exploration Inc., Roseville, CA

Dates Drilled: 9/16 to 9/20/88

Drilling Method:
9-inch tri-cone rotary, 0-149 feet
install 4 1/2-inch PVC casing with 0.015-inch slots at 138.1-148.1 feet

Key: Drilling and Sampling Log

‖ Tri-cone air-mist rotary

(1) 1.4-inch diameter sample taken with 2-inch O.D. split tube sampler advanced by a 140 pound weight falling 30 inches. Samples encased in stainless sleeves sealed with aluminum foil and inert duct tape.

Analytical Notes:
ND None detected

No VOCs were identifed, by EPA Method 8010, above a detection limit of 0.0002 ppm.

The soil sample from 148 feet was analyzed for 8 soluble metals by the EP Toxicity test. No metals were identified above STLCs in this sample.

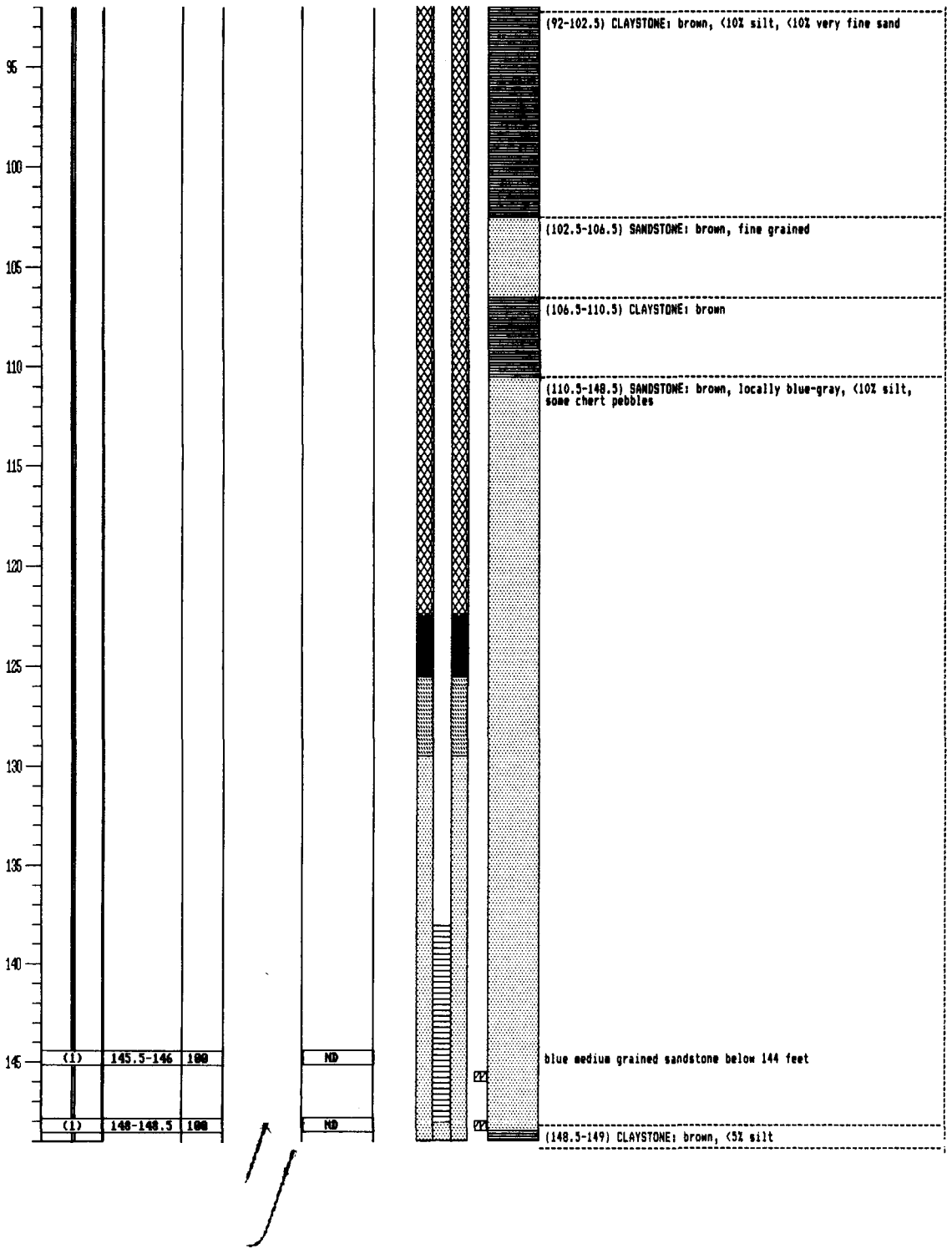
$$ Where given, percentages of sands, gravels, and fines represent field visual (e.g., volumetric) estimates.

Ground Water:
9/21/88 water was 145.3 feet below G.L.
1/31/89 well was dry.

Well Completion:

CASING: 4.5 inch I.D. PVC
SLOTTED CASING
FINE SAND: #0 Sand
SAND PACK: #3 Sand
BENTONITE
ANNULAR SEAL: Cement Grout
SLOUGH:MATERIAL

LOG: MONITOR WELL K8-05 (CONTINUED)



Appendix B

Analytical Results

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-01	08/01/82	5.5	Uranium (total), mg/kg	3.1
		5.5	Beryllium (total), mg/kg	0.44
K8-02	08/01/82	10.5	Uranium (total) mg/kg	2.0
		10.5	Beryllium (total), mg/kg	0.26
K8-04	07/20/88	2.0	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	0.0003
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	0.0004
			Trichlorofluoromethane, mg/kg	0.0003
			Vinyl chloride, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	7/20/88	2.0	EPA Method 8020	
			Benzene, mg/kg	0.001
			Chlorobenzene, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Ethylbenzene, mg/kg	0.0019
			Toluene, mg/kg	0.0017
			Total Xylene Isomers, mg/kg	0.0016
	07/20/88	2.2	EP-Toxicity Extraction	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	6
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	0.48
			Copper, mg/L	0.14
			Lead, mg/L	<0.1
			Mercury, mg/L	<0.001
			Molybdenum, mg/L	<0.1
			Nickel, mg/L	0.4
			Selenium, mg/L	<0.02
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	1.4
			Zinc, mg/L	0.07
	07/21/88	12.0	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	12.0	Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002
			<u>EPA Method 8020</u>	
			Benzene, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Ethylbenzene, mg/kg	<0.0002
			Toluene, mg/kg	0.0003
			Total Xylene Isomers, mg/kg	0.0009
	07/21/88	12.4	<u>EP-Toxicity Extraction</u>	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	0.5
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	<0.05
			Copper, mg/L	0.04
			Lead, mg/L	<0.1

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
k8-04	07/21/88	12.4	Mercury, mg/L	<0.001
			Molybdenum, mg/L	<0.1
			Nickel, mg/L	<0.05
			Selenium, mg/L	<0.02
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	0.3
			Zinc, mg/L	0.02
	07/21/88	20.3	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	20.5	EP-Toxicity Extraction	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	0.7
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	0.12
			Copper, mg/L	<0.02
			Lead, mg/L	<0.1
			Mercury, mg/L	<0.001
			Molybdenum, mg/L	<0.1
			Nickel, mg/L	<0.05
			Selenium, mg/L	<0.02
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	0.3
			Zinc, mg/L	0.05
	07/21/88	30.3	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	30.3	Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002
	07/21/88	30.5	EP-Toxicity Extraction	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	0.6
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	<0.05
			Copper, mg/L	0.14
			Lead, mg/L	<0.1
			Mercury, mg/L	<0.001
			Molybdenum, mg/L	<0.1
			Nickel, mg/L	<0.05
			Selenium, mg/L	<0.02
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	0.9
			Zinc, mg/L	<0.01
	07/21/88	40.3	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	40.3	1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002
	07/21/88	40.8	EP-Toxicity Extraction	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	0.6
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	<0.05
			Copper, mg/L	0.02
			Lead, mg/L	<0.1
			Mercury, mg/L	<0.001
			Molybdenum, mg/L	0.2
			Nickel, mg/L	0.1
			Selenium, mg/L	<0.05
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	0.5
			Zinc, mg/L	0.08
	07/21/88	50.3	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	50.3	2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002
			<u>EPA Method 8020.</u>	
			Benzene, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Ethylbenzene, mg/kg	<0.0002
			Toluene, mg/kg	0.0006
			Total Xylene Isomers, mg/kg	0.0013
	07/21/88	50.5	<u>EP-Toxicity Extraction</u>	
			Antimony, mg/L	<0.1
			Arsenic, mg/L	<0.02
			Barium, mg/L	0.7
			Beryllium, mg/L	<0.01
			Cadmium, mg/L	<0.01
			Chromium, mg/L	<0.02
			Cobalt, mg/L	<0.05

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-04	07/21/88	50.5	Copper, mg/L	0.37
			Lead, mg/L	<0.1
			Mercury, mg/L	<0.001
			Molybdenum, mg/L	<0.1
			Nickel, mg/L	<0.05
			Selenium, mg/L	<0.05
			Silver, mg/L	<0.01
			Thallium, mg/L	<0.1
			Vanadium, mg/L	0.3
			Zinc, mg/L	0.06
K8-05	09/19/88	145.5	EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002

Table-B-1. Analytical results of soil and rock core collected at Pit 8.

Borehole	Date Sampled	Depth (ft)	Parameters	Result
K8-05	09/19/88	148.0	EP-Toxicity Extraction	
			Arsenic, mg/L	<0.02
			Barium, mg/L	<0.05
			Cadmium, mg/L	<0.04
			Chromium, mg/L	<0.05
			Lead, mg/L	<0.3
			Mercury, mg/L	<0.0002
			Selenium, mg/L	<0.01
			Silver, mg/L	<0.02
			EPA Method 8010	
			Bromodichloromethane, mg/kg	<0.0002
			Bromoform, mg/kg	<0.0002
			Bromomethane, mg/kg	<0.0002
			Carbon Tetrachloride, mg/kg	<0.0002
			Chlorobenzene, mg/kg	<0.0002
			Chloroethane, mg/kg	<0.0002
			2-Chloroethylvinylether, mg/kg	<0.0002
			Chloroform, mg/kg	<0.0002
			Chloromethane, mg/kg	<0.0002
			Dibromochloromethane, mg/kg	<0.0002
			1,2-Dichlorobenzene, mg/kg	<0.0002
			1,3-Dichlorobenzene, mg/kg	<0.0002
			1,4-Dichlorobenzene, mg/kg	<0.0002
			Dichlorodifluoromethane, mg/kg	<0.0002
			1,1-Dichloroethane, mg/kg	<0.0002
			1,2-Dichloroethane, mg/kg	<0.0002
			1,1-Dichloroethylene, mg/kg	<0.0002
			1,2-Dichloroethylene (total), mg/kg	<0.0002
			1,2-Dichloropropane, mg/kg	<0.0002
			cis-1,3-Dichloropropene, mg/kg	<0.0002
			trans-1,3-Dichloropropene, mg/kg	<0.0002
			Freon 113, mg/kg	<0.0002
			Methylene chloride, mg/kg	<0.0002
			1,1,2,2-Tetrachloroethane, mg/kg	<0.0002
			Tetrachloroethylene, mg/kg	<0.0002
			1,1,1-Trichloroethane, mg/kg	<0.0002
			1,1,2-Trichloroethane, mg/kg	<0.0002
			Trichloroethylene, mg/kg	<0.0002
			Trichlorofluoromethane, mg/kg	<0.0002
			Vinyl chloride, mg/kg	<0.0002

Table B–2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8–01
	1st Quarter 1984
Radiological results	
Date sampled	3/19/84
Gross alpha, pCi/L	5
Two Std dev	+3
Gross beta, pCi/L	7
Two Std dev	+2
Tritium, pCi/L	<1000
Uranium 238, pCi/L	2.7
Two Std dev	+0.2
Uranium 235, pCi/L	<0.1
Uranium 234, pCi/L	4.6
Two Std dev	+0.2
	3rd Quarter 1984
Radiological results	
Date sampled	9/13/84
Gross alpha, pCi/L	4
Two Std dev	+3
Gross beta, pCi/L	12
Two Std dev	+3
Tritium, pCi/L	<1000
	4th Quarter 1984
Chemical and physical analyses	
Date sampled	11/02/84
Ammonia Nitrogen (as N), mg/L	<0.01
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	8.5
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.38
Radiological results	
Date sampled	11/02/84
Gross alpha, pCi/L	<4
Gross beta, pCi/L	<6
Tritium, pCi/L	<1000

Table B–2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8–01
	1st Quarter 1985
Radiological results	
Date sampled	3/22/85
Gross alpha, pCi/L	<4
Gross beta, pCi/L	8
Two Std dev	+2
Tritium, pCi/L	<1000
	2nd Quarter 1985
Chemical and physical analyses	
Date sampled	6/11/85
Ammonia Nitrogen (as N), mg/L	0.01
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	7.9
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.23
Radiological results	
Date sampled	6/11/85
Gross alpha, pCi/L	<5
Gross beta, pCi/L	3
Two Std dev	+1
Tritium, pCi/L	<1000
	3rd Quarter 1985
Chemical and physical analyses	
Date sampled	8/13/85
Ammonia Nitrogen (as N), mg/L	0.36
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	8.8
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.14
Radiological results	
Date sampled	8/12/85
Gross alpha, pCi/L	<5
Gross beta, pCi/L	10
Two Std dev	+3
Tritium, pCi/L	<1000

Table B–2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8–01
	4th Quarter 1985
Chemical and physical analyses	
Date sampled	11/19/85
Ammonia Nitrogen (as N), mg/L	0.03
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	8.6
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.58
Radiological results	
Date sampled	11/19/85
Gross alpha, pCi/L	<3
Gross beta, pCi/L	10
Two Std dev	+4
Tritium, pCi/L	<1000
	1st Quarter 1986
Chemical and physical analyses	
Date sampled	3/19/86
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	4
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.16
Radiological results	
Date sampled	3/19/86
Gross alpha, pCi/L	<5
Gross beta, pCi/L	8
Two Std dev	+4
Tritium, pCi/L	<240
	2nd Quarter 1986
Chemical and physical analyses	
Date sampled	5/29/86
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	9.4
Nitrite (as NO_2), mg/L	0.03
Total Kjeldahl Nitrogen, mg/L	<0.1

Table B–2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8–01
2nd Quarter 1986 (Continued)	
Radiological results	
Date sampled	5/29/86
Gross alpha, pCi/L	<4
Gross beta, pCi/L	8
Two Std dev	+4
Tritium, pCi/L	<206
3rd Quarter 1986	
Chemical and physical analyses	
Date sampled	7/16/86
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	11
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	<0.1
Radiological results	
Date sampled	7/16/86
Gross alpha, pCi/L	<4
Gross beta, pCi/L	10
Two Std dev	+4
Tritium, pCi/L	<194
4th Quarter 1986	
Chemical and physical analyses	
Date sampled	10/29/86
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Lead, mg/L	<0.1
Nitrate (as N), mg/L	9.5
Nitrite (as NO_2), mg/L	31
Total Kjeldahl Nitrogen, mg/L	0.18
Radiological results	
Date sampled	10/29/86
Gross alpha, pCi/L	<3
Gross beta, pCi/L	7
Two Std dev	+4
Tritium, pCi/L	<316

Table B–2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8–01
	1st Quarter 1987
Chemical and physical analyses	
Date sampled	1/22/87
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Nitrate (as N), mg/L	35
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	<0.1
Radiological results	
Date sampled	1/22/87
Gross alpha, pCi/L	<4
Gross beta, pCi/L	8
Two Std dev	+4
Tritium, pCi/L	209
Two Std dev	+180
	2nd Quarter 1987
Chemical and physical analyses	
Date sampled	5/13/87
Ammonia Nitrogen (as N), mg/L	<0.1
Beryllium, mg/L	<0.01
Lead, mg/L	0.016
Nitrate (as N), mg/L	10.4
Nitrite (as NO_2), mg/L	<0.03
Total Kjeldahl Nitrogen, mg/L	0.22
Radiological results	
Date sampled	5/13/87
Gross alpha, pCi/L	9
Two Std dev	+3
Gross beta, pCi/L	10
Two Std dev	+4
Tritium, pCi/L	<205

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	2nd Quarter 1987 (Continued)		
EPA Method 602			
Date sampled	5/13/87	–	–
Benzene, µg/L	<0.5	–	–
Chlorobenzene, µg/L	1.6	–	–
1,2–Dichlorobenzene, µg/L	<0.5	–	–
1,3–Dichlorobenzene, µg/L	<0.5	–	–
1,4–Dichlorobenzene, µg/L	<0.5	–	–
Ethylbenzene, µg/L	<0.5	–	–
Toluene, µg/L	<0.5	–	–
Total Xylene Isomers, µg/L	<0.5	–	–
	3rd Quarter 1987		
Chemical and physical analyses			
Date sampled	8/11/87	–	7/13/87
Ammonia Nitrogen (as N), mg/L	<0.1	–	–
Beryllium, mg/L	<0.01	–	–
Carbonate Alk (as $CaCO_3$), mg/L	<1	–	<1
Chloride, mg/L	73	–	86
Total dissolved solids (TDS), mg/L	520	–	540
Fluoride, mg/L	0.41	–	0.45
Iron, mg/L	<0.03	–	<0.03
Lead, mg/L	<0.001	–	–
Manganese, mg/L	<0.01	–	0.03
Nitrate (as NO_3), mg/L	48	–	47
Nitrate (as N), mg/L	11	–	–
Nitrite (as NO_2), mg/L	<0.01	–	–
Sodium, mg/L	54	–	82
Sulfate, mg/L	72	–	55
Total Kjeldahl Nitrogen, mg/L	<0.1	–	–
	3rd Quarter 1987		
EPA Method 624			
Date sampled	8/11/87	–	–
Date extracted	8/27/87	–	–
1,1,2,2–Tetrachloroethane, µg/L	<1	–	–
1,1,1–Trichloroethane, µg/L	<1	–	–
1,1,2–Trichloroethane, µg/L	<1	–	–
1,1–Dichloroethane, µg/L	<1	–	–
1,1–Dichloroethylene, µg/L	<1	–	–
1,2–Dichloroethane, µg/L	<1	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	3rd Quarter 1987 (Continued)		
EPA Method 624 (Continued)			
1,2–Dichloroethylene (total), µg/L	<1	–	–
1,2–Dichloropropane, µg/L	<1	–	–
2–Chloroethylvinylether, µg/L	<1	–	–
Bromodichloromethane, µg/L	<1	–	–
Bromomethane, µg/L	<1	–	–
Bromoform, µg/L	<1	–	–
Chlorobenzene, µg/L	<1	–	–
Carbon Tetrachloride, µg/L	<1	–	–
Chloroethane, µg/L	<1	–	–
Chloroform, µg/L	<1	–	–
Chloromethane, µg/L	<1	–	–
Dibromochloromethane, µg/L	<1	–	–
Methylene chloride, µg/L	<1	–	–
Tetrachloroethylene, µg/L	<1	–	–
Trichloroethylene, µg/L	5	–	–
Trichlorofluoromethane, µg/L	<1	–	–
Vinyl chloride, µg/L	<1	–	–
trans–1,3–Dichloropropene, µg/L	<1	–	–
Acrolein, µg/L	<10	–	–
Acrylonitrile, µg/L	<10	–	–
Toluene, µg/L	<1	–	–
Benzene, µg/L	<1	–	–
Ethylbenzene, µg/L	<1	–	–
Radiological results			
Date sampled	8/11/87	–	–
Gross alpha, pCi/L	0	–	–
Two Std dev	+3	–	–
Gross beta, pCi/L	8	–	–
Two Std dev	+4	–	–
Tritium, pCi/L	<362	–	–
General Mineral			
Date sampled	8/11/87	–	7/13/89
Date extracted	8/27/87	–	7/16/89
Hydroxide Alk (as $CaCO_3$), mg/L	<1	–	<1
Carbonate Alk (as $CaCO_3$), mg/L	<1	–	<1
Bicarbonate Alk (as $CaCO_3$), mg/L	212	–	227
Iron, mg/L	<0.03	–	<0.03
Manganese, mg/L	<0.01	–	0.03
Copper, mg/L	<0.02	–	<0.02
Zinc, mg/L	<0.01	–	<0.01
Surfactants, mg/L	<0.02	–	<0.02

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8-01	Well K8-02B	Well K8-03B
Total dissolved solids (TDS), mg/L	520	–	540
Specific Conductance, umhos/cm	810	–	850
pH, Units	7.6	–	7.9
Nitrate (as NO_3), mg/L	48	–	47
Chloride, mg/L	73	–	86
Sulfate, mg/L	72	–	55
Sodium, mg/L	54	–	82
Potassium, mg/L	5.3	–	5.2
Calcium (EDTA Titration), mg/L	60	–	58
Magnesium, mg/L	26	–	37

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8-01	Well K8-03B
	4th Quarter 1987	
Chemical and physical analyses		
Date sampled	10/01/87	–
Ammonia Nitrogen (as N), mg/L	<0.1	–
Beryllium, mg/L	<0.0001	–
Lead, mg/L	<0.001	–
Nitrate (as N), mg/L	11	–
Nitrite (as N), mg/L	<0.01	–
Total Kjeldahl Nitrogen, mg/L	<0.1	–
EPA Method 624		
Date sampled	10/01/87	–
Date extracted	10/14/87	–
1,1,2,2–Tetrachloroethane, µg/L	<1	–
1,1,1–Trichloroethane, µg/L	<1	–
1,1,2–Trichloroethane, µg/L	<1	–
1,1–Dichloroethane, µg/L	<1	–
1,1–Dichloroethylene, µg/L	<1	–
1,2–Dichloroethane, µg/L	<1	–
1,2–Dichloroethylene (total), µg/L	<1	–
1,2–Dichloropropane, µg/L	<1	–
2–Chloroethylvinylether, µg/L	<1	–
Bromodichloromethane, µg/L	<1	–
Bromomethane, µg/L	<1	–
Bromoform, µg/L	<1	–
Chlorobenzene, µg/L	<1	–
Carbon Tetrachloride, µg/L	<1	–
Chloroethane, µg/L	<1	–
Chloroform, µg/L	<1	–
Chloromethane, µg/L	<1	–
Dibromochloromethane, µg/L	<1	–
Methylene chloride, µg/L	<1	–
Tetrachloroethylene, µg/L	<1	–
Trichloroethylene, µg/L	5	–
Trichlorofluoromethane, µg/L	<1	–
Vinyl chloride, µg/L	<1	–
trans–1,3–Dichloropropene, µg/L	<1	–
Acrolein, µg/L	<10	–
Acrylonitrile, µg/L	<10	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area.

Parameters	Well K8-01	Well K8-03B
	4th Quarter 1987 (Continued)	
EPA Method 624 (Continued)		
Date sampled	10/01/87	–
Date extracted	10/14/87	–
Toluene, µg/L	<1	–
Benzene, µg/L	<1	–
Ethylbenzene, µg/L	<1	–
Radiological results		
Date sampled	10/01/87	11/09/87
Gross alpha, pCi/L	0	–
Two Std dev	+4	–
Gross beta, pCi/L	13	–
Two Std dev	+5	–
Tritium, pCi/L	283	<322
Two Std dev	+190	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	1st Quarter 1988		
Chemical and physical analyses			
Date sampled	1/15/88	–	–
Ammonia Nitrogen (as N), mg/L	<0.1	–	–
Beryllium, mg/L	<0.0001	–	–
Lead, mg/L	0.011	–	–
Nitrate (as N), mg/L	11	–	–
Nitrite (as N), mg/L	<0.01	–	–
Total Kjeldahl Nitrogen, mg/L	<0.1	–	–
EPA Method 624			
Date sampled	1/15/88	–	–
Date extracted	1/29/88	–	–
1,1,2,2–Tetrachloroethane, µg/L	<1	–	–
1,1,1–Trichloroethane, µg/L	<1	–	–
1,1,2–Trichloroethane, µg/L	<1	–	–
1,1–Dichloroethane, µg/L	<1	–	–
1,1–Dichloroethylene, µg/L	<1	–	–
1,2–Dichloroethane, µg/L	<1	–	–
1,2–Dichloroethylene (total), µg/L	<1	–	–
1,2–Dichloropropane, µg/L	<1	–	–
2–Chloroethylvinylether, µg/L	<1	–	–
Bromodichloromethane, µg/L	<1	–	–
Bromomethane, µg/L	<1	–	–
Bromoform, µg/L	<1	–	–
Chlorobenzene, µg/L	<1	–	–
Carbon Tetrachloride, µg/L	<1	–	–
Chloroethane, µg/L	<1	–	–
Chloroform, µg/L	<1	–	–
Chloromethane, µg/L	<1	–	–
Dibromochloromethane, µg/L	<1	–	–
Methylene chloride, µg/L	<1	–	–
Tetrachloroethylene, µg/L	<1	–	–
Trichloroethylene, µg/L	4	–	–
Trichlorofluoromethane, µg/L	<1	–	–
Vinyl chloride, µg/L	<1	–	–
trans–1,3–Dichloropropene, µg/L	<1	–	–
Acrolein, µg/L	<10	–	–
Acrylonitrile, µg/L	<10	–	–
Toluene, µg/L	<1	–	–
Benzene, µg/L	<1	–	–
Ethylbenzene, µg/L	<1	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	1st Quarter 1988 (Continued)		
Radiological results			
Date sampled	1/15/88	1/29/88	1/29/88
Gross alpha, pCi/L	0	–	–
Two Std dev	+4	–	–
Gross beta, pCi/L	0	–	–
Two Std dev	+5	–	–
Tritium, pCi/L	<277	<201	<307
	2nd Quarter 1988		
Chemical and physical analyses			
Date sampled	4/13/88	6/20/88	6/20/88
Ammonia Nitrogen (as N), mg/L	<0.1	–	–
Beryllium, mg/L	<0.0001	–	–
Carbonate Alk (as $CaCO_3$), mg/L	–	<1	<1
Chloride, mg/L	–	61	86
Total dissolved solids (TDS), mg/L	–	470	530
Fluoride, mg/L	–	0.41	0.43
Iron, mg/L	–	0.05	0.03
Lead, mg/L	0.004	–	–
Manganese, mg/L	–	<0.01	<0.01
Nitrate (as NO3), mg/L	–	12	23
Nitrate (as N), mg/L	9.2	–	–
Nitrite (as N), mg/L	<0.01	–	–
Sodium, mg/L	–	59	61
Sulfate, mg/L	–	79	59
Total Kjeldahl Nitrogen, mg/L	<0.1	–	–
EPA Method 624			
Date sampled	4/13/88	–	–
Date extracted	4/21/88	–	–
1,1,2,2–Tetrachloroethane, µg/L	<1	–	–
1,1,1–Trichloroethane, µg/L	<1	–	–
1,1,2–Trichloroethane, µg/L	<1	–	–
1,1–Dichloroethane, µg/L	<1	–	–
1,1–Dichloroethylene, µg/L	<1	–	–
1,2–Dichloroethane, µg/L	3	–	–
1,2–Dichloroethylene (total), µg/L	<1	–	–
1,2–Dichloropropane, µg/L	<1	–	–
2–Chloroethylvinylether, µg/L	<1	–	–
Bromodichloromethane, µg/L	<1	–	–
Bromomethane, µg/L	<1	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	2nd Quarter 1988 (Continued)		
EPA Method 624			
Bromoform, µg/L	<1	–	–
Chlorobenzene, µg/L	<1	–	–
Carbon Tetrachloride, µg/L	<1	–	–
Chloroethane, µg/L	<1	–	–
Chloroform, µg/L	<1	–	–
Chloromethane, µg/L	<1	–	–
Dibromochloromethane, µg/L	<1	–	–
Methylene chloride, µg/L	<1	–	–
Tetrachloroethylene, µg/L	<1	–	–
Trichloroethylene, µg/L	5	–	–
Trichlorofluoromethane, µg/L	<1	–	–
Vinyl chloride, µg/L	<1	–	–
trans–1,3–Dichloropropene, µg/L	<1	–	–
Acrolein, µg/L	<10	–	–
Acrylonitrile, µg/L	<10	–	–
Toluene, µg/L	<1	–	–
Benzene, µg/L	<1	–	–
Ethylbenzene, µg/L	<1	–	–
Radiological results			
Date sampled	4/14/88	5/06/88	5/06/88
Gross alpha, pCi/L	0	–	–
Two Std dev	+3	–	–
Gross beta, pCi/L	6	–	–
Two Std dev	+5	–	–
Tritium, pCi/L	<259	<285	<290
	3rd Quarter 1988		
Chemical and physical analyses			
Date sampled	7/18/88	–	–
Ammonia Nitrogen (as N), mg/L	<0.1	–	–
Beryllium, mg/L	<0.0001	–	–
Lead, mg/L	0.008	–	–
Nitrate (as N), mg/L	12	–	–
Nitrite (as N), mg/L	<0.02	–	–
Total Kjeldahl Nitrogen, mg/L	<0.5	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	Well K8-01	Well K8-02B	Well K8-03B
	3rd Quarter 1988 (Continued)		
EPA Method 624			
Date sampled	7/18/88	–	–
Date extracted	7/22/88	–	–
1,1,2,2–Tetrachloroethane, µg/L	<1	–	–
1,1,1–Trichloroethane, µg/L	<1	–	–
1,1,2–Trichloroethane, µg/L	<1	–	–
1,1–Dichloroethane, µg/L	<1	–	–
1,1–Dichloroethylene, µg/L	<1	–	–
1,2–Dichloroethane, µg/L	3	–	–
1,2–Dichloroethylene (total), µg/L	<1	–	–
1,2–Dichloropropane, µg/L	<1	–	–
2–Chloroethylvinylether, µg/L	<1	–	–
Bromodichloromethane, µg/L	<1	–	–
Bromomethane, µg/L	<1	–	–
Bromoform, µg/L	<1	–	–
Chlorobenzene, µg/L	<1	–	–
Carbon Tetrachloride, µg/L	<1	–	–
Chloroethane, µg/L	<1	–	–
Chloroform, µg/L	<1	–	–
Chloromethane, µg/L	<1	–	–
Dibromochloromethane, µg/L	<1	–	–
Methylene chloride, µg/L	<1	–	–
Tetrachloroethylene, µg/L	<1	–	–
Trichloroethylene, µg/L	6	–	–
Trichlorofluoromethane, µg/L	<1	–	–
Vinyl chloride, µg/L	<1	–	–
trans–1,3–Dichloropropene, µg/L	<1	–	–
Acrolein, µg/L	<10	–	–
Acrylonitrile, µg/L	<10	–	–
Toluene, µg/L	<1	–	–
Benzene, µg/L	<1	–	–
Ethylbenzene, µg/L	<1	–	–
Radiological results			
Date sampled	7/19/88	7/29/88	7/29/88
Gross alpha, pCi/L	0	–	–
Two Std dev	+4	–	–
Gross beta, pCi/L	12	–	–
Two Std dev	+6	–	–
Tritium, pCi/L	<232	<222	<607

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988			
Chemical and physical analyses				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Ammonia Nitrogen (as N), mg/L	<1.5	<0.5	0.62	<0.5
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Chloride, mg/L	69	70	84	78
Total dissolved solids (TDS), mg/L	460	460	520	470
Fluoride, mg/L	0.4	0.33	0.43	0.38
Iron, mg/L	<0.04	<0.04	0.06	<0.04
Manganese, mg/L	<0.04	<0.04	<0.04	0.05
Nitrate (as NO_3), mg/L	38	<0.4	41	<0.4
Nitrate (as N), mg/L	8.6	<0.4	9.2	<0.4
Nitrite (as N), mg/L	<0.01	0.02	<0.01	0.01
Low Level Phenolics, mg/L	<0.005	<0.005	<0.005	<0.005
Total suspended solids (TSS), mg/L	<1	<1	5	<1
Sodium, mg/L	67	60	62	77
Sulfate, mg/L	71	85	56	60
Total Kjeldahl Nitrogen, mg/L	<1.7	<0.5	1	<0.5
Quadruplicate TOC				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
TOC, Average, mg/L	1.2	0.9	1.2	1
TOC, Std dev, mg/L	0.02	0.02	0.02	0.01
Quadruplicate TOX				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
TOX, Average, mg/L	<0.025	<0.025	<0.025	<0.025
TOX, Std dev, mg/L	0	0	0	0
EPA Method 624				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date extracted	10/31/88	–	–	–
1,1,2,2–Tetrachloroethane, µg/L	<1	<1	<1	<1
1,1,1–Trichloroethane, µg/L	<1	<1	<1	<1
1,1,2–Trichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethylene, µg/L	<1	<1	<1	<1
1,2–Dichloroethane, µg/L	5	<1	<1	<1
1,2–Dichloroethylene (total), µg/L	<1	<1	<1	<1
1,2–Dichloropropane, µg/L	<1	<1	<1	<1
2–Chloroethylvinylether, µg/L	<1	<1	<1	<1
Bromodichloromethane, µg/L	<1	<1	<1	<1

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988 (Continued)			
EPA Method 624 (Continued)				
Bromomethane, µg/L	<1	<1	<1	<1
Bromoform, µg/L	<1	<1	<1	<1
Chlorobenzene, µg/L	<1	<1	<1	<1
Carbon Tetrachloride, µg/L	<1	<1	<1	<1
Chloroethane, µg/L	<1	<1	<1	<1
Chloroform, µg/L	<1	1	<1	<1
Chloromethane, µg/L	<1	<1	<1	<1
Dibromochloromethane, µg/L	<1	<1	<1	<1
Methylene chloride, µg/L	<1	<1	<1	<1
Tetrachloroethylene, µg/L	<1	<1	<1	<1
Trichloroethylene, µg/L	5	<1	2	<1
Trichlorofluoromethane, µg/L	<1	<1	<1	<1
Vinyl chloride, µg/L	<1	<1	<1	<1
trans-1,3-Dichloropropene, µg/L	<1	<1	<1	<1
Toluene, µg/L	<1	<1	<1	<1
Benzene, µg/L	<1	<1	<1	<1
Ethylbenzene, µg/L	<1	<1	<1	<1
EPA Method 601				
Date sampled	11/17/88	–	–	–
Date extracted	10/31/88	–	–	–
1,1,2,2-Tetrachloroethane, µg/L	<0.5	–	–	–
1,1,1-Trichloroethane, µg/L	<0.5	–	–	–
1,1,2-Trichloroethane, µg/L	<0.5	–	–	–
1,1-Dichloroethane, µg/L	<0.5	–	–	–
1,1-Dichloroethylene, µg/L	<0.5	–	–	–
1,2-Dichlorobenzene, µg/L	<0.5	–	–	–
1,2-Dichloroethane, µg/L	2.2	–	–	–
1,2-Dichloroethylene (total), µg/L	<0.5	–	–	–
1,2-Dichloropropane, µg/L	<0.5	–	–	–
1,3-Dichlorobenzene, µg/L	<0.5	–	–	–
1,4-Dichlorobenzene, µg/L	<0.5	–	–	–
2-Chloroethylvinylether, µg/L	<0.5	–	–	–
Bromodichloromethane, µg/L	<0.5	–	–	–
Bromomethane, µg/L	<0.5	–	–	–
Bromoform, µg/L	<0.5	–	–	–
Chlorobenzene, µg/L	<0.5	–	–	–
Carbon Tetrachloride, µg/L	<0.5	–	–	–
Chloroethane, µg/L	<0.5	–	–	–
Chloroform, µg/L	<0.5	–	–	–
Chloromethane, µg/L	<0.5	–	–	–
Dibromochloromethane, µg/L	<0.5	–	–	–
Dichlorodifluoromethane, µg/L	<0.5	–	–	–
Methylene chloride, µg/L	<0.5	–	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988 (Continued)			
EPA Method 601 (Continued)				
Tetrachloroethylene, µg/L	<0.5	–	–	–
Trichloroethylene, µg/L	4.8	–	–	–
Trichlorofluoromethane, µg/L	<0.5	–	–	–
Vinyl chloride, µg/L	<0.5	–	–	–
cis–1,3–Dichloropropene, µg/L	<0.5	–	–	–
trans–1,3–Dichloropropene, µg/L	<0.5	–	–	–
Freon 113, µg/L	<0.5	–	–	–
Title 22 organics				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date extracted	11/23/88	11/04/88	11/23/88	11/04/88
Date analyzed	11/30/88	11/11/88	11/30/88	11/11/88
2,4,5–TP (Silvex), µg/L	<1	<1	<2	<1
2,4–D, µg/L	<10	<10	<20	<10
Endrin, µg/L	<0.01	<0.01	<0.01	<0.01
Lindane, µg/L	<0.4	<0.4	<0.4	<0.4
Methoxychlor, µg/L	<10	<10	<10	<10
Toxaphene, µg/L	<0.5	<0.5	<0.5	<0.5
Explosive compounds				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
RDX, µg/L	<30	<30	<30	<30
HMX, µg/L	<20	<20	<20	<20
TNT, µg/L	<40	<40	<40	<40
Radiological results				
Date sampled	10/18/88	12/15/88	1/30/89	10/29/88
Gross alpha, pCi/L	0	0	9	0
Two Std dev	+4	+5	+4	+4
Gross beta, pCi/L	8	8	10	11
Two Std dev	+5	+5	+5	+4
Tritium, pCi/L	251	<211	<228	<234
Two Std dev	+170			–
Uranium 238, pCi/L	2.9	4.3	2.9	2.9
Two Std dev	+0.6	+0.4	+0.3	+0.3
Uranium 235, pCi/L	0	0.3	0	0
Two Std dev	+0.2	+0.1	+0.2	+0.2
Uranium 234, pCi/L	4.5	5.8	4.9	4.5
Two Std dev	+0.7	+0.5	+0.5	+0.4
Radium 226, pCi/L	0	0	0.3	0
Two Std dev	+0.1	+0.1	+0.1	+0.1

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988 (Continued)			
EPA Method 625				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date analyzed	12/01/88	11/09/88	12/01/88	11/09/88
Date extracted	10/31/88	–	–	–
1,2,4–Trichlorobenzene, µg/L	<2	<1	<2	<1
1,2–Dichlorobenzene, µg/L	<2	<1	<2	<1
1,2–Diphenylhydrazine, µg/L	<2	<1	<2	<1
1,3–Dichlorobenzene, µg/L	<2	<1	<2	<1
1,4–Dichlorobenzene, µg/L	<2	<1	<2	<1
2,4,6–Trichlorophenol, µg/L	<2	<1	<2	<1
2,4–Dichlorophenol, µg/L	<2	<1	<2	<1
2,4–Dimethylphenol, µg/L	<2	<1	<2	<1
2,4–Dinitrotoluene, µg/L	<2	<1	<2	<1
2,4–Dinitrophenol, µg/L	<20	<10	<20	<10
2,6–Dinitrotoluene, µg/L	<2	<1	<2	<1
2–Chloronaphthalene, µg/L	<2	<1	<2	<1
2–Nitrophenol, µg/L	<2	<1	<2	<1
2–Chlorophenol, µg/L	<2	<1	<2	<1
2–Methyl–4,6–dinitrophenol, µg/L	<2	<1	<2	<1
3,3'–Dichlorobenzidine, µg/L	<2	<1	<2	<1
4–Bromophenylphenylether, µg/L	<2	<1	<2	<1
4–Chloro–3–methylphenol, µg/L	<2	<1	<2	<1
4–Chlorophenylphenylether, µg/L	<2	<1	<2	<1
4–Nitrophenol, µg/L	<40	<20	<40	<20
Acenaphthene, µg/L	<2	<1	<2	<1
Acenaphthylene, µg/L	<2	<1	<2	<1
Anthracene, µg/L	<2	<1	<2	<1
Bis(2–ethylhexyl)phthalate, µg/L	<200	<100	<200	<100
Benzidine, µg/L	<80	<40	<80	<40
Bis(2–chloroethyl)ether, µg/L	<2	<1	<2	<1
Bis(2–chloroisopropyl)ether, µg/L	<2	<1	<2	<1
Bis(2–chloroethoxy)methane, µg/L	<2	<1	<2	<1
Benzo(a)anthracene, µg/L	<2	<1	<2	<1
Benzo(a)pyrene, µg/L	<2	<1	<2	<1
Benzo(b)fluoranthene, µg/L	<2	<1	<2	<1
Benzo(g,h,i)perylene, µg/L	<2	<1	<2	<1
Benzo(k)fluoranthene, µg/L	<2	<1	<2	<1
Butylbenzylphthalate, µg/L	<2	<1	<2	<1
Chrysene, µg/L	<2	<1	<2	<1
Di–n–octylphthalate, µg/L	<2	<1	<2	<1
Dibenzo(a,h)anthracene, µg/L	<2	<1	<2	<1
Dibutylphthalate, µg/L	<2	<1	<2	<1
Diethylphthalate, µg/L	<2	<1	<2	<1
Dimethylphthalate, µg/L	<2	<1	<2	<1
Fluorene, µg/L	<2	<1	<2	<1

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988 (Continued)			
EPA Method 625 (Continued				
Fluoranthene, µg/L	<2	<1	<2	<1
Hexachlorobenzene, µg/L	<2	<1	<2	<1
Hexachlorobutadiene, µg/L	<2	<1	<2	<1
Hexachlorocyclopentadiene, µg/L	<2	<1	<2	<1
Hexachloroethane, µg/L	<2	<1	<2	<1
Indeno(1,2,3-c,d)pyrene, µg/L	<2	<1	<2	<1
Isophorone, µg/L	<2	<1	<2	<1
N-Nitrosodi-n-propylamine, µg/L	<2	<1	<2	<1
N-Nitrosodimethylamine, µg/L	<2	<1	<2	<1
N-Nitrosodiphenylamine, µg/L	<2	<1	<2	<1
Naphthalene, µg/L	<2	<1	<2	<1
Nitrobenzene, µg/L	<2	<1	<2	<1
Pentachlorophenol, µg/L	<2	<1	<2	<1
Phenanthrene, µg/L	<2	<1	<2	<1
Phenol, µg/L	<2	<1	<2	<1
Pyrene, µg/L	<2	<1	<2	<1
C18 Fatty Acid (semi-quantitative)	10	–	–	–
General Mineral				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date analyzed	12/01/88	11/09/88	12/01/88	11/09/88
Date extracted	10/31/88	–	–	–
Hydroxide Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Bicarbonate Alk (as $CaCO_3$), mg/L	200	190	220	180
Iron, mg/L	<0.04	<0.04	0.06	<0.04
Manganese, mg/L	<0.04	<0.04	<0.04	0.05
Copper, mg/L	<0.08	<0.02	<0.08	<0.02
Zinc, mg/L	0.05	0.04	0.04	<0.01
Surfactants, mg/L	<0.02	<0.02	<0.02	<0.02
Total dissolved solids (TDS), mg/L	460	460	520	470
Specific Conductance, umhos/cm	820	730	800	740
pH, Units	7.7	7.8	7.6	7.8
Nitrate (as NO_3), mg/L	38	<0.4	41	<0.4
Chloride, mg/L	69	70	84	78
Sulfate, mg/L	71	85	56	60
Sodium, mg/L	67	60	62	77
Potassium, mg/L	4.3	4	4.8	5
Calcium (EDTA Titration), mg/L	64	56	62	37
Magnesium, mg/L	32	27	36	29

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	4th Quarter 1988 (Continued)			
EPA Method 602				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date analyzed	12/01/88	11/09/88	12/01/88	11/09/88
Date extracted	10/31/88	–	–	–
Benzene, µg/L	<1	<1	<1	<1
Chlorobenzene, µg/L	<1	<1	<1	<1
1,2–Dichlorobenzene, µg/L	<2	<1	<2	<1
1,3–Dichlorobenzene, µg/L	<2	<1	<2	<1
1,4–Dichlorobenzene, µg/L	<2	<1	<2	<1
Ethylbenzene, µg/L	<1	<1	<1	<1
Toluene, µg/L	<1	<1	<1	<1
Total Xylene Isomers, µg/L	<1	<1	<1	<1
Title 22 Metals				
Date sampled	11/17/88	10/28/88	11/17/88	10/28/88
Date analyzed	12/01/88	11/09/88	12/01/88	11/09/88
Date extracted	10/31/88	–	–	–
Arsenic, mg/L	0.016	–	0.016	–
Barium, mg/L	<0.05	<0.1	<0.05	<0.1
Beryllium, mg/L	<0.0001	–	–	–
Cadmium, mg/L	<0.04	<0.01	<0.04	<0.01
Chromium, mg/L	<0.05	<0.02	<0.05	<0.02
Copper, mg/L	<0.08	<0.02	<0.08	<0.02
Lead, mg/L	<0.301	0.005	<0.3	0.002
Mercury, mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Selenium, mg/L	0.003	0.004	0.003	0.007
Silver, mg/L	<0.02	<0.01	<0.02	<0.01
Zinc, mg/L	0.05	0.04	0.04	<0.01
	1st Quarter 1989			
Chemical and physical analyses				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
Ammonia Nitrogen (as N), mg/L	<0.02	<0.02	0.02	0.02
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Chloride, mg/L	68	63	130	72
Fluoride, mg/L	0.3	0.3	0.4	0.4
Nitrate (as N), mg/L	3.7	2.7	5.1	3.6
Nitrite (as N), mg/L	<0.01	<0.01	<0.01	<0.01
Low Level Phenolics, mg/L	<0.005	<0.005	<0.005	<0.005
Total suspended solids (TSS), mg/L	<1	<1	7	<1
Sodium, mg/L	44	47	49	56
Sulfate, mg/L	77	94	63	68
Total Kjeldahl Nitrogen, mg/L	<0.5	<0.5	0.8	0.6

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	1st Quarter 1989			
Quadruplicate Conductivity				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
Sp Cond, Average, umhos/cm	790	760	860	760
Sp Cond, Std dev, umhos/cm	12	5.8	25	5.8
Quadruplicate TOC				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
TOC, Average, mg/L	1	0.8	1	0.8
TOC, Std dev, mg/L	0.03	0.05	0.07	0.02
Quadruplicate TOX				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
TOX, Average, mg/L	<0.025	<0.025	<0.025	<0.025
TOX, Std dev, mg/L	0	0	0	0
EPA Method 624				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
1,1,2,2–Tetrachloroethane, µg/L	<1	<1	<1	<1
1,1,1–Trichloroethane, µg/L	<1	<1	<1	<1
1,1,2–Trichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethylene, µg/L	<1	<1	<1	<1
1,2–Dichloroethane, µg/L	<1	<1	<1	<1
1,2–Dichloroethylene (total), µg/L	<1	<1	<1	<1
1,2–Dichloropropane, µg/L	<1	<1	<1	<1
2–Chloroethylvinylether, µg/L	<1	<1	<1	<1
Bromodichloromethane, µg/L	<1	<1	<1	<1
Bromomethane, µg/L	<1	<1	<1	<1
Bromoform, µg/L	<1	<1	<1	<1
Chlorobenzene, µg/L	<1	<1	<1	<1
Carbon Tetrachloride, µg/L	<1	<1	<1	<1
Chloroethane, µg/L	<1	<1	<1	<1
Chloroform, µg/L	<1	<1	<1	<1
Chloromethane, µg/L	<1	<1	<1	<1
Dibromochloromethane, µg/L	<1	<1	<1	<1
Methylene chloride, µg/L	<1	<1	<1	<1
Tetrachloroethylene, µg/L	<1	<1	<1	<1
Trichloroethylene, µg/L	4	<1	2	<1
Trichlorofluoromethane, µg/L	<1	<1	<1	<1
Vinyl chloride, µg/L	<1	<1	<1	<1
trans–1,3–Dichloropropene, µg/L	<1	<1	<1	<1
Toluene, µg/L	<1	<1	<1	<1

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	1st Quarter 1989			
EPA Method 624 (Continued				
Benzene, µg/L	<1	<1	<1	<1
Ethylbenzene, µg/L	<1	<1	<1	<1
Title 22 organics				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
Date extracted	2/21/89	2/28/89	2/16/89	2/28/89
Date analyzed	2/27/89	2/21/89	2/23/89	2/21/89
2,4,5–TP (Silvex), µg/L	<2	<2	<1	<2
2,4–D, µg/L	<20	<20	<10	<20
Endrin, µg/L	<0.01	<0.01	<0.01	<0.01
Lindane, µg/L	<0.4	<0.4	<0.4	<0.4
Methoxychlor, µg/L	<10	<10	<10	<10
Toxaphene, µg/L	<0.5	<0.5	<0.5	<0.5
Explosive compounds				
Date sampled	2/15/89	2/16/89	2/14/89	2/16/89
RDX, µg/L	<20	<20	<20	<20
HMX, µg/L	<20	<20	<20	<20
TNT, µg/L	<20	<20	<20	<20
Radiological results				
Date sampled	2/16/89	3/30/89	3/30/89	3/30/89
Gross alpha, pCi/L	<4	4	<2	<9
Two Std dev		+2		
Gross beta, pCi/L	17	10	38	8
Two Std dev	+3	+2	+4	+3
Tritium, pCi/L	<228	<186	<186	<186
Uranium 238, pCi/L	2.8	3.2	2.8	3.5
Two Std dev	+0.5	+0.7	+0.3	+0.6
Uranium 235, pCi/L	0.3	0.5	0.2	0.2
Two Std dev	+0.2	+0.3	+0.1	+0.1
Uranium 234, pCi/L	5.4	4.1	5.1	4.7
Two Std dev	+0.7	+0.8	+0.5	+0.7
Radium 226, pCi/L	<0.1	<0.1	0.2	0.2
Two Std dev			+0.1	+0.1

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	1st Quarter 1989 (Continued)			
EPA Method 625				
Date sampled	2/16/89	–	–	–
Date analyzed	2/24/89	–	–	–
1,2,4–Trichlorobenzene, µg/L	<1	–	–	–
1,2–Dichlorobenzene, µg/L	<1	–	–	–
1,2–Diphenylhydrazine, µg/L	<1	–	–	–
1,3–Dichlorobenzene, µg/L	<1	–	–	–
1,4–Dichlorobenzene, µg/L	<1	–	–	–
2,4,6–Trichlorophenol, µg/L	<1	–	–	–
2,4–Dichlorophenol, µg/L	<1	–	–	–
2,4–Dimethylphenol, µg/L	<1	–	–	–
2,4–Dinitrotoluene, µg/L	<1	–	–	–
2,4–Dinitrophenol, µg/L	<10	–	–	–
2,6–Dinitrotoluene, µg/L	<1	–	–	–
2–Chloronaphthalene, µg/L	<1	–	–	–
2–Nitrophenol, µg/L	<1	–	–	–
2–Chlorophenol, µg/L	<1	–	–	–
2–Methyl–4,6–dinitrophenol, µg/L	<1	–	–	–
3,3'–Dichlorobenzidine, µg/L	<1	–	–	–
4–Bromophenylphenylether, µg/L	<1	–	–	–
4–Chloro–3–methylphenol, µg/L	<1	–	–	–
4–Chlorophenylphenylether, µg/L	<1	–	–	–
4–Nitrophenol, µg/L	<20	–	–	–
Acenaphthene, µg/L	<1	–	–	–
Acenaphthylene, µg/L	<1	–	–	–
Anthracene, µg/L	<1	–	–	–
Bis(2–ethylhexyl)phthalate, µg/L	<100	–	–	–
Benzidine, µg/L	<40	–	–	–
Bis(2–chloroethyl)ether, µg/L	<1	–	–	–
Bis(2–chloroisopropyl)ether, µg/L	<1			
Bis(2–chloroethoxy)methane, µg/L	<1	–	–	–
Benzo(a)anthracene, µg/L	<1	–	–	–
Benzo(a)pyrene, µg/L	<1	–	–	–
Benzo(b)fluoranthene, µg/L	<1	–	–	–
Benzo(g,h,i)perylene, µg/L	<1	–	–	–
Benzo(k)fluoranthene, µg/L	<1	–	–	–
Butylbenzylphthalate, µg/L	<1	–	–	–
Chrysene, µg/L	<1	–	–	–
Di–n–octylphthalate, µg/L	<1	–	–	–
Dibenzo(a,h)anthracene, µg/L	<1	–	–	–
Dibutylphthalate, µg/L	<1	–	–	–
Diethylphthalate, µg/L	<1	–	–	–
Dimethylphthalate, µg/L	<1	–	–	–
Fluorene, µg/L	<1	–	–	–
Fluoranthene, µg/L	<1	–	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	1st Quarter 1989 (Continued)			
EPA Method 625 (Continued)				
Hexachlorobenzene, µg/L	<1	–	–	–
Hexachlorobutadiene, µg/L	<1	–	–	–
Hexachlorocyclopentadiene, µg/L	<1	–	–	–
Hexachloroethane, µg/L	<1	–	–	–
Indeno(1,2,3-c,d)pyrene, µg/L	<1	–	–	–
Isophorone, µg/L	<1	–	–	–
N-Nitrosodi-n-propylamine, µg/L	<1	–	–	–
N-Nitrosodimethylamine, µg/L	<1	–	–	–
N-Nitrosodiphenylamine, µg/L	<1	–	–	–
Naphthalene, µg/L	<1	–	–	–
Nitrobenzene, µg/L	<1	–	–	–
Pentachlorophenol, µg/L	<1	–	–	–
Phenanthrene, µg/L	<1	–	–	–
Phenol, µg/L	<1	–	–	–
Pyrene, µg/L	<1	–	–	–
C10-C20 Hydrocarbon Matrix, µg/L (semi-quantitative)	2000	–	–	–
General Mineral				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
Date analyzed	2/24/89	6/25/89	2/23/89	2/25/89
Hydroxide Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Bicarbonate Alk (as $CaCO_3$), mg/L	200	180	210	180
Copper, mg/L	0.02	<0.001	<0.001	<0.001
Specific Conductance, umhos/cm	790	750	840	760
Chloride, mg/L	68	63	130	72
Sulfate, mg/L	77	94	63	68
Sodium, mg/L	44	47	49	56
EPA Method 602				
Date sampled	2/16/89	–	–	–
Date analyzed	2/24/89	–	–	–
Benzene, µg/L	<1	–	–	–
Chlorobenzene, µg/L	<1	–	–	–
1,2-Dichlorobenzene, µg/L	<1	–	–	–
1,3-Dichlorobenzene, µg/L	<1	–	–	–
1,4-Dichlorobenzene, µg/L	<1	–	–	–
Ethylbenzene, µg/L	<1	–	–	–
Toluene, µg/L	<1	–	–	–
Total Xylene Isomers, µg/L	<1	–	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	1st Quarter 1989 (Continued)			
Title 22 Metals				
Date sampled	2/16/89	2/16/89	2/14/89	2/16/89
Date analyzed	2/24/89	6/25/89	2/23/89	2/25/89
Arsenic, mg/L	0.02	0.02	0.02	0.02
Barium, mg/L	1.9	1.2	1.4	1.2
Beryllium, mg/L	<0.01	<0.03	<0.01	<0.01
Cadmium, mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, mg/L	0.04	0.001	0.0004	0.001
Copper, mg/L	0.02	<0.001	<0.001	<0.001
Lead, mg/L	<0.002	<0.002	<0.002	<0.002
Mercury, mg/L	<0.0008	<0.0008	<0.0008	<0.0008
Selenium, mg/L	<0.004	<0.004	<0.004	<0.004
Silver, mg/L	<0.0005	<0.0005	<0.0005	0.0005
	2nd Quarter 1989			
Chemical and physical analyses				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
Ammonia Nitrogen (as N), mg/L	<0.02	0.02	0.03	<0.02
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Chloride, mg/L	67	66	100	75
Fluoride, mg/L	0.4	0.4	0.4	0.4
Nitrate (as N), mg/L	11	7.6	12	9.2
Nitrite (as N), mg/L	<0.01	<0.01	–	<0.01
Nitrite (as NO_2), mg/L	–	–	<0.03	–
Low Level Phenolics, mg/L	<0.005	<0.005	<0.005	<0.005
Total suspended solids (TSS), mg/L	2	1	7	1
Sodium, mg/L	66	68	72	81
Sulfate, mg/L	74	80	67	60
Total Kjeldahl Nitrogen, mg/L	<0.5	<0.5	<0.5	<0.5
Quadruplicate Conductivity				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
Sp Cond, Average, umhos/cm	790	760	880	750
Sp Cond, Std dev, umhos/cm	4.5	16	5	5
Quadruplicate TOC				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
TOC, Average, mg/L	1.3	0.9	1.1	1
TOC, Std dev, mg/L	0.07	0.05	0.05	0.04

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	2nd Quarter 1989 (Continued)			
Quadruplicate TOX				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
TOX, Average, mg/L	<0.025	<0.025	<0.025	<0.025
TOX, Std dev, mg/L	0	0	0	0
EPA Method 624				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
1,1,2,2–Tetrachloroethane, µg/L	<1	<1	<1	<1
1,1,1–Trichloroethane, µg/L	<1	<1	<1	<1
1,1,2–Trichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethane, µg/L	<1	<1	<1	<1
1,1–Dichloroethylene, µg/L	<1	<1	<1	<1
1,2–Dichloroethane, µg/L	<1	<1	<1	<1
1,2–Dichloroethylene (total), µg/L	<1	<1	<1	<1
1,2–Dichloropropane, µg/L	<1	<1	<1	<1
2–Chloroethylvinylether, µg/L	<1	<1	<1	<1
Bromodichloromethane, µg/L	<1	<1	<1	<1
Bromomethane, µg/L	<1	<1	<1	<1
Bromoform, µg/L	<1	<1	<1	<1
Chlorobenzene, µg/L	<1	<1	<1	<1
Carbon Tetrachloride, µg/L	<1	<1	<1	<1
Chloroethane, µg/L	<1	<1	<1	<1
Chloroform, µg/L	<1	1	<1	<1
Chloromethane, µg/L	<1	<1	<1	<1
Dibromochloromethane, µg/L	<1	<1	<1	<1
Methylene chloride, µg/L	<1	<1	<1	<1
Tetrachloroethylene, µg/L	<1	<1	<1	<1
Trichloroethylene, µg/L	5	<1	2	<1
Trichlorofluoromethane, µg/L	<1	<1	<1	<1
Vinyl chloride, µg/L	<1	<1	<1	<1
trans–1,3–Dichloropropene, µg/L	<1	<1	<1	<1
Toluene, µg/L	<1	<1	<1	<1
Benzene, µg/L	<1	<1	<1	<1
Ethylbenzene, µg/L	<1	<1	<1	<1
Title 22 organics				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
Date extracted	4/12/89	4/12/89	4/12/89	4/12/89
Date analyzed	4/18/89	4/17/89	4/17/89	4/17/89
2,4,5–TP (Silvex), µg/L	<1	<1	<1	<1
2,4–D, µg/L	<10	<10	<10	<10
Endrin, µg/L	<0.01	<0.01	<0.01	<0.01
Lindane, µg/L	<0.4	<0.4	<0.4	<0.4

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	2nd Quarter 1989 (Continued)			
Title 22 organics (Continued)				
Methoxychlor, µg/L	<10	<10	<10	<10
Toxaphene, µg/L	<0.5	<0.5	<0.5	<0.5
Explosive compounds				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
RDX, µg/L	<20	<20	<20	<20
HMX, µg/L	<20	<20	<20	<20
TNT, µg/L	<20	<20	<20	<20
Radiological results				
Date sampled	4/05/89	4/05/89	4/07/89	5/10/89
Gross alpha, pCi/L	<4	3	<6	3
Two Std dev		+2		+2
Gross beta, pCi/L	18	8	11	9
Two Std dev	+6	+4	+6	+6
Tritium, pCi/L	<186	<468	<186	<186
Uranium 238, pCi/L	2.5	3.1	2.8	2.8
Two Std dev	+0.4	+0.4	+0.3	+0.3
Uranium 235, pCi/L	<0.2	0.2	0.3	0.2
Two Std dev		+0.1	+0.1	+0.1
Uranium 234, pCi/L	4.9	4.9	4.8	4.2
Two Std dev	+0.6	+0.5	+0.3	+0.3
Radium 226, pCi/L	<0.1	<0.1	0.3	<0.1
Two Std dev			+0.1	
EPA Method 625				
Date sampled	4/05/89	–	–	–
Date analyzed	4/18/89	–	–	–
1,2,4–Trichlorobenzene, µg/L	<1	–	–	–
1,2–Dichlorobenzene, µg/L	<1	–	–	–
1,2–Diphenylhydrazine, µg/L	<1	–	–	–
1,3–Dichlorobenzene, µg/L	<1	–	–	–
1,4–Dichlorobenzene, µg/L	<1	–	–	–
2,4,6–Trichlorophenol, µg/L	<1	–	–	–
2,4–Dichlorophenol, µg/L	<1	–	–	–
2,4–Dimethylphenol, µg/L	<1	–	–	–
2,4–Dinitrotolµene, µg/L	<1	–	–	–
2,4–Dinitrophenol, µg/L	<10	–	–	–
2,6–Dinitrotoluene, µg/L	<1	–	–	–
2–Chloronaphthalene, µg/L	<1	–	–	–
2–Nitrophenol, µg/L	<1	–	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	2nd Quarter 1989 (Continued)			
EPA Method 625 (continued)				
2–Chlorophenol, µg/L	<1	–	–	–
2–Methyl–4,6–dinitrophenol, µg/L	<1	–	–	–
3,3'–Dichlorobenzidine, µg/L	<1	–	–	–
4–Bromophenylphenylether, µg/L	<1	–	–	–
4–Chloro–3–methylphenol, µg/L	<1	–	–	–
4–Chlorophenylphenylether, µg/L	<1	–	–	–
4–Nitrophenol, µg/L	<20	–	–	–
Acenaphthene, µg/L	<1	–	–	–
Acenaphthylene, µg/L	<1	–	–	–
Anthracene, µg/L	<1	–	–	–
Bis(2–ethylhexyl)phthalate, µg/L	<100	–	–	–
Benzidine, µg/L	<40	–	–	–
Bis(2–chloroethyl)ether, µg/L	<1	–	–	–
Bis(2–chloroisopropyl)ether, µg/L	<1	–	–	–
Bis(2–chloroethoxy)methane, µg/L	<1	–	–	–
Benzo(a)anthracene, µg/L	<1	–	–	–
Benzo(a)pyrene, µg/L	<1	–	–	–
Benzo(b)fluoranthene, µg/L	<1	–	–	–
Benzo(g,h,i)perylene, µg/L	<1	–	–	–
Benzo(k)fluoranthene, µg/L	<1	–	–	–
Butylbenzylphthalate, µg/L	<1	–	–	–
Chrysene, µg/L	<1	–	–	–
Di–n–octylphthalate, µg/L	<1	–	–	–
Dibenzo(a,h)anthracene, µg/L	<1	–	–	–
Dibutylphthalate, µg/L	<1	–	–	–
Diethylphthalate, µg/L	<1	–	–	–
Dimethylphthalate, µg/L	<1	–	–	–
Fluorene, µg/L	<1	–	–	–
Fluoranthene, µg/L	<1	–	–	–
Hexachlorobenzene, µg/L	<1	–	–	–
Hexachlorobutadiene, µg/L	<1	–	–	–
Hexachlorocyclopentadiene, µg/L	<1	–	–	–
Hexachloroethane, µg/L	<1	–	–	–
Indeno(1,2,3–c,d)pyrene, µg/L	<1	–	–	–
Isophorone, µg/L	<1	–	–	–
N–Nitrosodi–n–propylamine, µg/L	<1	–	–	–
N–Nitrosodimethylamine, µg/L	<1	–	–	–
N–Nitrosodiphenylamine, µg/L	<1	–	–	–
Naphthalene, µg/L	<1	–	–	–
Nitrobenzene, µg/L	<1	–	–	–
Pentachlorophenol, µg/L	<1	–	–	–
Phenanthrene, µg/L	<1	–	–	–
Phenol, µg/L	<1	–	–	–
Pyrene, µg/L	<1	–	–	–

Table B-2. Analytical results reported by June 30, 1989, from the Pit 8 Area. (Continued)

Parameters	K8-01	K8-02B	K8-03B	K8-04
	2nd Quarter 1989 (Continued)			
General Mineral				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
Date analyzed	4/18/89	4/17/89	4/18/89	4/17/89
Hydroxide Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Carbonate Alk (as $CaCO_3$), mg/L	<1	<1	<1	<1
Bicarbonate Alk (as $CaCO_3$), mg/L	200	190	210	180
Specific Conductance, umhos/cm	790	770	880	740
Chloride, mg/L	67	66	100	75
Sulfate, mg/L	74	80	67	60
Sodium, mg/L	66	68	72	81
Title 22 Metals				
Date sampled	4/05/89	4/05/89	4/07/89	4/05/89
Date analyzed	4/18/89	4/17/89	4/18/89	4/17/89
Arsenic, mg/L	0.016	0.019	0.019	0.022
Barium, mg/L	<0.1	<0.1	<0.1	<0.1
Beryllium, mg/L	<0.01	<0.01	<0.01	<0.01
Cadmium, mg/L	<0.01	<0.01	<0.01	<0.01
Chromium, mg/L	<0.02	<0.02	<0.02	<0.02
Copper, mg/L	<0.02	<0.02	<0.02	<0.02
Lead, mg/L	0.007	<0.001	0.011	0.004
Mercury, mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Selenium, mg/L	0.002	0.003	0.003	0.004
Silver, mg/L	<0.01	<0.01	<0.01	<0.01

Appendix C

Water Elevations at Pit 8

Table C-1. Water elevation for installations in the Pit 8 Area.

Location	Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
K8-01				
	10/01/82		956.80	
	12/01/82		956.40	
	01/01/83		957.50	
	10/30/85		963.70	
	02/11/86		963.90	
	06/11/86		964.50	
	07/16/86		964.00	
	10/10/86		964.30	
	11/12/86	134.00	964.60	
	12/19/86	134.10	964.50	
	01/09/87	134.30	964.30	
	04/02/87	133.90	964.70	
	06/12/87	133.90	964.70	
	07/30/87	133.50	965.10	
	08/26/87	133.80	964.80	
	09/23/87	133.60	965.00	
	10/09/87	133.30	965.30	
	11/23/87	133.60	965.00	
	12/21/87	133.90	964.70	
	01/15/88	133.30	965.30	
	01/29/88	133.20	965.40	
	02/24/88	133.40	965.20	
	03/24/88	133.75	964.85	
	04/27/88	133.60	965.00	
	05/25/88	133.60	965.00	
	06/27/88	133.45	965.15	
	07/28/88	133.45	965.15	
	09/02/88	134.60	965.20	
	09/26/88	134.80	965.00	
	10/28/88	134.70	965.10	
	11/21/88	134.85	964.95	
	12/21/88	134.68	965.12	
	01/30/89	134.65	965.15	
	02/28/89	134.30	965.50	
	04/04/89	134.60	965.17	
	05/08/89	134.60	965.17	
	06/12/89	134.70	965.07	
K8-02B				
	06/12/87	163.60	963.90	
	07/30/87	163.50	964.00	
	08/26/87	163.50	964.00	
	09/23/87	163.50	964.00	
	11/23/87	163.30	964.20	
	12/21/87	183.60	943.90	ME
	01/29/88	163.10	964.40	
	02/23/88	163.00	964.50	
	03/24/88	163.90	963.60	
	03/29/88	163.60	963.90	
	04/27/88	163.50	964.00	
	05/25/88	163.65	963.85	
	06/27/88	163.80	963.70	
	07/28/88	163.80	963.70	
	09/01/88	163.60	963.90	
	09/26/88	164.30	963.60	
	11/02/88	164.00	963.90	
	11/21/88	164.32	963.58	
	12/21/88	164.05	963.85	
	01/30/89	164.10	963.80	
	02/28/89	164.70	963.20	
	04/04/89	164.10	964.32	
	05/08/89	164.20	964.22	
	06/12/89	164.20	964.22	
K8-03B				
	06/12/87	131.00	966.10	
	07/30/87	130.90	966.20	
	08/26/87	130.90	966.20	
	09/23/87	130.90	966.20	
	10/09/87	130.80	966.30	
	11/09/87	130.90	966.20	
	11/23/87	130.80	966.30	
	12/21/87	131.00	966.10	
	01/29/88	130.60	966.50	
	02/24/88	130.70	966.40	
	03/24/88	131.20	965.90	
	04/27/88	130.90	966.20	
	05/25/88	131.05	966.05	
	06/27/88	131.10	966.00	
	07/28/88	131.20	965.90	
	09/02/88	131.00	966.10	
	09/26/88	131.20	965.90	
	11/02/88	131.00	966.10	
	11/21/88	131.27	965.83	
	12/21/88	131.95	965.15	
	01/30/89	131.93	965.17	
	02/28/89	131.70	965.40	
	04/04/89	132.00	967.89	
	05/08/89	131.90	967.99	
	06/12/89	132.00	967.89	
K8-04				
	10/28/88	168.76	964.54	
	11/21/88	169.00	964.30	
	12/21/88	168.83	964.47	
	01/30/89	168.85	964.45	
	02/28/89	168.60	964.70	
	04/04/89	168.90	964.25	
	05/09/89	168.70	964.45	
	06/12/89	168.90	964.25	
K8-05				
	12/21/88	146.00	986.60	
	04/04/89			DRY
	05/08/89			DRY
	06/12/89			DRY

Notes:

ME Measuring error suspected.

Shiner elevations in the Pit 8 Area were resurveyed during March and April, 1989, and are being reviewed. Water elevations for these installations are tentative pending this review. Differences between elevations prior to and after April 1, 1989, will be resolved at the conclusion of the review.

Plate 1. Geologic map of Site 300 and surroundings (modified from Dibblee 1980a, b, c & d).