SOIL AND GROUND WATER QUALITY EVALUATION
PROPOSED EMERYVILLE POSTAL FACILITY
6121 HOLLIS STREET
EMERYVILLE, CALIFORNIA

7/30/13

STID #14428

LOVNEY ASSOCIATES
Environmental / Geotechnical / Engineering Services

LOWNEY ASSOCIATES
Environmental / Geotechnical / Engineering Services

July 30, 1993
864-17A, MV072908

Mr. Charles Wren
UNITED STATES POSTAL SERVICE
c/o DAMIEN, MANN, JOHNSON & MENDENHALL
222 Kearny Street, Suite 500
San Francisco, California 94108

RE: SOIL AND GROUND QUALITY EVALUATION PROPOSED EMERYVILLE POSTAL FACILITY 6121 HOLLIS STREET EMERYVILLE, CALIFORNIA

Dear Mr. Wren:

In accordance with your request, we have performed a soil and ground water quality evaluation at the proposed Emeryville Postal facility. The scope of work performed throughout this investigation was discussed with you and described in our proposal dated May 7, 1993. The purpose of this investigation was to further evaluate the extent of impacted soil and ground water as well as the need for and potential effectiveness of remedial measures at the site.

Four forms of petroleum fuel hydrocarbons (gasoline, diesel, kerosene, and oil) have been detected in the shallow on-site soils, mainly at a depth of greater than approximately 3 feet. The impacted soil appears to be located within an approximately 6- to 18-inch layer lying directly above ground water in the southern portion of the site.

Ground water was generally encountered at approximate depths of 4 to 9 feet below grade. The highest diesel range hydrocarbon level (4,900 parts per billion [ppb]) was detected near the down-gradient site boundary. The highest gasoline range hydrocarbon level (1,500 ppb) was detected near the up-gradient site boundary in the southeast corner of the property, suggesting that in addition to an on-site source in the southeast corner of the site, an off-site source also could be impacting the project site. Benzene at 3.2 ppb was the only compound detected exceeding drinking water standards.

Due to the low levels of petroleum hydrocarbons detected in the site's soil and ground water and that these hydrocarbons are likely to be relatively immobile and degrade over time, further remedial actions are not warranted, in our opinion. However, periodic monitoring of the on-site ground water should be initiated to monitor the migration and natural degradation of the petroleum fuel hydrocarbons.

We recommend also that you seek legal counsel regarding contacting the former on-site tenants and owners to evaluate responsible parties and to obtain financial assistance with further remedial actions. Consideration also should be given to

contacting Westinghouse regarding the soil with low levels of PCBs along the western boundary of the site that may be off-hauled prior to construction.

We refer you to the text of the report for details regarding our investigation. If you have any questions, please call.

Very truly yours,

LOWNEY ASSOCIATES

Stason I. Foster
Environmental Engineer

Ron L. Helm C.E.G.
Environmental Geologist

RLH:SIF

Copies: Addressee (6)

SOIL AND GROUND WATER QUALITY EVALUATION

For

PROPOSED EMERYVILLE POSTAL FACILITY
Emeryville, California

To

UNITED STATES POSTAL SERVICE
SAN BRUNO FACILITIES SERVICE CENTER
850 Cherry Avenue
San Bruno, California 94099-0310

July 1993

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SOIL AND GROUND WATER QUALITY EVALUATION
PROPOSED EMERYVILLE POSTAL FACILITY
6121 HOLLIS STREET
EMERYVILLE, CALIFORNIA

1.0 INTRODUCTION

1.1 Purpose

In this report, we present the results of our soil and ground water quality evaluation for the referenced site (Figures 1 and 2). The purpose of this work was to further evaluate site conditions and the need for remedial measures. The physical constraints affecting remediation were evaluated also on a preliminary basis. As you know, we recently performed a preliminary soil quality evaluation at the site. Our conclusions and recommendations were presented in the April 16, 1993 report titled, "Preliminary Soil Quality Evaluation, Proposed Emeryville Postal Facility, Emeryville, California."

1.2 Site/Project Description

The project site consists of approximately 1.7 acres of undeveloped land in a primarily industrial area bounded to the north by 62nd Street, to the south by Westinghouse Corporation property, to the west by Southern Pacific railroad tracks, and to the east by a parking lot for the 6121 Hollis Street building. Many of the buildings in the area date back to the early 1920s. The proposed United States Postal Service facility is expected to be developed by June 1994, and building foundations, asphaltic parking areas, and drives are expected to cover 95 percent of the native soil. Reportedly, only small strips of land, primarily at the front entrance along 62nd Street, will

be left uncapped to allow planting of decorative landscaping.

1.3 Site Background

Previous work to evaluate site conditions has included a review of site history, collection of numerous soil samples, installation of one ground water monitoring well, collection of ground water grab samples, and the performance of a geophysical survey.

As discussed in detail in previous reports (referenced below) for the site, the property has been used for a variety of purposes by several tenants. Former tenants include Thomas Rigging (a draying and rigging company), ITT Grinnell (a plumbing supply business), and U.C. Livermore Laboratory. A former on-site warehouse was also reportedly used for storage and repair of automobiles (Dames & Moore, March 26, 1993).

A 1930 Sanborn Fire Insurance map shows the site to have been used as an oil distribution facility operated by both Shell and Guardian Oil companies (Dames & Moore, March 26, 1993). Fourteen storage tanks, presumably above ground, were used to store petroleum fuels at the site. Four of the tanks, located on the southeastern portion of the site, were used to store gasoline. The ten remaining tanks were located on a concrete pad near the southwestern corner of the property; these tanks stored oil. Oil pumps and a filling shed were also shown on the Sanborn map. This distribution facility was demolished sometime prior to 1949.

Polychlorinated biphenyl (PCB) contamination has been detected in soil and ground water immediately

south of the site on property owned by Westinghouse (see section 1.4, following). In response, this site was enclosed by an underground slurry wall and capped. Several soil samples collected on the adjacent site near the southern boundary of the subject property were analyzed for PCBs by the California Department of Health Services in February 1981, and elevated PCB levels were detected. The former owner of the site, ITT Grinnell Corporation, contracted CH2M Hill in 1981 to evaluate shallow soil quality on the parcel immediately east of the project site. Reportedly, PCBs were detected along this property's southern boundary, with the highest concentrations (2,400 parts per million [ppm]) found adjacent to a railroad spur which ran between the Grinnell and Westinghouse properties.

To evaluate the potential impact of the Westinghouse facility on soil quality at the project site, 41 shallow soil samples were collected and analyzed for PCBs (Harding Lawson Associates, September 1990). Reportedly, only one sample contained PCBs (at 52 ppm) above 5 ppm. A second analysis performed on this sample detected PCBs at 17 ppm.

To further assess the concentration of PCBs and total petroleum hydrocarbons (TPH) in subsurface soil and ground water, additional sampling was conducted at the site (Harding Lawson Associates 1992). Of the 22 soil samples analyzed, PCBs were detected only in one sample (21 ppm) collected near the eastern boundary of the property. TPH as diesel was detected in three borings, with a maximum concentration of 700 ppm near the western property

boundary. TPH as kerosene was also detected in three borings at concentrations ranging from 2 to 86 ppm. To evaluate ground water quality, one ground water monitoring well was installed and sampled, and two ground water grab samples were collected. Analytical results indicated PCBs (up to 390 parts per billion [ppb]), TPH as diesel (up to 22,000 ppb), and TPH as kerosene (up to 870,000 ppb) in the ground water (Harding Lawson Associates, April 1992).

During preliminary construction activities in January and February 1993, several underground pipes and a 600-gallon underground storage tank were encountered at the site. A geophysical survey was subsequently performed to evaluate if additional buried features were present (Dames & Moore, March 5, 1993). This survey detected other anomalies.

Fourteen soil samples were collected from five trenches excavated at the site in February 1993 (Dames & Moore, March 16, 1993). Diesel fuel, kerosene, petroleum oil, and PCB were detected during this investigation at levels up to 6 ppm, 56 ppm, 81 ppm, and 0.053 ppm, respectively.

To evaluate the unknown anomalies as well as soil quality, 12 additional trenches were excavated in April 1993 (Lowney Associates, April 1993). This work indicated that several hundred feet of piping, most of which appeared to be old utility lines, were present on-site. In addition to the tank discovered during previous construction activities, a second tank was found to be located beneath the sidewalk along the northern side of the property. Also, what appeared

to be globules of diesel fuel were observed floating on the ground water in trenches located just south and southeast of the existing ground water monitoring well. This product ranged in thickness from a sheen to approximately 1/8 inch and appeared to be very weathered diesel.

Petroleum hydrocarbons, mainly diesel range compounds, were detected in soil at concentrations which generally near 1,000 ppm with a maximum of 2,900 ppm. The majority of the impacted soil appeared to located directly above the ground water table within the capillary fringe. Ground water below the site was typically encountered at depths of between 4 and 6 feet.

On the southeast corner of the site, soil impacted with petroleum oil (up to 13,000 ppm) was encountered. This oil appeared heavier than the gasoline and diesel range hydrocarbons encountered on other portions of the site.

1.4 Westinghouse

Westinghouse Electrical Corporation facility began operations in 1924 at a facility located immediately southeast of the site. The property located directly south of the site is also owned by Westinghouse. This facility was used for maintenance and repair of electrical transformers which contained PCBs, and has a history of PCB contamination. Westinghouse was formerly listed on the State Superfund List and is currently on the California Regional Water Quality Control Board (CRWQCB) North Bay Toxics list as well as on the Division of Toxic Substance Control Backlog Site Cleanup List. PCBs have been detected in soil at the Westinghouse facility at levels up to

430,000 ppm and on the property directly south of the project site at up to 130,000 ppm. Ground water below the facility was also found to be impacted by PCBs. Between 1985 and 1986, Westinghouse initiated remedial measures including excavation and off-site disposal of highly impacted soil, and on-site encapsulation of soil containing lower PCB levels. As mentioned previously, a bentonite and polymer slurry wall was installed around the site to a depth of 30 to 35 feet to limit the off-site migration of PCBs. The impacted soil was subsequently covered with a clay and asphaltic concrete cap (Dames & Moore, March 26, 1993).

1.5 Scope of Work

The scope of work performed during this investigation included the following:

- Performance of a soil vapor survey including advancing 46 vapor probes and performance of a vapor extraction feasibility evaluation.
- Collection and laboratory analysis of soil samples from 25 exploratory borings.
- Conversion of four of the borings to "permanent" ground water monitoring wells.
- Development, sampling, and surveying of the four newly installed wells. The existing well was also surveyed and sampled.
- Performance of slug tests on four wells to evaluate aquifer parameters.
- Preparation of this report.

2.0 SITE INVESTIGATION

2.1 Soil Vapor Survey

To help evaluate the distribution of volatile petroleum hydrocarbons in soil at the site, a soil vapor survey was performed on June 2 through June 4, 1993. This survey consisted of advancing 46 vapor probes (VP-1 through VP-46) in a grid pattern with spacings of approximately 30 feet. Probe locations are shown on Figure 3. A copy of the soil vapor survey report is presented in Appendix F.

Each of the vapor probes was constructed of 1/2-inch diameter schedule 40 galvanized steel pipe with a forged point at the lower end. To allow for vapor extraction, the lower 2 feet of the probes were perforated with 3/16-inch holes.

The probes were driven with a hand-held pneumatic driver to depths between 3 and 5 feet based on the estimated depth to ground water at each location. An electric hammer-drill was used to penetrate the pavements where necessary. The goal was to drive the probes to within approximately 1 foot of the ground water table which was estimated to range from approximately 3 feet below low lying areas to approximately 6 feet below locations with higher surface elevations. Probe depths were also varied if the permeability of the soil initially encountered was insufficient to allow for adequate vapor sample extraction.

2.1.1 Soil Vapor Analyses

After installation, soil gas was drawn from each probe through teflon tubing using a vacuum pump. Each sample was analyzed for total volatile hydrocarbons using a Beckman 400 total hydro-

carbon analyzer equipped with a flame ionization detector (FID).

As shown in Table 1, total hydrocarbon concentrations (up to 13,000 ppm) were detected in soil vapor at various locations. These results are also presented on Figure 3.

To further evaluate the constituents of the petroleum vapors detected, a tedlar bag sample was collected from well MW-1, which was installed in the area where the highest total hydrocarbon vapor concentration was detected. An organic and hydrogen sulfide-like odor was noted during collection of the tedlar bag sample. The sample was analyzed for total petroleum hydrocarbons as gasoline, BTEX, and methane. Analytical reports are presented in Appendix D. TPH as gasoline was detected at 7.1 mg/l (approximately 7,100 ppm). Benzene and toluene were detected at 0.052 and 0.020 mg/l, respectively. Ethylbenzene, xylenes, and methane were not detected.

TABLE 1. Soil Vapor Sample Analysis for Total Hydrocarbons
6121 Hollis Street
Emeryville, California

Sample Location	Date	Depth (ft)	Vacuum (in.Hg)	Total Hydrocarbons (ppm*)
VP-1	6-2-93	3.0	15	10,000
VP-2	6-2-93	3.0	9.0	20
VP-3	6-2-93	3.0	0.0	10
VP-4	6-2-93	3.0	0.0	5
VP-5	6-2-93	3.0	0.0	4
VP-6	6-2-93	3.0	18	4,000
VP-7	6-2-93	3.5	4.5	5
VP-8	6-2-93	3.5	13	5
VP-9	6-2-93	3.5	5.0	210

continued

TABLE 1. Soil Vapor Sample Analysis for Total Hydrocarbons
6121 Hollis Street
Emeryville, California
(continued)

Sample Location	Date	Depth (ft)	Vacuum(in.Hg)	Total Hydrocarbons (ppm*)
VP-10	6-3-93	4.0	2.0	12
VP-11	6-2-93	5.0	2.5	9,400
VP-12	6-2-93	NS	NS	NS
VP-13	6-2-93	5.0	0.0	15
VP-14	6-2-93	5.0	4.0	2,500
VP-15	6-2-93	5.0	Not Available	1,500
VP-16	6-3-93	4.0	1.0	260
VP-17	6-3-93	4.0	10	37
VP-18	6-3-93	5.0	1.25	9
VP-19	6-3-93	5.0	4.5	28
VP-20	6-3-93	5.0	5.0	31
VP-21	6-3-93	4.0	3.5	16
VP-22	6-3-93	4.0	4.0	17
VP-23	6-3-93	4.0	0.0	40
VP-24	6-3-93	4.5	1.0	1,500
VP-25	6-3-93	4.5	2.0	300
VP-26	6-3-93	4.5	0.0	8
VP-27	6-3-93	4.5	3.0	12
VP-28	6-3-93	4.5	0.0	4
VP-29	6-3-93	4.0	4.0	1,300
VP-30	6-3-93	4.0	2.0	5
VP-31	6-3-93	3.5	4.0	15
VP-32	6-3-93	5.0	2.5	6
VP-33	6-3-93	5.0	4.0	19
VP-34	6-3-93	5.0	3.0	26
VP-35	6-3-93	4.5	1.5	9,200
VP-36	6-3-93	4.5	2.5	6,900
VP-37	6-3-93	4.0	0.0	5
VP-38	6-3-93	4.0	0.0	6
VP-39	6-4-93	3.0	4.5	30
VP-40	6-4-93	4.5	0.0	9,700
VP-41	6-4-93	4.5	4.5	9,700
VP-42	6-4-93	4.5	4.5	13,000
VP-43	6-4-93	4.5	1.5	11,000
VP-44	6-4-93	5.0	4.5	19
VP-45	6-4-93	3.0	0.0	3
VP-46	6-4-93	4.0	0.0	3

NS Not Sampled- probe could not be driven
* ppm as propane in air

2.2 Soil Quality Evaluation

To evaluate soil quality at the site, soil samples were subsequently collected from 25 exploratory borings (EB-1 through EB-21 and MW-1 through MW-4).

Borings MW-1 through MW-4 were converted to ground water monitoring wells as discussed below in section 2.3. This work was performed on June 6 and 7, 1993. The boring locations are shown on Figure 4.

Exploratory borings EB-6 through EB-12 were drilled near the southeastern corner of the site to evaluate the extent of oil impacted soil that was previously detected in shallow soil during trenching in this area. Similarly, soil samples from exploratory borings EB-18 through EB-21 were collected to evaluate the extent of oil and PCBs that were previously detected in the shallow gravelly fill located beneath the former train track spur that ran along the western side of the site (Lowney Associates, April 1993).

The remaining borings were located in areas at which elevated total hydrocarbon levels were detected during the soil vapor survey or in areas where petroleum fuels were suspected to have been stored during the time the site was used as an oil distribution facility. Two additional borings, EB-13 and MW-3, were drilled through the water-bearing zone into the underlying aquitard to help evaluate the vertical extent of petroleum hydrocarbon contamination in the southern portion of the site.

2.2.1 Subsurface Materials

On June 7 and 8, 1993, 25 exploratory borings were drilled to depths of 5 to 15 feet at the locations shown on Figure 4. At the time of drilling, ground water was encountered at depths ranging from 3.5 to 9 feet below grade. The upper-most stratum (stratum A*f*) consisted of fill material ranging from silty/sandy gravel to gravelly clay. Stratum A*f* was encountered in all borings to depths of 2 to 7 feet.

Stratum B, silty clay to clayey silt, was encountered beneath the fill to a maximum depth of 9 feet in all borings except exploratory borings EB-5 and EB-16.

Stratum C, the water-bearing zone, underlies stratum B and consists of sandy clay to sandy gravel to a maximum depth of 13 feet.

Stratum D was encountered beneath stratum C in borings MW-3, EB-2, and EB-13 to the maximum depth explored of 15 feet. Stratum D is a silty clay aquitard. Boring logs are presented in Appendix A.

2.2.2 Soil Analyses

Soil samples were collected from each boring at depth intervals typically of 5 feet or less. The soil samples collected were monitored for volatile hydrocarbons using a portable organic vapor meter (OVM). As shown on the attached boring logs (see Appendix B), OVM readings ranged from 0 to >1,000 ppm, with the highest levels typically detected in soil located just above the ground water table.

Based on the OVM data and field observations, selected samples from the borings were analyzed for TPH as gasoline and BTEX compounds (EPA Test Method 8015/8020), diesel and kerosene range hydrocarbons using a fuel fingerprint analysis (EPA Test Method 8015M), and total petroleum oil (Standard Method 5520EF). In addition, two composite samples, EB-(6, 7, 10, 11) and EB-(18 to 21), collected from the oil and PCB impacted areas at the southeast corner of the site and beneath the former train track spur along the western site boundary, respectively, were analyzed for 17 California Assessment Manual (CAM) metals;

halogenated volatile organic compounds (VOCs) (EPA Test Method 8010); reactivity, corrosivity, and ignitability (RCI); and PCBs (EPA Test Method 8080). These analyses are typically required by local landfills prior to acceptance of soil. Analytical results are presented in Tables 2 and 2A. Copies of all laboratory reports are attached in Appendix D.

TABLE 2. Laboratory Results of Soil Samples for Petroleum Hydrocarbons
6121 Hollis Street
Emeryville, California
(concentrations in ppm)

Sample Location	Depth (feet)	Oil	Extractable Hydrocarbons (diesel range)	Non-Gas Mix (<C6) (gasoline range)	Benzene	Toluene	Ethyl-Benzene	Xylenes	VOCs	PCBs
EB-1	2.5-3.0	--	--	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
	4.0-4.5	<50	<1.0	--	--	--	--	--	--	--
EB-2	2.5-3.0	--	--	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
	7.5-8.0	740	1,500[1]	570	<0.005	<0.005	<0.005	2.7	--	--
EB-3	7.0-7.5	<50	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
EB-5	7.0-7.5	<50	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
EB-6	2.0-2.5	<50	--	--	--	--	--	--	--	--
EB-7	2.0-2.5	790	--	--	--	--	--	--	--	--
EB-8	2.0-2.5	<50	--	--	--	--	--	--	--	--
EB-9	2.5-3.0	92	--	--	--	--	--	--	--	--
EB-10	2.5-3.0	530	--	--	--	--	--	--	--	--
EB-11	2.0-2.5	190	--	--	--	--	--	--	--	--
EB-12	4.5-5.0	<50	--	--	--	--	--	--	--	--
EB-13	4.5-5.0	190	390[1]	52	<0.005	0.038	<0.005	0.13	--	--
	14.5-15.0	<50	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
EB-14	5.0-5.5	<50	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
EB-15	5.0-5.5	<50	100[2]	12	<0.005	0.017	0.059	0.037	--	--
EB-16	8.5-9.0	<50	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
EB-17	5.0-5.5	<50	25[3]	19	<0.005	0.035	0.052	0.34	--	--
EB-18	0.5	51	--	--	--	--	--	--	--	--
EB-19	0.5	<50	--	--	--	--	--	--	--	--
EB-20	0.5	<50	--	--	--	--	--	--	--	--
EB-21	0.5	<50	--	--	--	--	--	--	--	--
EB-(6,7,10,11)*		--	--	--	--	--	--	--	ND	ND
EB(18-21)*		--	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	ND	0.45
MW-1	2.5-3.0	160	5.3[4]	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
MW-2	5.0-5.5	140	--	--	--	--	--	--	--	--
	5.5-6.0	490	100[5]	330	<0.005	<0.005	<0.005	0.60	--	--

continued

TABLE 2. Laboratory Results of Soil Samples for Petroleum Hydrocarbons
6121 Hollis Street
Emeryville, California
(concentrations in ppm)
(continued)

Sample Location	Depth (feet)	Oil	Extractable Hydrocarbons (diesel range)	Non-Gas Mix (<C6) (gasoline range)	Benzene	Toluene	Ethyl-Benzene	Xylenes	VOCs	PCBs
MW-3	7.0-7.5*	<50	98[4]	420[5]	<0.005	1.0	2.3	1.0	--	--
	12.5-13.0	230[2]	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	--	--
MW-4	6.0-6.5	180[2]	36[3]	26	<0.005	0.026	<0.005	<0.005	--	--

ND Not Detected above laboratory detection limits
-- Not Analyzed
* Composite sample
< Less than detection limit
1 Non-diesel mix (C-10 to C22)
2 Motor oil
3 Gas
4 (>C18)
5 Kerosene and discrete peaks

TABLE 2A. Laboratory Results of Composite Soil Samples for Metals and RCI
6121 Hollis Street
Emeryville, California
(concentrations in ppm)

	EB-(6,7,10,11)	EB-(18-21)	TTLC Maximum Limit
Metals			
Antimony	<5.0	<5.0	500
Arsenic	<5.0	18	500
Barium	210	210	10,000
Beryllium	<0.01	<0.01	75
Cadmium	<0.01	31	100
Chromium	23	26	2,500
Cobalt	7.9	8.0	8,000
Copper	19	45	2,500
Lead	31	61	1,000
Mercury	<1.0	0.17	20
Molybdenum	<0.05	<0.05	3,500
Nickel	<0.05	<0.05	2,000
Selenium	<5.0	5.0	100
Silver	<0.01	<0.01	500
Thallium	<5.0	<5.0	700

continued

TABLE 2A. Laboratory Results of Composite Soil Samples for Metals and RCI
6121 Hollis Street
Emeryville, California
(concentrations in ppm)

	EB-(6,7,10,11)	EB-(18-21)	TTLC Maximum Limit
Vanadium	21	25	2,400
Zinc	59	220	5,000
Corrosivity (pH)	6.6	6.1	
Ignitability			
Flashpoint	>100°C	>100°C	
Reactivity			
Sulfide	<13	<13	
Cyanide	<0.50	<0.50	
Reaction with Water	Negative	Negative	

As shown in Table 2, a low concentration of PCBs (0.45 ppm) was detected in the composite sample collected near the former on-site railroad track spur. However, PCBs were not detected in the composite samples from the southeast corner of the site. VOCs were not detected in the samples; the analyses also indicated that the soil tested is not reactive, corrosive, or ignitable. Metal concentrations detected in these composite soil samples are typical of naturally occurring background levels.

2.3 Ground Water Quality Evaluation

To better evaluate ground water quality at the site, exploratory borings MW-1, MW-2, MW-3, and MW-4 were converted to ground water monitoring wells. Each well was permitted and installed in accordance with Zone 7 Water Agency Guidelines. Well permits are presented in Appendix A. Boring logs, well construction details, and details regarding our field investigation are included in Appendix B. Well

development and sampling protocols as well as field data sheets are presented in Appendix C.

As shown on Figure 4, wells MW-1 and MW-4 were installed near the western site boundary at locations suspected to be down-gradient of the most highly impacted areas and, in the case of MW-1, where elevated hydrocarbon levels were detected during the soil vapor survey. Well MW-3 was centrally located on-site. Well MW-2 was located in the expected up-gradient corner of the site, near the location where oil impacted soil was previously detected. Elevated hydrocarbon levels were also detected near MW-2 during our soil vapor survey. The previously existing on-site well, MW-1A, is located near the center of the western property line.

2.3.1 Ground Water Analyses

Ground water samples collected from each of the five wells were analyzed at a state certified laboratory for TPH as gasoline and BTEX compounds (EPA Test Method 8015/8020), diesel and kerosene range extractable hydrocarbons using a fuel fingerprint analysis (EPA Test Method 8015M), and total petroleum oil (Standard Method 5520EF).

In addition, ground water samples from wells MW-1 and MW-3 were analyzed for VOCs (EPA Test Method 8240), 13 priority pollutant metals, and PCBs (EPA Test Method 8080). The ground water sampling protocol is described in Appendix C.

As shown in Table 3, the highest petroleum hydrocarbon levels were detected in ground water samples from the previously existing well, MW-1A. During sampling, a diesel-like sheen was observed on

water sampled from this well. This product appeared to be less than 1/8 inch thick. Only relatively low concentrations of gasoline and diesel range hydrocarbons were detected in wells MW-2, 3, and 4. Petroleum hydrocarbons were not detected in well MW-1, the northernmost well.

Benzene, at a concentration slightly above drinking water standards, was detected only in ground water from well MW-2 located near the up-gradient site boundary. All other compounds detected in ground water at the site were below established drinking water standards. The low level of trichloroethene (TCE) detected in ground water sampled from MW-1 is likely due to an off-site, up-gradient source.

TABLE 3. Laboratory Results of Ground Water Samples
6121 Hollis Street
Emeryville, California
(concentrations in ppb)

Sample Location	Petroleum Oil†	Extractable Hydrocarbons (Diesel range)	Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylenes	TCE	PCBs
MW-1	<5.0	<50	<50	<0.50	<0.50	<0.50	<0.50	4	ND
MW-2	<5.0	240[1]	1,500	3.2	4.7	<0.50	<0.50	--	--
MW-3	<5.0	530[2]	180	<0.50	3.6	0.98	3.4	<2.0	ND
MW-4	<5.0	730[3]	1,200	<0.50	4.0	16	1.5	--	--
MW-1A	8.0	4,900[4]	<50	<0.50	<0.50	7.7	<0.50	--	--
Drinking Water Standards	NE	NE	NE	1.0	1,000	680	1,750	5.0	0.5

ND Not Detected above laboratory detection limits
NE Not Established
-- Not Analyzed
† Oil and grease concentrations in ppm
1 Chromatogram pattern indicates kerosene + non-kerosene mix (C15-C22)
2 Chromatogram pattern indicates non-diesel mix (C9-C20)
3 Chromatogram pattern indicates kerosene
4 Chromatogram pattern indicates diesel

The analyses of ground water samples from wells MW-1 and MW-3 for metals detected only arsenic (44 ppb) and lead (7.9 ppb) in the MW-3 sample. These concentrations are below drinking water standards and likely represent natural background levels.

2.4 Ground Water Occurrence and Flow

The shallow ground water-bearing zone appears to be semi-confined and consists of heterogeneous alluvial deposits including sandy clay, clayey gravel, silty sand, and sandy gravel. The sands and gravels likely represent buried stream channel deposits. The total thickness of the shallow water-bearing zone encountered in the borings ranged from approximately 2 to 7 feet. The water-bearing zone is underlain by a silty clay aquitard which retards vertical movement of ground water.

The expected regional ground water flow direction at the site is [redacted]oward the San Francisco Bay. This corresponds to the ground water flow direction measured by Lowney Associates at a site located approximately 1/4 mile south of the subject site. It is likely, in our opinion, that ground water flow at the site is influenced by the slurry wall around the adjacent property. The overall effect is two-fold: first, the gradient across the southern part of the site is likely steepened due to flow around the slurry wall; second, ground water elevations in the southwest portion of the site, in the wake of flow around the slurry wall, are likely to be lower than otherwise expected.

To establish the ground water gradient, the newly installed ground water wells and the previously

existing well were surveyed. The top of casing elevations as well as ground water elevations measured on June 11, 1993 are presented in Table 4. At that time, depth to water in the wells was approximately 3 to 6 feet below ground surface.

TABLE 4. Ground Water Elevations
6121 Hollis Street
Emeryville, California

Well No.	Top of Casing Elevation*	Ground Elevation*	Ground Water Elevation* 6/11/93	Depth to Water From Grade 6/11/93
MW-1A	19.21	17.24	11.31	5.93
MW-1	19.44	17.10	11.09	6.01
MW-2	18.18	15.70	12.97	2.73
MW-3	20.00	16.93	11.27	5.66
MW-4	18.10	15.54	11.43	4.11

* Elevations were surveyed relative to the top of casing of well MW-3, which was assigned an elevation of 20 feet.

Based upon our evaluation of the measured ground water elevations, the elevation data from MW-3 appear to be lower than expected, relative to its location and the water elevations measured in the other on-site wells. In our opinion, the anomalous elevation measured in MW-3 may be a result of the slurry wall located along the up-gradient property boundary which may be affecting some of the strata within the heterogeneous water-bearing zone more than others. Thus, elevation data from MW-3 were discarded in calculation of ground water gradient. The calculated ground water gradient across the site is thus 0.007 ft/ft to the west, which corresponds with the regional flow direction.

The average linear velocity of ground water movement in the shallow water-bearing zone beneath the site was estimated using Darcy's Law with the above calculated hydraulic gradient and hydraulic conductivity estimated by performing slug tests on each of the four newly installed wells.

The Hvorslev method was used to evaluate slug test results and estimate the hydraulic conductivity (Fetter 1988). Test procedures and calculations are presented in Appendix E. An average soil hydraulic conductivity of 7.3×10^{-3} cm/sec was estimated from data obtained and ranged from 5.8×10^{-4} cm/sec for the sandy clay strata to 1.5×10^{-2} cm/sec for the silty sand strata. These results are in the high range of published values of hydraulic conductivities for similar soil types. Based on this data, the average ground water velocity (specific discharge) was estimated at 4.1 feet per year for the silty clay strata and 109 feet per year for the silty sand strata. The average ground water velocity for the shallow water-bearing zone was estimated at 53 feet per year.

As the above calculations are based on averaged values of soil hydraulic conductivity, we expect that at many locations ground water movement may actually be faster or slower than stated above, corresponding to natural variations in the hydraulic gradient and permeability of the aquifer materials across the site. In addition, hydraulic gradient across the site may vary over time. Aquifer parameters for the wells tested are listed in Table 9.

TABLE 5. Slug Test Data for Selected Wells
Sun Garden Facilities
San Jose, California

Well #	Saturated Aquifer Thickness (Feet)	Aquifer Material	Well Diameter (Inches)	Hydraulic Conductivity (Cm/Sec)	Estimated Pumping Rate (Gal/Min)	Approximate Up-gradient Width of Capture Zone (feet)
MW-1	_ _	Sandy Clay	4	0.00058	0.1	not calculated
MW-2	_ _	Silty Clay	4	0.0016	0.1	94
MW-3	_ _	Silty Sand	4	0.015	0.25	78
MW-4	_ _	Clayey Silt/ Clayey Sand	4	0.012	0.5	62

Ground water pumping rates and resulting capture zones were estimated using the hydraulic conductivities estimated from the slug tests following the methods presented by Grubb (1993). This method assumes extraction rates to calculate corresponding theoretical capture zones for the pumping wells. Based on the observed aquifer characteristics, flow rates were iteratively compared to resulting capture zones until reasonable results were obtained. This method, which assumes that the shallow aquifer is homogeneous and isotropic in the vicinity of the wells, was used to estimate theoretical capture zones for the well locations. Calculations are presented in Appendix E.

2.5 Vapor Extraction Feasibility Study

To evaluate the air permeability of the soil as well as the effectiveness of soil vapor extraction as a possible remedial alternative (if warranted), a soil vapor permeability study was conducted on-site. This study consisted of applying a vacuum to a single vapor probe and measuring the vacuum influence on

surrounding probes. The probes were advanced to a depth of 4.5 to 5.0 feet. The lower 2 feet of the probes were perforated with 3/16-inch holes. The vacuum was applied using a using a 3 horsepower Sutorbilt blower; Magnehelic gauges were used to measure the vacuum influence at each selected monitoring point.

This process was repeated at two on-site locations using probes VP-11 and VP-35 as extraction points. The vacuum influence was measured on each of the four nearest probes to the extraction point as well as from two additional probes driven at a distance of approximately 15 feet.

Vacuum influence was measured after pumping for a period of approximately 20 to 30 minutes, after which steady state was assumed to have been achieved. No vacuum influence was measured in the probes located at a distance of 30 feet from the extraction points. However, a vacuum influence of between 0.01 and 0.04 inches of water was measured at a distance of 15 feet.

This relatively low radius of influence is likely due to the low permeability of silts and clays present directly above the ground water table at the site.

3.0 CONCLUSIONS

The purpose of this investigation was to evaluate soil and ground water quality and the need for remedial measures at the site. Physical characteristics that could affect remediation were also evaluated on a preliminary basis.

3.1 Contaminant Source

Historically, the site was used as an oil distribution facility by both Shell and Guardian Oil companies. This facility appears to have been in operation from the 1920s through the 1940s. Fourteen storage tanks, presumably above ground, were reportedly used to store petroleum fuels. This facility is the suspected source of petroleum hydrocarbons detected at the site. There are currently two small underground storage tanks on-site; however, these tanks are not suspected to have contributed significantly to the petroleum contamination. We understand that removal of these tanks is scheduled for the end of July/beginning of August 1993.

3.2 Development Plans

The site is proposed to be developed as a United States Postal Service facility by June 1994. The facility is expected to cover approximately 95 percent of the native soil. The cover cap will consist of the building foundation, asphaltic parking areas, and drives. Reportedly, only small strips of land, primarily at the entrance along 62nd Street, will be left uncapped to allow planting of decorative landscaping.

3.3 Soil Quality

Generally, the petroleum impacted soil encountered appeared to be located within an approximately 6- to 18-inch layer located directly above the ground water table in the southern portion of the site. The upper approximately 3 feet of soil at the site typically was not found to be impacted. The impacted stratum is likely within the capillary fringe of the semi-confined shallow aquifer. Petroleum fuel hydrocarbons appear to have been transported across the site via ground water flow, subsequently impacting soil throughout the capillary fringe.

The highest levels of purgeable (gasoline-range) petroleum hydrocarbons, extractable petroleum hydrocarbons (diesel-range), and petroleum oil detected in soil were 570, 1,500, and 790 ppm, respectively. Benzene was not detected in any of the soil samples and only low levels of toluene, ethylbenzene, and xylenes were detected.

Soil samples collected from the southeastern corner of the site (EB-[6 to 13] and MW-2) indicate that the extent of oil impacted soil previously detected in this area is relatively limited. Previous sampling data from this area indicated that oil concentrations up to 13,000 ppm were present (Lowney Associates, April 1993); results of samples collected at nearby locations surrounding this "hot spot" were significantly lower or below detection limits. Excavation and disposal of the shallow oil impacted soil in this area are currently in progress. This work will be discussed in a subsequent report.

3.4 PCBs/Metals

Previous soil sampling data (Lowney Associates, April 1993) revealed PCBs (0.62 ppm) and elevated levels of lead (520 ppm) and zinc (500 ppm) beneath the railroad spur near the western property boundary. Subsequent analysis of one composite of four soil samples collected from 1 foot or less below the former railroad track spur also detected low levels of PCBs (0.45 ppm). Low levels of lead (31 to 61 ppm) and zinc (59 to 220 ppm) were detected also. Based on this and the previous sampling data (Lowney Associates, April 1993), contamination in this area appears to limited in extent and not a significant concern, in our opinion.

3.5 Ground Water Quality

Petroleum hydrocarbons were not detected in ground water sampled from well MW-1, located on the northwestern portion of the site. However, relatively low concentrations of gasoline and diesel range hydrocarbons were detected in the remaining four wells. Ground water was generally initially encountered at depths of 4 to 9.5 feet below grade.

The highest diesel-range hydrocarbon concentration (4,900 ppb) was detected in well MW-1A located along the down-gradient site boundary. A diesel-like product sheen (less that 1/8 inch in thickness) was observed during sampling of this well and at previous trench locations just to the south and southeast. Since this sheen was not present in wells MW-4 or MW-3, its lateral extent in a cross-gradient direction appears relatively limited. The highest gasoline concentration (1,500 ppb) was detected in well MW-2 located near the limited area of petroleum oil impacted soil at the southeast corner near the up-gradient site boundary. These data suggest that the site's ground water is being impacted by this area and/or an up-gradient source.

Benzene, toluene, ethylbenzene, and xylene concentrations detected in ground water at the site are near or below drinking water standards.

3.6 Discussion of Detected Petroleum Compounds

According to the analytical laboratory, the fuel fingerprint scans detected a mixture of petroleum hydrocarbon compounds including gasoline, diesel, kerosene, and oil. These TPH mixtures were characterized by comparing the gas chromatograms obtained for the samples with a library of

chromatograms typically associated with fresh product. This comparison indicated that the TPH in the site soil and ground water is a weathered mixture of petroleum products, mainly consisting of heavier diesels and oils. These weathered mixtures bear little resemblance to fresh product. The large degree of weathering or degradation is also evident in that no benzene was detected in any of the soil samples and detected only at a low level in one ground water sample. In addition, toluene, ethylbenzene, and xylenes were detected only at very low levels. These compounds are typically found at higher levels in fresh fuels.

Considering that the petroleum hydrocarbons likely have been present at the site for more than 60 years, and the fact that they are present in relatively fine grained sediments underlain by a silty clay aquitard, the potential for additional significant migration is very low, in our opinion.

The relatively low levels of weathered petroleum hydrocarbons present at the site likely do not present a significant threat to human health or the environment, in our opinion. The site is located in an industrial/commercial area and proposed for such use in the future. After site development, there would be no significant pathways for on-site exposure to human receptors.

3.7 Potential Impacts to Construction Activities

We understand that the Postal Service desires to begin construction activities on-site in order for the new facility to be completed by June 1994. Since approximately 3 feet of non-impacted soil appear to be present at the surface across much of the site, in our opinion, construction activities would not be impacted significantly. However, the potential exists that impacted soil may be encountered during some grading and trenching activities. Thus, we recommend that an appropriate site specific health and safety plan be prepared and followed during construction activities. Care should be taken not to unnecessarily disturb any impacted soil. In addition, the off-site disposal of soil (if needed) should be done at an appropriate facility.

4.0 RECOMMENDATIONS

Based on the data collected, natural degradation of the petroleum hydrocarbons has been occurring in soil and ground water at the site for more than 60 years. In our opinion, this degradation process will continue to decrease the petroleum concentrations.

Due to the apparent high degree of degradation and relatively low/limited concentrations of the detected compounds (especially BTEX compounds), the implementation of remedial measures is not needed, in our opinion, for the following reasons:

NOT

- Data obtained at the site indicate that only a low potential exists for further significant migration of the compounds within the same water-bearing zone or to deeper water-bearing zones.

- The site is located in an industrial/commercial area and is proposed for similar future use. The planned development will effectively cap 95 percent of the site. Exposure pathways and health/environmental risks likely will be minimal.

- Shallow ground water is generally not used (not suitable) for water supply purposes in the site.

- Implementing remedial technologies would be of limited benefit since the detected compounds appear to be confined and relatively immobile and natural biodegradation appears to be occurring. In addition, implementing ground water extraction technology could endanger the integrity of the Westinghouse grout wall that was installed to limit off-site migration of PCBs.

As an alternative to remedial measures, we recommend that a periodic sampling program be established to monitor the migration and natural degradation of the petroleum compounds present in ground water on-site.

We also recommend contacting former on-site tenants and owners to evaluate responsible parties and to obtain financial assistance with further on-site remedial actions. Consideration also should be given to contacting an environmental attorney to help evaluate responsible parties and reporting obligations to state and local agencies. These responsible parties will likely be required by local and state regulatory agencies to define the off-site extent of petroleum fuel hydrocarbon contamination.

Westinghouse should also be contacted regarding the on-site soil impacted with low levels of PCBs that may be off-hauled from the site prior to construction. We understand that the PCB contamination likely came from the Westinghouse facility.

5.0 LIMITATIONS

Soil deposits and rock formations may vary in type, strength, and many other important properties across any geologic area. The study that we have made assumes that the data obtained in the field and laboratory are reasonably representative of field conditions and that the subsurface conditions are reasonably susceptible to interpolation and extrapolation between sampling locations.

The accuracy and reliability of geo- or hydrochemical studies are a reflection of the number and type of samples taken and the extent of the analysis conducted, and is thus inherently limited and dependent upon the resources expended. Our sampling and analytical plan was designed using accepted environmental engineering principles and our judgement for the performance of a reconnaissance soil quality investigation, and was based on the degree of investigation desired by you. It is possible to obtain a greater degree of certainty, if desired, by implementing a more rigorous soil sampling program or by installation of monitoring wells to establish a baseline of ground water quality.

This report was prepared for the use of the United States Postal Service in evaluating conditions at the referenced site at the time of this study. We make

no warranty, expressed or implied, except that our services have been performed in accordance with environmental engineering principles generally accepted at this time and location. The chemical and other data presented in this report can change over time and are applicable only to the time this study was performed.

* * * * * * * *

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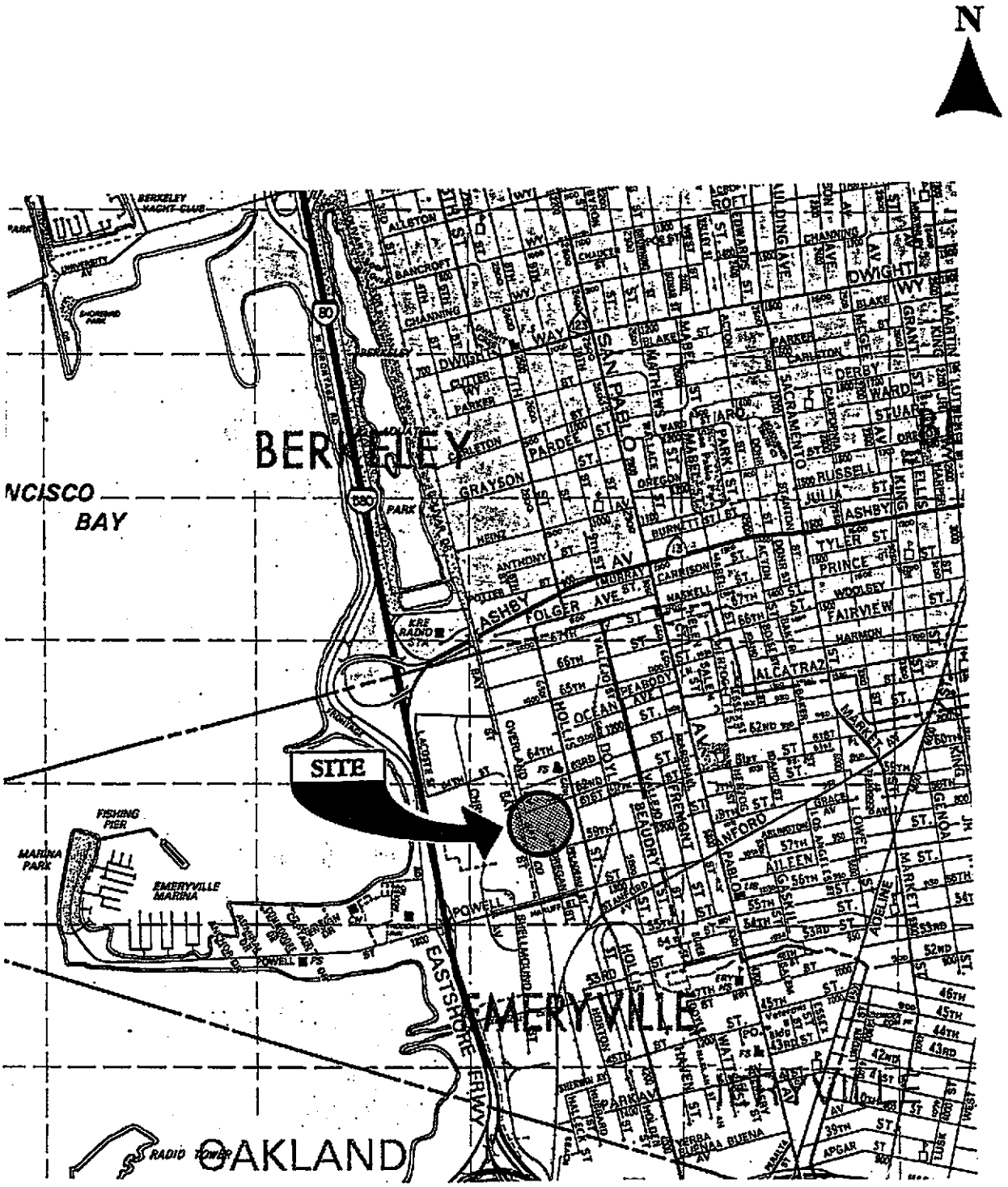

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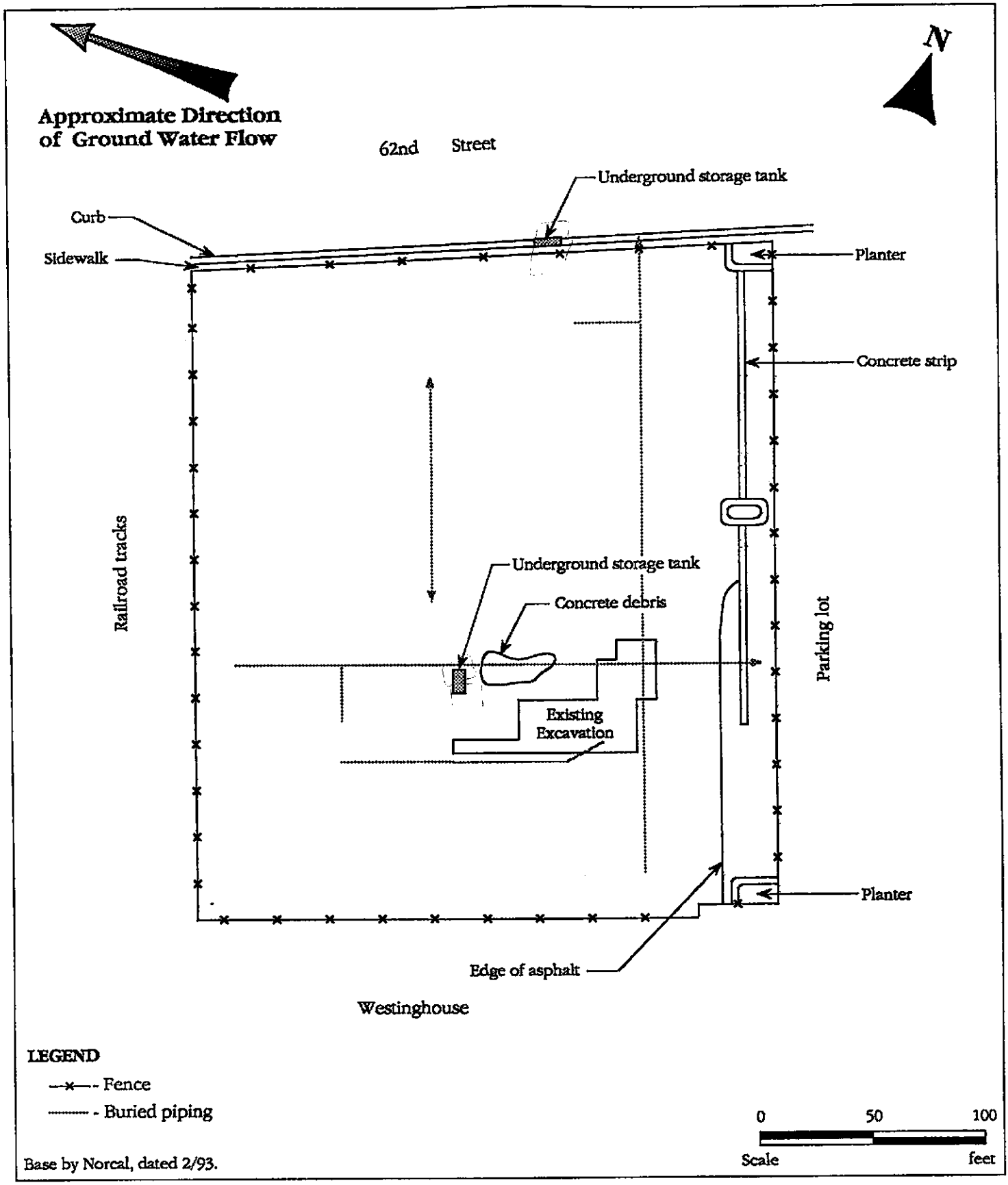
864-17, 4/14 SF *EB

VICINITY MAP

EMERYVILLE POSTAL FACILITY
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

FIGURE 1
864-17A, July 1993



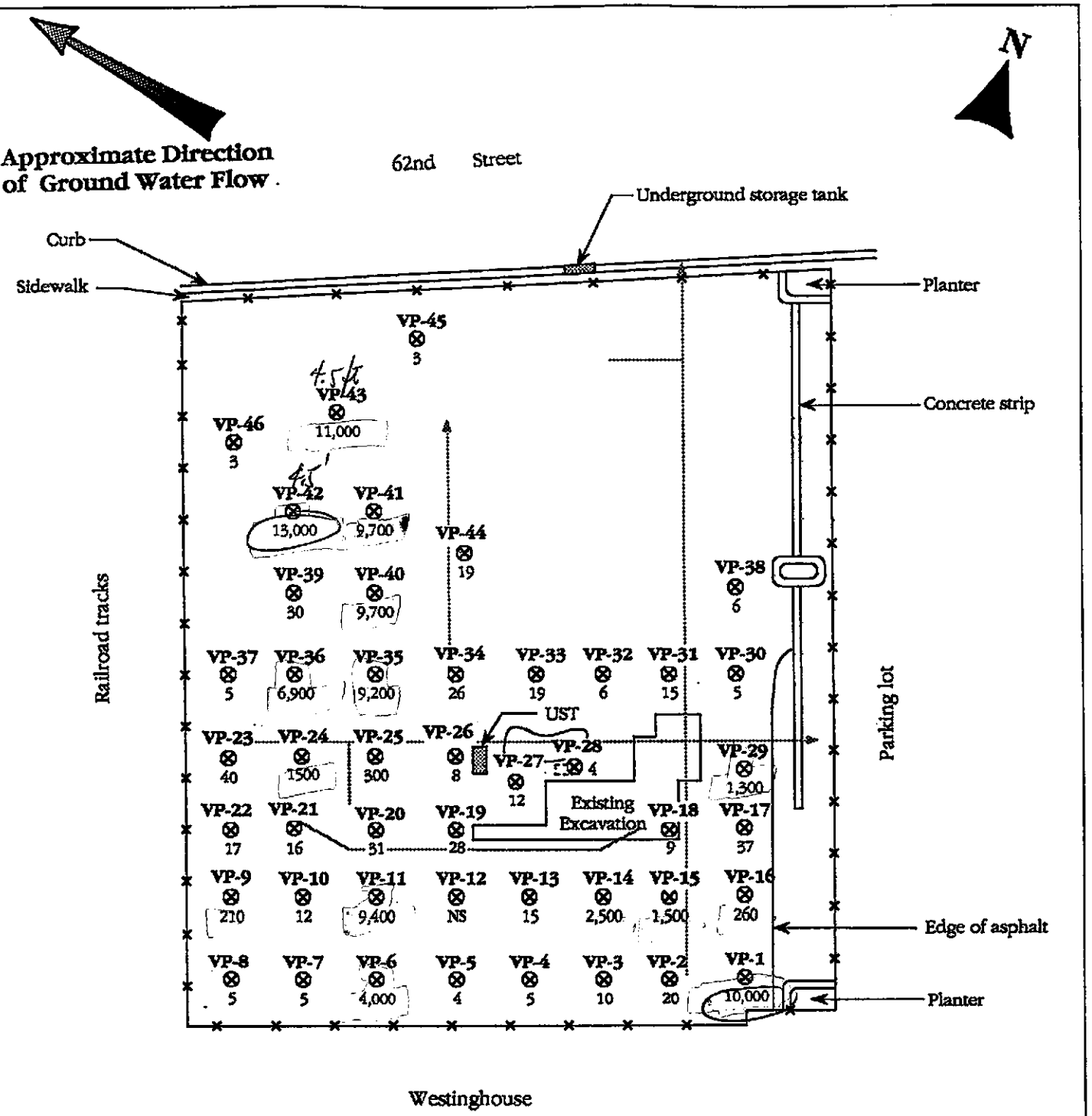
864-17A, 6/30 SF*EB

SITE PLAN

EMERYVILLE POSTAL FACILITY
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

FIGURE 2
864-17A, July 1993



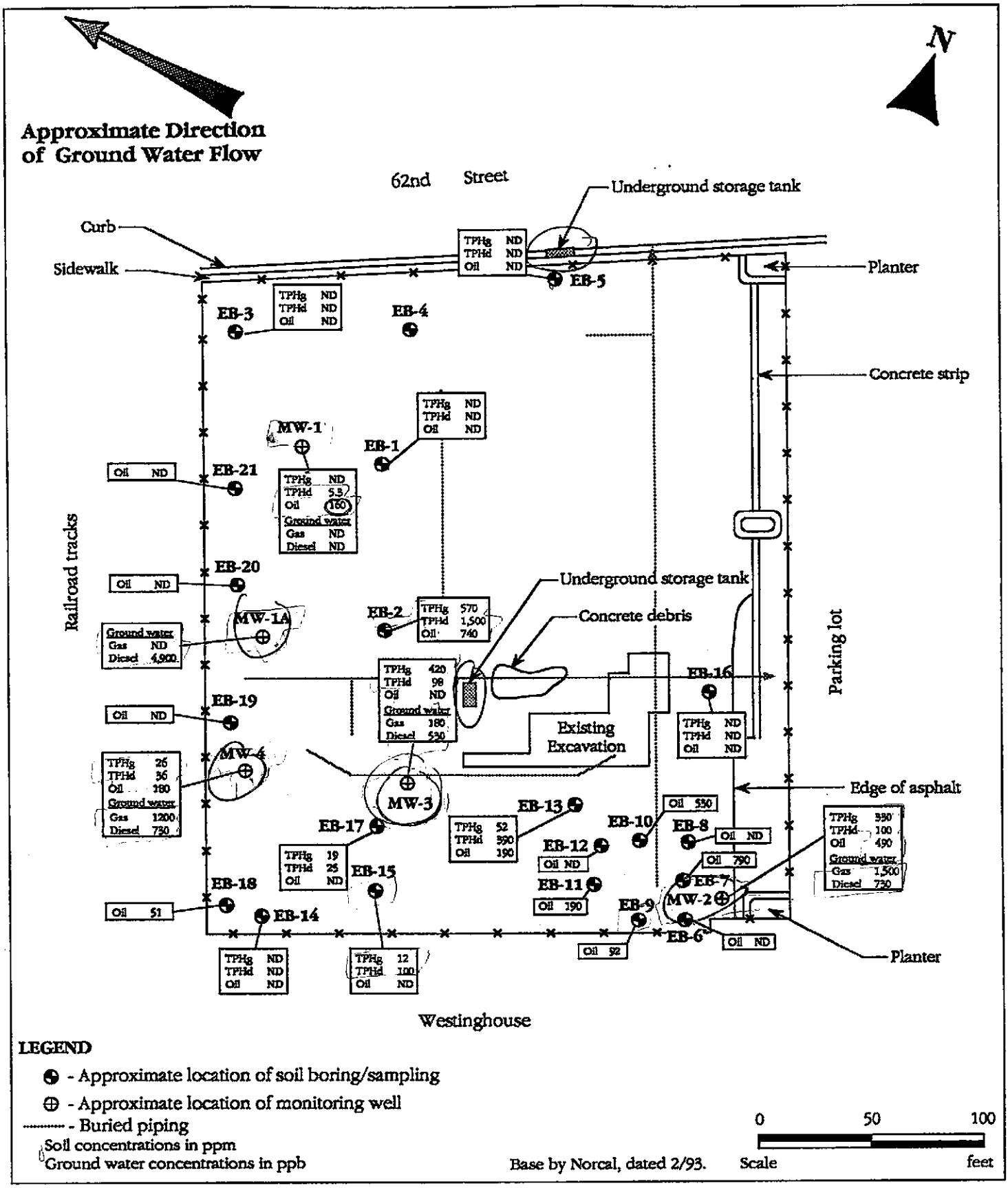
864-17A, 6/30 SF*EB

SOIL VAPOR SURVEY RESULTS

EMERYVILLE POSTAL FACILITY
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

FIGURE 3
864-17A, July 1993



864-17A, 8/30 SF*EB

SOIL AND GROUND WATER RESULTS

EMERYVILLE POSTAL FACILITY
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

FIGURE 4
864-17A, July 1993

APPENDIX A

MONITORING WELL CONSTRUCTION PERMITS

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 6121 Hollis Street, Emeryville

CLIENT
Name UNITED STATES POSTAL SERVICE
Address 850 CHERRY AVE Phone (415) 742-4237
City SAN BRUNO, CA Zip 94099

APPLICANT
Name LOWNEY ASSOCIATES
Address 405 CLYDE AVE Phone (415) 967-2365
City MTN. VIEW CA Zip 94043

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	___
Monitoring	X	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. C57 484288

WELL PROJECTS

Drill Hole Diameter	12	in.	Maximum		
Casing Diameter	4	in.	Depth	20	ft.
Surface Seal Depth	5	ft.	Number	4	

GEOTECHNICAL PROJECTS

Number of Borings	___		Maximum		
Hole Diameter	___	in.	Depth	___	ft.

ESTIMATED STARTING DATE 6-8-93
ESTIMATED COMPLETION DATE 6-9-93

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Stason Foster Date 6-2-93
STASON FOSTER

FOR OFFICE USE

PERMIT NUMBER 93302
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well Projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 3 Jun 93
Wyman Hong

31992

APPENDIX B

SUBSURFACE INVESTIGATION

A subsurface investigation was performed on June 7 and 8, 1993, using a portable drill rig equipped with 12-inch hollow stem augers. A total of 21 borings were drilled on-site. Four of the borings, MW-1, MW-2, MW-3, and MW-4 were completed as monitoring wells. The soils encountered in the borings were logged using the Unified Soil Classification System (ASTM D-2487). The logs of the borings, as well as a key to the classification of the soil (Figure B-1), are included as part of this appendix.

The exploratory borings were sampled at 2.5- to 5.0-foot intervals to the bottom of the borings.

All sampling equipment was thoroughly cleaned with a tri-sodium phosphate and distilled water solution or steam cleaned. Soil samples were collected in clean 2.5-inch diameter brass liners using a California Modified drive sampler. Upon collection from the sampler, the ends of the brass liner were covered with aluminum foil and then sealed with a plastic cap at each end. The caps were taped airtight and labeled appropriately. These samples were then immediately placed in a refrigerated ice chest for transport to a certified analytical laboratory.

Standard penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The blows per foot recorded on the boring logs represent the accumulated number of

blows required to drive the sampler the last 12 inches of the interval indicated.

The attached boring logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring locations. The passage of time may result in a change in the subsurface conditions due to environmental changes. In addition, any stratification lines on the logs represent the approximate boundary between soil types and the transition may be gradual.

Borings MW-1, MW-2, MW-3, and MW-4 were advanced into the uppermost water-bearing sediments and converted to "permanent" monitoring wells with the installation of 4-inch I.D., threaded, flush-jointed, Schedule 40 PVC casing with sections containing perforated 0.02-inch slots installed in the lower portion of the wells. After the casing was installed, a filter pack composed of Lone Star Number 3 sand was placed in the annulus to approximately 0.5 to 1.0 foot above the slotted casing. A 0.5- to 1-foot seal composed of bentonite pellets topped by 2 to 5 feet of cement was placed in the annulus above the sand pack to the surface. The wells were completed with above-grade steel locked well covers fitted over the PVC casing approximately 3 feet above the adjacent grade. In addition, the PVC well casing was fitted with a watertight seal. Well construction details are shown on the boring logs.

PRIMARY DIVISIONS			SOIL TYPE	LEGEND	SECONDARY DIVISIONS
COARSE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS (MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE)	CLEAN GRAVELS (LESS THAN 5% FINES)	GW		Well graded gravels, gravel-sand mixtures, little or no fines.
			GP		Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM		Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC		Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS (MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE)	CLEAN SANDS (LESS THAN 5% FINES)	SW		Well graded sands, gravelly sands, little or no fines.
			SP		Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM		Silty sands, sand-silt mixtures, non-plastic fines.
			SC		Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE)	SILTS AND CLAYS (LIQUID LIMIT IS LESS THAN 50%)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL		Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (LIQUID LIMIT IS GREATER THAN 50%)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH		Inorganic clays of high plasticity, fat clays.
			OH		Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt		Peat and other highly organic soils.

DEFINITION OF TERMS

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4"	3"	12"	
SILTS AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

GRAIN SIZES

TERZAGHI SPLIT SPOON STANDARD PENETRATION

MODIFIED CALIFORNIA

SHELBY TUBE PITCHER TUBE

SAMPLERS

SAND AND GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

SILTS AND CLAYS	STRENGTH‡	BLOWS/FOOT*
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
MEDIUM STIFF	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

CONSISTENCY

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

‡ Unconfined compressive strength in tons/sq. ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation.

KEY TO EXPLORATORY BORING LOGS
Unified Soil Classification System (ASTM D - 2487)

EMERYVILLE POST OFFICE
Emeryville, California

LOWNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

FIGURE A - 1
864-17A, July 1993

DRILL RIG: Mobile B-40

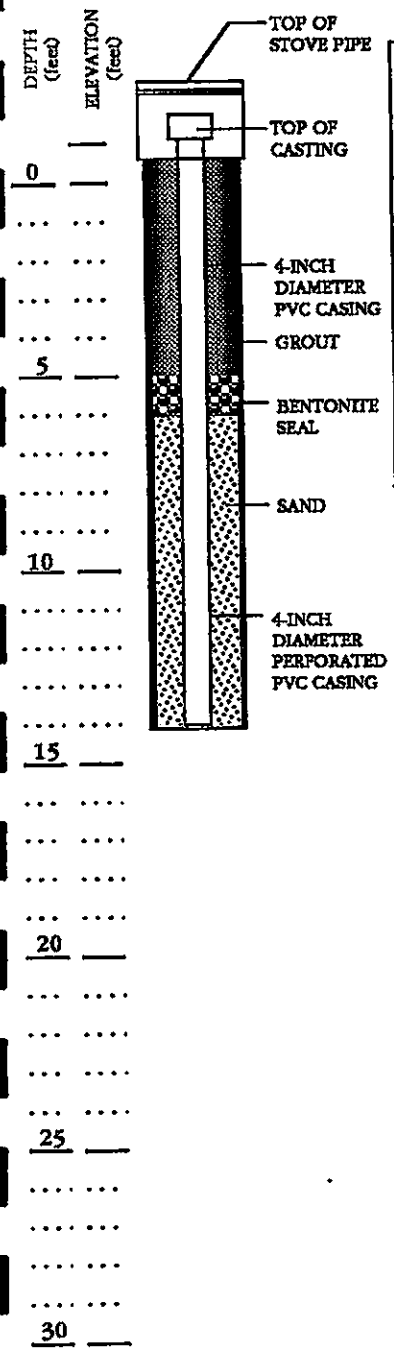
DEPTH TO GROUNDWATER: 9.0 feet
(From Surface Elevation)

SURFACE ELEVATION: --

BORING DIAMETER: 12 inches

LOGGED BY: TR

DATE DRILLED: 6/8/93



DESCRIPTION	SYMBOL	CONSISTENCY	SOIL TYPE	LEGEND	DEPTH (feet)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	ORGANIC VAPORS (ppm)
Silty gravel, minor sand	Af		GM						
Clayey silt fill, black, moist, trace coarse sand, glass and wood bits FILL	Af	Very stiff	ML					24	800
Silty clay, brown and light gray mottled, low plasticity, moist, trace coarse sand and fine gravel Minor gravel at 7.0 feet	B	Hard	CL		5			63	150
Sandy clay, brown, fine to medium grained sand, moderate plasticity, moist to wet More coarse sand, wet to saturated at 9.0 feet	C	Hard	CL				▽	63	1.5
Interbedded layers of sandy silt, moist at 13.0 feet					10				9
Bottom of Well = 14.0 feet					15				
					20				
					25				
					30				

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 8/29 TR'EB

MONITORING WELL LOG - MW-1

EMERYVILLE POST OFFICE
Emeryville, California

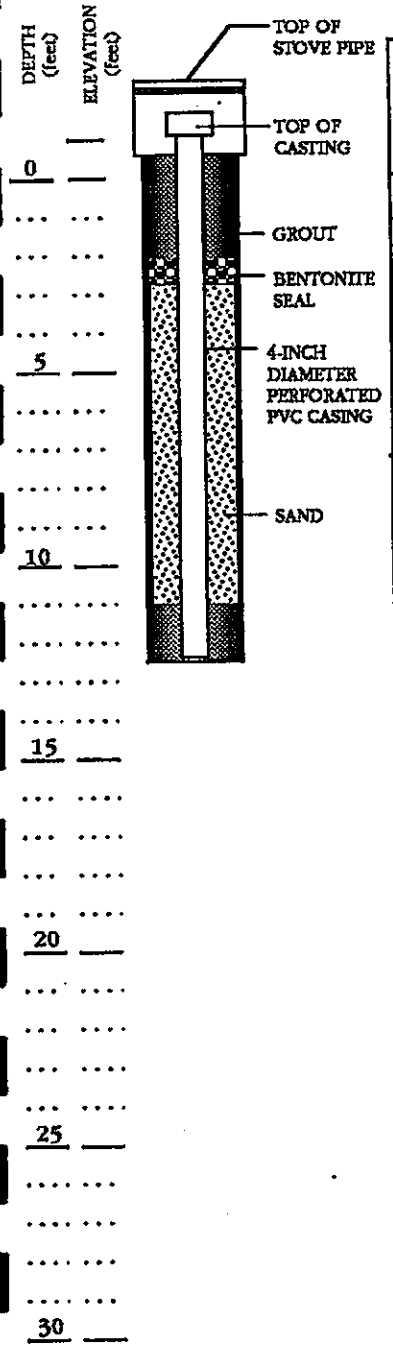
LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

MW-1

864-17A, July 1993

DRILL RIG: Mobile B-40 | SURFACE ELEVATION: -- | LOGGED BY: TR

DEPTH TO GROUNDWATER: 4.0 feet (From Surface Elevation) | BORING DIAMETER: 12 inches | DATE DRILLED: 6/8/93



DESCRIPTION	SYMBOL	CONSISTENCY	SOIL TYPE	LEGEND	DEPTH (feet)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	ORGANIC VAPORS (ppm)
Gravelly sand, minor silt	Af		SM						
Clayey silt fill, black, moist to wet	Af	Stiff	ML						
Saturated at 4.0 feet					5			11	90
Moderate kerosene odor at 5.5 feet Moist to wet at 6.0 feet FILL								12	1000+
Silty clay to clayey silt, brown with light gray mottling, moderate plasticity, minor fine to coarse sand, trace fine gravel, saturated	B	Hard	CL/ ML		10			37	NA
Less sand and no gravel at 11.0 feet, moist								50	5
Bottom of Well = 12.5 feet					15				
					20				
					25				
NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.					30				

864-17A, 8/29 TR*EB

MONITORING WELL LOG - MW-2

EMERYVILLE POST OFFICE
Emeryville, California

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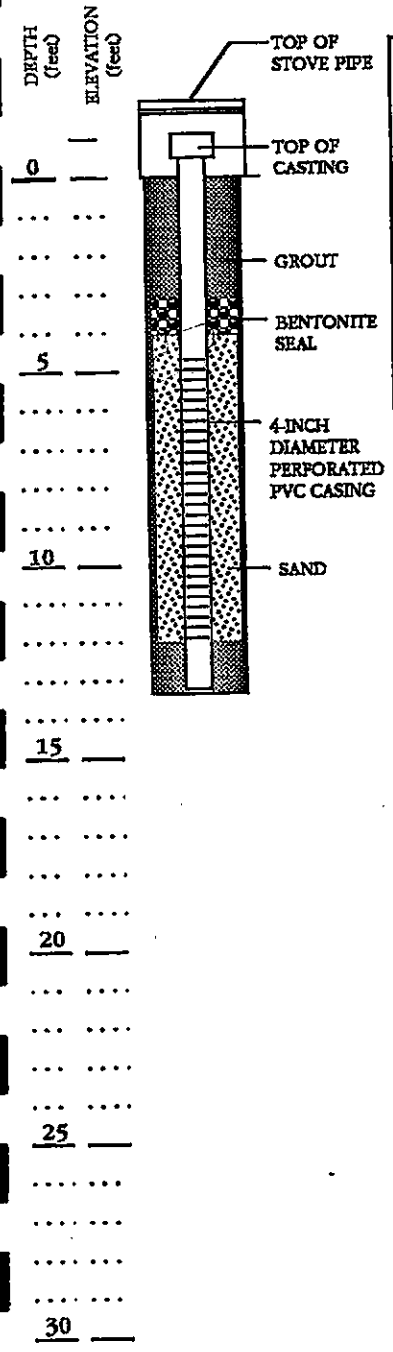
DRILL RIG: Mobile B-40 | SURFACE ELEVATION: – | LOGGED BY: TR

DEPTH TO GROUNDWATER: (From Surface Elevation) 9.5 feet | BORING DIAMETER: 12 inches | DATE DRILLED: 6/8/93



DESCRIPTION	SYMBOL	CONSISTENCY	SOIL TYPE	LEGEND	DEPTH (feet)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	ORGANIC VAPORS (ppm)
Gravelly silt fill, dark gray with brown and reddish-brown mottling, minor coarse sand, slightly moist ▲ FILL	Af	Hard	ML					80+	NA
Clayey silt, greenish-gray, minor fine sand, moist to wet, moderate to strong petroleum odor More sand at 8.0 feet	B	Hard	ML		5			42	1000+
Silty sand to sandy silt, fine grained sand, greenish-gray, wet, moderate petroleum odor, sand size increase to coarse at 9.5 feet, saturated, trace gravel	C	Hard	SM/ML		10		▽		250
Silty clay, brown, moderate to high plasticity, moist	D	Hard	CL						2
Bottom of Well = 13.5 feet					15				
					20				
					25				
					30				

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/29 TR*EB

MONITORING WELL LOG - MW-3

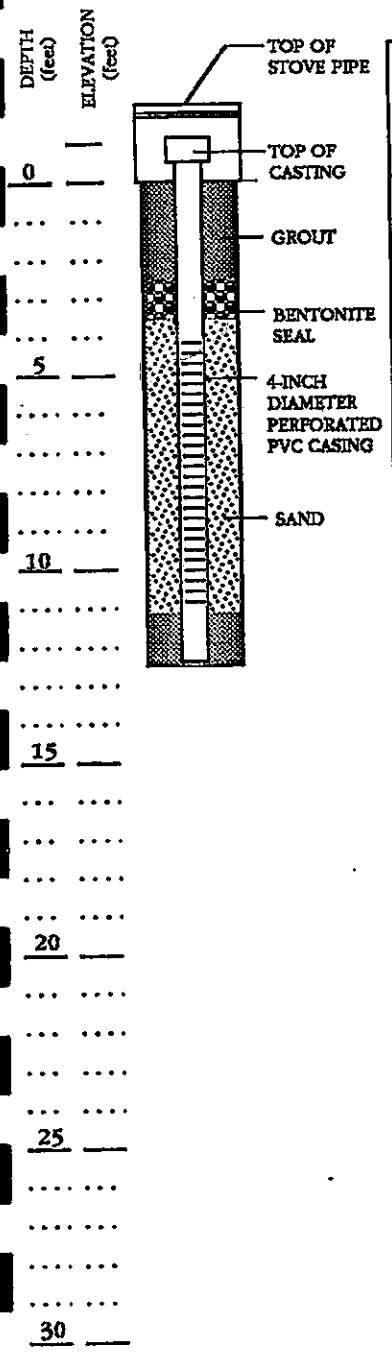
EMERYVILLE POST OFFICE
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

MW-3
864-17A, July 1993

DRILL RIG: Mobile B-40 | SURFACE ELEVATION: -- | LOGGED BY: TR

DEPTH TO GROUNDWATER: 5.5 feet (From Surface Elevation) | BORING DIAMETER: 12 inches | DATE DRILLED: 6/8/93



DESCRIPTION	SYMBOL	CONSISTENCY	SOIL TYPE	LEGEND	DEPTH (feet)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	ORGANIC VAPORS (ppm)
Gravelly silt, dark gray, moist — FILL	Af		SM						
Clayey silt, brown and light gray mottled, moist	B	Hard	ML		5			52	NA
Greenish-gray, moderate petroleum odor, saturated at 5.5 feet More clay and sand at 6.5 feet								44	1000+
Sandy silt, greenish-gray, fine to medium grained sand, moderate petroleum odor Interbedded layers of sandy clay, moist Coarse sand and gravel lense at 9.0 feet, saturated	C	Hard	ML		10			43	600
Sandy clay, moist observed in cuttings	C		CL						
Clayey sand, reddish-brown, fine to medium grained sand, trace fine gravel, saturated, no petroleum odor	C		SC					50 for 6"	20
Bottom of Well = 12.5 feet					15				
					20				
					25				
					30				

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/29 TR*ER

MONITORING WELL LOG - MW-4

EMERYVILLE POST OFFICE
Emeryville, California

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MW-4
864-17A, July 1993

DRILL RIG: Mobile B-40 SURFACE ELEVATION: – LOGGED BY: TR

DEPTH TO GROUNDWATER: 6.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (TSF)	ORGANIC VAPOR METER (ppm)
Sandy gravel, reddish-brown, plastic fines, slightly moist	Af			GC						
Clayey silt fill, black, trace coarse sand, moist ↑ FILL	Af		Very stiff	ML				27		200
Silty clay, light gray, high plasticity, moist to wet Light brown with gray mottling at 4.0 feet Minor gravel and sand at 6.0 feet	B		Hard	CL	5			32		
								33		20
								50 for 5"		
Sandy gravel, gray, well-graded, plastic fines, saturated	C		Very Dense	GC						
Bottom of Boring = 8.0 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-1

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EB-1
864-17A, July 1993

DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 8.0 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Sandy gravel, reddish-brown, plastic fines, slightly moist	Af			GC						
Clayey silt fill, black, trace coarse sand, moist heterogeneous, clumps of sand, gray at 3.0 feet FILL	Af		Very stiff	ML				22		250
Silty clay, reddish-brown, high plasticity, moist to wet	B		Hard	CL	5			39		
Gray at 7.0 feet Wet pores and moderate petroleum odor at 7.5 feet							▽	78		800
Clayey gravel, gray, fine to coarse grained, minor sand, saturated, moderate petroleum odor	C		Very dense	GC	10					
Silty clay, light brown, trace to minor coarse sand and fine gravel, moist to wet, moderate plasticity	D		Hard	CL				47		NA
Bottom of Boring = 15.0 feet.					15					
					20					
					25					
NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.					30					

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-2

EMERYVILLE POST OFFICE
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DRILL RIG: Mobile B-40 SURFACE ELEVATION: – LOGGED BY: TR

DEPTH TO GROUNDWATER: 7.0 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Sandy gravel, reddish-brown, plastic fines, slightly moist	Af			GC						
Clayey silt fill, black, trace coarse sand, moist ↑ FILL	Af		Very stiff	ML				18		2.5
Silty clay, brown, moderate plasticity, moist	B		Hard	CL	5					
Saturated rootlets and minor gravel at 7.0 feet							▽	43		5
Bottom of Boring = 8.0 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-3

EMERYVILLE POST OFFICE
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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 7.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Gravelly sand, brown, slightly moist, well graded	Af			SM						
Clayey silt fill, black, trace coarse sand, moist FILL	Af		Very stiff	ML				27		16
Silty clay, light brown, gray mottling, moderate to high plasticity, moist	B		Hard	CL	5					
Minor coarse sand and fine gravel, more silt at 7.0 feet Saturated voids at 7.5 feet							▽	68		3
Bottom of Boring = 8.0 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-4

EMERYVILLE POST OFFICE
Emeryville, California

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 7.0 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Gravelly sand, brown, slightly moist, well graded	Af			SM						
Clayey silt fill, black, trace coarse sand, moist	Af		Stiff	ML						
Gravelly clay fill, minor sand, well-graded, wood, moist, low to moderate plasticity	Af		Very stiff	CL				25		1.5
FILL					5					
Clayey gravel, reddish-brown, minor sand, moist to wet Saturated at 7.0 feet	C		Very dense	GC			▽	47		2
Bottom of Boring = 8.0 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 8/28 TR'EB

EXPLORATORY BORING LOG - EB-5

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: – LOGGED BY: TR

DEPTH TO GROUNDWATER: 3.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Sandy gravel, gray, dry to slightly moist	Af			GM						
Clayey silt fill, black, wet	Af		Very stiff	ML				20		2
Saturated at 3.5 feet			Medium stiff				▽	6		80
FILL					5					
Bottom of Boring = 5.5 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-6

EMERYVILLE POST OFFICE
Emeryville, California

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 4.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Gravelly sand, non-plastic fines	Af			SM						
Mixture of light gray silty clay and black clayey silt fill, moist to wet	Af		Very stiff	CL/ ML				17		70
Clayey silt fill, black, wet to saturated, trace coarse sand, gravel ↑ FILL	Af		Medium stiff	ML	5		▽	9		20
Bottom of Boring = 5.5 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 8/28 TR*EB

EXPLORATORY BORING LOG - EB-7

EMERYVILLE POST OFFICE
Emeryville, California

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 4.0 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLES	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Gravelly sand, non-plastic fines	Af			SM						
Clayey silt fill, black, wet	Af		Stiff	ML				13		9
Saturated at 4.0 feet ▲ FILL					5		▽	9		7
Bottom of Boring = 5.5 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-8

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Emeryville, California

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EB-8
864-17A, July 1993

DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 3.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Gravelly sand, non-plastic fines	Af			SM						
Clayey silt fill, black, wet	Af		Very stiff	ML				18		20
Saturated at 3.5 feet ▽			Medium stiff		5			5		200
FILL										
Bottom of Boring = 5.5 feet.										

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-9

EMERYVILLE POST OFFICE
Emeryville, California

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Environmental/Geotechnical/Engineering Services

DRILL RIG: Mobile B-40 SURFACE ELEVATION: – LOGGED BY: TR

DEPTH TO GROUNDWATER: 4.0 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Silty gravel, minor fine sand, moist	Af		Very dense	GM				48		
Clayey silt fill, black, wet Saturated at 4.0 feet ▲ FILL	Af		Medium stiff	ML	5		▽	6		2.5
Bottom of Boring = 5.5 feet.					10 15 20 25 30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-10

EMERYVILLE POST OFFICE
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

EB-10
864-17A, July 1993

DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 4.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Silty gravel, minor fine sand	Af		Very dense	GM				42		550
Clayey silt fill, black, wet Saturated at 4.5 feet Slight petroleum odor ▲ FILL	Af		Very stiff	ML	5		▽	20		1000+
Bottom of Boring = 5.5 feet.					10 15 20 25 30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-11

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Emeryville, California

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 5.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Silty gravel, fine-grained, minor fine sand, some coarse gravel and cobbles, moist	Af		Very dense	GM						10
Sandy gravel, poorly-graded subangular coarse gravel, moist	Af		Very dense	GW				65		<1
Clayey silt fill, black, wet FILL	Af		Stiff	ML			Final			
Silty clay, light brown, trace sand, low plasticity, wet	B		Stiff	CL	5		13 Initial			< 1
Bottom of Boring = 5.5 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-12

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DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 5.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Clayey silt fill, dark gray, high organics, moist FILL	Af		Very stiff	ML						
Clayey silt, light brown, moist Minor coarse sand at 2.5 - 3.0 feet	A		Very stiff	ML				16		<1
Silty clay, greenish-gray, low plasticity, moist to wet, slight petroleum odor	B		Very stiff	CL	5		▽	19		400
Bottom of Boring = 5.5 feet.					10 15 20 25 30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-14

EMERYVILLE POST OFFICE
Emeryville, California

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Environmental/Geotechnical/Engineering Services

DRILL RIG: Mobile B-40 SURFACE ELEVATION: – LOGGED BY: TR

DEPTH TO GROUNDWATER: 5.5 feet BORING DIAMETER: 8 inches DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Sandy gravel, minor silt, brown, slightly moist to moist	Af			GM						
Clayey silt fill, dark gray, moist ▲ FILL	Af		Very stiff	ML				20		90
Clayey silt, greenish-gray, wet, moderate petroleum odor	B		Hard	ML						
Trace coarse sand at 4.5 feet Saturated at 5.5 feet					5		▽	56		1000+
Bottom of Boring = 5.5 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-15

EMERYVILLE POST OFFICE
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

EB-15
864-17A, July 1993

DRILL RIG: Mobile B-40 | SURFACE ELEVATION: -- | LOGGED BY: TR

DEPTH TO GROUNDWATER: 9.0 feet | BORING DIAMETER: 8 inches | DATE DRILLED: 6/7/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (tsf)	ORGANIC VAPOR METER (ppm)
Gravelly sand, minor fines, slightly moist	Af			SM						
Clayey silt fill, dark gray, moist ↑ FILL	Af		Very stiff	ML				19		1.5
Sandy silt, light brown, minor gravel, moist More clay at 4.0 feet	C		Very stiff	ML	5					
Clayey silt, brown, trace coarse sand, moist	B		Hard	ML				50 for 4"		NA
Silty sand, brown, fine to coarse grained, well-graded trace gravel, wet	C		Very dense	SM			▽	65		8
Sandy silt, brown, poorly-graded fine grained sand, moist	C		Hard	ML	10					
Bottom of Boring = 9.5 feet.										
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

884-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-16

EMERYVILLE POST OFFICE
Emeryville, California

LOVNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

DRILL RIG: Mobile B-40 SURFACE ELEVATION: -- LOGGED BY: TR

DEPTH TO GROUNDWATER: 6.0 feet BORING DIAMETER: 12 inches DATE DRILLED: 6/8/93

DESCRIPTION AND REMARKS	SYMBOL	LEGEND	CONSISTENCY	SOIL TYPE	DEPTH (FEET)	SAMPLER	WATER CONTENT (%)	PENETRATION RESISTANCE (BLOWS/FT.)	SHEAR STRENGTH BY TORVANE (KSF)	ORGANIC VAPOR METER (ppm)
Clayey silt fill, black, trace coarse sand, moist slight petroleum odor	Af		Very stiff	ML				27		150
FILL										
Clayey silt, greenish-gray, moist, moderate petroleum odor	B		Hard	ML						
Silty clay, greenish-gray with brown mottling, low to moderate plasticity, moist to wet, moderate petroleum odor	B		Hard	CL	5		▽	51		1000+
Bottom of Boring = 6.0 feet.					10					
					15					
					20					
					25					
					30					

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.

864-17A, 6/28 TR*EB

EXPLORATORY BORING LOG - EB-17

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EB-17
864-17A, July 1993

APPENDIX C

WELL DEVELOPMENT AND GROUND WATER SAMPLING

Each well was developed by pumping such that a representative ground water sample was obtained and fine-grained material was flushed from the well and surrounding soil. Twenty-four hours after well development, the static water level was measured. An electric submersible pump was then used to purge three well casing volumes of water from the wells. Conductivity, pH, and temperature measurements were recorded. Ground water was placed into appropriate sample bottles, labeled, and immediately refrigerated until delivered to an analytical laboratory certified by the California Department of Health Services for chemical analysis of drinking water and hazardous waste. Carried along with the ground water samples was a chain of custody form that was maintained for all well samples. All well developing and sampling equipment was steam cleaned prior to entering the well.

A well sampling record for each well was maintained by Lowney Associates. A copy of this record is attached.

LOVNEY ASSOCIATES — RECORD OF WELL DEVELOPMENT/SAMPLING

Project Number 864-17A

Project Name Emeryville P.O.

Field Geologist/Engineer Tim Rumbolz

Well Number MW-1 Boring Diameter 12 (inches)

Well Total Depth (completed) 14' (feet) Casing Diameter 4 (inches)

Development Date 6/10/93 Method Grundfos Pump Volume Produced 20 (liter/gal)

WELL VOLUME CONVERSION FACTORS

6.12

2-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.17
VOL (LITERS) = FEET OF WATER x 0.62

4-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.66
VOL (LITERS) = FEET OF WATER x 2.5

Sampling Date 6/11/93 Time 1:40 Method Grundfos Pump

Static Water Level Prior to Purging 8.35 (ft) (Measured from top of casing)

Water Level After Recovery 9.21 (ft)

80 Percent Recharged Yes ☒ No ☐

Well Volume 5.05 (liter/gal)

Three Well Volumes 15.15 (liter/gal)

Total Produced 15.15 (liter/gal)

Number of Well Volumes 3

Production Time _____ (min)

Production Rate _____ (_ /min)

Well Volumes	pH	Conductivity µSx10	Temp °F
1	6.36	70	67
2	6.47	70	67
3	6.54	70	66
4			
5			
6			
7			
8			
9			
10			

Sample Description _____

Laboratory _____

Deliver ☐ Pick-Up ☐ Date _____

Comments

LOVNEY ASSOCIATES — RECORD OF WELL DEVELOPMENT/SAMPLING

Project Number 864-17A

Project Name Emeryville R.D.

Field Geologist/Engineer Tim Rumbolz

Well Number MW-2 Boring Diameter 12 (inches)

Well Total Depth (completed) 11 (feet) Casing Diameter 4 (inches)

Development Date 6/10/93 Method Grundfos Pump Volume Produced 23 (liter/gal)

WELL VOLUME CONVERSION FACTORS

2-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.17
VOL (LITERS) = FEET OF WATER x 0.62

4-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.66
VOL (LITERS) = FEET OF WATER x 2.5

Sampling Date 6/11/93 Time 11:20 Method Grundfos Pump

Static Water Level Prior to Purging (Measured from top of casing) 5.21 (-2) (ft) Water Level After Recovery 7.4 6.75 (ft)

80 Percent Recharged Yes ☒ No ☐

Well Volume ~~4.88~~ 5.14 (liter/gal)

Three Well Volumes ~~14.40~~ 15.42 (liter/gal)

Total Produced ~~14.40~~ 15.42 (liter/gal)

Number of Well Volumes ~~3~~ 3

Production Time _____ (min)

Production Rate _____ (_ /min)

Well Volumes	pH	Conductivity µS×10	Temp °F
1	6.73	70	68
2	6.85	80	68
3	6.82	90	67
4			
5			
6			
7			
8			
9			
10			

Sample Description _____

Laboratory _____

Deliver ☐ Pick-Up ☐ Date _____

Comments

_____

_____

_____

A 1.7

LOVNEY ASSOCIATES — RECORD OF WELL DEVELOPMENT/SAMPLING

Project Number 864-17A

Project Name Emeryville P.O.

Field Geologist/Engineer Tim Rumbolz

Well Number MW-3 Boring Diameter 12 (inches)

Well Total Depth (completed) 12 (feet) Casing Diameter 4 (inches)

Development Date 6/10/03 Method Grundfos Pump Volume Produced 20 (liter/gal)

WELL VOLUME CONVERSION FACTORS

2-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.17
VOL (LITERS) = FEET OF WATER x 0.62

4-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.66
VOL (LITERS) = FEET OF WATER x 2.5

Sampling Date 6/11/03 Time 3:05 Method Grundfos Pump

Static Water Level Prior to Purging 8.73 (ft)
(Measured from top of casing)

Water Level After Recovery 9.41 (ft)

80 Percent Recharged Yes ☐ No ☐

Well Volume 3.5 (liter/gal)

Three Well Volumes 10.5 (liter/gal)

Total Produced 10.5 (liter/gal)

Number of Well Volumes 3

Production Time _____ (min)

Production Rate _____ (_ /min)

Well Volumes	pH	Conductivity µSx10	Temp °F
1	6.39	0100	64
2	6.49	0090	66
3	10.40	90	66
4			
5			
6			
7			
8			
9			
10			

Sample Description _____

Laboratory _____

Deliver ☐ Pick-Up ☐ Date _____

Comments

LOVNEY ASSOCIATES — RECORD OF WELL DEVELOPMENT/SAMPLING

Project Number: SLL-17A

Project Name: Energy Lab R.O.

Field Geologist/Engineer: Tim Kimball

Well Number: MW-4 — Boring Diameter: 12 (inches)

Well Total Depth (completed): 11 (feet) — Casing Diameter: 4 (inches)

Development Date: 6/10/93 — Method: GrundFos Pump — Volume Produced: 35 (liter/gal)

WELL VOLUME CONVERSION FACTORS

2-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.17
VOL (LITERS) = FEET OF WATER x 0.62

4-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.66
VOL (LITERS) = FEET OF WATER x 2.5

Sampling Date: 6/11/93 — Time: 4:05 — Method: GrundFos Pump

Static Water Level Prior to Purging (Measured from top of casing): 6.67 (ft) — Water Level After Recovery: 7.32 (ft)

80 Percent Recharged: Yes ☐ No ☐

Well Volume: 4.2 (liter/gal)

Three Well Volumes: 12.6 (liter/gal)

Total Produced: 12.6 (liter/gal)

Number of Well Volumes: 3

Production Time: _____ (min)

Production Rate: _____ (_ /min)

Well Volumes	pH	Conductivity µSx10	Temp °F
1	6.37	60	67
2	6.39	60	68
3	6.47	60	67
4			
5			
6			
7			
8			
9			
10			

Sample Description: _____

Laboratory: _____

Deliver ☐ Pick-Up ☐ Date: _____

Comments

LOVNEY ASSOCIATES — RECORD OF WELL DEVELOPMENT/SAMPLING

Project Number 864-17A

Project Name Emeryville P.O.

Field Geologist/Engineer SF

Well Number MW-1A

Boring Diameter _____ (inches)

Well Total Depth (completed) 20 (feet)

Casing Diameter 2 (inches)

Development Date _____ Method _____ Volume Produced _____ (liter/gal)

WELL VOLUME CONVERSION FACTORS

2-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.17
VOL (LITERS) = FEET OF WATER x 0.62

4-INCH CASING DIAMETER

VOL (GALLONS) = FEET OF WATER x 0.66
VOL (LITERS) = FEET OF WATER x 2.5

Sampling Date 6/14/93 Time 11:30 Method Bailer

Static Water Level Prior to Purging 7.90 (ft)
(Measured from top of casing)

Water Level After Recovery 8.15 (ft)

80 Percent Recharged Yes ☒ No ☐

Well Volume 7.5 (liter/gal) 2

Three Well Volumes 23 (liter/gal) 3

Total Produced 23 (liter/gal) 3

Number of Well Volumes 3

Production Time _____ (min)

Production Rate _____ (_ /min)

Well Volumes	pH	Conductivity µSx10	Temp °F
1	7.01	0120	72
2	6.89	0110	71
3	6.89	0110	70
4			
5			
6			
7			
8			
9			
10			

Sample Description _____

Laboratory _____

Deliver ☐ Pick-Up ☐ Date _____

Comments DIESEL LIKE SHEEN ON WATER
PETROLEUM ODOR

RECHARGES QUICKLY

APPENDIX D

ANALYTICAL RESULTS

The refrigerated ground water and soil samples and the chain of custody form were delivered to Sequoia Analytical Laboratory, located in Redwood City, California. Soil and ground water samples were analyzed for TPH as gasoline plus BTEX (EPA Test Method 8015/8020), fuel fingerprint (EPA Test Method 8015), total petroleum oil (EPA Test Method 5520 EF), VOCs (EPA Test Method 8240 for ground water, EPA Test Method 8010 for soil), PCBs (EPA Test Method 8080), and priority pollutant metals. Two soil samples were additionally analyzed for reactivity, corrosivity, and ignitability. Attached are copies of these results and the chain of custody documentation. Sequoia is certified by the State of California as Hazardous Waste Testing Laboratories and as Approved Water and Wastewater Laboratories.

Four soil samples were submitted to Cooper Testing Labs of Mountain View, California. These samples were tested for grain size distribution (sieve and hydrometer, ASTM D-422).

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(415) 364-9600 • FAX (415) 364-9233

JUN 23 1993

Lowney Associates	Client Project ID: 864-17A	Sampled:	~~Jun 8, 1993~~
405 Clyde Avenue	Sample Descript: Soil Composite, ~~SS-1-4~~ EB(18-21)	Received:	Jun 9, 1993
Mountain View, CA 94043			
Attention: Peter Langtry	Lab Number: 3F40116	Reported:	Jun 17, 1993

INORGANIC PERSISTENT AND BIOACCUMULATIVE TOXIC SUBSTANCES

Analyte	Soluble Threshold Limit Concentration (Waste Extraction Test) STLC Max. Limit (mg/L)	Detection Limit (mg/L)	Analysis Result (mg/L)	Total Threshold Limit Concentration TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Analysis Result (mg/kg)
Antimony	15	0.10	-	500	5.0	N.D.
Arsenic	5.0	0.10	-	500	5.0	18
Barium	100	0.10	-	10,000	0.10	210
Beryllium	0.75	0.010	-	75	0.010	N.D.
Cadmium	1.0	0.010	-	100	0.010	31
Chromium (VI)	5.0	0.0050	-	500	0.050	-
Chromium	560	0.010	-	2,500	0.010	26
Cobalt	80	0.050	-	8,000	0.050	8.0
Copper	25	0.010	-	2,500	0.010	45
Lead	5.0	0.10	-	1,000	5.0	61
Mercury	0.20	0.00020	-	20	1.0	0.17
Molybdenum	350	0.050	-	3,500	0.050	N.D.
Nickel	20	0.050	-	2,000	0.050	N.D.
Selenium	1.0	0.10	-	100	5.0	N.D.
Silver	5.0	0.010	-	500	0.010	N.D.
Thallium	7.0	0.10	-	700	5.0	N.D.
Vanadium	24	0.050	-	2,400	0.050	25
Zinc	250	0.010	-	5,000	0.010	220
Asbestos	-	10	-	10,000	100	-
Fluoride	180	0.10	-	18,000	1.0	-

TTLC results are reported as mg/kg of wet weight. Asbestos results are reported as fibers/g.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

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JUN 23

Lowney Associates	Client Project ID: 864-17A	Sampled:	Jun 7, 1993
405 Clyde Avenue	Sample Descript: Soil Composite, EB-6, 7, 10, 11	Received:	Jun 9, 1993
Mountain View, CA 94043			
Attention: Peter Langtry	Lab Number: 3F40126	Reported:	Jun 17, 1993

INORGANIC PERSISTENT AND BIOACCUMULATIVE TOXIC SUBSTANCES

	Soluble Threshold Limit Concentration (Waste Extraction Test)			Total Threshold Limit Concentration		
Analyte	STLC Max. Limit (mg/L)	Detection Limit (mg/L)	Analysis Result (mg/L)	TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Analysis Result (mg/kg)
Antimony	15	0.10	-	500	5.0	N.D.
Arsenic	5.0	0.10	-	500	5.0	N.D.
Barium	100	0.10	-	10,000	0.10	210
Beryllium	0.75	0.010	-	75	0.010	N.D.
Cadmium	1.0	0.010	-	100	0.010	N.D.
Chromium (VI)	5.0	0.0050	-	500	0.050	-
Chromium	560	0.010	-	2,500	0.010	23
Cobalt	80	0.050	-	8,000	0.050	7.9
Copper	25	0.010	-	2,500	0.010	19
Lead	5.0	0.10	-	1,000	5.0	31
Mercury	0.20	0.00020	-	20	1.0	N.D.
Molybdenum	350	0.050	-	3,500	0.050	N.D.
Nickel	20	0.050	-	2,000	0.050	N.D.
Selenium	1.0	0.10	-	100	5.0	N.D.
Silver	5.0	0.010	-	500	0.010	N.D.
Thallium	7.0	0.10	-	700	5.0	N.D.
Vanadium	24	0.050	-	2,400	0.050	21
Zinc	250	0.010	-	5,000	0.010	59
Asbestos	-	10	-	10,000	100	-
Fluoride	180	0.10	-	18,000	1.0	-

TTLC results are reported as mg/kg of wet weight. Asbestos results are reported as fibers/g.
Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript:	Soil Composite, ~~SS-1-4~~ EB (18-21)	Received: Jun 9, 1993
Mountain View, CA 94043			Analyzed: 6/10, 14/93
Attention: Peter Langtry	Lab Number:	3F40116	Reported: Jun 17, 1993

CORROSIVITY, IGNITABILITY, AND REACTIVITY

Analyte	Detection Limit	Sample Results
Corrosivity:		
pH	N.A.	6.1
Ignitability:		
Flashpoint (Pensky-Martens), °C	N.A.	> 100 °C
Reactivity:		
Sulfide, mg/kg	13	N.D.
Cyanide, mg/kg	0.50	N.D.
Reaction with water	N.A.	Negative

Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript:	Soil Composite, EB-6, 7, 10, 11	Received: Jun 9, 1993
Mountain View, CA 94043			Analyzed: 6/10, 14/93
Attention: Peter Langtry	Lab Number:	3F40126	Reported: Jun 17, 1993

CORROSIVITY, IGNITABILITY, AND REACTIVITY

Analyte	Detection Limit	Sample Results
Corrosivity:		
pH	N.A.	6.6
Ignitability:		
Flashpoint (Pensky-Martens), °C	N.A.	> 100 °C
Reactivity:		
Sulfide, mg/kg	13	N.D.
Cyanide, mg/kg	0.50	N.D.
Reaction with water	N.A.	Negative

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript:	Soil Composite, ~~SS-1-4~~	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	EPA 5030/8010 EB (18-21)	Analyzed: Jun 10, 1993
Attention: Peter Langtry	Lab Number:	3F40116	Reported: Jun 17, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID: 864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript: Soil Composite, EB-6, 7, 10, 11	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method: EPA 5030/8010	Analyzed: Jun 10, 1993
Attention: Peter Langtry	Lab Number: 3F40126	Reported: Jun 17, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript:	Soil Composite, ~~SS-1-4~~ EB (18-21)	~~Received: Jun 9, 1993~~
Mountain View, CA 94043	Analysis Method:	EPA 8080	Extracted: Jun 11, 1993
Attention: Peter Langtry	Lab Number:	3F40116	Analyzed: Jun 11, 1993
			Reported: Jun 17, 1993

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
PCB 1016	100	N.D.
PCB 1221	400	N.D.
PCB 1232	100	N.D.
PCB 1242	100	N.D.
PCB 1248	100	N.D.
PCB 1254	100	N.D.
PCB 1260	100	450

450 ppb

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

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Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Descript:	Soil Composite, EB- 6, 7, 10, 11	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	EPA 8080	Extracted: Jun 11, 1993
Attention: Peter Langtry	Lab Number:	3F40126	Analyzed: Jun 11, 1993
			Reported: Jun 17, 1993

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
PCB 1016	20	N.D.
PCB 1221	80	N.D.
PCB 1232	20	N.D.
PCB 1242	20	N.D.
PCB 1248	20	N.D.
PCB 1254	20	N.D.
PCB 1260	20	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 7, 1993
405 Clyde Avenue	Sample Matrix:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	EPA 5030/8015/8020	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #:	3F40104	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40104 EB-13 4.5-5.0	Sample I.D. 3F40105 EB-13, 14.5-15.0	Sample I.D. 3F40106 EB-14, 5.0-5.5	Sample I.D. 3F40107 EB-15, 5.0-5.5	Sample I.D. 3F40108 EB-16, 8.5-9.0	Sample I.D. 3F40120 EB-1, 2.5-3.0
Purgeable Hydrocarbons	1.0	52	N.D.	N.D.	12	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.0050	0.038	N.D.	N.D.	0.017	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	0.059	N.D.	N.D.
Total Xylenes	0.0050	0.13	N.D.	N.D.	0.037	N.D.	N.D.
Chromatogram Pattern:		Non-Gas Mix > C6	--	--	Non Gas Mix > C6	--	--

Quality Control Data

Report Limit Multiplication Factor:	5.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	6/14/93	6/10/93	6/10/93	6/10/93	6/10/93	6/10/93
Instrument Identification:	GCHP-1	GCHP-1	GCHP-18	GCHP-1	GCHP-1	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	78	109	95	104	110	111

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID: 864-17A	Sampled: Jun 7, 1993
405 Clyde Avenue	Sample Matrix: Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method: EPA 5030/8015/8020	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #: 3F40122	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40122 EB-2 2.5-3.0	Sample I.D. 3F40123 EB-2, 7.5-8.0	Sample I.D. 3F40124 EB-3, 7.0-7.5	Sample I.D. 3F40125 EB-5, 7.0-7.5	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	1.0	N.D.	570	N.D.	N.D.		
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.		
Toluene	0.0050	N.D.	N.D.	N.D.	N.D.		
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	N.D.		
Total Xylenes	0.0050	N.D.	2.7	N.D.	N.D.		
Chromatogram Pattern:		--	Non Gas Mix > C6	--	--		

Quality Control Data

Report Limit Multiplication Factor:	1.0	20	1.0	1.0
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/11/93
Instrument Identification:	GCHP-18	GCHP-1	GCHP-1	GCHP-18
Surrogate Recovery, %: (QC Limits = 70-130%)	107	93	111	88

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID: 864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Matrix: Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method: EPA 5030/8015/8020	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #: 3F40109	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40109 EB-17, 5.0-5.5	Sample I.D. 3F40110 MW-1, 2.5-3.0	Sample I.D. 3F40112 MW-2, 5.5-6.0	Sample I.D. 3F40113 MW-3, 7.0-7.5	Sample I.D. 3F40114 MW-3, 12.5-13.0	Sample I.D. 3F40115 MW-4, 6.0-6.5
Purgeable Hydrocarbons	1.0	19	N.D.	330	420	N.D.	26
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.0050	0.035	N.D.	N.D.	1.0	N.D.	0.026
Ethyl Benzene	0.0050	0.052	N.D.	N.D.	2.3	N.D.	N.D.
Total Xylenes	0.0050	0.34	N.D.	0.60	1.0	N.D.	N.D.
Chromatogram Pattern:		Non-Gas Mix > C6	--	Non-Gas Mix > C6	Non-Gas Mix > C6	--	Non-Gas Mix > C6

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	100	1.0	1.0
Date Analyzed:	6/11/93	6/11/93	6/11/93	6/10/93	6/10/93	6/11/93
Instrument Identification:	GCHP-1	GCHP-18	GCHP-1	GCHP-1	GCHP-1	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	77	88	89	101	99	100

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Matrix:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	EPA 5030/8015/8020	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #:	3F40116	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40116 Composite, ~~6614~~ EB-(18-21)	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	1.0	N.D.					
Benzene	0.0050	N.D.					
Toluene	0.0050	N.D.					
Ethyl Benzene	0.0050	N.D.					
Total Xylenes	0.0050	N.D.					
Chromatogram Pattern:		--					

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	6/11/93
Instrument Identification:	GCHP-18
Surrogate Recovery, %: (QC Limits = 70-130%)	93

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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LOWNEY ASSOC.

JUN 23 1993

RECEIVED

Lowney Associates	Client Project ID:	864-17A
405 Clyde Avenue	Sample Matrix:	Soil
Mountain View, CA 94043	Analysis Method:	EPA 3550/8015
Attention: Peter Langtry	First Sample #:	3F40121

Sampled: Jun 7, 1993
Received: Jun 9, 1993
Reported: Jun 17, 1993

FUEL FINGERPRINT

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40121 EB-1, 4.0-4.5	Sample I.D. 3F40123 EB-2, 7.5-8.0	Sample I.D. 3F40124 EB-3, 7.0-7.5	Sample I.D. 3F40125 EB-5, 7.0-7.5	Sample I.D.	Sample I.D.
Extractable Hydrocarbons	1.0	N.D.	1,500	N.D.	N.D.		
Chromatogram Pattern:		--	Non-Diesel Mix C10-C22	--	--		

Quality Control Data

Report Limit Multiplication Factor:	1.0	100	1.0	1.0
Date Extracted:	6/10/93	6/10/93	6/10/93	6/10/93
Date Analyzed:	6/11/93	6/11/93	6/11/93	6/11/93
Instrument Identification:	GCHP-5	GCHP-5	GCHP-5	GCHP-5

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID: 864-17A	Sampled: Jun 7, 1993
405 Clyde Avenue	Sample Matrix: Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method: EPA 3550/8015	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #: 3F40104	

FUEL FINGERPRINT

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40104 EB-13, 4.5-5.0	Sample I.D. 3F40105 EB-13, 14.5-15.0	Sample I.D. 3F40106 EB-14, 5.0-5.5	Sample I.D. 3F40107 EB-15, 5.0-5.5	Sample I.D. 3F40108 EB-16, 8.5-9.0	Sample I.D.
Extractable Hydrocarbons	1.0	390	N.D.	N.D.	100	N.D.	
Chromatogram Pattern:		Non-Diesel C10-C22	--	--	Motor Oil	--	

Quality Control Data

Report Limit Multiplication Factor:	20	1.0	1.0	1.0	1.0
Date Extracted:	6/10/93	6/10/93	6/10/93	6/10/93	6/10/93
Date Analyzed:	6/14/93	6/11/93	6/11/93	6/15/93	6/11/93
Instrument Identification:	GCHP-5	GCHP-5	GCHP-5	GCHP-4	GCHP-5

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Project Manager

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Sample Matrix:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	EPA 3550/8015	Reported: Jun 17, 1993
Attention: Peter Langtry	First Sample #:	3F40109	

FUEL FINGERPRINT

Analyte	Reporting Limit mg/kg	Sample I.D. 3F40109 EB-17, 5.0-5.5	Sample I.D. 3F40110 MW-1, 2.5-3.0	Sample I.D. 3F40112 MW-2, 5.5-6.0	Sample I.D. 3F40113 MW-3, 7.0-7.5	Sample I.D. 3F40114 MW-3, 12.5-13.0	Sample I.D. 3F40115 MW-4, 6.0-6.5
Extractable Hydrocarbons	1.0	25	5.3	100	98	N.D.	36
Chromatogram Pattern:		Gas	> C18	Kerosene & Discrete Peaks	Non-Diesel Mix C10-C16	--	Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	20	5.0	1.0	1.0
Date Extracted:	6/10/93	6/10/93	6/10/93	6/10/93	6/10/93	6/10/93
Date Analyzed:	6/11/93	6/11/93	6/14/93	6/14/93	6/11/93	6/11/93
Instrument Identification:	GCHP-5	GCHP-5	GCHP-5	GCHP-5	GCHP-5	GCHP-5

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Matrix Descript:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	SM 5520 E&F (Gravimetric)	Extracted: Jun 10, 1993
Attention: Peter Langtry	First Sample #:	3F40101	Analyzed: Jun 15, 1993
			Reported: Jun 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/kg
3F40101	EB-10 2.5-3.0	530
3F40102	EB-11 2.0-2.5	190
3F40103	EB-12, 4.5-5.0	N.D.
3F40104	EB-13, 4.5-5.0	190
3F40105	EB-13, 14.5-15.0	N.D.
3F40106	EB-14, 5.0-5.5	N.D.

Detection Limits:	**50**

Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Matrix Descript:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	SM 5520 E&F (Gravimetric)	Extracted: Jun 11, 1993
Attention: Peter Langtry	First Sample #:	3F40107	Analyzed: Jun 15, 1993
			Reported: Jun 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/kg
3F40107	EB-15 5.0-5.5	N.D.
3F40108	EB-16, 8.5-9.0	N.D.
3F40109	EB-17 5.0-5.5	N.D.
3F40110	MW-1 2.5-3.0	160
3F40117	MW-2, 3.0-3.5	140
3F40112	MW-2, 5.5-6.0	490
3F40113	MW-3, 7.0-7.5	N.D.
3F40114	MW-3 12.5-13.0	230
3F40115	MW-4, 6.0-6.5	180
3F40116	~~SS-1~~ EB-18	51
Detection Limits:		**50**

Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates	Client Project ID:	864-17A	Sampled: Jun 8, 1993
405 Clyde Avenue	Matrix Descript:	Soil	Received: Jun 9, 1993
Mountain View, CA 94043	Analysis Method:	SM 5520 E&F (Gravimetric)	Extracted: Jun 11, 1993
Attention: Peter Langtry	First Sample #:	3F40117	Analyzed: Jun 15, 1993
			Reported: Jun 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/kg
3F40117	~~SS-2~~ EB-19	N.D.
3F40118	~~SS-3~~ EB-20	N.D.
3F40119	~~SS-4~~ EB-21	N.D.

Detection Limits:	**50**

Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates	Client Project ID:	864-17A
405 Clyde Avenue	Matrix Descript:	Soil
Mountain View, CA 94043	Analysis Method:	SM 5520 E&F (Gravimetric)
Attention: Peter Langtry	First Sample #:	3F40121

Sampled:	Jun 8, 1993
Received:	Jun 9, 1993
Extracted:	Jun 14, 1993
Analyzed:	Jun 15, 1993
Reported:	Jun 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/kg
3F40121	EB-1, 4.0-4.5	N.D.
3F40123	EB-2, 7.5-8.0	740
3F40124	EB-3, 7.0-7.5	N.D.
3F40125	EB-5, 7.0-7.5	N.D.
3F40126	EB-6, 2.0-2.5	N.D.
3F40127	EB-7, 2.0-2.5	790
3F40128	EB-8, 2.0-2.5	N.D.
3F40129	EB-9, 2.5-3.0	92

Detection Limits:	**50**

Analytes reported as N.D. were not present above the stated limit of detection.

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Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil
QC Sample Group: 3F40116, 26

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Mercury	Mercury	Beryllium	Cadmium	Chromium	Nickel
Method:	EPA 245.1	EPA 7471	EPA 6010	EPA 6010	EPA 6010	EPA 6010
Analyst:	A. McDonald	A. McDonald	C.Medefesser	C.Medefesser	C.Medefesser	C.Medefesser
Conc. Spiked:	0.0020	1.0	0.20	0.20	0.20	0.20
Units:	mg/L	mg/L	mg/kg	mg/kg	mg/kg	mg/kg
LCS Batch#:	BLK061193	BLK061193	BLK061193	BLK061193	BLK061193	BLK061193
Date Prepared:	6/11/93	6/11/93	6/11/93	6/11/93	6/11/93	6/11/93
Date Analyzed:	6/11/93	6/11/93	6/14/93	6/14/93	6/14/93	6/14/93
Instrument I.D.#:	MPE-2	MPE-2	MTJA-2	MTJA-2	MTJA-2	MTJA-2
LCS % Recovery:	98	108	97	100	100	100
Control Limits:	90-110	90-110	90-110	90-110	90-110	90-110
MS/MSD Batch #:	3F38303	3F40116	3F51905	3F51905	3F51905	3F51905
Date Prepared:	6/10/93	6/10/93	6/11/93	6/11/93	6/11/93	6/11/93
Date Analyzed:	6/10/93	6/10/93	6/14/93	6/14/93	6/14/93	6/14/93
Instrument I.D.#:	MPE-2	MPE-2	MTJA-2	MTJA-2	MTJA-2	MTJA-2
Matrix Spike % Recovery:	96	100	93	91	96	92
Matrix Spike Duplicate % Recovery:	102	118	80	72	77	80
Relative % Difference:	6.1	17	15	23	22	14

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Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

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Lowney Associates
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Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil

QC Sample Group: 3F40116, 26

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	pH	Flashpoint
Method:	EPA 9040	EPA 1010
Analyst:	Y. Arteaga	K. Newberry
Units:	N.A.	°C
Date:	6/10/93	6/14/93
Sample #:	3F40701	3F40126
Sample Concentration:	7.7	> 100
Sample Duplicate Concentration:	7.8	> 100
% RPD:	1.3	0.0
Control Limits:	0-30	± 5.0

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Lowney Associates
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Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil

QC Sample Group: 3F40116, 26

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Sulfide	Cyanide
Method:	EPA 9030	EPA 9010
Analyst:	K. Newberry	A.Savva
Conc. Spiked:	1300	3.4
Units:	mg/kg	mg/kg
LCS Batch#:	LCS061493	LCS061493
Date Prepared:	6/14/93	6/14/93
Date Analyzed:	6/14/93	6/14/93
Instrument I.D.#:	N.A.	N.A.
LCS % Recovery:	83	107
Control Limits:	80-120	80-120
MS/MSD Batch #:	3F31601	3F18001
Date Prepared:	6/8/93	6/9/93
Date Analyzed:	6/8/93	6/9/93
Instrument I.D.#:	N.A.	N.A.
Matrix Spike % Recovery:	81	100
Matrix Spike Duplicate % Recovery:	81	100
Relative % Difference:	0.0	0.0

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Lowney Associates
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Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil

QC Sample Group: 3F40116, 26

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloroethene	Trichloroethene	Chloro-benzene	PCB 1260
Method:	EPA 8010	EPA 8010	EPA 8010	EPA 8080
Analyst:	B. Samra	B. Samra	B. Samra	L.Laikhtman
Conc. Spiked:	25	25	25	500
Units:	µg/kg	µg/kg	µg/kg	µg/kg
LCS Batch#:	VBLK061093	VBLK061093	VBLK061093	BLK061193
Date Prepared:	6/10/93	6/10/93	6/10/93	6/11/93
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/11/93
Instrument I.D.#:	GCHP-9	GCHP-9	GCHP-9	GCHP-12
LCS % Recovery:	108	92	82	72
Control Limits:	59-172	62-137	60-133	50-150
MS/MSD Batch #:	V3F32705	V3F32705	V3F32705	P3F40010
Date Prepared:	6/10/93	6/10/93	6/10/93	6/11/93
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/11/93
Instrument I.D.#:	GCHP-9	GCHP-9	GCHP-9	GCHP-12
Matrix Spike % Recovery:	100	82	80	*
Matrix Spike Duplicate % Recovery:	88	88	82	*
Relative % Difference:	13	7.1	2.5	*

* - Diluted Out.

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Maile A. Springer
Project Manager

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LOWNEY ASSOC

Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil
QC Sample Group: 3F40104-10, 12-16, 20, 22, 23, 25

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R.Geckler	R.Geckler	R.Geckler	R.Geckler
Conc. Spiked:	0.20	0.20	0.20	0.60
Units:	mg/kg	mg/kg	mg/kg	mg/kg
LCS Batch#:	GBLK061093	GBLK061093	GBLK061093	GBLK061093
Date Prepared:	6/10/93	6/10/93	6/10/93	6/10/93
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/10/93
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
LCS % Recovery:	95	100	100	98
Control Limits:	60-140	60-140	60-140	60-140
MS/MSD Batch #:	G3F34601	G3F34601	G3F34601	G3F34601
Date Prepared:	6/10/93	6/10/93	6/10/93	6/10/93
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/10/93
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
Matrix Spike % Recovery:	90	90	90	90
Matrix Spike Duplicate % Recovery:	90	90	90	90
Relative % Difference:	0.0	0.0	0.0	0.0

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Project Manager

Please Note:
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Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil

QC Sample Group: 3F41014 - 10, 12-15, 21, 23, 25

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel

Method:	EPA 8015
Analyst:	E. Cunanan
Conc. Spiked:	15
Units:	mg/kg
LCS Batch#:	DBLK061093
Date Prepared:	6/10/93
Date Analyzed:	6/11/93
Instrument I.D.#:	GCHP-5
LCS % Recovery:	80
Control Limits:	50-150

MS/MSD Batch #:	3F40105
Date Prepared:	6/10/93
Date Analyzed:	6/11/93
Instrument I.D.#:	GCHP-5
Matrix Spike % Recovery:	80
Matrix Spike Duplicate % Recovery:	87
Relative % Difference:	8.4

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil

QC Sample Group: 3F40101 - 19

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Oil & Grease
Method:	SM5520EF
Analyst:	M.Shkidt
Conc. Spiked:	1,000
Units:	mg/kg
LCS Batch#:	BLK061093
Date Prepared:	6/10/93
Date Analyzed:	6/10/93
Instrument I.D.#:	N.A.
LCS % Recovery:	90
Control Limits:	70-110

MS/MSD Batch #:	3F40106
Date Prepared:	6/10/93
Date Analyzed:	6/10/93
Instrument I.D.#:	N.A.
Matrix Spike % Recovery:	93
Matrix Spike Duplicate % Recovery:	100
Relative % Difference:	7.3

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Peter Langtry

Client Project ID: 864-17A
Matrix: Soil
QC Sample Group: 3F40121, 23 - 29

Reported: Jun 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Oil & Grease
Method:	SM5520EF
Analyst:	M.Shkidt
Conc. Spiked:	1,000
Units:	mg/kg
LCS Batch#:	BLK061493
Date Prepared:	6/14/93
Date Analyzed:	1/6/00
Instrument I.D.#:	N.A.
LCS % Recovery:	90
Control Limits:	70-110

MS/MSD Batch #:	BLK061493
Date Prepared:	6/14/93
Date Analyzed:	6/15/93
Instrument I.D.#:	N.A.
Matrix Spike % Recovery:	90
Matrix Spike Duplicate % Recovery:	84
Relative % Difference:	6.9

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

SS-1 TO SS-4
CHANGED TO
EB-18 TO EB-21
SF

LOWNEY ASSOCIATES
CHAIN OF CUSTODY RECORD

JOB NO.	PROJECT NAME/LOCATION
364-17A	EMERYville P.O.

SAMPLER (S): (Signature) Jim Rumbolz

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	TPH-GAS/BTEX	Fuel/Kerosene (Diesel)	Oil & Grease (5520EF)	EPA 8010	17 CAM METALS	PCBs (8080)	R.C.I.*
6/8/93	16:30	SS-1 Soil	1			X				
		SS-2	1			X				
		SS-3	1			X				
		SS-4	1			X				
		SS-(1 TO 4) COMPOSITE	1	X			X	X	X	X
6/7/93		EB-1 2.5-3.0	1	X						
		4.0-4.5	1		X	X				
		EB-2 2.5-3.0	1	X						
		7.5-8.0	1	X	X	X				
		EB-3 7.0-7.5	1	X	X	X				
		EB-5 7.0-7.5	1	X	X	X				
		EB-6 2.0-2.5	1			X				
		EB-7 2.0-2.5	1			X				
		EB-8 2.0-2.5	1			X				
		EB-9 2.5-3.0	1			X				

SHIP TO:
LOWNEY ASSOCIATES
405 Clyde Avenue
Mountain View, CA 94043
415-967-2365
415-967-2785 (FAX)

REMARKS
9306401 - 16
1-WEEK TURNAROUND 17
18
19
20
21
22
23
24
25
26
27
28
29

Relinquished By: (Signature) Jim Rumbolz
Laboratory of Record: SEQUOIA

Date	Time	Received By: (Signature)
6/9/93	14:50	R Jehlik 6/9/93 1130
6/9	16:30	Received for Laboratory By: (Signature) Steve Bee

Relinquished By: (Signature) R Jehlik

Date	Time	Received By: (Signature)
6/9/93	1630	

Date | Time | Remarks:

* RCI = REACTIVITY, CORROSIVITY, & IGNITABILITY

LOWNEY ASSOCIATES
CHAIN OF CUSTODY RECORD

JOB NO.	PROJECT NAME/LOCATION
864-17A	Emeryville P.O

SAMPLER (S): (Signature)
Jim Rumbolz

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	EPA 8010	17 CAM METALS	PCB'S (8080)	T.C.L	REMARKS
6/2/93		EB 6, 7, 10, 11 Composit		X	X	X	X	9306401
								1-WEEK TURNAROUND

ANALYSIS REQUIRED

SHIP TO:
LOWNEY ASSOCIATES
405 Clyde Avenue
Mountain View, CA 94043
415-967-2365
415-967-2785 (FAX)

Relinquished By: (Signature)	Date	Time	Received By: (Signature)
Jim Rumbolz	6/9/93	14:30	R. Jehlik 6/9/93 1430
Laboratory of Record: SEQUOIA	Date:	Time:	Received for Laboratory By: (Signature) Jim Rumbolz

Relinquished By: (Signature)	Date	Time	Received By: (Signature)
R. Jehlik	6/9/93	1630	

Remarks:

LOWNEY ASSOCIATES
CHAIN OF CUSTODY RECORD

JOB NO.: 864-17A
PROJECT NAME/LOCATION: Emeryville P.O.

SAMPLER (S): (Signature) Jim Rumbaugh

SHIP TO:
LOWNEY ASSOCIATES
405 Clyde Avenue
Mountain View, CA 94043
415-967-2365
415-967-2785 (FAX)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	TPH-GAS	BTEX	Fuel Fingerprint (8015M)	O/G 5520 EF	EPA 8010	17 CAM METALS	PCB's (8080)	R.C.I.	REMARKS
6/7/93		EB-10 2.5-3.0 So:1	1				X					9306401-01
		EB-11 2.0-2.5	1				X					-02
		EB-12 4.5-5.0	1				X					1-WEEK TURNAROUND 03
		EB-13 4.5-5.0	1	X	X		X					04
		14.5-15.0	1	X	X		X					05
		EB-14 5.0-5.5	1	X	X		X					06
		EB-15 5.0-5.5	1	X	X		X					07
		EB-16 8.5-9.0	1	X	X		X					08
6/8/93		EB-17 5.0-5.5	1	X	X		X					09
		MW-1 2.5-3.0	1	X	X		X					10
		MW-2 3.0-3.5	1				X					11
		5.5-6.0	1	X	X		X					12
		MW-3 7.0-7.5	1	X	X		X					13
		12.5-13.0	1	X	X		X					14
		MW-4 6.0-6.5	1	X	X		X					15

Relinquished By: (Signature)	Date	Time	Received By: (Signature)
Jim Rumbaugh	6/9/93	14:30	R. Jehlik 6/9/93 1430
R. Jehlik	6/9/93	1630	

Laboratory of Record:	Date	Time	Received for Laboratory By: (Signature)	Date	Time	Remarks:
SEQUOIA	6/9	1630	Jane Dee			

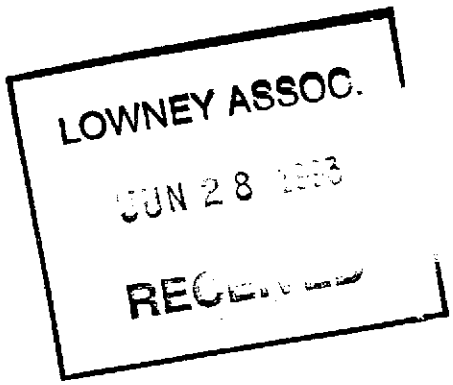
SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-1	Received:	Jun 14, 1993
Mountain View, CA 94043			Analyzed:	6/17-21/93
Attention: Stason Foster	Lab Number:	3F62301	Reported:	Jun 24, 1993

E.P.A. PRIORITY POLLUTANTS: METALS

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Antimony	5.0	N.D.
Arsenic	5.0	N.D.
Beryllium	10	N.D.
Cadmium	10	N.D.
Chromium	10	N.D.
Copper	10	N.D.
Lead	5.0	N.D.
Mercury	0.20	N.D.
Nickel	50	N.D.
Selenium	5.0	N.D.
Silver	10	N.D.
Thallium	5.0	N.D.
Zinc	10	N.D.



Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

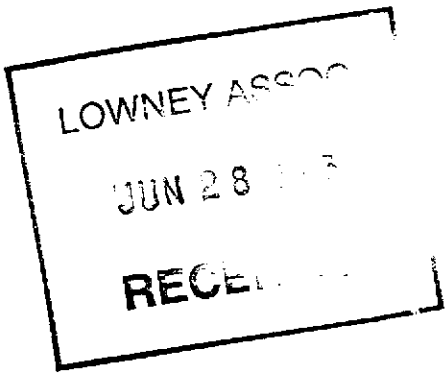
SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-3	Received:	Jun 14, 1993
Mountain View, CA 94043			Analyzed:	6/17-21/93
Attention: Stason Foster	Lab Number:	3F62303	Reported:	Jun 24, 1993

E.P.A. PRIORITY POLLUTANTS: METALS

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Antimony	5.0	N.D.
Arsenic	**5.0**	**44**
Beryllium	10	N.D.
Cadmium	10	N.D.
Chromium	10	N.D.
Copper	10	N.D.
Lead	**5.0**	**7.9**
Mercury	0.20	N.D.
Nickel	50	N.D.
Selenium	5.0	N.D.
Silver	10	N.D.
Thallium	5.0	N.D.
Zinc	10	N.D.



Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Matrix:	Water	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 5030/8015/8020	Reported:	Jun 24, 1993
Attention: Stason Foster	First Sample #:	3F62301		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3F62301 MW-1	Sample I.D. 3F62302 MW-2	Sample I.D. 3F62303 MW-3	Sample I.D. 3F62304 MW-4	Sample I.D. 3F62305 MW-1A	Sample I.D.
Purgeable Hydrocarbons	50	N.D.	1,500	180	1,200	N.D.	
Benzene	0.50	N.D.	3.2	N.D.	N.D.	N.D.	
Toluene	0.50	N.D.	4.7	3.6	4.0	N.D.	
Ethyl Benzene	0.50	N.D.	N.D.	0.98	16	7.7	
Total Xylenes	0.50	N.D.	N.D.	3.4	1.5	N.D.	
Chromatogram Pattern:		--	--	--	--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	2.5	1.0	2.5	10
Date Analyzed:	6/17/93	6/18/93	6/18/93	6/18/93	6/18/93
Instrument Identification:	GCHP-2	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	103	91	98	82	78

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Christine Middleton

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Matrix:	Water	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 3510/3520/8015	Reported:	Jun 24, 1993
Attention: Stason Foster	First Sample #:	3F62301		

FUEL FINGERPRINT

Analyte	Reporting Limit µg/L	Sample I.D. 3F62301 MW-1	Sample I.D. 3F62302 MW-2	Sample I.D. 3F62303 MW-3	Sample I.D. 3F62304 MW-4	Sample I.D. 3F62305 MW-1A	Sample I.D.
Extractable Hydrocarbons	50	N.D.	240	530	730	4,900	
Chromatogram Pattern:		--	Kerosene + Non-Kerosene Mix C15-C22	Non-Diesel Mix C9-C20	Kerosene	Diesel	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	2.0	5.0	20
Date Extracted:	6/16/93	6/16/93	6/16/93	6/16/93	6/16/93
Date Analyzed:	6/17/93	6/17/93	6/17/93	6/17/93	6/17/93
Instrument Identification:	GCHP-5	GCHP-5	GCHP-5	GCHP-5	GCHP-5

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Matrix Descript:	Water	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	Jun 17, 1993
Attention: Stason Foster	First Sample #:	3F62301	Analyzed:	Jun 17, 1993
			Reported:	Jun 24, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L
3F62301	MW-1	N.D.
3F62302	MW-2	N.D.
3F62303	MW-3	N.D.
3F62304	MW-4	N.D.
3F62305	MW-1A	8.0

Detection Limits:	**5.0**

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

3F62301.JVL <5>

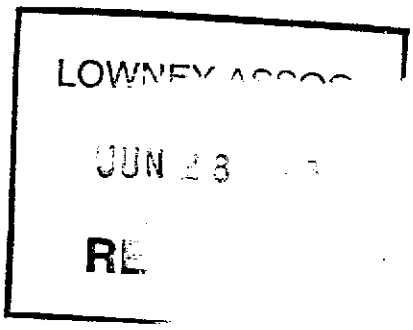
SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-1	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 8080	Extracted:	Jun 16, 1993
Attention: Stason Foster	Lab Number:	3F62301	Analyzed:	Jun 16, 1993
			Reported:	Jun 24, 1993

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit µg/L	Sample Results µg/L
PCB 1016	0.50	N.D.
PCB 1221	2.0	N.D.
PCB 1232	0.50	N.D.
PCB 1242	0.50	N.D.
PCB 1248	0.50	N.D.
PCB 1254	0.50	N.D.
PCB 1260	0.50	N.D.



Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-3	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 8080	Extracted:	Jun 16, 1993
Attention: Stason Foster	Lab Number:	3F62303	Analyzed:	Jun 16, 1993
			Reported:	Jun 24, 1993

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit µg/L	Sample Results µg/L
PCB 1016	0.50	N.D.
PCB 1221	2.0	N.D.
PCB 1232	0.50	N.D.
PCB 1242	0.50	N.D.
PCB 1248	0.50	N.D.
PCB 1254	0.50	N.D.
PCB 1260	0.50	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-1	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 8240	Analyzed:	Jun 16, 1993
Attention: Stason Foster	Lab Number:	3F62301	Reported:	Jun 24, 1993

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acetone	10	N.D.
Benzene	2.0	N.D.
Bromodichloromethane	2.0	N.D.
Bromoform	2.0	N.D.
Bromomethane	2.0	N.D.
2-Butanone	10	N.D.
Carbon disulfide	2.0	N.D.
Carbon tetrachloride	2.0	N.D.
Chlorobenzene	2.0	N.D.
Chloroethane	2.0	N.D.
2-Chloroethyl vinyl ether	10	N.D.
Chloroform	2.0	N.D.
Chloromethane	2.0	N.D.
Dibromochloromethane	2.0	N.D.
1,1-Dichloroethane	2.0	N.D.
1,2-Dichloroethane	2.0	N.D.
1,1-Dichloroethene	2.0	N.D.
cis-1,2-Dichloroethene	2.0	N.D.
trans-1,2-Dichloroethene	2.0	N.D.
1,2-Dichloropropane	2.0	N.D.
cis-1,3-Dichloropropene	2.0	N.D.
trans-1,3-Dichloropropene	2.0	N.D.
Ethylbenzene	2.0	N.D.
2-Hexanone	10	N.D.
Methylene chloride	5.0	N.D.
4-Methyl-2-pentanone	10	N.D.
Styrene	2.0	N.D.
1,1,2,2-Tetrachloroethane	2.0	N.D.
Tetrachloroethene	2.0	N.D.
Toluene	2.0	N.D.
1,1,1-Trichloroethane	2.0	N.D.
1,1,2-Trichloroethane	2.0	N.D.
Trichloroethene	**2.0**	**4.1**
Trichlorofluoromethane	2.0	N.D.
Vinyl acetate	2.0	N.D.
Vinyl chloride	2.0	N.D.
Total Xylenes	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID:	864-17A	Sampled:	Jun 11, 1993
405 Clyde Avenue	Sample Descript:	Water, MW-3	Received:	Jun 14, 1993
Mountain View, CA 94043	Analysis Method:	EPA 8240	Analyzed:	Jun 16, 1993
Attention: Stason Foster	Lab Number:	3F62303	Reported:	Jun 24, 1993

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acetone	10	N.D.
Benzene	2.0	N.D.
Bromodichloromethane	2.0	N.D.
Bromoform	2.0	N.D.
Bromomethane	2.0	N.D.
2-Butanone	10	N.D.
Carbon disulfide	2.0	N.D.
Carbon tetrachloride	2.0	N.D.
Chlorobenzene	2.0	N.D.
Chloroethane	2.0	N.D.
2-Chloroethyl vinyl ether	10	N.D.
Chloroform	2.0	N.D.
Chloromethane	2.0	N.D.
Dibromochloromethane	2.0	N.D.
1,1-Dichloroethane	2.0	N.D.
1,2-Dichloroethane	2.0	N.D.
1,1-Dichloroethene	2.0	N.D.
cis-1,2-Dichloroethene	2.0	N.D.
trans-1,2-Dichloroethene	2.0	N.D.
1,2-Dichloropropane	2.0	N.D.
cis-1,3-Dichloropropene	2.0	N.D.
trans-1,3-Dichloropropene	2.0	N.D.
Ethylbenzene	2.0	N.D.
2-Hexanone	10	N.D.
Methylene chloride	5.0	N.D.
4-Methyl-2-pentanone	10	N.D.
Styrene	2.0	N.D.
1,1,2,2-Tetrachloroethane	2.0	N.D.
Tetrachloroethene	2.0	N.D.
Toluene	**2.0**	**5.4**
1,1,1-Trichloroethane	2.0	N.D.
1,1,2-Trichloroethane	2.0	N.D.
Trichloroethene	2.0	N.D.
Trichlorofluoromethane	2.0	N.D.
Vinyl acetate	2.0	N.D.
Vinyl chloride	2.0	N.D.
Total Xylenes	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Lowney Associates	Client Project ID: 864-17A	
405 Clyde Avenue	Matrix: Water	
Mountain View, CA 94043		
Attention: Stason Foster	QC Sample Group: 3F62301	Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	M.Nipp	M.Nipp	M.Nipp	M.Nipp
Conc. Spiked:	10	10	10	30
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	GBLK061793	GBLK061793	GBLK061793	GBLK061793
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/17/93	6/17/93	6/17/93	6/17/93
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
LCS % Recovery:	94	94	94	93
Control Limits:	80-120	80-120	80-120	80-120
MS/MSD Batch #:	G3F75502	G3F75502	G3F75502	G3F75502
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/17/93	6/17/93	6/17/93	6/17/93
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Matrix Spike % Recovery:	97	96	96	97
Matrix Spike Duplicate % Recovery:	82	82	80	80
Relative % Difference:	17	16	18	19

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

Please Note:
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SEQUOIA ANALYTICAL

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LOW
UCN
R

Lowney Associates	Client Project ID:	864-17A
405 Clyde Avenue	Matrix:	Water
Mountain View, CA 94043		
Attention: Stason Foster	QC Sample Group: 3F62302 - 05	Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J.Villar	J.Villar	J.Villar	J.Villar
Conc. Spiked:	10	10	10	30
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	GBLK061893	GBLK061893	GBLK061893	GBLK061893
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/18/93	6/18/93	6/18/93	6/18/93
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
LCS % Recovery:	94	98	94	93
Control Limits:	80-120	80-120	80-120	80-120
MS/MSD Batch #:	G3F36206	G3F36206	G3F36206	G3F36206
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/18/93	6/18/93	6/18/93	6/18/93
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Matrix Spike % Recovery:	80	82	81	80
Matrix Spike Duplicate % Recovery:	95	97	98	97
Relative % Difference:	17	17	19	19

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

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Lowney Associates	Client Project ID: 864-17A	
405 Clyde Avenue	Matrix: Water	
Mountain View, CA 94043		
Attention: Stason Foster	QC Sample Group: 3F45901 - 05	Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Oil & Grease	Diesel
Method:	SM5520BF	EPA 8015
Analyst:	M. Shkidt	C.Lee
Conc. Spiked:	30	300
Units:	mg/L	µg/L
LCS Batch#:	BLK061593	DBLK061693
Date Prepared:	6/15/93	6/16/93
Date Analyzed:	6/15/93	6/17/93
Instrument I.D.#:	N.A.	GCHP-5
LCS % Recovery:	80	60
Control Limits:	70-110	50-150
MS/MSD Batch #:	3F45901	DBLK061693
Date Prepared:	6/15/93	6/16/93
Date Analyzed:	6/15/93	6/17/93
Instrument I.D.#:	N.A.	GCHP-5
Matrix Spike % Recovery:	77	60
Matrix Spike Duplicate % Recovery:	73	63
Relative % Difference:	5.3	4.9

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

Please Note:
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(415) 364-9600 • FAX (415) 364-9233

Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Stason Foster

Client Project ID: 864-17A
Matrix: Water
QC Sample Group: 3F62301 - 05

Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Beryllium	Chromium	Nickel	Lead	Mercury	Zinc
Method:	EPA 200.7	EPA 200.7	EPA 200.7	EPA 239.2	EPA 245.1	EPA 200.7
Analyst:	C.Medefesser	C.Medefesser	C.Medefesser	S.Chin	A.McDonald	C.Medefesser
Conc. Spiked:	1.0	1.0	1.0	50	0.0020	1.0
Units:	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L
LCS Batch#:	BLK061693	BLK061693	BLK061693	BLK061693	BLK061793	BLK061693
Date Prepared:	6/16/93	6/16/93	6/16/93	6/15/93	6/17/93	6/16/93
Date Analyzed:	6/17/93	6/17/93	6/17/93	6/16/93	6/17/93	6/17/93
Instrument I.D.#:	MTJA-2	MTJA-2	MTJA-2	MV-1	MPE-2	MTJA-2
LCS % Recovery:	97	96	98	89	102	95
Control Limits:	90-110	90-110	90-110	75-125	90-110	90-110
MS/MSD Batch #:	3F65813	3F65813	3F65813	3F67301	3F67401	3F65813
Date Prepared:	6/16/93	6/16/93	6/16/93	6/15/93	6/17/93	6/16/93
Date Analyzed:	6/17/93	6/17/93	6/17/93	6/17/93	6/17/93	6/17/93
Instrument I.D.#:	MTJA-2	MTJA-2	MTJA-2	MV-1	MPE-2	MTJA-2
Matrix Spike % Recovery:	95	95	96	60	117	94
Matrix Spike Duplicate % Recovery:	94	94	94	60	105	93
Relative % Difference:	1.1	1.1	2.1	0.0	5.6	1.1

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

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SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

LOWNEY ASS...

Lowney Associates	Client Project ID:	864-17A
405 Clyde Avenue	Matrix:	Water
Mountain View, CA 94043		
Attention: Stason Foster	QC Sample Group: 3F62301, 03	Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Arsenic	Selenium	Antimony	Thallium	1242 PCB
Method:	EPA 206.2	EPA 270.2	EPA 204.2	EPA 279.2	EPA 8080
Analyst:	F.Contreras	F.Contreras	W.Thant	W.Thant	L.Laikhtman
Conc. Spiked:	50	50	50	50	1000
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	BLK061693	BLK061693	BLK061693	BLK061693	BLK061193
Date Prepared:	6/16/93	6/16/93	6/16/93	6/16/93	6/11/93
Date Analyzed:	6/21/93	6/21/93	6/18/93	6/21/93	6/14/93
Instrument I.D.#:	TJA-3	TJA-3	MTJA-1	MTJA-1	GCHP-12
LCS % Recovery:	100	98	120	95	91
Control Limits:	75-125	75-125	75-125	75-125	50-150
MS/MSD Batch #:	3F67301	3F67301	3F67301	3F67301	BLK061193
Date Prepared:	6/16/93	6/16/93	6/16/93	6/16/93	6/11/93
Date Analyzed:	6/21/93	6/21/93	6/18/93	6/21/93	6/11/93
Instrument I.D.#:	TJA-3	TJA-3	MTJA-1	MTJA-1	GCHP-12
Matrix Spike % Recovery:	96	82	103	93	91
Matrix Spike Duplicate % Recovery:	92	90	108	95	88
Relative % Difference:	4.3	9.3	4.7	2.1	3.4

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

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(415) 364-9600 • FAX (415) 364-9233

Lowney Associates
405 Clyde Avenue
Mountain View, CA 94043
Attention: Stason Foster

Client Project ID: 864-17A
Matrix: Water
QC Sample Group: 3F62301, 03

Reported: Jun 24, 1993

QUALITY CONTROL DATA REPORT

ANALYTE:	1,1-Dichloro-ethene	Trichloroethene	Benzene	Toluene	Chloro-benzene
Method:	EPA 8240	EPA 8240	EPA 8240	EPA 8240	EPA 8240
Analyst:	M. Williams	M. Williams	M. Williams	M. Williams	M. Williams
Conc. Spiked:	50	50	50	50	50
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	VBLK061693	VBLK061693	VBLK061693	VBLK061693	VBLK061693
Date Prepared:	6/16/93	6/16/93	6/16/93	6/16/93	6/16/93
Date Analyzed:	6/16/93	6/16/93	6/16/93	6/16/93	6/16/93
Instrument I.D.#:	MSHP-6	MSHP-6	MSHP-6	MSHP-6	MSHP-6
LCS % Recovery:	98	96	104	98	94
Control Limits:	61-145	71-120	76-127	76-125	75-130
MS/MSD Batch #:	V3F49703	V3F49703	V3F49703	V3F49703	V3F49703
Date Prepared:	6/16/93	6/16/93	6/16/93	6/16/93	6/16/93
Date Analyzed:	6/16/93	6/16/93	6/16/93	6/16/93	6/16/93
Instrument I.D.#:	MSHP-6	MSHP-6	MSHP-6	MSHP-6	MSHP-6
Matrix Spike % Recovery:	106	98	100	100	96
Matrix Spike Duplicate % Recovery:	104	98	104	102	96
Relative % Difference:	1.9	0.0	3.9	2.0	0.0

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SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

LOWNEY ASSOCIATES
CHAIN OF CUSTODY RECORD

JOB NO.	PROJECT NAME/LOCATION
664-17A	EMERYVILLE P.O.

SAMPLER (S): (Signature) Brian K. DeBruine

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	TPH Gas + BTEX (8015/8020)	*Fuel Fingerprint (8015Mod)	Oil and Grease (5520 E&F)	VOCs (8240)	13 Metals (Cam 17 Metals)	PCBs (8080)
6/11/93	1:40	MW-1, Groundwater	9	X	X	X	X	X	X
6/11/93	11:20	MW-2, Groundwater	5	X	X	X			
6/11/93	3:05	MW-3, Groundwater	9	X	X	X	X	X	X
6/11/93	4:05	MW-4, Groundwater	6	X	X	X			
6/14/93	11:20	MW-1A, Groundwater	6	X	X	X			

ANALYSIS REQUIRED

SHIP TO:
LOWNEY ASSOCIATES
405 Clyde Avenue
Mountain View, CA 94043
415-967-2365
415-967-2785 (FAX)

REMARKS

ONE WEEK RESPONSE 9306623-01A
-02A
-03A
-04A
-05A

REPORT TO COMMERCE TESTER

*FUEL FINGERPRINT - DIESEL/KEROSENE

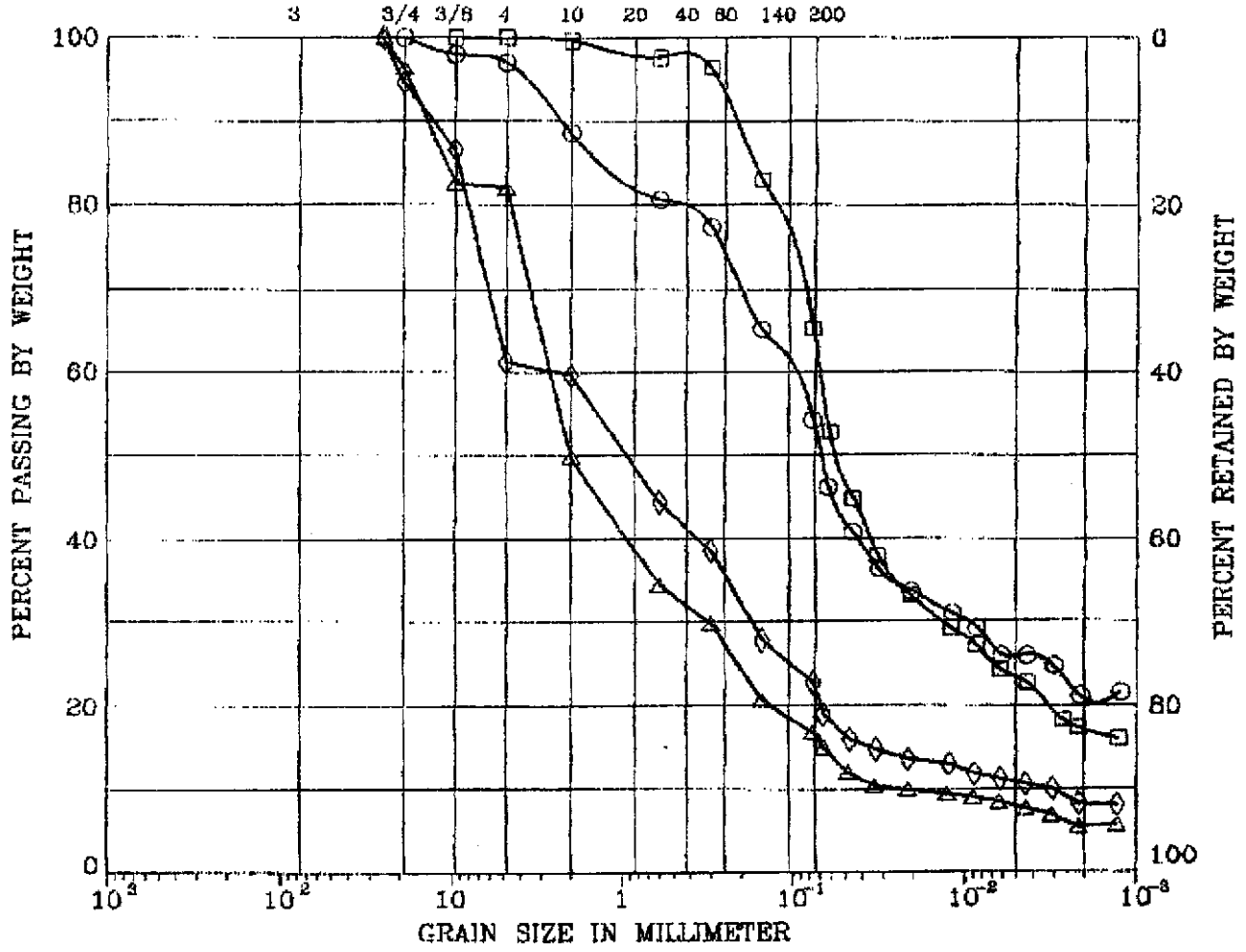
PLEASE FILTER AND PRESERVE METAL SAMPLES.

Relinquished By: (Signature)	Date	Time	Received By: (Signature)
Brian K. DeBruine	6/14/93	1550	R. Tschudi 6/14/93 1550
Laboratory of Record:	Date	Time	Received for Laboratory By: (Signature)

Relinquished By: (Signature)	Date	Time	Received By: (Signature)
R. Tschudi	6/14/93	1610	
Date: 6/14/93	Time: 4:50	Remarks:	

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	MW-2	8.5-9.0			brown sandy clayey Silt
□	MW-3	9.0-9.5			gray sandy Silt w/clay
△	MW-4	9.0-9.5			gray silty Sand w/gravel
◇	EB-13	9.5-10			gray clayey Sand w/gravel

Remark :

Project No.028-098	Lowney 864-17A
Cooper Testing Labs Mountain View CA	GRAIN SIZE DISTRIBUTION Figure No.

Cooper Testing Laboratories

Project No.028-098

Lowney

Figure No.

BORING	DEPTH	% COBBLES	% GRAVEL	% SAND	% FINE	% SILT	% CLAY	Cu	Cc
W-2	8.5-9.0	0.00	2.94	42.77		28.19	26.10		
W-3	9.0-9.5	0.00	0.10	34.64		41.82	23.44		
W-4	9.0-9.5	0.00	17.92	65.34		8.82	7.91	114.4	1.6
B-13	9.5-10	0.00	38.80	38.35		11.97	10.88	809.2	4.1

MW-2 8.5-9.0		MW-3 9.0-9.5		MW-4 9.0-9.5		EB-13 9.5-10	
Grain Size (mm)	% Finer	Grain Size (mm)	% Finer	Grain Size (mm)	% Finer	Grain Size (mm)	% Finer
0.0012	21.66	0.0013	16.02	0.0013	5.67	0.0013	7.98
0.0021	21.11	0.0021	17.37	0.0022	5.37	0.0021	8.21
0.0030	24.73	0.0027	18.43	0.0031	6.90	0.0030	10.05
0.0042	26.10	0.0043	22.86	0.0044	7.67	0.0044	10.69
0.0060	26.10	0.0061	24.37	0.0063	8.43	0.0062	11.29
0.0084	29.24	0.0086	27.30	0.0088	8.93	0.0088	11.88
0.0118	31.02	0.0120	29.26	0.0125	9.43	0.0123	13.08
0.0203	33.68	0.0206	33.17	0.0215	9.93	0.0213	13.67
0.0318	36.35	0.0320	38.05	0.0339	10.42	0.0335	14.87
0.0442	40.79	0.0442	44.90	0.0475	11.92	0.0471	16.06
0.0612	46.12	0.0608	52.72	0.0659	14.91	0.0655	19.04
0.0750	54.29	0.0750	65.26	0.0750	16.74	0.0750	22.85
0.1500	65.16	0.1500	82.95	0.1500	20.74	0.1500	27.89
0.3000	77.48	0.3000	96.31	0.3000	29.75	0.3000	38.56
0.6000	80.69	0.6000	97.69	0.6000	34.46	0.6000	44.43
2.0000	88.55	2.0000	99.65	2.0000	49.78	2.0000	59.66
4.7500	97.06	4.7500	99.90	4.7500	82.08	4.7500	61.20
9.5250	98.04	9.5250	100.00	9.5250	82.56	9.5250	86.56
19.0500	100.00			19.0500	96.42	19.0500	94.61
				25.4000	100.00	25.4000	100.00

APPENDIX E

BAIL-DOWN TEST PROCEDURES AND AQUIFER CALCULATIONS

Aquifer testing was performed on June 11, 1993 on monitoring wells MW-1, MW-2, MW-3, and MW-4. The tests were performed by removing a "slug" of water from the monitoring wells using a Teflon bailer. The recovery of the water level within the well was then recorded using a Hermit 1000C data logger produced by In-Situ, Inc. The aquifer hydraulic conductivity was then calculated using the Hvorslev method (Fetter 1988). The recorded data and calculations are presented in this appendix. The slug test method measures hydraulic conductivity only immediately around the test well. Therefore, the resulting values of hydraulic conductivity are typically accurate to within an order of magnitude.

Theoretical capture zones were calculated using the methods presented by Grubb (1993). Assumptions for the capture zone calculations are that 1) uniform flow conditions exist, 2) a confined aquifer has a uniform transmissivity and no leakage through the upper of lower confining layers, 3) vertical gradients are negligible, and 4) the well is fully penetrating.

MW-1	T_o = 500.6	r_c = 4"	L = 7'	b = 5'
MW-2	T_o = 128.4	↓	8'	6'
MW-3	T_o = 14.8		7'	2'
MW-4	T_o = 19.998		8'	6.5'

$$K_{mw-2} = \frac{(0.167ft)^2 \ln(8ft/0.167ft)}{2(8ft)(128.4sec)} = 5.3 \times 10^{-5} ft/sec$$

$$= 1.6 \times 10^{-3} cm/sec$$

$$K_{mw-1} = \frac{(0.167ft)^2 \ln(5ft/0.167ft)}{2(5ft)(500.6)} = 1.89 \times 10^{-5} ft/sec$$

$$5.8 \times 10^{-4} cm/sec$$

$$K_{mw-3} = \frac{(0.167ft)^2 \ln(7ft/0.167ft)}{2(7ft)(14.8sec)} = 5.0 \times 10^{-4} ft/sec$$

$$1.5 \times 10^{-2} cm/sec.$$

$$K_{mw-4} = \frac{(0.167ft)^2 \ln(6.5/0.167)}{2(6.5ft)(20.0sec)} = 3.9 \times 10^{-4} ft/sec$$

$$= 1.2 \times 10^{-2} cm/sec$$

LOWNEY ASSOCIATES

Capture zone - MW-2

$T = Kb = 5.3 \times 10^{-5}$ ft/sec $\times$ 6 ft $= 3.2 \times 10^{-4}$ ft^2/sec

$= 27.5$ ft^2/day

First attempt

$Q = 1$ gal/minute $\times 0.1337$ ft^3/gal $\times 1440$ min/day $= 192$ ft^3/day

$$X_{stag} = \frac{Q_w}{2\pi T\, dh/dl} = \frac{192 \text{ ft}^3/\text{day}}{2\pi(27.5 \text{ ft}^2/\text{day})(.007)} = 158.7 \text{ ft}$$

$$Y_{divide} = \pm \frac{Q_w}{2T\, dh/dl} = \frac{192 \text{ ft}^3/\text{day}}{2(27.5 \text{ ft}^2/\text{day})(0.007)} = 499 \text{ ft}$$

2nd iteration

$Q = 0.25$ g/m $\times 0.1337$ ft^3/gal $\times 1440$ m/day $= 48$ ft^3/day

$$X_{stag} = \frac{48 \text{ ft}^3/\text{day}}{2\pi(27.5 \text{ ft}^2/\text{day})(0.007)} = 39.7$$

$$Y_{div} = \frac{48 \text{ ft}^3/\text{day}}{2(27.5 \text{ ft}^2/\text{day})(0.007)} = 125 \text{ ft}$$

3rd iteration

$Q = 0.1$ g/min $\times 0.1337$ ft^3/gal $\times 1440$ min/day $= 19$ ft^3/day

$$X_{stag} = \frac{19 \text{ ft}^3/\text{day}}{2\pi(27.5 \text{ ft}^2/\text{day})(0.007)} = \boxed{15 \text{ ft}}$$

$$Y_{div} = \frac{19 \text{ ft}^3/\text{day}}{2(27.5 \text{ ft}^2/\text{day})(0.007)} = \boxed{47 \text{ ft}}$$

MW-3 Capture Zone

$K = 5.0 \times 10^{-4}$ ft/sec = 43.2 ft/day b = 2 ft

$T = Kb = 43.2 \text{ ft/day} \times 2 \text{ ft} = 86.4 \text{ ft}^2/\text{day}$

$Q = 0.25 \text{ gpm} \times 0.1337 \text{ gal/ft}^3 \times 1440 \text{ min/day} = 48 \text{ ft}^3/\text{day}$

$$X_{stag} = \frac{48 \text{ ft}^3/\text{day}}{2\pi (86.4 \text{ ft}^3/\text{day})(0.007)} = 12.6 \text{ ft}$$

$$Y_{div} = \frac{48 \text{ ft}^3/\text{day}}{2(86.4 \text{ ft}^3/\text{day})(0.007)} = 39 \text{ ft}$$

MW-4

$K = 3.9 \times 10^{-4}$ ft/sec = 33.7 ft/day

$T = Kb = 219 \text{ ft}^2/\text{day}$ b = 6.5 ft

$Q = 0.25 \text{ g/min} \times 0.1337 \text{ ft}^3/\text{gal} \times 1440 \text{ min/day} = 48 \text{ ft}^3/\text{day}$

$$X_{stag} = \frac{Q}{2\pi T^2/b} = \frac{48 \text{ ft}^3/\text{day}}{2\pi (219 \text{ ft}^2/\text{day})(0.007)} = 5.0 \text{ ft}$$

too small

$Q = 0.50 \text{ g/min} \times 0.1337 \text{ ft}^3/\text{gal} \times 1440 \text{ min/day} = 96 \text{ ft}^3/\text{day}$

$$X_{stag} = \frac{96 \text{ ft}^3/\text{day}}{2\pi (219 \text{ ft}^2/\text{day})(0.007)} = 10 \text{ ft}$$

$$Y_{div} = \frac{96 \text{ ft}^3/\text{day}}{2(219 \text{ ft}^2/\text{day})(0.007)} = 31 \text{ ft}$$

} looks ok

0		99.993						
0.0033		100						
0.0066		100						
0.01		100						
0.0133		100						
0.0166		100						
0.02		100						
0.0233		100						
0.0266		100						
0.03		100						
0.0333		100						
0.0366		99.523						
0.04		96.883						
0.0433		95.912						
0.0466		96.147						
0.05		97.562						
0.0533		97.149						
			change in					
field	time (sec)	depth to	water level		ln(h/ho)			
recording	x	water	h	h/ho	y	x * y	x^2	y^2
0.0566	0	95.614	4.386	1	-1.00E-15	0	0	1.00E-30
0.06	0.204	96.032	3.968	0.9047	-0.10016	-0.02043	0.041616	0.010032
0.0633	0.402	97.01	2.99	0.68172	-0.38314	-0.15402	0.161604	0.146796
0.0666	0.6	96.324	3.676	0.83812	-0.17659	-0.10595	0.36	0.031184
0.07	0.804	96.534	3.466	0.79024	-0.23542	-0.18928	0.646416	0.055423
0.0733	1.002	96.673	3.327	0.75855	-0.27635	-0.2769	1.004004	0.076369
0.0766	1.2	96.54	3.46	0.78887	-0.23715	-0.28458	1.44	0.05624
0.08	1.404	96.642	3.358	0.76562	-0.26707	-0.37497	1.971216	0.071326
0.0833	1.602	96.667	3.333	0.75992	-0.27454	-0.43981	2.566404	0.075372
0.0866	1.8	96.648	3.352	0.76425	-0.26886	-0.48395	3.24	0.072286
0.09	2.004	96.692	3.308	0.75422	-0.28207	-0.56527	4.016016	0.079563
0.0933	2.202	96.724	3.276	0.74692	-0.29179	-0.64252	4.848804	0.085141
0.0966	2.4	96.718	3.282	0.74829	-0.28996	-0.6959	5.76	0.084077
0.1	2.604	96.775	3.225	0.73529	-0.30748	-0.80068	6.780816	0.094544
0.1033	2.802	96.756	3.244	0.73963	-0.30161	-0.84511	7.851204	0.090969
0.1066	3	96.794	3.206	0.73096	-0.31339	-0.94017	9	0.098213
0.11	3.204	96.8	3.2	0.72959	-0.31527	-1.01013	10.26562	0.099395
0.1133	3.402	96.825	3.175	0.72389	-0.32311	-1.09922	11.5736	0.1044
0.1166	3.6	96.838	3.162	0.72093	-0.32721	-1.17796	12.96	0.107066
0.12	3.804	96.851	3.149	0.71797	-0.33133	-1.26038	14.47042	0.10978
0.1233	4.002	96.876	3.124	0.71227	-0.3393	-1.35788	16.016	0.115124
0.1266	4.2	96.87	3.13	0.71363	-0.33738	-1.417	17.64	0.113825
0.13	4.404	96.895	3.105	0.70793	-0.3454	-1.52114	19.39522	0.119301
0.1333	4.602	96.902	3.098	0.70634	-0.34766	-1.59993	21.1784	0.120867
0.1366	4.8	96.914	3.086	0.7036	-0.35154	-1.68739	23.04	0.12358
0.14	5.004	96.933	3.067	0.69927	-0.35772	-1.79003	25.04002	0.127964
0.1433	5.202	96.94	3.06	0.69767	-0.36	-1.87272	27.0608	0.1296
0.1466	5.4	96.965	3.035	0.69197	-0.36821	-1.98833	29.16	0.135579
0.15	5.604	96.971	3.029	0.69061	-0.37019	-2.07454	31.40482	0.137041

0.1533	5.802	96.984	3.016	0.68764	-0.37449	-2.17279	33.6632	0.140243
0.1566	6	97.003	2.997	0.68331	-0.38081	-2.28486	36	0.145016
0.16	6.204	97.003	2.997	0.68331	-0.38081	-2.36255	38.48962	0.145016
0.1633	6.402	97.016	2.984	0.68035	-0.38515	-2.46573	40.9856	0.148341
0.1666	6.6	97.035	2.965	0.67602	-0.39154	-2.58416	43.56	0.153304
0.17	6.804	97.035	2.965	0.67602	-0.39154	-2.66404	46.29442	0.153304
0.1733	7.002	97.041	2.959	0.67465	-0.39357	-2.75578	49.028	0.154897
0.1766	7.2	97.048	2.952	0.67305	-0.39593	-2.8507	51.84	0.156761
0.18	7.404	97.06	2.94	0.67032	-0.40001	-2.96167	54.81922	0.160008
0.1833	7.602	97.06	2.94	0.67032	-0.40001	-3.04088	57.7904	0.160008
0.1866	7.8	97.067	2.933	0.66872	-0.40239	-3.13864	60.84	0.161918
0.19	8.004	97.073	2.927	0.66735	-0.40444	-3.23714	64.06402	0.163572
0.1933	8.202	97.079	2.921	0.66598	-0.40649	-3.33403	67.2728	0.165234
0.1966	8.4	97.086	2.914	0.66439	-0.40889	-3.43468	70.56	0.167191
0.2	8.604	97.092	2.908	0.66302	-0.41095	-3.53581	74.02882	0.16888
0.2033	8.802	97.098	2.902	0.66165	-0.41302	-3.6354	77.4752	0.170586
0.2066	9	97.098	2.902	0.66165	-0.41302	-3.71718	81	0.170586
0.21	9.204	97.105	2.895	0.66006	-0.41543	-3.82362	84.71362	0.172582
0.2133	9.402	97.111	2.889	0.65869	-0.41751	-3.92543	88.3976	0.174315
0.2166	9.6	97.111	2.889	0.65869	-0.41751	-4.0081	92.16	0.174315
0.22	9.804	97.117	2.883	0.65732	-0.41959	-4.11366	96.11842	0.176056
0.2233	10.002	97.117	2.883	0.65732	-0.41959	-4.19674	100.04	0.176056
0.2266	10.2	97.124	2.876	0.65572	-0.42202	-4.3046	104.04	0.178101
0.23	10.404	97.124	2.876	0.65572	-0.42202	-4.3907	108.2432	0.178101
0.2333	10.602	97.13	2.87	0.65436	-0.42411	-4.49641	112.4024	0.179869
0.2366	10.8	97.13	2.87	0.65436	-0.42411	-4.58039	116.64	0.179869
0.24	11.004	97.136	2.864	0.65299	-0.4262	-4.6899	121.088	0.181646
0.2433	11.202	97.136	2.864	0.65299	-0.4262	-4.77429	125.4848	0.181646
0.2466	11.4	97.143	2.857	0.65139	-0.42865	-4.88661	129.96	0.183741
0.25	11.604	97.143	2.857	0.65139	-0.42865	-4.97405	134.6528	0.183741
0.2533	11.802	97.149	2.851	0.65002	-0.43075	-5.08371	139.2872	0.185546
0.2566	12	97.149	2.851	0.65002	-0.43075	-5.169	144	0.185546
0.26	12.204	97.149	2.851	0.65002	-0.43075	-5.25687	148.9376	0.185546
0.2633	12.402	97.155	2.845	0.64866	-0.43285	-5.36821	153.8096	0.187359
0.2666	12.6	97.155	2.845	0.64866	-0.43285	-5.45391	158.76	0.187359
0.27	12.804	97.155	2.845	0.64866	-0.43285	-5.54221	163.9424	0.187359
0.2733	13.002	97.162	2.838	0.64706	-0.43532	-5.66003	169.052	0.189504
0.2766	13.2	97.162	2.838	0.64706	-0.43532	-5.74622	174.24	0.189504
0.28	13.404	97.162	2.838	0.64706	-0.43532	-5.83503	179.6672	0.189504
0.2833	13.602	97.162	2.838	0.64706	-0.43532	-5.92122	185.0144	0.189504
0.2866	13.8	97.168	2.832	0.64569	-0.43743	-6.03653	190.44	0.191345
0.29	14.004	97.168	2.832	0.64569	-0.43743	-6.12577	196.112	0.191345
0.2933	14.202	97.175	2.825	0.6441	-0.43991	-6.2476	201.6968	0.193521
0.2966	14.4	97.175	2.825	0.6441	-0.43991	-6.3347	207.36	0.193521
0.3	14.604	97.175	2.825	0.6441	-0.43991	-6.42445	213.2768	0.193521
0.3033	14.802	97.175	2.825	0.6441	-0.43991	-6.51155	219.0992	0.193521
0.3066	15	97.175	2.825	0.6441	-0.43991	-6.59865	225	0.193521
0.31	15.204	97.181	2.819	0.64273	-0.44204	-6.72078	231.1616	0.195399
0.3133	15.402	97.181	2.819	0.64273	-0.44204	-6.8083	237.2216	0.195399

0.3166	15.6	97.181	2.819	0.64273	-0.44204	-6.89582	243.36	0.195399
0.32	15.804	97.181	2.819	0.64273	-0.44204	-6.986	249.7664	0.195399
0.3233	16.002	97.187	2.813	0.64136	-0.44417	-7.10761	256.064	0.197287
0.3266	16.2	97.187	2.813	0.64136	-0.44417	-7.19555	262.44	0.197287
0.33	16.404	97.187	2.813	0.64136	-0.44417	-7.28616	269.0912	0.197287
0.3333	16.602	97.187	2.813	0.64136	-0.44417	-7.37411	275.6264	0.197287
0.35	17.604	97.194	2.806	0.63976	-0.44666	-7.863	309.9008	0.199505
0.3666	18.6	97.2	2.8	0.6384	-0.4488	-8.34768	345.96	0.201421
0.3833	19.602	97.206	2.794	0.63703	-0.45094	-8.83933	384.2384	0.203347
0.4	20.604	97.213	2.787	0.63543	-0.45345	-9.34288	424.5248	0.205617
0.4166	21.6	97.213	2.787	0.63543	-0.45345	-9.79452	466.56	0.205617
0.4333	22.602	97.219	2.781	0.63406	-0.45561	-10.2977	510.8504	0.20758
0.45	23.604	97.225	2.775	0.6327	-0.45777	-10.8052	557.1488	0.209553
0.4666	24.6	97.232	2.768	0.6311	-0.46029	-11.3231	605.16	0.211867
0.4833	25.602	97.232	2.768	0.6311	-0.46029	-11.7843	655.4624	0.211867
0.5	26.604	97.238	2.762	0.62973	-0.46246	-12.3033	707.7728	0.213869
0.5166	27.6	97.244	2.756	0.62836	-0.46464	-12.8241	761.76	0.21589
0.5333	28.602	97.244	2.756	0.62836	-0.46464	-13.2896	818.0744	0.21589
0.55	29.604	97.251	2.749	0.62677	-0.46718	-13.8304	876.3968	0.218257
0.5666	30.6	97.251	2.749	0.62677	-0.46718	-14.2957	936.36	0.218257
0.5833	31.602	97.257	2.743	0.6254	-0.46937	-14.833	998.6864	0.220308
0.6	32.604	97.263	2.737	0.62403	-0.47156	-15.3747	1063.021	0.222369
0.6166	33.6	97.263	2.737	0.62403	-0.47156	-15.8444	1128.96	0.222369
0.6333	34.602	97.27	2.73	0.62244	-0.47412	-16.4055	1197.298	0.22479
0.65	35.604	97.27	2.73	0.62244	-0.47412	-16.8806	1267.645	0.22479
0.6666	36.6	97.276	2.724	0.62107	-0.47632	-17.4333	1339.56	0.226881
0.6833	37.602	97.276	2.724	0.62107	-0.47632	-17.9106	1413.91	0.226881
0.7	38.604	97.282	2.718	0.6197	-0.47852	-18.4728	1490.269	0.228981
0.7166	39.6	97.282	2.718	0.6197	-0.47852	-18.9494	1568.16	0.228981
0.7333	40.602	97.282	2.718	0.6197	-0.47852	-19.4289	1648.522	0.228981
0.75	41.604	97.289	2.711	0.6181	-0.4811	-20.0157	1730.893	0.231457
0.7666	42.6	97.289	2.711	0.6181	-0.4811	-20.4949	1814.76	0.231457
0.7833	43.602	97.295	2.705	0.61674	-0.48332	-21.0737	1901.134	0.233598
0.8	44.604	97.295	2.705	0.61674	-0.48332	-21.558	1989.517	0.233598
0.8166	45.6	97.301	2.699	0.61537	-0.48554	-22.1406	2079.36	0.235749
0.8333	46.602	97.301	2.699	0.61537	-0.48554	-22.6271	2171.746	0.235749
0.85	47.604	97.308	2.692	0.61377	-0.48813	-23.2369	2266.141	0.238271
0.8666	48.6	97.308	2.692	0.61377	-0.48813	-23.7231	2361.96	0.238271
0.8833	49.602	97.308	2.692	0.61377	-0.48813	-24.2122	2460.358	0.238271
0.9	50.604	97.314	2.686	0.6124	-0.49036	-24.8142	2560.765	0.240453
0.9166	51.6	97.314	2.686	0.6124	-0.49036	-25.3026	2662.56	0.240453
0.9333	52.602	97.32	2.68	0.61104	-0.4926	-25.9117	2766.97	0.242655
0.95	53.604	97.32	2.68	0.61104	-0.4926	-26.4053	2873.389	0.242655
0.9666	54.6	97.32	2.68	0.61104	-0.4926	-26.896	2981.16	0.242655
0.9833	55.602	97.327	2.673	0.60944	-0.49522	-27.5352	3091.582	0.245243
1	56.604	97.327	2.673	0.60944	-0.49522	-28.0314	3204.013	0.245243
1.2	68.604	97.359	2.641	0.60214	-0.50726	-34.8001	4706.509	0.257313
1.4	80.604	97.384	2.616	0.59644	-0.51677	-41.6537	6497.005	0.267051
1.6	92.604	97.409	2.591	0.59074	-0.52637	-48.744	8575.501	0.277065

1.8	104.604	97.428	2.572	0.58641	-0.53373	-55.8303	10942	0.284868
2	116.604	97.447	2.553	0.58208	-0.54115	-63.1003	13596.49	0.292843
2.2	128.604	97.473	2.527	0.57615	-0.55138	-70.9097	16538.99	0.30402
2.4	140.604	97.511	2.489	0.56749	-0.56654	-79.6578	19769.48	0.320968
2.6	152.604	97.549	2.451	0.55882	-0.58192	-88.8033	23287.98	0.338631
2.8	164.604	97.587	2.413	0.55016	-0.59755	-98.3591	27094.48	0.357066
3	176.604	97.625	2.375	0.5415	-0.61342	-108.332	31188.97	0.376284
3.2	188.604	97.663	2.337	0.53283	-0.62955	-118.736	35571.47	0.396333
3.4	200.604	97.695	2.305	0.52554	-0.64334	-129.057	40241.96	0.413886
3.6	212.604	97.733	2.267	0.51687	-0.65996	-140.31	45200.46	0.435547
3.8	224.604	97.765	2.235	0.50958	-0.67418	-151.424	50446.96	0.454519
4	236.604	97.797	2.203	0.50228	-0.6886	-162.926	55981.45	0.47417
4.2	248.604	97.828	2.172	0.49521	-0.70277	-174.711	61803.95	0.493886
4.4	260.604	97.86	2.14	0.48792	-0.71761	-187.012	67914.44	0.514964
4.6	272.604	97.892	2.108	0.48062	-0.73268	-199.731	74312.94	0.53682
4.8	284.604	97.923	2.077	0.47355	-0.74749	-212.739	80999.44	0.558741
5	296.604	97.949	2.051	0.46762	-0.76009	-225.446	87973.93	0.577737
5.2	308.604	97.974	2.026	0.46192	-0.77235	-238.35	95236.43	0.596525
5.4	320.604	98.006	1.994	0.45463	-0.78827	-252.723	102786.9	0.62137
5.6	332.604	98.031	1.969	0.44893	-0.80089	-266.379	110625.4	0.641425
5.8	344.604	98.063	1.937	0.44163	-0.81728	-281.638	118751.9	0.667947
6	356.604	98.088	1.912	0.43593	-0.83027	-296.078	127166.4	0.689348
6.2	368.604	98.114	1.886	0.43001	-0.84396	-311.087	135868.9	0.712268
6.4	380.604	98.139	1.861	0.42431	-0.8573	-326.292	144859.4	0.734963
6.6	392.604	98.165	1.835	0.41838	-0.87137	-342.103	154137.9	0.759286
6.8	404.604	98.184	1.816	0.41405	-0.88178	-356.772	163704.4	0.777536
7	416.604	98.209	1.791	0.40835	-0.89564	-373.127	173558.9	0.802171
7.2	428.604	98.235	1.765	0.40242	-0.91027	-390.145	183701.4	0.828591
7.4	440.604	98.254	1.746	0.39809	-0.92109	-405.836	194131.9	0.848407
7.6	452.604	98.279	1.721	0.39239	-0.93551	-423.416	204850.4	0.875179
7.8	464.604	98.298	1.702	0.38805	-0.94661	-439.799	215856.9	0.89607
8	476.604	98.317	1.683	0.38372	-0.95784	-456.51	227151.4	0.917457
8.2	488.604	98.336	1.664	0.37939	-0.96919	-473.55	238733.9	0.939329
8.4	500.604	98.361	1.639	0.37369	-0.98433	-492.76	250604.4	0.968906 ← T_6
8.6	512.604	98.381	1.619	0.36913	-0.99661	-510.866	262762.9	0.993231
8.8	524.604	98.4	1.6	0.3648	-1.00841	-529.016	275209.4	1.016891
9	536.604	98.419	1.581	0.36047	-1.02036	-547.529	287943.9	1.041135
9.2	548.604	98.438	1.562	0.35613	-1.03245	-566.406	300966.3	1.065953
9.4	560.604	98.457	1.543	0.3518	-1.04469	-585.657	314276.8	1.091377
9.6	572.604	98.469	1.531	0.34907	-1.0525	-602.666	327875.3	1.107756
9.8	584.604	98.488	1.512	0.34473	-1.06498	-622.592	341761.8	1.134182
10	596.604	98.507	1.493	0.3404	-1.07763	-642.918	355936.3	1.161286
11	656.604	98.59	1.41	0.32148	-1.13483	-745.134	431128.8	1.287839
12	716.604	98.66	1.34	0.30552	-1.18575	-849.713	513521.3	1.406003
13	776.604	98.736	1.264	0.28819	-1.24414	-966.204	603113.8	1.547884
14	836.604	98.793	1.207	0.27519	-1.29028	-1079.45	699906.3	1.664822
15	896.604	98.85	1.15	0.2622	-1.33866	-1200.25	803898.7	1.792011
16	956.604	98.901	1.099	0.25057	-1.38402	-1323.96	915091.2	1.915511
17	1016.604	98.952	1.048	0.23894	-1.43153	-1455.3	1033484	2.049278

	23004.86				-9.54E+01	-21746.7	11139405	62.96803
	xbar=	130.7094						
	ybar=	-0.54205						
	m=	-0.00114						
	b=	-0.39294						
	r=	-0.96959						
LINEST(F21:F196,B21:B196)								

$\ln x = 0.34$

$e^{0.34} = x$

0	100							
0.0033	100							
0.0066	100							
0.01	100							
0.0133	100							
0.0166	100							
0.02	100							
0.0233	100							
0.0266	100							
0.03	100							
0.0333	100							
0.0366	100							
0.04	99.047							
0.0433	97.27							
0.0466	96.046							
0.05	97.118							
0.0533	97.194							
0.0566	96.839							
			change in					
field	time (sec)	depth to	water level		ln (h/ho)			
recording	x	water	h	h/ho	y	x*y	x^2	y^2
0.06	0	96.718	3.282	1	-1.10E-15	0	0	1.23E-30
0.0633	0.198	96.909	3.091	0.941804	-0.05996	-0.01187	0.039204	0.003595
0.0666	0.396	96.921	3.079	0.938147	-0.06385	-0.02528	0.156816	0.004077
0.07	0.6	96.928	3.072	0.936015	-0.06612	-0.03967	0.36	0.004372
0.0733	0.798	97.016	2.984	0.909202	-0.09519	-0.07596	0.636804	0.009061
0.0766	0.996	97.055	2.945	0.897319	-0.10834	-0.10791	0.992016	0.011738
0.08	1.2	97.074	2.926	0.89153	-0.11482	-0.13778	1.44	0.013183
0.0833	1.398	97.15	2.85	0.868373	-0.14113	-0.19731	1.954404	0.019919
0.0866	1.596	97.169	2.831	0.862584	-0.14782	-0.23593	2.547216	0.021852
0.09	1.8	97.22	2.78	0.847044	-0.166	-0.2988	3.24	0.027557
0.0933	1.998	97.251	2.749	0.837599	-0.17722	-0.35408	3.992004	0.031405
0.0966	2.196	97.289	2.711	0.826021	-0.19114	-0.41973	4.822416	0.036533
0.1	2.4	97.327	2.673	0.814442	-0.20525	-0.4926	5.76	0.042128
0.1033	2.598	97.378	2.622	0.798903	-0.22452	-0.58329	6.749604	0.050407
0.1066	2.796	97.41	2.59	0.789153	-0.2368	-0.66208	7.817616	0.056072
0.11	3	97.435	2.565	0.781536	-0.24649	-0.73948	9	0.06076
0.1133	3.198	97.48	2.52	0.767824	-0.26419	-0.84489	10.2272	0.069799
0.1166	3.396	97.53	2.47	0.75259	-0.28423	-0.96526	11.53282	0.080789
0.12	3.6	97.556	2.444	0.744668	-0.29482	-1.06134	12.96	0.086917
0.1233	3.798	97.588	2.412	0.734918	-0.308	-1.16977	14.4248	0.094862
0.1266	3.996	97.626	2.374	0.723339	-0.32388	-1.29421	15.96802	0.104896
0.13	4.2	97.651	2.349	0.715722	-0.33446	-1.40475	17.64	0.111866
0.1333	4.398	97.689	2.311	0.704144	-0.35077	-1.5427	19.3424	0.123041
0.1366	4.596	97.721	2.279	0.694394	-0.36472	-1.67624	21.12322	0.133018
0.14	4.8	97.753	2.247	0.684644	-0.37886	-1.81851	23.04	0.143533
0.1433	4.998	97.784	2.216	0.675198	-0.39275	-1.96296	24.98	0.154252
0.1466	5.196	97.816	2.184	0.665448	-0.40729	-2.1163	26.99842	0.165889

0.15	5.4	97.841	2.159	0.657831	-0.41881	-2.26156	29.16	0.1754
0.1533	5.598	97.873	2.127	0.64808	-0.43374	-2.42808	31.3376	0.188131
0.1566	5.796	97.898	2.102	0.640463	-0.44556	-2.58249	33.59362	0.198527
0.16	6	97.924	2.076	0.632541	-0.45801	-2.74806	36	0.209773
0.1633	6.198	97.949	2.051	0.624924	-0.47013	-2.91384	38.4152	0.221018
0.1666	6.396	97.975	2.025	0.617002	-0.48288	-3.08852	40.90882	0.233176
0.17	6.6	98	2	0.609385	-0.49531	-3.26902	43.56	0.245328
0.1733	6.798	98.019	1.981	0.603595	-0.50485	-3.43198	46.2128	0.254875
0.1766	6.996	98.044	1.956	0.595978	-0.51755	-3.62079	48.94402	0.267859
0.18	7.2	98.063	1.937	0.590189	-0.52731	-3.79665	51.84	0.278059
0.1833	7.398	98.083	1.917	0.584095	-0.53769	-3.97784	54.7304	0.289112
0.1866	7.596	98.095	1.905	0.580439	-0.54397	-4.132	57.69922	0.295904
0.19	7.8	98.114	1.886	0.57465	-0.55399	-4.32116	60.84	0.30691
0.1933	7.998	98.133	1.867	0.56886	-0.56412	-4.51183	63.968	0.318232
0.1966	8.196	98.146	1.854	0.564899	-0.57111	-4.6808	67.17442	0.326164
0.2	8.4	98.159	1.841	0.560938	-0.57814	-4.85641	70.56	0.334251
0.2033	8.598	98.171	1.829	0.557282	-0.58468	-5.02711	73.9256	0.341855
0.2066	8.796	98.184	1.816	0.553321	-0.59182	-5.20562	77.36962	0.350247
0.21	9	98.19	1.81	0.551493	-0.59513	-5.35614	81	0.354175
0.2133	9.198	98.203	1.797	0.547532	-0.60233	-5.54027	84.6032	0.362807
0.2166	9.396	98.216	1.784	0.543571	-0.60959	-5.72775	88.28482	0.371606
0.22	9.6	98.222	1.778	0.541743	-0.61296	-5.88445	92.16	0.375725
0.2233	9.798	98.228	1.772	0.539915	-0.61634	-6.03894	96.0008	0.37988
0.2266	9.996	98.241	1.759	0.535954	-0.62371	-6.23458	99.92002	0.389011
0.23	10.2	98.247	1.753	0.534126	-0.62712	-6.39667	104.04	0.393285
0.2333	10.398	98.254	1.746	0.531993	-0.63113	-6.56244	108.1184	0.398319
0.2366	10.596	98.26	1.74	0.530165	-0.63457	-6.72388	112.2752	0.402676
0.24	10.8	98.267	1.733	0.528032	-0.6386	-6.89687	116.64	0.407809
0.2433	10.998	98.273	1.727	0.526204	-0.64207	-7.06145	120.956	0.41225
0.2466	11.196	98.279	1.721	0.524375	-0.64555	-7.22755	125.3504	0.416732
0.25	11.4	98.286	1.714	0.522243	-0.64962	-7.4057	129.96	0.42201
0.2533	11.598	98.292	1.708	0.520414	-0.65313	-7.575	134.5136	0.426579
0.2566	11.796	98.292	1.708	0.520414	-0.65313	-7.70432	139.1456	0.426579
0.26	12	98.298	1.702	0.518586	-0.65665	-7.87979	144	0.431188
0.2633	12.198	98.305	1.695	0.516453	-0.66077	-8.06008	148.7912	0.436617
0.2666	12.396	98.311	1.689	0.514625	-0.66432	-8.23487	153.6608	0.441316
0.27	12.6	98.311	1.689	0.514625	-0.66432	-8.37039	158.76	0.441316
0.2733	12.798	98.317	1.683	0.512797	-0.66788	-8.54747	163.7888	0.446057
0.2766	12.996	98.324	1.676	0.510664	-0.67204	-8.73387	168.896	0.451642
0.28	13.2	98.324	1.676	0.510664	-0.67204	-8.87097	174.24	0.451642
0.2833	13.398	98.33	1.67	0.508836	-0.67563	-9.05208	179.5064	0.456475
0.2866	13.596	98.336	1.664	0.507008	-0.67923	-9.23479	184.8512	0.461352
0.29	13.8	98.336	1.664	0.507008	-0.67923	-9.37336	190.44	0.461352
0.2933	13.998	98.343	1.657	0.504875	-0.68344	-9.56685	195.944	0.467096
0.2966	14.196	98.343	1.657	0.504875	-0.68344	-9.70217	201.5264	0.467096
0.3	14.4	98.349	1.651	0.503047	-0.68707	-9.89383	207.36	0.472068
0.3033	14.598	98.349	1.651	0.503047	-0.68707	-10.0299	213.1016	0.472068
0.3066	14.796	98.355	1.645	0.501219	-0.69071	-10.2198	218.9216	0.477084
0.31	15	98.355	1.645	0.501219	-0.69071	-10.3607	225	0.477084

0.3133	15.198	98.355	1.645	0.501219	-0.69071	-10.4975	230.9792	0.477084
0.3166	15.396	98.362	1.638	0.499086	-0.69498	-10.6999	237.0368	0.482993
0.32	15.6	98.362	1.638	0.499086	-0.69498	-10.8416	243.36	0.482993
0.3233	15.798	98.368	1.632	0.497258	-0.69865	-11.0372	249.5768	0.488107
0.3266	15.996	98.368	1.632	0.497258	-0.69865	-11.1756	255.872	0.488107
0.33	16.2	98.368	1.632	0.497258	-0.69865	-11.3181	262.44	0.488107
0.3333	16.398	98.374	1.626	0.49543	-0.70233	-11.5168	268.8944	0.493267
0.35	17.4	98.381	1.619	0.493297	-0.70664	-12.2956	302.76	0.499346
0.3666	18.396	98.393	1.607	0.48964	-0.71408	-13.1363	338.4128	0.509916
0.3833	19.398	98.406	1.594	0.485679	-0.72221	-14.0094	376.2824	0.521582
0.4	20.4	98.419	1.581	0.481718	-0.7304	-14.9001	416.16	0.533477
0.4166	21.396	98.425	1.575	0.47989	-0.7342	-15.7089	457.7888	0.539046
0.4333	22.398	98.432	1.568	0.477757	-0.73865	-16.5443	501.6704	0.545607
0.45	23.4	98.444	1.556	0.474101	-0.74633	-17.4642	547.56	0.557015
0.4666	24.396	98.451	1.549	0.471968	-0.75084	-18.3176	595.1648	0.563766
0.4833	25.398	98.457	1.543	0.47014	-0.75472	-19.1685	645.0584	0.569609
0.5	26.4	98.463	1.537	0.468312	-0.75862	-20.0276	696.96	0.575505
0.5166	27.396	98.47	1.53	0.466179	-0.76319	-20.9082	750.5408	0.582452
0.5333	28.398	98.482	1.518	0.462523	-0.77106	-21.8965	806.4464	0.594532
0.55	29.4	98.489	1.511	0.46039	-0.77568	-22.805	864.36	0.601681
0.5666	30.396	98.495	1.505	0.458562	-0.77966	-23.6985	923.9168	0.60787
0.5833	31.398	98.501	1.499	0.456734	-0.78365	-24.6052	985.8344	0.614115
0.6	32.4	98.501	1.499	0.456734	-0.78365	-25.3904	1049.76	0.614115
0.6166	33.396	98.508	1.492	0.454601	-0.78834	-26.3273	1115.293	0.621473
0.6333	34.398	98.514	1.486	0.452773	-0.79237	-27.2558	1183.222	0.627842
0.65	35.4	98.52	1.48	0.450945	-0.79641	-28.1929	1253.16	0.63427
0.6666	36.396	98.527	1.473	0.448812	-0.80115	-29.1587	1324.669	0.641844
0.6833	37.398	98.533	1.467	0.446984	-0.80523	-30.1141	1398.61	0.648401
0.7	38.4	98.539	1.461	0.445155	-0.80933	-31.0783	1474.56	0.655018
0.7166	39.396	98.539	1.461	0.445155	-0.80933	-31.8844	1552.045	0.655018
0.7333	40.398	98.546	1.454	0.443023	-0.81413	-32.8894	1631.998	0.662815
0.75	41.4	98.552	1.448	0.441194	-0.81827	-33.8764	1713.96	0.669565
0.7666	42.396	98.552	1.448	0.441194	-0.81827	-34.6914	1797.421	0.669565
0.7833	43.398	98.559	1.441	0.439062	-0.82312	-35.7216	1883.386	0.677519
0.8	44.4	98.565	1.435	0.437233	-0.82729	-36.7316	1971.36	0.684406
0.8166	45.396	98.565	1.435	0.437233	-0.82729	-37.5556	2060.797	0.684406
0.8333	46.398	98.571	1.429	0.435405	-0.83148	-38.5789	2152.774	0.691356
0.85	47.4	98.571	1.429	0.435405	-0.83148	-39.4121	2246.76	0.691356
0.8666	48.396	98.578	1.422	0.433272	-0.83639	-40.4779	2342.173	0.699546
0.8833	49.398	98.584	1.416	0.431444	-0.84062	-41.5248	2440.162	0.706637
0.9	50.4	98.584	1.416	0.431444	-0.84062	-42.3671	2540.16	0.706637
0.9166	51.396	98.59	1.41	0.429616	-0.84486	-43.4226	2641.549	0.713794
0.9333	52.398	98.59	1.41	0.429616	-0.84486	-44.2691	2745.55	0.713794
0.95	53.4	98.597	1.403	0.427483	-0.84984	-45.3815	2851.56	0.722228
0.9666	54.396	98.597	1.403	0.427483	-0.84984	-46.2279	2958.925	0.722228
0.9833	55.398	98.603	1.397	0.425655	-0.85413	-47.3169	3068.938	0.729531
1	56.4	98.603	1.397	0.425655	-0.85413	-48.1727	3180.96	0.729531
1.2	68.4	98.654	1.346	0.410116	-0.89132	-60.966	4678.56	0.794444
1.4	80.4	98.685	1.315	0.40067	-0.91462	-73.5352	6464.16	0.836523

1.6	92.4	98.711	1.289	0.392748	-0.93459	-86.3558	8537.76	0.873451
1.8	104.4	98.736	1.264	0.385131	-0.95417	-99.6155	10899.36	0.910444
2	116.4	98.762	1.238	0.377209	-0.97496	-113.485	13548.96	0.950539 ← To
2.2	128.4	98.787	1.213	0.369592	-0.99536	-127.804	16486.56	0.990734
2.4	140.4	98.806	1.194	0.363803	-1.01114	-141.965	19712.16	1.022412
2.6	152.4	98.825	1.175	0.358013	-1.02718	-156.543	23225.76	1.055109
2.8	164.4	98.844	1.156	0.352224	-1.04349	-171.549	27027.36	1.088866
3	176.4	98.857	1.143	0.348263	-1.0548	-186.066	31116.96	1.112596
3.2	188.4	98.876	1.124	0.342474	-1.07156	-201.882	35494.56	1.148239
3.4	200.4	98.895	1.105	0.336685	-1.08861	-218.157	40160.16	1.185067
3.6	212.4	98.908	1.092	0.332724	-1.10044	-233.734	45113.76	1.210973
3.8	224.4	98.927	1.073	0.326935	-1.11799	-250.878	50355.36	1.249912
4	236.4	98.939	1.061	0.323278	-1.12924	-266.953	55884.96	1.275186
4.2	248.4	98.958	1.042	0.317489	-1.14731	-284.992	61702.56	1.316323
4.4	260.4	98.971	1.029	0.313528	-1.15987	-302.029	67808.16	1.345288
4.6	272.4	98.977	1.023	0.3117	-1.16571	-317.54	74201.76	1.358888
4.8	284.4	98.996	1.004	0.305911	-1.18446	-336.861	80883.36	1.402948
5	296.4	99.009	0.991	0.30195	-1.19749	-354.937	87852.96	1.433991
5.2	308.4	99.022	0.978	0.297989	-1.2107	-373.379	95110.56	1.465791
5.4	320.4	99.035	0.965	0.294028	-1.22408	-392.195	102656.2	1.498372
5.6	332.4	99.047	0.953	0.290372	-1.23659	-411.044	110489.8	1.529163
5.8	344.4	99.06	0.94	0.286411	-1.25033	-430.613	118611.4	1.563321
6	356.4	99.066	0.934	0.284583	-1.25673	-447.899	127021	1.579375
6.2	368.4	99.079	0.921	0.280622	-1.27075	-468.144	135718.6	1.614801
6.4	380.4	99.092	0.908	0.276661	-1.28496	-488.8	144704.2	1.651132
6.6	392.4	99.098	0.902	0.274832	-1.29159	-506.821	153977.8	1.668214
6.8	404.4	99.111	0.889	0.270871	-1.30611	-528.191	163539.4	1.705926
7	416.4	99.123	0.877	0.267215	-1.3197	-549.524	173389	1.741611
7.2	428.4	99.13	0.87	0.265082	-1.32772	-568.793	183526.6	1.762827
7.4	440.4	99.142	0.858	0.261426	-1.3416	-590.842	193952.2	1.799902
7.6	452.4	99.149	0.851	0.259293	-1.3498	-610.648	204665.8	1.82195
7.8	464.4	99.162	0.838	0.255332	-1.36519	-633.994	215667.4	1.863744
8	476.4	99.181	0.819	0.249543	-1.38812	-661.302	226957	1.926889
8.2	488.4	99.2	0.8	0.243754	-1.4116	-689.424	238534.6	1.992605
8.4	500.4	99.225	0.775	0.236137	-1.44335	-722.25	250400.2	2.083245
8.6	512.4	99.244	0.756	0.230347	-1.46817	-752.289	262553.8	2.155514
8.8	524.4	99.257	0.743	0.226386	-1.48551	-779.003	274995.4	2.206747
9	536.4	99.276	0.724	0.220597	-1.51142	-810.724	287725	2.284381
9.2	548.4	99.288	0.712	0.216941	-1.52813	-838.027	300742.6	2.335182
9.4	560.4	99.308	0.692	0.210847	-1.55662	-872.331	314048.2	2.423073
9.6	572.4	99.32	0.68	0.207191	-1.57412	-901.024	327641.8	2.47784
9.8	584.4	99.333	0.667	0.20323	-1.59342	-931.194	341523.4	2.538982
10	596.4	99.346	0.654	0.199269	-1.6131	-962.053	355693	2.602095
11	656.4	99.409	0.591	0.180073	-1.71439	-1125.33	430861	2.939141
12	716.4	99.454	0.546	0.166362	-1.79359	-1284.93	513229	3.216963
13	776.4	99.492	0.508	0.154784	-1.86573	-1448.55	602797	3.480937
14	836.4	99.523	0.477	0.145338	-1.92869	-1613.16	699565	3.719852
15	896.4	99.555	0.445	0.135588	-1.99813	-1791.13	803533	3.992539
16	956.4	99.587	0.413	0.125838	-2.07276	-1982.39	914701	4.296337

17	1016.4	99.606	0.394	0.120049	-2.11986	-2154.62	1033069	4.493795
18	1076.4	99.631	0.369	0.112431	-2.18541	-2352.38	1158637	4.776024
19	1136.4	99.65	0.35	0.106642	-2.23828	-2543.58	1291405	5.009876
20	1196.4	99.663	0.337	0.102681	-2.27613	-2723.16	1431373	5.180747
21	1256.4	99.682	0.318	0.096892	-2.33416	-2932.63	1578541	5.448288
22	1316.4	99.701	0.299	0.091103	-2.39576	-3153.78	1732909	5.739688
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0.0166	98.914							
0.02	98.914							
0.0233	98.914							
0.0266	98.914							
0.03	98.914							
0.0333	98.914							
0.0366	98.914							
0.04	98.654							
0.0433	96.433							
0.0466	96.135							
			change in					
field	time (sec)	depth to	water level		ln (h/ho)			
recording	x	water	h	h/ho	y	x*y	x^2	y^2
0.05	0	94.701	4.213	1	2.00E-15	0	0	3.99E-30
0.0533	0.198	95.773	3.141	0.745549	-0.29363	-0.05814	0.039204	0.086221
0.0566	0.396	95.158	3.756	0.891526	-0.11482	-0.04547	0.156816	0.013184
0.06	0.6	95.291	3.623	0.859957	-0.15087	-0.09052	0.36	0.022763
0.0633	0.798	95.354	3.56	0.845004	-0.16841	-0.13439	0.636804	0.028363
0.0666	0.996	95.386	3.528	0.837408	-0.17744	-0.17673	0.992016	0.031486
0.07	1.2	95.431	3.483	0.826727	-0.19028	-0.22834	1.44	0.036207
0.0733	1.398	95.475	3.439	0.816283	-0.20299	-0.28379	1.954404	0.041207
0.0766	1.596	95.513	3.401	0.807263	-0.21411	-0.34171	2.547216	0.045841
0.08	1.8	95.557	3.357	0.796819	-0.22713	-0.40883	3.24	0.051587
0.0833	1.998	95.602	3.312	0.786138	-0.24062	-0.48076	3.992004	0.057899
0.0866	2.196	95.634	3.28	0.778543	-0.25033	-0.54973	4.822416	0.062666
0.09	2.4	95.678	3.236	0.768099	-0.26384	-0.63321	5.76	0.06961
0.0933	2.598	95.722	3.192	0.757655	-0.27753	-0.72102	6.749604	0.077021
0.0966	2.796	95.729	3.185	0.755993	-0.27972	-0.7821	7.817616	0.078245
0.1	3	95.545	3.369	0.799668	-0.22356	-0.67068	9	0.049979
0.1033	3.198	95.272	3.642	0.864467	-0.14564	-0.46576	10.2272	0.021212
0.1066	3.396	95.19	3.724	0.883931	-0.12338	-0.41899	11.53282	0.015222
0.11	3.6	95.202	3.712	0.881082	-0.1266	-0.45578	12.96	0.016029
0.1133	3.798	95.329	3.585	0.850938	-0.16142	-0.61306	14.4248	0.026055
0.1166	3.996	95.431	3.483	0.826727	-0.19028	-0.76036	15.96802	0.036207
0.12	4.2	95.488	3.426	0.813197	-0.20678	-0.86848	17.64	0.042759
0.1233	4.398	95.634	3.28	0.778543	-0.25033	-1.10096	19.3424	0.062666
0.1266	4.596	96.059	2.855	0.677664	-0.3891	-1.78832	21.12322	0.151401
0.13	4.8	96.274	2.64	0.626632	-0.4674	-2.2435	23.04	0.218459
0.1333	4.998	96.325	2.589	0.614526	-0.4869	-2.43354	24.98	0.237075
0.1366	5.196	96.325	2.589	0.614526	-0.4869	-2.52995	26.99842	0.237075
0.14	5.4	96.331	2.583	0.613102	-0.48922	-2.64181	29.16	0.23934
0.1433	5.598	96.35	2.564	0.608592	-0.49661	-2.78	31.3376	0.246618
0.1466	5.796	96.369	2.545	0.604083	-0.50404	-2.92144	33.59362	0.254061

0.15	6	96.395	2.519	0.597911	-0.51431	-3.08588	36	0.264518
0.1533	6.198	96.42	2.494	0.591977	-0.52429	-3.24953	38.4152	0.274877
0.1566	6.396	96.445	2.469	0.586043	-0.53436	-3.41778	40.90882	0.285543
0.16	6.6	96.471	2.443	0.579872	-0.54495	-3.59666	43.56	0.296969
0.1633	6.798	96.496	2.418	0.573938	-0.55523	-3.77448	46.2128	0.308285
0.1666	6.996	96.522	2.392	0.567766	-0.56605	-3.96005	48.94402	0.320407
0.17	7.2	96.547	2.367	0.561832	-0.57655	-4.15117	51.84	0.332412
0.1733	7.398	96.579	2.335	0.554237	-0.59016	-4.36603	54.7304	0.348292
0.1766	7.596	96.598	2.316	0.549727	-0.59833	-4.54494	57.69922	0.358003
0.18	7.8	96.642	2.272	0.539283	-0.61751	-4.81661	60.84	0.381324
0.1833	7.998	96.674	2.24	0.531688	-0.6317	-5.05233	63.968	0.399044
0.1866	8.196	96.706	2.208	0.524092	-0.64609	-5.29534	67.17442	0.41743
0.19	8.4	96.813	2.101	0.498695	-0.69576	-5.8444	70.56	0.484084
0.1933	8.598	96.832	2.082	0.494185	-0.70485	-6.06027	73.9256	0.496808
0.1966	8.796	96.864	2.05	0.486589	-0.72034	-6.33607	77.36962	0.518883
0.2	9	96.909	2.005	0.475908	-0.74253	-6.68278	81	0.551352
0.2033	9.198	96.966	1.948	0.462378	-0.77137	-7.09508	84.6032	0.595014
0.2066	9.396	97.023	1.891	0.448849	-0.80107	-7.52685	88.28482	0.641712
0.21	9.6	97.023	1.891	0.448849	-0.80107	-7.69026	92.16	0.641712
0.2133	9.798	97.042	1.872	0.444339	-0.81117	-7.94782	96.0008	0.657993
0.2166	9.996	97.055	1.859	0.441253	-0.81814	-8.17809	99.92002	0.669347
0.22	10.2	97.067	1.847	0.438405	-0.82461	-8.41105	104.04	0.679985
0.2233	10.398	97.086	1.828	0.433895	-0.83495	-8.68184	108.1184	0.697146
0.2266	10.596	97.099	1.815	0.430809	-0.84209	-8.92278	112.2752	0.709115
0.23	10.8	97.112	1.802	0.427724	-0.84928	-9.1722	116.64	0.721273
0.2333	10.998	97.124	1.79	0.424875	-0.85596	-9.41384	120.956	0.732666
0.2366	11.196	97.137	1.777	0.42179	-0.86325	-9.66493	125.3504	0.745198
0.24	11.4	97.15	1.764	0.418704	-0.87059	-9.92474	129.96	0.757929
0.2433	11.598	97.169	1.745	0.414194	-0.88142	-10.2227	134.5136	0.776902
0.2466	11.796	97.181	1.733	0.411346	-0.88832	-10.4786	139.1456	0.789114
0.25	12	97.188	1.726	0.409684	-0.89237	-10.7084	144	0.796321
0.2533	12.198	97.2	1.714	0.406836	-0.89935	-10.9702	148.7912	0.808822
0.2566	12.396	97.207	1.707	0.405174	-0.90344	-11.199	153.6608	0.816199
0.26	12.6	97.22	1.694	0.402089	-0.91108	-11.4796	158.76	0.830071
0.2633	12.798	97.232	1.682	0.39924	-0.91819	-11.751	163.7888	0.843075
0.2666	12.996	97.251	1.663	0.394731	-0.92955	-12.0805	168.896	0.864067
0.27	13.2	97.258	1.656	0.393069	-0.93377	-12.3258	174.24	0.871926
0.2733	13.398	97.264	1.65	0.391645	-0.9374	-12.5593	179.5064	0.878718
0.2766	13.596	97.277	1.637	0.388559	-0.94531	-12.8524	184.8512	0.89361
0.28	13.8	97.308	1.606	0.381201	-0.96443	-13.3091	190.44	0.930122
0.2833	13.998	97.321	1.593	0.378115	-0.97256	-13.6138	195.944	0.945865
0.2866	14.196	97.321	1.593	0.378115	-0.97256	-13.8064	201.5264	0.945865
0.29	14.4	97.327	1.587	0.376691	-0.97633	-14.0591	207.36	0.953219
0.2933	14.598	97.334	1.58	0.37503	-0.98075	-14.317	213.1016	0.961871
0.2966	14.796	97.346	1.568	0.372181	-0.98837	-14.624	218.9216	0.976883
0.3	15	97.404	1.51	0.358414	-1.02607	-15.391	225	1.05281
0.3033	15.198	97.435	1.479	0.351056	-1.04681	-15.9094	230.9792	1.095809
0.3066	15.396	97.442	1.472	0.349395	-1.05155	-16.1897	237.0368	1.105764
0.31	15.6	97.448	1.466	0.347971	-1.05564	-16.4679	243.36	1.11437

0.3133	15.798	97.448	1.466	0.347971	-1.05564	-16.677	249.5768	1.11437
0.3166	15.996	97.454	1.46	0.346546	-1.05974	-16.9516	255.872	1.123046
0.32	16.2	97.454	1.46	0.346546	-1.05974	-17.1678	262.44	1.123046
0.3233	16.398	97.454	1.46	0.346546	-1.05974	-17.3776	268.8944	1.123046
0.3266	16.596	97.461	1.453	0.344885	-1.06454	-17.6672	275.4272	1.133255
0.33	16.8	97.461	1.453	0.344885	-1.06454	-17.8843	282.24	1.133255
0.3333	16.998	97.461	1.453	0.344885	-1.06454	-18.0951	288.932	1.133255
0.35	18	97.473	1.441	0.342037	-1.07284	-19.3111	324	1.150981
0.3666	18.996	97.486	1.428	0.338951	-1.0819	-20.5518	360.848	1.170508
0.3833	19.998	97.499	1.415	0.335865	-1.09105	-21.8187	399.92	1.19038
0.4	21	97.511	1.403	0.333017	-1.09956	-23.0908	441	1.209037
0.4166	21.996	97.524	1.39	0.329931	-1.10887	-24.3907	483.824	1.229595
0.4333	22.998	97.543	1.371	0.325421	-1.12263	-25.8184	528.908	1.260308
0.45	24	97.549	1.365	0.323997	-1.12702	-27.0485	576	1.270175
0.4666	24.996	97.556	1.358	0.322336	-1.13216	-28.2995	624.8	1.281791
0.4833	25.998	97.562	1.352	0.320911	-1.13659	-29.5491	675.896	1.291837
0.5	27	97.569	1.345	0.31925	-1.14178	-30.8281	729	1.303664
0.5166	27.996	97.575	1.339	0.317826	-1.14625	-32.0905	783.776	1.313893
0.5333	28.998	97.588	1.326	0.31474	-1.15601	-33.5219	840.884	1.336355
0.55	30	97.594	1.32	0.313316	-1.16054	-34.8163	900	1.346861
0.5666	30.996	97.607	1.307	0.31023	-1.17044	-36.279	960.752	1.369931
0.5833	31.998	97.613	1.301	0.308806	-1.17504	-37.599	1023.872	1.380723
0.6	33	97.619	1.295	0.307382	-1.17966	-38.9289	1089	1.391608
0.6166	33.996	97.626	1.288	0.30572	-1.18508	-40.2881	1155.728	1.404425
0.6333	34.998	97.632	1.282	0.304296	-1.18975	-41.639	1224.86	1.415514
0.65	36	97.632	1.282	0.304296	-1.18975	-42.8311	1296	1.415514
0.6666	36.996	97.638	1.276	0.302872	-1.19444	-44.1897	1368.704	1.426698
0.6833	37.998	97.645	1.269	0.301211	-1.19995	-45.5955	1443.848	1.43987
0.7	39	97.645	1.269	0.301211	-1.19995	-46.7979	1521	1.43987
0.7166	39.996	97.651	1.263	0.299786	-1.20469	-48.1826	1599.68	1.451266
0.7333	40.998	97.657	1.257	0.298362	-1.20945	-49.5849	1680.836	1.462762
0.75	42	97.664	1.25	0.296701	-1.21503	-51.0313	1764	1.476301
0.7666	42.996	97.664	1.25	0.296701	-1.21503	-52.2415	1848.656	1.476301
0.7833	43.998	97.67	1.244	0.295277	-1.21984	-53.6707	1935.824	1.488017
0.8	45	97.676	1.238	0.293852	-1.22468	-55.1105	2025	1.499836
0.8166	45.996	97.676	1.238	0.293852	-1.22468	-56.3303	2115.632	1.499836
0.8333	46.998	97.683	1.231	0.292191	-1.23035	-57.8239	2208.812	1.513757
0.85	48	97.683	1.231	0.292191	-1.23035	-59.0567	2304	1.513757
0.8666	48.996	97.689	1.225	0.290767	-1.23523	-60.5215	2400.608	1.525803
0.8833	49.998	97.689	1.225	0.290767	-1.23523	-61.7592	2499.8	1.525803
0.9	51	97.695	1.219	0.289343	-1.24014	-63.2474	2601	1.537957
0.9166	51.996	97.702	1.212	0.287681	-1.2459	-64.782	2703.584	1.552275
0.9333	52.998	97.702	1.212	0.287681	-1.2459	-66.0304	2808.788	1.552275
0.95	54	97.708	1.206	0.286257	-1.25087	-67.5468	2916	1.564665
0.9666	54.996	97.708	1.206	0.286257	-1.25087	-68.7926	3024.56	1.564665
0.9833	55.998	97.714	1.2	0.284833	-1.25585	-70.3253	3135.776	1.577168
1	57	97.714	1.2	0.284833	-1.25585	-71.5836	3249	1.577168
1.2	69	97.759	1.155	0.274151	-1.29407	-89.2912	4761	1.674629
1.4	81	97.791	1.123	0.266556	-1.32217	-107.096	6561	1.748137

1.6	93	97.822	1.092	0.259198	-1.35016	-125.565	8649	1.822943
1.8	105	97.848	1.066	0.253026	-1.37426	-144.297	11025	1.888595
2	117	97.867	1.047	0.248516	-1.39225	-162.893	13689	1.938349
2.2	129	97.892	1.022	0.242582	-1.41641	-182.717	16641	2.006227
2.4	141	97.911	1.003	0.238073	-1.43518	-202.36	19881	2.05974
2.6	153	97.93	0.984	0.233563	-1.4543	-222.509	23409	2.115001
2.8	165	97.949	0.965	0.229053	-1.4738	-243.177	27225	2.172093
3	177	97.962	0.952	0.225967	-1.48737	-263.264	31329	2.212255
3.2	189	97.981	0.933	0.221457	-1.50753	-284.922	35721	2.272632
3.4	201	98	0.914	0.216948	-1.5281	-307.148	40401	2.335089
3.6	213	98.013	0.901	0.213862	-1.54243	-328.537	45369	2.379075
3.8	225	98.025	0.889	0.211014	-1.55583	-350.062	50625	2.420616
4	237	98.038	0.876	0.207928	-1.57056	-372.224	56169	2.466672
4.2	249	98.051	0.863	0.204842	-1.58552	-394.793	62001	2.51386
4.4	261	98.063	0.851	0.201994	-1.59952	-417.474	68121	2.558458
4.6	273	98.076	0.838	0.198908	-1.61491	-440.871	74529	2.607941
4.8	285	98.089	0.825	0.195822	-1.63055	-464.706	81225	2.658683
5	297	98.102	0.812	0.192737	-1.64643	-488.99	88209	2.710731
5.2	309	98.114	0.8	0.189888	-1.66132	-513.347	95481	2.759979
5.4	321	98.127	0.787	0.186803	-1.6777	-538.542	103041	2.814684
5.6	333	98.133	0.781	0.185379	-1.68536	-561.223	110889	2.840422
5.8	345	98.146	0.768	0.182293	-1.70214	-587.238	119025	2.897282
6	357	98.159	0.755	0.179207	-1.71921	-613.759	127449	2.955692
6.2	369	98.165	0.749	0.177783	-1.72719	-637.334	136161	2.98319
6.4	381	98.171	0.743	0.176359	-1.73523	-661.124	145161	3.011038
6.6	393	98.184	0.73	0.173273	-1.75289	-688.884	154449	3.072608
6.8	405	98.19	0.724	0.171849	-1.76114	-713.261	164025	3.10161
7	417	98.203	0.711	0.168763	-1.77926	-741.951	173889	3.165758
7.2	429	98.209	0.705	0.167339	-1.78773	-766.937	184041	3.195987
7.4	441	98.216	0.698	0.165678	-1.79771	-792.791	194481	3.231765
7.6	453	98.228	0.686	0.162829	-1.81505	-822.219	205209	3.294416
7.8	465	98.235	0.679	0.161168	-1.82531	-848.769	216225	3.331753
8	477	98.241	0.673	0.159744	-1.83418	-874.906	227529	3.364234
8.2	489	98.247	0.667	0.158319	-1.84314	-901.296	239121	3.397166
8.4	501	98.254	0.66	0.156658	-1.85369	-928.699	251001	3.436168
8.6	513	98.26	0.654	0.155234	-1.86282	-955.628	263169	3.470109
8.8	525	98.267	0.647	0.153572	-1.87358	-983.632	275625	3.510317
9	537	98.279	0.635	0.150724	-1.89231	-1016.17	288369	3.580819
9.2	549	98.286	0.628	0.149062	-1.90339	-1044.96	301401	3.622894
9.4	561	98.292	0.622	0.147638	-1.91299	-1073.19	314721	3.659531
9.6	573	98.298	0.616	0.146214	-1.92268	-1101.7	328329	3.696711
9.8	585	98.305	0.609	0.144553	-1.93411	-1131.46	342225	3.740789
10	597	98.311	0.603	0.143128	-1.94401	-1160.58	356409	3.779187
11	657	98.343	0.571	0.135533	-1.99854	-1313.04	431649	3.994166
12	717	98.362	0.552	0.131023	-2.03238	-1457.22	514089	4.130577
13	777	98.387	0.527	0.125089	-2.07873	-1615.17	603729	4.321117
14	837	98.413	0.501	0.118918	-2.12932	-1782.24	700569	4.534021
15	897	98.432	0.482	0.114408	-2.16799	-1944.68	804609	4.700164
16	957	98.451	0.463	0.109898	-2.2082	-2113.25	915849	4.876161

17	1017	98.47	0.444	0.105388	-2.25011	-2288.36	1034289	5.062976
18	1077	98.489	0.425	0.100878	-2.29384	-2470.47	1159929	5.261707
19	1137	98.508	0.406	0.096368	-2.33958	-2660.1	1292769	5.473621
20	1197	98.52	0.394	0.09352	-2.36958	-2836.39	1432809	5.614906
21	1257	98.533	0.381	0.090434	-2.40313	-3020.74	1580049	5.775038
22	1317	98.546	0.368	0.087349	-2.43785	-3210.64	1734489	5.9431
23	1377	98.559	0.355	0.084263	-2.47381	-3406.44	1896129	6.119748
24	1437	98.571	0.343	0.081415	-2.5082	-3604.28	2064969	6.291066
25	1497	98.584	0.33	0.078329	-2.54684	-3812.62	2241009	6.486382
26	1557	98.59	0.324	0.076905	-2.56519	-3994	2424249	6.580183
27	1617	98.603	0.311	0.073819	-2.60614	-4214.12	2614689	6.791952
28	1677	98.609	0.305	0.072395	-2.62562	-4403.16	2812329	6.893872
	38221.75				-2.19E+02	-78802.9	32411072	3.26E+02
xbar=	203.3072							
ybar=	-1.16746							
m=	-0.00139							
b=	-0.88543							
r=	-0.82616							

0	100							
0.0033	100							
0.0066	100							
0.01	100							
0.0133	100							
0.0166	100							
0.02	100							
0.0233	100							
0.0266	100							
0.03	100							
0.0333	100							
0.0366	100							
0.04	99.815							
0.0433	98.121							
0.0466	96.96							
			change in		ln (h/ho)			
field	time (sec)	depth to	water level					
recording	x	water	h	h/ho	y	x*y	x^2	y^2
0.05	0	96.44	3.56	1	6.66E-16	0	0	4.44E-31
0.0533	0.198	97.797	2.203	0.61882	-0.47994	-0.09503	0.039204	0.230343
0.0566	0.396	96.865	3.135	0.880618	-0.12713	-0.05034	0.156816	0.016162
0.06	0.6	96.51	3.49	0.980337	-0.01986	-0.01192	0.36	0.000394
0.0633	0.798	96.364	3.636	1.021348	0.021124	0.016857	0.636804	0.000446
0.0666	0.996	96.459	3.541	0.994663	-0.00535	-0.00533	0.992016	2.86E-05
0.07	1.2	96.516	3.484	0.978652	-0.02158	-0.0259	1.44	0.000466
0.0733	1.398	96.56	3.44	0.966292	-0.03429	-0.04794	1.954404	0.001176
0.0766	1.596	96.605	3.395	0.953652	-0.04746	-0.07574	2.547216	0.002252
0.08	1.8	96.643	3.357	0.942978	-0.05871	-0.10568	3.24	0.003447
0.0833	1.998	96.7	3.3	0.926966	-0.07584	-0.15152	3.992004	0.005751
0.0866	2.196	96.744	3.256	0.914607	-0.08926	-0.19602	4.822416	0.007968
0.09	2.4	96.789	3.211	0.901966	-0.10318	-0.24763	5.76	0.010646
0.0933	2.598	96.82	3.18	0.893258	-0.11288	-0.29326	6.749604	0.012742
0.0966	2.796	96.858	3.142	0.882584	-0.1249	-0.34922	7.817616	0.0156
0.1	3	96.903	3.097	0.869944	-0.13933	-0.41798	9	0.019412
0.1033	3.198	96.922	3.078	0.864607	-0.14548	-0.46525	10.2272	0.021165
0.1066	3.396	96.979	3.021	0.848596	-0.16417	-0.55753	11.53282	0.026953
0.11	3.6	97.017	2.983	0.837921	-0.17683	-0.63659	12.96	0.031269
0.1133	3.798	97.055	2.945	0.827247	-0.18965	-0.7203	14.4248	0.035968
0.1166	3.996	97.087	2.913	0.818258	-0.20058	-0.80151	15.96802	0.040231
0.12	4.2	97.131	2.869	0.805899	-0.2158	-0.90635	17.64	0.046568
0.1233	4.398	97.163	2.837	0.79691	-0.22701	-0.9984	19.3424	0.051535
0.1266	4.596	97.195	2.805	0.787921	-0.23836	-1.09549	21.12322	0.056814
0.13	4.8	97.239	2.761	0.775562	-0.25417	-1.22	23.04	0.064601
0.1333	4.998	97.271	2.729	0.766573	-0.26583	-1.32859	24.98	0.070663
0.1366	5.196	97.309	2.691	0.755899	-0.27985	-1.45409	26.99842	0.078315
0.14	5.4	97.347	2.653	0.745225	-0.29407	-1.58798	29.16	0.086477
0.1433	5.598	97.379	2.621	0.736236	-0.3062	-1.71413	31.3376	0.093761
0.1466	5.796	97.404	2.596	0.729213	-0.31579	-1.83031	33.59362	0.099723

0.15	6	97.442	2.558	0.718539	-0.33053	-1.98321	36	0.109253
0.1533	6.198	97.474	2.526	0.709551	-0.34312	-2.12668	38.4152	0.117734
0.1566	6.396	97.506	2.494	0.700562	-0.35587	-2.27616	40.90882	0.126645
0.16	6.6	97.537	2.463	0.691854	-0.36838	-2.43131	43.56	0.135704
0.1633	6.798	97.569	2.431	0.682865	-0.38146	-2.59315	46.2128	0.14551
0.1666	6.996	97.607	2.393	0.672191	-0.39721	-2.7789	48.94402	0.157778
0.17	7.2	97.632	2.368	0.665169	-0.40771	-2.93555	51.84	0.166231
0.1733	7.398	97.664	2.336	0.65618	-0.42132	-3.11693	54.7304	0.177511
0.1766	7.596	97.689	2.311	0.649157	-0.43208	-3.28208	57.69922	0.186693
0.18	7.8	97.721	2.279	0.640169	-0.44602	-3.47899	60.84	0.198937
0.1833	7.998	97.747	2.253	0.632865	-0.4575	-3.65907	63.968	0.209304
0.1866	8.196	97.772	2.228	0.625843	-0.46866	-3.84111	67.17442	0.219639
0.19	8.4	97.804	2.196	0.616854	-0.48312	-4.05823	70.56	0.233408
0.1933	8.598	97.829	2.171	0.609831	-0.49457	-4.25234	73.9256	0.244602
0.1966	8.796	97.854	2.146	0.602809	-0.50615	-4.45214	77.36962	0.256193
0.2	9	97.88	2.12	0.595506	-0.51834	-4.6651	81	0.268681
0.2033	9.198	97.905	2.095	0.588483	-0.53021	-4.87684	84.6032	0.281119
0.2066	9.396	97.931	2.069	0.58118	-0.5427	-5.09916	88.28482	0.294518
0.21	9.6	97.956	2.044	0.574157	-0.55485	-5.32658	92.16	0.307861
0.2133	9.798	97.975	2.025	0.56882	-0.56419	-5.52794	96.0008	0.318311
0.2166	9.996	98	2	0.561798	-0.57661	-5.76383	99.92002	0.332483
0.22	10.2	98.026	1.974	0.554494	-0.5897	-6.01493	104.04	0.347744
0.2233	10.398	98.045	1.955	0.549157	-0.59937	-6.23225	108.1184	0.359245
0.2266	10.596	98.07	1.93	0.542135	-0.61224	-6.4873	112.2752	0.374838
0.23	10.8	98.089	1.911	0.536798	-0.62213	-6.71905	116.64	0.387051
0.2333	10.998	98.115	1.885	0.529494	-0.63583	-6.99289	120.956	0.404283
0.2366	11.196	98.134	1.866	0.524157	-0.64596	-7.23221	125.3504	0.417269
0.24	11.4	98.153	1.847	0.51882	-0.6562	-7.48066	129.96	0.430596
0.2433	11.598	98.172	1.828	0.513483	-0.66654	-7.73051	134.5136	0.444273
0.2466	11.796	98.191	1.809	0.508146	-0.67699	-7.98573	139.1456	0.458311
0.25	12	98.21	1.79	0.502809	-0.68754	-8.25054	144	0.472718
0.2533	12.198	98,235	1.765	0.495787	-0.70161	-8.55824	148.7912	0.492256
0.2566	12.396	98.248	1.752	0.492135	-0.709	-8.7888	153.6608	0.502685
0.26	12.6	98.267	1.733	0.486798	-0.71991	-9.07082	158.76	0.518265
0.2633	12.798	98.286	1.714	0.481461	-0.73093	-9.35445	163.7888	0.53426
0.2666	12.996	98.299	1.701	0.477809	-0.73854	-9.59812	168.896	0.545448
0.27	13.2	98.318	1.682	0.472472	-0.74978	-9.89706	174.24	0.562166
0.2733	13.398	98.33	1.67	0.469101	-0.75694	-10.1414	179.5064	0.572953
0.2766	13.596	98.349	1.651	0.463764	-0.76838	-10.4469	184.8512	0.590407
0.28	13.8	98.362	1.638	0.460112	-0.77628	-10.7127	190.44	0.602618
0.2833	13.998	98.375	1.625	0.456461	-0.78425	-10.978	195.944	0.615052
0.2866	14.196	98.394	1.606	0.451124	-0.79601	-11.3002	201.5264	0.633638
0.29	14.4	98.406	1.594	0.447753	-0.80351	-11.5706	207.36	0.645635
0.2933	14.598	98.419	1.581	0.444101	-0.8117	-11.8492	213.1016	0.658862
0.2966	14.796	98.432	1.568	0.440449	-0.81996	-12.1321	218.9216	0.672334
0.3	15	98.438	1.562	0.438764	-0.82379	-12.3569	225	0.678636
0.3033	15.198	98.451	1.549	0.435112	-0.83215	-12.647	230.9792	0.692475
0.3066	15.396	98.464	1.536	0.431461	-0.84058	-12.9416	237.0368	0.706573
0.31	15.6	98.476	1.524	0.42809	-0.84842	-13.2354	243.36	0.71982

0.3133	15.798	98.489	1.511	0.424438	-0.85699	-13.5387	249.5768	0.73443
0.3166	15.996	98.502	1.498	0.420787	-0.86563	-13.8466	255.872	0.749315
0.32	16.2	98.508	1.492	0.419101	-0.86964	-14.0882	262.44	0.756279
0.3233	16.398	98.521	1.479	0.415449	-0.87839	-14.4039	268.8944	0.771577
0.3266	16.596	98.533	1.467	0.412079	-0.88654	-14.713	275.4272	0.785955
0.33	16.8	98.54	1.46	0.410112	-0.89132	-14.9742	282.24	0.794459
0.3333	16.998	98.552	1.448	0.406742	-0.89958	-15.291	288.932	0.809239
0.35	18	98.597	1.403	0.394101	-0.93115	-16.7607	324	0.867036
0.3666	18.996	98.635	1.365	0.383427	-0.95861	-18.2097	360.848	0.918926
0.3833	19.998	98.673	1.327	0.372753	-0.98684	-19.7348	399.92	0.973853 ← To
0.4	21	98.705	1.295	0.363764	-1.01125	-21.2362	441	1.022626
0.4166	21.996	98.73	1.27	0.356742	-1.03074	-22.6722	483.824	1.062432
0.4333	22.998	98.756	1.244	0.349438	-1.05143	-24.1808	528.908	1.105502
0.45	24	98.775	1.225	0.344101	-1.06682	-25.6037	576	1.138104
0.4666	24.996	98.794	1.206	0.338764	-1.08245	-27.057	624.8	1.171701
0.4833	25.998	98.813	1.187	0.333427	-1.09833	-28.5544	675.896	1.206332
0.5	27	98.832	1.168	0.32809	-1.11447	-30.0906	729	1.242038
0.5166	27.996	98.844	1.156	0.324719	-1.12479	-31.4898	783.776	1.265163
0.5333	28.998	98.857	1.143	0.321067	-1.1361	-32.9447	840.884	1.290733
0.55	30	98.876	1.124	0.31573	-1.15287	-34.586	900	1.329102
0.5666	30.996	98.889	1.111	0.312079	-1.1645	-36.0948	960.752	1.35606
0.5833	31.998	98.895	1.105	0.310393	-1.16992	-37.4349	1023.872	1.368702
0.6	33	98.908	1.092	0.306742	-1.18175	-38.9977	1089	1.396532
0.6166	33.996	98.921	1.079	0.30309	-1.19373	-40.5819	1155.728	1.424981
0.6333	34.998	98.927	1.073	0.301404	-1.1993	-41.9732	1224.86	1.438325
0.65	36	98.94	1.06	0.297753	-1.21149	-43.6137	1296	1.467712
0.6666	36.996	98.952	1.048	0.294382	-1.22288	-45.2416	1368.704	1.495428
0.6833	37.998	98.959	1.041	0.292416	-1.22958	-46.7215	1443.848	1.511864
0.7	39	98.965	1.035	0.29073	-1.23536	-48.179	1521	1.526112
0.7166	39.996	98.971	1.029	0.289045	-1.24117	-49.642	1599.68	1.540511
0.7333	40.998	98.984	1.016	0.285393	-1.25389	-51.4069	1680.836	1.572233
0.75	42	98.99	1.01	0.283708	-1.25981	-52.912	1764	1.587122
0.7666	42.996	98.997	1.003	0.281742	-1.26677	-54.4658	1848.656	1.604694
0.7833	43.998	99.003	0.997	0.280056	-1.27277	-55.9991	1935.824	1.619931
0.8	45	99.009	0.991	0.278371	-1.2788	-57.5461	2025	1.635333
0.8166	45.996	99.016	0.984	0.276404	-1.28589	-59.1458	2115.632	1.653513
0.8333	46.998	99.022	0.978	0.274719	-1.29201	-60.7217	2208.812	1.66928
0.85	48	99.035	0.965	0.271067	-1.30539	-62.6586	2304	1.704037
0.8666	48.996	99.035	0.965	0.271067	-1.30539	-63.9588	2400.608	1.704037
0.8833	49.998	99.041	0.959	0.269382	-1.31162	-65.5786	2499.8	1.720359
0.9	51	99.047	0.953	0.267697	-1.3179	-67.2129	2601	1.736863
0.9166	51.996	99.054	0.946	0.26573	-1.32527	-68.9089	2703.584	1.756349
0.9333	52.998	99.06	0.94	0.264045	-1.33164	-70.574	2808.788	1.773254
0.95	54	99.067	0.933	0.262079	-1.33911	-72.312	2916	1.793217
0.9666	54.996	99.073	0.927	0.260393	-1.34556	-74.0005	3024.56	1.810538
0.9833	55.998	99.079	0.921	0.258708	-1.35206	-75.7124	3135.776	1.828055
1	57	99.086	0.914	0.256742	-1.35969	-77.5021	3249	1.848744
1.2	69	99.155	0.845	0.23736	-1.43818	-99.2344	4761	2.068359
1.4	81	99.212	0.788	0.221348	-1.50802	-122.149	6561	2.274117

1.6	93	99.257	0.743	0.208708	-1.56682	-145.714	8649	2.454924
1.8	105	99.295	0.705	0.198034	-1.61932	-170.028	11025	2.622191
2	117	99.327	0.673	0.189045	-1.66577	-194.895	13689	2.774791
2.2	129	99.358	0.642	0.180337	-1.71293	-220.968	16641	2.934121
2.4	141	99.384	0.616	0.173034	-1.75427	-247.352	19881	3.077459
2.6	153	99.409	0.591	0.166011	-1.7957	-274.742	23409	3.224538
2.8	165	99.435	0.565	0.158708	-1.84069	-303.714	27225	3.38814
3	177	99.454	0.546	0.153371	-1.8749	-331.857	31329	3.515238
3.2	189	99.473	0.527	0.148034	-1.91032	-361.05	35721	3.649304
3.4	201	99.492	0.508	0.142697	-1.94703	-391.354	40401	3.790943
3.6	213	99.511	0.489	0.13736	-1.98515	-422.838	45369	3.940834
3.8	225	99.523	0.477	0.133989	-2.01	-452.25	50625	4.040097
4	237	99.543	0.457	0.128371	-2.05283	-486.521	56169	4.214121
4.2	249	99.562	0.438	0.123034	-2.0953	-521.729	62001	4.390269
4.4	261	99.581	0.419	0.117697	-2.13964	-558.447	68121	4.57808
4.6	273	99.593	0.407	0.114326	-2.1687	-592.056	74529	4.703271
4.8	285	99.612	0.388	0.108989	-2.21651	-631.705	81225	4.912919
5	297	99.619	0.381	0.107022	-2.23472	-663.711	88209	4.993958
5.2	309	99.631	0.369	0.103652	-2.26672	-700.416	95481	5.138016
5.4	321	99.644	0.356	0.1	-2.30259	-739.13	103041	5.301898
5.6	333	99.65	0.35	0.098315	-2.31958	-772.421	110889	5.380464
5.8	345	99.663	0.337	0.094663	-2.35743	-813.314	119025	5.55749
6	357	99.669	0.331	0.092978	-2.3754	-848.017	127449	5.642513
6.2	369	99.682	0.318	0.089326	-2.41546	-891.306	136161	5.834468
6.4	381	99.688	0.312	0.08764	-2.43451	-927.549	145161	5.926852
6.6	393	99.695	0.305	0.085674	-2.4572	-965.681	154449	6.037852
6.8	405	99.701	0.299	0.083989	-2.47707	-1003.21	164025	6.135887
7	417	99.708	0.292	0.082022	-2.50076	-1042.82	173889	6.253811
7.2	429	99.72	0.28	0.078652	-2.54273	-1090.83	184041	6.465457
7.4	441	99.72	0.28	0.078652	-2.54273	-1121.34	194481	6.465457
7.6	453	99.733	0.267	0.075	-2.59027	-1173.39	205209	6.709484
7.8	465	99.733	0.267	0.075	-2.59027	-1204.47	216225	6.709484
8	477	99.739	0.261	0.073315	-2.613	-1246.4	227529	6.827745
8.2	489	99.746	0.254	0.071348	-2.64018	-1291.05	239121	6.970559
8.4	501	99.752	0.248	0.069663	-2.66409	-1334.71	251001	7.09736
8.6	513	99.758	0.242	0.067978	-2.68858	-1379.24	263169	7.228452
8.8	525	99.765	0.235	0.066011	-2.71793	-1426.91	275625	7.387145
9	537	99.771	0.229	0.064326	-2.74379	-1473.42	288369	7.528405
9.2	549	99.777	0.223	0.06264	-2.77034	-1520.92	301401	7.674806
9.4	561	99.777	0.223	0.06264	-2.77034	-1554.16	314721	7.674806
9.6	573	99.784	0.216	0.060674	-2.80224	-1605.68	328329	7.852535
9.8	585	99.79	0.21	0.058989	-2.83041	-1655.79	342225	8.011211
10	597	99.79	0.21	0.058989	-2.83041	-1689.75	356409	8.011211
11	657	99.809	0.191	0.053652	-2.92524	-1921.88	431649	8.557043
12	717	99.822	0.178	0.05	-2.99573	-2147.94	514089	8.974412
13	777	99.841	0.159	0.044663	-3.10861	-2415.39	603729	9.663466
	19366.75				-199.635	-45465.1	7702337	348.764

xbar=	111.3032							
ybar=	-1.14733							
m=	-0.00419							
b=	-0.68088							
r=	#NUM!							

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Soil Gas Survey
Emeryville, CA

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Project Number:

93010

June 93

Disclaimer

This report was furnished to Lowney Associates by Plan B Environmental. The contents of this report were produced solely for the use of Lowney Associates. Any and all data generated by this operation is considered confidential and shall not be released to a third party without the written consent of an authorized representative of Lowney Associates.

Contents

SECTION 1

Introduction

At the request of Lowney Associates, Plan B Environmental performed a soil gas survey. The survey was performed on 6/2-4/93 at a site located adjacent to 6121 Hollis Street, Emeryville, California. The operation consisted of the installation of 45 temporary exploratory probes to various depths, and the subsequent analysis of the extracted soil gases. Soil gases were analyzed for total hydrocarbons employing a Beckman 400 Hydrocarbon Analyzer equipped with a flame ionization detector (FID). The Beckman 400 Hydrocarbon Analyzer was calibrated with propane in air standards.

A summary of **Analytical Results** can be found in Section 2. Section 3 contains the **Site Plan. Discussions** are contained in Section 4. Section 5 describes the **Equipment and Procedures** used in the operation. **Quality Assurance and Quality Control** efforts are listed in Section 6.

SECTION 2

Analytical Results

Date : 6-2-93
Location : 6121 Hollis Street, Emeryville, California
Analytical Equipment : Beckman 400 Hydrocarbon Analyzer (FID)

Location	PPM*	Depth (ft.)	Vacuum (in Hg)**
VP - 1	10,000	3	15
VP - 2	20	3	9.0
VP - 3	10	3	0.0
VP - 4	5	3	0.0
VP - 5	4	3	0.0
VP - 6	4,000	3	18
VP - 7	5	3.5	4.5
VP - 8	5	3.5	13
VP - 9	210	3.5	5.0
VP - 11	9,400	5	2.5
VP - 13	15	5	0.0
VP - 14	2,500	5	4.0
VP - 15	1,500	5	N/A

* PPM as propane in air.
** Vacuum taken at the probe head.

Date : 6-3-93
Location : 6121 Hollis Street, Emeryville, California
Analytical Equipment : Beckman 400 Hydrocarbon Analyzer (FID)

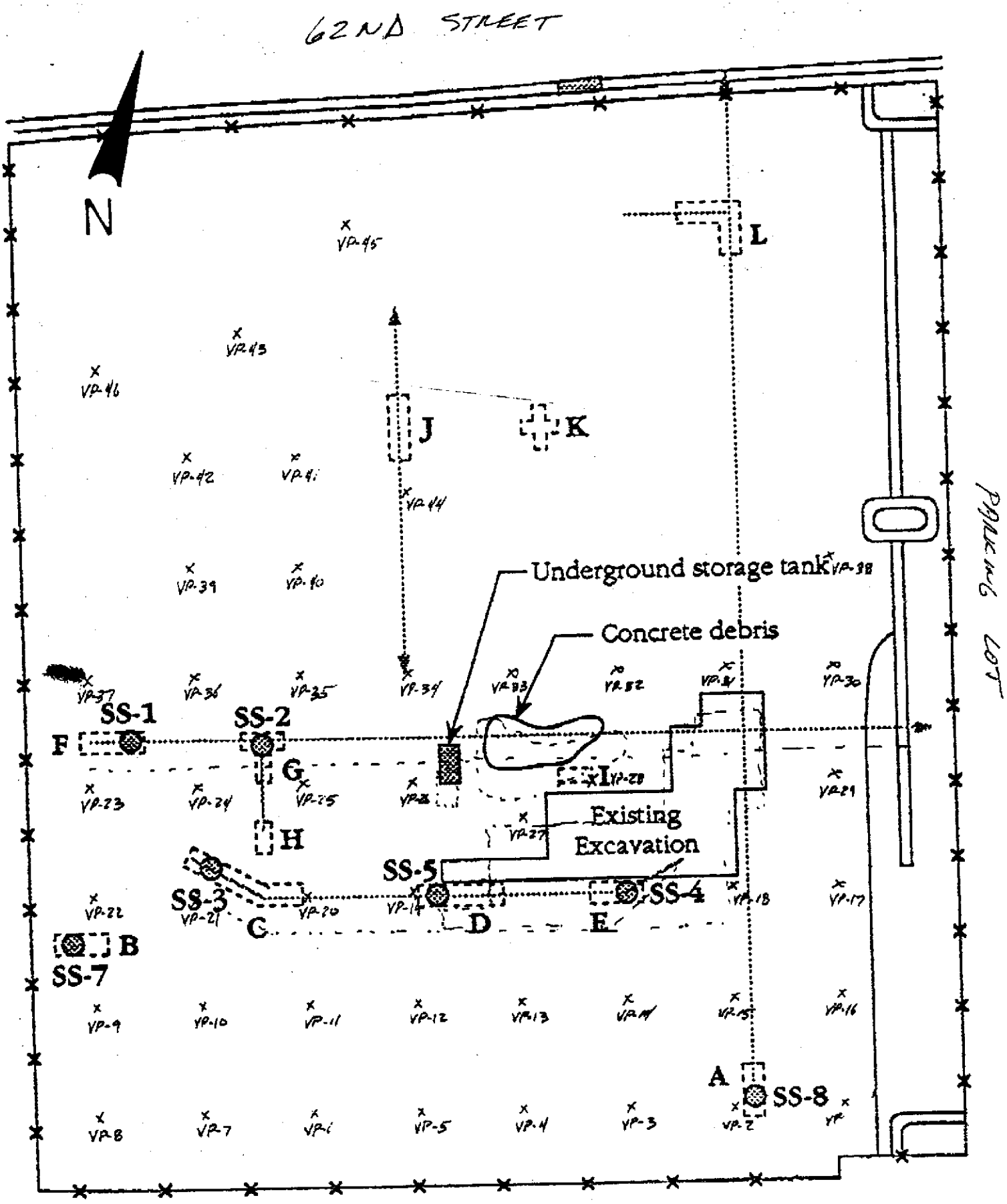
Location	PPM*	Depth (ft.)	Vacuum (in Hg)**
VP - 10	12	4	2.0
VP - 16	260	4	1.0
VP - 17	37	4	10
VP - 18	9	5	1.25
VP - 19	28	5	4.5
VP - 20	31	5	5.0
VP - 21	16	4	3.5
VP - 22	17	4	4.0
VP - 23	40	4	0.0
VP - 24	1,500	4.5	1.0
VP - 25	300	4.5	2.0
VP - 26	8	4.5	0.0
VP - 27	12	4.5	3.0
VP - 28	4	4.5	0.0
VP - 29	1,300	4	4.0
VP - 30	5	4.0	2.0
VP - 31	15	3.5	4.0
VP - 32	6	5	2.5
VP - 33	19	5	4.0
VP - 34	26	5	3.0
VP - 35	9,200	4.5	1.5
VP - 36	6,900	4.5	2.5
VP - 37	5	4	0.0
VP - 38	6	4	0.0

* PPM as propane in air.
** Vacuum taken at the probe head.

Date : 6-4-93
Location : 6121 Hollis Street, Emeryville, California
Analytical Equipment : Beckman 400 Hydrocarbon Analyzer (FID)

Location	PPM*	Depth (ft.)	Vacuum (in Hg)**
VP - 39	30	3	4.5
VP - 40	9,700	4.5	0.0
VP - 41	9,700	4.5	4.5
VP - 42	13,000	4.5	4.5
VP - 43	11,000	4.5	1.5
VP - 44	19	5	4.5
VP - 45	3	3	0.0
VP - 46	3		0.0

* PPM as propane in air.
** Vacuum taken at the probe head.


62ND STREET
N
L
J
K
Underground storage tank
Concrete debris
Existing Excavation
SS-1
SS-2
SS-3
SS-4
SS-5
SS-7
SS-8
A
B
C
D
E
F
G
H
I
PARKING LOT
WESTINGHOUSE

SECTION 4

Discussion

In order to clarify the significance of "vacuum", and "depth" as included in the data summary, the following explanations are included:

1) Vadose probe installation depths: The 45 probes employed in this operation were driven to depths of between three and five feet below grade. The reason for the varied depths was two-fold. It was estimated that groundwater on the site was between three and six feet below grade, depending upon the location. Consequently, the probes were driven to a depth in accordance with an estimation, based on relative elevation, of groundwater depth at each location. Secondly, the amount of air permeability demonstrated by the soil was at times insufficient for the acquisition of a soil vapor sample. Therefore the probe had to be raised to a depth where soil air permeability was sufficient enough to allow for the acquisition of a soil gas sample.

2) Vacuum at the probe head: The degree of vacuum measured at the probe head is generally an indication of the air permeability of soils adjacent to the vadose probe. Knowledge of air permeability, used in conjunction with other site information can help to better interpret and understand the data provided by the soil gas survey, and thus better comprehend the site conditions.

SECTION 5

Equipment & Procedures

The procedures for the soil gas survey are as follows:

1) Sampling Point Location: Sampling point locations were chosen exclusively by Lowney Associates.

2) Probe Construction: Each vadose probe was constructed of 1/2" 40 galvanized steel pipe. A point is forged at one end of the pipe and the last 24" screened with 20 3/16" holes.

3) Probe Installation: A hammer drill was employed to drill a hole through surface materials (blacktop, concrete). Probes were installed using a pneumatic driver. Probes were driven to various depths, depending on the air permeability of the soil and groundwater depth.

4) Soil Gas Sampling and Analysis: A "probe head T" fitting is attached at the surface to each of the probes. One side of the "T" is closed off with a Teflon faced silicon septum. The other side of the fitting is hooked up (via Teflon hose and a pump) to the Beckman 400 Hydrocarbon Analyzer. The pump applies a vacuum to the top of the probe, extracting and transporting soil gases to the Beckman 400 for total hydrocarbon analysis.

SECTION 6

Quality Assurance/Quality Control

Quality assurance/quality control for the soil gas sampling and analysis operation was maintained as follows:

1) Leak tests were made on the sample lines prior to performing any sampling.

2) All components of the sampling and analysis system which come into contact with the sample are composed of inert, non-reactive materials such as Teflon and stainless steel. This minimizes sample compromise through adsorption.

3) All Teflon tubing underwent a thorough cleaning prior to use. The tubing was cleaned twice with acetone and completely air purged.

4) All vadose probes were thoroughly cleaned with Alconox and tap water and air dried prior to installation.

5) It is the opinion of Plan B Environmental that all quality assurance/quality control efforts were successful, and at no time during the operation was the quality or integrity of the samples, or sample analysis compromised.

7) Field calibrations for all analytical equipment were run prior to performing any analysis, and periodically throughout the test days. The Beckman 400 Hydrocarbon Analyzer is calibrated with propane in air standards.