Additional Ground-water Investigations
Yerba Buena Project Site
Emeryville and Oakland, California

LF 1649.01
September 6, 1991

Prepared for:

Catellus Development Corporation
201 Mission Street, Suite 250
San Francisco, California 94105

LEVINE·FRICKE

LEVINE·FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

September 6, 1991

LF 1649.01

Mr. Dennis Byrne
Alameda Health Care Agency
Division of Hazardous Materials
80 Swan Way, Room 200
Oakland, CA 94621

Subject: Results of Additional Ground-Water Investigations
Yerba Buena Project Site
Emeryville and Oakland, California

Dear Mr. Byrne:

Enclosed is a report discussing results of additional hydrogeologic investigations of the Yerba Buena Project Site.

These additional investigations included:

(1) installing three wells (two shallow and one intermediate depth) near Hollis street to further assess the extent of VOC-affected ground-water and provide monitoring wells adjacent to the proposed ground-water extraction trench to be installed in this area;

(2) collecting ground-water samples from the newly installed wells for laboratory analysis;

(3) reviewing records at the Alameda County Health Agency to investigate a potential off-site, up-gradient source for elevated VOC concentrations detected in well LF-10 located on the northwestern boundary of the Project Site.

A brief summary of the results of the investigation is provided below.

Results of the ACHA file review indicate chlorinated solvents have been detected in ground-water samples collected from the ECI facility located within 450 feet northeast (upgradient) of well LF-10. The possibility that ECI is responsible for the VOCs detected in ground-water samples collected from well LF-10 should be evaluated after review of upcoming ECI off-site monitoring data.

1900 Powell Street, 12th Floor
Emeryville, California 94608
(415) 652-4500
FAX (415) 652-2246

Other offices in Irvine, CA, Sacramento/Roseville, CA; Tallahassee, FL

Analytical results for the ground-water sample collected from deeper monitoring well LF-19D (screened from 33 to 43 feet below ground surface [bgs]) did not indicate the presence of VOCs above laboratory detection limits (0.0005 ppm). This indicates that intermediate-depth (30 to 40 feet) ground water in the vicinity of LF-19D has not been affected by VOCs and further supports the appropriateness of the shallow ground-water extraction trench proposed for the Site. Well LF-19D will be included in the proposed periodic monitoring program for the Site to monitor intermediate-depth ground-water quality at the downgradient end of the Site.

Analytical results for ground water collected from off-site shallow (20 feet) wells LF-22 and LF-23 (screened from 10 to 20 feet bgs) indicate low concentrations (less than 0.053 ppm) of VOCs consisting of TCA, 1,1-DCA, 1,1-DCE, PCE, TCE and 1,2-DCE in shallow ground water just west of Area A of the Yerba Buena Project site. The TCA, 1,1-DCA and 1,1-DCE compounds are likely associated with the VOC-affected ground-water plume detected in Area A that contains these compounds, which indicates that the plume extends just slightly beyond Area A. The PCE, TCE and 1,2-DCE compounds have not been detected in on-site wells in Area A and may indicate an off-site source downgradient of Area A.

If you have any questions with regard to the enclosed report, please do not hesitate to call me, Ms. Cindy Barclay or Ms. Jenifer Carter.

Sincerely,

Amanda Spencer
Senior Hydrogeologist

Enclosure

cc: Ric Notini, Catellus (w/enclosure)
Pat Cashman, Catellus (w/enclosure)
Don Marini, Catellus (w/enclosure)

CONTENTS

LIST OF FIGURES

September 6, 1991 LF 1649.01

ADDITIONAL GROUND-WATER INVESTIGATIONS
YERBA BUENA PROJECT SITE
EMERYVILLE AND OAKLAND, CALIFORNIA

1.0 INTRODUCTION

This report, prepared on behalf of Catellus Development Corporation ("Catellus"), summarizes and evaluates ground-water data gathered from recent hydrogeologic investigations conducted by Levine•Fricke, Inc. during April and July 1991 for the Yerba Buena Project site ("the Site"; Figure 1) located in Emeryville and Oakland, California. The layout of the Site is presented in Figure 2. As illustrated in Figure 2, the Site had been divided into four quadrants (Areas A, B, C and D) to aid in the organization of the sampling and analysis program previously conducted at the Site. The work conducted during this investigation included performing the records search at the Alameda County Health Agency (ACHA) to investigate and potentially identify an off-site source for volatile organic compounds (VOCs) north of well LF-10 in Area C, installing three monitoring wells in and near Area A, and collecting ground-water samples from the newly installed wells for laboratory analysis.

1.1 Background and Objectives

Results of environmental investigations conducted at the Site by Levine•Fricke between September 1989 and December 1990 indicate that VOCs are present in ground water in the vicinity of monitoring well LF-10, located on the upgradient (northern) boundary of Area C (notably, up to 7.6 parts per million [ppm] of trichloroethylene [TCE]). Based on the distribution and concentrations of VOCs in ground water in the vicinity of well LF-10 and the southwesterly ground-water gradient, it appears that these compounds likely originate from an off-site source north of monitoring well LF-10. The objective for performing the records search at the ACHA was to investigate and potentially identify an off-site source for VOCs north of well LF-10 in Area C.

In Area A of the Site, results of environmental investigations indicate that shallow ground water has been affected by VOCs at concentrations of up to 0.73 ppm. Previous investigations conducted by Levine•Fricke indicate that the affected ground water extends approximately 800 to 1,200 feet southwest of

well LF-5, and approximately 200 to 300 feet northeast of well LF-5, in a band approximately 200 to 250 feet wide (Figure 2). These results are discussed in more detail in the Phase III Environmental Investigation report (Levine·Fricke, 1991a). The proposed ground-water remedial plan for the Site is presented in the Site Remedial Plan (Levine·Fricke, 1991b), and includes the installation of a shallow ground-water collection trench (i.e., french drain) along the Hollis Street property boundary to intercept VOC-affected ground water from Area A. Shallow ground water entering the trench will be pumped and treated on site using a conventional treatment technology. The objective for installing two off-site shallow monitoring wells (approximately 20 feet below the ground surface [bgs]) and one intermediate well (approximately 43 feet bgs) was to better assess the lateral and vertical extent of VOC-affected ground water in or near the western portion of Area A, and to monitor the effectiveness of the proposed remediation system in that area of the Site.

2.0 REVIEW OF ACHA RECORDS

A review of ACHA records was conducted to investigate a potential upgradient source for VOCs detected in monitoring well LF-10 at the Site. The location of the well is shown in Figure 2. The records search was conducted by Mr. Dennis Byrne of ACHA and Ms. Amanda Spencer of Levine·Fricke in April 1991.

Results of the ACHA file review indicate that chlorinated solvents have been detected in ground-water samples collected from the Electro Coatings, Inc. (ECI) facility located within 450 feet northeast (upgradient) of well LF-10. According to a letter from the RWQCB to ECI dated April 8, 1986, TCE was detected in ground-water samples collected from ECI monitoring wells (including well W-21, located within 100 feet east of well LF-10) at concentrations of up to 1.2 ppm. The letter also mentions that trichloroethane (TCA) and tetrachloroethene (PCE) were detected in ground-water samples collected from ECI monitoring wells; however, concentrations of these compounds were not discussed. Based on correspondence between ECI and the Regional Water Quality Control Board (RWQCB) between 1984 and 1991 contained in the ACHA files, it appears that ECI has not yet conducted a complete investigation of soil and ground water at the facility.

Based on conversations with representatives of ECI on June 24, 1991 and June 28, 1991, it is our understanding that the investigations at ECI are currently under the direction of the

RWQCB. ECI reportedly initiated a quarterly ground-water sampling program in June 1991 which consisted of collecting ground-water samples from four monitoring wells (W-4, W-5, W-12, and W-15). Well W-15 is reportedly within 150 feet northeast of well LF-10. Three of ECI's monitoring wells that were not sampled in June 1991 (W-18, W-18A and W-21), possibly due to access difficulties, are located within 100 feet northwest and east of LF-10. The results of the recent environmental investigation will be submitted to the RWQCB. Levine•Fricke will review these reports as they become available to the public.

3.0 RECENT HYDROGEOLOGIC INVESTIGATIONS

To further assess the lateral and vertical extent of VOC-affected ground water in the western portion of Area A and to monitor the effectiveness of the proposed extraction trench along Hollis Street, three monitoring wells were installed, developed and sampled at the Site in July 1991. The locations of the newly installed wells are presented in Figure 2.

3.1 Monitoring Well Installation

Two shallow soil borings (LF-22 and LF-23) and one intermediate soil boring (LF-19D) were drilled and completed as monitoring wells using the hollow-stem auger method and air-rotary method, respectively. Soil samples were collected during drilling for lithologic description and possible chemical analyses. Appendix A describes the procedures for soil sampling and monitoring well installation. Graphic illustrations of the lithology and well constructions for each well are presented in Appendix B.

3.2 Well Development and Ground-Water Sampling

The newly installed wells were developed on July 12, 1991, by overpumping and surging the well to remove sediment around the well and to enhance hydraulic communication with the surrounding formation. Procedures used during well development are described in Appendix A. Water-quality sheets are included in Appendix C.

Ground-water samples were collected from wells LF-22, LF-23 and LF-19D on July 12, 1991. The samples were analyzed by BC Analytical, a State-certified laboratory, for volatile organic compounds using EPA Method 8010. Field procedures for ground-water sampling are described in Appendix A.

4.0 GROUND-WATER ELEVATIONS AND FLOW DIRECTION

Depth to ground water was measured in 15 ground-water monitoring wells in Area A of the Project Site on August 7, 1991. Water-level measurements were collected prior to developing and sampling wells LF-22, LF-23 and LF-19D. Depth to ground water ranged from 11.49 feet bgs (well LF-22) to 17.73 feet bgs (well LF-18). Contoured ground-water elevation data are presented on Figure 3. These data indicate a generally westerly to northwesterly flow direction with a gradient of approximately 0.009 ft/ft in the western portion of Area A. These results indicate a slight shift in the general ground-water flow direction which was previously reported as westerly to southwesterly for Area A of the Site.

5.0 GROUND-WATER QUALITY RESULTS

Chemical analysis results for ground-water samples collected from wells LF-22, LF-23 and LF-19D are presented in Figure 4. Also included on Figure 4 is a summary of ground-water quality results collected from the other wells in Area A during previous investigations at the Site. Laboratory data sheets and chain-of-custody forms are contained in Appendix D.

Analytical results for the ground-water sample collected from monitoring well LF-19D did not indicate the presence of VOCs above laboratory detection limits (0.0005 ppm). Analytical results for the ground water collected from off-site wells LF-22 and LF-23 indicate low concentrations (less than 0.053 ppm) of VOCs in shallow ground water just west of Area A of the Yerba Buena Project site. These results are similar to results of grab ground-water sampling and analysis conducted in this Area during Levine·Fricke's Phase III Investigation of the Site (Levine·Fricke, 1991a). It should be noted that PCE, TCE and 1,2-DCE were detected at concentrations up to 0.027 ppm, 0.0039 ppm and 0.0016 ppm, respectively, in off-site wells LF-22 and LF-23. The presence of these compounds have not been detected previously in on-site wells in Area A and may indicate an off-site source downgradient of Area A.

For quality control/quality assurance (QA/QC) purposes, one field blank (LF-23FB) was collected prior to sampling well LF-23. The results indicate that VOCs were not present in the sample above laboratory detection limits. Additionally, a duplicate sample (LF-190) was collected from monitoring well LF-19D for QA/QC purposes. The results of the duplicate

analysis are in good agreement with the results for the primary sample collected from well LF-19D. Field procedures for collecting QA/QC samples are described in Appendix A.

6.0 SUMMARY AND CONCLUSIONS

Results of the ACHA file review indicate chlorinated solvents have been detected in ground-water samples collected from the ECI facility located within 450 feet northeast (upgradient) of well LF-10. The possibility that ECI is responsible for the VOCs detected in ground-water samples collected from well LF-10 should be evaluated after review of upcoming ECI off-site monitoring data.

Ground-water elevation data for the western portion of Area A indicate a generally westerly to northwesterly flow direction with a gradient of approximately 0.009 ft/ft. These results indicate a slight shift in ground-water flow direction from the westerly to southwesterly direction previously reported for Area A. This slight shift should not significantly influence the effectiveness of the proposed extraction trench for shallow ground water in Area A.

Analytical results for the ground-water sample collected from deeper monitoring well LF-19D did not indicate the presence of VOCs above laboratory detection limits (0.0005 ppm). This indicates that intermediate-depth (30 to 40 feet) ground water in the vicinity of LF-19D has not been affected by VOCs and further supports the appropriateness of the shallow ground-water extraction trench proposed for the Site. Well LF-19D will be included in the proposed periodic monitoring program for the Site to monitor intermediate-depth ground-water quality at the downgradient end of the Site.

Analytical results for ground water collected from off-site shallow (20 feet) wells LF-22 and LF-23 indicate low concentrations (less than 0.053 ppm) of VOCs consisting of TCA, 1,1-DCA, 1,1-DCE, PCE, TCE and 1,2-DCE in shallow ground water just west of Area A of the Yerba Buena Project site. The TCA, 1,1-DCA and 1,1-DCE compounds are likely associated with the VOC-affected ground-water plume detected in Area A that contains these compounds, which indicates that the plume extends just slightly beyond Area A. The PCE, TCE and 1,2-DCE compounds have not been detected in on-site wells in Area A and may indicate an off-site source downgradient of Area A.

REFERENCES

Levine•Fricke, Inc. 1990. Phase I and II Environmental Investigation, Yerba Buena Project Site, Emeryville, California, August 15, 1990.

Levine•Fricke, Inc. 1991a. Phase III Environmental Investigation, Yerba Buena Project Site, Emeryville, California, February 6, 1991.

Levine•Fricke, Inc. 1991b. Site Remedial Plan, Yerba Buena Project Site, Emeryville and Oakland, California, February 11, 1991.

APPENDIX A

PROCEDURES USED DURING MONITORING WELL INSTALLATION, DEVELOPMENT, AND SAMPLING

PROCEDURES USED DURING MONITORING WELL INSTALLATION, DEVELOPMENT, AND SAMPLING

A1.0 Monitoring Well Installation

Shallow Monitoring Wells

On July 10 and 11, 1991, Gregg Drilling of Concord, California, a licensed well drilling contractor, drilled two soil borings (LF-22 and LF-23) off site to the west of Area A of the Yerba Buena Project Site under the direction of a Levine•Fricke geologist. Soil borings were drilled using a truck-mounted drilling rig equipped with nominal 8-inch outside diameter hollow-stem augers to depths of 20 feet below ground surface (bgs).

During drilling, soil samples for lithologic description were collected by driving a 2-inch-diameter, 18-inch-long, split-spoon sampler ahead of the augers into undisturbed soil. The sampler was lined with three clean, 2-inch-diameter, 6-inch-long brass tubes. A field organic vapor analyzer (OVA) was used to screen samples for possible chemical analysis. Organic vapor concentrations were not detected using the OVA and no samples were retained for chemical analysis. The soil cores were described using the Unified Soil Classification System. Lithologic logs are presented in Appendix B.

The wells were constructed of 4-inch polyvinyl chloride (PVC) casing with 0.002-inch factory-slotted screen. A filter pack consisting of Number 3 Monterey sand was poured into the annular space between the augers and the slotted polyvinyl chloride (PVC) well casing as the augers were gradually removed from the borehole. The filter pack was installed to approximately 2 feet above the top of the slotted casing. A 2-foot-thick layer of bentonite was placed on top of the filter pack and the remainder of the annular space was sealed by pumping a cement-bentonite grout through a tremie pipe from the bottom of the annular borehole space to the ground surface. At the ground surface, a 10-inch diameter, locking steel well cover was installed and finished at grade to protect the integrity the well. Well construction details are presented on the lithologic logs presented in Appendix B.

All drilling and sampling equipment was steam cleaned prior to use at each drilling location. Soil cuttings from each borehole were stockpiled on site pending receipt of analytical results to determine an appropriate disposal method.

Intermediate-depth Monitoring Well

On July 9, 1991, Water Development Corporation of Woodland, California, a licensed well drilling contractor, drilled one soil boring in the western portion of Area A of the Yerba Buena Project Site under the direction of a Levine·Fricke geologist. An intermediate monitoring well (LF-19D) was installed using the air-rotary casing hammer method to prevent fluids and sediments from the upper, potentially VOC-affected water-bearing zone from moving deeper through the borehole during or following well installation. The drive casing is a heavy wall flush threaded pipe which is driven simultaneously with the rotated drilling of a smaller diameter borehole while filtered air is forced downward through the center drill rod to the drill bit. The drive casing seals formations in the borehole as drilling progresses, thus mitigating against possible cross-contamination of different water-bearing zones.

Upon completion of the drilling, the drill rod and bit were extracted from the center of the drive casing. Permanent well completion materials were installed down the center of the casing as the drive casing was hydraulically withdrawn. The well was constructed by inserting 4-inch-diameter, flush-threaded, solid and slotted (0.020-inch) well casing through the drive casing. A filter pack consisting of Number 2/12 silica sand was poured into the annular space between the drive casing and the slotted PVC well casing as the drive casing was gradually removed from the borehole. The filter pack was installed to approximately 2 feet above the top of the slotted casing. A 2-foot-thick layer of bentonite was placed on top of the filter pack and the remainder of the annular space was sealed by pumping a cement-bentonite grout through a tremie pipe from the bottom of the annular borehole space to the ground surface. At the ground surface, an 8-inch diameter, 4-foot long, locking steel well cover was installed and finished approximately 3 feet above the ground surface to protect the integrity of the well. Well construction details are presented on the lithologic logs presented in Appendix B.

On July 16, 1991, elevation of the top of the PVC casing for each of the three wells was surveyed to the nearest 0.01 foot relative to mean sea level by Moran Engineering of Berkeley, California, a licensed surveyor.

A2.0 Well Development and Ground-Water Sampling

Well Development

On July 12, 1991, newly installed wells LF-19D, LF-22 and LF-23 were developed to remove fine particles near the slotted casing and improve hydraulic communication between the slotted casing and the formation.

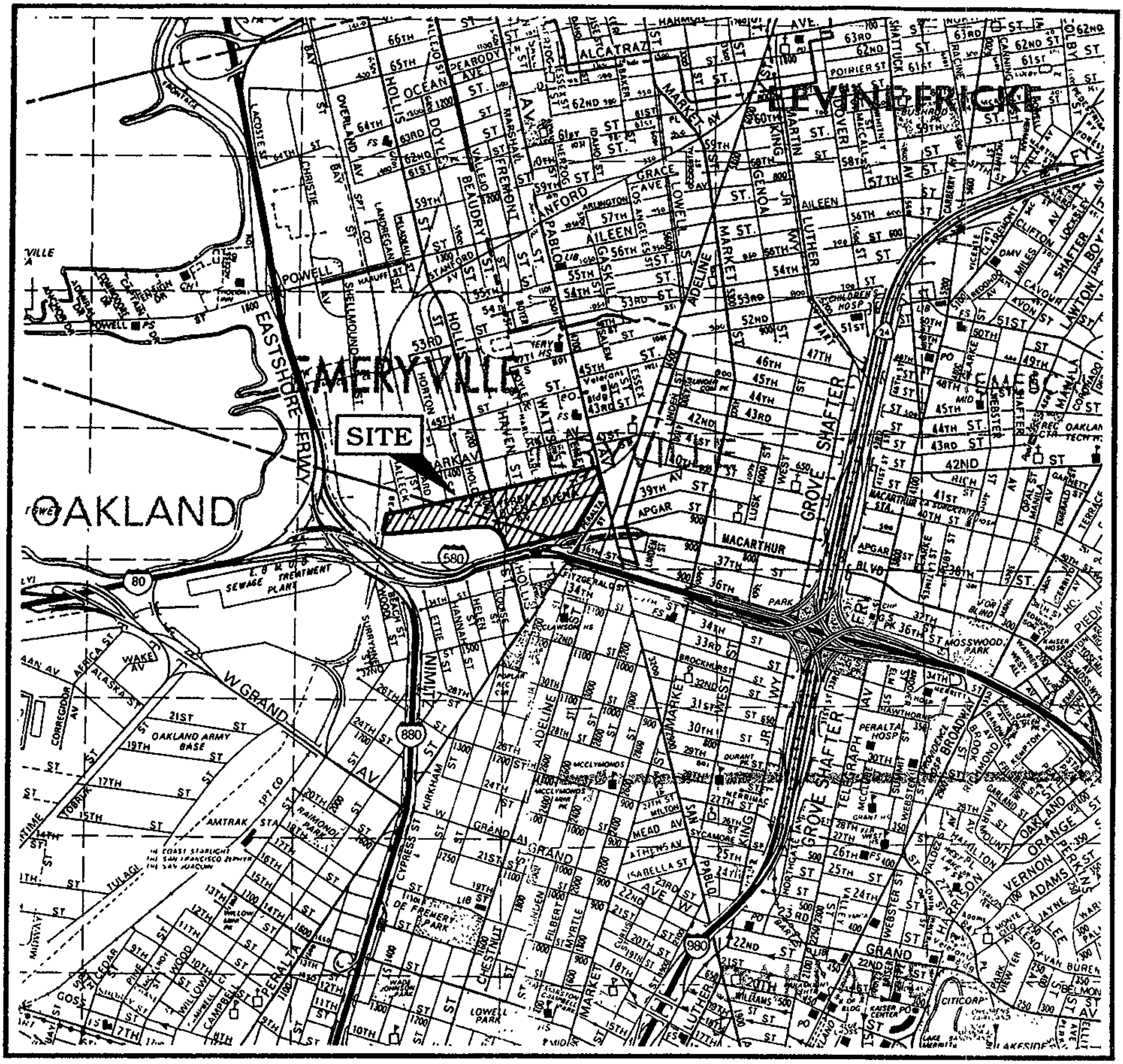
The wells were developed by purging approximately 10 well volumes from the well using a submersible pump. Wells were purged until indicator parameters (specific conductance, pH, and temperature) had stabilized, thereby indicating complete removal of static water from the well. During the purging process, indicator parameters were recorded on water-quality sampling sheets, which are included in Appendix C. Ground-water samples were collected from the well after indicator parameters stabilized.

Ground-Water Sampling

Newly installed wells LF-19D, LF-22, and LF-23 were sampled on July 12, 1991 following well development. Ground-water samples were collected from each well using a Teflon bailer and poured directly into 40-milliliter, glass volatile organic analysis (VOA) vials. Before the ground-water sample was collected, one field blank (LF-23FB) was collected for quality control/quality assurance (QA/QC) purposes by pouring laboratory supplied distilled water into a clean Teflon bailer and filling three 40-milliliter VOA bottles with the water from the bailer. A duplicate sample (LF-190) was also collected from monitoring well LF-19D for QA/QC purposes.

Immediately after collection, samples were labeled and placed in an ice-chilled cooler. Ground-water samples were delivered under strict chain-of-custody protocol to BC Analytical of Emeryville, California for analysis using Modified EPA Method 8010. Copies of the laboratory certificates are presented in Appendix D.

Purged water (generated during well development and sample collection) was stored in a Baker tank located on site.



MAP SOURCE:
Alameda & Contra Costa Counties,
Thomas Bros. map, 1990 Edition

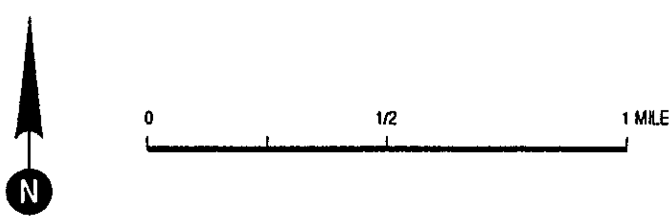


Figure 1 : SITE LOCATION MAP
YERBA BUENA PROJECT SITE

Project No. 1649

LEVINE • FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

1649ALS•6FEB91•ryz

APPENDIX B

LITHOLOGIC WELL LOGS AND WELL CONSTRUCTION DATA FOR MONITORING WELLS LF-19D, LF-22 and LF-23

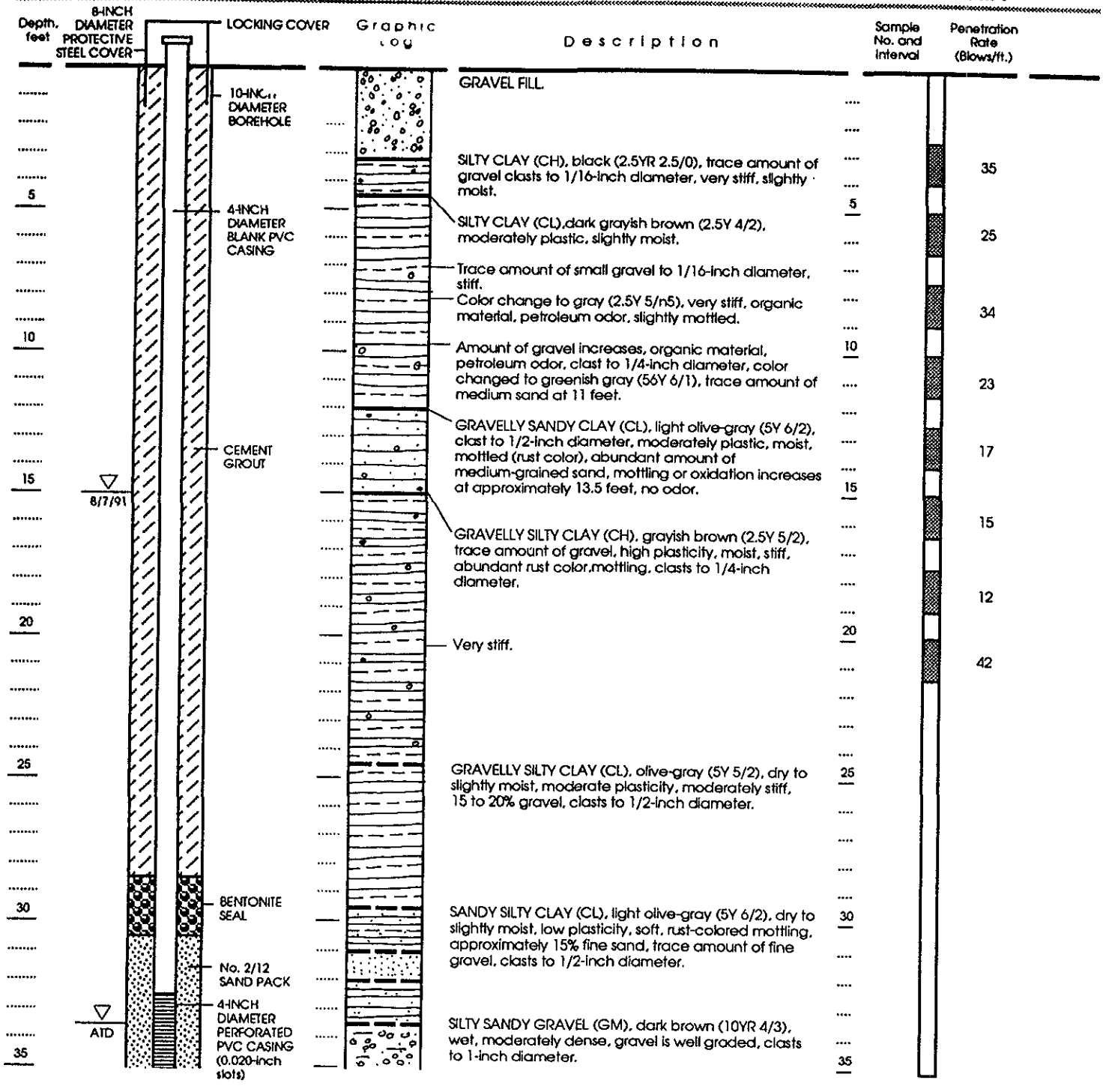
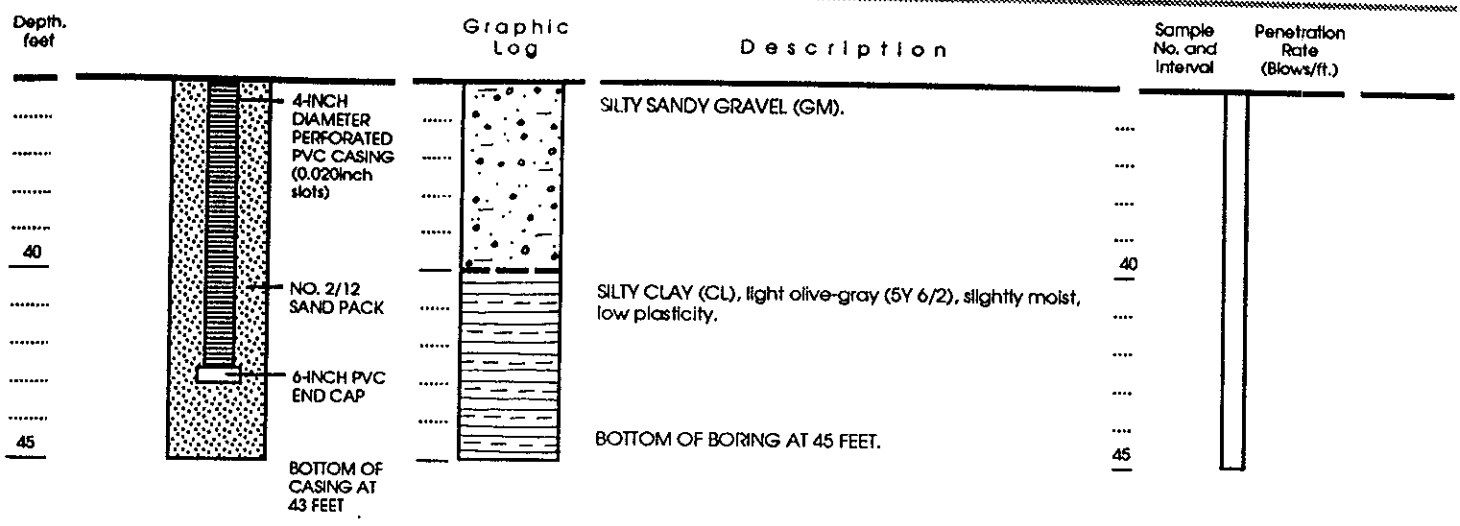


Figure B1 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-19D

Project No. 1649.01

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

JJB7AUG91jc/sm



EXPLANATION

Clay
Silt
Sand
Gravel

Date boring drilled: July 7, 1991.
Hammer weight and drop: 140 lbs.
LF Geologist: Jenifer Beatty

Modified California Sampler

ATD — Water level at time of drilling

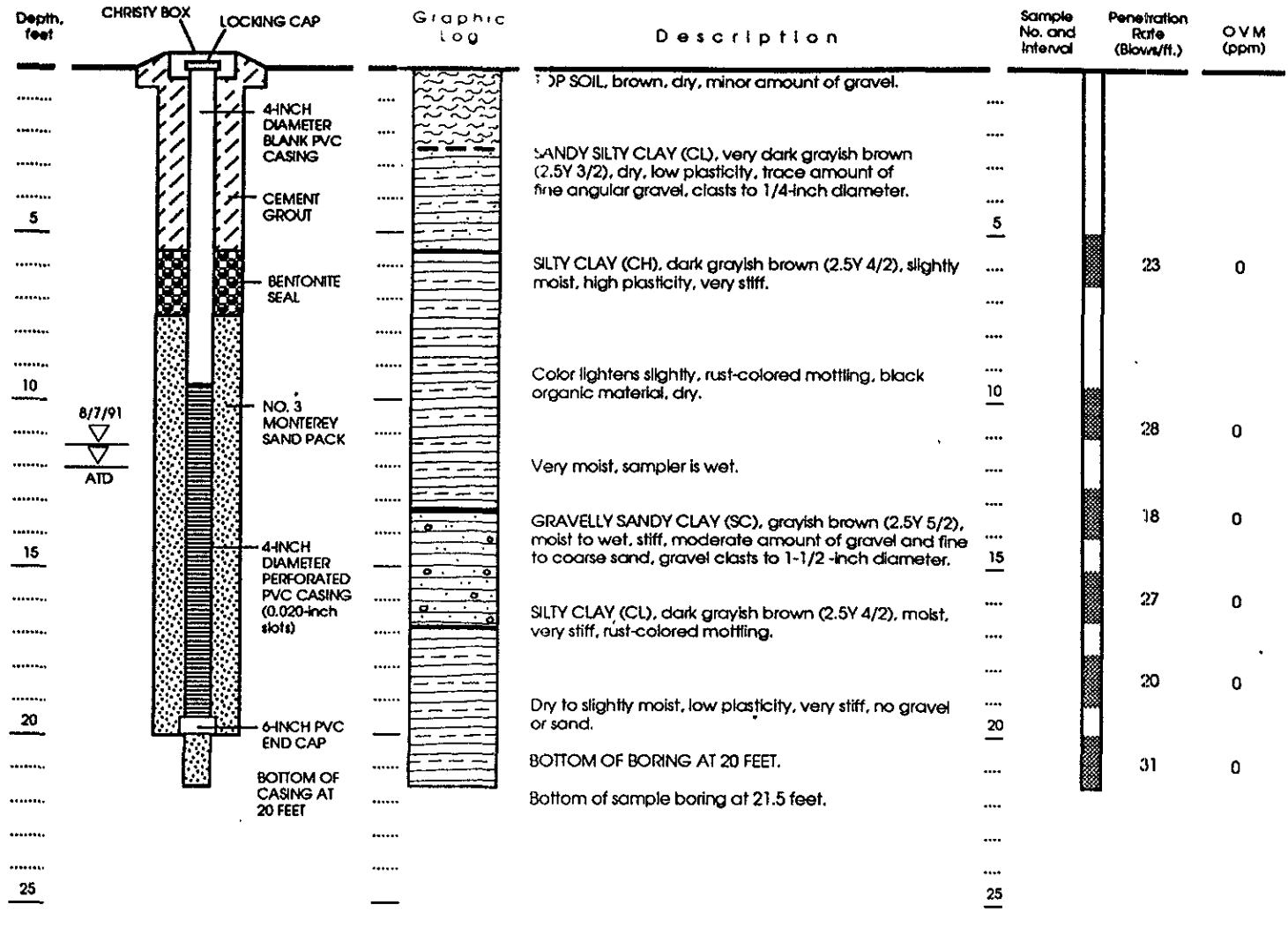
Approved by :

Figure B1 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-19D (page 2 of 2)

Project No. 1649.01

LEVINE • FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

JJB&AUG91lc/jm



EXPLANATION

Clay
Silt
Sand
Gravel

Date boring drilled: July 10, 1991.
Hammer weight and drop: 140 lbs.
LF Geologist: Jenifer Beatty

Modified California Sampler

ATD — Water level at time of drilling

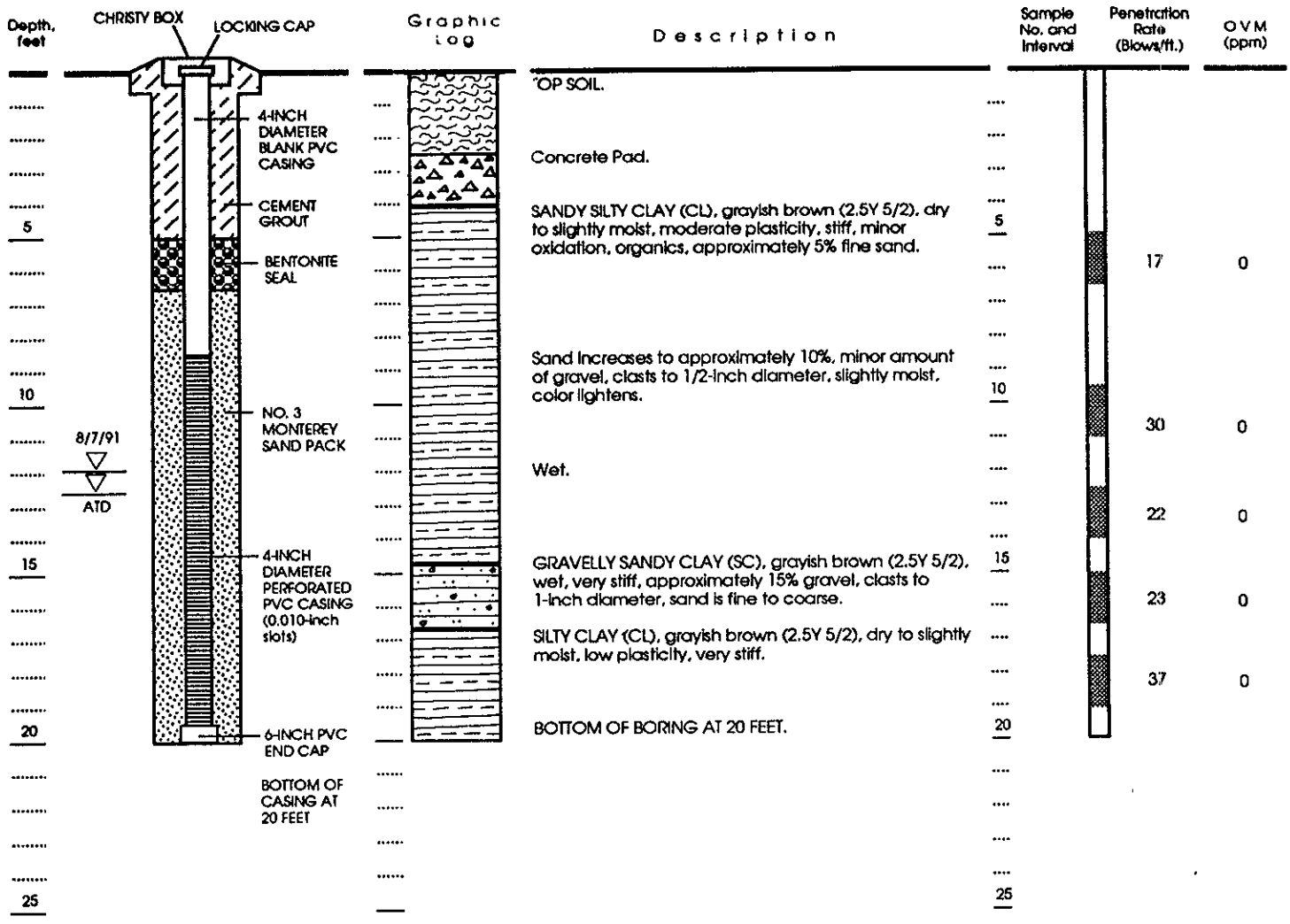
Approved by :

Figure B2 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-22

Project No. 1649.01

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

JJB19\JUL91\cf\sm



EXPLANATION

- Clay
- Silt
- Sand
- Gravel

Date boring drilled: July 11, 1991
Hammer weight and drop: 140 lbs.
LF Geologist: Jenifer Beatty

Modified California Sampler

ATD — Water level at time of drilling

Approved by :

Figure B3 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-23

Project No. 1649.01

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

JJB19JUL91jc

DRAFT
August 15, 1991

APPENDIX C

WATER-QUALITY SAMPLING SHEETS

LEVINE•FRICKE

WATER-QUALITY SAMPLING INFORMATION

Project Name _____ Project No. 1649.01

Date 7-12-91 Sample No. LF-22

Samplers Name JCK VJR

Sampling Location LF-22

Sampling Method SUBMERSIBLE Pump / TEFLON Bail

Analyses Requested EPA 8010

Number and Types of Sample Bottles used 3 VOA

Method of Shipment HAND DELIVER

GROUND WATER

Well No. LF-22

Well Diameter (in.) 4

Depth to Water, Static (ft) 9.64

Water in Well Box _____

Well Depth (ft) 19.60

Height of Water Column in Well 9.96

Water Volume in Well 6.47

SURFACE WATER

Stream Width _____

Stream Depth _____

Stream Velocity _____

Rained recently? _____

Other _____

2-inch casing = 0.16 gal/ft

4-inch casing = 0.65 gal/ft

5-inch casing = 1.02 gal/ft

6-inch casing = 1.47 gal/ft

19.60
9.64
9.96
.65
4980
5976
6.4740

LOCATION MAP

TIME	DEPTH TO WATER (feet)	VOLUME WITHDRAWN (gallons)	TEMP (deg. C)	pH (S.U.)	COND (mhos/cm)	OTHER		REMARKS
213 1515								START
220 15:16		7	18.7	7.48	1633			TURBID
227 15:17		12		7				WELL DEWATERED / PUMP OFF
234 15:20		14	19.0	7.36	1357			START / TURBID
241 15:25		21	18.9	7.21	1328			WELL DEWATERS; PUMP SLOW / TURB.
248 15:27		23						PUMP OFF
256 15:44								
263 15:45		30	18.5	6.95	1107			turbid / pump.
270 15:49		37	18.9	7.02	1090			turbid pump off / surge
277 15:57								pump on
16:00		44	18.4	6.94	1072			turbid
16:08		51	19.1	6.89	1061			Slightly turbid / pump off / surge.

Suggested Method for Purging Well Sub Pump

10-30-89
LEVINE•FRICKE

WATER-QUALITY SAMPLING INFORMATION

Project Name Yerba Buena

Project No. 1649.01

Date 7/12/91

Sample No. LF-22 (Cont.)

Samplers Name JCK, JJB

Sampling Location LF-22

Sampling Method SUB PUMP

Analyses Requested EPA 8010

Number and Types of Sample Bottles used 3 VOA

Method of Shipment

GROUND WATER

Well No.

Well Diameter (in.)

Depth to Water, Static (ft)

Water in Well Box

Well Depth (ft)

Height of Water Column in Well

Water Volume in Well

SURFACE WATER

Stream Width

Stream Depth

Stream Velocity

Rained recently ?

Other

2-inch casing = 0.16 gal/ft

4-inch casing = 0.65 gal/ft

5-inch casing = 1.02 gal/ft

6-inch casing = 1.47 gal/ft

LOCATION MAP

TIME	DEPTH TO WATER (feet)	VOLUME WITHDRAWN (gallons)	TEMP (deg. C)	pH (S.U.)	COND (mhos/cm)	OTHER		REMARKS
1624	12.4							Pump on
1625		58	18.3	6.85	1038			turbid
1630		65	18.4	6.89	1055			turbid
1645								Sampled.

Suggested Method for Purging Well

10-30-89
LEVINE•FRICKE

WATER-QUALITY SAMPLING INFORMATION

Project Name YERBA BUENA Project No. 1659.01

Date 7-12-91 Sample No. LF-23

Samplers Name JCK

Sampling Location LF-23

Sampling Method SUBMERS PUMP/TEFLON BAR

Analyses Requested EPA 8010

Number and Types of Sample Bottles used 3 VOA

Method of Shipment HAND DELIVER

GROUND WATER

Well No. LF-23

Well Diameter (in.) 4

Depth to Water, Static (ft) 9.76

Water in Well Box NO

Well Depth (ft) 18.50

Height of Water Column in Well 8.74

Water Volume in Well 5.67

SURFACE WATER

Stream Width

Stream Depth

Stream Velocity

Rained recently ?

Other

2-inch casing = 0.16 gal/ft

4-inch casing = 0.65 gal/ft

5-inch casing = 1.02 gal/ft

6-inch casing = 1.47 gal/ft

18.50
9.76
8.74
.65
4270
5244
5.6710

LOCATION MAP

TIME	DEPTH TO WATER (feet)	VOLUME WITHDRAWN (gallons)	TEMP (deg. C)	pH (S.U.)	COND (mhos/cm)	OTHER		REMARKS
1650								start
1651		6	17.9	7.92	1672			very turbid
1657		12	17.8	7.24	1496			very turbid
1700		18	17.8	6.99	1166			turbid
1703		24	17.8	6.92	1028			turbid
1706		30	17.8	6.86	957			slightly turbid/pump off/s
								pump on
1712		36	17.7	6.86	986			
		36	17.7	6.86	986			turbid
1714		42	17.7	6.83	978			turbid
1717		48	17.7	6.76	941			turbid
1719		54	17.7	6.80	922			slightly turbid

Suggested Method for Purging Well 60

LEVINE•FRICKE

WATER-QUALITY SAMPLING INFORMATION

Project Name Yerba Buena

Project No. 1649.01

Date 7/12/91

Sample No. LF-23 (cont)

Samplers Name

Sampling Location

Sampling Method

Analyses Requested

Number and Types of Sample Bottles used

Method of Shipment

GROUND WATER

Well No.

Well Diameter (in.)

Depth to Water, Static (ft)

Water in Well Box

Well Depth (ft)

Height of Water Column in Well

Water Volume in Well

SURFACE WATER

Stream Width

Stream Depth

Stream Velocity

Rained recently ?

Other

2-inch casing = 0.16 gal/ft

4-inch casing = 0.65 gal/ft

5-inch casing = 1.02 gal/ft

6-inch casing = 1.47 gal/ft

LOCATION MAP

TIME	DEPTH TO WATER (feet)	VOLUME WITHDRAWN (gallons)	TEMP (deg. C)	pH (S.U.)	COND (mhos/cm)	OTHER		REMARKS
1721		60	17.8	680	917			slightly turbid
1720	1720							FBlank
1725	1725							Sample Lost.

Suggested Method for Purging Well

LEVINE•FRICKE

WATER-QUALITY SAMPLING INFORMATION

Project Name _____ Project No. 1649.01

Date 7-12-91 Sample No. LF-19D
LF-19D-DUP
190

Samplers Name JCK

Sampling Location LF-19D

Sampling Method SUBMERSIBLE PUMP / TEFLON BAIL

Analyses Requested EPA 8010

Number and Types of Sample Bottles used 6 VOA

Method of Shipment HAND DELIVER

45.20
16.30
28.90
.65
14450
17340
18.7850

LOCATION MAP

GROUND WATER

Well No. LF-19D

Well Diameter (in.) 4

Depth to Water, Static (ft) 16.30

Water in Well Box NO

Well Depth (ft) 45.20

Height of Water Column in Well _____

Water Volume in Well _____

SURFACE WATER

Stream Width _____

Stream Depth _____

Stream Velocity _____

Rained recently? _____

Other _____

2-inch casing = 0.16 gal/ft

4-inch casing = 0.65 gal/ft

5-inch casing = 1.02 gal/ft

6-inch casing = 1.47 gal/ft

TIME	DEPTH TO WATER (feet)	VOLUME WITHDRAWN (gallons)	TEMP (deg. C)	pH (S.U.)	COND (mhos/cm)	OTHER		REMARKS
1:21	16.3							start
1:23		19	18.7	6.88	1156			turbid
125		38	18.6	6.92	1104			slightly turbid / surge
128		57	18.8	6.93	1166			turbid
130		76	19.0	6.92	1094			sl. turbid
132		95	18.7	6.90	1151			
134		114	18.8	6.92	1064			MOD TURBID
136		133	18.8	6.90	1050			TURBID SURGE
138		152	18.9	6.85	1134			TURBID / SURGE / PUMP OFF
								start
221		171	19.0	6.89	1088			clear
228		190	18.8	6.91	1065			clear

Suggested Method for Purging Well Sub. Pump

250 SAMPLED — Duplicate Label: LF-19D

DRAFT
August 15, 1991

APPENDIX D

LABORATORY DATA SHEETS FOR GROUND-WATER SAMPLE ANALYSES

Analytical Report

LOG NO: E91-07-294

Received: 12 JUL 91

Mailed: JUL 24 1991

Mr. Glenn Leong
Levine - Fricke
1900 Powell Street 12th Floor
Emeryville, California 94608
CC: Ms. Jennifer Beaty

Requisition: 7208
Project: 1649.01

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
07-294-1	LF-23	12 JUL 91
07-294-2	LF-23FB	12 JUL 91
07-294-3	LF-190	12 JUL 91
07-294-4	LF-22	12 JUL 91
07-294-5	LF-19D	12 JUL 91

PARAMETER	07-294-1	07-294-2	07-294-3	07-294-4	07-294-5
EPA Method 8010					
Date Analyzed	07.17.91	07.17.91	07.17.91	07.17.91	07.17.91
Confirmation Date	07.18.91	---	---	07.18.91	---
Dilution Factor, Times	1	1	1	1	1
1,1,1-Trichloroethane, ug/L	0.9	<0.5	<0.5	12	<0.5
1,1,2,2-Tetrachloroethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane, ug/L	11	<0.5	<0.5	6.3	<0.5
1,1-Dichloroethene, ug/L	1.2	<0.5	<0.5	53	<0.5
1,2-Dichloroethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethene (Total), ug/L	0.9	<0.5	<0.5	1.6	<0.5
1,2-Dichloropropane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinylether, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5

1255 Powell Street
Emeryville, CA 94608

415/428-2300
Fax: 415/547-3643

BCA B C Analytical

Analytical Report

LOG NO: E91-07-294

Received: 12 JUL 91

Mr. Glenn Leong
Levine - Fricke
1900 Powell Street 12th Floor
Emeryville, California 94608
CC: Ms. Jennifer Beaty

Requisition: 7208
Project: 1649.01

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
07-294-1	LF-23	12 JUL 91
07-294-2	LF-23FB	12 JUL 91
07-294-3	LF-190	12 JUL 91
07-294-4	LF-22	12 JUL 91
07-294-5	LF-19D	12 JUL 91

PARAMETER	07-294-1	07-294-2	07-294-3	07-294-4	07-294-5
Dibromochloromethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Freon 113, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene, ug/L	3.9	<0.5	<0.5	0.7	<0.5
Trichlorofluoromethane, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene, ug/L	27	<0.5	<0.5	1.7	<0.5
Vinyl chloride, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene, ug/L	0.9	<0.5	<0.5	1.6	<0.5
cis-1,3-Dichloropropene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5

Sim D. Lessley, Ph.D., Laboratory Director

1255 Powell Street
Emeryville, CA 94608

415/428-2300
Fax: 415/547-3643

BCA B C Analytical

ORDER PLACED FOR CLIENT: Levine - Fricke 9107294 :
BC ANALYTICAL : EMVL LAB : 11:27:35 24 JUL 1991 - P. 1 :

AMPLES...	SAMPLE DESCRIPTION..	DETERM.....	DATE.... ANALYZED	METHOD.....	EQUIP.	BATCH	ID.NO
107294*1	LF-23	VH.8010	07.17.91	8010	516-21	441	7553
107294*2	LF-23FB	VH.8010	07.17.91	8010	516-21	441	7553
9107294*3	LF-190	VH.8010	07.17.91	8010	516-21	441	7553
9107294*4	LF-22	VH.8010	07.17.91	8010	516-21	441	7553
107294*5	LF-19D	VH.8010	07.17.91	8010	516-21	441	7553

**

Notes: Equipment = BC Analytical identification number for a particular piece of analytical equipment.

ID.NO = BC Analytical employee identification number of analyst.

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9107294

ATE REPORTED : 07/24/91

LABORATORY CONTROL STANDARDS

PARAMETER	DATE ANALYZED	BATCH NUMBER	LC RESULT	LT RESULT	UNIT	PERCENT RECOVERY
locarbons (EPA 601)						
Dilution Factor	07.17.91	441	1	1	Times	100
1,1,1-Trichloroethane	07.17.91	441	22	20	ug/L	110
1,1,2,2-Tetrachloroethane	07.17.91	441	26	20	ug/L	130
1,1,2-Trichloroethane	07.17.91	441	24	20	ug/L	120
1,1-Dichloroethane	07.17.91	441	22	20	ug/L	110
1,1-Dichloroethene	07.17.91	441	21	20	ug/L	105
1,2-Dichloroethane	07.17.91	441	22	20	ug/L	110
1,2-Dichlorobenzene	07.17.91	441	26	20	ug/L	130
1,2-Dichloroethene (Total)	07.17.91	441	44	40	ug/L	110
1,2-Dichloropropane	07.17.91	441	22	20	ug/L	110
1,3-Dichlorobenzene	07.17.91	441	23	20	ug/L	115
1,4-Dichlorobenzene	07.17.91	441	25	20	ug/L	125
2-Chloroethylvinylether	07.17.91	441	22	20	ug/L	110
Bromodichloromethane	07.17.91	441	22	20	ug/L	110
Bromomethane	07.17.91	441	19	20	ug/L	95
Bromoform	07.17.91	441	24	20	ug/L	120
Chlorobenzene	07.17.91	441	23	20	ug/L	115
Carbon Tetrachloride	07.17.91	441	21	20	ug/L	105
Chloroethane	07.17.91	441	19	20	ug/L	95
Chloroform	07.17.91	441	25	20	ug/L	125
Chloromethane	07.17.91	441	16	20	ug/L	80
Dibromochloromethane	07.17.91	441	23	20	ug/L	115
Dichlorodifluoromethane	07.17.91	441	13	20	ug/L	65
Freon 113	07.17.91	441	20	20	ug/L	100
Methylene chloride	07.17.91	441	18	20	ug/L	90
Trichloroethene	07.17.91	441	23	20	ug/L	115
Trichlorofluoromethane	07.17.91	441	20	20	ug/L	100
Tetrachloroethene	07.17.91	441	25	20	ug/L	125
Vinyl chloride	07.17.91	441	22	20	ug/L	110
cis-1,2-Dichloroethene	07.17.91	441	21	20	ug/L	105
cis-1,3-Dichloropropene	07.17.91	441	32	32	ug/L	100
trans-1,2-Dichloroethene	07.17.91	441	23	20	ug/L	115
trans-1,3-Dichloropropene	07.17.91	441	10	8.0	ug/L	125

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9107294

DATE REPORTED : 07/24/91

MATRIX QC PRECISION (DUPLICATE SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	S1 RESULT	S2 RESULT	UNIT	RELATIVE %DIFF
Halocarbons (EPA 601)						
Dilution Factor	07.18.91	441	1	1	Times	0
1,1,1-Trichloroethane	07.18.91	441	14	14	ug/L	0
1,1-Dichloroethane	07.18.91	441	14	14	ug/L	0
1,1-Dichloroethene	07.18.91	441	12	12	ug/L	0
1,2-Dichloroethane	07.18.91	441	15	15	ug/L	0
1,2-Dichloropropane	07.18.91	441	15	14	ug/L	7
Bromodichloromethane	07.18.91	441	14	14	ug/L	0
Bromoform	07.18.91	441	15	14	ug/L	7
Carbon Tetrachloride	07.18.91	441	13	13	ug/L	0
Chloroethane	07.18.91	441	1.7	2.0	ug/L	16
Chloroform	07.18.91	441	16	16	ug/L	0
Dibromochloromethane	07.18.91	441	14	14	ug/L	0
Methylene chloride	07.18.91	441	11	10	ug/L	10
Trichloroethene	07.18.91	441	15	15	ug/L	0
Tetrachloroethene	07.18.91	441	15	14	ug/L	7

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9107294

ATE REPORTED : 07/24/91

MATRIX QC ACCURACY (SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	SBAR RESULT	TRUE RESULT	RBAR RESULT	UNIT	PERCENT RECOVERY
alocarbons (EPA 601)							
1,1,1-Trichloroethane	07.17.91	441	14	12	<0.5	ug/L	117
1,1-Dichloroethane	07.17.91	441	14	12	<0.5	ug/L	117
1,1-Dichloroethene	07.17.91	441	12	12	<0.5	ug/L	100
1,2-Dichloroethane	07.17.91	441	15	12	<0.5	ug/L	125
1,2-Dichloropropane	07.17.91	441	14.5	12	<0.5	ug/L	121
Bromodichloromethane	07.17.91	441	14	12	<0.5	ug/L	117
Bromoform	07.17.91	441	14.5	12	<0.5	ug/L	121
Carbon Tetrachloride	07.17.91	441	13	12	<0.5	ug/L	108
Chloroform	07.17.91	441	16	12	<0.5	ug/L	133
Dibromochloromethane	07.17.91	441	14	12	<0.5	ug/L	117
Methylene chloride	07.17.91	441	10.5	12	<0.5	ug/L	88
Trichloroethene	07.17.91	441	15	12	<0.5	ug/L	125
Tetrachloroethene	07.17.91	441	14.5	12	<0.5	ug/L	121

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9107294

ATE REPORTED : 07/24/91

METHOD BLANKS AND REPORTING DETECTION LIMIT (RDL)

PARAMETER	DATE ANALYZED	BATCH NUMBER	BLANK RESULT	RDL	UNIT
locarbons (EPA 601)					
1,1,1-Trichloroethane	07.17.91	441	0	0.5	ug/L
1,1,2,2-Tetrachloroethane	07.17.91	441	0	0.5	ug/L
1,1,2-Trichloroethane	07.17.91	441	0	0.5	ug/L
1,1-Dichloroethane	07.17.91	441	0	0.5	ug/L
1,1-Dichloroethene	07.17.91	441	0	0.5	ug/L
1,2-Dichloroethane	07.17.91	441	0	0.5	ug/L
1,2-Dichlorobenzene	07.17.91	441	0	0.5	ug/L
1,2-Dichloroethene (Total)	07.17.91	441	0	0.5	ug/L
1,2-Dichloropropane	07.17.91	441	0	0.5	ug/L
1,3-Dichlorobenzene	07.17.91	441	0	0.5	ug/L
1,4-Dichlorobenzene	07.17.91	441	0	0.5	ug/L
2-Chloroethylvinylether	07.17.91	441	0	0.5	ug/L
Bromodichloromethane	07.17.91	441	0	0.5	ug/L
Bromomethane	07.17.91	441	0	0.5	ug/L
Bromoform	07.17.91	441	0	0.5	ug/L
Chlorobenzene	07.17.91	441	0	0.5	ug/L
Carbon Tetrachloride	07.17.91	441	0	0.5	ug/L
Chloroethane	07.17.91	441	0	0.5	ug/L
Chloroform	07.17.91	441	0	0.5	ug/L
Chloromethane	07.17.91	441	0	0.5	ug/L
Dibromochloromethane	07.17.91	441	0	0.5	ug/L
Dichlorodifluoromethane	07.17.91	441	0	0.5	ug/L
Freon 113	07.17.91	441	0	0.5	ug/L
Methylene chloride	07.17.91	441	0	0.5	ug/L
Trichloroethene	07.17.91	441	0	0.5	ug/L
Trichlorofluoromethane	07.17.91	441	0	0.5	ug/L
Tetrachloroethene	07.17.91	441	0	0.5	ug/L
Vinyl chloride	07.17.91	441	0	0.5	ug/L
cis-1,2-Dichloroethene	07.17.91	441	0	0.5	ug/L
cis-1,3-Dichloropropene	07.17.91	441	0	0.5	ug/L
trans-1,2-Dichloroethene	07.17.91	441	0	0.5	ug/L
trans-1,3-Dichloropropene	07.17.91	441	0	0.5	ug/L

5 40A Trip

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

9107294

Project No.: 1649.01	Field Logbook No.:	Date: 7/12/91	Serial No.: 7208
Project Name: Yerba Buena	Project Location: EMERYVILLE		
Sampler (Signature): Jennifer Cook.			Samplers: JJC, JCK

SAMPLES / ANALYSES

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	EPA 601	EPA 624				HOLD	RUSH	REMARKS
LF-23	7/12/91	1725		3	GW	✓							
LF-23FB		1720				✓							
LF-19S		350				✓							Normal TAT
LF-22		1645				✓							
LF-19D		250				✓							Results to Jenifer Beaty

RELINQUISHED BY: (Signature) Jennifer Cook	DATE 7/12/91	TIME 625	RECEIVED BY: (Signature) [illegible]	DATE 7/29/91	TIME 625
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:
LEVINE-FRICKE
1900 Powell Street, 12th Floor
Emeryville, Ca 94608
(415) 652-4500

Analytical Laboratory:
BC Analytical

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) FORM NO. 86/COC/ARF