STREAMBORN

510/528-4234
Fax 528-2613

Amy Leech
Alameda County Department
of Environmental Health
1131 Harbor Bay Parkway, #250
Alameda CA 94502-6577

18 January 1996

Project No. P178

Report
Soil and Groundwater Investigation
21031 Western Boulevard
Hayward CA

Dear Ms. Leech:

The enclosed report documents the following soil and groundwater investigation activities recently completed at the subject property:

- Drilling and sampling of five soil borings near a former underground gasoline tank.
- Analysis of soil samples collected during drilling.
- Completion of three of the borings as monitoring wells.
- Surveying and development of the new wells.
- Groundwater level measurement.
- Collection and analysis of groundwater samples from the new wells.
- Disposal of investigation-derived waste.

Soil and groundwater samples were analyzed for TPH-gasoline, BTEX, and lead. Results revealed nondetectable or nonelevated concentrations in all samples.

Please call us with any questions or comments.

Sincerely,
STREAMBORN

Keith D. Beury
Environmental Engineer

Douglas W. Lovell, PE
Geoenvironmental Engineer

Enclosure

cc: William and Kathy Florence, Oakland CA
Kevin Graves/San Francisco Bay Regional Water Quality Control Board, Oakland CA

Mail: P.O. Box 9504, Berkeley CA 94709-0504

Office: 900 SantaFe Avenue, Albany CA 94706

KEITH BEURY

Amy, 1/22/96

The enclosed report documents the investigation activities recently completed at 21031 Western Blvd in Hayward. Based on the results (no evidence of soil or groundwater contamination), we will forego (1) monthly water level measurements and (2) analysis for lead for future groundwater sampling (these were proposed in our work plan but now appear unnecessary). Please call if you have any questions and once you've had a chance to review. Thanks

— Keith Beury

MEMO

STREAMBORN

510/528-4234
Fax 528-2613

Report
Soil and Groundwater Investigation
21031 Western Boulevard
Hayward CA

Prepared For
William and Kathy Florence
Oakland CA

Prepared By
STREAMBORN
Berkeley CA

Project No. P178

18 January 1996

Mail: P.O. Box 9504, Berkeley CA 94709-0504 Office: 900 SantaFe Avenue, Albany CA 94706

CONTENTS

Contents (continued)

INTRODUCTION

This report describes soil and groundwater investigation activities associated with a former underground gasoline tank located near the eastern property boundary of 21031 Western Boulevard, Hayward CA (Figures 1 and 2). The purpose of the investigation was to identify the presence or absence of soil and/or groundwater contamination in the former tank area. Work was performed in accordance with our 14 November 1994 workplan and 22 December 1994 workplan addendum. Approval for the work was provided by the Alameda County Department of Environmental Health in its letter dated 23 January 1995 (Appendix B).

BACKGROUND

A chronology of environmental activities performed at 21031 Western Boulevard is summarized in Table 1.

In April 1989, the property was purchased by William and Kathy Florence. At the time of purchase, a 1,000-gallon underground gasoline tank existed in the area east of the onsite building (Figure 2). The tank had been installed by previous owners of the property. The tank was never used by the Florences.

On 21 August 1989, West Coast Tank Testing removed the tank and a release was discovered. Approximately 20 cubic yards of gasoline-contaminated soil were overexcavated and stockpiled onsite. Representatives of the Eden Consolidated Fire Protection District and Alameda County were present during the tank removal. Soil samples were collected from beneath the north and south ends of the tank (Table 2).

On 22 September 1989, approximately 80 additional cubic yards of soil were overexcavated. This soil was reportedly stockpiled with the previously-excavated soil. An invoice from West Coast Tank Testing indicates that 100 cubic yards of soil were aerated onsite. B&B Associated Services collected a composite sample of soil for analysis (Table 2). It is not documented whether the sample was representative of excavated or unexcavated soil.

On 2 October 1989, B&B Associated Services collected five soil samples for analysis, presumably from the limits of the enlarged excavation (Table 2).

On 13 October 1989, B&B Associated Services collected a composite soil sample for analysis (Table 2). It is not documented whether the sample was representative of excavated or unexcavated soil.

Analytical results of soil sampling (Table 2) indicate that a release of gasoline occurred. Documentation regarding the tank removal and subsequent overexcavation of contaminated soil is limited. West Coast Tank Testing and B&B Associated Services are no longer in business. Accordingly, details regarding tank removal activities and the extent to which soil contamination was addressed, are not available.

SCOPE OF WORK

Soil and groundwater investigation activities included the following:

- Permitting.
- Utility clearance of the proposed drilling locations.

- Drilling of 5 soil borings to depths of between approximately 31- and 35-feet (including collection and field screening of soil samples).
- Analysis of soil samples for total petroleum hydrocarbons as gasoline (TPH-gasoline), benzene, toluene, ethylbenzene, and xylenes (BTEX), and total lead.
- Completion of three of the borings as 2-inch monitoring wells.
- Elevation surveying of the new wells.
- Well development.
- Measurement of groundwater levels and calculation of the groundwater gradient.
- Groundwater purging and sampling.
- Analysis of groundwater samples for TPH-gasoline, BTEX, and dissolved lead.
- Disposal of investigation derived waste (soil cuttings, development water, and purge water).

INVESTIGATION ACTIVITIES

Prior to beginning fieldwork, Fremont Engineers (Fremont CA) was retained to perform a survey of the eastern property boundary for 21031 Western Boulevard. The survey revealed that the former tank had been installed in the Alameda County right-of-way for Western Boulevard, approximately 3-feet east of the subject property boundary. The survey plat is included in Appendix C. In accordance with this finding, an encroachment permit was obtained from Alameda County Public Works Agency to allow drilling in the right-of-way (Appendix D).

Prior to drilling, we notified Underground Service Alert to identify buried utilities near the planned drilling locations. Identified utilities were marked in the field. A well construction permit was obtained from Alameda County Flood Control and Water Conservation District (Appendix D).

Drilling, Soil Sampling, and Soil Analysis

Drilling and soil sampling were performed on 19 and 20 December 1995 in accordance with Standard Operating Procedure 1A: Hollow-Stem Auger Drilling and Split-Spoon Sampling (Appendix E). HEW Drilling of Palo Alto CA was the drilling contractor.

During drilling, groundwater was encountered at a depth of approximately 25-feet. Accordingly, actual drilling depths were deeper than proposed in the workplan. Soil borings B-1 and B-2 were drilled to a depth of approximately 31-feet and the borings for wells MW-1, MW-2, and MW-3, were drilled to a depth of approximately 35-feet.

Drilling was performed using hollow-stem augers. Soil samples were collected at approximate 5-foot intervals using a split-spoon fitted with brass liners. Samples were visually classified in the field and examined with respect to staining and odor. Soil samples were also screened in the field using a field organic vapor monitor (Thermo Environmental Instruments Model 580B, 10.0 eV photoionization detector calibrated to 100 ppm v/v isobutylene). Petroleum staining and odor were not observed during drilling. Boring logs are contained in Appendix A.

From each of the three borings closest to the former tank location, B-1, B-2, and MW-1, three samples were retained for chemical analysis. These samples were collected from (1) above the groundwater table, (2) approximately coincident with the groundwater table, and (3) below the groundwater table. For the two remaining borings (MW-2 and MW-3), one sample was retained for chemical analysis. This sample was approximately coincident with the groundwater table. Soil samples were analyzed for TPH-gasoline, BTEX, and lead. Analytical results revealed (1) nondetectable concentrations of TPH-gasoline and BTEX, and (2) nondetectable or non-elevated concentrations of lead.

Analytical results are summarized in Table 3. Chain-of-custody forms are included in Appendix F. Laboratory reports are included in Appendix G.

Following sampling, borings B-1 and B-2 were backfilled with neat cement grout.

Completion of Borings as Wells

On 19 and 20 December 1995, the borings for MW-1, MW-2, and MW-3, were completed as 2-inch PVC monitoring wells. The wells were completed according to Standard Operating Procedure 2A: Completion of Borings as Wells (Appendix E). Well completion schematics are presented in Appendix A. DWR-188 reports are included in Appendix D.

Surveying

On 20 December 1995, Streamborn surveyed the new wells. Two elevations were surveyed for each well; (1) the north side of the top of the PVC casing, and (2) the ground surface at the north side of the traffic box. Elevations were measured relative to a temporary bench mark (Figure 3) designated as the surface of the concrete slab, at the south side of the roll up door, at the east wall of the building (assumed elevation = 1,000.00-feet).

Well locations were measured relative to property features using a tape measure.

Copies of survey field notes are contained in Appendix H. Elevation data for the wells are summarized in Table 4.

Well Development

On 26 December 1995, the new wells were developed by bailing and surging according to Standard Operating Procedure 3A: Well Development (Appendix E). Surging was accomplished by rapidly raising and lowering a decontaminated bailer through the water column. The development logs are presented in Appendix I.

Groundwater Level Measurements

Groundwater level measurements were made on 27 December 1995 (Table 4), prior to groundwater sampling. The data indicated a direction of the groundwater gradient toward the south-southwest, with a magnitude of approximately 0.008. The groundwater elevation contours and gradient direction are depicted on Figure 3. The calculated gradient direction indicates that well MW-3 is located downgradient of the former tank location.

Groundwater Sampling and Analysis

On 27 December 1995, groundwater samples were collected from wells MW-1, MW-2, and MW-3. Samples were collected in accordance with Standard Operating Procedure 20: Well Purging and Sampling Using Bailers (Appendix E). Groundwater purging and sampling

information is summarized in Table 5. Samples were analyzed for TPH-gasoline, BTEX, and dissolved lead. Results revealed nondetectable concentrations.

Analytical results are summarized in Table 6. Groundwater sampling forms are presented in Appendix J. Chain-of-custody forms are contained in Appendix F. Laboratory reports are included in Appendix G.

Investigation-Derived Waste

Soil cuttings generated during drilling were containerized in steel drums and stored onsite. Based on the laboratory results for boring samples, soil was accepted for disposal at Redwood Landfill in Novato CA. On 10 January 1996, approximately 2 cubic yards of soil were transported by Paul Casey Hauling (Hayward CA) to Redwood Landfill for disposal. Soil profiling documentation and landfill disposal receipts are included in Appendix K.

Purge water generated during well development and groundwater monitoring was containerized in steel drums and stored onsite. Because contamination was not detected in any of the monitoring wells, the water was discharged to the sanitary sewer.

BIBLIOGRAPHY

Alameda County (1994). *Letter presenting comments on Streamborn's 14 November 1994 workplan and providing tentative approval of workplan, 21031 Western Boulevard, Hayward CA.* Letter from Amy Leech, Alameda County Department of Environmental Health, Alameda CA. Letter to William and Kathy Florence, Oakland CA. 2 December 1994.

Alameda County (1995). *Letter regarding approval of Streamborn's 22 December 1994 workplan addendum, 21031 Western Boulevard, Hayward CA.* Letter from Amy Leech, Alameda County Department of Environmental Health, Alameda CA. Letter to William and Kathy Florence, Oakland CA. 23 January 1995.

SFBRWQCB (1990). *Tri-Regional Board Staff Recommendations For Preliminary Evaluation and Investigation of Underground Tank Sites.* Prepared by San Francisco Bay Regional Water Quality Control Board, Oakland CA. 10 August 1990.

Streamborn (1994a). *Workplan, Soil and Groundwater Investigation, 21031 Western Boulevard, Hayward CA.* Prepared for William and Kathy Florence, Oakland CA. Prepared by Streamborn, Berkeley CA. Project No. P170. 14 November 1994.

Streamborn (1994b). *Addendum to Streamborn's 14 November 1994 Workplan, Soil and Groundwater Investigation, 21031 Western Boulevard, Hayward CA.* Prepared for William and Kathy Florence, Oakland CA. Prepared by Streamborn, Berkeley CA. Project No. P170C. 22 December 1994.

Table 1

Environmental Chronology

Date	Performed By	Description
April 1989	William and Kathy Florence	• Property at 21031 Western Boulevard was purchased by William and Kathy Florence. • At the time the property was purchased by the Florences, a 1,000-gallon underground gasoline tank existed near the east side of the onsite building. The tank was installed by a previous owner of the property.
21 August 1989	West Coast Tank Testing	• The tank was removed. • Approximately 20 cubic yards of gasoline-contaminated soil were overexcavated and stockpiled onsite. • Two soil samples were collected from the excavation. The sample depths and exact locations were not documented. Analytical results indicated elevated concentrations of TPH-gasoline and BTEX.
22 September 1989	West Coast Tank Testing	• Approximately 80 cubic yards of gasoline-contaminated soil were excavated and stockpiled onsite with the previously-excavated 20 cubic yards. The 100 cubic yards of overexcavated soil were apparently aerated onsite. Final disposition of the soil was not documented.
September and October 1989	B&B Associated Services	• Several soil samples were collected. The sample depths and exact locations were not documented, but some of the samples were presumably collected from the limits of the excavation. Analytical results indicated elevated concentrations of TPH-gasoline and BTEX.
14 November 1994	Streamborn	• Workplan describing soil and groundwater investigation was submitted to Alameda County Department of Environmental Health.
2 December 1994	Alameda County	• Comments regarding the workplan were provided by Alameda County Department of Environmental Health.
22 December 1994	Streamborn	• Workplan addendum was submitted to Alameda County.
23 January 1995	Alameda County	• Alameda County approved the workplan and addendum.
19 and 20 December 1995	Streamborn	• Soil borings B-1 and B-2 were drilled adjacent to the former tank excavation. Soil samples collected from the borings revealed nondetectable concentrations for TPH-gasoline and BTEX, and nondetectable or nonelevated concentrations of lead. • Monitoring well MW-1 was installed east of the former tank excavation. Soil samples from the boring revealed nondetectable concentrations for TPH-gasoline and BTEX, and nondetectable or nonelevated concentrations of lead. • Monitoring well MW-2 was installed northwest of the former tank excavation. Soil samples from the boring revealed nondetectable concentrations for TPH-gasoline and BTEX, and nondetectable or nonelevated concentrations of lead. • Monitoring well MW-3 was installed west of the former tank excavation. Soil samples from the boring revealed nondetectable concentrations for TPH-gasoline and BTEX, and nondetectable or nonelevated concentrations of lead. • Level survey of wells performed.
26 December 1995	Streamborn	• Monitoring wells MW-1, MW-2, and MW-3 were developed.
27 December 1995	Streamborn	• Groundwater samples were collected from wells MW-1, MW-2, and MW-3. Groundwater levels measured. Results revealed nondetectable concentrations for TPH-gasoline, BTEX, and dissolved lead.

General Notes

(a) Alameda County = Alameda County Department of Environmental Health.

(b) TPH-gasoline = Total petroleum hydrocarbons as gasoline.

(c) BTEX = Benzene, toluene, ethylbenzene, and xylenes.

Table 2

Analytical Results of Historic Soil Sampling

Presumed Sample Location	Depth (feet)	Sample Date	Sample Identification	Collected by	Sample Type	TPH-Gasoline (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)
North side of excavation	Not documented	21 August 1989	No. 1 North End	B&B Associated Services	Grab	5,700	30	16	110	630
South side of excavation	Not documented	21 August 1989	No. 2 South End	B&B Associated Services	Grab	3.2	<0.04	0.059	0.077	0.60
Unknown	Not documented	22 September 1989	Composite of No. 1-N No. 2-NE No. 3-S No. 4-NW	B&B Associated Services	Composite	1,500	61	210	52	280
Northwest side of excavation	Not documented	2 October 1989	No. 1 NW	B&B Associated Services	Grab	1.2	<0.01	<0.01	0.038	0.13
Northeast side of excavation	Not documented	2 October 1989	No. 2 NE	B&B Associated Services	Grab	<0.5	<0.01	<0.01	<0.02	<0.06
Southwest side of excavation	Not documented	2 October 1989	No. 3 SW	B&B Associated Services	Grab	7.3	<0.01	0.10	0.07	0.96
Southeast side of excavation	Not documented	2 October 1989	No. 4 SE	B&B Associated Services	Grab	9,500	3.7	370	230	1,500
Center of excavation	Not documented	2 October 1989	No. 5 Center	B&B Associated Services	Grab	2,200	4.3	55	40	220
Unknown	Not documented	13 October 1989	Composite of No. 1 No. 2 No. 3	B&B Associated Services	Composite	<0.5	<0.01	<0.02	<0.02	<0.06

General Notes

(a) TPH-Gasoline = Total petroleum hydrocarbons as gasoline.

(b) < indicates concentration below detection limit (shaded values).

(c) Laboratory analysis performed by Trace Analysis Laboratory, Hayward CA.

(d) Sample locations and depths were not documented.

Table 3

Soil Analytical Results for Borings

Location	Depth Interval (feet)	Sample Date	Sample Identification	Collected by	Sample Type	Visual Classification	Odor or Staining	TPH-Gasoline (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total Lead (mg/kg)
B-1	±20.5-21.0	19 Dec 1995	B-1,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	6.5
	±25.5-26.0	19 Dec 1995	B-1,S-5,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±30.5-31.0	19 Dec 1995	B-1,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
B-2	±20.5-21.0	20 Dec 1995	B-2,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±26.0-26.5	20 Dec 1995	B-2,S-5,26-26.5	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±30.5-31.0	20 Dec 1995	B-2,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-1	±25.5-26.0	19 Dec 1995	MW-1,S-4,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-2	±26.0-26.5	20 Dec 1995	MW-2,S-3,26-26.5	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-3	±20.5-21.0	20 Dec 1995	MW-3,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	6.2
	±25.5-26.0	20 Dec 1995	MW-3,S-5,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	5.4
	±30.5-31.0	20 Dec 1995	MW-3,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0

General Notes

(a) TPH-Gasoline = Total petroleum hydrocarbons as gasoline.

(b) < indicates concentration below detection limit (shaded values).

(c) Laboratory analysis performed by Chromalab, Pleasanton CA.

Table 4

Groundwater Level Measurements

	Location	MW-1		MW-2		MW-3	
Measured By	Measuring Point	Top of PVC Casing-N Side, Elevation 999.63 (1) (Ground Surface-N Side, Elevation 1,000.09)		Top of PVC Casing-N Side, Elevation 999.40 (Ground Surface-N Side, Elevation 999.81)		Top of PVC Casing-N Side, Elevation 999.72 (Ground Surface-N Side, Elevation 1,000.16)	
	Parameter or Date	Depth	Elevation	Depth	Elevation	Depth	Elevation
Streamborn	27 December 1995	25.13	974.50	24.73	974.67	25.27	974.45
	Total Depth	34.9	-	34.8	-	35.0	-

General Notes

(a) Monitoring wells were surveyed by Streamborn on 20 December 1995.

(b) Measurements in units of feet.

(c) Elevations relative to site specific datum - temporary bench mark at top of concrete slab, south side of roll up door, at east side of building, assumed elevation = 1,000.00 feet.

Table 5

Monitoring Well Purging and Sampling Information

Sample Location	Sample Identification	Sample Date	Sample Time	Type of Sample	ORP (mV)	pH	Dissolved Oxygen (mg/L)	Temp (°C)	Purge Method	Purge Duration (minutes)	Volume Purged (gallons)	Purged Dry ?	Static Casing Volumes Removed	Turbidity
MW-1	MW-1(27Dec95)	27 Dec 1995	13:55	Grab (bailer)	115	6.8	4.6	17.7	Bailer	20	5	No	3.2	Translucent, Brown
MW-2	MW-2(27Dec95)	27 Dec 1995	13:25	Grab (bailer)	90	6.8	5.7	18.3	Bailer	20	5	No	3.1	Opaque, Brown
MW-3	MW-3(27Dec95)	27 Dec 1995	14:20	Grab (bailer)	85	6.6	4.3	17.9	Bailer	20	5	No	3.2	Translucent, Brown

General Note

(a) Sampling conducted by Streamborn (Berkeley CA).

Table 6

Groundwater Analytical Results

Monitoring Well	Sample Date	Sample Identification	Sample Type	Sampled By	TPH-Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	Dissolved Lead (µg/L)
MW-1	27 December 1995	MW-1(27Dec95)	Grab	Streamborn	<50	<0.5	<0.5	<0.5	<0.5	<5
MW-2	27 December 1995	MW-2(27Dec95)	Grab	Streamborn	<50	<0.5	<0.5	<0.5	<0.5	<5
MW-3	27 December 1995	MW-3(27Dec95)	Grab	Streamborn	<50	<0.5	<0.5	<0.5	<0.5	<5

General Notes

(a) TPH-Gasoline = Total petroleum hydrocarbons as gasoline.

(b) < denotes less than detection limit (shaded values).

(c) Laboratory analysis performed by Chromalab, Pleasanton CA.

Figure 1

Location Map

21031 Western Boulevard
Hayward CA

STREAMBORN

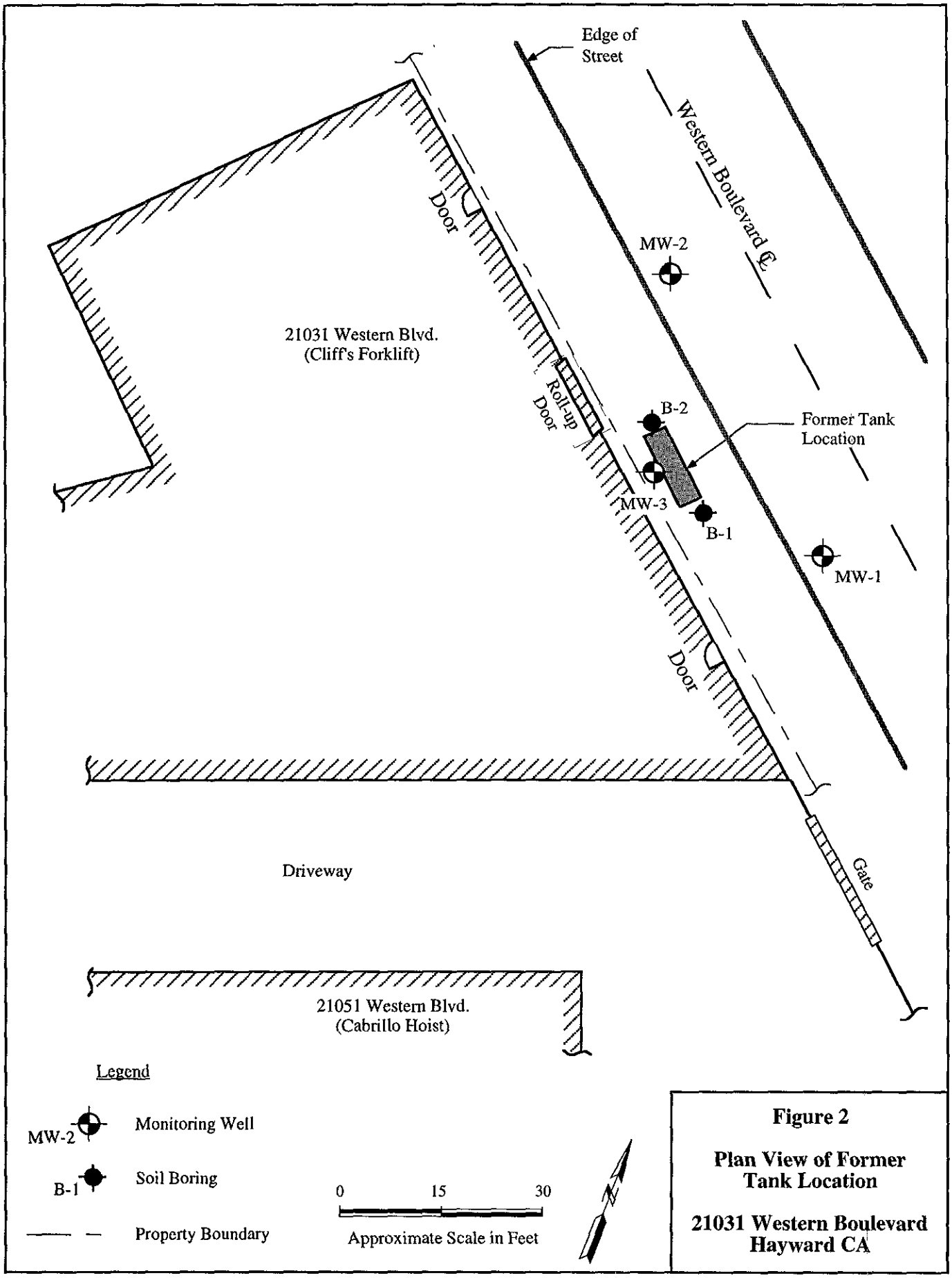


Figure 2

Plan View of Former Tank Location

21031 Western Boulevard Hayward CA

STREAMBORN

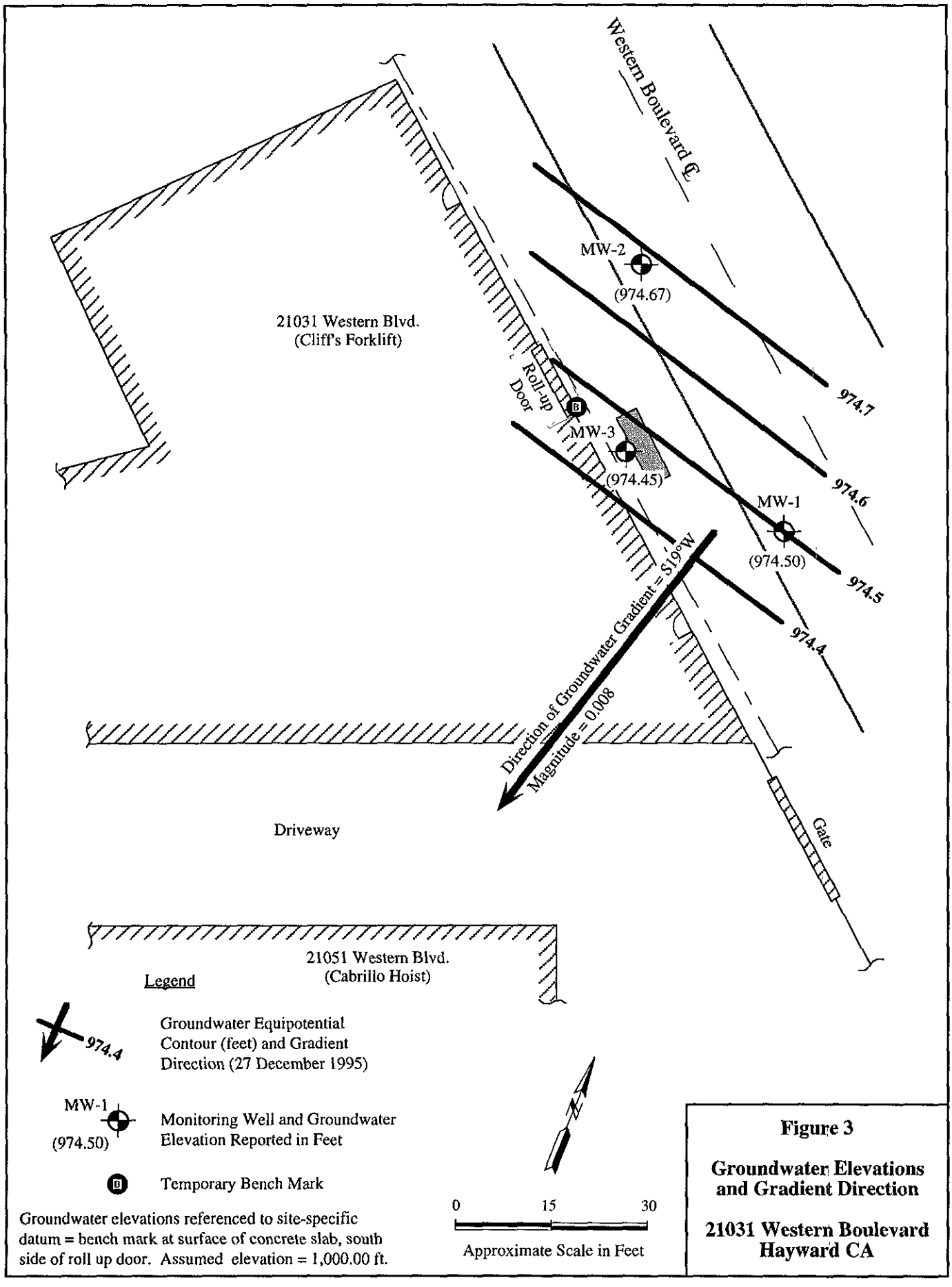


Figure 3

Groundwater Elevations and Gradient Direction

21031 Western Boulevard Hayward CA

STREAMBORN

APPPENDIX A

Boring Logs and Well Completion Schematics

BORING LOG LEGEND AND NOTES

Soil Classification

Soils were classified in the field in approximate accordance with ASTM D 2488-90 (Standard Practice for Description and Identification of Soils, Visual-Manual Procedure). Textural classifications represent the opinion of the field geologist or field engineer regarding the nature and character of encountered materials. Proportions of textural classes (sand, gravel, etc.) cited on the logs should be considered approximate. Laboratory classification tests may not have been performed to verify the field classifications. In general, mixtures of soil types and gradual transitions between soil types may more accurately represent the subsurface materials, instead of the distinct divisions depicted on the logs. Soils were necessarily classified only at depths where samples were examined; extrapolation to other depths, as depicted on the logs, adds uncertainty.

Textural Classification

 Silty Gravel (GM)

 Clay (CH or CL)

 Sand (SP)

 Silty Sand (SM)

Textural Transitions

— — — Approximate location of gradational transition or inferred contact between soil types

Sampling

 Sampling Interval (collected or attempted)

When blow counts are reported, sampling performed with a 140-pound weight, falling approximately 30-inches, driving a 2-inch inside diameter by 18-inch long split-spoon sampler fitted with three 2-inch diameter by 6-inch long brass or stainless steel liners. When blow counts are not reported, sampling performed by pushing the aforementioned sampler with the hydraulic ram of the drill rig.

General Notes

(a) OVM (ppmv) = Measurement by field organic vapor monitor in ppm volume/volume. Measurements performed using Thermo Environmental Instruments Model 580B OVM, 10.0 eV photoionization detector, calibrated to 100 ppm v/v isobutylene. Measurements performed by screening the ends of the freshly retrieved liners. Value cited on log was maximum reading obtained at either end of liner.

(b) Depths measured from ground surface.

Boring No. B-1 (page 1 of 3)

Project	Soil and Groundwater Investigation 21031 Western Boulevard Hayward CA	Address	21031 Western Boulevard Hayward CA
Location	±21-feet east-southeast of roll-up door	Logged By	Doug Lovell, STREAMBORN, Berkeley CA
Elevation	Ground surface, north side = 1,000.12-feet (assumed datum)	Project No.	P178
Start Drilling	10:45 AM, 19 December 1995	Finish Drilling	11:55 AM, 19 December 1995
Drill Method	±4-inch ID by ±7-inch OD hollow-stem auger	Driller	HEW, Palo Alto CA
Drill Rig	CME 45	Drilled Depth	±31.5-feet
Completion	Neat cement grout	Groundwater (During Drilling)	±25-feet
Sampling	±2-inch ID by ±2-1/2-inch OD driven split-spoon fitted with 2-inch diameter by 6-inch long brass or stainless steel liners. Samples collected by driving spoon ahead of auger bit.	Groundwater (Stabilized)	Refer to nearby wells

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
0.0							
		GM				Silty Gravel (GM). Fill (aggregate base).	
1.0							
2.0							
3.0							
4.0							
5.0		SP					
					6	Poorly-graded Sand (SP), fine to medium sand, moist, brown. No odor or staining. Fill (excavation backfill).	
				Push	6		< 5
6.0					6		
7.0							
8.0							
						Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
9.0		CH					
10.0							

STREAMBORN

Boring No. B-1 (page 2 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
10.0					6	Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
				Push	6		< 5
11.0					6		
12.0							
13.0							
14.0							
15.0					6	Clay (CH), as above. Pocket penetrometer = 2.5 tsf. No odor or staining.	
				Push	6		< 5
16.0					6		
17.0		CH and/or CL					
18.0							
19.0							
20.0					6	Clay (CL or CH), medium plasticity, moist, stiff, brown, light brown, and mottled gray-brown. No odor or staining.	
				Push	6		< 5
21.0					6		
22.0							
23.0							
24.0							
25.0							

Boring No. B-1 (page 3 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
25.0					6	Clay (CL or CH), as above. No odor or staining.	
		CH/CL					
				Push	6		< 5
26.0					6	Silty Sand (SM), fine sand texture, 20-40% silt and clay (varies with depth), wet, light brown. No odor or staining.	
27.0							
28.0							
		SM					
29.0							
30.0					6	Silty Sand (SM), as above. No odor or staining.	
				Push	6		< 5
31.0					6		
						Total depth = 31.5-feet.	
32.0						Boring backfilled with neat cement grout.	
						Immediately prior to grouting, groundwater observed at ±25-feet in borehole.	
33.0							
34.0							
35.0							
36.0							
37.0							
38.0							
39.0							
40.0							

STREAMBORN

Boring No. B-2 (page 1 of 3)

Project	Soil and Groundwater Investigation 21031 Western Boulevard Hayward CA	Address	21031 Western Boulevard Hayward CA
Location	±8-feet east of roll-up door	Logged By	Doug Lovell, STREAMBORN, Berkeley CA
Elevation	Ground surface, north side = 999.70-feet (assumed datum)	Project No.	P178
Start Drilling	8:30 AM, 20 December 1995	Finish Drilling	9:50 AM, 20 December 1995
Drill Method	±4-inch ID by ±7-inch OD hollow-stem auger	Driller	HEW, Palo Alto CA
Drill Rig	CME 45	Drilled Depth	±31.5-feet
Completion	Neat cement grout	Groundwater (During Drilling)	±25-feet
Sampling	±2-inch ID by ±2-1/2-inch OD driven split-spoon fitted with 2-inch diameter by 6-inch long brass or stainless steel liners. Samples collected by driving spoon ahead of auger bit.	Groundwater (Stabilized)	Refer to nearby wells

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
0.0							
		GM				Silty Gravel (GM). Fill (aggregate base).	
1.0							
2.0							
3.0							
4.0							
5.0		SP			6	Poorly-graded Sand (SP), fine to medium sand, moist, brown. No odor or staining. Fill (excavation backfill).	
				Push	6		< 5
6.0					6		
7.0							
8.0							
						Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
9.0		CH					
10.0							

STREAMBORN

Boring No. B-2 (page 2 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
10.0					6	Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
				Push	6		< 5
11.0					6		
12.0							
13.0							
14.0							
15.0					6	Clay (CL), medium plasticity, 15% fine sand, stiff, moist, brown. No odor or staining.	
				Push	6		< 5
16.0					6		
17.0		CH and/or CL					
18.0							
19.0							
20.0					6	Clay (CL or CH), medium plasticity, moist, stiff, brown, light brown, and mottled gray-brown. No odor or staining.	
				Push	6		< 5
21.0					6		
22.0							
23.0							
24.0							
25.0							

Boring No. B-2 (page 3 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
25.0					6	Clay (CL or CH), as above. No odor or staining.	
				Push	6		< 5
26.0		CH/CL			6		
27.0							
28.0							
29.0		SM					
30.0				5	6	Silty Sand (SM), fine sand texture, 20-40% silt and clay (varies with depth), wet, light brown. No odor or staining.	
				8	6		< 5
31.0				10	6		
						Total depth = 31.5-feet.	
32.0						Boring backfilled with neat cement grout.	
						Immediately prior to grouting, groundwater observed at ±25-feet in borehole.	
33.0							
34.0							
35.0							
36.0							
37.0							
38.0							
39.0							
40.0							

STREAMBORN

Boring No. MW-1 (page 1 of 3)

Project	Soil and Groundwater Investigation 21031 Western Boulevard Hayward CA	Address	21031 Western Boulevard Hayward CA
Location	±39-feet southeast of roll-up door	Logged By	Doug Lovell, STREAMBORN, Berkeley CA
Elevation	Ground surface, north side = 1,000.09-feet (assumed datum)	Project No.	P178
Start Drilling	12:30 PM, 19 December 1995	Finish Drilling	2:30 PM, 19 December 1995
Drill Method	±4-inch ID by ±7-inch OD hollow-stem auger	Driller	HEW, Palo Alto CA
Drill Rig	CME 45	Drilled Depth	±36.5-feet
Completion	2-inch PVC well with traffic box	Groundwater (During Drilling)	±26-feet
Sampling	±2-inch ID by ±2-1/2-inch OD driven split-spoon fitted with 2-inch diameter by 6-inch long brass or stainless steel liners. Samples collected by driving spoon ahead of auger bit.	Groundwater (Stabilized)	25.1-feet below top of casing, measured 27 December 1995

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
0.0						Asphalt concrete pavement.	
1.0		GM				Silty Gravel (GM). Fill (aggregate base).	
2.0							
3.0							
4.0							
5.0							
		CH				Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
6.0							
7.0							
8.0							
9.0							
10.0							

STREAMBORN

Boring No. MW-1 (page 2 of 3)

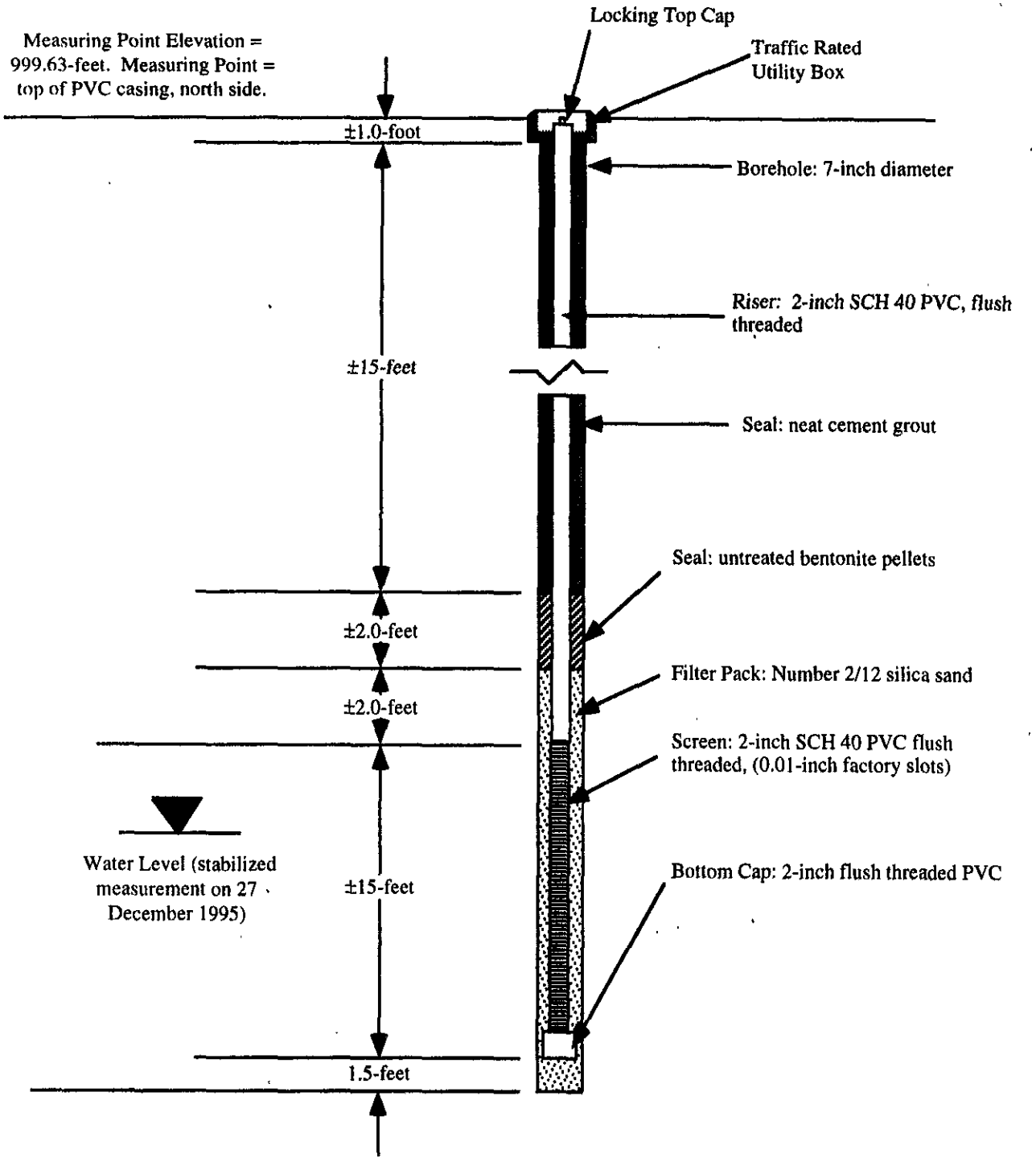
Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
10.0				5	6	Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
				10	6		< 5
11.0				12	6		
12.0							
13.0							
14.0							
15.0					6	Clay (CL or CH), medium plasticity, moist, stiff, brown, light brown, and mottled gray-brown. No odor or staining.	
				Push	6		< 5
16.0					6		
17.0		CH and/or CL					
18.0							
19.0							
20.0					6	Clay (CL or CH), as above. No odor or staining.	
				Push	6		< 5
21.0					6		
22.0							
23.0							
24.0							
25.0							

STREAMBORN

Boring No. MW-1 (page 3 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
25.0					6	Clay (CL or CH), as above. No odor or staining.	
		CH/CL					
				Push	6		< 5
26.0							
					6	Silty Sand (SM), fine sand texture, 20-40% silt and clay (varies with depth), wet, light brown with gray mottling. No odor or staining.	
27.0							
28.0							
29.0							
30.0					0	Silty Sand (SM), as above. No odor or staining.	
				Push	0		< 5
31.0		SM			6		
32.0							
33.0							
34.0							
35.0				5	6	Silty Sand (SM), as above. No odor or staining.	
				5	6		< 5
36.0				6	6		
						Total depth = 36.5-feet.	
37.0						Boring completed as 2-inch PVC well. Refer to completion schematic.	
						On 27 December 1995, stabilized water level measured at 25.1-feet below top of casing.	
38.0							
39.0							
40.0							

STREAMBORN



No Scale

MW-1
Monitoring Well Completion Schematic

21031 Western Boulevard
Hayward CA

Boring No. MW-2 (page 1 of 3)

Project	Soil and Groundwater Investigation 21031 Western Boulevard Hayward CA	Address	21031 Western Boulevard Hayward CA
Location	±26-feet northeast of south side of roll-up door	Logged By	Doug Lovell, STREAMBORN, Berkeley CA
Elevation	Ground surface, north side = 999.81-feet (assumed datum)	Project No.	P178
Start Drilling	10:15 AM, 20 December 1995	Finish Drilling	11:30 AM, 20 December 1995
Drill Method	±4-inch ID by ±7-inch OD hollow-stem auger	Driller	HEW, Palo Alto CA
Drill Rig	CME 45	Drilled Depth	±36.5-feet
Completion	2-inch PVC well with traffic box	Groundwater (During Drilling)	±26-feet
Sampling	±2-inch ID by ±2-1/2-inch OD driven split-spoon fitted with 2-inch diameter by 6-inch long brass or stainless steel liners. Samples collected by driving spoon ahead of auger bit.	Groundwater (Stabilized)	24.7-feet below top of casing, measured 27 December 1995

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
0.0						Asphalt concrete pavement.	
1.0		GM				Silty Gravel (GM). Fill (aggregate base).	
2.0							
3.0							
4.0							
5.0							
		CH				Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
6.0							
7.0							
8.0							
9.0							
10.0							

STREAMBORN

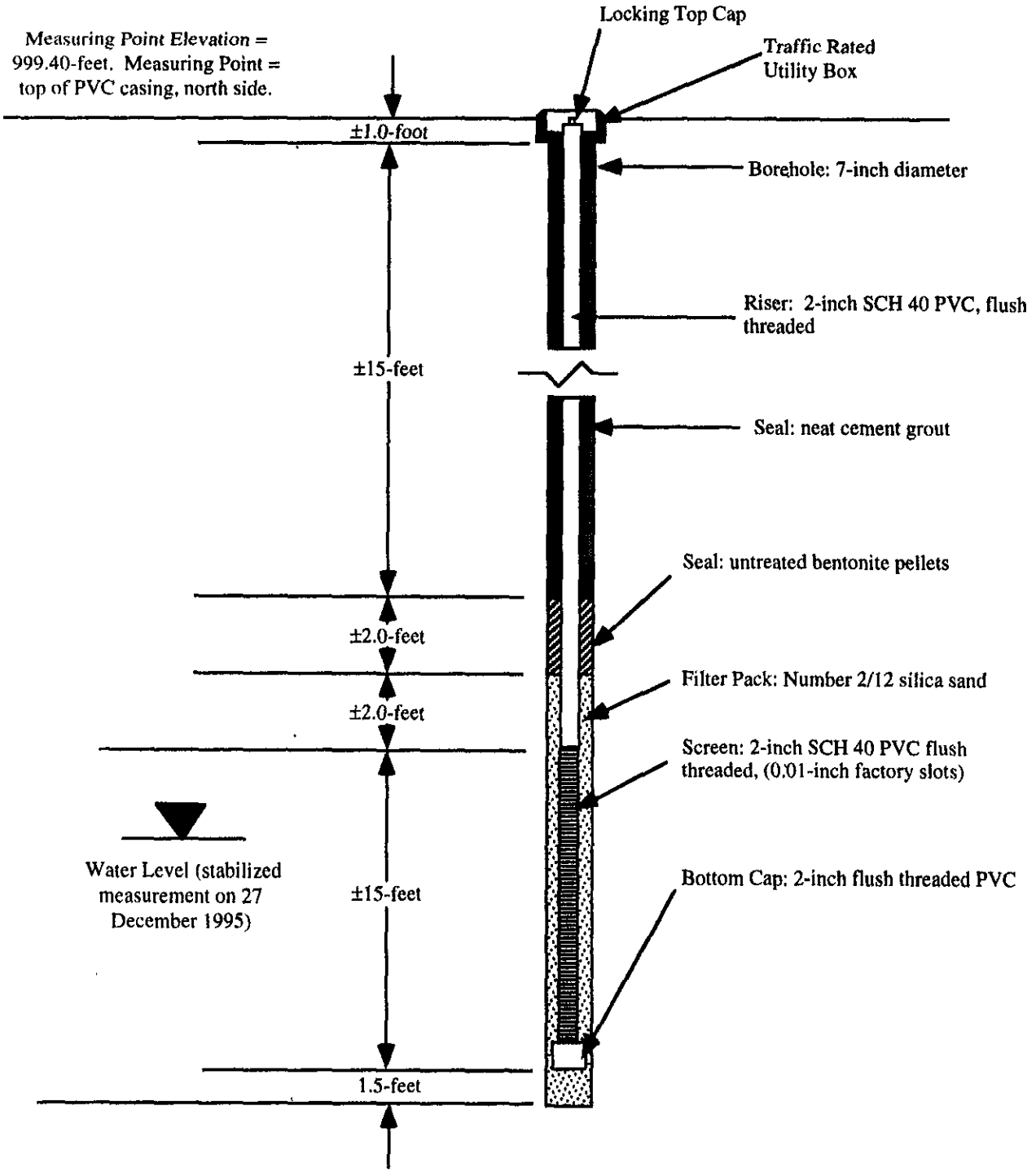
Boring No. MW-2 (page 2 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
10.0					6	Clay (CL or CH), medium plasticity, moist, stiff, brown, light brown, and mottled gray-brown. *No odor or staining.*	
				Push	6		< 5
11.0					6		
12.0							
13.0							
14.0							
15.0							
16.0							
17.0		CH and/or CL					
18.0							
19.0							
20.0					6	Clay (CL or CH), as above. No odor or staining.	
				Push	6		< 5
21.0					6		
22.0							
23.0							
24.0							
25.0							

Boring No. MW-2 (page 3 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
25.0					6	Clay (CL or CH), as above. No odor or staining.	
		CH/CL					
				Push	6		< 5
26.0							
					6	Silty Sand (SM), fine sand texture, 20-40% silt and clay (varies with depth), wet, light brown with gray mottling. No odor or staining.	
27.0							
28.0							
29.0							
30.0					0	Silty Sand (SM), as above. No odor or staining.	
				Push	0		< 5
31.0		SM			6		
32.0							
33.0							
34.0							
35.0					6	Silty Sand (SM), as above. No odor or staining.	
				Push	6		< 5
36.0					6		
						Total depth = 36.5-feet.	
37.0						Boring completed as 2-inch PVC well. Refer to completion schematic. On 27 December 1995, stabilized water level measured at 24.7-feet below top of casing.	
38.0							
39.0							
40.0							

STREAMBORN



No Scale

MW-2
Monitoring Well Completion Schematic

21031 Western Boulevard
Hayward CA

Boring No. MW-3 (page 1 of 3)

Project	Soil and Groundwater Investigation 21031 Western Boulevard Hayward CA	Address	21031 Western Boulevard Hayward CA
Location	±10-feet southeast of roll-up door	Logged By	Doug Lovell, STREAMBORN, Berkeley CA
Elevation	Ground surface, north side = 1,000.16-feet (assumed datum)	Project No.	P178
Start Drilling	12:40 PM, 20 December 1995	Finish Drilling	3:30 PM, 20 December 1995
Drill Method	±4-inch ID by ±7-inch OD hollow-stem auger	Driller	HEW, Palo Alto CA
Drill Rig	CME 45	Drilled Depth	±35-feet
Completion	2-inch PVC well with traffic box	Groundwater (During Drilling)	±27-feet
Sampling	±2-inch ID by ±2-1/2-inch OD driven split-spoon fitted with 2-inch diameter by 6-inch long brass or stainless steel liners. Samples collected by driving spoon ahead of auger bit.	Groundwater (Stabilized)	25.3-feet below top of casing, measured 27 December 1995

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
0.0							
		GM				Silty Gravel (GM). Fill (aggregate base).	
1.0							
2.0							
3.0							
4.0							
5.0					6	Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
		CH		Push	6		< 5
6.0					6		
7.0						Very hard drilling from 7-feet to 8-feet. Cuttings contain particles of concrete. Driller suspects that a portion of the boring encountered the edge of the adjacent building foundation.	
8.0							
9.0							
10.0							

STREAMBORN

Boring No. MW-3 (page 2 of 3)

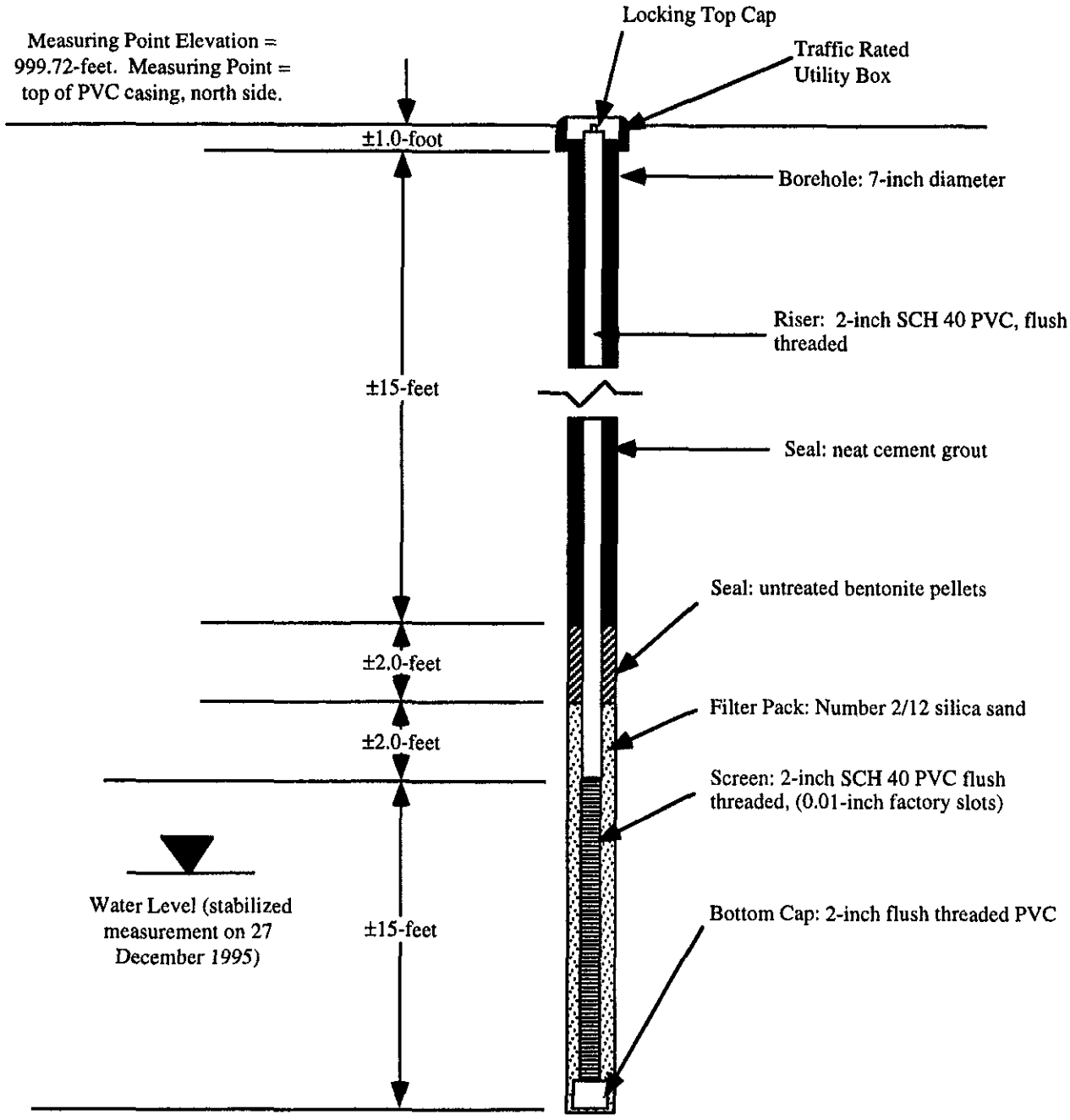
Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
10.0					6	Clay (CH), medium to high plasticity, stiff, moist, dark brown. No odor or staining.	
				Push	6		< 5
11.0					6		
12.0							
13.0							
14.0							
15.0					6	Clay (CL or CH), medium plasticity, moist, stiff, brown, light brown, and mottled gray-brown. No odor or staining.	
				Push	6		< 5
16.0					6		
17.0		CH and/or CL					
18.0							
19.0							
20.0					6	Clay (CL or CH), as above. No odor or staining.	
				Push	6		< 5
21.0					6		
22.0							
23.0							
24.0							
25.0							

STREAMBORN

Boring No. MW-3 (page 3 of 3)

Depth (feet)	Graphic Log	USCS	Sample Interval	Blows per 6 inches	Recovery (inches)	Soil Description, Observations, Comments	OVM (ppmv)
25.0					6	Clay (CL or CH), as above. No odor or staining.	
		CH/CL					
				Push	6		< 5
26.0							
					6		
27.0							
28.0							
29.0							
30.0					6	Silty Sand (SM), fine sand texture, 20-40% silt and clay (varies with depth), wet, light brown with gray mottling. No odor or staining.	
				Push	6		< 5
31.0		SM					
					6		
32.0							
33.0							
34.0							
35.0						Total depth = 35-feet.	
						Boring completed as 2-inch PVC well. Refer to completion schematic.	
						On 27 December 1995, stabilized water level measured at 25.3-feet below top of casing.	
36.0							
37.0							
38.0							
39.0							
40.0							

STREAMBORN



No Scale

MW-3
Monitoring Well Completion Schematic

21031 Western Boulevard
Hayward CA

APPPENDIX B

Workplan Addendum Approval Letter From Alameda County Department of Environmental Health

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR
DEPARTMENT OF ENVIRONMENTAL HEALTH
State Water Resources Control Board
Division of Clean Water Programs
UST Local Oversight Program

January 23, 1995

ALAMEDA COUNTY CC4580
DEPT. OF ENVIRONMENTAL HEALTH
ENVIRONMENTAL PROTECTION DIVISION
1131 HARBOR BAY PKWY., #250
ALAMEDA CA 94502-6577

William and Kathy Florence
6316 Castle Dr
Oakland CA 94611

Said 3574

Subject: Addendum to work plan for investigations at Cliff's Forklift Repair located at 21031 Western Blvd., Hayward, California.

Dear Mr. and Mrs. Florence:

This office received and reviewed Streamborn's addendum to the work plan, dated December 22, 1994. The addendum is acceptable to this office.

Please notify me at least 3 business days in advance of field activities so that I may arrange to be on-site. If you have any questions, please contact me at (510)567-6755.

Sincerely,

Amy Leech
Hazardous Materials Specialist

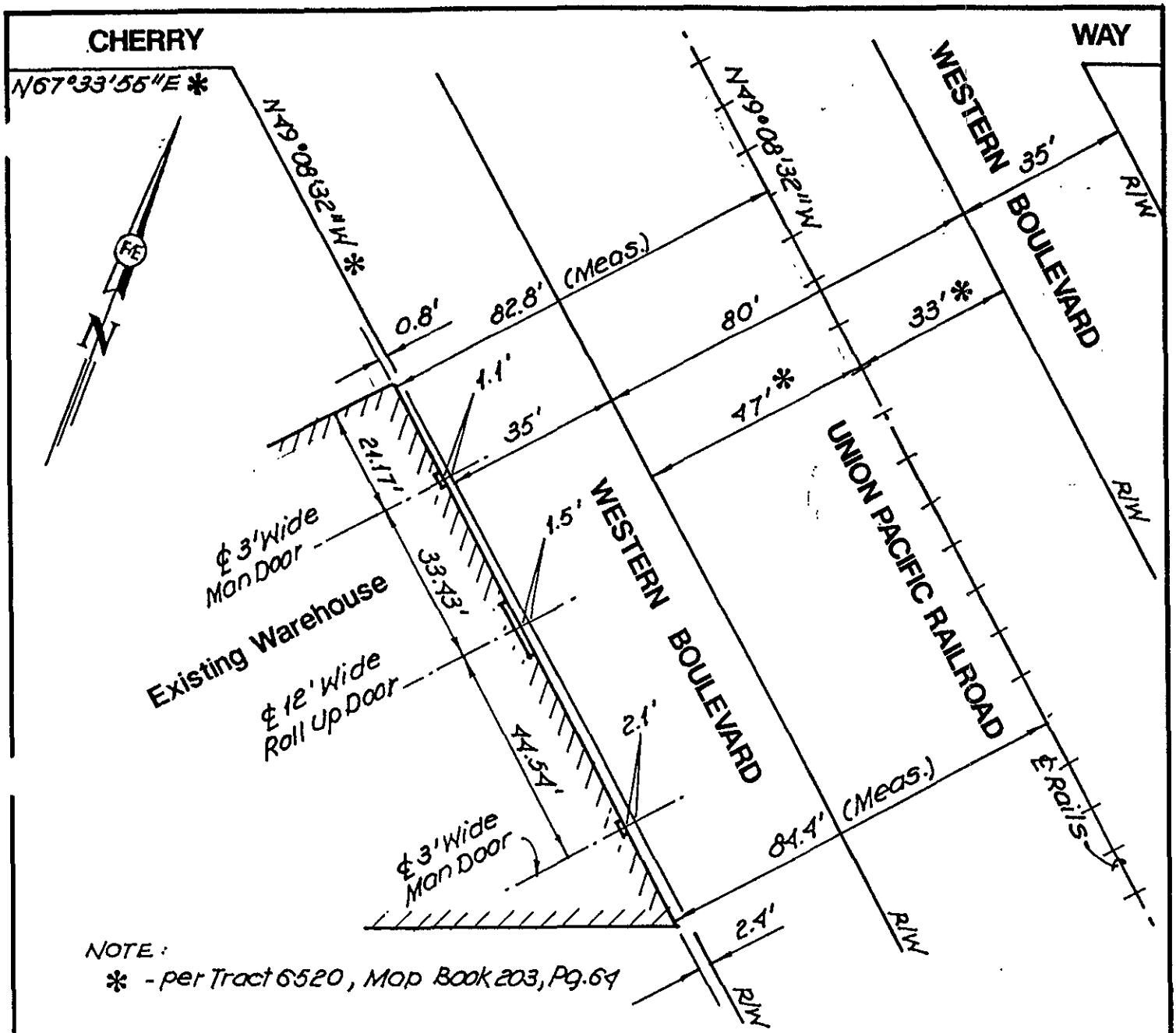
cc: Keith D. Beury
Streamborn
900 SantaFe Ave
Albany CA 94706

Edgar Howell

Post-it™ brand fax transmittal memo 7671 | # of pages ▶ 1
To Keith Beury | From Amy Leech
Co. Streamborn | Co. Alameda Cty
Dept. | Phone # (510)567-6755
Fax # 528-2613 | Fax # 337-9335

APPPENDIX C

Survey Plat Showing Location of the Eastern Property Boundary For 21031 Western Boulevard



NOTE:

* - per Tract 6520, Map Book 203, Pg. 64

PLAT OF LOCATION OF WAREHOUSE BUILDING @ 21031 WESTERN BLVD. ALAMEDA COUNTY, CA. WITH RESPECT TO THE RIGHT-OF-WAY LINE OF WESTERN AVE.

A.P.N. 429 - 19 - 38 & 39

EDEN TOWNSHIP ALAMEDA COUNTY CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
CHARLES A. LUDWIG
No. 31917
Exp. 12/31/96
CIVIL
STATE OF CALIFORNIA

NO	DATE	REVISION	BY

JOB NO 4230 | DRAWN E.S.B. | DATE July 18/95
F B 151 PAGE 52 | CHECKED C.A.L. | SCALE 1" = 30'

APPROVED Charles Ludwig RCE 31917

FREMONT ENGINEERS, INC.
4551 EGGERS DRIVE FREMONT, CA. 94536 (510) 792-18

APPPENDIX D

Permits and DWR-188 Reports

Permit # R00-940742
Issue Date: 12/5/95

COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
399 ELMHURST STREET, HAYWARD, CA 94544
(510) 670-5429

ROAD ENCROACHMENT PERMIT

This Permit is issued in accordance with the provisions of Chapter 1 of Title 5 of the Ordinance Code of the County of Alameda.

NAME & ADDRESS OF PERMITTEE:

Streamborn
900 Santa Fe Ave.
Albany CA 94706

PHONE:

Work Order Number: 80001
Expiration Date: N/A
Receipt Number:

JOB SITE(S): 21031 Western Blvd.
Haywavd, CA

This Permit authorizes an encroachment onto the roadway right-of-way, at the said Job Site(s), in order to perform the work described below; unless specifically exempted, this encroachment shall be subject to the terms and conditions of the said Chapter 1 of Title 5 and to all other provisions attached to and written into this Permit.

THE PERMITTEE INTENDS TO PERFORM THE FOLLOWING:

Install 3 groundwater monitoring wells at subject property. In addition, 2 soil borings will be drilled for soil sampling. The soil borings will be grouted with cement/bentonite to surface on same day.

Attention is directed to the inspection requirements and to the other general terms and conditions, as outlined on the back of this form -- and to those special requirements written below:

None; a separate permit will be required for well removal.

Other Required Permits: Zone 7 Drilling

Bond Information: $9000

Inspection (Fee) Deposit: $125 ;Chg. Insp. to WO#

BY: Keith Berry, PERMITTEE

BY: JK Rogers FOR ALAMEDA COUNTY

Reviewed By:
Work Completed:
Inspector:

INSPECTION REQUIREMENTS

1. All work or access authorized by this Permit is subject to review and/or inspection by the County.

2. It is the Permittee's responsibility to notify the appropriate County office(s), as indicated below:

a. The work described in this permit must be accepted by the County. Contact the County Inspection Office at (510) 670-5762, prior to the start of work, to arrange for the required tests and inspections.

Confirm each scheduled test/inspection operation by notifying the assigned inspector 24 hours in advance.

b. ~~The work or access described in this permit is subject to review by the County; however, notification of the County Inspection Office is not required.~~

c. ~~Some or all of the work described in this permit requires additional coordination with the County -- as indicated below:~~

_____

_____

Note that, unless a. above is lined out, you will still be required to notify the County Inspection Office.

TERMS AND CONDITIONS

1. Unless exempted below, all work or access shall be subject to the terms and conditions delineated in the attached "General Provisions":

Particular attention shall be paid to the requirement to call USA and the County Traffic Section, if applicable, prior to any excavation; see Provisions 27 and 28.

2. In addition, the authorized work or access shall be subject to those special requirements shown on the front of this form and to all restrictions imposed by other agencies having jurisdiction.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 21031 Western Boulevard
Hayward, California

CLIENT
Name William and Kathy Florence
Address 6316 Castle Drive Phone 510-482-1784
City Oakland CA Zip 94611

APPLICANT
Name Keith Beury
Streamborn
Address P.O. Box 8330 Phone 510-528-4234
City Berkeley CA Zip 94707-8330

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	X
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. 604987 (HEW Drilling)

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 2 in. Depth 30' (each of 3 wells)
Surface Seal Depth 8 ft. Number MW-1, MW-2, MW-3

GEOTECHNICAL PROJECTS
Number of Borings 2 Maximum
Hole Diameter 8 in. Depth 30 ft.

ESTIMATED STARTING DATE 4 October 1995
ESTIMATED COMPLETION DATE 5 October 1995

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

APPLICANT'S SIGNATURE Keith Beury Date 9/21/95

FOR OFFICE USE

PERMIT NUMBER 95643
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 29 Sep 95
Wyman Hong

121989

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED

Boring Logs and Well Completion Schematics are Included in Appendix A

APPPENDIX E

Standard Operating Procedures

STANDARD OPERATING PROCEDURE (SOP) 1A
HOLLOW-STEM AUGER DRILLING AND SPLIT-SPOON SOIL SAMPLING

1.0 INTRODUCTION AND SUMMARY

This SOP describes methods for drilling with the use of hollow-stem augers and soil sampling with the use of spilt-spoon samplers. Drilling activities covered by this SOP may be conducted to obtain soil samples or to create a borehole within which a well may be constructed. Soil samples may be obtained to log subsurface materials, to collect samples for chemical characterization, or to collect samples for physical parameter characterization.

The soil sampling techniques described in this SOP are generally suitable for chemical characterization and physical classification tests; because a driven split-spoon sampler is employed, the resulting soil samples should generally be considered "disturbed" with respect to physical structure and may not be suitable for measuring sensitive physical parameters, such as strength and compressibility. The augering techniques described in this SOP generally produce a borehole with a diameter corresponding to the outside diameter of the auger flights, a relatively small annulus of remoulded soil surrounding the outside diameter of the auger flights, and limited capability for cross-contamination between subsurface strata as the leading flights of the augers pass from contaminated strata to uncontaminated underlying strata. However, should conditions require strict measures to help prevent cross-contamination or maintain the integrity of an aquitard, consideration should be given to augmenting the procedures of this SOP, for example, by using pre-drilled and grouted isolation casing.

The procedures for hollow-stem auger drilling and split-spoon soil sampling generally consist of initial decontamination, advancement of the augers, driving and recovery of the split-spoon sampler, logging and packaging of the soil samples, decontamination of the split-spoon, and continued augering and sampling until the total depth of the borehole is reached. Withdrawal of the augers upon reaching the total depth requires completion of the borehole by grouting, by constructing a well, or other measures; borehole completion is not covered in this SOP.

2.0 EQUIPMENT AND MATERIALS

- Drill rig, drill rods, hollow-stem augers, and drive-weight assembly (for driving the split-spoon sampler) should conform to ASTM D 1586 - Standard Method for Penetration Test and Split-Barrel Sampling of Soils, except: (1) hollow-stem augers may exceed 6.5 inches inside diameter as may be necessary for installing 4-inch diameter well casing, (2) hollow-stem augers should have a center bit assembly (end plug), (3) alternative drive-weight assemblies or downhole hammers are acceptable as long as the type, weight, and equivalent free fall are noted on the boring log.
- Split-spoon sampler should conform to ASTM D 1586 - Standard Method for Penetration Test and Split-Barrel Sampling of Soils, except: (1) split-spoon should be fitted with liners for collection of chemical characterization sample, and (2) allowable split-spoon diameters include nominal 1-1/2-inch inside diameter by nominal 2-inch outside diameter (Standard Penetration Test split-spoon), nominal 2-inch inside diameter by nominal 2-1/2-inch outside diameter (California Modified split-

spoon), or nominal 2-1/2-inch inside diameter by nominal 3-inch outside diameter (Dames & Moore split-spoon). The split-spoon type and length of the split-barrel portion of the sampler should be noted on the boring log, as should the use of a sample catcher if employed.

- Liners should be 3- to 6-inch length, fitted with plastic end-caps, brass or stainless steel, with a nominal diameter corresponding to that of the inside diameter of the split-spoon sampler. The boring log should note whether brass or stainless steel liners were used.
- Teflon sheets, approximate 6-mil thickness, precut to a diameter or width of the liner diameter plus approximately 1 inch
- 1/2-pint widemouth glass jars, laboratory cleaned
- Kimwipes, certified clean silica sand, or deionized water (for blank sample preparation)
- Duct tape
- Sample labels, boring log forms, chain-of-custody forms, hazardous waste labels, and daily report forms
- Ziploc plastic bags of size to accommodate a liner
- Stainless steel spatula and knife
- Cooler with ice or dry ice (do not use blue ice)
- Field organic vapor monitor. The make, model, and calibration information of the field organic vapor monitor (including compound and concentration of calibration gas) should be noted on the boring log.
- Aluminum foil, and rubber bands
- Pressure washer or steam cleaner
- Large trough (such as a water tank for cattle), plastic-lined pit, or equivalent for decontamination of hollow-stem augers, drill rod, and end plug
- Buckets and bristle brushes for decontamination of liners, split-spoon sampler, and other small gear
- Low residue, organic free soap such as Liquinox or Alconox
- Distilled water
- Steel, 55-gallon, open-top drums conforming to the requirements of DOT 17H

As specified in the Site Safety Plan, additional safety and personnel decontamination equipment and materials may be needed.

3.0 TYPICAL PROCEDURES

The following typical procedures are intended to cover the majority of drilling and sampling conditions. However, normal field practice requires re-evaluation of these procedures and implementation of alternate procedures upon encountering unusual or unexpected subsurface

conditions. Deviations from the following typical procedures may be expected and should be noted on the boring log.

1. Decontaminate drill rig, drill rods, hollow-stem augers, split-spoon sampler and other drilling equipment immediately prior to mobilization to the site.
2. Investigate the location of the proposed boreholes for buried utilities and obstructions. At least 48 hours before drilling, contact known or suspected utility services individually or through collective services such as "USA" and "Underground Alert". As appropriate, retain private buried utility location services or geophysical investigation services to search for buried utilities and obstructions. Also as appropriate, pothole suspect utility locations prior to drilling or relocate boreholes. During initial advancement of each borehole, drill cautiously and have the driller pay particular attention to the "feel" of the hollow-stem auger. The suspected presence of an obstruction, buried pipeline or cable, utility trench backfill, or similar may be cause for suspension of drilling, subject to further investigation.
3. Advance the hollow-stem auger, fitted with end plug, to the desired sampling depth. Note depth interval, augering conditions, and driller's comments on boring log. Samples should be taken at intervals of 5 feet or less in homogeneous strata and at detectable changes of strata.
4. Remove drill rod and end plug from the hollow stem and note presence of water mark on drill rod, if any. If below the groundwater table in clean sand, allow water level in hollow-stem to equilibrate prior to removing end plug and remove plug slowly so as to minimize suction at the base of the plug. Also, monitor top of hollow-stem using field organic vapor monitor, as appropriate.
5. Decontaminate split-spoon, liners, spatulas and knives, and other equipment that may directly contact the chemical characterization sample. Fit split-spoon with liners and attach to drill rod.
6. Lower split-spoon sampler through hollow-stem of auger until sampler is resting on soil. Note discrepancy between elevation of tip of sampler and leading edge of augers, if any. If more than 6-inches of slough exists inside the hollow-stem augers, consider the conditions unsuitable and re-advance the hollow-stem augers and end plug to a new sampling depth.
7. Drive and recover the split-spoon according to the requirements of ASTM D 1586 - Standard Method for Penetration Test and Split-Barrel Sampling of Soils. Record depth interval, hammer blows for each 6-inches, and sample recovery on boring log. Monitor the recovered split-spoon with the field organic vapor monitor, as appropriate.
8. Remove either bottom-most or second-from-bottom liner (or both) from split-spoon for purposes of chemical characterization and physical parameter testing. Observe soil at each end of liner(s) for purposes of completing sample description. Place teflon sheet at each end of liner, cover with plastic caps, and tape plastic caps with duct tape (do not use

electrical tape) to further minimize potential loss of moisture or volatile compounds. Label liner(s) and place in ziploc bag on ice or dry ice inside cooler.

9. Extrude soil from remaining liner(s) and subsample representative 1-inch cube (approximate dimensions). Place subsample in widemouth glass jar, cover jar with aluminum foil and seal foil to jar with rubber band. Allow jar to equilibrate at ambient conditions for approximately 5 minutes and screen for organic vapors by inserting the probe of the field organic vapor monitor through the aluminum foil. Record depth interval, observed sample reading, and ambient (background) reading on the boring log. Glass jars may be reused by discarding the soil subsample and wiping any residue from the jar using a paper towel.
10. Visually classify soil sample in approximate accordance with ASTM D 2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Descriptions should include moisture content, color, textural information, group symbol, group name, and odor. Optional descriptions, especially if classification is performed with protective gloves, include particle angularity and shape, clast composition, plasticity, dilatancy, dry strength, toughness, and reaction with HCl. Add notes on geologic structure of sample, as appropriate. Record depth interval, visual classification, and other notes to the boring log.
11. Repeat steps 3 through 10 until total depth of borehole is reached.
12. Complete borehole according to the requirements specified elsewhere.
13. Decontaminate hollow-stem augers, drill rod, and end plug between boreholes and after finishing last borehole prior to drill rig leaving site.
14. Change decontamination solutions and clean decontamination trough, buckets, and brushes between boreholes.
15. Containerize soil cuttings, excess soil sample, and decontamination wastewaters in steel drums. Affix hazardous waste labels to the drums.
16. Complete pertinent portion of the chain-of-custody form and daily activity report.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

Quality control sampling consists of sequential replicates, collected at an approximate frequency of 1 sequential replicate for every 10 natural samples. Sequential replicates are collected by packaging two adjacent liners of soil from a selected split-spoon drive. Each sample is labeled according to normal requirements. The replicate samples obtained in such a manner are suitable for assessing the reproducibility of both chemical and physical parameters. Interpretations of data reproducibility should recognize the potential for significant changes in soil type, even over 6-inch intervals. Accordingly, sequential replicates do not supply the same information as normally encountered duplicate or split samples. Duplicate or split samples are better represented by the laboratory performing replicate analyses on adjacent subsamples of soil from the same liner.

Optional quality control samples may be collected to check for cross-contamination using field blanks. Field blanks may be prepared by (1) swipe sampling decontaminated liners and split-spoon with kimwipes, (2) pouring clean silica sand into a decontaminated split-spoon sampler that has been fitted with liners, or (3) pouring deionized water over the decontaminated liners and split-spoon and collecting the water that contacts the sampling implements for aqueous analysis. Field blanks may be prepared at the discretion of the field staff given reasonable doubt regarding the efficacy of the decontamination procedures.

The comparability of the field visual classification may be checked by conducting laboratory classification tests. Requests for laboratory testing verification of the field classification should be left to the discretion of the field staff.

Field decisions that may also affect the quality of collected data include the frequency of sampling and the thoroughness of documentation. Subject to reasonable limitations of budget and schedule, the completeness, comparability, and representativeness of data obtained using this SOP will be enhanced by decreasing the sampling interval (including collecting continuous samples with depth) and increasing the level of detail for sample classification and description of drilling conditions. More frequent sampling and more detailed documentation may be appropriate in zones of chemical concentration or in areas of critical geology (for example, zones of changing strata or cross-correlation of confining strata).

5.0 DOCUMENTATION

Observations, measurements, and other documentation of the drilling and soil sampling effort should be recorded on the following:

- Daily Report
- Field Notebook
- Boring Log
- Sample Label
- Chain-of-Custody

Documentation should include any deviations from this SOP, notations of unusual or unexpected conditions, and documentation of the containerization and disposition/disposal of investigation-derived waste. Specific instructions for selected forms are provided below.

5.1 Sample Label

- Project name and project number
- Boring or well number
- Sample depth interval (feet below ground surface), record the depth interval using notation similar to "19.2-19.7", generally do not record just one depth "19.2" because of uncertainty regarding the location such depth corresponds to (midpoint, top, etc.)
- Sample date and sample time
- Sampler

- Optional designation of orientation of sample within the subsurface, for example, an arrow with "up" or "top" designated

5.2 Boring Log

- Project name and project number
- Boring number
- Description of boring location, including taped or paced measurements to noticeable topographic features (a location sketch should be considered)
- Date and time drilling started and completed
- Drilling company and name of drilling supervisor, optional names and responsibilities of drillers helpers
- Manufacturer and model number of drill rig
- Inside diameter of the hollow stem and outside diameter of the auger flights of the hollow-stem augers, optional description of type of bit on end plug and leading edge of auger, optional description of the size of drill rod
- Depth at which groundwater was first encountered with the notation "during drilling"
- Method of borehole completion
- Other notations and recordings described previously in 2. EQUIPMENT AND MATERIALS and 3. TYPICAL PROCEDURES

6.0 DECONTAMINATION

Prior to entering the site, the drill rig and appurtenant items (drill rod, hollow-stem augers, end plug, split-spoon sampler, shovels, troughs and buckets, drillers stand, etc.) should be decontaminated by steam cleaning or pressure washing. Between each borehole, appurtenant items that contacted downhole soil (essentially all appurtenant items including drill rod, hollow-stem augers, end plug, split spoon sampler, shovels, troughs and buckets, etc.) should be decontaminated by steam cleaning or pressure washing. Prior to leaving the site, the drill rig and appurtenant items should be decontaminated by steam cleaning and pressure washing. Onsite decontamination should be conducted within the confines of a trough or lined pit to temporarily contain the wastewater. Between each borehole and prior to demobilization, the trough or lined pit should be decontaminated by steam cleaning or pressure washing. If a rack or other support is used to suspend appurtenant items over the trough or lined pit during decontamination, only the rack or other support needs to be decontaminated between boreholes.

Prior to each sample, the split-spoon sampler, liners, sample catcher, spatulas and knives, and other equipment or materials that may directly contact the sample should be decontaminated. Decontamination for these items should consist of a soap wash (Alconox, Liquinox, or other organic free - low residue soap), followed by a tap water rinse, followed by a distilled water

rinse. Wastewater from the soap wash should be temporarily contained. Wastewater from the tap water and distilled water rinses may be discharged to the ground surface or a sanitary sewer.

Between each borehole, buckets and brushes should be decontaminated by steam cleaning or pressure washing. Before each borehole, fresh decontamination solutions should be prepared.

7.0 INVESTIGATION-DERIVED WASTE

Wastes resulting from the activities of this SOP may include soil cuttings, excess soil sample, decontamination wastewaters, and miscellaneous waste (paper, plastic, gloves, jars, aluminum foil, etc.) Unless otherwise prohibited by the Site Safety Plan, miscellaneous waste should be double-bagged in plastic garbage bags and disposed of as municipal waste.

Soil cuttings and excess soil sample from each borehole should be placed in individual steel drums with hazardous waste labels affixed. Solids from multiple boreholes may be combined within a single drum if field observations (presence or absence of chemical staining and field organic vapor monitoring) indicate the solids are similarly uncontaminated or similarly contaminated. Given sufficient drums and reasonable doubt, separate drums should be used for each borehole.

Decontamination wastewaters for each borehole should be placed in individual steel drums with hazardous waste labels affixed. Wastewaters from multiple boreholes may be combined, subject to the same limitations as solids.

8.0 SAFETY

Normal and special safety precautions are described in the Site Safety plan. The Site Safety plan should be reviewed periodically during drilling to keep mindful of important safety measures. Physical hazards typically prevail because the drill rig contains exposed rotating and hammering equipment and because drill rod and augers are heavy material with sharp edges.

Chemical hazards are typically discovered upon withdrawal of the end plug or withdrawal of the soil-filled split-spoon sampler from the hollow-stem auger, as well as removal of the soil-filled liners from the split-barrel. Opportune monitoring for volatile chemicals may be conducted at these times. Splash protection and direct contact protection are also essential measures to minimize the potential for chemical exposure.

9.0 REFERENCES

American Society for Testing and Materials, 1989. 1989 Annual Book of ASTM Standards, Section 4 - Construction, Volume 4.08 - Soil and Rock, Building Stones; Geotextiles. ASTM, Philadelphia, PA. 1989.

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, and D.M. Nielsen, 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells. National Water Well Association, Dublin, OH. 1989.

U.S. Environmental Protection Agency, 1989a. A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14. USEPA, Office of Emergency and Remedial Response, Washington, DC. December 1989.

U.S. Environmental Protection Agency, 1989b. Soil Sampling Quality Assurance User's Guide - Second Edition. National Technical Information Service, PB 89-189 864/AS, Springfield, VA. 1989.

STANDARD OPERATING PROCEDURE (SOP) 2A
COMPLETION OF BORINGS AS WELLS

1.0 INTRODUCTION AND SUMMARY

This SOP describes methods for installation of a monitoring well within an existing borehole. The well construction techniques discussed in this SOP are generally suitable for construction of wells screened in one groundwater zone which will be used for water quality sampling and/or observations of groundwater elevation (piezometers). Typically, 2- or 4-inch diameter wells, with total depths less than 80-feet will be installed using this SOP. Large diameter or deep wells may require modification of the methods described herein. Discussion of specific well casing and screen material is beyond the scope of this SOP, and well casing and screen material should be selected on a site specific basis. The permitting activities of this SOP apply in California and different permits are needed in other locations.

The procedures for construction of wells generally consist of well permitting, well design, decontamination of well casing and screen, simultaneous assembly and lowering of casing and screen into the borehole, placement of the filter-pack around the screen, installation of a bentonite seal above the filter pack, sealing of the remaining annular space with grout, and surface completion. The procedures described below are intended to conform to accepted practices (Aller et al. 1989, USEPA 1989, and DWR 1990).

2.0 EQUIPMENT AND MATERIALS

- Pressure washer or steam cleaner
- Grout mixing equipment
- Tap water
- Hand tools (pipe wrenches, chain wrenches, pipe vise, shovels, rubber mallet, etc.)
- Tape measure long enough to reach the bottom of the boring
- Well casing, screen, and end caps
- Centralizers (generally not required)
- Buckets and bristle brushes for decontamination
- Low residue, organic free soap such as Liquinox or Alconox
- Filter pack material (typically clean sand of specified gradation)
- Bentonite pellets (or powder) for seal above filter pack, unaltered sodium bentonite
- Cement for grout
- Locking hasp
- Protective surface casing
- Well construction log and daily report forms
- Calculator

Site specific conditions may require other specialized equipment.

3.0 TYPICAL PROCEDURES

The following procedures apply to most well installations. However, normal field practice requires re-evaluation and modification of these procedures upon encountering unexpected situations during well construction. Deviations from the following procedures may occur and should be documented.

1. Determine local jurisdiction charged with regulation of wells and apply for required local permits. Local jurisdictions may include county, water district, or city. Determine special design considerations (such as minimum length of grout seal) and inspection requirements (such as witnessing the placement of the grout seal). Also file notice of intent to construct well with the California Department of Water Resources using its standardized form.

2. Well design begins with the conception of the purpose for the well, and should include consideration of the analytes of interest, anticipated subsurface conditions at the intended well location, and the soil conditions encountered during drilling and recorded on the boring log.

   Design considerations discussed in this SOP are limited to portions of the well subject to modification by information gathered during drilling. Such information includes depth to groundwater, thickness of water bearing strata, and grain size distribution of the water bearing strata. Conceptual well designs should be modified as required in the field to prevent connection of naturally separate groundwater zones, to allow an adequate surface seal to be installed, and to maximize the chance for detection of the contaminants of concern.

3. Prior to installation in the borehole, well casing and screen should be decontaminated and inspected.

   Decontamination may consist of steam cleaning/pressure washing, hand washing, or equivalent. A tap water rinse should be employed after washing. If oil or grease is observed on the casing or screen, a soap wash and tap water rinse should be employed. This procedure should be applied to both the outside and the inside of well casing and screen immediately before assembly and well installation.

4. Assembly of the well screen and blank casing is accomplished simultaneously with insertion into the boring. Initially, a bottom plug is attached to the bottom of the screen and the screen is lowered into the boring. The next length of casing (screen or blank depending on the specific well design) is attached and the process is repeated until the well extends from the ground surface to the bottom of the boring. Various types of mechanical clamps are used to prevent dropping of the well screen into the well during assembly. It is useful to leave surplus blank casing extending above grade at this point to facilitate subsequent construction activities.

   Measure the length of well screen and blank casing inserted into the boring and record the quantities on the well construction log. The total length of well screen and casing should be confirmed by taping.

5. Install the filter pack by pouring filter pack material into the annulus between the casing and borehole. Unless otherwise delineated in the

Workplan, Quality Assurance Project Plan, or Sampling Plan, install filter pack from (1) an elevation approximately 6-inches beneath the elevation of the bottom cap of the well casing to (2) approximately 2-feet above the top of the screened interval.

If augers or drill casing remain in the ground during well construction, the annulus between the well material and the casing may be used as a tremie If the well is constructed in an open borehole that (1) exceeds 30-feet depth or (2) is below the groundwater table, then the filter pack should be placed using a tremie pipe. The filter pack should be poured slowly into the borehole and the depth to the top of the filter pack should be "tagged" periodically with a tape. Adequate time should be allowed for the filter pack material to settle through standing water prior to tagging or the tape may be lost by burial. Tagging may be time consuming, but provides reasonable checks of filter pack bridging during installation.

If augers or other temporary casing are being used as a tremie, they should be withdrawn as the filter pack is placed. During placement, the elevation of the tip of the augers/temporary casing should be kept slightly above the top of the filter pack. Minimizing the separation between the top of the filter pack and tip of the augers/temporary casing during filter pack placement will help prevent inclusions of formation material or slough within the filter pack. However, if the tip of the augers/temporary casing is not kept above the top of the filter pack and the filter pack is allowed to settle within the augers/temporary casing, a filter pack bridge may occur and the well casing may become "locked" inside the augers/temporary casing.

The theoretical quantity of filter pack material required to fill the annulus should be calculated. The quantity of filter pack material actually installed in the well should be measured and compared to the calculated quantity. Both quantities should be recorded on the well construction log.

6. The bentonite seal is installed by pouring bentonite pellets or slurried bentonite powder onto the top of the filter pack. Unless otherwise delineated in the Workplan, Quality Assurance Project Plan, or Sampling Plan, the bentonite seal should extend approximately two feet above the top of the filter pack. The quantity and type of bentonite used should be recorded on the well construction log. The top of the bentonite seal should be measured by taping. If bentonite pellets are used and the seal exists above the groundwater table, water should be poured on top of the pellets after their installation and the pellets should be allowed to hydrate for approximately 10 minutes before proceeding with installation of the overlying grout seal.

7. The grout seal should be tremied into the well to prevent inclusions of formation material or slough in the annular seal. Unless otherwise delineated in the Workplan, Quality Assurance Project Plan, or Sampling Plan, grout seal may consist of (1) neat cement grout, using 1 sack (94 pounds dry weight) of Type I/II Portland cement to 5 gallons of water, or (2) cement-bentonite grout using the same basic formula but substituting approximately 5% powdered bentonite for part of the cement. Local requirements may require inspection of grout seal placement by the regulating authority.

If augers or temporary casing remain in the borehole during grouting, the level of the grout should be kept above the tip of the augers or casing to help prevent inclusions of formation material in the grout seal.

The volume of the grout actually used should be recorded on the well construction log and compared to the theoretical annular volume of the sealed interval. Any discrepancies should be noted on the well construction log.

8. Complete the surface of the well by installing a protective surface casing and locking mechanism around the top of the well casing.
9. The completed well should be protected from disturbance while bentonite seal hydrates and grout cures. Further well activities, such as development or sampling, should be withheld for a period of 3 to 7 days to allow these materials to obtain an initial set.
10. Complete and file form DWR 188 plus reports or forms required by local agencies.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance checks for well completion include comparison of theoretical versus actual volumes of filter pack, bentonite seal, and grout seal. Discrepancies that indicate actual "take" was less than theoretical may indicate inclusions of formation material or slough within the annulus. Specific attention to such discrepancies is necessary if the bentonite seal and grout seal are needed to separate contaminated from uncontaminated zones that may be penetrated by the well.

Other quality assurance details include accurate measurement and documentation of the lengths and types of materials used to complete the well.

5.0 DOCUMENTATION

Observations, measurements, and other documentation of the well completion effort should be recorded on the following:

- Daily Report
- Field Notebook
- Well Completion Log
- DWR 188

Documentation should include any deviations from this SOP, as well as documentation of the containerization and disposition/disposal of investigation-derived waste.

6.0 DECONTAMINATION

Materials used for filter pack, bentonite seal, and grout seal should be new at the beginning of each project. Typically, damaged or partially-used containers of material that are brought onsite by drillers or other material suppliers should not be used for well completion. If there is sufficient question regarding contamination of materials, obtain representative samples for later laboratory testing.

Well casing and screen should be decontaminated immediately prior to insertion within the borehole.

If augers or temporary casing are removed during well construction, these materials should be decontaminated by steam cleaning, pressure washing, or equivalent.

7.0 INVESTIGATION-DERIVED WASTE

Wastewater from casing and screen decontamination may be discharged to the ground surface near the well subject to the landowner's permission. Otherwise, these wastewaters may be discharged to the sanitary sewer.

Borehole fluids displaced during well completion, excess grout, and decontamination wastes from the cleaning of augers or temporary casing should be placed in steel drums. The drums should be labeled indicating the generator's name, accumulation date, contents, and well number.

8.0 SAFETY

Primary chemical hazards during well completion are associated with dermal exposure to borehole fluids that may be displaced during completion. Primary protection against dermal exposure includes splash protection and gloves.

Other specific site safety guidance is provided in the Site Safety Plan.

9.0 REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, and D.M. Nielsen, 1989. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*. National Water Well Association, Dublin, OH. 1989.

DWR, 1990. *California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81), Final Draft*. California Department of Water Resources, Sacramento CA. January 1990.

USEPA, 1989. *A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14*. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. December 1989.

STANDARD OPERATING PROCEDURE (SOP) 3A
WELL DEVELOPMENT

1.0 INTRODUCTION AND SUMMARY

This SOP describes procedures to develop wells that have been properly installed. Typically, fine soil particles are entrained within the filter pack and adjacent formation during well installation. The well development procedures described herein are intended to help remove the fine soil particles, resulting in enhanced hydraulic response of the well and increased representativeness of water quality samples collected from the well.

Typically, this SOP will be used to develop 2- or 4-inch diameter monitoring wells and occasionally larger diameter monitoring or pumping wells; all screened within a single groundwater zone. The procedures described herein should be modified for domestic wells. The procedures described herein may also need modification if product is observed in the well.

Well development activities generally include decontaminating the downhole equipment, repetitive combinations of surging/swabing and overpumping/bailing, measurement and observation of well yield, turbidity, and field parameters, and containerizing the development wastewater. Development is typically conducted until (1) no further improvement in well response and turbidity is observed, or (2) a reasonable time has been devoted to development.

2.0 EQUIPMENT AND MATERIALS

- Pressure washer or steam cleaner
- Buckets and bristle brushes for decontamination
- Low residue, organic free soap such as Liquinox or Alconox
- Tap water
- Steel. 55-gallon, open-top drums conforming to the requirements of DOT 17H
- Field organic vapor monitor. The make, model, and calibration information of the field organic vapor monitor (including compound and concentration of calibration gas) should be documented.
- Glass beaker, ±250 milliliter for measurement of field parameters. A similar flow-through cell may also be used.
- Water level meter
- pH, temperature, and specific conductivity instruments, including pH and specific conductivity standards approximating or spanning the natural groundwater parameters.
- Vented surge block or swab of appropriate diameter for the screened interval of the well casing.

- Bailing and/or overpumping equipment consisting of one or a combination of the following:

  Bailer: Steel or PVC. Dedicated or new bailer rope. Generally as large a diameter as will fit down well.

  Surface Centrifugal Pump: Limited to water lift of approximately 20-feet. Dedicated or new flexible plastic suction hose. Foot valve and flow control valve optional.

  Air-Lift Pump: Dual-casing assembly with eductor casing (outer casing) to extend at least 2-feet beyond inner casing. Foot valve should be provided at the bottom of the eductor casing to prevent release of aerated water into the well when the air lift pump is turned off. Air from compressor should be dual-filtered to remove oil.

As specified in the Site Safety Plan, additional safety and personnel decontamination equipment and materials may be needed.

3.0 TYPICAL PROCEDURES

The following procedures are intended to cover the majority of well development conditions. However, normal field practice requires re-evaluation of these procedures upon encountering unusual or unexpected conditions such as observation of free product, measuring elevated pH in the development water, or observing dramatic increases in turbidity as development progresses. Deviations from the following procedures may be expected and should be documented.

1. Development should generally be initiated after the well sealing materials (grout) have obtained an initial cure. Typically, development may begin 3 to 7 days after well completion.
2. Remove top cap and perform field organic vapor monitoring of well casing.
3. Measure static water level and total depth of well. Compare total depth to well completion diagram. Calculate volume of standing water in casing.
4. Decontaminate downhole equipment (see section DECONTAMINATION in this SOP).
5. Begin bailing or overpumping using as high an evacuation rate as possible. Record the following at the beginning of development and during each bail/overpump cycle:
   - Volume removed and time
   - pH, temperature, and specific conductance
   - Turbidity (clarity and color)
   - Approximate drawdown and well yield
   - Whether well was bailed/pumped dry
   - Other observations (such as presence of product) as appropriate

   Bail/overpump until at least one casing volume of standing water has been removed. Continue bailing/overpumping if the removed water

remains very turbid, indicating removal of fines from the screened interval. Terminate bailing/overpumping upon improvement of clarity.

6. Surge/swab the well to loosen fines from the screened interval. Position vented surge block several feet above the screened interval and surge/swab with upward motion. Lower the surge/swab several feet and repeat, keep surging/swabing progressively lower intervals until the bottom of the screened interval is reached. For each interval, surge/swab for several minutes or as indicated by field experimentation.
7. Repeat items 5 and 6 until evacuated water at the end of the bailing/overpumping cycle is low or non-turbid, field parameters are representative of natural groundwater conditions, and well yield has stabilized at a value representative of the intercepted groundwater zone. Terminate development after a reasonable period of time even if these conditions are not observed. Unless otherwise specified in the Workplan, Quality Assurance Project Plan, or Sampling Plan, 4 hours may typically be taken as a reasonable time effort.
8. Terminate development by bailing or overpumping for an extended period of time to remove fines that have been loosened by the last cycle of surging/swabing. Record final observations.
9. Containerize development water and decontamination wastewater in steel drum(s). Label drum(s) with hazardous waste label, description of contents, and well number from which waste originated.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

Meters for measurement of field parameters should be calibrated at least once per day. Calibration standards should generally approximate or span natural groundwater characteristics. Recalibration may be appropriate if unusual measurements are noticed. Calibration activities should be documented on the instrument calibration log.

Quantitative turbidity measurements may be taken with a turbidity meter (both field and laboratory versions are available). If qualitative descriptions of turbidity are used, these terms (very-, moderate-, low-turbidity) may be further defined on the development log. Representative samples may also be collected and returned to the laboratory for measurement with a turbidity meter.

Because well development is typically the first activity of a newly completed well and because the activity is fairly vigorous, the following precautions may be appropriate:

- If product is observed but not anticipated within the groundwater zone intercepted by a well, and the well penetrated a contaminated overlying groundwater zone, well development may be interrupted subject to further consideration or study. Faulty well sealing may result in migration of product from overlying to underlying groundwater zones, which is exacerbated during development.
- If elevated pH is observed but not anticipated, and the well is being developed soon after completion, well development may be interrupted subject to further consideration or study. Elevated pH may originate from grout that has not yet cured, or from grout contamination of the filter pack.

- If turbidity increases dramatically after surging/swabing and does not return to previously observed levels, the cause may be a broken well casing, broken screen, or dislodged end cap, which allows soil to enter the casing unretarded by the filter pack. Probing the well may disclose a break or faulty joint. Consider interrupting well development if this condition is suspected.

5.0 DOCUMENTATION

The well completion schematic should be taken into the field to serve as reference information. Observations, measurements, and other documentation of the development effort should be recorded on the following:

- Daily Report
- Field Notebook
- Instrument Calibration Log
- Well Development Log

Documentation should include any deviations from this SOP, as well as the documentation of the containerization and disposition/disposal of investigation-derived waste.

6.0 DECONTAMINATION

Prior to entering the site, well development equipment should be decontaminated by steam cleaning, pressure washing, or equivalent.

Prior to development of each well, down-well equipment should be decontaminated by steam cleaning or pressure washing, washing with soap, and rinsing with tap water, or equivalent.

Prior to leaving the site, equipment should be steam cleaned, pressure washed, or equivalent.

7.0 INVESTIGATION-DERIVED WASTE

Development water and decontamination wastewater should be containerized in steel drums. Drums should be labeled with hazardous waste labels, including: generator's name and accumulation date. The drums should also be labeled with a description of contents and well number of waste origination. Waste from different wells may be combined in single drums, but chemically-affected and clean wastes should not be mixed.

8.0 SAFETY

Primary chemical hazards during well development are associated with dermal exposure. Primary protection against dermal exposure includes splash protection and gloves. Air-lift pumping may also exacerbate the release of volatile organic compounds from groundwater to air, thus increasing the risk of exposure; frequent monitoring with the field organic vapor monitor may be employed to mitigate this risk.

Other specific site safety guidance is provided in the Site Safety Plan.

9.0 REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, and D.M. Nielsen, 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells. National Water Well Association, Dublin, OH. 1989.

U.S. Environmental Protection Agency, 1989. A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14. USEPA, Office of Emergency and Remedial Response, Washington, DC. December 1989.

STANDARD OPERATING PROCEDURE (SOP) 20
WELL PURGING AND SAMPLING USING BAILERS

1.0 INTRODUCTION AND SUMMARY

This SOP describes standard procedures to purge and sample groundwater monitoring wells using bailers. This SOP will be typically be used for 2- or 4-inch diameter wells which have been properly installed and developed. The sampling described herein is appropriate for a variety of groundwater analyses, including: total and dissolved metals, volatile and semivolatile organic compounds, and general minerals. For newly installed and developed wells, the purging and sampling described in this SOP is typically performed at least 7 days after well development to allow ambient groundwater conditions to re-establish in the vicinity of the well.

The procedures described in this SOP should be modified for domestic wells or wells with dedicated sampling equipment. The procedures should also be modified if product is observed in the well.

Typical well sampling and purging activities include decontaminating the bailer, purging the stagnant water from the well casing and filter pack, measuring field parameters and evacuated volume of groundwater during purging, terminating the purging process when field parameters stabilize, collecting groundwater samples, and labeling and preserving the collected samples.

2.0 EQUIPMENT AND MATERIALS

- Buckets and bristle brushes for decontamination
- Low residue, organic free soap such as Liquinox or Alconox
- If sampling is to be performed for metals, dilute (10%) reagent-grade nitric acid (for decontamination)
- Tap water (for decontamination)
- Distilled water (for decontamination and quality control blank samples)
- Cooler with ice (do not use blue ice or dry ice)
- Ziplock bags of size to accommodate sample containers
- Steel, 55-gallon, open-top drums, DOT 17H
- Field organic vapor monitor. The make, model, and calibration information of the field organic vapor monitor (including compound and concentration of calibration gas) should be documented.
- Laboratory-cleaned containers of proper type and size for the analytical parameters (refer to Table 1)
- Reagent-grade chemicals for sample preservation, as required for the analytical parameters (refer to Table 1)
- If field filtration will be performed for dissolved metals analyses, 45-micron cellulose acetate filters and filtering device. Alternate filter type and size (cellulose nitrate, Teflon, or glass-fiber pre-filters) may be required. The make, type, and size of filter, including disposable filters, should be documented.

- Glass beaker, ±250 milliliter for measurement of field parameters. A similar flow-through cell may also be used.
- Water level meter
- pH, temperature, and specific conductivity instruments, including pH and specific conductivity standards approximating or spanning the natural groundwater parameters. Oxidation-reduction potential (ORP) or dissolved oxygen meters may also be required.
- Bailers: PVC, Teflon, or stainless steel. Dedicated or new bailer rope. If samples are collected for volatile organic compound analysis, bailer should also be fitted with bottom-emptying device.

As specified in the Site Safety Plan, additional safety and personnel decontamination equipment and materials may be needed.

3.0 TYPICAL PROCEDURES

The following procedures are intended to cover the majority of purging and sampling conditions. However, normal field practice requires re-evaluation of these procedures and implementation of alternate procedures upon encountering unusual or unexpected conditions. Deviations from the following procedures may be expected and should be documented.

1. Remove top cap and perform field organic vapor monitoring of well casing
2. Measure static water level and total depth and compare to historic measurements. Remeasure if discrepancies are noted with historic data. Document observations of product, if appropriate. Calculate volume of standing water in casing.
3. Decontaminate purging and sampling equipment (see section DECONTAMINATION in this SOP)
4. Purge well by repeatedly lowering the bailer into the well, allowing the bailer to fill, removing the bailer, and emptying the collected groundwater into a 55-gallon drum or other suitable container. Record the following observations at the beginning of purge, periodically during purge, and during sampling:
   - Purge volume and time
   - pH, temperature, and specific conductivity
   - Turbidity (clarity and color)
   - Approximate drawdown and well yield during purge
   - Whether well was purged dry
   - Other observations (such as presence of product) as appropriate
5. Terminate purging when one of the following conditions is observed:

   Quick Recharge Wells: Well shows stabilized field parameters and at least 4 casing volumes of standing water have been removed - ready for sampling. If field parameters have not stabilized after removal of 10 casing volumes of standing water, terminate purging anyway. Wells

should be allowed to recover to at least 1/2 the original standing water depth prior to sampling.

Slow Recharge Wells: Wells that are initially purged dry, and do not recover to 1/2 of the original standing water depth within 2 hours, should be purged dry again and then sampled when sufficient recovery has occurred to submerge the sampling bailer. Generally, 3 feet of recovery may be considered sufficient recovery for normal bailer submergence.

6. If recharge has submerged the entire screened interval, sample from mid-depth of screened interval. Otherwise, sample from mid-depth of water column at time of sampling.
7. If field filtration will be performed for dissolved metals analyses, filter sample. If the sample is moderately turbid or very turbid, collect companion filtered and unfiltered samples.
8. Fill sample containers and add preservative according to the requirements of Table 1. Containers should generally be filled to capacity. 40 milliliter glass vials should be filled from the bottom using a sample discharge tube (bottom-emptying device for bailer or discharge tube of bladder pump). 40 milliliter vials should not have headspace.
9. Label sample containers, place in ziplock bag, and place on ice in cooler.
10. Log samples onto chain-of-custody form and maintain sample custody until shipped to laboratory.
11. Containerize purge water, excess sample, and decontamination wastewater in steel drum(s). Label drum(s) with hazardous waste label, contents, and well number from which waste originated.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

Depending on the level of data validation required on a given project, quality control sampling may consist of none, one, or any combination of the following samples, to be collected at a pre-established frequency (i.e., one quality control sample for every 10 natural samples):

- Duplicate samples.
- Cross-contamination blank - prepared by collecting a sample of deionized water which has been passed over and through decontaminated sampling equipment.
- Travel blanks - typically if analyses require collection of samples in 40 milliliter vials (typical frequency of 1 per day of sampling).
- Other quality control samples include standard reference materials and natural matrix spikes.

Meters for measurement of field parameters should be calibrated at least once per day. Calibration standards should generally approximate or span natural groundwater characteristics. Recalibration may be appropriate if unusual measurements are noticed. Calibration activities should be documented on the instrument calibration log.

5.0 DOCUMENTATION

The following information should be compiled prior to sampling and taken into the field for reference:

- Well completion schematic
- Summary of historic water level, total depth, and field parameter measurements

Observations, measurements, and other documentation of the purging and sampling effort should be recorded on the following:

- Daily Report
- Field Notebook
- Instrument Calibration Log
- Well Purge and Sample Log
- Chain-of-Custody

Documentation should include any deviations from this SOP, as well as documentation of the containerization and disposition/disposal of investigation-derived waste.

6.0 DECONTAMINATION

Prior to purging and sampling each well, down-well equipment and equipment that will contact the sample (except sample containers) should be decontaminated according to the following procedure:

- Steam clean or pressure wash (optional unless oily contamination covers equipment)
- Wash with soap
- Rinse with tap water
- Double rinse with distilled water

If metals are included in the analytical parameters, the decontamination procedures should include (1) a dilute nitric acid rinse and (2) a second tap water rinse, prior to rinsing with distilled water.

Prior to leaving the site, purging and sampling equipment should be decontaminated.

7.0 INVESTIGATION-DERIVED WASTE

Purge water, excess sample, and decontamination wastewater should be containerized in steel drums. Drums should be labeled with hazardous waste labels, including: Generator's name and accumulation date. Wastes from different wells may be combined, but wastes that are anticipated to contain chemical should not be mixed with waste that are not thought to be contaminated.

8.0 SAFETY

Primary chemical hazards during well purging and sampling are associated with dermal exposure. Acids used for decontamination and sample preservation may also present chemical hazards. Primary protection against dermal exposure includes splash protection and gloves. Special chemical hazards may be associated with the presence of product, if discovered during sampling. Water quality samples are not generally considered representative in the presence of product. Accordingly, it may be appropriate to abandon sampling efforts if product is discovered.

Other specific site safety guidance is provided in the Site Safety Plan.

9.0 REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, and D.M. Nielsen, 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells. National Water Well Association, Dublin, OH. 1989.

U.S. Environmental Protection Agency, 1989a. A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14. USEPA, Office of Emergency and Remedial Response, Washington, DC. December 1989.

Table 1

Sampling and Preservation for Groundwater Samples

Parameter	Analytical Method	Container	Preservation	Maximum Holding Time
Purgeable Halocarbons by GC	EPA 8010	Two 40-ml glass vials	HCl to pH<2, cool to 4 degrees Celsius	14 days after collection
Purgeable Aromatics by GC	EPA 8020	Two 40-ml glass vials	HCl to pH<2, cool to 4 degrees Celsius	14 days after collection
Organochlorine Pesticides and PCB's	EPA 8080	Two 1-liter amber glass	Cool to 4 degrees Celsius	Extract 7 days after collection Analyze 40 days after extraction
Organophosphorus Pesticides	EPA 8140	Two 1-liter amber glass	Cool to 4 degrees Celsius	Extract 7 days after collection Analyze 40 days after extraction
Chlorinated Herbicides (Phenoxy Herbicides)	EPA 8150	Two 1-liter amber glass	Cool to 4 degrees Celsius	Extract 7 days after collection Analyze 40 days after extraction
Volatile Organic Compounds by GC/MS	EPA 8240	Two 40-ml glass vials	Cool to 4 degrees Celsius	14 days after collection
Semivolatile Organic Compounds by GC/MS (Base/Neutral/Acid Extractable Organics)	EPA 8270	Two 1-liter amber glass	Cool to 4 degrees Celsius	Extract 7 days after collection Analyze 40 days after extraction
Dibromoethane (EDB) and 1,2-Dibromo-3-Chloropropane (DBCP)	EPA 504	Two 1-liter amber glass	Cool to 4 degrees Celsius	Extract 7 days after collection Analyze 40 days after extraction
Total Petroleum Hydrocarbons as Diesel	Extract by EPA 3550 and analyze by GCFID	Two 40-ml glass vials	HCl to pH<2, cool to 4 degrees Celsius	Extract 7 days after collection Analyze 7 days after extraction
Oil & Grease	SM 503	One 1-liter glass with aluminum foil-lined cap	H_2SO_4 to pH<2, cool to 4 degrees Celsius	28 days after collection
Total Metals	EPA 7000 Series	One 1/2 liter poly	HNO3 to pH<2, cool to 4 degrees Celsius	6 months after acidification (28 days for mercury)
Dissolved Metals (field filtration)	EPA 7000 Series	One 1/2 liter poly	After field filtration, add HNO3 to pH<2, cool to 4 degrees Celsius	6 months after acidification (28 days for mercury)
Dissolved Metals (laboratory filtration)	EPA 7000 Series	One 1/2 liter poly	No field acidification, cool to 4 degrees Celsius	1 day for filtration, 6 months after acidification (28 days for mercury)
General Minerals	Various	Two 1-liter poly	Cool to 4 degrees Celsius	7 days after collection

APPPENDIX F

Chain-of-Custody Forms

323/114724-114734

5670

STREAMBORN CHAIN-OF-CUSTODY

Project Name: 21031 Western Blvd	Project Location: 21031 Western Blvd	Project Number: P178
Sampler: Douglas W. Lovell	Laboratory: Chromalab	Laboratory Number:

SUBM #: 9512323 REP: PM
CLIENT: STREAM
DUE: 12/29/95
REF #:25670

Sample Designation	Date	Time	Matrix			Type		Containers		Preservative	Filtration	Turnaround			Analyses						Sampler Comments	Laboratory Comments
			Soil	Water	Vapor	Grab	Composite	Quantity	Type			48-Hour	7- Working Days	10-Working Days	TPH-gas	BTEX	Lead					
B-1, S-4, 20.5-21	19-Dec-95		x			x		1	Liner						x	x	x					
B-1, S-5, 25.5-26	19-Dec-95		x			x		1	Liner						x	x	x					
B-1, S-6, 30.5-31	19-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-4, 20.5-21	20-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-5, 26-26.5	20-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-6, 30.5-31	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-4, 20.5-21	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-5, 25.5-26	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-6, 30.5-31	20-Dec-95		x			x		1	Liner						x	x	x					
MW-1, S-4, 25.5-26	19-Dec-95		x			x		1	Liner						x	x	x					
MW-2, S-3, 26-26.5	20-Dec-95		x			x		1	Liner						x	x	x					

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By: Douglas W. Lovell	Received By: [signature]	Date: 12-21-95 Time: 14:02
Relinquished By: [signature]	Received By: Jimmie Polk	Date: 12/21/95 Time: 15 10

STREAMBORN Mail: PO Box 8330, Berkeley CA 94707-8330 Office: 900 Santa Fe Ave, Albany CA 94706 510/528-4234 Fax: 528-2613

STREAMBORN CHAIN-OF-CUSTODY FORM

Project Name: 21031 Western Blvd.	Project Location: 21031 Western Blvd. Hayward CA	Project Number: P178
Sampler: Keith Beury	Laboratory: Chromalab	Laboratory Number:

Sample Designation	Date	Time	Matrix			Type		Containers		Preservative (HNO3)	Filtration (in Lab)	Turnaround			Analyses						Sampler Comments	Laboratory Comments
			Soil	Water	Vapor	Grab	Composite	Quantity	Type			48 Hours	7- Working Days	10-Working Days	Gas/BTEX	Dissolved Lead						
MW-1 (27Dec95)	27 Dec 1995	13:55		X		X		4	Various	X	X			X	X	X					Filter in lab (for dissolved Pb analysis)	
MW-2 (27Dec95)	27 Dec 1995	13:25		X		X		4	Various	X	X			X	X	X					Filter in lab (for dissolved Pb analysis)	
MW-3 (27Dec95)	27 Dec 1995	14:20		X		X		4	Various	X	X			X	X	X					Filter in lab (for dissolved Pb analysis)	

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By: Keith Beury	Received By: [signature]	Date: 12-28-95 Time: 1234
Relinquished By:	Received By:	Date: Time:

STREAMBORN Mail: PO Box 83304, Berkeley CA 94707-8330 Office: 900 Santa Fe Ave, Albany CA 94706 510/528-4234 Fax: 528-2613

APPPENDIX G

Laboratory Reports

CHROMALAB, INC.

Environmental Services (SDB)

December 28, 1995 *Submission #:* 9512323

STREAMBORN

Atten: Douglas Lovell

Project: 21031 WESTERN BLVD *Project#:* P178
Received: December 21, 1995

re: 11 samples for Gasoline and BTEX analysis.
Method: EPA 5030/8015M/8020

Sampled: December 19, 1995 *Matrix:* SOIL
Run: 9868-1 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114724	B-1,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114725	B-1,S-5,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.
114726	B-1,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.
114733	MW-1,S-4,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.

Sampled: December 20, 1995 *Matrix:* SOIL
Run: 9868-1 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114727	B-2,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114728	B-2,S-5,26-26.5	N.D.	N.D.	N.D.	N.D.	N.D.
114729	B-2,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.
114730	MW-3,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114731	MW-3,S-5,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.
114732	MW-3,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.

Sampled: December 20, 1995 *Matrix:* SOIL
Run: 9872-4 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114734	MW-2,S-3,26-26.5	N.D.	N.D.	N.D.	N.D.	N.D.

Reporting Limits	1.0	5.0	5.0	5.0	5.0
Blank Result	N.D.	N.D.	N.D.	N.D.	N.D.
Blank Spike Result (%)	98	109	106	107	106

June Zhao
Chemist

Marianne Alexander
Gas/BTEX Supervisor

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

December 28, 1995 *Submission #:* 9512323

STREAMBORN

Atten: Douglas Lovell

Project: 21031 WESTERN BLVD *Project#:* P178
Received: December 21, 1995

re: 11 samples for Lead analysis.
Method: EPA 3050M/7420

Sampled: December 19, 1995 *Matrix:* SOIL *Extracted:* December 28, 1995
Run: 9909-A *Analyzed:* December 28, 1995

Spl #	Sample ID	LEAD (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
114724	B-1,S-4,20.5-21	6.5	5.0	N.D.	97
114725	B-1,S-5,25.5-26	N.D.	5.0	N.D.	97
114726	B-1,S-6,30.5-31	N.D.	5.0	N.D.	97
114733	MW-1,S-4,25.5-26	N.D.	5.0	N.D.	97

Sampled: December 20, 1995 *Matrix:* SOIL *Extracted:* December 28, 1995
Run: 9909-A *Analyzed:* December 28, 1995

Spl #	Sample ID	LEAD (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
114727	B-2,S-4,20.5-21	N.D.	5.0	N.D.	97
114728	B-2,S-5,26-26.5	N.D.	5.0	N.D.	97
114729	B-2,S-6,30.5-31	N.D.	5.0	N.D.	97
114730	MW-3,S-4,20.5-21	6.2	5.0	N.D.	97
114731	MW-3,S-5,25.5-26	5.4	5.0	N.D.	97
114732	MW-3,S-6,30.5-31	N.D.	5.0	N.D.	97
114734	MW-2,S-3,26-26.5	N.D.	5.0	N.D.	97

Christopher Arndt
Chemist

John S. Labash
Inorganics Supervisor

CHROMALAB, INC.

Environmental Services (SDB)

January 12, 1996 *Submission #:* 9512372

STREAMBORN

Atten: Keith Beury

Project: 21031 WESTERN BLVD. *Project#:* P178
Received: December 28, 1995

re: 3 samples for Gasoline and BTEX analysis.
Method: EPA 5030/8015M/602/8020

Sampled: December 27, 1995 *Matrix:* WATER
Run: 9952-4 *Analyzed:* December 29, 1995

Spl #	Sample ID	Gasoline (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)
115200	MW-1 (27DEC95)	N.D.	N.D.	N.D.	N.D.	N.D.
115201	MW-2 (27DEC95)	N.D.	N.D.	N.D.	N.D.	N.D.
115202	MW-3 (27DEC95)	N.D.	N.D.	N.D.	N.D.	N.D.
Reporting Limits		0.05	0.5	0.5	0.5	0.5
Blank Result		N.D.	N.D.	N.D.	N.D.	N.D.
Blank Spike Result (%)		110	110	108	108	107

June Zhao
Chemist

Marianne Alexander
Gas/BTEX Supervisor

CHROMALAB, INC.

Environmental Services (SDB)

January 3, 1996 *Submission #:* 9512372

STREAMBORN

Atten: Keith Beury

Project: 21031 WESTERN BLVD. *Project#:* P178
Received: December 28, 1995

re: 3 samples for Lead in Drinking Water analysis.
Method: EPA 3005A M/6010

Sampled: December 27, 1995 *Matrix:* WATER *Extracted:* December 29, 1995
Run: 9949-C *Analyzed:* January 2, 1996

Spl #	Sample ID	LEAD (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE RESULT (%)
115200	MW-1 (27DEC95)	N.D.	0.005	N.D.	91
115201	MW-2 (27DEC95)	N.D.	0.005	N.D.	91
115202	MW-3 (27DEC95)	N.D.	0.005	N.D.	91

Charles Woolley
Chemist

John S. Labash
Inorganic Supervisor

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

APPPENDIX H

Survey Notes

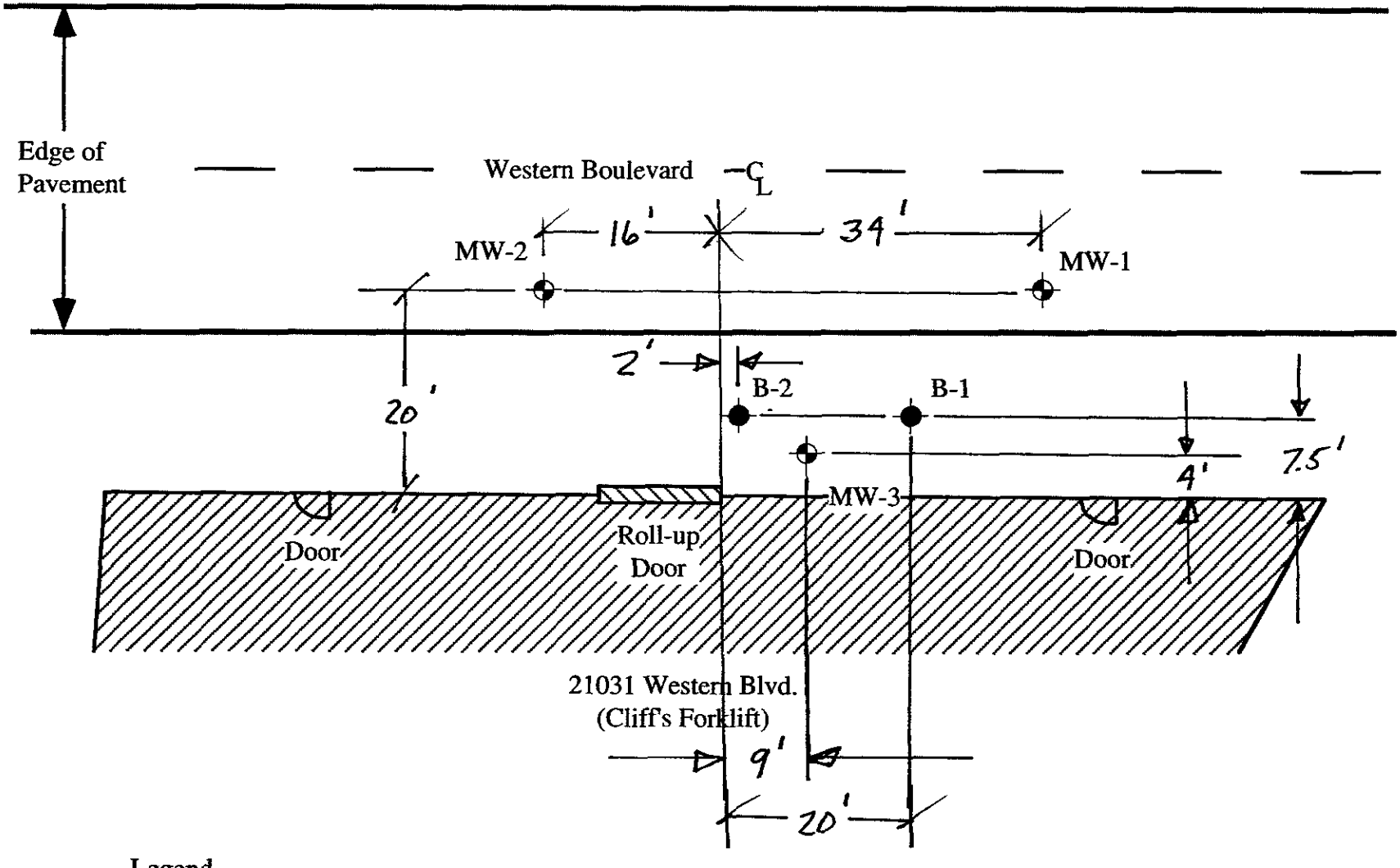
Dwr
20 Dec 95
P17B

Survey DWL & Phil/Hew

Cool, Sunny, Calm

Point	El	FS	HI	BS	EL
Center door, Top conc, S-side	1,000.00	5.25	1,005.25		
MW-1, TOC, N-side				5.62	999.63
MW-1, GS, N-side				5.16	1,000.09
MW-2, TOC, N-side				5.85	999.40
MW-2, GS, N-side				5.44	999.81
MW-3, TOC, N-side				5.53	999.72
MW-3, GS, N-side				5.09	1,000.16
B-1, GS, N-side				5.13	1,000.12
B-2, GS, N-side				5.55	999.70
Starting point				5.25	1,000.00 ✓

GS = ground surface. TOC = Top of PVC casing



Legend

MW-2 — Monitoring Well

B-1 — Soil Boring

Field Measurements
Dwr
20 Dec 95

Exploration Locations

21031 Western Boulevard
Hayward CA

APPPENDIX I

Well Development Logs

STREAMBORN MONITORING WELL DEVELOPMENT DATA

Project Name/Number: 21031 Western Blvd.	Logged By: Keith Beury
Property Location: Hayward CA	Date: 12/26/95
Well Number: MW-1	Depth to Water: 25.13 Post devel: = 25.14
Development Equipment: Bailer, purge pump	Total Depth: 34.8 Post devel: = 34.9
Measuring Point: TOC-N	Odor: None
Free Product: None	Comments:

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)		Depth to Water (feet)		0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well		Casing Volume (gallons)
34.8	-	25.1	x	0.16	=	1.55

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	10:45									Start development
5	10:50	4.0	6.76	736	17.2	140	Turbid	Brown	No	No odor, well
10	10:55	3.5	6.71	662	17.2	125	"	"	"	recharges quickly
15	11:03	4.4	6.77	659	17.7	115	Opaque	"	"	
20	11:15	3.8	6.74	639	17.2	115	"	"	"	
25	11:20	3.8	6.73	667	17.3	115	Trans	"	"	
30	11:30	3.5	6.77	657	16.8	115	"	"	"	

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

STREAMBORN MONITORING WELL DEVELOPMENT DATA

Project Name/Number:	21031 Western Blvd / P178	Logged By:	Keith Beury
Property Location:	Hayward, CA	Date:	12/26/95
Well Number:	MW-2	Depth to Water:	24.72 Post devel: = 24.75
Development Equipment:	Bailer, purge pump	Total Depth:	34.8 Post devel: = 34.8
Measuring Point:	TOC-N	Odor:	None
Free Product:	None	Comments:	

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)	-	Depth to Water (feet)	x	0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well	=	Casing Volume (gallons)
34.8	-	24.7	x	0.16	=	1.61

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	9:55									Start development
5	10:00	2.5	6.71	774	17.7	95	Turbid	Brown	No	
15	10:10	3.8	6.57	677	17.9	90	"	"	"	
20	10:20	3.4	6.60	688	18.1	80	"	"	"	
25	10:30	3.3	6.55	679	17.7	95	Opaque	"	"	
30	10:40	3.0	6.60	670	18.0	90	Trans.	"	"	

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

STREAMBORN MONITORING WELL DEVELOPMENT DATA

Project Name/Number:	21031 Western Blvd	Logged By:	Keith Beury
Property Location:	Hayward, CA	Date:	12/26/95
Well Number:	MW-3	Depth to Water:	25.26 Post devel: 25.30
Development Equipment:	Bailer; purge pump	Total Depth:	34.9 Post devel: 35.0
Measuring Point:	TOC-N	Odor:	None
Free Product:	None	Comments:	

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)	-	Depth to Water (feet)	x	0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well	=	Casing Volume (gallons)
34.9	-	25.2	x	0.16	=	1.55

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	8:50									Start development
5	9:00	1.0	6.60	1,010	17.5	140	Turbid	Brown	No	
15	9:10	3.4	6.58	719	17.1	105	"	"	"	
25	9:20	2.8	6.61	740	17.4	95	"	"	"	
35	9:30	3.2	6.55	720	17.4	105	Opaque	"	"	
45	9:40	2.7	6.66	690	17.7	90	Trans.	"	"	
50	9:50	2.7	6.61	684	17.7	85	"	"	"	

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

APPPENDIX J

Groundwater Sampling Forms

STREAMBORN MONITORING WELL PURGE DATA

Project Name/Number:	21031 Western Blvd	Logged By:	Keith Beury
Property Location:	Hayward CA	Date:	27 December 1995
Well Number:	MW-1	Sample Type:	Grab
Sampling Equipment:	Bailer	Depth to Water:	25.13
Measuring Point:	Top of Casing – north side	Total Depth:	34.9
Free Product:	None	Odor:	None
Comments:		Sample Number:	MW-1 (27DEC'95)

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)	-	Depth to Water (feet)	x	0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well	=	Casing Volume (gallons)
34.9	-	25.1	x	0.16	=	1.56

x 3 = 4.7
= 3 casing volumes

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	1:35									Start purge
0.5	1:40	4.2	6.75	NM	17.5	60	Opaque	Brown	No	
1.5	1:45	5.3	6.89	NM	17.9	50	"	"	"	
3.0	1:50	5.7	6.90	NM	17.7	30	"	"	"	
5.0	1:55	4.6	6.80	NM	17.7	35	Translucent	"	"	
										Collect sample 1:55

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

NM = Not measured

STREAMBORN MONITORING WELL PURGE DATA

Project Name/Number: 21031 Western Blvd	Logged By: Keith Beury
Property Location: Hayward CA	Date: 27 December 1995
Well Number: MW-1	Sample Type: Grab
Sampling Equipment: Bailer	Depth to Water: 24.73
Measuring Point: Top of Casing - North side	Total Depth: 34.8
Free Product: None	Odor: None
Comments:	Sample Number: MW-1(27DEC95)

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)	-	Depth to Water (feet)	x	0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well	=	Casing Volume (gallons)
34.8	-	24.7	x	0.16	=	1.61

x 3 = 4.8 gallons
= 3 casing volumes

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	1:05									Start purge
0.5	1:10	5.1	6.61	NM	18.4	60	Turbid	Brown	No	
1.5	1:15	5.3	6.60	NM	18.4	55	Turbid	Brown	No	
5.0	1:25	5.7	6.75	NM	18.3	75	Opaque	Brown	No	
										Collect sample 1:25

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

NM = Not Measured

STREAMBORN MONITORING WELL PURGE DATA

Project Name/Number:	21031 Western Blvd	Logged By:	Keith Beury
Property Location:	Hayward CA	Date:	27 December 1995
Well Number:	MW-3	Sample Type:	Grab
Sampling Equipment:	Bailer	Depth to Water:	25.27
Measuring Point:	Top of casing - north side	Total Depth:	35.0
Free Product:	None	Odor:	None
Comments:		Sample Number:	MW-3 (27 Dec 95)

Note obstructions, well damage, or other compromising features under comments. Record depth in feet.

Total Depth (feet)	-	Depth to Water (feet)	x	0.16 gallons/foot for 2-inch well 0.65 gallons/foot for 4-inch well 1.47 gallons/foot for 6-inch well	=	Casing Volume (gallons)
35.0	-	25.2	x	0.16	=	1.57

x 3 = 4.7
= 3 casing volumes

Purge Volume (gallons)	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µmhos/cm²)	Temp (°C)	ORP (mV)	Turbidity	Color	Purged Dry?	Comments
0	2:00									Start purge
0.5	2:05	5.3	6.70	NM	17.8	90	Translucent	Brown	No	
1.5	2:10	4.7	6.65	NM	17.9	65	"	"	"	
3.0	2:15	5.4	6.68	NM	17.5	65	"	"	"	
5.0	2:20	4.3	6.63	NM	17.9	70	"	"	"	
										Collect sample 2:20

Note observations of odor, sheen, and other signs of contamination under comments. Record turbidity as clear, translucent, opaque, cloudy, or turbid.

NM = Not measured

APPPENDIX K

Documentation For Landfill Profiling and Disposal of Soil Cuttings

STREAMBORN

510/528-4234
Fax 528-2613

Whitney King
Redwood Landfill
8950 Redwood Highway
P.O. Box 793
Novato CA 94948

4 January 1996

Project No. P178

Request for Authorization to Dispose of Soil at Redwood Landfill
21031 Western Boulevard
Hayward CA

Dear Mr. King:

The purpose of this letter is to request authorization to dispose of approximately 2.5 cubic yards of soil at Redwood Landfill. The soil was generated during drilling of 5 soil borings at the subject property. During drilling, 11 samples were collected for laboratory analysis. Samples were collected in clean brass liners, sealed with plastic end caps and duct tape, placed in a cooler with ice, and transported to Chromalab (Pleasanton CA) under chain-of-custody.

The samples were analyzed in the laboratory for total petroleum hydrocarbons as gasoline, benzene, toluene, ethylbenzene, xylenes, and total lead. Analytical results are summarized in Table 1. Results revealed nondetect or nonelevated concentrations of tested analytes in all samples. The laboratory reports and chain-of-custody form are also attached.

Please review the attached Generator's Waste Profile and call if you have any questions. Following your acceptance of the soil we will arrange delivery to Redwood Landfill.

Sincerely,

STREAMBORN

Keith Beury

Keith Beury
Environmental Engineer

Attachments

Mail: P.O. Box 9504, Berkeley CA 94709-0504

Office: 900 SantaFe Avenue, Albany CA 94706

Approval No.:

Redwood Landfill, Inc.

Generator's Waste Profile

IMPORTANT: This form must be completed by a Representative of the Waste Generator. The information on this form must be typed or legibly printed in ink and signed by an Authorized Agent of the Generator. Completed form bearing original signature must be provided to Redwood Landfill, Inc. PRIOR TO DISPOSAL.

1.0 Generator Information

1.1 Generator Name: William and Kathy Florence

1.2 Generating Facility Name: None

1.3 Facility Address: 21031 Western Blvd.
City: Hayward State: CA Zip: 94541

1.4 Company Representative: Keith Beury (Streamborn)
Title: Environmental Engineer

1.5 Emergency Contact: Mark Buscheck (Streamborn)
Title: Geologist

1.6 Local Registration No.: Not applicable

1.7 Generator's EPA ID No.: Not applicable

1.8 Facility Phone: (510) 581-5416

1.9 After Hours Phone: (510) 528-4234

1.10 Emergency Phone: (510) 528-2613

General Site Activity: Residential/Forklift Maintenance

2.0 Waste Description

2.1 General Waste Description: Nonhazardous soil

2.2 Process Generating Waste: Drill cuttings from soil investigation

2.3 Is this Waste "Hazardous Waste" as defined by Federal, State or Local Regulations: ____ Yes _X_ No

2.4 Has this waste ever been "Handled or "Disposed" of as a hazardous
No material No waste No disposed of via a "uniform hazardous waste manifest".
If yes, explain: ____

2.5 State/Local Regulatory Waste Identification Code Number: Not applicable

2.6 Waste Generation Rate: ____ Tons ±2.5 Cubic Yards ____ Other: ____
Per: ____ Day ____ Week ____ Year _X_ Other one-time

2.7 Waste will be transported in: ____ Roll Off Boxes ____ Drums (Type/Size): ____
____ Dump Trucks _X_ Other: Pickup Truck

3.0 Waste Properties at Room Temperature

3.1 Physical State:
_X_ Solid ____ Semi-Solid ____ Powder
____ Liquid ____ Combination ____

3.2 Odor: _X_ None ____ Mild ____ Strong

3.3 pH Range: 6.0 to: 8.0 (estimated)

3.4 Color(s): None

3.5 Percent Solid: >50 %

3.6 Flash Point F°: None

4.0 Transportation

4.1 Proper U.S. DOT Shipping Name: Not applicable

4.2 U.S. DOT Hazard Class: Not applicable (nonhazardous)

4.3 CERCLA Reportable Quantity: Not applicable

__X__ This Waste is NOT a DOT Hazardous Material

Transporter Name: Paul's Hauling
Address: 111 Dale Avenue
Piedmont CA 94610
Technical Contact: Keith Beury
Phone: 510/528-4234
State Hazardous Waste
Hauler License: Not applicable

5.0 Attached Information

5.1 ANALYTICAL (Check all that apply) **

__X__ TPH Gas/Diesel __X__ BTEX ____ TRPH ____ TCLP Analysis
____ Semivolatile Organics ____ Volatile Organics ____ Herbicides/Pesticides ____ Total Metals

5.2 ____ MSDS ____ Generator Certification ____ Other: Total lead

** __X__ Analytical data supplied from California State Certified Labs.

6.0 Billing Information

6.1 Bill To: Streamborn
P.O. Box 8330
Berkeley CA 94707-8330

Attention: Keith Beury
Phone No.: 510/528-4234
P.O. #: P178
Job #:

6.2 Does customer have a current account with Redwood Landfill, Inc.? ____ Yes __X__ No

I hereby certify that all information supplied is truly representative of the above mentioned waste. I agree to notify Redwood Landfill, Inc. if there is a change in the waste stream information submitted for acceptance. I also authorize Redwood Landfill, Inc. to periodically reanalyze the waste, at my expense. I also certify that all samples were collected according to EPA Method SW-846 and that samples were analyzed by a California State Certified Lab and that the appropriate chain of custody was attached. **I further certify that the wastes submitted for disposal are non-hazardous in accordance with the California State Health and Safety Code, and the Code of Federal Regulations and any applicable local laws or regulations.**

Printed Name Kathy Florence Company or Business None

Generator Signature Keith Beury For Kathy Florence Date 4 January 1996

INTERNAL USE ONLY - DO NOT WRITE BELOW THIS LINE

FACILITY DECISION	BILLING INFORMATION
___ Accept ___ Reject By:	___ Accept ___ Reject By:
Comments:	Comments:
	Redwood Landfill, Inc. Account No.:

Verbal acceptance provided by Whitney King on 8 January 1996. Accept # 823RC

Table 1

Soil Analytical Results for Borings

Location	Depth Interval (feet)	Sample Date	Sample Identification	Collected by	Sample Type	Visual Classification	Odor or Staining	TPH-Gasoline (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Total Lead (mg/kg)
B-1	±20.5-21.0	19 Dec 1995	B-1,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	6.5
	±25.5-26.0	19 Dec 1995	B-1,S-5,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±30.5-31.0	19 Dec 1995	B-1,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
B-2	±20.5-21.0	20 Dec 1995	B-2,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±26.0-26.5	20 Dec 1995	B-2,S-5,26-26.5	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
	±30.5-31.0	20 Dec 1995	B-2,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-1	±25.5-26.0	19 Dec 1995	MW-1,S-4,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-2	±26.0-26.5	20 Dec 1995	MW-2,S-3,26-26.5	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0
MW-3	±20.5-21.0	20 Dec 1995	MW-3,S-4,20.5-21	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	6.2
	±25.5-26.0	20 Dec 1995	MW-3,S-5,25.5-26	Streamborn	Grab (liner)	CL or CH - Clay	None	<1.0	<0.005	<0.005	<0.005	<0.005	5.4
	±30.5-31.0	20 Dec 1995	MW-3,S-6,30.5-31	Streamborn	Grab (liner)	SM - Silty Sand	None	<1.0	<0.005	<0.005	<0.005	<0.005	<5.0

General Notes

(a) TPH-Gasoline = Total petroleum hydrocarbons as gasoline.

(b) *< indicates concentration below detection limit (shaded values).*

(c) Laboratory analysis performed by Chromalab, Pleasanton CA.

CHROMALAB, INC.

Environmental Services (SDB)

December 28, 1995

Submission #: 9512323

STREAMBORN

Attn: Douglas Lovell

Project: 21031 WESTERN BLVD *Project#:* P178
Received: December 21, 1995

re: 11 samples for Gasoline and BTEX analysis.
Method: EPA 5030/8015M/8020

Sampled: December 19, 1995 *Matrix:* SOIL
Run: 9868-1 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114724	B-1,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114725	B-1,S-5,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.
114726	B-1,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.
114733	MW-1,S-4,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.

Sampled: December 20, 1995 *Matrix:* SOIL
Run: 9868-1 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114727	B-2,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114728	B-2,S-5,26-26.5	N.D.	N.D.	N.D.	N.D.	N.D.
114729	B-2,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.
114730	MW-3,S-4,20.5-21	N.D.	N.D.	N.D.	N.D.	N.D.
114731	MW-3,S-5,25.5-26	N.D.	N.D.	N.D.	N.D.	N.D.
114732	MW-3,S-6,30.5-31	N.D.	N.D.	N.D.	N.D.	N.D.

Sampled: December 20, 1995 *Matrix:* SOIL
Run: 9872-4 *Analyzed:* December 22, 1995

Spl #	Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
114734	MW-2,S-3,26-26.5	N.D.	N.D.	N.D.	N.D.	N.D.
	Reporting Limits	1.0	5.0	5.0	5.0	5.0
	Blank Result	N.D.	N.D.	N.D.	N.D.	N.D.
	Blank Spike Result (%)	98	109	106	107	106

June Zhao
Chemist

Marianne Alexander
Gas/BTEX Supervisor

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

December 28, 1995

Submission #: 9512323

STREAMBORN

Atten: Douglas Lovell

Project: 21031 WESTERN BLVD
Project#: P178
Received: December 21, 1995

re: 11 samples for Lead analysis.
Method: EPA 3050M/7420

Sampled: December 19, 1995 Matrix: SOIL Extracted: December 28, 1995
Run: 9909-A Analyzed: December 28, 1995

Spl #	Sample ID	LEAD (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
114724	B-1,S-4,20.5-21	6.5	5.0	N.D.	97
114725	B-1,S-5,25.5-26	N.D.	5.0	N.D.	97
114726	B-1,S-6,30.5-31	N.D.	5.0	N.D.	97
114733	MW-1,S-4,25.5-26	N.D.	5.0	N.D.	97

Sampled: December 20, 1995 Matrix: SOIL Extracted: December 28, 1995
Run: 9909-A Analyzed: December 28, 1995

Spl #	Sample ID	LEAD (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
114727	B-2,S-4,20.5-21	N.D.	5.0	N.D.	97
114728	B-2,S-5,26-26.5	N.D.	5.0	N.D.	97
114729	B-2,S-6,30.5-31	N.D.	5.0	N.D.	97
114730	MW-3,S-4,20.5-21	6.2	5.0	N.D.	97
114731	MW-3,S-5,25.5-26	5.4	5.0	N.D.	97
114732	MW-3,S-6,30.5-31	N.D.	5.0	N.D.	97
114734	MW-2,S-3,26-26.5	N.D.	5.0	N.D.	97

Christopher Arndt
Chemist

John S. Labash
Inorganics Supervisor

323/114724-114734

25670

STREAMBORN CHAIN-OF-CUSTODY

Project Name 21031 Western Blvd	Project Location: 21031 Western Blvd	Project Number: P178
Sampler: Douglas W. Lovell	Laboratory: Chromalab	Laboratory Number:

SUBM #: 9512323 REP: PM
CLIENT: STREAM
DUE: 12/29/95
REF #:25670

Sample Designation	Date	Time	Matrix			Type		Containers		Preservative	Filtration	Turnaround			Analyses						Sampler Comments	Laboratory Comments
			Soil	Water	Vapor	Grab	Composite	Quantity	Type			48-Hour	7-Working Days	10-Working Days	TPH-gas	BTEX	Lead					
B-1; S-4, 20.5-21	19-Dec-95		x			x		1	Liner						x	x	x					
B-1; S-5, 25.5-26	19-Dec-95		x			x		1	Liner						x	x	x					
B-1, S-6, 30.5-31	19-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-4, 20.5-21	20-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-5, 26-26.5	20-Dec-95		x			x		1	Liner						x	x	x					
B-2, S-6; 30.5-31	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-4; 20.5-21	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-5, 25.5-26	20-Dec-95		x			x		1	Liner						x	x	x					
MW-3, S-6; 30.5-31	20-Dec-95		x			x		1	Liner						x	x	x					
MW-1, S-4, 25.5-26	19-Dec-95		x			x		1	Liner						x	x	x					
MW-2, S-3, 26-26.5	20-Dec-95		x			x		1	Liner						x	x	x					

Note: Sampler and laboratory to observe preservative, condition, integrity, etc. of samples and record (under "Comments") any exceptions from standard protocols.

Relinquished By: Douglas W. Lovell	Received By: [illegible]	Date: 12-21-95 Time: 14:02
Relinquished By: [illegible]	Received By: [illegible]	Date: 12/21/95 Time: 15:10

STREAMBORN Mail: PO Box 8330, Berkeley CA 94707-8330 Office: 900 Santa Fe Ave, Albany CA 94706 510/528-4234 Fax: 528-2613

REDWOOD LANDFILL INC.
8950 REDWOOD HIGHWAY
P.O. BOX 793
NOVATO, CALIFORNIA 94948
TEL: (415) 892-2851
FAX: (415) 898-1354

- PERSONS USING THESE PREMISES DO SO AT THEIR OWN RISK.
- CHILDREN AND PETS ARE NOT ALLOWED OUT OF VEHICLES.
- NO RUMMAGING IN DUMP AREA.
- NO SMOKING ON DUMP SITE.
- FOR YOUR OWN SAFETY, WE RECOMMEND THAT YOU WEAR LEATHER WORK SHOES WITH REINFORCED SOLES, HEAVY SAFETY GLOVES, SAFETY GLASSES, WORK CLOTHING, AND CARRY A DUST MASK.
- PLEASE YIELD TO EQUIPMENT.
- PLEASE NOTIFY OFFICE OF ANY COMPLAINT.
- THANK YOU!

X _____
DRIVER'S SIGNATURE

RECEIVED BY: RHONDA D. SAG

ACCOUNT NUMBER: 0 CUSTOMER:
JOB NUMBER: PC823 DESC: PC823
VEHICLE: TIME: 10:58:52 DATE: 1/10/96
COMMODITY: PC. DIRT YARDS: 2.00 LOAD #: 204
PER YARD 14.00 FEE 28.00

TOTAL 35.00

MINIMUM CHG CUSTOMER COPY
B0/S0-0 *** CASH *** LOAD TICKET #: 21372