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INITIAL INVESTIGATION  
OF GROUND WATER CONTAMINATION  
CLARK'S HOME & GARDEN  
23040 CLAWITER ROAD  
HAYWARD, CALIFORNIA

PROJECT 4983

*Sept 91*

For

Mr. Chester Clark  
521 Triller Lane  
Grants Pass, Oregon  
97527

By

Terratech, Inc.  
1365 Vander Way  
San Jose, California 95112

September 5, 1991



INITIAL INVESTIGATION OF GROUND WATER CONTAMINATION  
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PROJECT 4983

INTRODUCTION

This report describes the work performed and the findings from Terratech's investigation of the shallow soil and ground water at 23040 Clawiter Road in Hayward (see Figure 1). The investigation is being performed according to the requirements of the Alameda County Health Agency (ACHA) as follow-up to a fuel leak discovered when two underground storage tanks were removed from the site in 1988.

BACKGROUND

In November 1988 two underground storage tanks - one previously containing diesel and one containing gasoline - were removed from the subject property. Soil samples collected from the vicinity of the former tanks were found to contain total petroleum hydrocarbons (TPH) as diesel up to 24,000 parts per million (ppm). Lower concentrations of TPH as gasoline and the specific fuel compounds - benzene, toluene, ethylbenzene and xylenes (BTEX) were also discovered in the soil.

Because the contaminants discovered in-place exceeded local and state regulatory action levels, the ACHA requested an investigation into the extent of ground water impact beneath the site.

SUMMARY OF WORK PERFORMED

The following work was performed for this investigation:

1. Submitted a copy of our Work Plan for review and comment to the ACHA.
2. Contacted local regulators and reviewed regulatory files at the Regional Water Quality Control Board (RWQCB) and Hayward Fire Department to obtain information on nearby fuel leak cases.
3. Obtained a well construction permit from the Alameda County Zone 7 Water District, which has local jurisdiction over monitoring well installations. A copy of the executed permit is presented in Appendix A.



4. On August 1, 1991 monitoring well MW-1 was installed approximately 8 feet west (estimated down-gradient direction) of the former tank installation (see Figure 2). The drilling, soil sampling, and monitoring well construction were performed by West Tek Drilling, a C-57 licensed drilling contractor from San Jose. An environmental geologist from our staff provided professional guidance during drilling and well construction activities, and prepared a log of the soil conditions and an as-built sketch of MW-1.

The exploration drill hole logs and as-built monitoring well diagram are presented in Appendix A.

MW-1 was constructed and sealed according to RWQCB guidelines, with a locking protective vault, and traffic-rated Christy box installed slightly above the ground surface to inhibit inflow of surface runoff.

All drilling and sampling equipment were cleaned prior to use to minimize the risk of introducing or spreading contamination. The soils encountered were logged using the Unified Soil Classification System with visual-manual procedures (ASTM D2488-84).

Soil samples were collected from the boring at five-foot vertical intervals starting at a depth of roughly 5 feet and continuing to the bottom of the boring at 26 feet. Samples were obtained using an 18-inch long Modified California split-spoon sampler containing 2-inch diameter brass liners.

The ends of the liners retained for consideration for subsequent laboratory analysis were sealed with aluminum foil and taped end caps. The liners were then individually labeled and iced for preservation.

Selected samples were screened in the field for the presence of volatile organic constituents using a PHOTOVAC MICROTIP portable photoionization detector (PID) with a 10.6 eV lamp. The PID was calibrated at the beginning of the field day using isobutylene at 100 parts per million by volume (ppmv) in air as the "span gas" and ambient air as the "zero gas".

For screening purposes, soil was placed a glass container which was covered with aluminum foil then allowed to sit for roughly 5 minutes. The vapors which accumulated in the jar were then drawn into the PID by puncturing the foil seal with the instrument's sampling tip. Positive PID readings recorded in the field are shown on the drill logs in Appendix A.



5. According to ACHA recommendations, one soil sample was also collected from native soil beneath the former fuel dispenser (see Figure 2).
6. Submitted three unsaturated soil samples from the MW-1 boring (from 5.5 feet, 10.5 feet and 15 feet), and the sample from the fuel dispenser area (DH-1) to NET Pacific, a State-certified laboratory in Santa Rosa. The laboratory was instructed to analyze the samples for TPH as gasoline, TPH as diesel, and BTEX using California RWQCB approved testing procedures.
7. On August 5th, following a minimum 72-hour seal-solidifying period, we developed MW-1 by removing approximately 10 well volumes of water using Teflon bailer.
8. On August 7th, we purged and sampled MW-1 using a Teflon bailer. Temperature, pH and specific conductance were measured during purging until stable readings (<10% variation) were obtained. Approximately four well volumes of water were removed prior to sampling. All sampling and purging equipment was steam cleaned at our office prior to travel to the site.

Ground water was carefully transferred from the bailer into 40-ml volatile organic analysis (VOA) vials and 1-liter amber glass jars supplied by the testing laboratory. The vials were filled until a positive meniscus formed, sealed with a Teflon septum and screw cap then inverted and tapped to confirm the absence of air bubbles. All containers were then labelled and placed on ice for preservation.

9. Submitted the ground water samples to NET Pacific for analysis for TPH as gasoline, TPH as diesel, and BTEX, using California RWQCB approved testing procedures.
10. Evaluated the data collected and prepared this report presenting our findings, comments and recommendations.

Soil cuttings from the drilling operation and ground water from development and purging activities were placed in closed, labeled 55-gallon drums and left on-site.

Standard chain of custody procedures were followed to document all sample collection, handling and analytical requests.



FINDINGSSurrounding Conditions

The following information was obtained from our discussions and review of regulatory files on surrounding fuel leak cases:

*Oliver de Silva, Inc. - 22991 Clawiter Road*

This site is approximately 40 feet northwest of the subject project site on the west side of Clawiter Road. We understand four underground storage tanks exist at the site: a 12,000-gallon gasoline tank, a 12,000-gallon diesel tank, a 4,000-gallon motor oil tank and a 400-gallon waste oil tank. In 1988, during replacement of the three larger tanks, fuel contamination was discovered in the soil. Some excavation was performed to remove contaminated soil, however, according to a report prepared by Azonic, excavation efforts did not remove all soil containing TPH as gasoline and BTEX "above local cleanup levels".

Four ground water monitoring wells presently exist on-site. Two of the wells were apparently installed in 1986 before replacement of the tanks. In 1986, one of these initial wells was found to contain 8,100 parts per billion (ppb) total volatile hydrocarbons, and elevated benzene, toluene and xylenes levels. The other well was found to contain 48,000 ppb oil and grease. Two additional wells were installed after the tank replacements. In 1988, one of the wells was reportedly found to contain contamination "above local cleanup levels". Another well contained floating fuel product. We have been unable to locate additional reliable information on the exact levels of contaminants detected in the ground water. The ground water gradient measured at this site in 1988 was slightly north of west, making it down gradient from Clark's Home and Garden.

Mr. Hugh Murphy with the Hayward Fire Department recently informed us that he has not received information on sampling or analysis performed to monitor this site since 1988. He also stated that the responsible party has been directed to submit a ground water remediation plan.

*Alhambra Water - 22990 Clawiter Road*

This site is immediately adjacent to the northern property line of the subject site (down/cross gradient), on the east side of Clawiter Road. The Alhambra site is noted to have contained a 10,000-gallon underground gasoline storage tank, a 5,000-gallon diesel tank, and a 500-gallon waste oil tank. In July 1986, the 10,000-gallon gasoline tank was removed and replaced with a 12,000-gallon tank. Soil samples collected at that time were found to contain up to 520 ppm TPH as gasoline.

A recent Fire Department inspection form noted that as of June 1991, the contents of the 12,000-gallon tank had been changed to diesel. No ground water monitoring wells had been installed.

Mr. Murphy informed us that he is in the process of reviewing a work plan to address the contamination found on the Alhambra site.



*Process Construction, Inc. (PCI) - 23520 Clawiter Road*

This site is approximately 500 feet south of the subject project site (up/cross gradient), on the east side of Clawiter Road. In January 1989 a 1,000-gallon underground gasoline storage tank was removed from the PCI site, and soil contamination discovered. Three ground water monitoring wells were subsequently installed in July 1989. According to a December 1989 report by SCS Engineers, in July 1989, tests on water from the wells north and east of the former tank did not detect gasoline or BTEX. The well nearest to (approximately 10 feet from) the west side of the former tank was found to contain 28,300 ppb TPH as gasoline and high levels of BTEX. In November 1989, the well nearest the tank contained 0.5 feet of free floating product. Another well further west (approximately 40 feet from the tank) was found to contain 2,990 ppb TPH as gasoline and elevated BTEX.

Mr. Murphy informed us no additional work has been performed at this site, and he suspects the plume to be migrating westward. He is apparently in the process of reviewing a ground water remediation plan for the site.

*Berkeley Farms (formerly Lawrence Dairy) - 23555 Saklan Avenue*

This site is just southeast (up gradient) of the project site on the west side of Saklan Avenue. In 1988 an 8,000-gallon underground diesel storage tank was removed from the site. Floating fuel product was allegedly discovered in an old agricultural well on that site. During June 1990 five ground water monitoring wells were installed.

This site is being overseen by the ACHA. We have been unable to obtain analytical information for review, however, Ms. Pamela Evans with the ACHA informed us that 22,000 ppb TPH (type unknown) was reportedly found in one of the on-site wells (according to a report dated June 1991). There is apparently no more floating product on site, and perimeter wells were not found to contain detectable petroleum hydrocarbons. Ms. Evans stated that she believes the plume has been defined and is within the property boundaries. The responsible party has a quarterly monitoring report due this September. ↴

On-Site Subsurface Conditions

The soil in the vicinity of DH-1 near the former fuel dispenser consists of gravel fill to roughly 1.5 feet below the ground surface. This fill is underlain by clay to a depth of 5.5 feet, the bottom of DH-1. The subsurface stratigraphy in the vicinity of MW-1 consists of gravel and clay fill to a depth of roughly 4.5 feet below the ground surface. The fill is underlain by varying interbedded layers sands and clays to a depth of 26 feet - the maximum depth explored during this investigation.

Saturated soils were first encountered during drilling at a depth of approximately 15 feet. Free ground water was encountered at roughly 17 feet. Immediately prior to our August 5th and 7th development and sampling events, the



water was measured at approximately 17.4 feet below the ground surface. Our observations indicate that ground water exists beneath the site under unconfined or "water table" conditions.

For a detailed description of subsurface conditions encountered during this investigation, see the exploration drill hole logs presented in Appendix A.

#### Soil Contamination

A fuel odor was noticed in the clay from DH-1 beginning at a depth of approximately 1.5 feet. The odor persisted to the bottom of that boring at 5.5 feet. A greyish staining and fuel odor were first noticed in the soil from the MW-1 boring at approximately 10.5 feet and persisted to roughly 21 feet. The sample collected from around 25 feet did not display staining or fuel odors.

Field PID readings of soil screened from the DH-1 boring registered 282 ppmv at roughly 5 feet. PID readings on soil from the MW-1 boring ranged from 61.8 ppmv on the soil cuttings from roughly 12 feet, to 2,153 ppmv at 15 feet. These PID readings (which are used strictly for qualitative purposes) appear to be generally consistent with laboratory analyses (discussed below). The appended drill hole logs display field PID readings.

Laboratory analysis of the soil sample collected from DH-1 at 5 feet detected 9.9 ppm TPH as gasoline, 29 ppm TPH as diesel, and trace BTEX levels (from 0.3 to 0.0027 ppm). The samples from MW-1 at 5.5 feet and 10.5 feet were not found to contain analyzed fuel constituents above laboratory detection levels. The MW-1 soil sample from 15 feet was found to contain 6,700 ppm TPH as gasoline, 350 ppm TPH as diesel, and low levels of ethylbenzene and xylenes (6.6 ppm and 27 ppm, respectively).

A summary of the results of laboratory analysis of soil samples is presented in Table 1. A copy of the laboratory report is presented in Appendix B.

#### Ground Water Contamination

Our sampling technician noticed a fuel odor in the ground water removed from MW-1 during the August 5th and 7th development and sampling activities. A product sheen was also noted on the surface of drummed purge water.

Laboratory analyses of the shallow ground water sample from MW-1 detected 5,900 parts per billion (ppb) TPH as gasoline, 7,100 ppb TPH as diesel, 45 ppb benzene, 130 ppb ethylbenzene, and 520 ppb xylenes.

A summary of the results of laboratory analysis of ground water is presented in Table 2. A copy of the laboratory report is presented in Appendix B.



September 5, 1991

Project 4983

COMMENTS AND RECOMMENDATIONS

Our observations and laboratory analyses indicate that leakage from the former tank installation has impacted shallow soil and ground water beneath the subject site. Some of the detected compounds were found to exceed state regulatory action levels for drinking water (see Table 2).

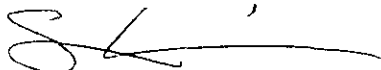
To monitor the persistence or abatement of fuel contamination, and according to requirements set forth by the ACHA, we will be proceeding with two consecutive monthly ground water sampling rounds, and then four quarterly rounds for one year, as contracted. Reports will be submitted accordingly, following completion of the next two monthly sampling/testing rounds, and after each subsequent quarterly event.

LIMITATIONS

This report and the associated work have been provided in accordance with the general principles and practices currently employed in the environmental consulting profession. This is in lieu of all warranties, express or implied. Our sampling and testing program is necessarily limited.

Report Prepared by:

TERRATECH, INC.



Shiela M. Chrisley  
Project Environmental Geologist

Reviewed by:



Eric R. Lautenbach  
CE 42437



cc: Mr. Hugh Murphy - Hayward Fire Department  
Ms. Pamela Evans - Alameda County Health Care Agency  
Mr. Richard Hiatt - Regional Water Quality Control Board





**TABLE 1**

**SUMMARY OF SOIL SAMPLE ANALYSIS RESULTS**

**Clark's Home and Garden Center  
23040 Clawiter Road  
Hayward, California**

(Concentrations are in parts per million (ppm))

Sample Location	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes
MW-1 @ 5.5'	ND	ND	ND	ND	ND	ND
MW-1 @ 10.5'	ND	ND	ND	ND	ND	ND
MW-1 @ 15.0'	350	6,700	ND	ND	6.6	27
DH-1 @ 5.0'	29	9.9	.0027	.028	.120	.3
Detection Limit	1	1	.0025	.0025	.0025	.0025

NOTES:

TPH = Total petroleum hydrocarbons

ND = Not detected above laboratory's reliable quantification threshold.



**TABLE 2**

**SUMMARY OF GROUND WATER SAMPLE ANALYSIS RESULTS**

**Clark's Home and Garden Center  
23040 Clawiter Road  
Hayward, California**

(Concentrations are in parts per billion (ppb))

Sample Location	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes
MW-1	7,100	5,900	45	ND	130	520
Detection Limit	500	500	0.5	0.5	0.5	0.5
Action Level/MCL	--	--	1	100	680	1,750

NOTES:

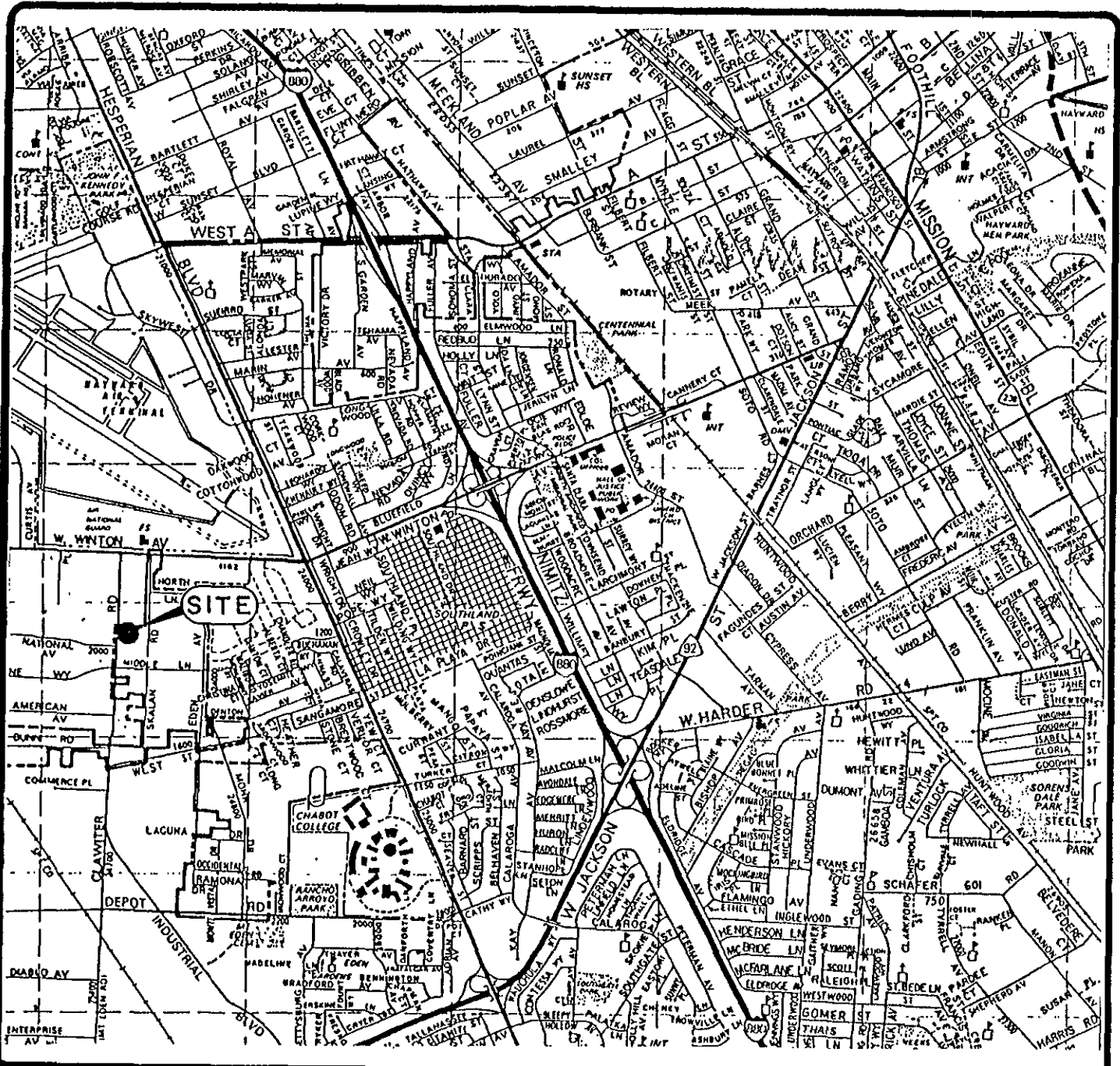
TPH = Total petroleum hydrocarbons

ND = Not detected above laboratory's reliable quantification threshold.

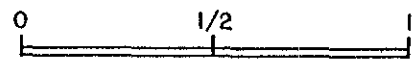
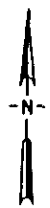
Action Levels and Maximum Contaminant Levels (MCL) are for contaminants in drinking water, as established by the California Department of Health Services.

-- = MCL not established for TPH in drinking water. Action Levels are established on a site-specific basis.





BASE MAP: Thomas Brothers Maps; Alameda County  
1990 edition; p. 58.



Scale in miles

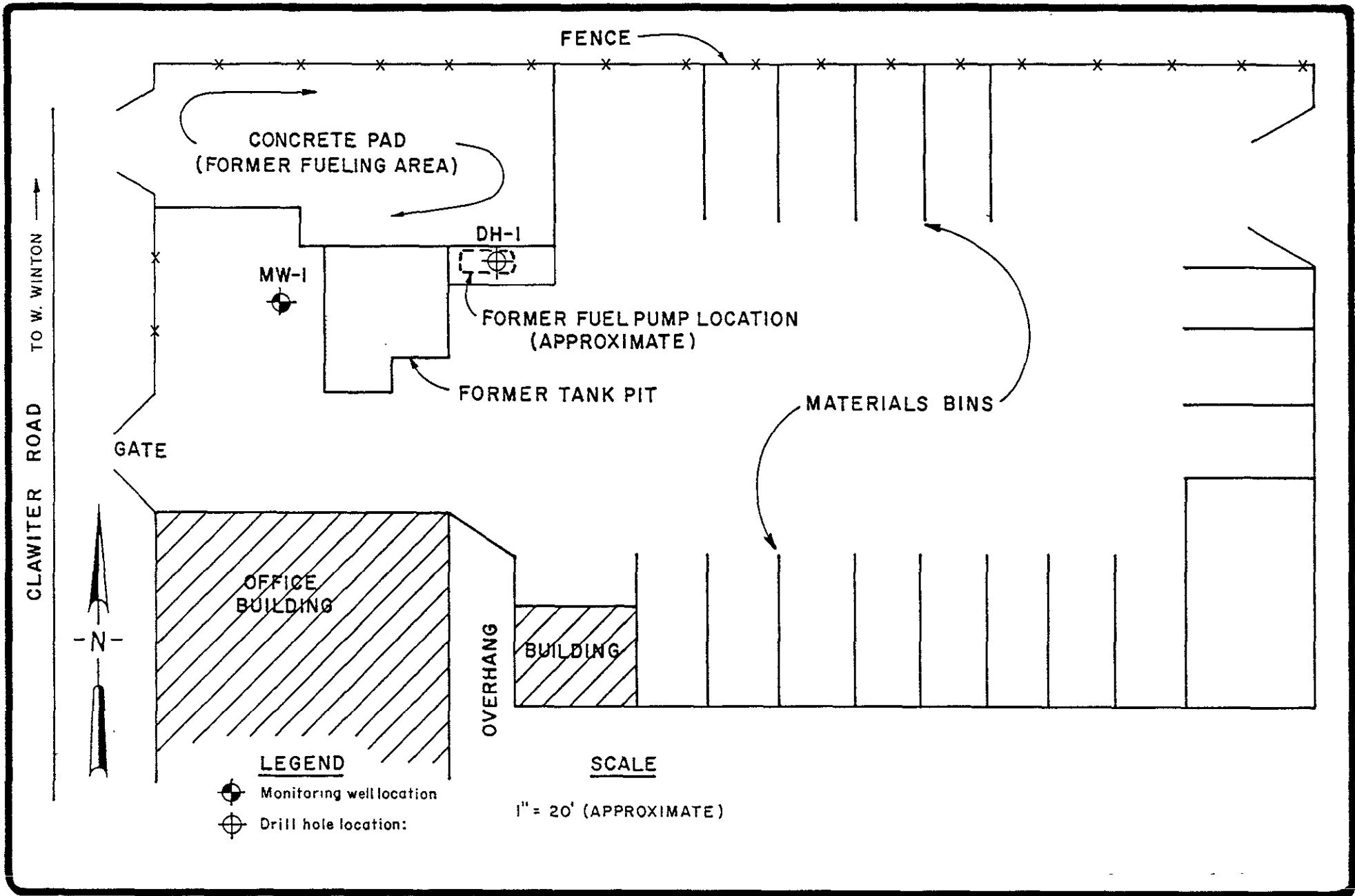


AUG. 1991  
**TERRATECH**

CLARK'S HOME AND GARDEN  
23040 CLAWITER ROAD  
HAYWARD, CALIFORNIA

**SITE VICINITY MAP**

**FIGURE**  
**1**  
**PROJECT**  
**4983**




AUG. 1991  
**TERRATECH**

CLARK'S HOME AND GARDEN  
 23040 CLAWWATER ROAD  
 HAYWARD, CALIFORNIA

**SITE PLAN**

**FIGURE**  
 2  
**PROJECT**  
 4983

APPENDIX A

ALAMEDA COUNTY ZONE 7 WELL CONSTRUCTION PERMIT,  
AS-BUILT MONITORING WELL DIAGRAM,  
EXPLORATORY DRILL HOLE LOGS



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

FOR OFFICE USE

1) LOCATION OF PROJECT Clark Home & Garden 23040 Clamwater Road Hayward, CA

PERMIT NUMBER 91385 LOCATION NUMBER

CLIENT Name Chester Clark Address 561 Triller Lane Phone (503) 476-1588 City Grants Pass, OR Zip 97527

PERMIT CONDITIONS

Circled Permit Requirements Apply

3) APPLICANT Name Terratech, Inc. Address 11635 Vander Way Phone (408) 297-6969 City San Jose, CA Zip 95122

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.

DESCRIPTION OF PROJECT Water Well Construction X Geotechnical Investigation Cathodic Protection General Well Destruction Contamination

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, irrigation, and monitoring wells unless a lesser depth is specially approved.

5) PROPOSED WATER WELL USE Domestic Industrial Irrigation Municipal Monitoring X Other

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.

PROPOSED CONSTRUCTION Drilling Method: Mud Rotary Air Rotary Auger X (Hollow-stem) Cable Other

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

DRILLER'S LICENSE NO. C57: 500139

E. WELL DESTRUCTION. See attached.

WELL PROJECTS Drill Hole Diameter 10 in. Maximum Casing Diameter 4 in. Depth 25 ft. Surface Seal Depth 13 ft. Number 1

\* Drilling may not start before 21 Jul 91.

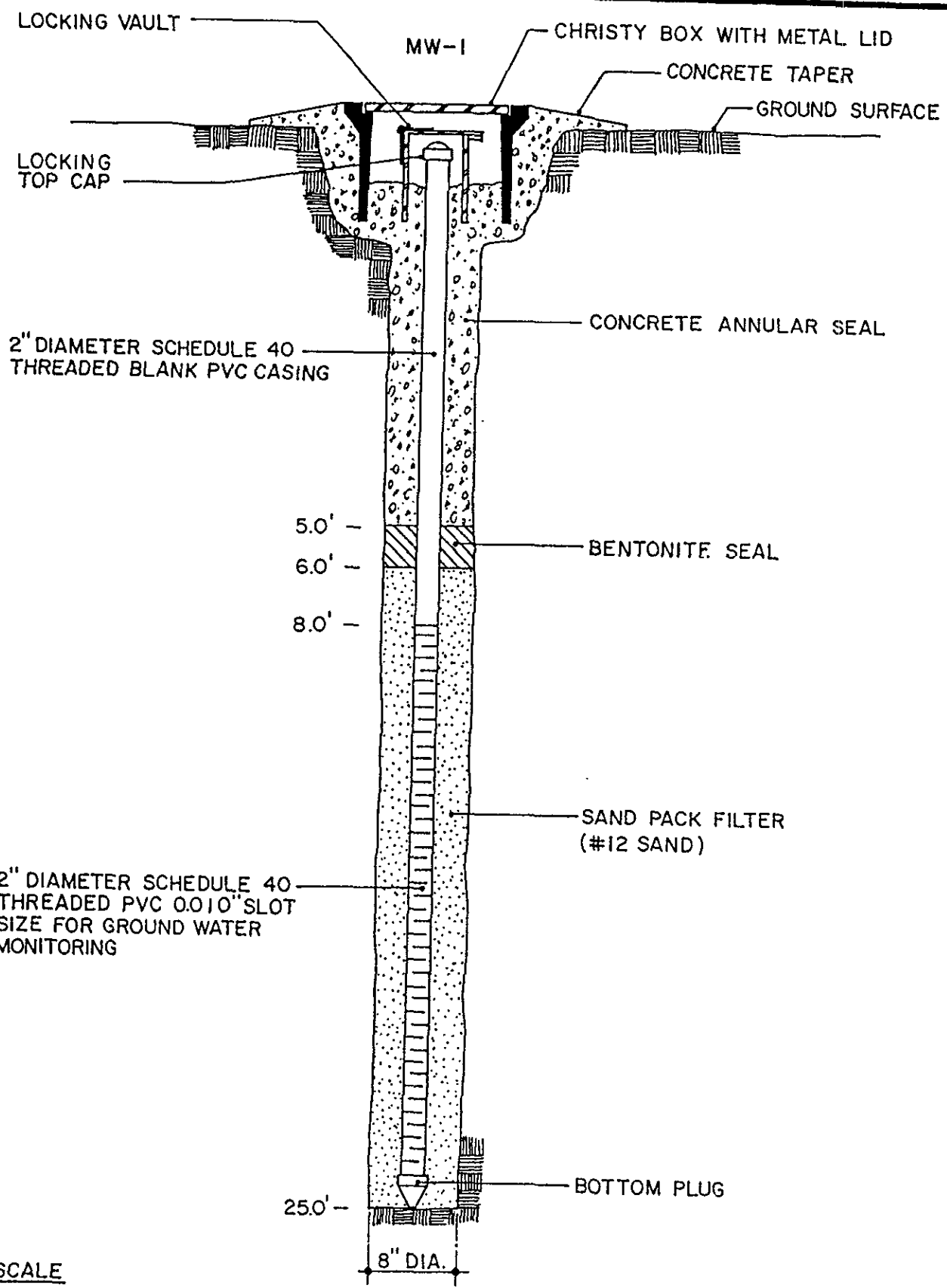
GEOTECHNICAL PROJECTS Number of Borings Maximum Hole Diameter in. Depth ft.

7) ESTIMATED STARTING DATE July 23, 1991 ESTIMATED COMPLETION DATE July 23, 1991

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

Approved Wyman Hong Date 11 Jul 91

APPLICANT'S SIGNATURE Date 7-8-91 Terratech, Inc.



NOT TO SCALE



AUG. 1991  
**TERRATECH**

CLARK'S HOME AND GARDEN  
 23040 CLAWITER ROAD  
 HAYWARD, CALIFORNIA

AS-BUILT MONITORING WELL DIAGRAM

FIGURE  
 3  
 PROJECT  
 4983

# KEY TO EXPLORATORY BORING LOGS

## SOIL CLASSIFICATION

PRIMARY DIVISIONS		GROUP SYMBOL	SECONDARY DIVISIONS		
<b>COARSE GRAINED SOILS</b> More than half of material is larger than No. 200 sieve size	<b>GRAVELS</b> More than half of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	
		Gravel with fines	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.	
		<b>SANDS</b> More than half of coarse fraction is smaller than No. 4 Sieve	Clean Sands (less than 5% fines)	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			Sands with fines	GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	<b>FINE GRAINED SOILS</b> More than half of material is smaller than No. 200 sieve size	<b>SILTS AND CLAYS</b> Liquid Limit is less than 35 ("lean")	SW	Well graded sands, gravelly sands, little or no fines.	
			SP	Poorly graded sands or gravelly sands, little or no fines.	
			SM	Silty sands, sand-silt mixtures, non-plastic fines.	
		<b>SILTS AND CLAYS</b> Liquid Limit is between 35 and 50	SC	Clayey sands, sand-clay mixtures, plastic fines.	
ML			Inorganic silts, clayey silts, rock flour, very silty fine sands.		
CL			Inorganic clays of low plasticity, gravelly clays of low plasticity.		
<b>SILTS AND CLAYS</b> Liquid Limit is greater than 50 ("fat")		OL	Organic silts and organic silty clays of low plasticity.		
		MI	Inorganic silts, clayey silts and silty fine sands of intermediate plasticity.		
	CI	Inorganic clays, gravelly clays, sandy clays and silty clays of intermediate plasticity.			
	OI	Organic clays and silty clays of intermediate plasticity.			
<b>SILTS AND CLAYS</b> Liquid Limit is greater than 50 ("fat")	MH	Inorganic silts, clayey silts, elastic silts, micaceous or diatomaceous silty or fine sandy soils.			
	CH	Inorganic clays of high plasticity.			
	OH	Organic clays and silts of high plasticity.			
HIGHLY ORGANIC SOILS		Pt	Peat, meadow mat, highly organic soils.		

## SOIL CONSISTENCY

SANDS and GRAVELS (non-cohesive)	BLOWS per FOOT
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	over 50

SILTS and CLAYS	UNCONFINED SHEAR STRENGTH (PSF)
Very Soft	0 - 250
Soft	250 - 500
Firm	500 - 1000
Stiff	1000 - 2000
Very Stiff	2000 - 4000
Hard	4000+

See "Notes" and "Symbols & Abbreviations" on following page.





## KEY TO EXPLORATORY BORING LOGS (CONTINUED)

### NOTES

1. FINES - Material smaller than No. 200 sieve size.
2. BLOWS per FOOT - Resistance to the advancement of the soil sampler-number of blows of a 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1½ inch I.D.) split spoon sampler (ASTM D1586-84).
3. The stratification lines on the logs represent the approximate boundary between soil types, and the transition may be gradual.
4. Mod. Cal. - 2½ inch O.D. (1½ inch I.D.) "Modified California" split spoon sampler.
5. Std. Pen. - 2 inch O.D. (1½ inch I.D.) "Standard Penetration" split spoon sampler (ASTM D1586-84).

### SYMBOLS & ABBREVIATIONS

-  - Initial ground water level
-  - Final ground water level
- PID - Photo Ionization Detector
- ppmv - Parts per million by volume
- / - Soil sample collected
- X - Soil sample analyzed

# EXPLORATION DRILL HOLE LOG

HOLE No. DH-1

PROJECT CLARK'S HOME & GARDEN

DATE 8/1/91

LOGGED BY SMC

DRILL RIG CME 55 - Hollow Stem

HOLE DIA. 8"

SAMPLER Mod. Cal.

GROUNDWATER DEPTH INITIAL ---

FINAL ---

HOLE ELEV. + 30'

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	PID (ppmv)	LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
SILTY GRAVEL WITH SAND; brown, dry; fill; odorless	GM	1											
CLAY; blackish-brown, moist, fuel odor	CI	2											
		3											
		4											
		5	/				282						
		6	/										
		7	X										
BOTTOM OF HOLE AT 5.5'		8											
No ground water encountered Hole backfilled with concrete		9											
		10											
		11											
		12											
		13											
		14											
		15											
		16											
		17											
		18											
		19											
		20											

# EXPLORATION DRILL HOLE LOG

HOLE No. MW-1

PROJECT CLARK'S HOME & GARDEN

DATE 8/1/91

LOGGED BY SMC

DRILL RIG CME 55 - Hollow Stem HOLE DIA. 8" SAMPLER Mod. Cal.

GROUNDWATER DEPTH INITIAL 17' FINAL 17.4' (after 4 days) HOLE ELEV. + 30'

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)	PID (ppmv)	LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
SILTY GRAVEL; brown, dry, minor sand; fill; odorless	GM	1											
CLAY; blackish-brown, moist; fill; odorless	CI	2											
POORLY GRADED GRAVEL; grey, dry; fill (1-1/2" base rock); odorless	GP	3											
SANDY CLAY; brown, damp, very stiff; approx. 40% fine sand; minor organics; odorless	CI	4					0.0						
		5	/										
CLAYEY SAND; brown, moist, medium dense; fine sand; approx. 45% clayey fines; odorless	SC	6	X	17									
		7	/										
SANDY CLAY; brown, moist, stiff; fine sand stained grey coloration; fuel odor	CI	8	/				0.0						
		9	X	12									
decreasing fines; fuel odor and staining; wet		10	/										
		11	X	12									
POORLY GRADED SAND; grey, wet, medium dense; fuel odor and staining	SP	12	/				61.8 (cuttings)						
		13	/										
CLAY WITH SAND; dark grey, moist, stiff; slight fuel odor	CI	14	/				2153						
		15	X	12									
		16	/										
		17	/										
		18	/										
		19	/										
		20	/										

EXPLORATION DRILL HOLE LOG

HOLE No.

MW-1

PROJECT CLARK'S HOME & GARDEN

DATE 8/1/91

LOGGED BY SMC

DRILL RIG CME 55 - Hollow Stem HOLE DIA 8" SAMPLER Mod. Cal.

GROUNDWATER DEPTH INITIAL 17' FINAL 17.4' (after 4 days) HOLE ELEV + 30'

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	PID (ppmv)	LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)	
CLAY WITH SAND; dark grey, moist, stiff; slight fuel odor	CI	21	/	8			211							
		22												
brown with grey mottles; minor root holes; odorless		23												
		24												
BOTTOM OF HOLE AT 26'		25	/											
		26	/	8										
Monitoring well MW-1 installed to a completed depth of 25'		27												
		28												
		29												
		30												
		31												
		32												
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		37												
		38												
		39												
		40												

APPENDIX B

CHAIN OF CUSTODY RECORDS

AND

LABORATORY REPORTS



TERRATECH

CHAIN OF CUSTODY RECORD

P.O. NO. 9061

9020

TURNAROUND: 10 day

PROJECT NUMBER: <u>4983</u>						Number of Containers	Analysis Required					REMARKS	SAMPLE DEPTH
SAMPLERS (signature): <u>[Signature]</u>							TPH as Gasoline	BTEX	TPH as Diesel				
Station Number	Date	Time	Comp.	Grab	Station Location								
MW-1	8-1			X	West of former fuel tanks	1 brass liner	X	X					5.5'-6'
MW-1	↓			X	" "	"	X	X					10.5'-11'
MW-1	↓			X	" "	"	X	X					15'-15.5'
DT-1	8-1			X	Between former pumps	"	X	X	X		-NOT REQUIRED - 8/2/91		5'-5.5'
											client notified - do not over pump to 65 8/2/91		
Relinquished by(signature): <u>[Signature]</u>		Date / Time		Received by (signature): <u>[Signature]</u>		Relinquished by(signature): <u>[Signature]</u>		Date / Time		Received by (signature):			
Company or Agency: <u>TERRATECH, INC.</u>		8-1-91 3:45pm		Company or Agency: <u>NET</u>		Company or Agency: <u>NET</u>		8/1/91 17:30		Company or Agency:			
Relinquished by(signature):		Date / Time		Received by (signature):		Relinquished by:		Date / Time		Received by (signature):			
Company or Agency:				Company or Agency:		Company or Agency:				Company or Agency:			
Relinquished by(signature): <u>[Signature]</u>		Date / Time		Received for Laboratory by: (signature) <u>[Signature]</u>		Date / Time		Remarks/Shipping Information					
Company or Agency: <u>TERRATECH, INC.</u>						8/2/91 0800		Send reports to: <u>S. Christy</u> 1385 VANDER WAY, SAN JOSE 95112					



NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Pacific, Inc.  
435 Tesconi Circle  
Santa Rosa, CA 95401  
Tel: (707) 526-7200  
Fax: (707) 526-9623

TERRATECH

AUG 22 1991

RECEIVED

Sheila Chrisley  
Terratech  
1365 Vander Way  
San Jose, CA 95112

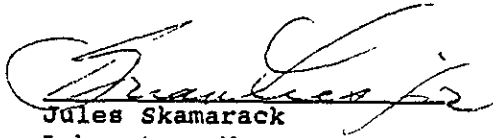
Date: 08-19-91  
NET Client Acct No: 704  
NET Pacific Log No: 9020  
Received: 08-02-91 0800

Client Reference Information

Project: 4983

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

  
Jules Skamarack  
Laboratory Manager

JS:rct  
Enclosure(s)



NET Pacific, Inc

Client No: 704  
©Client Name: Terratech  
NET Log No: 9020

Date: 08-19-91

Page: 2

Ref: Project: 4983

Descriptor, Lab No. and Results

Parameter	Method	Reporting Limit	MW-1 5.5-6	MW-1 10.5-11	Units
			08-01-91	08-01-91	
			93588	93589	
PETROLEUM HYDROCARBONS			--	--	
VOLATILE (SOIL)			--	--	
DILUTION FACTOR *			1	1	
DATE ANALYZED			08-06-91	08-06-91	
METHOD GC FID/5030			--	--	
as Gasoline	1		ND	ND	mg/Kg
METHOD 8020			--	--	
DILUTION FACTOR *			1	1	
DATE ANALYZED			08-06-91	08-06-91	
Benzene	2.5		ND	ND	ug/Kg
Ethylbenzene	2.5		ND	ND	ug/Kg
Toluene	2.5		ND	ND	ug/Kg
Xylenes, total	2.5		ND	ND	ug/Kg
PETROLEUM HYDROCARBONS			--	--	
EXTRACTABLE (SOIL)			--	--	
DILUTION FACTOR *			1	1	
DATE EXTRACTED			08-04-91	08-04-91	
DATE ANALYZED			08-06-91	08-06-91	
METHOD GC FID/3550			--	--	
as Diesel	1		ND	ND	mg/Kg
as Motor Oil	10		ND	ND	mg/Kg





NET Pacific, Inc

Client No: 704  
Client Name: Terratech  
NET Log No: 9020

Date: 08-19-91

Page: 3

Ref: Project: 4983

Descriptor, Lab No. and Results

MW-1 15-15.5  
08-01-91

Parameter	Method	Reporting Limit	93590	Units
PETROLEUM HYDROCARBONS				
VOLATILE (SOIL)				
DILUTION FACTOR *				
DATE ANALYZED				
METHOD GC FID/5030				
as Gasoline		1	6,700	mg/Kg
METHOD 8020				
DILUTION FACTOR *				
DATE ANALYZED				
Benzene		2.5	ND	ug/Kg
Ethylbenzene		2.5	6,600	ug/Kg
Toluene		2.5	ND	ug/Kg
Xylenes, total		2.5	27,000	ug/Kg
PETROLEUM HYDROCARBONS				
EXTRACTABLE (SOIL)				
DILUTION FACTOR *				
DATE EXTRACTED				
DATE ANALYZED				
METHOD GC FID/3550				
as Diesel		1	350	mg/Kg
as Motor Oil		10	ND	mg/Kg



NET Pacific, Inc

Client Acct: 704  
Client Name: Terratech  
NET Log No: 9020

Date: 08-19-91  
Page: 4

Ref: Project: 4983

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Diesel	1	mg/Kg	101	ND	79	77	1.9
Motor Oil	10	mg/Kg	99	ND	N/A	N/A	N/A
Diesel	1	mg/Kg	102	ND	N/A	N/A	1.0
Motor Oil	10	mg/Kg	110	ND	N/A	N/A	N/A

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	1	mg/Kg	110	ND	93	90	3.3
Benzene	2.5	ug/Kg	95	ND	113	103	9.3
Toluene	2.5	ug/Kg	97	ND	94	94	< 1

COMMENT: Blank Results were ND on other analytes tested.



NET Pacific, Inc.

KEY TO ABBREVIATIONS and METHOD REFERENCES

- < : Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
- \* : Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
- ICVS : Initial Calibration Verification Standard (External Standard).
- mean : Average; sum of measurements divided by number of measurements.
- mg/Kg (ppm) : Concentration in units of milligrams of analyte per kilogram of sample, (parts per million)..
- mg/L : Concentration in units of milligrams of analyte per liter of sample.
- mL/L/hr : Milliliters per liter per hour.
- MPN/100 mL : Most probable number of bacteria per one hundred milliliters of sample.
- N/A : Not applicable.
- NA : Not analyzed.
- ND : Not detected; the analyte concentration is less than applicable listed reporting limit.
- NTU : Nephelometric turbidity units.
- RPD : Relative percent difference,  $100 \text{ [Value 1 - Value 2] / mean value}$ .
- SNA : Standard not available.
- ug/Kg (ppb) : Concentration in units of micrograms of analyte per kilogram of sample, (parts per billion).
- ug/L : Concentration in units of micrograms of analyte per liter of sample.
- umhos/cm : Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.



TERRATECH

CHAIN OF CUSTODY RECORD

P.O. NO. 9061

9071

TURNAROUND: 10-day

PROJECT NUMBER: <u>1983</u>					Number of Containers	Analysis Required						REMARKS	SAMPLE DEPTH
SAMPLERS (signature): <i>[Signature]</i>						TPH as Gasoline	BTEX	TPH as Diesel					
Station Number	Date	Time	Comp.	Grab	Station Location								
DH-1	8-1			X	Beneath former pump	1 brass liner	X	X	X				5'5.5
<p><b>COU</b> CHAIN OF CUSTODY SEALED <u>8/5/91</u></p> <p><u>19:00 J.W.</u></p> <p>@ Seal intact</p>													
Relinquished by(signature):		Date / Time		Received by (signature):		Relinquished by(signature):		Date / Time		Received by (signature):			
Company or Agency:				Company or Agency:		Company or Agency:				Company or Agency:			
Relinquished by(signature):		Date / Time		Received by (signature):		Relinquished by:		Date / Time		Received by (signature):			
Company or Agency:				Company or Agency:		Company or Agency:		8/5/91 15:00		Company or Agency:			
Relinquished by(signature):		Date / Time		Received for Laboratory by:		Date / Time		Remarks/Shipping Information					
Company or Agency:		8/5/91 15:00		(signature)		8/6/91		Send reports to: 1385 VANDER WAY, SAN JOSE 95112					



NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Pacific, Inc.  
435 Tesconi Circle  
Santa Rosa, CA 95401  
Tel: (707) 526-7200  
Fax: (707) 526-9623

TERRATECH  
AUG 22 1991  
RECEIVED

Eric Lautenbach  
Terratech  
1365 Vander Way  
San Jose, CA 95112

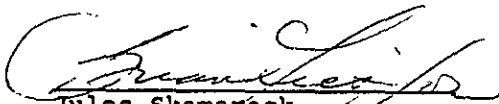
Date: 08-19-91  
NET Client Acct. No: 704  
NET Pacific Log No: 9071  
Received: 08-06-91 0800

Client Reference Information

Project: 4983

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

  
Jules Skamarack  
Laboratory Manager

Enclosure(s)



NET Pacific, Inc

Client Acct: 704  
Client Name: Terratech  
NET Log No: 9071

Date: 08-19-91  
Page: 2

Ref: Project: 4983

SAMPLE DESCRIPTION: DH-1 08-01-91  
LAB Job No: (-93723 )

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS				
VOLATILE (SOIL)			--	
DILUTION FACTOR *			5	
DATE ANALYZED			08-08-91	
METHOD GC FID/5030			--	
as Gasoline			1	
METHOD 8020			9.9	mg/Kg
DILUTION FACTOR *			1	
DATE ANALYZED			08-06-91	
Benzene			2.5	ug/Kg
Ethylbenzene			2.5	ug/Kg
Toluene			2.5	ug/Kg
Xylenes, total			2.5	ug/Kg
PETROLEUM HYDROCARBONS				
EXTRACTABLE (SOIL)			--	
DILUTION FACTOR *			1	
DATE EXTRACTED			08-06-91	
DATE ANALYZED			08-07-91	
METHOD GC FID/3550			--	
as Diesel			1	mg/Kg
as Motor Oil			10	mg/Kg



Client Acct: 704  
 @Client Name: Terratech  
 NET Log No: 9071

Date: 08-19-91  
 Page: 3

Ref: Project: 4983

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Diesel	1	mg/Kg	106	ND	N/A	N/A	8.0
Motor Oil	10	mg/Kg	108	ND	N/A	N/A	N/A

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	1	mg/Kg	111	ND	110	117	6.5
Benzene	2.5	ug/Kg	110	ND	99	104	5.3
Toluene	2.5	ug/Kg	108	ND	99	103	5.4

COMMENT: Blank Results were ND on other analytes tested.



NET Pacific, Inc.

KEY TO ABBREVIATIONS and METHOD REFERENCES

- < : Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
- \* : Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
- ICVS : Initial Calibration Verification Standard (External Standard).
- mean : Average; sum of measurements divided by number of measurements.
- mg/Kg (ppm) : Concentration in units of milligrams of analyte per kilogram of sample, (parts per million).
- mg/L : Concentration in units of milligrams of analyte per liter of sample.
- mL/L/hr : Milliliters per liter per hour.
- MPN/100 mL : Most probable number of bacteria per one hundred milliliters of sample.
- N/A : Not applicable.
- NA : Not analyzed.
- ND : Not detected; the analyte concentration is less than applicable listed reporting limit.
- NTU : Nephelometric turbidity units.
- RPD : Relative percent difference,  $100 \text{ [Value 1 - Value 2] / mean value}$ .
- SNA : Standard not available.
- ug/Kg (ppb) : Concentration in units of micrograms of analyte per kilogram of sample, (parts per billion).
- ug/L : Concentration in units of micrograms of analyte per liter of sample.
- umhos/cm : Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.





TERRATECH

CHAIN OF CUSTODY RECORD

P.O. NO. 90666

9143

TURNAROUND: 10 days

PROJECT NUMBER: 4983						Number of Containers	Analysis Required				REMARKS	SAMPLE DEPTH
SAMPLERS (signature): <i>[Signature]</i>							TPH as Gasoline	BTEX	TPH as Diesel			
Station Number	Date	Time	Comp.	Grab	Station Location							
MW-1	8-7	am		X	West of former fuel tanks	3-4 liter NCA'S	X	X				(w/ HPC preservative) ~18'
↓	↓	pm		X	" "	2-liter CUMBERS	X	X				~18'
<p><b>CUSTODY SEALED</b> 8/8/91</p> <p>@ 19:00 J.W. Seal</p>												
Relinquished by(signature):		Date / Time		Received by (signature):		Relinquished by(signature):		Date / Time		Received by (signature):		
Company or Agency:				Company or Agency:		Company or Agency:				Company or Agency:		
Relinquished by(signature):		Date / Time		Received by (signature):		Relinquished by:		Date / Time		Received by (signature):		
<i>[Signature]</i>		8/8/91		<i>[Signature]</i>		Company or Agency:		8/8/91		Company or Agency:		
TERRATECH, INC.		15:20		NET		NET		19:00				
Relinquished by(signature):		Date / Time		Received for Laboratory by:		Date / Time		Remarks/Shipping Information				
<i>[Signature]</i>				(signature)		0800		Send reports to: Sheila Chrsky				
TERRATECH, INC.				<i>[Signature]</i>		8/9/91		1385 VANDER WAY, SAN JOSE 95112				



NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Pacific, Inc.  
435 Tesconi Circle  
Santa Rosa, CA 95401  
Tel: (707) 526-7200  
Fax: (707) 526-9623

TERRATECH  
AUG 24 1991  
RECEIVED

Shiela Chrisley  
Terratech  
1365 Vander Way  
San Jose, CA 95112

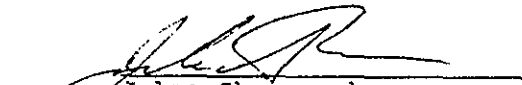
Date: 08-22-91  
NET Client Acct. No: 704  
NET Pacific Log No: 9143  
Received: 08-09-91 0800

Client Reference Information

Project: 4983

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

  
Jules Skamarack  
Laboratory Manager

Enclosure(s)



Client Acct: 704  
 @Client Name: Terratech  
 NET Log No: 9143

Date: 08-22-91  
 Page: 2

NET Pacific, Inc

Ref: Project: 4983

SAMPLE DESCRIPTION: MW-1 08-07-91  
 LAB Job No: (-94086 )

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS				
VOLATILE (WATER)			--	
DILUTION FACTOR *			50	
DATE ANALYZED			08-15-91	
METHOD GC FID/5030			--	
as Gasoline		0.05	5.9	mg/L
METHOD 602			--	
DILUTION FACTOR *			50	
DATE ANALYZED			08-15-91	
Benzene		0.5	45	ug/L
Ethylbenzene		0.5	130	ug/L
Toluene		0.5	ND	ug/L
Xylenes, total		0.5	520	ug/L
PETROLEUM HYDROCARBONS				
EXTRACTABLE (WATER)			--	
DILUTION FACTOR *			10	
DATE EXTRACTED			08-09-91	
DATE ANALYZED			08-11-91	
METHOD GC FID/3510			--	
as Diesel		0.05	7.1	mg/L
as Motor Oil		0.5	ND	mg/L



Ref: Project: 4983

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Diesel	0.05	mg/L	104	ND	61	74	20
Motor Oil	0.5	mg/L	104	ND	N/A	N/A	N/A

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	0.05	mg/L	101	ND	102	105	2.6
Benzene	0.5	ug/L	104	ND	104	106	1.2
Toluene	0.5	ug/L	101	ND	103	104	< 1

COMMENT: Blank Results were ND on other analytes tested.



NET Pacific, Inc.

## KEY TO ABBREVIATIONS and METHOD REFERENCES

- < : Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
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- mL/L/hr : Milliliters per liter per hour.
- MPN/100 mL : Most probable number of bacteria per one hundred milliliters of sample.
- N/A : Not applicable.
- NA : Not analyzed.
- ND : Not detected; the analyte concentration is less than applicable listed reporting limit.
- NTU : Nephelometric turbidity units.
- RPD : Relative percent difference,  $100 \text{ [(Value 1 - Value 2)]/mean value}$ .
- SNA : Standard not available.
- ug/Kg (ppb) : Concentration in units of micrograms of analyte per kilogram of sample, (parts per billion).
- ug/L : Concentration in units of micrograms of analyte per liter of sample.
- umhos/cm : Micromhos per centimeter.

### Method References

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Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.