



groundwater resources inc.

5400 ALDRIN CT.
BAKERSFIELD, CALIFORNIA 93313

General Engineering Contractor
Class A/Haz License No. 520768

**MALIBU GRAND PRIX
8000 South Coliseum Way
Oakland, California**

**PRELIMINARY SITE ASSESSMENT
November 15, 1989**

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1.0 INTRODUCTION

This report provides the results of an investigation to determine the existence of a hydrocarbon plume in the soil and groundwater at the Malibu Grand Prix facility, 8000 South Coliseum Way, Oakland, California (Plate 1). Large concentrations of hydrocarbons were found in two groundwater monitoring wells located near the tank excavation. Groundwater Resources, Inc. (GRI) recommends continued assessment of the vadose and groundwater to fully define any hydrocarbon plume that may exist in the subsurface. It is also recommended that preliminary remediation of the groundwater be initiated to arrest any further migration of the plume.

2.0 BACKGROUND

One 6,000 gallon underground storage tank containing marine mix gasoline was removed from the Malibu Grand Prix facility on March 29, 1989. During the removal, the water table was observed at approximately eight feet below grade. Floating product was observed on the water in the tank excavation. A soil sample was collected from each end of the tank excavation at the soil/water interface and a water sample was collected from the tank pit (Plate 2). Laboratory analyses of the samples reported hydrocarbon contamination in the soil and groundwater. The soil sample from the south end of the excavation contained 33 ppm Benzene and 150 ppm TPH while the soil sample from the north end of the excavation was reported as having a TPH of 50 ppm and 7.3 ppm of Benzene. The water sample contained 920 ppb Benzene and 15,000 ppb TPH. The excavation was backfilled, compacted and the site secured. A closure report was submitted to the Alameda County Department of Environmental Health on April 20, 1989 with all relevant waste manifests and analysis results. On June 29, 1989 a letter from Alameda County was sent to Malibu Grand Prix Corp. requiring an initial site investigation to determine the extent of soil and groundwater contamination present at the Malibu Grand Prix facility. Drilling for the preliminary site assessment began on September 21, 1989.

3.0 BORINGS AND MONITORING WELL COMPLETIONS

Four groundwater monitoring wells and five soil borings were made on the days of September 21-22, 1989. The monitoring wells were drilled using eight and ten inch hollow stem augers while the soil borings were made using six inch solid stem augers. A groundwater monitoring well designated MW-1, was drilled at the north end of the tank location (Plate 2). Monitoring wells MW-2 and MW-3 were constructed 161.2 feet south and 209.9 feet northeast of MW-1 respectively. these wells were drilled so that the direction of



the local groundwater gradient could be determined. MW-4 was constructed 15 feet from the suspected source of the leak in the calculated downgradient direction. Monitoring wells MW-2 and MW-3 were constructed by advancing an eight inch boring to a depth of 20 feet and then backfilling with clean filter pack sand to a depth of 15 feet. The well casing was made up of two-inch PVC with a ten foot slotted interval and five feet of blank to the surface (see Boring Logs, Plates 4-7). Monitoring wells MW-1 and MW-4 were constructed of four-inch PVC casing. MW-1 was drilled with eight-inch augers to a depth of 20 feet and completed open hole. Due to the presence of a heaving mud, the well was completed to a depth of ten feet with five feet of screen and five feet of blank casing. MW-4 was drilled using ten-inch augers and advanced to a depth of 15 feet. The well has ten feet of screen and four feet of blank casing. All of the wells have 0.010" slotted intervals and #0/30 sand for the filter pack. Each well has a two to four foot bentonite surface seal and was capped with concrete. All of the wells were secured with locking caps and a traffic box. Groundwater was encountered at 5 1/2 feet in MW-1.

Five soil borings were made around the tank perimeter to detect the presence of a vadose plume at each boring location (see Plate 3). A six-inch solid stem auger was drilled to five feet and a soil sample was collected (see Boring Logs, Plates 8-12). Borings B-4 and B-5 were angled beneath the sidewalk so that native soil could be sampled. The borings were abandoned by sealing the hole with bentonite and capping with concrete.

4.0 SAMPLING PROCEDURES

All soil samples were collected using a two and one-half inch diameter California splitspoon sampler containing three six-inch brass sleeves. The cores selected for analysis were sealed in the sleeve with teflon lined plastic end-caps and integrity tape. The core-sampler was washed and rinsed after each use to avoid cross contamination.

After the monitoring wells were constructed, approximately three to four well volumes were pumped from each well to insure that the water present in the well was representative of the groundwater in the formation. A groundwater sample was drawn from each well and analyzed for Benzene, Toluene, Xylene and Ethylbenzene (BTX & E) and Total Petroleum Hydrocarbon (TPH) for gasoline. All samples were labeled, chilled and transported to a State Certified Laboratory under a Chain of Custody (Appendix B).

5.0 FINDINGS

Soil samples analyzed from the vadose and monitoring well borings indicate low concentrations of hydrocarbons are present in all of



the locations sampled except for the five foot samples collected at MW-4 and B-4 (see Table 1). Analysis of the water samples collected from MW's 1 & 4 were reported as having large concentrations of hydrocarbons.

ANALYSIS RESULTS
TABLE 1

SAMPLE	Benzene <u>ppm</u>	TPH <u>ppm</u>	TDS
<u>Soil</u>			
B-1-5	ND	ND	NA
B-2-5	ND	ND	NA
B-3-5	ND	ND	NA
B-4-5	660 ppm	3,200 ppm	NA
B-5-5	0.24 ppm	2.2 ppm	NA
MW-1-5	0.10 ppm	2.7 ppm	NA
MW-1-7	1.8 ppm	16 ppm	NA
MW-2-5	ND	ND	NA
MW-2-7	ND	ND	NA
MW-3-5	0.18 ppm	ND	NA
MW-4-5	47 ppm	1,200 ppm	NA
<u>Water</u>			
MW-1	410 ppb	35,000 ppb	1625 ppm
MW-2	ND	ND	1950 ppm
MW-3	1.2 ppb	ND	7490 ppm
MW-4	410 ppb	4,000 ppb	1595 ppm

ND = Not detected

NA = Not analyzed

MW-2 was reported clean while an anomalous level of 1.2 ppb benzene was detected in MW-3.

The analysis results for the water samples collected from each monitoring well showed significant levels of hydrocarbons present in MW's 1 and 4. During development of MW-1, some floating product was recovered from the well. A low concentration of benzene was also reported in MW-3.

The soil encountered while boring was typically a black to dark gray silty clay with low to medium plasticity. A clayey gravel was observed in the boring for MW-2. The first five feet of soil encountered was generally fill material consisting of silty clay and debris.



The elevations and distances of the wells were measured by Samuel Kushner, a licensed land surveyor (see Appendix B). The direction of the local groundwater gradient was determined to be 72 degrees west of south with a gradient of 2.88 feet per 100 feet.

6.0 CONCLUSIONS

6.1 Discussion of Vadose

Samples collected in the vadose zone from each monitoring well and boring location have shown little or no significant hydrocarbon concentrations in the soil except for the soil on the north and east side of the tank excavation. The high levels of contamination reported for the samples B-4-5 could possibly reflect a leak from the product line which ran east of the tank to the dispenser. The significant levels of contamination observed north of the tank were most likely the result of a leak around the turbine pump. Since the depth to groundwater was recorded at 5.45 feet and 5.28 feet for MW's 1 and 4 respectively, the samples collected at five feet are probably in the capillary fringe of the water table. The hydrocarbon concentrations reported for the soil borings may not reflect a true vadose plume, but rather the top of the groundwater with hydrocarbons accumulating in the capillary zone.

6.2 Discussion of Groundwater

The results of analysis for the water samples collected from MW's 1-4 indicate that the groundwater has been impacted near the tank location. The presence of floating product in MW-1 and dissolved product in MW-4 indicates that a significant amount of product has been released into the groundwater resulting in a groundwater hydrocarbon plume of yet unknown dimensions. The horizontal and vertical extent of the plume will need to be defined before a complete plan for remediation can be formed.

The analysis of Total Dissolved Solids for the groundwater at the facility indicates that the water is brackish with TDS concentrations above 1000 ppm up to 7490 ppm (see Table 1). Since the groundwater at the site is very shallow, unconfined and contains high quantities of dissolved solids, it is GRI's opinion that the groundwater would not be used as a public water source.

7.0 RECOMMENDATIONS

It is recommended that additional work be performed at the site to fully assess the horizontal and vertical extent of the hydrocarbon plume in the groundwater. Three additional groundwater monitoring wells should be placed downgradient from the tank excavation in an effort to find the limit of the groundwater plume (see Plate 3). All additional wells will be constructed similar to MW-1 and MW-4.



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Since contaminated soil was reported from boring B-4, groundwater samples should be collected south and southwest of the tank excavation to determine if the groundwater plume is present in that location. It is recommended that a Hydropunch groundwater sampling tool be utilized in collecting these samples. The use of the Hydropunch would alleviate the need to install a monitoring well south and southwest of the tank pit since a groundwater plume is not anticipated at that location. The Hydropunch tool is driven into the saturated soil with a drill rig. A screen interval is exposed and groundwater is allowed to enter the tool. The Hydropunch is then extracted and the water is collected in a 40 ml VOA bottle. If data obtained from the Hydropunch demonstrates that hydrocarbons are present at that location, a groundwater monitoring well should be constructed at a subsequent time so that a qualitative groundwater sample could be collected.

Additional soil borings should be made east of the tank excavation to define the extent of vadose contamination at that location. After the limits of the vadose plume are defined, a plan for remediation could be developed.

It is recommended that an additional water sample be collected from MW-3 to verify the presence of benzene at that location. Sampling could be performed during the next phase of drilling.

It is GRI's opinion that preliminary remediation should be initiated in the groundwater utilizing MW-1 and MW-4 or any other wells that are constructed in the plume at a later date. A preliminary remediation plan would be sent to the Alameda County Health Agency for approval before treatment of the groundwater would begin.

8.0 LIMITATIONS

This report was prepared for the exclusive use of Malibu Grand Prix as it relates to the property described. The discussion and conclusions presented in this report are based on:

- The test borings performed at this site.
- The observations of field personnel.
- The results of laboratory tests performed by SMC Laboratory, Bakersfield, California.
- Our understanding of the regulations of Alameda County and the California Regional Water Quality Control Board.

Possible variations in the soil or groundwater conditions which may exist beyond the points explored in this investigation might effect



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the validity of this report unless those variations or conditions come to our attention and are reviewed and assimilated into the conclusions and recommendations of this report. Also, changes in the hydrologic conditions found could occur with time due to variations in rainfall, temperature, regional water usage, or other factors, any of which could effect this report.

The services performed by GRI have been conducted in a manner consistent with the levels of care and skill ordinarily exercised by professionals currently practicing under similar conditions in California. The absence of contamination on or beneath the property cannot be guaranteed by this report. GRI is not responsible for any contamination or hazardous material found on the property. No other warranty expressed or implied, is made.

Respectfully submitted,

GROUNDWATER RESOURCES, INC.

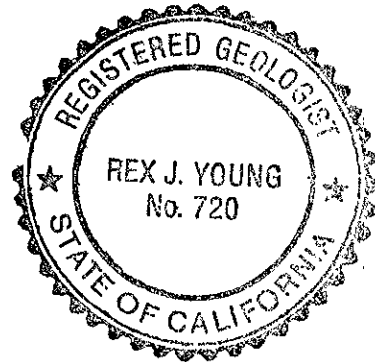
Timothy C. Reed (TB)

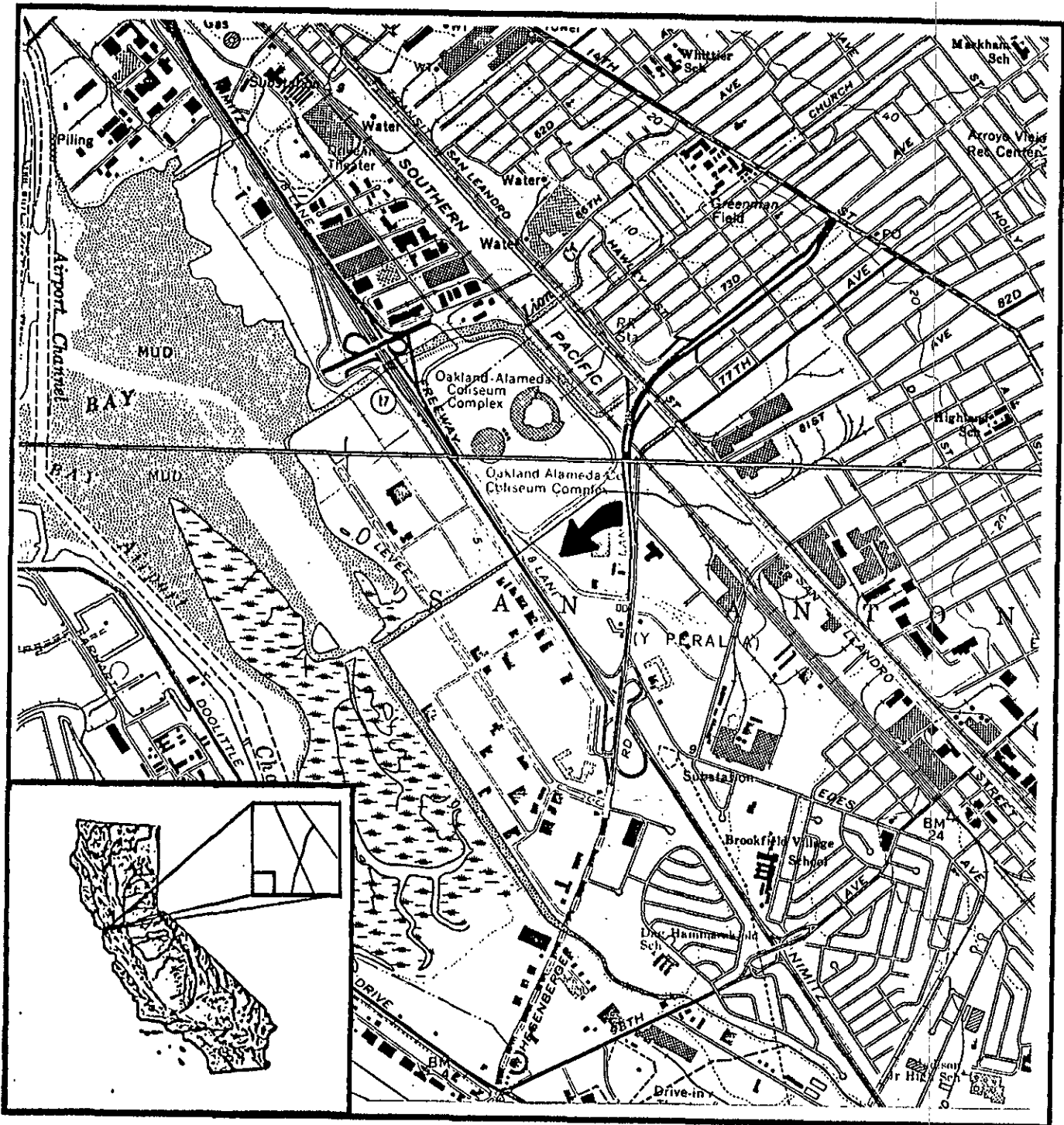
Timothy C. Reed
Project Geologist


TCR:tab:041.rep

Rex J. Young

Rex J. Young
State Registered Geologist #720







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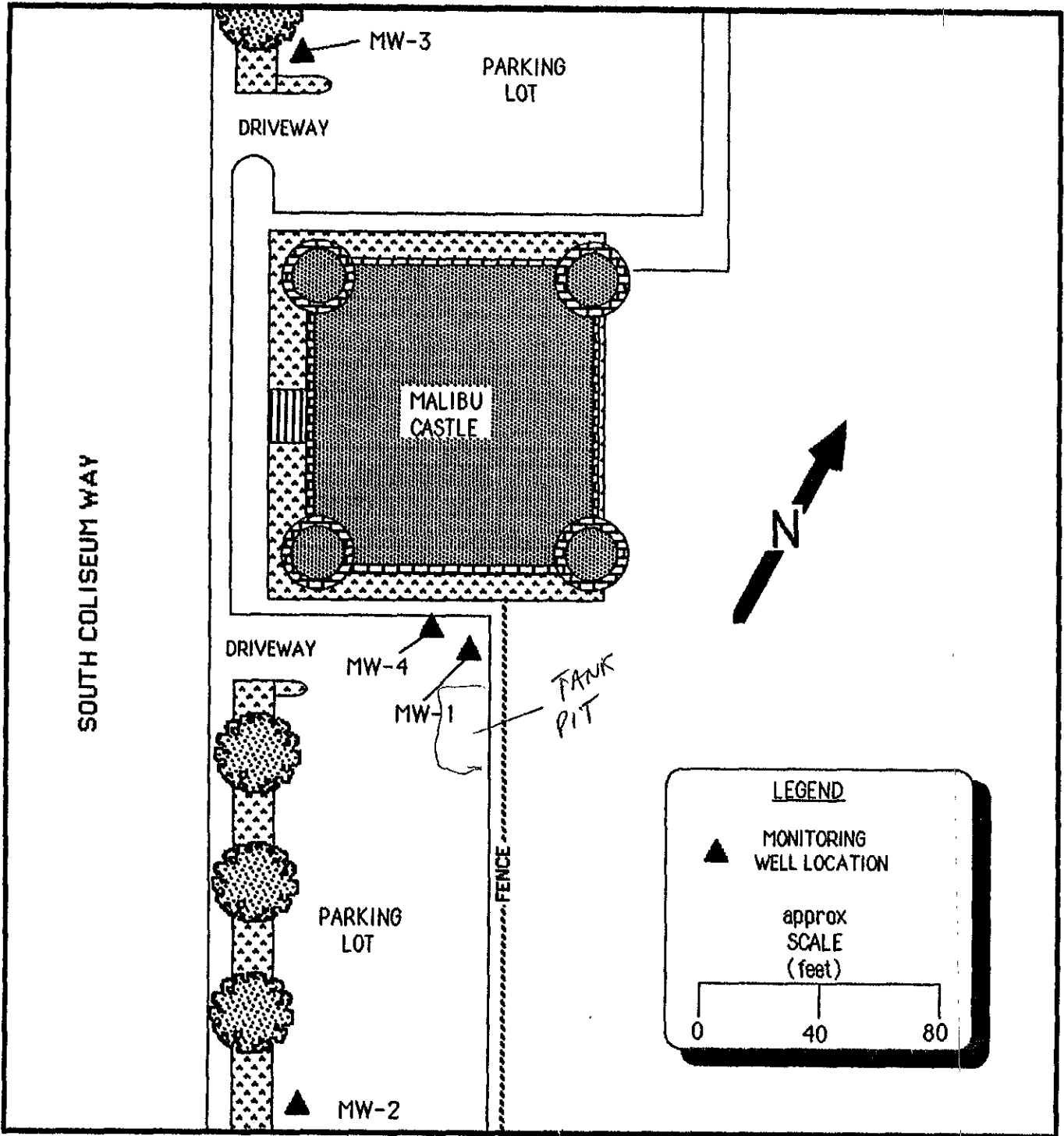
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MALIBU FUN CENTER
 8000 S. COLISEUM DR
 OAKLAND, CA

LOCATION MAP

PLATE

1



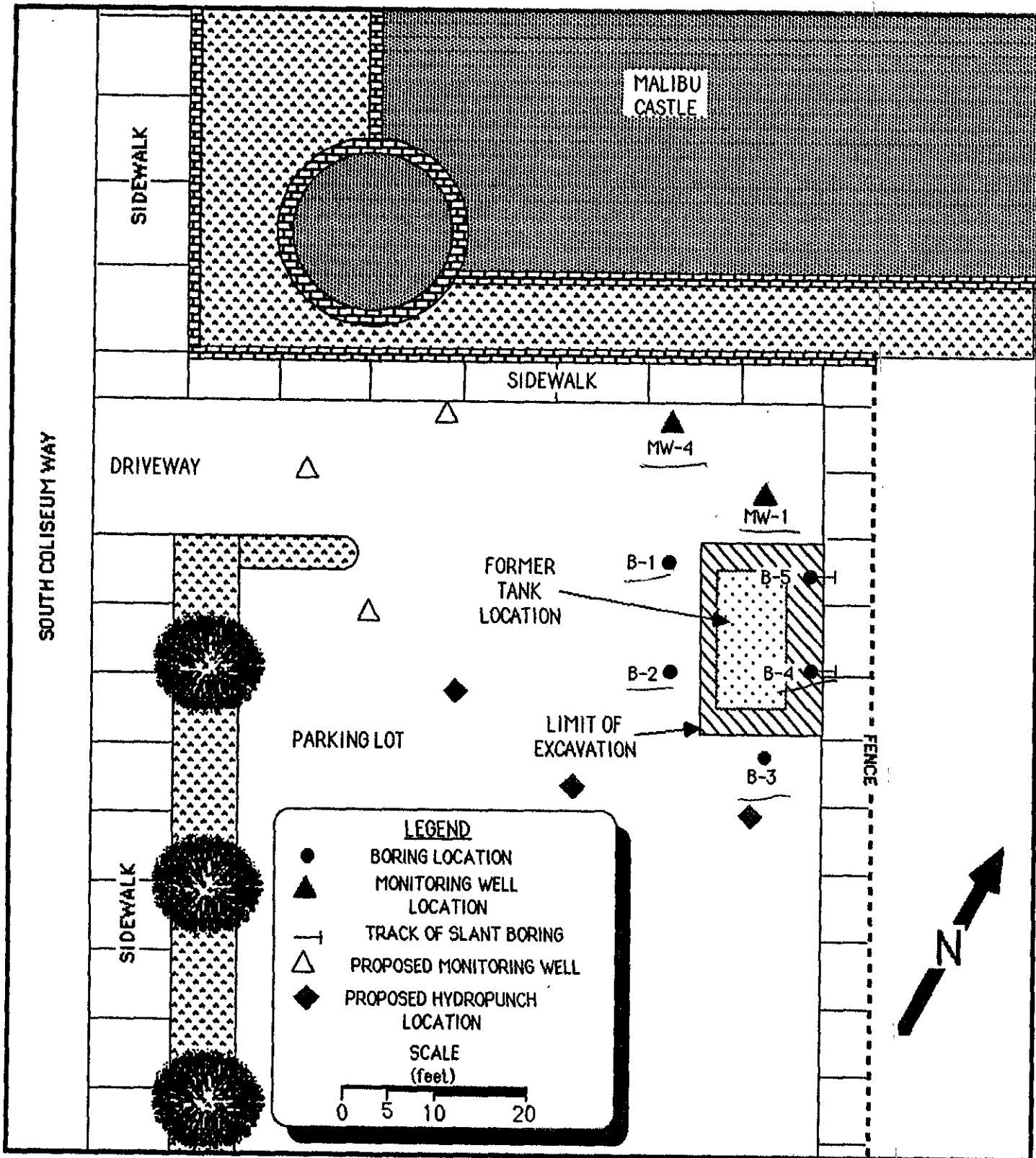

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9-28-89

MALIBU FUN CENTER
 8000 S. COLISEUM DR
 OAKLAND, CA

PLOT PLAN

PLATE
2




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MALIBU GRAND PRIX
 8000 SOUTH COLISEUM WAY
 OAKLAND, CALIFORNIA
WELL AND BORING DETAIL

PLATE
3

WELL COMPLETION	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		Lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
Locking Cap Traffic Box Cement Bentonite WT *0/30 Sand Slough 4" PVC, 0.01" slotted T.D. 20'	0.10 2.7 1.8 16	0 0	5 12 40 9 25 36	0 5 10 15 20 25 30 35 40 45 50	MW-1-5 MW-1-7		CL ML CL GC	CLAY- blk, v silty, occ sand, gravel and debris, moist, low plast, no odor, no stn SILT- dk gnsh gry, v clayey, low plast, occ peb, wet, no odor, no stn CLAY- dk gry, tr silt, med plast, saturated no odor, no stn GRAVEL- gry, angular peb, v clayey, v silty, saturated, no odor, no stn	
WATER (ppb)	410 35,000								

SURFACE ELEVATION: 10.3 ft.
 TOTAL DEPTH: 20 ft.
 DATE DRILLED: 9-20-89

LOGGED BY: TCR
 SUPERVISED BY: RJY
 DIAMETER of BORING: 8 inch
 WATER ENCOUNTERED AT: 5.35 ft.

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LOCATION:
 PUMP END OF TANK

PLATE
 4

PROJECT NUMBER: 28069

LOG OF BORING MW-1

page 1 of 1

WELL COMPLETION	ANALYSES		BLOW COUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
				0					
	ND	0	13						
	ND	0	28						
	ND	0	50	5	■	MW-2-5			FILL- gnsh blk, sity, clay, sand, occ peb, abd debris material, moist, no odor, no stn
	ND	0	20						
	ND	0	5						
	ND	0	4	10	■	MW-2-7	GC		GRAVEL- blsh grn, ang clast, peb-med snd, tr clay, saturated, no odor, no stn
	WATER (ppb)			15			GC		GRAVEL- gnsh brn, ang clast, peb-vcrs snd, v clayey, saturated, no odor, no stn
	ND			20			CL		CLAY- gry, v silty, med plast, saturated, no odor, no stn
	ND			25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 9.9 ft.
TOTAL DEPTH: 20 ft.
DATE DRILLED: 9-20-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 7.38 ft.

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LOCATION:
SOUTH OF MW-1

PROJECT NUMBER: 28069

LOG OF BORING MW-2

PLATE
5

page 1 of 1

WELL COMPLETION	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		Lithology symbol	u.s.o.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
Locking Cap Traffic Box Cement Bentonite 2" PVC, 0.01" slotted #0/30 Sand Slough T.D. 20'	0.18 ND	0	7 17 20	0 5	MW-3-5		ML	SILT- blk, clayey, sandy, occ peb, low plast, moist, no odor, no stn	
WATER (ppb) 1.2 ND				10 15 20			CL	CLAY- blk, v silty, low-med plast, saturated, no odor, no stn	
				20 25 30 35 40 45 50			CL	CLAY- blk, v silty, low-med plast, saturated, no odor, no stn	

SURFACE ELEVATION: 10.2 ft. TOTAL DEPTH: 20 ft. DATE DRILLED: 9-20-89	LOGGED BY: TCR SUPERVISED BY: RJY DIAMETER of BORING: 8 inch WATER ENCOUNTERED AT: 9.1 ft.
--	---

GROUNDWATER RESOURCES, INC. (805)835-7700 environmental/geotechnical services PROJECT NUMBER: 28069	LOCATION: NORTH OF MW-1	PLATE 6 page 1 of 1
	LOG OF BORING MW-3	

WELL COMPLETION	ANALYSES		BLOW COUNT	DEPTH (feet)	SAMPLE		Lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
	47	0	5	0	MW-4-5				FILL- gnsh blk, clay- peb, abd debris, moist, strng odor, dk stn
1,200		12	5						
	410		40	10					CL CLAY- dk gry, tr silt, med plast, saturated, no odor, no stn
WATER (ppb)	4,000			15					GC GRAVEL- gry, angular peb, v clayey, v silty, saturated, no odor, no stn
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 10 ft.
TOTAL DEPTH: 20 ft.
DATE DRILLED: 9-21-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 10 inch
WATER ENCOUNTERED AT: 5.45 ft.

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LOCATION:
DOWN GRADIENT OF MW-1



PROJECT NUMBER: 28069

LOG OF BORING MW-4

PLATE

7

page 1 of 1

HOLE ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-design.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
 Cement  Bentonite	ND	0	3	0					FILL MATERIAL
	ND		15	5	B-1-5		SC	SAND- blk, v clayey, v silty, abd peb, wet, no odor, no stn	
			15						
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 10 ft. TOTAL DEPTH: 5 ft. DATE DRILLED: 9-21-89		LOGGED BY: TCR SUPERVISED BY: RJY DIAMETER of BORING: 6 inch WATER ENCOUNTERED AT: none encountered	
GROUNDWATER RESOURCES, INC. (805)835-7700 environmental/geotechnical services		LOCATION: NORTHWEST OF TANK	
PROJECT NUMBER: 28069		LOG OF BORING B-1	
		PLATE 8 page 1 of 1	

HOLE ABANDONMENT	ANALYSES		BLOW COUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
				0					FILL MATERIAL
Cement Bentonite	ND ND	0	5 95 6	5	B-2-5		CL		CLAY- gnsh blk, v silty, v sandy, abd peb. low plast, no odor, no str
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 10 ft.
TOTAL DEPTH: 5 ft.
DATE DRILLED: 9-21-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 6 inch
WATER ENCOUNTERED AT: none encountered

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LOCATION:
SOUTHWEST OF TANK

PLATE
9




PROJECT NUMBER: 28069

LOG OF BORING B-2

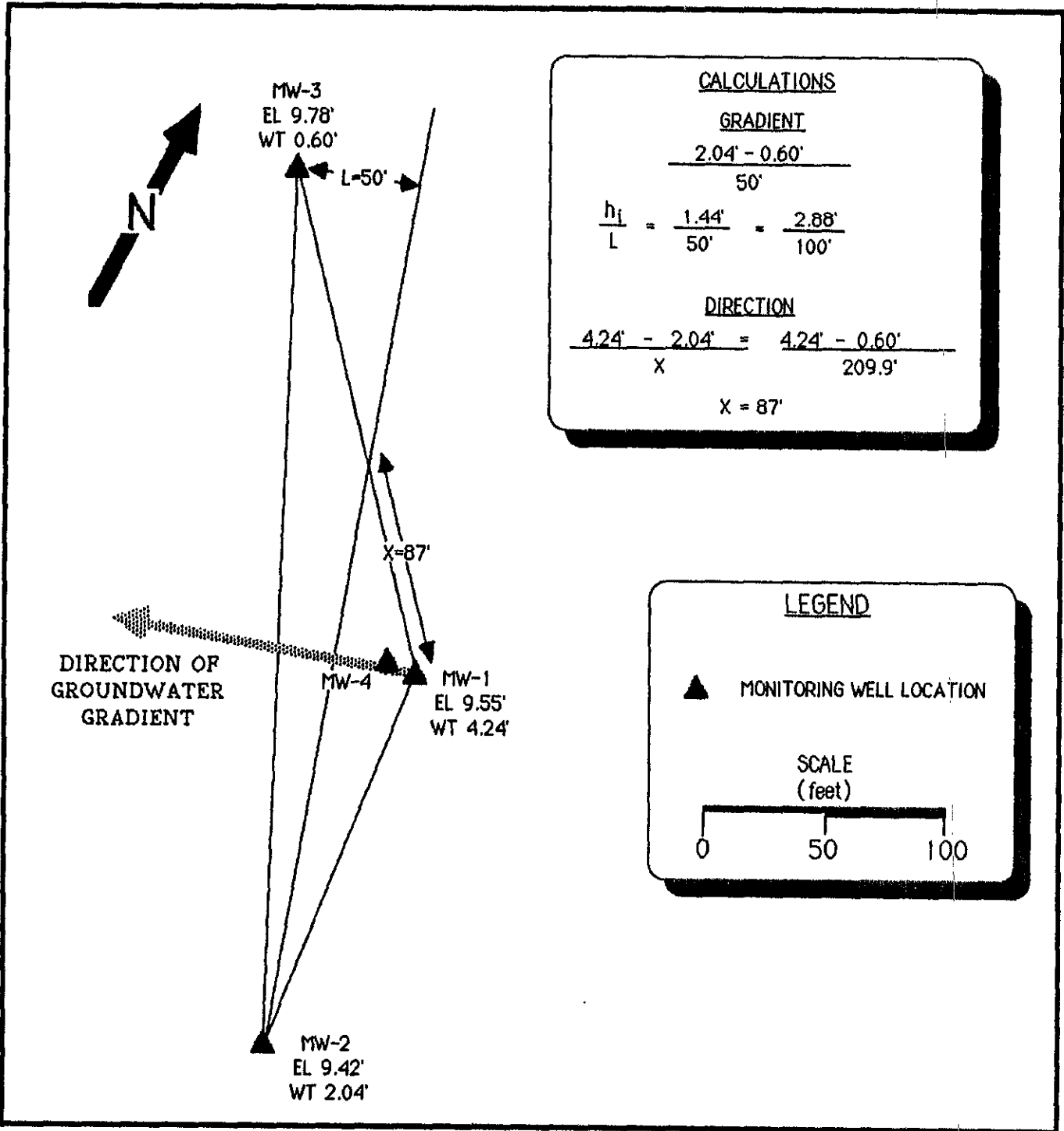
page 1 of 1


HOLE ABANDONMENT	ANALYSES		BLOYCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
				0					FILL MATERIAL
 Cement  Bentonite	660 3,200	0	9 20 19	5	B-4-5		SC	SAND- blk, v clayey, v silty, occ peb, moist-wet, fnt odor, no str	
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 10 ft. TOTAL DEPTH: 5 ft. DATE DRILLED: 9-21-89		LOGGED BY: TCR SUPERVISED BY: RJY DIAMETER of BORING: 6 Inch WATER ENCOUNTERED AT: none encountered	
GROUNDWATER RESOURCES, INC. (805)835-7700 environmental/geotechnical services		LOCATION: 25 ANGLE BORING SOUTHEAST OF TANK	
PROJECT NUMBER: 28069		LOG OF BORING B-4	
		PLATE 11 page 1 of 1	

HOLE ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPH ppm	Hnu P.I.D. ppm							
				0					
 Cement				0					FILL MATERIAL
 Bentonite	.24	0	9	5	B-5-5		GC		GRAVEL- grysh gn, v clayey, v silty, med- vcrs sand, abd peb, moist, fnt odor, no stn
	2.2		20						
			19						
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 10 ft. TOTAL DEPTH: 5 ft. DATE DRILLED: 9-21-89		LOGGED BY: TCR SUPERVISED BY: RJY DIAMETER of BORING: 6 inch WATER ENCOUNTERED AT: none encountered	
GROUNDWATER RESOURCES, INC. (805)835-7700 environmental/geotechnical services		LOCATION: 25 ANGLE BORING NORTHEAST OF TANK	
PROJECT NUMBER: 28069		LOG OF BORING B-5	
		PLATE 12 page 1 of 1	



 groundwater resources, inc.
environmental/geotechnical services
Project Number: 28069

9-29-89

MALIBU FUN CENTER
8000 S. COLISEUM DR
OAKLAND, CA

GRADIENT MAP

PLATE
13



groundwater resources inc.

A P P E N D I X A

Client Name: Groundwater Resources, Inc.
Address : 5400 Aldrin Court
Bakersfield, CA 93313

Date samples received : 9-22-89
Date analysis completed: 10-03-89
Date of report : 10-03-89

Laboratory No. 2580 through 2599 Project No. 28069

Purchase Order No. 3043

RESULTS OF ANALYSIS

#2580 ID: MW1-5	ugm/gm	MDL, ugm/gm
Benzene	0.10	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	2.7	1.0

#2581 ID: MW1-7	ugm/gm	MDL, ugm/gm
Benzene	1.8	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	0.17	0.1
TPH (Gasoline)	16	1.0

Method of Analysis for BTX/TPH (Gasoline) in Soil: 3810/8020 (FID)
Method of Analysis for BTX/TPH (Gasoline) in Water: 5030/8020
Method of Analysis for Total Dissolved Solids: EPA 160.3

MDL = Minimum Detection Level
TPH = Total Petroleum Hydrocarbons
ugm/gm = micrograms per gram
ugm/L = micrograms per liter
mg/L = milligrams per liter
ND = Not detected


Stan Comer

Laboratory No. 2580 through 2599 Project No. 28069

Purchase Order No. 3043

RESULTS OF ANALYSIS

#2582 ID: MW2-5

	ugm/gm	MDL, ugm/gm
Benzene	ND	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

#2583 ID: MW2-7

	ugm/gm	MDL, ugm/gm
Benzene	ND	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

#2584 ID: MW3-5

	ugm/gm	MDL, ugm/gm
Benzene	0.18	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

Stan Comer
Stan Comer

Laboratory No. 2580 through 2599 Project No. 28069

Purchase Order No. 3043

RESULTS OF ANALYSIS

#2585 ID: MW4-5

	ugm/gm	MDL, ugm/gm
Benzene	47	0.1
Toluene	5.5	0.1
Ethylbenzene	2.9	0.1
p-Xylene	35	0.1
m-Xylene	21	0.1
o-Xylene	44	0.1
Isopropylbenzene	26	0.1
TPH (Gasoline)	1,200	1.0

#2586 ID: B-1-5

	ugm/gm	MDL, ugm/gm
Benzene	ND	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

#2587 ID: B-2-5

	ugm/gm	MDL, ugm/gm
Benzene	ND	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

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RESULTS OF ANALYSIS

#2588 ID: B-3-5	ugm/gm	MDL, ugm/gm
Benzene	ND	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	ND	1.0

#2589 ID: B-4-5	ugm/gm	MDL, ugm/gm
Benzene	660	0.1
Toluene	31	0.1
Ethylbenzene	260	0.1
p-Xylene	12	0.1
m-Xylene	9.0	0.1
o-Xylene	24	0.1
Isopropylbenzene	47	0.1
TPH (Gasoline)	3,200	1.0

#2590 ID: B-5-5	ugm/gm	MDL, ugm/gm
Benzene	0.24	0.1
Toluene	ND	0.1
Ethylbenzene	ND	0.1
p-Xylene	ND	0.1
m-Xylene	ND	0.1
o-Xylene	ND	0.1
Isopropylbenzene	ND	0.1
TPH (Gasoline)	2.2	1.0

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RESULTS OF ANALYSIS

#2591 ID: MW-2A	ugm/L	MDL,ugm/L
Benzene	ND	0.5
Toluene	ND	0.5
Ethylbenzene	ND	0.5
p-Xylene	ND	0.5
m-Xylene	ND	0.5
o-Xylene	ND	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	ND	50

#2592 ID: MW-3A	ugm/L	MDL,ugm/L
Benzene	1.2	0.5
Toluene	ND	0.5
Ethylbenzene	ND	0.5
p-Xylene	ND	0.5
m-Xylene	ND	0.5
o-Xylene	ND	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	ND	50

#2593 ID: MW-4A	ugm/L	MDL,ugm/L
Benzene	410	0.5
Toluene	430	0.5
Ethylbenzene	78	0.5
p-Xylene	94	0.5
m-Xylene	90	0.5
o-Xylene	140	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	4,000	50

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Laboratory No. 2580 through 2599 Project No. 28069

Purchase Order No. 3043

RESULTS OF ANALYSIS

#2594 ID: MW-1A	ugm/L	MDL,ugm/L
Benzene	410	0.5
Toluene	1,800	0.5
Ethylbenzene	1,100	0.5
p-Xylene	1,600	0.5
m-Xylene	3,500	0.5
o-Xylene	2,000	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	35,000	50

#2599 ID: Travel Blank	ugm/L	MDL,ugm/L
Benzene	ND	0.5
Toluene	ND	0.5
Ethylbenzene	ND	0.5
p-Xylene	ND	0.5
m-Xylene	ND	0.5
o-Xylene	ND	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	ND	50

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Laboratory No. 2580 through 2599

Project No. 28069

Purchase Order No. 3043

RESULTS OF ANALYSIS

#2595 ID: MW-2B	<u>mg/L</u>
Total Dissolved Solids	1590
#2596 ID: MW-3B	<u>mg/L</u>
Total Dissolved Solids	7490
#2597 ID: MW-4B	<u>mg/L</u>
Total Dissolved Solids	1595
#2598 ID: MW-1B	<u>mg/L</u>
Total Dissolved Solids	1625

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A P P E N D I X B



CHAIN OF CUSTODY RECORD

5610 District Blvd., Suite 106
Bakersfield, California 93313
(805) 835-7700 — Bakersfield
(213) 724-3147 — Los Angeles

SHIP TO: <i>SMC</i>						SAMPLE CONDITION UPON RECEIPT	EPA-602 (WATER)	BTX-TYH (GASOLINE)	OIL & GREASE (TOX) LEAD (WASTE OIL)	EPA 418.1 (DIESEL)	TPH (OIL & GREASE), BENZENE (DIESEL)	ALAMEDA COUNTY REMARKS (LAB #'S ETC)		
SAMPLERS: (Signature) <i>Tim Neal</i>			PROJECT NUMBER <i>28069 P.O. 3043</i>											
SAMPLE NUMBER	DATE	TIME	2-500P -500P	2-500P -500P	SAMPLE LOCATION									
2580	MW-1S	9-20-87	7:39	X	MW-1							<i>BTX:G, TPH (GASOLINE)</i>		
2581	MW-1-7	"	7:47		MW-1									
2582	MW-2-5	"	10:07		MW-2									
2583	MW-2-7	"	10:19		MW-2									
2584	MW-3-5	"	12:41		MW-3									
2585	MW-4-5	9-21-87	11:15		MW-4									
2586	B-1-5	"	9:03		B-1									
2587	B-2-5	"	9:14		B-2									
2588	B-3-5	"	9:20		B-3									
2589	B-4-5	"	9:52		B-4									
2590	B-5-5	"	10:19		B-5									
2591	MW-2A	9-22-87	8:16	X	MW-2									
2592	MW-3A	"	8:43		MW-3									
2593	MW-4A	"	8:57		MW-4									
Relinquished by (Signature) <i>Tim Neal</i>			Date/Time <i>9-21-87 4:05</i>		Received by (Signature) <i>Karla Henry</i>			Relinquished by (Signature)			Date/Time		Received by (Signature)	
Relinquished by (Signature)			Date/Time <i>9/21/87</i>		Received by (Signature)			Relinquished by (Signature)			Date/Time		Received by (Signature)	
Relinquished by (Signature)			Date/Time <i>9/22/87 4:05</i>		Received for Laboratory by (Signature) <i>Karla Henry</i>			Date/Time		Remarks			CC: DEB FILE LAB INDEX	



**GROUNDWATER
RESOURCE
INDUSTRIES**

5610 District Blvd., Suite 106
Bakersfield, California 93313
(805) 835-7700 — Bakersfield
(213) 724-3147 — Los Angeles

CHAIN OF CUSTODY RECORD

SHIP TO:					PROJECT NUMBER	SAMPLE CONDITION UPON RECEIPT	EPA-602 (WATER)	BTX-TYH (GASOLINE)	OIL & GREASE (TOX) LEAD (WASTE OIL)	EPA 418.1 (DIESEL)	TPH (OIL & GREASE), BENZENE (DIESEL)	ALAMEDA COUNTY REMARKS (LAB #'S ETC)
SAMPLERS: (Signature)												
SAMPLE NUMBER	DATE	TIME	COMP.	ANALYST	SAMPLE LOCATION							
2594	MW-1A	9-22-89	9:03	X	MW-1	BTRIE, TPH (GASOLINE)						
2595	MW-2B	"	8:16		MW-2	TOTAL DISSOLVED SOLIDS						
2596	MW-3B	"	8:43		MW-3							
2597	MW-4B	"	8:57		MW-4							
2598	MW-1B	"	9:03		MW-1							
2599	TRAIL BLANK											
Relinquished by (Signature)			Date/Time	Received by (Signature)			Relinquished by (Signature)			Date/Time	Received by (Signature)	
<i>Tin Reed</i>			9-22-89 4:00 PM	_____			_____				_____	
Relinquished by (Signature)			Date/Time	Received by (Signature)			Relinquished by (Signature)			Date/Time	Received by (Signature)	
_____				_____			_____				_____	
Relinquished by (Signature)			Date/Time	Received for Laboratory by (Signature)			Date/Time	Remarks				CC: DEB FILE LAB INDEX
_____			9/22/89 4:05 PM	<i>Karla Honey</i>			9/22/89					

SAMUEL KUSHNER

LICENSED LAND SURVEYOR

21 Diaz Place
Oakland, CA 94611
(415) 339-1728

September 22, 1989

GROUNDWATER RESOURCES - "MALIBU G.P. PROJECT", OAKLAND

Point	Coordinates		Elevation	
	North	East	Rim	Casing
mw1	458138	1509067	10.3	9.55
mw2	457993	1509138	9.9	9.42
mw3	458248	1508889	10.2	9.78

Point	Bearing	Distance
mw1	S 26/00/19 E	161.2
mw2	N 44/20/55 W	356.7
mw3	S 58/19/58 E	209.9
mw1		

Horizontal coordinates are based on the California Coordinate System, Zone III. Basis of the survey is City of Oakland Monuments 26 NE 13 and 26 NE 14.

Elevation is on NOAA N.G.S. mean sea level Datum.

BENCH MARK is U.S.C. & G.S. brass disc "M 554" on top of storm drain headwall, southeast of intersection of Railroad and 85th Aves.
ELEVATION = 11.43





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A P P E N D I X C



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S A M P L I N G P R O T O C O L



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TEST BORING PROCEDURES

I. Soil Sampling Protocol

The following are procedures for soil sampling operations utilizing the hollow stem auger drilling technique.

A. Hollow Stem Auger

1. Soil borings drilled by the hollow stem auger utilize continuous flight hollow stem augers.
2. Augers, samplers and all downhole equipment are steam cleaned prior to use. In the field steam cleaning is done between borings to minimize the potential for cross-contamination.
3. A G.R.I. geologist observes the work, visually logs the soils, and collects samples at appropriate intervals.
4. The Unified Soils Classification System is utilized to classify soils encountered. Additional geological observations are noted as appropriate.
5. Soil samples destined for laboratory analysis are collected by a modified California Split Spoon. This sampler uses three, six inch long, by two and one-half inch diameter (o.d.) tubes.

Various tubes can be utilized to accommodate the type of analysis necessary:

Brass	-	All organics and general analyses (not to be used for copper or zinc analysis)
Stainless Steel	-	All organics and metals analyses for copper and zinc (not to be used for chrome or nickel analyses)
Plastic	-	All metals analyses (not to be used for organics)



TEST BORING PROCEDURES
(Cont'd)

6. The tubes are cleaned and prepared in the G.R.I. laboratory. Tubes are scrubbed, inside and outside, with a brush and TSP, rinsed, dried, and packed in clean containers with seals. Tubes are delivered to the drilling site in these closed containers to preserve the state of cleanliness.
7. After the sample(s) have been removed from the sampler, the sampler is completely disassembled and scrubbed in TSP and tap water. It is then rinsed in clean tapwater and reassembled with three clean tubes.
8. Dirty tubes are field washed in TSP solution, rinsed with water, and reused.
9. The sampler is driven by a 140 pound hammer with a 30 inch free fall. Blow counts are recorded as number of blows per inch of drive.
10. The sampler is driven 18 inches at each sampling interval. The first (or lowest) tube is generally retained as the sample for analysis. The other two tubes are retained for back-up or split samples.
11. A sand catcher is used in the sampler where loose soils are anticipated. This will prevent the soil from falling out of the sampler.
12. After retrieval, the sample is visually logged and immediately sealed with aluminum foil lined caps, labeled, and chilled. Clean ice chests and chemical ice ("blue ice") are used to keep the samples cold until delivered to the chemical laboratory. Teflon seals are also available for field samples.
13. Samples are delivered to the laboratory the same day they are taken, if physically possible. If the samples must be held until the next day, they are kept frozen in a secure freezer at the G.R.I. facility.
14. Sample control is maintained by a Chain of Custody form which accompanies the sample. The form documents the time, date, and responsible person during each step in the transportation process.



MONITORING WELL SAMPLING PROTOCOL

II. Groundwater Sampling

A. All equipment that is used in a monitoring well for purging, sampling, or depth measurement is decontaminated by steam cleaning or a TSP wash and rinse procedure prior to use and before re-using when more than one sample is collected.

B. Purge Volume Determination

The following procedure is followed to determine the appropriate purging volume prior to well sampling.

1. The depth-to-water is measured by a clean, electric level indicator. Measurement datum is the top of well protector.
2. Depth to the bottom of the well is measured by a clean tape and plumb bob. If possible, this is compared to the well construction log to determine inconsistencies, i.e. damaged casing, sediment in casing, etc.
3. Water volume is calculated by using the total water depth and the inside diameter of the casing.

C. Well Purging and Sampling

1. Prior to sampling, a minimum of three to five well volumes are purged from each well to ensure that water sampled is representative of the groundwater within the formation.
2. Measurements of pH, conductivity and temperature are taken at frequent intervals during the purge. Stabilization of these values indicates that representative formation fluids are being removed from the well.



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MONITORING WELL SAMPLING PROTOCOL
(Cont'd)

3. In the event that the well is pumped dry, and alternate procedure will be followed. Once a well is pumped dry, the water that enters the well during recovery is, by definition, representative formation water. The well will, therefore, be pumped dry and allowed to recover to 80% or more of the original water level.
4. Purge water is pumped directly into barrels on site until the proper method of disposal is determined.
5. Samples are pumped or poured from a bailer into sampling bottles prepared by a state certified laboratory contracted for the particular job and placed in refrigerated coolers for transport to the laboratory.
6. Samples are delivered by courier, directly to the lab on the same day of sampling, whenever practical. If next day delivery is necessary, the samples are kept refrigerated at 4 degrees C overnight and delivered to the laboratory the following morning.
7. Samples are accompanied by a Chain of Custody form which documents the time, date and responsible person during each step of the transportation process.
8. The G.R.I. coded sample numbering system allows identification of sample and client to G.R.I., while not revealing the client to anyone else.