

ENVIRONMENTAL
PROTECTION

RESNA
Working to Restore Nature

93 JUL -2 PM 2:38

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then
P-35*

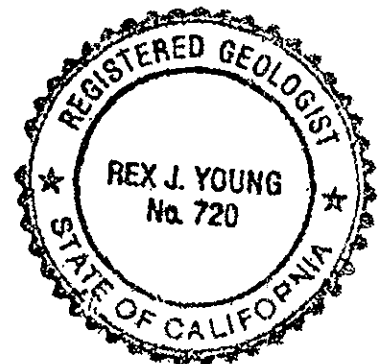
**MALIBU GRAND PRIX
8000 South Coliseum Way
Oakland, California**

**SITE ASSESSMENT REPORT
July 30, 1993**

Report Prepared for:
MALIBU GRAND PRIX
7301 Topanga Canyon Boulevard
Canoga Park, California 91303

Rex J. Young

Rex J. Young, R.G. #720
Registered Geologist



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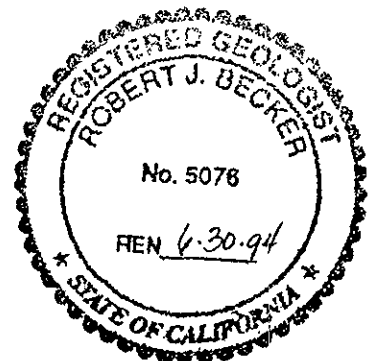


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EXECUTIVE SUMMARY

Assessment borings were made February 9, 10 and 11, 1993, at Malibu Grand Prix in Oakland to define the vadose plumes at the Castle and the Race Track prior to developing a remediation work plan to be submitted for approval. The plume at the Race Track is defined. The plume at the Castle only needs some additional assessment at the former dispenser location before a work plan can be developed for both locations.

1.0 INTRODUCTION

RESNA has performed additional assessment of hydrocarbon plumes in the soil at the Malibu Grand Prix Race Track and Castle areas, 8000 South Coliseum Way, Oakland, California (Plate 1). This report reviews the past history of the site, gives the results of the analysis of soil samples, interpretation of findings and recommendations based on the findings.

2.0 BACKGROUND

Malibu Grand Prix (MGP) operates two adjacent amusement park facilities, a Racetrack for midget cars and a Fun Center with miniature golf and batting cages on leased property at 8000 South Coliseum Way, Oakland (Plates 1 & 2). Prior to 1989 the MGP facility maintained two 6,000 gallon underground storage tanks containing marine mix gasoline. The tanks were located in the parking lots adjacent to the MGP Castle and Race Track. The tanks were removed on March 29, 1989 and February 1, 1990 respectively. Closure reports were submitted to the Alameda County Department of Environmental Health 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 MGP Castle while a verbal request was issued for an assessment at the Race Track at the time of the removal. The site assessment at the Castle began on September 21, 1989 and a report was issued on November 15, 1989, describing Borings B-1 through -5, the installation of Monitoring Wells MW-1 through -4, and recommending further assessment work. The assessment work at the Race Track, and the continued assessment at the Castle began on June 12, 1990, with the installation of MW-5 through -10 and Boring B-6 through -17. Monitoring Wells 1 through 10 were sampled July 17, 1991. Four additional monitoring wells (MW-11 through -14) at the Castle and four additional MWs (-15 through -18) at the Race Track were constructed on August 27-30, 1991. All monitoring wells, MW-1 through -18, were sampled October 9, 10, 11, 1991, for water analyses and pump tests and slug tests were performed on selected wells. Ground water table measurement-data are interpreted to reflect tidal effects and inhomogeneity of the backfill material underlying this site. The analyses of water and sludge samples collected December 2, 1992, from the drainage ditches on the north and west sides of the site indicate that the ditches are not impacted adversely by effluent ground water from the MGP site. Ground water monitoring is performed and reported on a quarterly basis. A total of eighteen borings (B-18 through -35) were made February 9, 10, and 11, 1993, in the areas of the former USTs to further define the extent of soil impaction and facilitate remediation plans for the soil.

3.0 ASSESSMENT BORINGS

3.1 Rationale for Boring Locations

Eighteen borings were located to determine the volume of soil to be remediated at the two former UST locations. At the Race Track, ten borings were placed around the perimeter of the vadose plume, as previously defined, in areas lacking control. Additional information was needed to the south in the parking lot, to the east in the

track area, and to the north in the car-ramp area where the former dispenser was located (Plate 3).

Eight borings were made around the plume, as previously defined, at the Castle. The Castle area was especially lacking control to the east under the golf course, and to the north under the Castle (Plate 4).

3.2 Augering Procedures

A truck-mounted, continuous flight, hollow-stemmed auger was used to make the borings and take samples. Borings were drilled so that a soil sample could be taken above the ground water from a depth of between five and ten feet. Attention was given to the first occurrence of gasoline impacted soil at the top of the plume, resulting in some samples from two and three feet. A hand auger was used in inaccessible places such as landscaped areas.

4.0 SAMPLING PROCEDURES

All soil samples obtained with the eight-inch hollow-stem auger were collected using a two and one-half-inch diameter California split-spoon sampler containing four 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. Samples retrieved with a hand auger were also sealed in brass sample-sleeves. Soil samples were analyzed for Benzene, Toluene, Xylene and Ethylbenzene (BTX & E) and Total Petroleum Hydrocarbon for gasoline (TPHg). All samples were labeled, chilled and transported to a State Certified Laboratory under a Chain of Custody (Appendix B).

5.0 FINDINGS

The results of laboratory analyses for Benzene and TPHg in the soil samples are displayed on Plates 3 and 4 to show the lateral extent of the gasoline impacted soil at each of the UST locations. The complete report of Laboratory Results and the Chain of Custody for the samples are in Appendix A.

6.0 DISCUSSION

As a result of this investigation the lateral extent of the Race Track plume is now defined well enough to enable the design of a remediation plan but the Castle dispenser area needs a small amount of additional investigation.

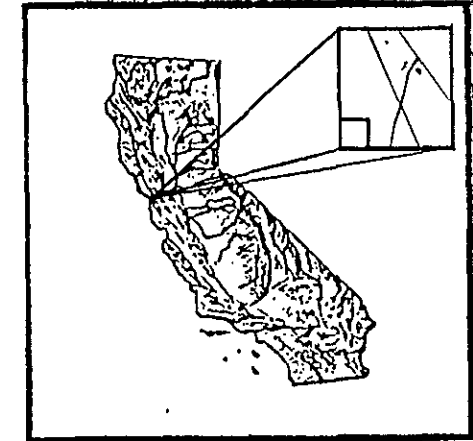
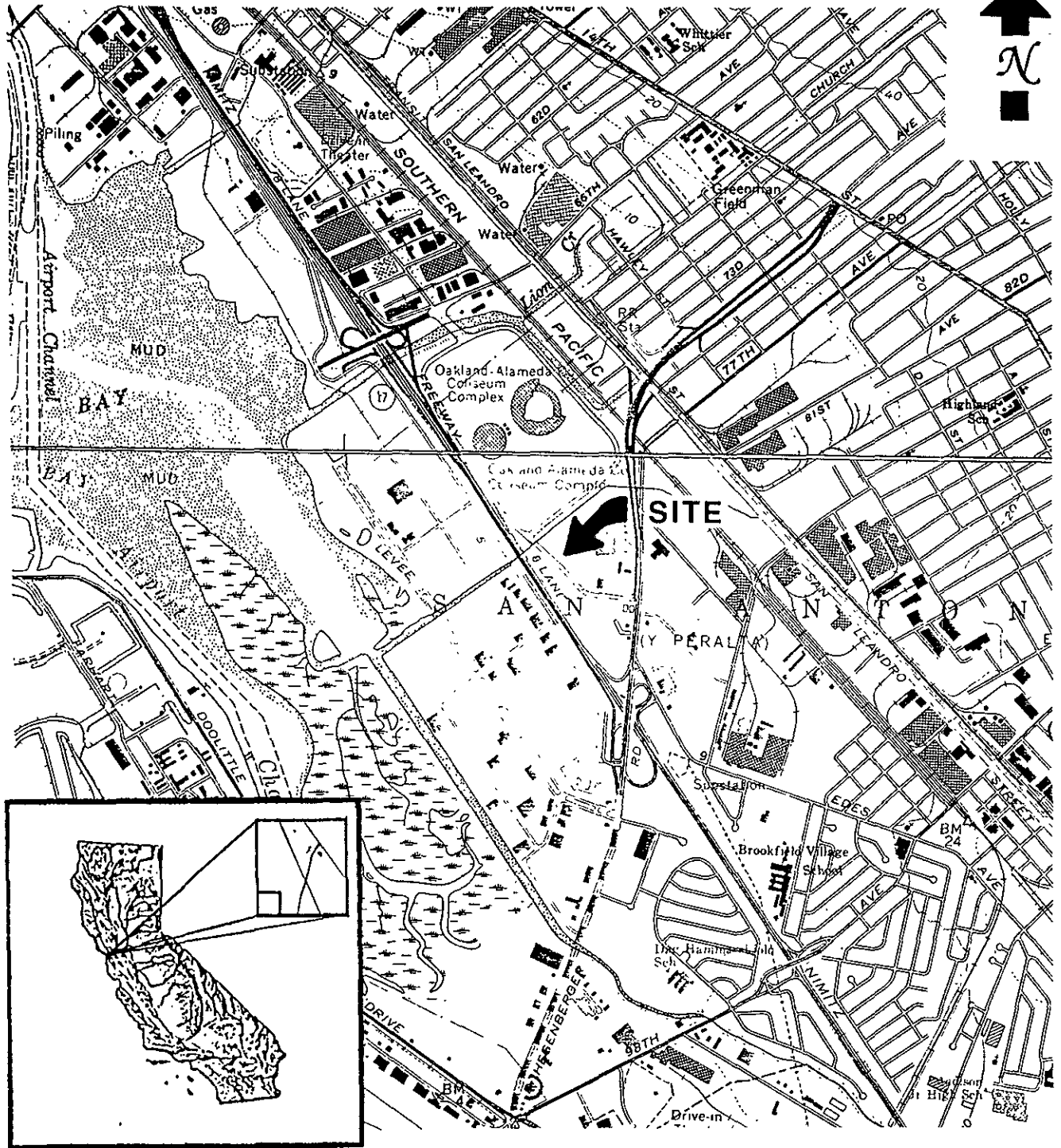
The plume at the Castle is shown to be no larger than before (Plate 4), but sample B-35, at the former dispenser location, with 9.4 ppm TPHg from 3 feet below grade, indicates the need for additional soil samples to find out whether the impaction increases or decreases with depth and whether it spreads

laterally. Remediation of 9.4 ppm TPHg in the soil will not be recommended, but additional confirmation-samples are recommended. Field observations and samples analyses should reveal whether more extensive remediation of impacted soil is needed at that dispenser location.

At the Race Track, borings B-22 and B-27 have shown petroleum contamination to a greater extent than in previous reports, to the north beneath the concrete ramp area, and northeast beneath the landscaped part of the track (Plate 3). Traversing the former dispenser area, starting at boring B-22 (0.84 ppm Benzene, 1500 ppm TPHg accompanied by gasoline odor), concentration levels at 4 feet below grade decrease at B-27 (0.02 ppm Benzene, 430 ppm TPHg with gasoline odor) and become ND (with no gasoline odor) at B-26. Samples from 4 feet are deep enough to accurately describe the extent of vadose plume in that area and, assuming a degree of symmetry about the former dispenser location, the plume is extrapolated to the north and east, as shown in Plate 3, to about the same distance as that between B-26 and B-27. Concentration levels as low as those in B-23 (Benzene, 0.03 ppm and TPHg, 17 ppm) will not be recommended for remediation, but cleaning up around B-27 (Benzene, .23 ppm and TPHg, 430 ppm) is probably necessary.

7.0 RECOMMENDATIONS

It is recommended that a corrective action plan be developed for both vadose plumes at the former tank locations at this site. As discussed in Section 6.0, no additional assessment borings are recommended at the Race Track prior to submitting a work plan. At the Castle, however, the results of analysis of soil samples from boring B-35 indicate the need for additional assessment at the former dispenser location. The results of additional assessment at the Castle dispenser location will be incorporated into the work plan for remediation at that tank site.



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DATE: 3/12/93
PROJECT NUMBER: B4281.42

MALIBU GRAND PRIX
8000 SOUTH COLISEUM WAY
OAKLAND, CALIFORNIA

LOCATION MAP

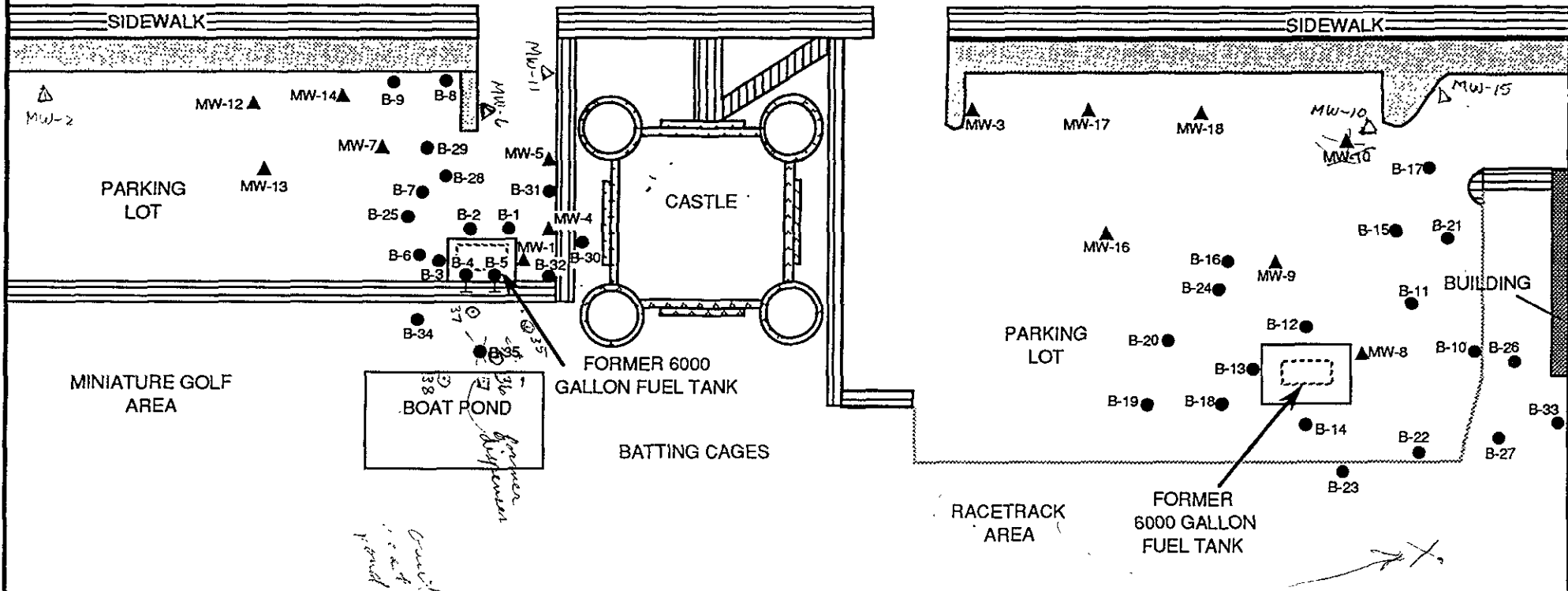
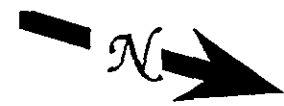
PLATE

1

PLANTED MEDIAN

PLANTED MEDIAN

SOUTH COLISEUM WAY



RESNA
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DATE: 7/15/93
PROJECT NUMBER: B 2481-42

MALIBU GRAND PRIX
8000 SOUTH COLISEUM WAY
OAKLAND, CALIFORNIA

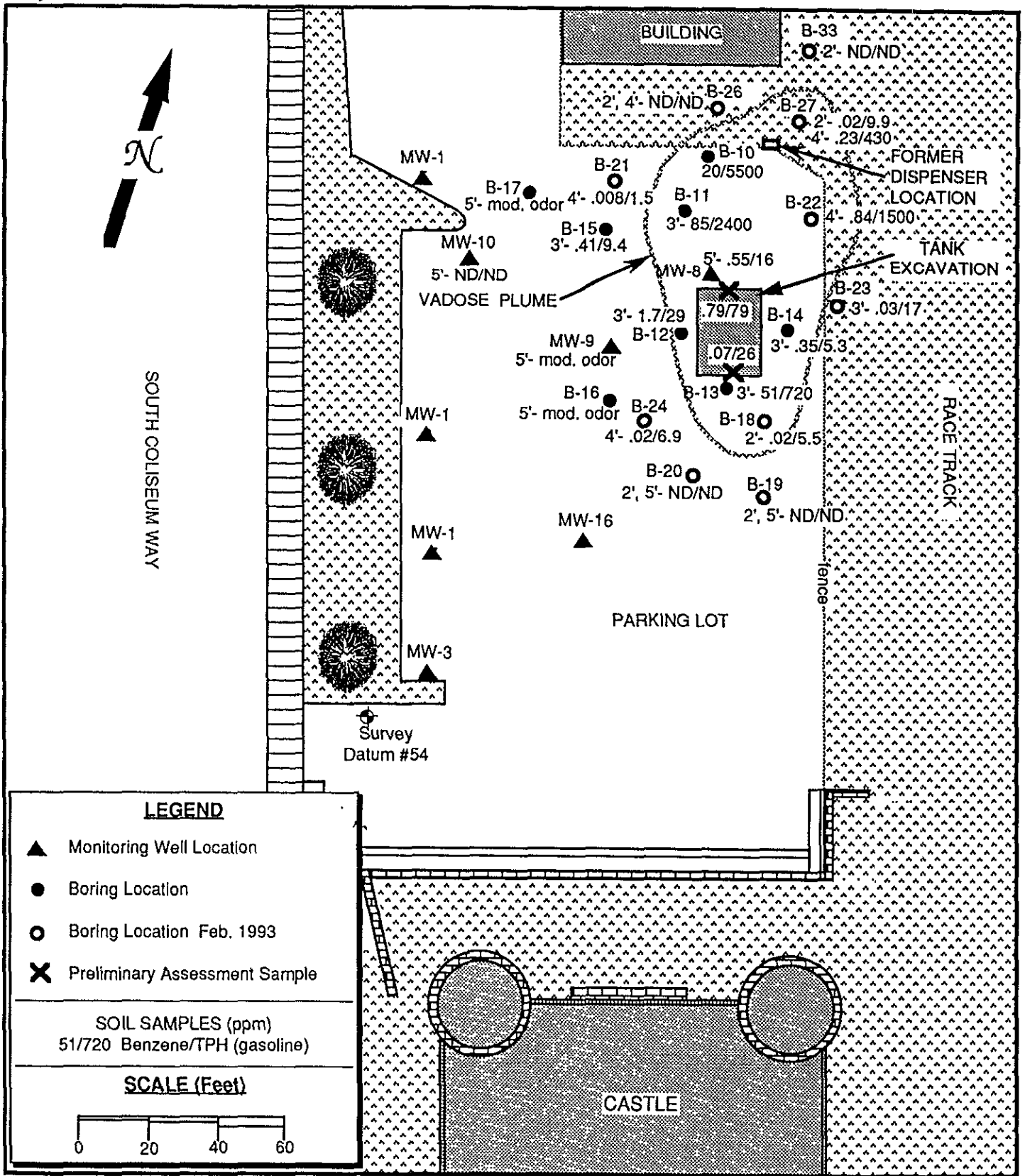
**CASTLE AND RACE TRACK
SITE PLAN**

PLATE
2

LEGEND

- ▲ MONITORING WELL LOCATION
- BORING LOCATION

SCALE IN FEET
ONE INCH = 50 FEET



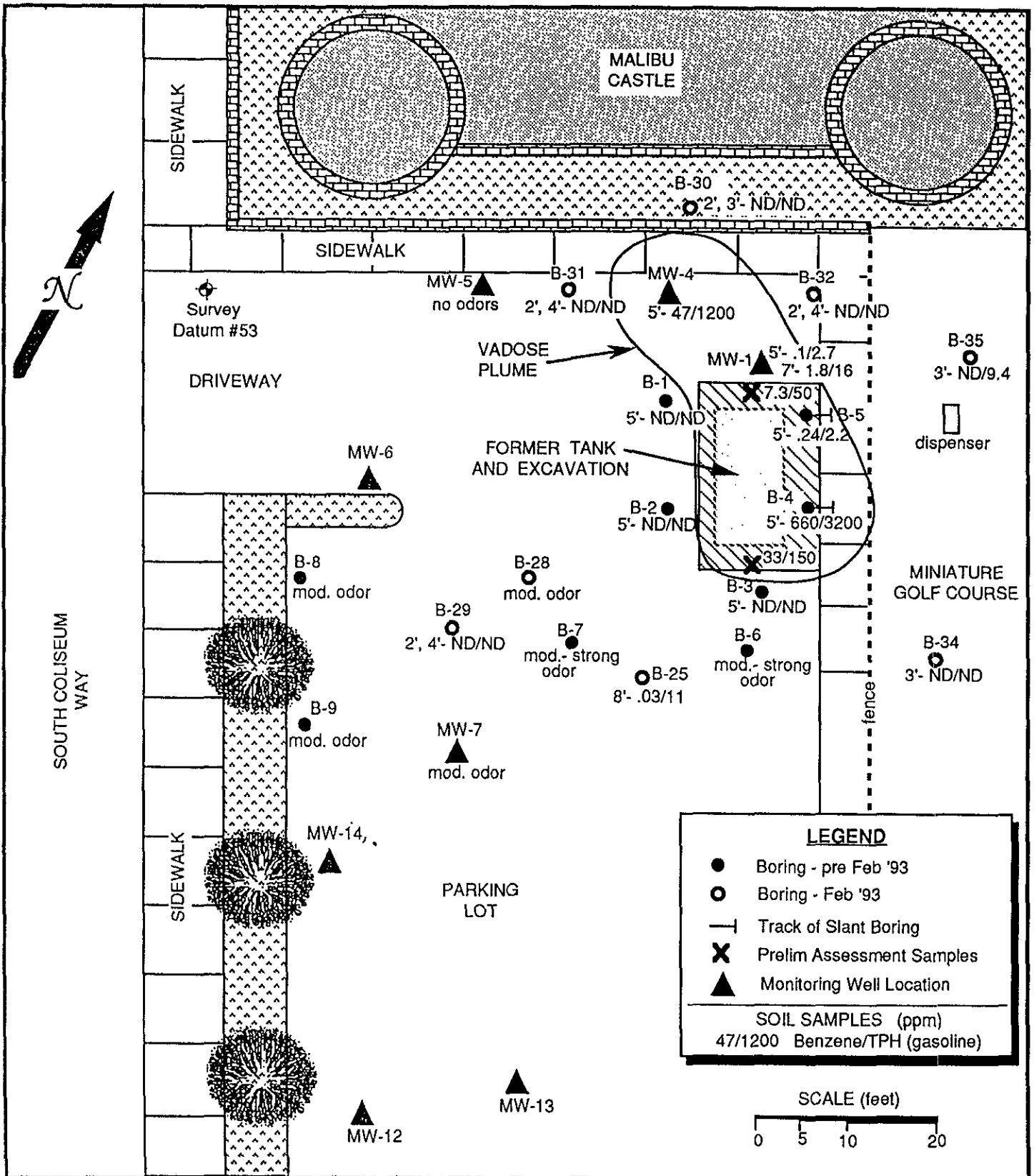
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DATE: 07/15/92; rev 7/22/93
PROJECT NUMBER: B 2481-41

MALIBU GRAND PRIX
8000 SOUTH COLISEUM WAY
OAKLAND, CALIFORNIA

RACE TRACK PLOT PLAN
AREAL EXTENT OF VADOSE PLUME

PLATE
3



RESNA
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DATE: 07/15/92; rev 7/22/93
PROJECT NUMBER: B 2481-41

MALIBU GRAND PRIX
8000 SOUTH COLISEUM WAY
OAKLAND, CALIFORNIA

CASTLE PLOT PLAN
AREAL EXTENT OF VADOSE PLUME

PLATE
4

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
	.022								
bentonite	5.5				B-18-2		GL		FILL MATERIAL - clay, gravel, greenish gray, moderate odor, moderate stain
	NA			5		B-18-5		GL	A/A - strong odor, sheen visb
	NA								
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: 6 FEET
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 20 FEET SOUTHEAST
 OF UST LOCATION

PLATE

5

LOG OF BORING B-18

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
	ND								
bentonite	ND								
	ND			5		B-19-2	GL		FILL MATERIAL - no odor, no stain
	ND					B-19-5	GL		FILL MATERIAL - no odor, no stain
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 40 FEET SOUTHEAST
 OF UST LOCATION

PLATE
6

LOG OF BORING B-19

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete	ND			0					
bentonite	ND			2	B-20-2	GL	GL	FILL - no odor, no stain	
	ND			5	B-20-5	GL	GL	A/A	
	ND			10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 800 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 40 FEET SOUTH OF
 UST LOCATION

PLATE

7

LOG OF BORING B-20

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
	0.10					B-22-2	GL		FILL - slight odor
bentonite	2.5					B-22-4	GL		FILL - no odor
	0.84			5					
	1500								
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 40 FEET NORTH OF
 UST LOCATION

PLATE

9

LOG OF BORING B-22

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
bentonite	0.03 17			0 5 10 15 20 25 30 35 40 45 50		B-23-3		GL	FILL - moderate brown, clay-pebbles, moist, no odor, no stain

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 3 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: 3 FEET
 SAMPLING METHOD: HAND AUGER CUTTING

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services

SITE NAME:

MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA

BORING LOCATION:

RACE TRACK, 30 FEET NORTHEAST
 OF UST LOCATION

PROJECT NUMBER: B2481.41

LOG OF BORING B-23

PLATE

10

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete	ND ND 0.02 6.9			0					
bentonite						B-24-2	SM	SAND - silty, greenish gray, moist, faint odor	
				5		B-24-4	GL	FILL - faint odor	
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 30 FEET SOUTHWEST
 OF UST LOCATION

PLATE

11

LOG OF BORING B-24

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
bentonite	ND ND			5		B-25-4	GL		FILL - no odor, no stain
	0.03 11			10		B-25-8	GL		FILL - faint odor
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 9 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: 9 +/- FEET
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE, 22 FEET SOUTH OF UST
 LOCATION

PLATE

12

LOG OF BORING B-25

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete	0.02			0					1 FT. - strong odor
bentonite	9.9			2		B-27-2	GL		FILL
	0.23			4		B-27-4			
	430			5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/9/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: HAND AUGER CUTTINGS

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, 60 FEET NORTH OF
 UST LOCATION

LOG OF BORING B-27

PLATE

14

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
bentonite				5		B-28-4	GL		FILL - moderate odor
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/10/93
 TOTAL DEPTH: 8 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: 5 FEET
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE, 25 FEET SOUTHWEST OF
 UST LOCATION

PLATE

15

LOG OF BORING B-28

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete	ND ND ND ND			0					
bentonite						B-29-2	GL	FILL - no odor, no stain	
						B-29-4	GL	FILL - no odor, no stain	
				5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/10/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE, 35 FEET SOUTHWEST OF
 UST LOCATION

PLATE

16

LOG OF BORING B-29

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
bentonite	ND			0					
	ND			1	B-30-2		GL		FILL - no odor, no stain
	ND			2	B-30-3		GL		FILL - no odor, no stain
	ND			3					
	ND			4					
	ND			5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/10/93
 TOTAL DEPTH: 3 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE, SHRUB BED, 35 FEET
 NORTHWEST OF UST LOCATION

PLATE

17

LOG OF BORING B-30

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete	ND ND ND ND			0					
bentonite						B-31-2		GL	FILL - no odor, no stain
				5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/10/93
 TOTAL DEPTH: 5 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: MODIFIED SPLIT-SPOON

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE, 25 FEET WEST OF UST
 LOCATION

PLATE

18

LOG OF BORING B-31

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
concrete				0					
bentonite	ND			1		B-32-2	GL		FILL - no odor, no stain
	ND			2					
	ND			3					
	ND			4		B-32-4	GL		FILL - no odor, no stain
	ND			5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR DATE DRILLED: 2/10/93 TOTAL DEPTH: 5 FEET DRILLING COMPANY: RESNA INDUSTRIES, INC.	DIAMETER OF BORING: 8-INCH WATER ENCOUNTERED AT: NONE SAMPLING METHOD: MODIFIED SPLIT-SPOON
--	---

RESNA INDUSTRIES INC. BAKERSFIELD, CALIFORNIA (805)835-7700 environmental/geotechnical services PROJECT NUMBER: B2481.41	SITE NAME: MGP OAKLAND 8000 S. COLISEUM WAY OAKLAND, CALIFORNIA	PLATE 19 page 1 of 1
	BORING LOCATION: NORTHEAST CORNER OF CASTLE PARKING LOT LOG OF BORING B-32	

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
bentonite	ND	ND		0					
				5		B-33-2		ML	SOIL - brown, no odor
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/10/93
 TOTAL DEPTH: 2 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: HAND AUGER SAMPLE

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: RACE TRACK, SHRUB BED,
 SOUTHEAST CORNER OF BUILDING

PLATE

20

LOG OF BORING B-33

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
bentonite	ND	ND		0					
				5		B-34-3		ML	SOIL - brown, no odor
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/11/93
 TOTAL DEPTH: 3 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: HAND AUGER SAMPLE

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA

BORING LOCATION: CASTLE GOLF COURSE FLOWER BED,
 27 FT SOUTHEAST OF UST LOCATION

PROJECT NUMBER: B2481.41

PLATE

21

LOG OF BORING B-34

page 1 of 1

BORING ABANDONMENT	ANALYSES		BLOWCOUNT	DEPTH (feet)	SAMPLE		lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	Lab	Field			INTERVAL	NUMBER			
	Benzene TPHg ppm	HNU ppm							
bentonite	ND 9.4			0		B-35-3		ML	SOIL - brown, no odor
				5					
				10					
				15					
				20					
				25					
				30					
				35					
				40					
				45					
				50					

LOGGED BY: TCR
 DATE DRILLED: 2/11/93
 TOTAL DEPTH: 3 FEET
 DRILLING COMPANY: RESNA INDUSTRIES, INC.

DIAMETER OF BORING: 8-INCH
 WATER ENCOUNTERED AT: NONE
 SAMPLING METHOD: HAND AUGER SAMPLE

RESNA INDUSTRIES INC.
 BAKERSFIELD, CALIFORNIA
 (805)835-7700
 environmental/geotechnical services
 PROJECT NUMBER: B2481.41

SITE NAME: MGP OAKLAND
 8000 S. COLISEUM WAY
 OAKLAND, CALIFORNIA
 BORING LOCATION: CASTLE GOLF COURSE FLOWER BED,
 27 FT NORTHEAST OF UST LOCATION

PLATE

22

LOG OF BORING B-35

page 1 of 1

A P P E N D I X A

**Laboratory Results &
Chain of Custody**

1.



CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. <i>248142</i>		PROJECT NAME/SITE <i>OAKLAND</i>						ANALYSIS REQUESTED											P.O. # <i>A4730</i>		
SAMPLERS <i>[Signature]</i>		(SIGN) / (PRINT) <i>TIM RIZZO</i>						NO. CONTAINERS	SAMPLE TYPE	/ / / / / / / / / / / / / / / /											REMARKS
SAMPLE IDENTIFICATION		DATE	TIME	COMP	GRAB	PRES. USED	ICED			BTX (602/6020)	TPH _g (8015)	TPH _d (8015)	TOG 418.1/5520	601/8010	624/8240	625/8270					
✓ MW-16	2-11-93	3:56			1K1	X	2	W	X	X							W1302 242				
✓ MW-17		3:45					"										243				
✓ MW-18		3:51					"										244				
✓ TRAVEL DUMK							1										245				
✓ B-18-2	2-9-93	8:00						S									S1302 246				
✓ B-19-2		8:30															247				
✓ B-19-5		9:00															248				
✓ B-20-2		9:30															249				
✓ B-20-5		9:45															250				
✓ B-21-2		10:00															251				
✓ B-21-4		11:00															252				
✓ B-22-2		11:55															253				
✓ B-22-4		12:15															254				
✓ B-23-3		12:15															255				
✓ B-24-2		12:40															256				

RELINQUISHED BY: <i>[Signature]</i>	DATE <i>2-11-93</i>	TIME <i>97:40</i>	RECEIVED BY: <i>[Signature]</i>	LABORATORY: <i>RESNA</i>	PLEASE SEND RESULTS TO: <i>RESNA-BAKERSFIELD</i>
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:		
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	REQUESTED TURNAROUND TIME: <i>NORMAL</i>	
RELINQUISHED BY:	DATE	TIME	RECEIVED BY LABORATORY:	RECEIPT CONDITION:	PROJECT MANAGER: <i>REX YOUNG</i>



CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. B2481.42		PROJECT NAME/SITE OAKLAND						ANALYSIS REQUESTED										P.O. #: A4730					
SAMPLERS <i>T. Neal</i> (SIGN)		(PRINT) <i>TIM REED</i>						NO. CONTAINERS	SAMPLE TYPE	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">BTEX (602/8020)</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">TPHg (8015)</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">TPHd (8015)</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">TOG 418 1/5520</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">601/8010</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">624/8240</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">625/8270</div> </div>										REMARKS			
SAMPLE IDENTIFICATION		DATE	TIME	COMP	GRAB	PRES. USED	ICED																
B-33-2		2-10-93	9:30		X		X	1	S	X	X												S1302272
B-34-3		2-11-93	8:40		X		X	"															273
B-35-3		"	9:30		X		X	"															274
RELINQUISHED BY: <i>T. Neal</i>		DATE 2-11-93	TIME 17:40	RECEIVED BY: <i>I. K. Miller</i>		LABORATORY: RESNA					PLEASE SEND RESULTS TO: RESNA - BAKERFIELD												
RELINQUISHED BY:		DATE	TIME	RECEIVED BY:		REQUESTED TURNAROUND TIME: NORMAL																	
RELINQUISHED BY:		DATE	TIME	RECEIVED BY:		RECEIPT CONDITION:					PROJECT MANAGER: REX YOUNG												
RELINQUISHED BY:		DATE	TIME	RECEIVED BY LABORATORY:																			

ANALYSIS REPORT

Attention: Mr. Rex Young
RESNA
1500 South Union Avenue
Bakersfield, CA 93307
Project: 11010.0L, Project B2481.42
Oakland

Date Sampled: 02-09-93
Date Received: 02-11-93
BTEX Analyzed: 02/18-22/93
TPHg Analyzed: 02/18-22/93
TPHd Analyzed: NR
Matrix: Soil

1020lab.frm

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE

Laboratory Identification

B-18-2 S1302246	0.022	ND	0.30	0.012	5.5	NR
B-19-2 S1302247	ND	ND	ND	ND	ND	NR
B-19-5 S1302248	ND	ND	ND	ND	ND	NR
B-20-2 S1302249	ND	ND	ND	ND	ND	NR
B-20-5 S1302250	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

MTASU

Laboratory Representative

February 26, 1993

Date Reported

RESNA ENVIRONMENTAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY

(Certification No. E1211)

42501 Albrae Street • Fremont, CA 94538 • Phone: (510) 623-0775 • (800) 247-5223 • FAX: (510) 651-8754

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Rex Young RESNA 1500 South Union Avenue Bakersfield, CA 93307	Date Sampled:	02-09-93
Project:	11010.0L, Project B2481.42 Oakland	Date Received:	02-11-93
		BTEX Analyzed:	02/18-22/93
		TPHg Analyzed:	02/18-22/93
		TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE

Laboratory Identification

B-21-2 S1302251	ND	ND	ND	ND	ND	NR
B-21-4 S1302252	0.008	ND	ND	ND	1.5	NR
B-22-2 S1302253	0.10	ND	0.094	ND	2.5	NR
B-22-4 S1302254	0.84	16	16	69	1500	NR
B-23-3 S1302255	0.030	0.10	0.072	0.83	17	NR

ppm = parts per million = mg/kg = milligrams per kilogram.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX— Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg—Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd—Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

M. T. Aguirre

Laboratory Representative

February 26, 1993
Date Reported

ANALYSIS REPORT

Attention: Mr. Rex Young
RESNA
1500 South Union Avenue
Bakersfield, CA 93307
Project: 11010.0L, Project B2481.42
Oakland

Date Sampled: 02-09-93
Date Received: 02-11-93
BTEX Analyzed: 02/18-22/93
TPHg Analyzed: 02/18-22/93
TPHd Analyzed: NR
Matrix: Soil

1020lab.frm

	<u>Benzene</u> ppm	<u>Toluene</u> ppm	<u>Ethyl- benzene</u> ppm	<u>Total Xylenes</u> ppm	<u>TPHg</u> ppm	<u>TPHd</u> ppm
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE
Laboratory Identification

B-24-2 S1302256	ND	ND	ND	0.013	ND	NR
B-24-4 S1302257	0.022	0.074	0.10	0.58	6.9	NR
B-25-4 S1302258	ND	ND	ND	ND	ND	NR
B-25-8 S1302259	0.034	0.008	0.081	0.014	11	NR
B-26-2 S1302260	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

MTague
Laboratory Representative

February 26, 1993
Date Reported

ANALYSIS REPORT

Attention: Mr. Rex Young
RESNA
1500 South Union Avenue
Bakersfield, CA 93307
Project: 11010.0L, Project B2481.42
Oakland

Date Sampled: 02-09-93
Date Received: 02-11-93
BTEX Analyzed: 02/18-22/93
TPHg Analyzed: 02/18-22/93
TPHd Analyzed: NR
Matrix: Soil

1020lab.frm

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE

Laboratory Identification

B-26-4 S1302261	ND	ND	ND	ND	ND	NR
B-27-2 S1302262	0.022	ND	0.22	0.091	9.9	NR
B-27-4 S1302263	0.23	0.069	5.1	3.8	430	NR
B-29-2 S1302264	ND	ND	ND	ND	ND	NR
B-29-4 S1302265	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

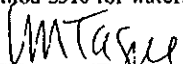
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.



Laboratory Representative

February 26, 1993

Date Reported

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Rex Young
RESNA
1500 South Union Avenue
Bakersfield, CA 93307
Project: 11010.0L, Project B2481.42
Oakland

Date Sampled: 02-09-93
Date Received: 02-11-93
BTEX Analyzed: 02/18-22/93
TPHg Analyzed: 02/18-22/93
TPHd Analyzed: NR
Matrix: Soil

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE

Laboratory Identification

B-30-2 S1302266	ND	ND	ND	ND	ND	NR
B-30-3 S1302267	ND	ND	ND	ND	ND	NR
B-31-2 S1302268	ND	ND	ND	ND	ND	NR
B-31-4 S1302269	ND	ND	ND	ND	ND	NR
B-32-2 S1302270	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

MM Tague
Laboratory Representative

February 26, 1993
Date Reported

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Rex Young	Date Sampled:	02-09-93
	RESNA	Date Received:	02-11-93
	1500 South Union Avenue	BTEX Analyzed:	02/18-22/93
	Bakersfield, CA 93307	TPHg Analyzed:	02/18-22/93
Project:	11010.0L, Project B2481.42	TPHd Analyzed:	NR
	Oakland	Matrix:	Soil

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.005	0.005	0.005	0.005	1.0	1.0

SAMPLE

Laboratory Identification

B-32-4 S1302271	ND	ND	ND	ND	ND	NR
B-33-2 S1302272	ND	ND	ND	ND	ND	NR
B-34-3 S1302273	ND	ND	ND	ND	ND	NR
B-35-3 S1302274	ND	ND	ND	0.010	9.4	NR

ppm = parts per million = mg/kg = milligrams per kilogram.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

M. Tague

Laboratory Representative

February 26, 1993

Date Reported

APPENDIX B

Sampling Protocol



1500 So. Union Avenue
Bakersfield, California 93307
Phone: (805) 835-7700
FAX: (805) 835-7717

**RESNA INDUSTRIES INC.
1500 SOUTH UNION AVENUE
BAKERSFIELD, CALIFORNIA 93307**

**SAMPLING PROTOCOL
QUALITY ASSURANCE & QUALITY CONTROL**

(QAQC)

Revised April 1991

SAMPLING PROTOCOL - QUALITY ASSURANCE AND QUALITY CONTROL

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SAMPLING PROTOCOL-QUALITY ASSURANCE AND QUALITY CONTROL

RESNA Industries Inc. (RESNA) has adopted the following Site Investigation Quality Assurance/Quality Control (QA/QC) program intended to facilitate the acquisition of accurate and reliable data. Environmental data gathered during the investigation shall be collected and analyzed following procedures prescribed in the Quality Control Program. A Quality Assurance Program has been established to assure that the Quality Control Program is effective. Both programs are necessary to provide accurate data and documentation for investigations and laboratory analyses. The following field and laboratory procedures shall be implemented to ensure that QA/QC objectives are met.

1.0 RECORDING OF FIELD DATA

All information pertinent to the field investigation shall be kept in a field log book. In addition, boring log and chain-of-custody comprise the field documents in which all of the pertinent information about bore hole soil samples are recorded. Information to be documented includes at least the following:

- Sample number.
- Locations of sample collection.
- Soil boring or well numbers, as applicable.
- Depths at which samples were obtained.
- Names of collectors.
- Dates and times of collection.
- Purpose of sample.
- Sample distribution (e.g., laboratory, archive, etc.).
- Field observations.
- Field measurements (e.g., PID readings, pH, conductivity, water levels).
- Other data records (e.g., development log, soil sampling report, well log, etc.).

2.0 SAMPLE CONTAINERS

Groundwater samples shall be placed in containers supplied by RESNA or an analytical laboratory. Table 1 summarizes the required sample containers.

Soil samples shall be collected in either 8-ounce widemouth glass jars with screw-on caps lined with teflon or in brass or stainless steel tubes (Table 1). Screw-on caps for the tubes shall be fitted with teflon liners. Tubes shall be tightly capped and sealed with integrity tape.

3.0 QUALITY CONTROL OF WATER SAMPLES

A QC program independent from the laboratory's program shall be maintained. The program entails *submittals of travel blanks, duplicates, and field blanks to a certified laboratory. No spiked samples shall be supplied from the field; the laboratory in-house QC program shall include analysis of spiked samples. Field blanks shall be assigned independent sample numbers and made indistinguishable from non quality control samples.*

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3.1 Travel Blanks

When sampling groundwater, travel blanks shall be used to detect the introduction of contaminants during transportation from the field to the laboratory. The travel blanks shall be provided by RESNA or the analytical laboratory. They shall be taken to the field and accompany the collected groundwater samples to the laboratory for analysis. The blanks shall consist of deionized water or analytically confirmed organic-free water. The blank is numbered, packaged, and sealed in the same manner as the other samples.

3.2 Duplicates

Five percent (1 in 20) or one (1) per sampling set, whichever is more, shall be submitted to the laboratory for analysis as duplicates. Therefore, if a job site has one (1) and up to twenty (20) wells to be sampled, one (1) duplicate shall be analyzed. If twenty-one (21) wells are to be sampled then two (2) duplicates shall be analyzed. The duplicate is acquired by filling two sample bottles from the same well bailer. If more than one bailer volume is required, each bailer volume shall be split between containers. The duplicates shall be labeled as duplicate without identifying the actual well location either on the chain-of-custody or on the actual sample. The actual well location of the duplicate shall be noted in the field log book.

3.3 Field Blanks

Field blanks shall be prepared and submitted to the analytical laboratory for analysis on the same frequency stated for duplicates. A field blank shall be acquired by sampling the deionized water used to rinse the sampling bailer in between sample points.

3.4 Sample Preservation

Sample containers shall be pre-cooled and transported to the site in coolers. All samples shall be preserved as indicated on Table 1 and placed in coolers immediately after collection. Sealed chemical ice shall be used in the coolers to maintain samples at a temperature of 4 degrees celsius. A high level recording thermometer shall accompany the samples during transport conditions.

4.0 GROUNDWATER SAMPLING PROTOCOL

Immediately prior to sampling, the depth to water (DTW) in the well shall be recorded. If there is free product in the well, the thickness of product on top of the groundwater shall be measured using an interface probe.

If free product is detected, analysis of groundwater at the interface for dissolved product shall not be conducted. A product sample shall be collected for source identification. If all free product cannot be removed, an interval-specific sampling device may be utilized to collect a sample from below the

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zone of free product. The well shall be purged until indicator parameters (temperature, conductivity and pH) are stabilized. This shall entail the removal of at least four well-casing volumes by bailing or pumping. The criteria for determining well-casing volumes and temporary storage of purged water is outlined in Section 9.0, (Well Development Protocol). The indicator parameter measurements shall be taken both before and after purging of each well-casing volume. Once the well is purged and indicator parameters have stabilized, a sample may be collected after the water level has reached 80 percent of its initial elevation. Where water level recovery is slow, the sample may be collected after stabilization is achieved and enough water is present to fill sample containers.

Cross contamination from transferring pumps (or bailers) from well to well shall be avoided by utilizing dedicated equipment. Where this is not feasible, thorough cleaning of equipment shall be performed between sampling rounds. Sampling shall proceed from the least contaminated to the most contaminated well, if that information is available before sample collection, or if it is indicated by field evidence. Where several types of analysis shall be performed for a given well, individual samples shall be collected in the following order:

1. Volatile organics
2. Purgeable organics
3. Purgeable organic halogens
4. Total organics
5. Total organic halogens
6. Extractable organics
7. Total metals
8. Dissolved metals
9. Phenols
10. Cyanide

The specific analytical methods to be utilized for the common volatile/semi-volatile analyses are shown on Table 2.

Duplicate samples shall be transferred to vials or containers that meet Regional Board specifications (Table 1). Groundwater from the bailer shall be transferred to the sample container by allowing the fluid to flow slowly along the sides of the vessel. All containers shall be filled above the top of the opening to form a positive meniscus. No head space should be present in the sample container once it is sealed. After the vial is capped it should be inverted to check for air bubbles. If bubbles are present the sample should be discarded and replaced. If it is not possible to collect a sample without air bubbles, the problem shall be noted in the field log book.

5.0 CHAIN-OF-CUSTODY PROCEDURES

5.1 Sample Labels

Each sample container shall be labeled prior to filling to prevent misidentification. The label shall contain at least the following information:

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- Sample number which uniquely identifies the sample
- Project title or number
- Location of sample collection
- Soil boring or well number, as applicable
- Name of collector
- Date and time of collection

5.2 Chain-of-Custody Record and Sample Analysis Request Form

A chain-of-custody record for each container or sample shall be used to track possession of the samples from the time they were collected in the field until the time they are analyzed in the laboratory.

The chain-of-custody record shall contain the following information:

1. Site name or project number
2. Signature of collector
3. Date and time of collection
4. Sample identification number(s)
5. Number of containers in sample set
6. Description of sample and container(s)
7. Name and signature of persons, and the companies or agencies they represent, who are involved in the chain-of-custody
8. Inclusive dates and times of possession
9. Type of analysis requested

5.3 Delivery of Samples to Laboratory

Samples shall be delivered to the laboratory on a daily basis. Samples shall be maintained at approximately 4 degrees celsius for shipping. Shipping containers shall be sealed with security tape to assure sample integrity during shipping. Delivered samples shall be accompanied by a chain-of-custody record. The laboratory shall note on the chain-of-custody that samples were properly preserved and security tape was intact upon arrival.

6.0 SAMPLING AND DRILLING EQUIPMENT DECONTAMINATION

Prior to arriving at the sampling site, all sampling equipment shall be cleaned with laboratory grade detergent (Alconox or equivalent) and rinsed twice with tap water. This procedure shall also be carried out on-site before sampling of any additional monitoring wells.

All decontamination shall be conducted on an impermeable surface and all decontamination effluent shall be contained. All surfaces of the equipment shall be thoroughly decontaminated using a steam cleaner. The equipment shall be placed on a drying rack for air drying. The water used for decontamination shall be stored in containers certified for hazardous materials storage and disposed of in an approved manner.

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7.0 FIELD EQUIPMENT CALIBRATION AND MAINTENANCE

The following measuring equipment may be used during the Site Investigation and/or sample collection. Calibration procedures and frequency are listed for each piece.

Soil Borings and Well Dimensions - Steel and coated cloth tape. Calibration: none.

Water Level Measurements in Wells - Water Sensing tape. Calibration: Manufacturer supplied temperature correction shall be applied as applicable for field conditions. Electrical well sounders.

Total Organic Vapors - Foxboro OVA, flame ionization detector (FID). Calibration: Daily field calibration using manufacturer recommended procedures.

Organic Vapors - Photovac, photoionization detector (PID). Calibration: Daily field calibration using an isobutylene standard as per manufacturer instructions.

Groundwater pH Measurement - Digital pH meter. Calibration: Standard pH solutions of 4, 7, and 10 shall be utilized for daily field calibration according to manufacturer instructions.

Electrical Conductivity - Electrical conductivity meter. Calibration: Factory-calibrated annually and periodically calibrated against laboratory prepared standard calibration solution.

Water Temperature - Alcohol or digital thermometers. Calibration: Factory-calibrated once.

Combustible Gas/Oxygen - Gastech LEL, combustible gas/oxygen meter calibration: Factory calibrated, field calibrated monthly, zeroed daily according to manufacturer's instructions.

Miscellaneous Measuring Devices - Calibration procedures for any other measuring device used shall be documented at the request of the regulatory authority.

All equipment shall be checked before use and replaced as necessary. Instrument manuals and an instrument log book shall accompany equipment into the field. Any calibrations, repairs or related information shall be recorded in the log book.

8.0 GROUNDWATER MONITORING PROTOCOL

Monitoring of depth to water and free product thickness within wells at the site shall be conducted using an interface probe or conductivity meter. For consistency, all measurements shall be taken from

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the north side of the wellhead at the survey mark. To assess potential infiltration of fine-grained sediments, total well depth shall also be sounded.

Newly installed wells shall be allowed to stabilize for 24 hours after development prior to free product inspection. A clean bailer or sampler shall be used for visual inspection of the groundwater in order to note sheens (difficult to detect with the interface probe), odors, microbial action and sediments.

To reduce the potential for cross contamination between wells, the monitoring shall take place in order from the least to the most contaminated, if known. Wells containing free product shall be monitored last. Between each well monitoring, the equipment shall be decontaminated.

Water level data collected from the wells shall be used to develop a groundwater contour map for the project site. Groundwater flow shall be estimated to be perpendicular to equipotential lines drawn on the map.

9.0 WELL DEVELOPMENT PROTOCOL

Groundwater monitoring wells shall be surged and developed prior to setting the surface seal. Approximately 3 to 5 times the volume of water in the casing shall be withdrawn if possible. Casing volumes shall be calculated in the following manner:

Volume of Schedule 40 PVC Pipe

Diameter (inches)	I.D. (inches)	Volume (gal/linear ft.)
2	2.067	0.17
4	4.026	0.66

If the aquifer is slow to recharge, development shall continue until recharge is too slow to practically continue. The volume of water produced, versus time, shall be recorded.

All withdrawn groundwater shall be stored on-site in 55-gallon waste drums unless permission is granted by the appropriate regulatory agency to discharge the water to the ground surface or sanitary sewer. Drummed water shall be labeled with the source of the water to help ensure appropriate disposal based on contamination levels.

10.0 QUALITY CONTROL OF SOIL SAMPLES

10.1 Travel Blanks

Travel blanks shall not be used for soil sample transportation due to problems associated with obtaining a blank material.

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10.2 Duplicates

The effort to collect duplicate soil samples from a bore hole may be compromised by variations of soil texture. This shall be minimized by selecting a duplicate sample location as near as possible to the actual sample. In a split-spoon sampler the lowest tube shall be a duplicate when needed. The middle tube shall be the actual sample. All soil sample tubes shall be marked to show from which end the tube is to be sampled. The ends, where the two sample tubes joined shall be marked. The laboratory shall be instructed to sample the marked end. The upper tube shall be used for soil characterization.

The frequency with which soil duplicates are taken shall be at a minimum five (5) percent (1 in 20). In bore-holes the samples are best collected below the five foot depth in zones of either low or no transition.

When sampling soil piles or tank pits the top inch or two shall be removed before sampling. Efforts shall be made to avoid areas where soil texture changes. Fill the sample jar completely full avoiding any unnecessary head space in the sample jar.

Duplicate soil samples shall be labeled as duplicate without any other identification. A record of its actual sampling point shall be kept in the field log book.

10.3 Field Blanks

A soil field-blank from a bore hole would be best sampled from the top of the bore hole i.e. the first sample depth (not to be greater than five feet) and only if there is no indication of contaminants. The blank should be labeled as to the boring number, depth, and B for blank. For example, a blank obtained from soil boring number two (2), at a depth of five feet would be labeled as SB2-5B. The frequency of blanks may differ than that of duplicates, but when possible they shall be of the same frequency, five (5) percent (1 in 20).

A blank from a soil pile or tank pit shall be taken from the surface material only. It shall be taken in a zone where no contamination is indicated.

11.0 SOIL SAMPLING PROTOCOL

11.1 Sample Collection During Drilling Activities

A proposal shall be submitted to the lead Regulatory Authority with proposed boring/sampling locations. The exact location and number of borings at each site shall be determined in the field by the Project Geologist/Engineer.

Prior to arriving at the sample site, the drill rig/augers shall be steam cleaned and all sample equipment shall be cleaned. Cleaning between samples shall be conducted on-site on all sampling equipment.

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Soil samples shall be obtained using a California modified split-spoon sampler containing three, six inch long, two inch diameter brass tubes. The sampler shall be driven 18 inches ahead of the hollow stem auger by a 140-pound hammer with a 30-inch drop in accordance with American Society for Testing and Materials (ASTM Method D 1586-84) for split-barrel sampling of soil and (ASTM Method D 1587-83) for thin-walled tube sampling of soils. The blows required to drive the sampler each six-inch interval shall be recorded on the boring log. The sampler shall be removed from the boring and opened to reveal the brass tubes. The middle tube shall be covered with teflon and plastic end caps, taped, labeled, and placed into a cooler containing frozen chemical. A high level temperature recording thermometer shall accompany sample shipments to ensure proper temperature maintenance. The samples shall be delivered to a state certified laboratory, with a chain-of-custody, following all protocols, within 48 hours of sampling.

Soil in the uppermost brass tube shall be described according to ASTM standard practice for physical description and identification of soils (ASTM Method D 2488-84). Stratigraphic, genetic and other data/interpretations shall also be recorded on a log prepared for each boring/well. The second sample tube may be used with the lowermost tube for preparation of duplicates.

Soil samples shall be collected at five foot intervals, at significant changes in lithology and intervals of obvious contamination in order to develop a complete profile of soil contamination.

11.2 Sample Collection During Tank Removal

Soil samples shall be collected as soon as possible after removal of the tank. Where feasible, all preparations for soil sampling shall be made prior to tank removal. Soil samples collected from a backhoe bucket or directly from the excavation floor shall be collected in glass sampling jar with a Teflon lined screw cap. When sampling, the jar should be filled with soil as completely as possible.

11.3 Sampling from Soil Piles or Shallow Soil Pits

Soil samples shall be collected and transported from excavated material in the manner described in the previous section, however, a backhoe shall not be utilized. If composite samples are collected, four sample jars shall be collected for every 50 cubic yards of material to be sampled unless otherwise specified by the lead regulatory agency. The samples shall be composited by the state certified analytical laboratory personnel prior to testing.