groundwater resources inc.

SCOTSMAN CORPORATION
6055 Scarlett Ct.
Dublin, California

SITE CHARACTERIZATION REPORT
June 30, 1989

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ILLUSTRATIONS

APPENDIX

1.0 INTRODUCTION

This report provides the results of an investigation to further determine the extent of a hydrocarbon plume in the groundwater at the Scotsman Corporation facility at 6055 Scarlett Ct., Dublin, California. Groundwater Resources, Inc. (GRI) recommends that further drilling and sampling be done before a final remediation plan is submitted.

2.0 BACKGROUND

Two 500 gallon underground gasoline storage tanks were removed from the Scotsman facility on October 23, 1987. During the removal, corrosion was noted on the tanks and one of the tanks was described as having a hole by the fill point. The water table was observed near the tank bottoms at six and one-half feet. Laboratory analysis of the samples reported substantial hydrocarbon levels in the soil. Based on this preliminary assessment, the County Department of Environmental Health ordered a site investigation. In response to GRI's Site investigation report, dated 1-19-89, the Department requested further work to completely define the extent of the hydrocarbon plume. In addition, mapping of the groundwater gradient and information on the soil characteristics were requested.

3.0 BORINGS AND MONITORING WELL COMPLETIONS

Six groundwater monitoring wells were drilled on the days of May 24-25, 1989, bringing the total number of monitoring wells at the site to seven. Three monitoring wells, designated MW-2, MW-3 and MW-4 were placed 335 feet north, 285 feet northeast and 70 feet south of MW-1, respectively, in order to provide information on the local groundwater gradient (Plate 2). Well MW-6 was drilled at the south edge of the tank excavation to characterize the extent of soil contamination in this area and to aid in remediation. Well MW-7 was drilled through the concrete slab ten feet north of MW-1 to investigate possible migration of hydrocarbons under the slab. MW-5 was drilled 20 feet to the southwest of the source to find the extent of hydrocarbon migration downgradient of the suspected source (Plate 3).

All borings were completed as groundwater monitoring wells. The wells ranged in depth from 16.5 feet to 21.5 feet and were constructed with four-inch PVC casing and a 10 foot slotted interval (see Boring Logs, Plates 4-9). A grayish brown silty clay was generally encountered in all of the borings with the exception of MW-3 in which a fine grained, medium brown, silty sand was observed from 13-16.5 feet.

4.0 SAMPLING PROCEDURES

Soil samples were collected using a two and one-half inch diameter California Split Spoon 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 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 BTX&E and TPH (gasoline). All samples were labeled, chilled and transported to a State Certified Laboratory under a Chain of Custody (Appendix B).

5.0 FINDINGS

All soil samples analyzed during the latest drilling phase were reported as having no detectable Hydrocarbons present. Hydrocarbons were found in the groundwater in MW's 1, 2, 3, 5, 6 and 7. The highest readings for TPH (gasoline) were found in MW-6 at 76000 ppb with 6200 ppb Benzene (see Laboratory Results, Appendix A). TPH and Benzene levels for MW-7, 10 feet north of MW-1, were 1100 ppb and 67 ppb respectively. The downgradient location of MW-5 was chosen to help determine the degree of migration in that direction. A TPH concentration of 1400 ppb and 270 ppb Benzene was found there. In MW-4, no Hydrocarbon concentrations were detected. Both MW-2 and MW-3 showed positive results for Benzene at 15 ppb and 4.6 ppb respectively with MW-2 also reported as having 52 ppb TPH. Elevations of the wells were measured by a licensed surveyor and the local groundwater gradient was determined. The local gradient (as of 5-25-89) was calculated to be 3.7 feet per 1000 feet with a bearing of 15 degrees west of south (Plate 10). Additional soil samples were collected for permeability analysis. This data is not yet available.

6.0 CONCLUSIONS

6.1 Discussion of Vadose

Samples collected in the vadose zone from each monitoring well and boring have shown little or no significant contamination present in the soil above the watertable. The soil sample collected from boring B-3 at a depth of six feet (see Site Investigation Report, 1-19-89) was below the watertable or at the capillary fringe and may have contained contaminated groundwater. It should not therefore be considered part of the vadose zone.

It can be inferred from the analysis results obtained from the borings that vadose zone contamination is not a factor and does not require remedial action.

6.2 Discussion of Groundwater

The high readings for TPH in the groundwater at MW-6 (76000 ppb) and hydrocarbon concentrations reported in MW-5 indicates a southerly or downgradient migration of the plume. There may also have been some upgradient migration under the concrete slab, as shown by the positive readings in MW-7. This phase of plume delineation has shown that migration has occurred down the gradient more than 20 feet from the source and upgradient at least ten feet under the concrete pad. It is noteworthy that MW-2 and MW-3, which are more than 200 feet upgradient from the tank excavation, indicate that Benzene and TPH concentrations are present in the groundwater. GRI considers it very unlikely that these wells were affected by the suspected source at the tank location. It appears that there is either a second source of hydrocarbons to the north of the tank excavation or there is a high background level of hydrocarbons due to previous land use.

7.0 RECOMMENDATIONS

In view of the high levels of hydrocarbons in wells 1, 5, 6 and 7, and the apparent mobility of the plume, GRI recommends that a pump and treat program be started as soon as it is practical in order to prevent the further spread of the contaminants. In addition, further delineation of the plume should be continued. We propose to auger a series of holes around the known plume using a DeepRock Hydra-Drill with two-inch, continuous-flight augers, and take groundwater samples as needed until the plume is fully defined (Plate 3). These samples would be for screening purposes only, so that the approximate boundary of the plume could be defined. Upon completion of the analysis, monitoring wells would be constructed on the plume edges to verify the extent of hydrocarbon migration. In addition, a series of monitoring wells with discreet screened intervals would be placed in the plume to determine the vertical extent of groundwater contamination. Pump tests to determine the hydrologic conductivity of the soil would also be performed. Additional samples taken upgradient from the known plume are also recommended and a study of present and past land use should be done so that the source of the positive readings at MW-2 and MW-3 may be identified. When sufficient data was accumulated, GRI would develop and submit a plan for full remediation.

Pursuant to Alameda County Department of Environmental Health requirements, monthly water levels will be recorded in all monitoring wells and bi-monthly water samples will be collected

and analyzed. Water level data, contour maps and gradient determinations will be submitted along with sampling results and hydrological characteristics.

8.0 LIMITATIONS

This report was prepared for the exclusive use of Scotsman Manufacturing Corporation 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 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
Project Geologist

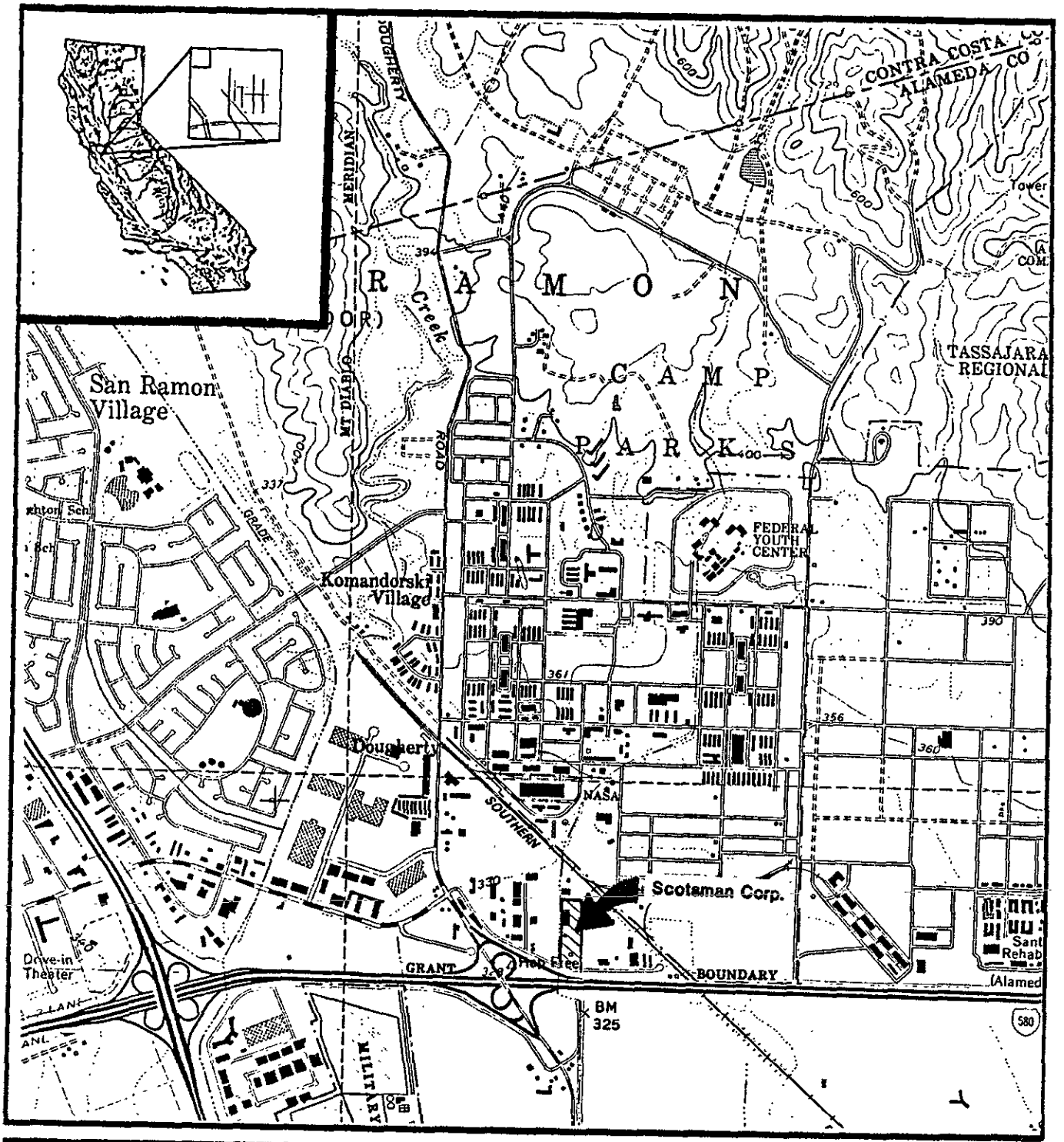
REGISTERED ENVIRONMENTAL ASSESSOR
THOMAS A. MELE
NO. 00552
Expires: 6-30-89
STATE OF CALIFORNIA

Rex J. Young
State Registered
Geologist #720

REGISTERED GEOLOGIST
REX J. YOUNG
No. 720
STATE OF CALIFORNIA

Date: 7-3-89

TCR:tab:r2/021



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Project Number: 55018

SCOTSMAN CORPORATION

6055 SCARLETT COURT

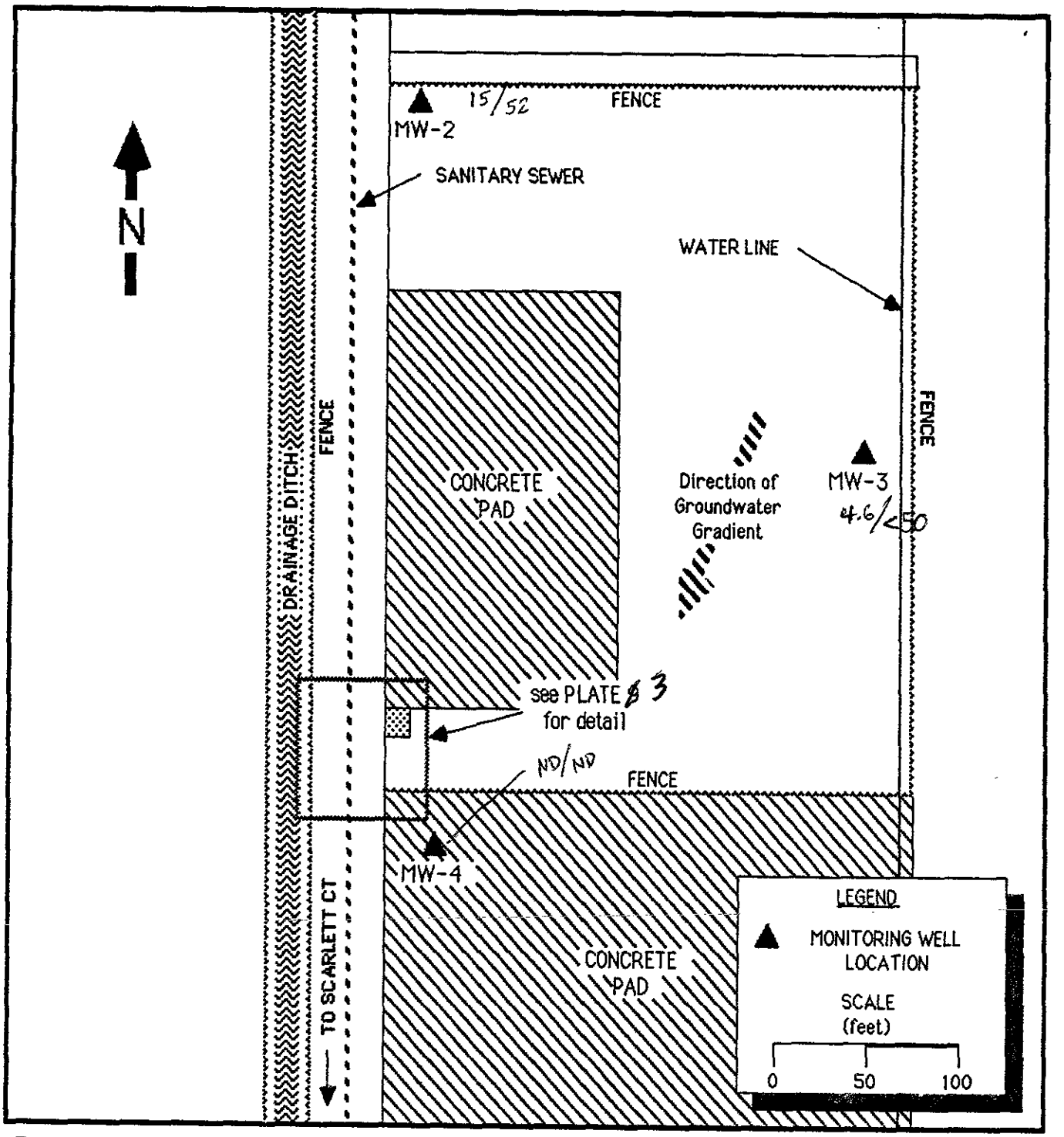
DUBLIN, CA

LOCATION MAP

PLATE

1

ppb, benzene / TPH



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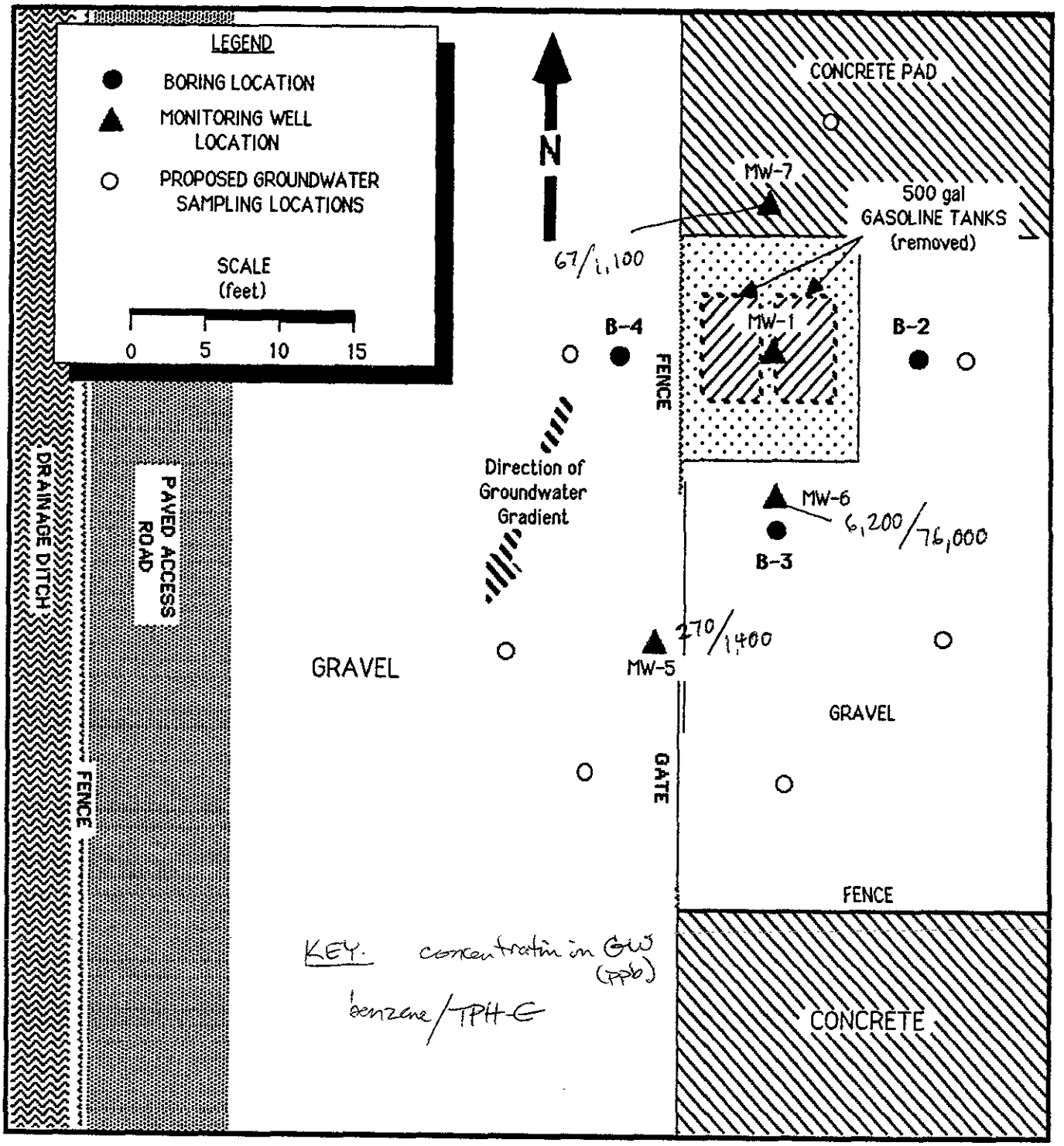
DUBLIN, CA

PLOT PLAN

PLATE

2



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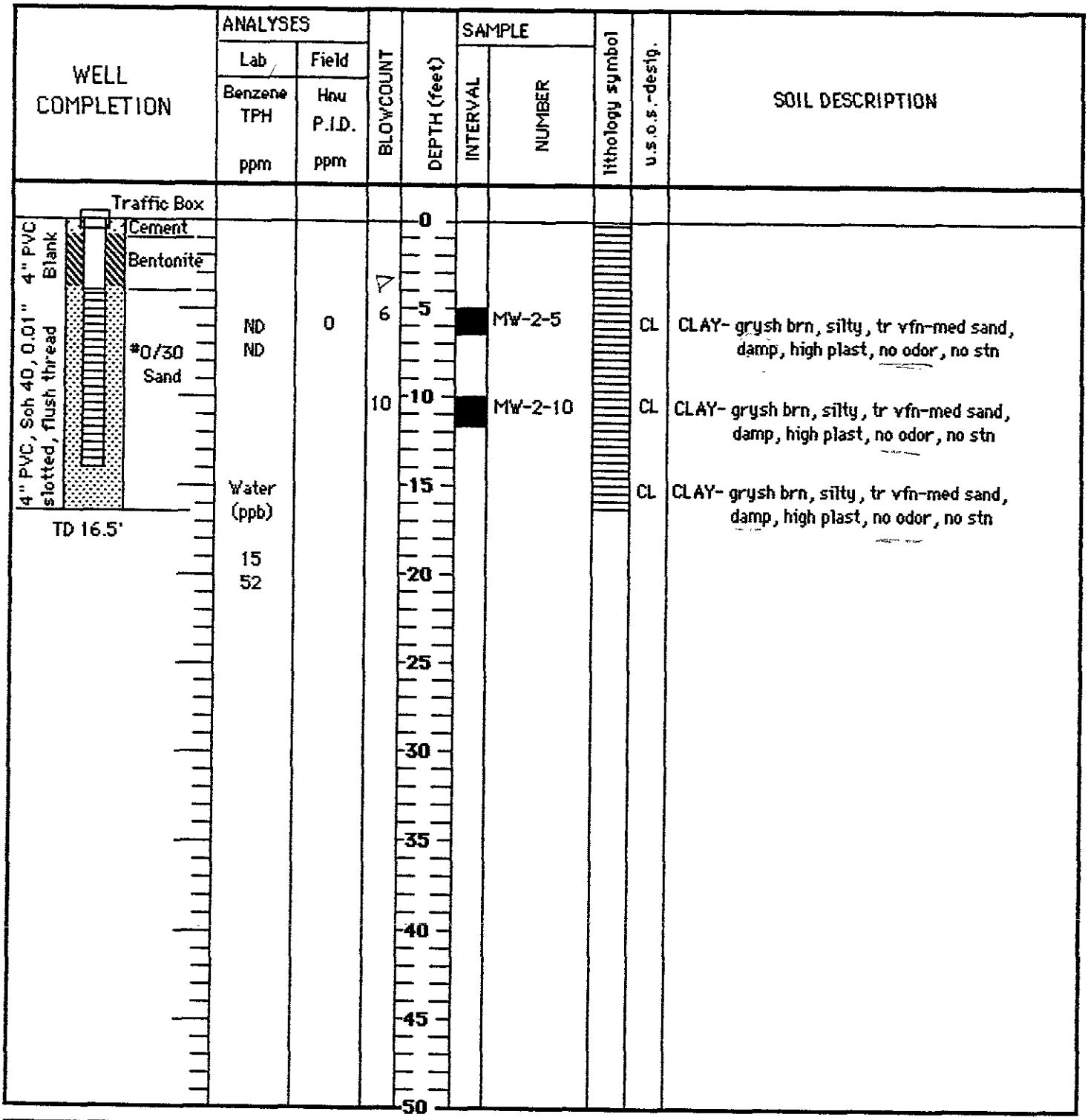
6-27-89

SCOTSMAN CORP.
DUBLIN, CA.

DETAIL OF TANK LOCATION

PLATE 3



SURFACE ELEVATION: 329 ft
TOTAL DEPTH: 16.5 ft
DATE DRILLED: 5-24-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 4.9 ft

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(805)835-7700
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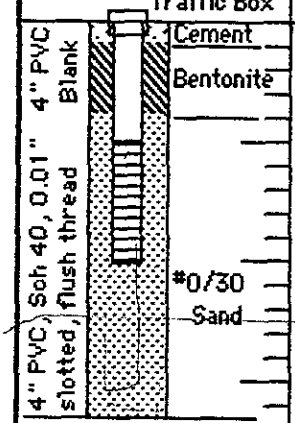
PROJECT NUMBER: 55018

LOCATION:
334' NORTH OF MW-1

LOG OF BORING MW-2

PLATE
4
page 1 of 1



WELL COMPLETION	ANALYSES Lab: Benzene TPH ppm	ANALYSES Field: Hnu P.I.D. ppm	BLOWCOUNT	DEPTH (feet)	SAMPLE INTERVAL	SAMPLE NUMBER	lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
	ND ND	0	6	5		MW-3-5		CL	CLAY- grysh brn, silty, vfn-fn sand, mod plast, moist, no odor, no stn
				10				CL	CLAY- brnsh gry, tr silt, mod-high plast, moist, no odor, no stn
	Water (ppb) 4.6 ND			15		MW-3-15		SM	SAND- med brn, vfn-fn, v silty, saturated, no odor, no stn
				20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 327.7 ft
TOTAL DEPTH: 16.5 ft
DATE DRILLED: 5-24-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 3.5 ft

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(805)835-7700
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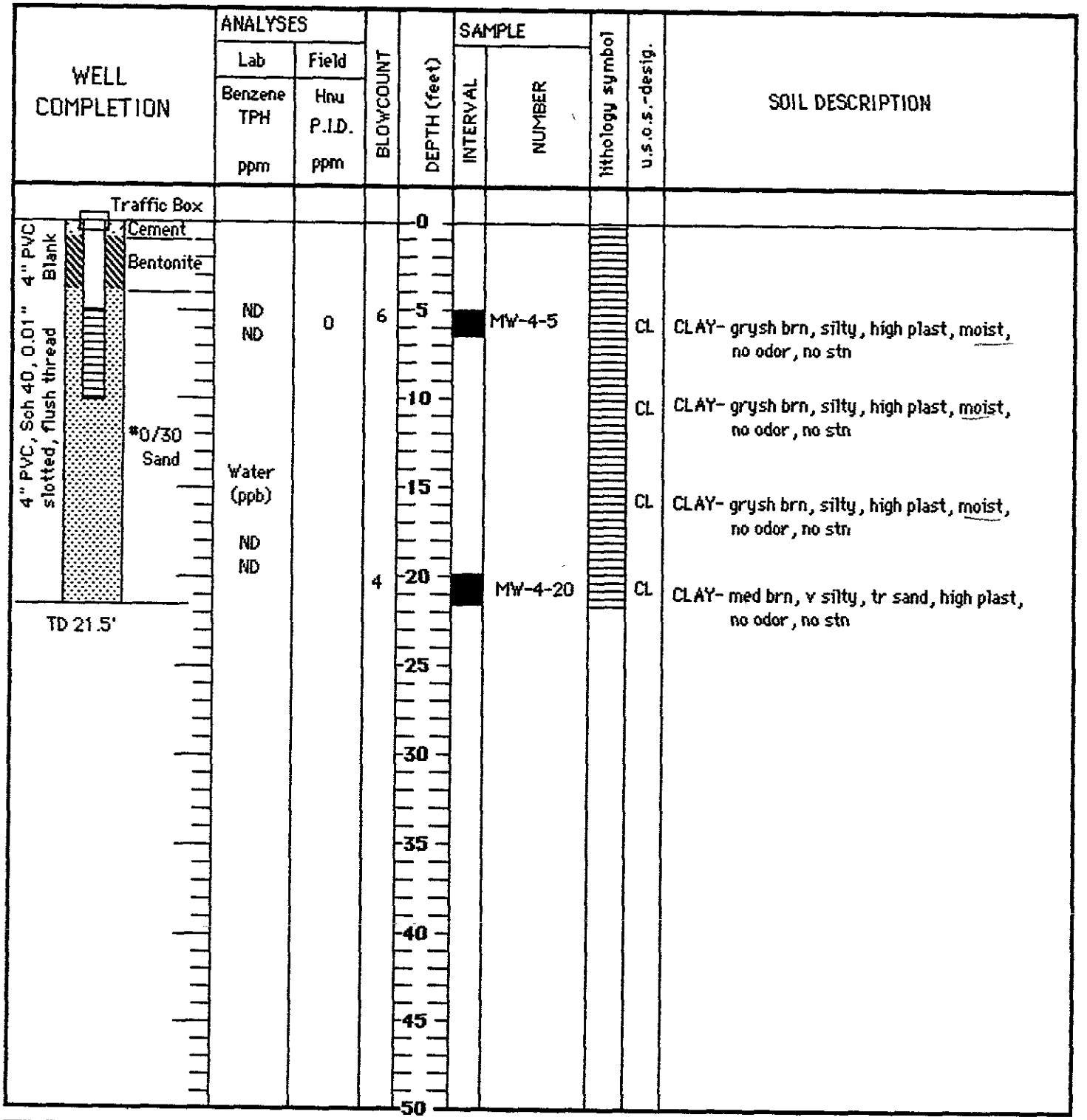
PROJECT NUMBER: 55018

LOCATION:
285' NORTH EAST OF MW-1

LOG OF BORING MW-3

PLATE 5



SURFACE ELEVATION: 329.2 ft
TOTAL DEPTH: 21.5 ft
DATE DRILLED: 5-24-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 7.1 ft

GROUNDWATER RESOURCES, INC.
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PROJECT NUMBER: 55018

LOCATION:
60' SOUTH OF MW-1

LOG OF BORING MW-4

PLATE
6
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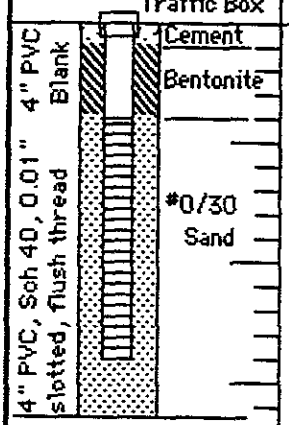

WELL COMPLETION	ANALYSES Lab: Benzene TPH ppm	ANALYSES Field: Hnu P.I.D. ppm	BLOWCOUNT	DEPTH (feet)	SAMPLE INTERVAL	SAMPLE NUMBER	lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
				0					
	ND	0	6	5		MW-5-5		CL	CLAY- dk gry, v silty, mod plast, moist, no odor, no stn
	ND								
				10				CL	CLAY- med brn, v silty, mod-high plast, wet, fnt odor, no stn
	Water (ppb)		7	15		MW-5-15		CL	CLAY- grysh brn, v silty, saturated, high plast, fnt odor, no stn
	270								
	1400			20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 328.9 ft
TOTAL DEPTH: 16.5 ft
DATE DRILLED: 5-25-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 6 ft

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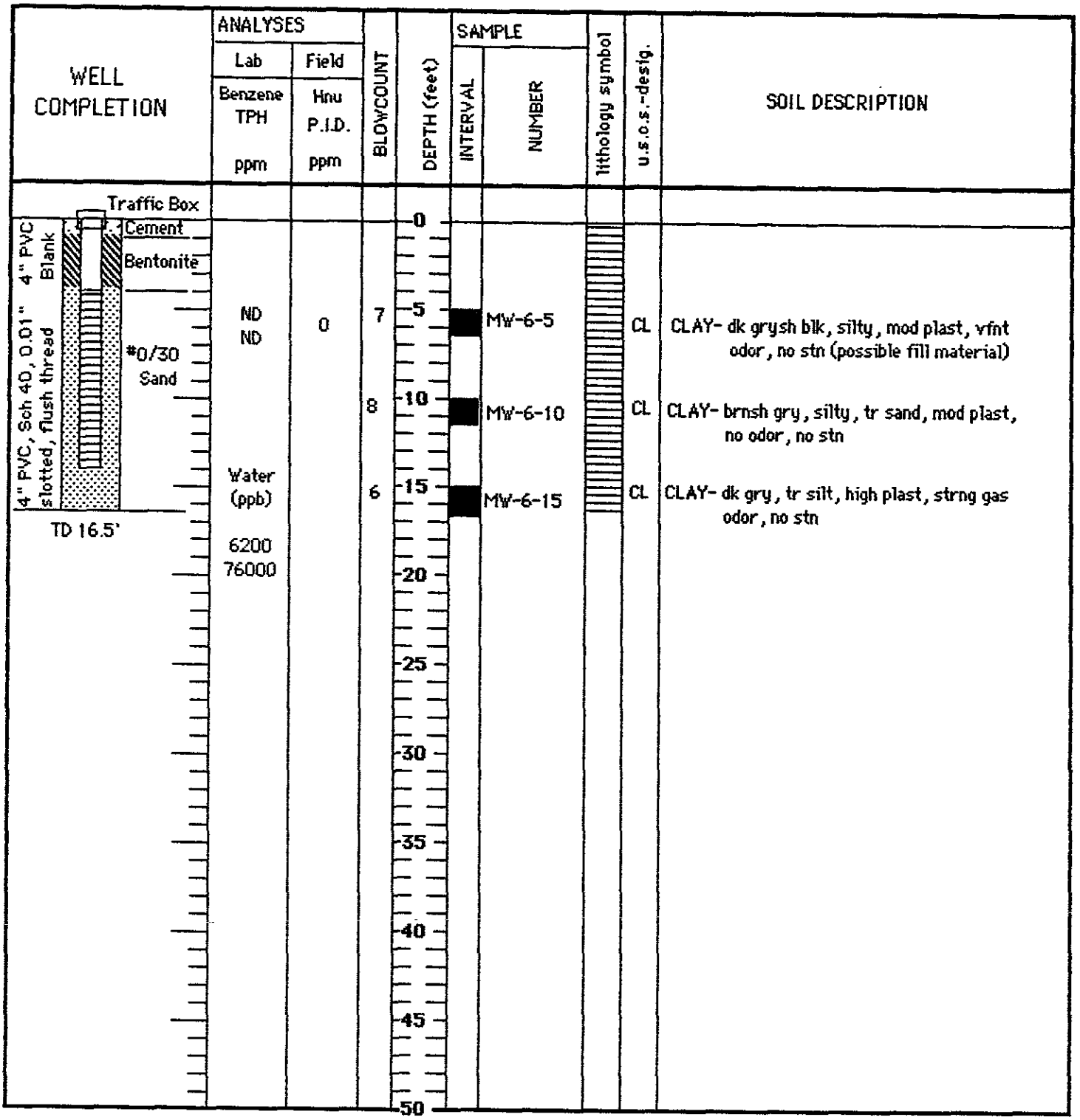
PROJECT NUMBER: 55018

LOCATION: 20' SOUTH WEST OF MW-1

LOG OF BORING MW-5

PLATE 7



SURFACE ELEVATION: 328.2 ft
TOTAL DEPTH: 16.5 ft
DATE DRILLED: 5-24-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 5.8 ft

GROUNDWATER RESOURCES, INC.
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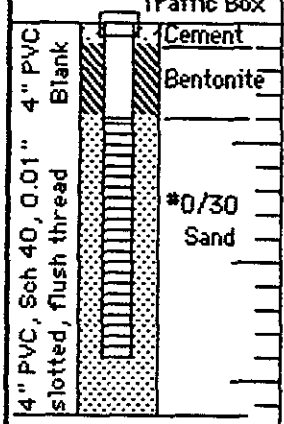
PROJECT NUMBER: 55018

LOCATION:
10' SOUTH OF MW-1

LOG OF BORING MW-6

PLATE
8
page 1 of 1



WELL COMPLETION	ANALYSES Lab: Benzene TPH ppm	ANALYSES Field: Hnu P.I.D. ppm	BLOWCOUNT	DEPTH (feet)	SAMPLE INTERVAL	SAMPLE NUMBER	lithology symbol	u.s.c.s.-desig.	SOIL DESCRIPTION
				0					
	ND	0	8	5	MW-6-5		CL	CLAY- dk gry, v silty, mod plast, moist, no odor, no stn
	ND								
				10			CL	CLAY- med brn, v silty, mod-high plast, wet, no odor, no stn
	Water (ppb)			15			CL	CLAY- gnsh brn, v sitly, high plast, saturated, no odor, no stn
	67								
	1100			20					
				25					
				30					
				35					
				40					
				45					
				50					

SURFACE ELEVATION: 328.9 ft
TOTAL DEPTH: 16.5 ft
DATE DRILLED: 5-25-89

LOGGED BY: TCR
SUPERVISED BY: RJY
DIAMETER of BORING: 8 inch
WATER ENCOUNTERED AT: 6 ft

GROUNDWATER RESOURCES, INC.
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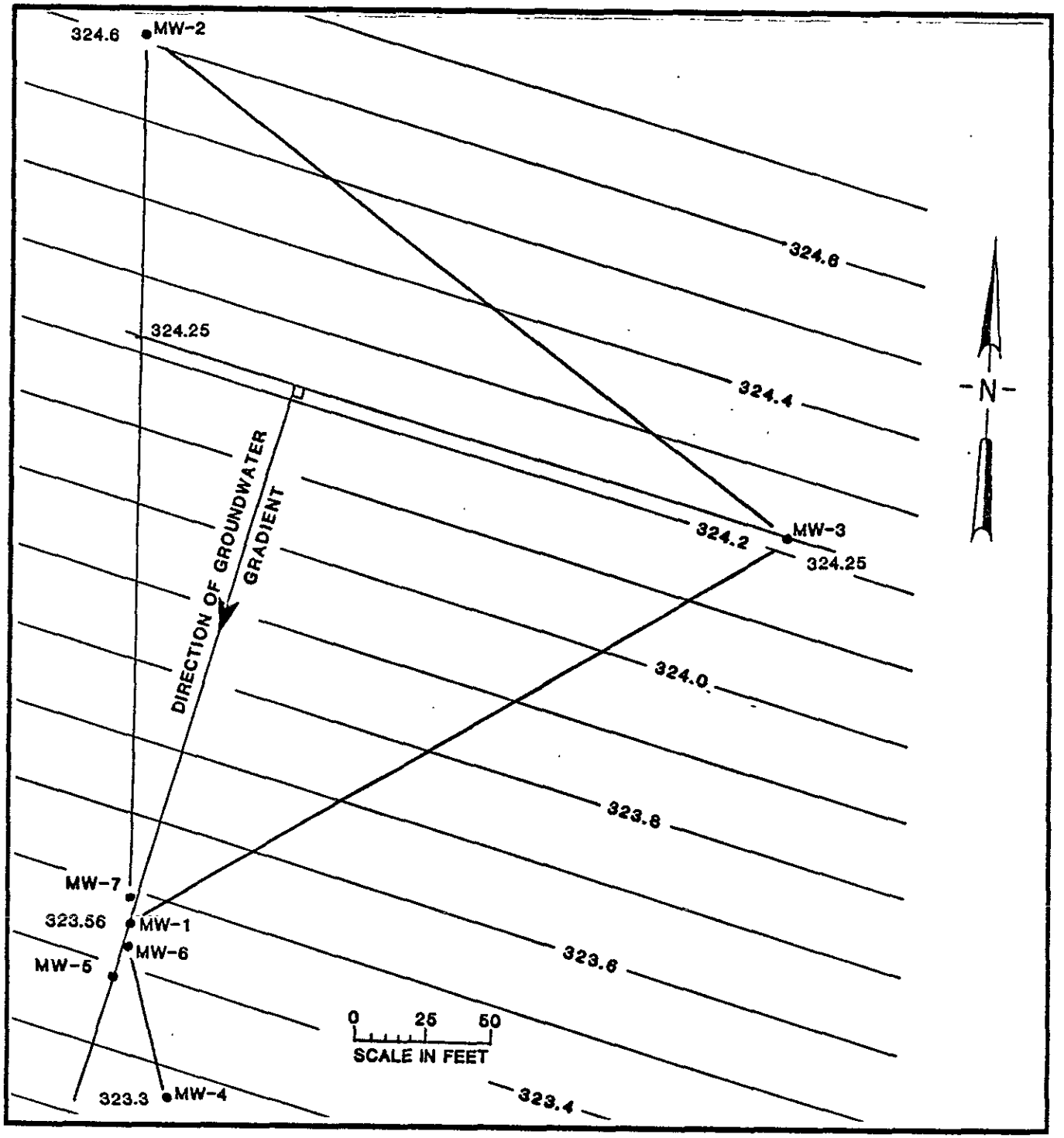
PROJECT NUMBER: 55018

LOCATION:
10' NORTH OF MW-1

LOG OF BORING MW-7

PLATE 9



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Project Number: 55018

SCOTSMAN CORPORATION

6055 SCARLETT COURT
DUBLIN, CA

GRADIENT MAP

PLATE

10

SMC Laboratory

Analytical Chemistry

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

Date samples received : 5-26-89
Date analysis completed: 6-02-89
Date of report : 6-02-89

Laboratory No. 1283 through 1296 Project No. 55018

RESULTS OF ANALYSIS

#1283 ID: MW-2-5	ugm/gm	MRL,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

#1284 ID: MW-3-5	ugm/gm	MRL,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

Method of Analysis: California DOHS LUFT manual
MRL = Minimum Reporting Level
TPH = Total Petroleum Hydrocarbons
ugm/gm = micrograms per gram
ND = Not detected

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3155 Pegasus Drive • Bakersfield, CA 93308 • (805) 393-3597
P.O. Box 80835 • Bakersfield, CA 93380 • FAX (805) 393-3623

Laboratory No. 1283 through 1296 Project No. 55018

RESULTS OF ANALYSIS

#1285 ID: MW-4-5	ugm/gm	MRL,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

#1286 ID: MW-5-5	ugm/gm	MRL,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

#1287 ID: MW-6-5	ugm/gm	MRL,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

#1288 ID: MW-7-5	ugm/gm	MRL,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

#1289 ID: MW-1	ugm/L	MRL,ugm/L
Benzene	900	0.5
Toluene	260	0.5
Ethylbenzene	1,600	0.5
p-Xylene	3,300	0.5
m-Xylene	ND	0.5
o-Xylene	44	0.5
Isopropylbenzene	50	0.5
TPH (Gasoline)	32,000	50

#1290 ID: MW-2	ugm/L	MRL,ugm/L
Benzene	15	0.5
Toluene	1.1	0.5
Ethylbenzene	0.89	0.5
p-Xylene	1.6	0.5
m-Xylene	3.6	0.5
o-Xylene	ND	0.5
Isopropylbenzene	ND	0.5
TPH (Gasoline)	52	50

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Laboratory No. 1283 through 1296 Project No. 55018

RESULTS OF ANALYSIS

#1291 ID: MW-3	ugm/L	MRL,ugm/L
Benzene	4.6	0.5
Toluene	7.6	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

#1292 ID: MW-4	ugm/L	MRL,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

#1293 ID: MW-5	ugm/L	MRL,ugm/L
Benzene	270	0.5
Toluene	ND	0.5
Ethylbenzene	0.86	0.5
p-Xylene	6.0	0.5
m-Xylene	ND	0.5
o-Xylene	0.82	0.5
Isopropylbenzene	7.2	0.5
TPH (Gasoline)	1,400	50

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Laboratory No. 1283 through 1296 Project No. 55018

RESULTS OF ANALYSIS

#1294 ID: MW-6	ugm/L	MRL,ugm/L
Benzene	6,200	0.5
Toluene	350	0.5
Ethylbenzene	2,500	0.5
p-Xylene	5,700	0.5
m-Xylene	3,900	0.5
o-Xylene	2,100	0.5
Isopropylbenzene	620	0.5
TPH (Gasoline)	76,000	50

#1295 ID: MW-7	ugm/L	MRL,ugm/L
Benzene	67	0.5
Toluene	13	0.5
Ethylbenzene	48	0.5
p-Xylene	ND	0.5
m-Xylene	ND	0.5
o-Xylene	ND	0.5
Isopropylbenzene	7.1	0.5
TPH (Gasoline)	1,100	50

#1296 ID: Travel Blank	ugm/L	MRL,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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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: SMC LABS

SAMPLERS: (Signature) Tim Read

PROJECT NUMBER: 55018

	SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	SAMPLE LOCATION	SAMPLE CONDITION UPON RECEIPT	EPA-602 (WATER)	BTX-TVH (GASOLINE)	OIL & GREASE (TOX) LEAD (WASTE OIL)	EPA 418.1 (DIESEL)	TPH (OIL & GREASE), BENZENE (DIESEL)		REMARKS (LAB #'S ETC.)
1283	MW-2-5	5-24-89	10:15	X		MW-2								BTX&E, TPH (GASOLINE)
1284	MW-3-5	"	11:25	X		MW-3								
1285	MW-4-5	"	9:21	X		MW-4								
1286	MW-5-5	5-25-89	11:40	X		MW-5								
1287	MW-6-5	5-24-89	13:00	X		MW-6								
1288	MW-7-5	5-25-89	12:30	X		MW-7								
1289	MW-1	5-26-89	9:21		X	MW-1								
1290	MW-2	"	8:09		X	MW-2								
1291	MW-3	"	8:27		X	MW-3								
1292	MW-4	"	8:42		X	MW-4								
1293	MW-5	"	9:04		X	MW-5								
1294	MW-6	"	9:14		X	MW-6								
1295	MW-7	"	8:55		X	MW-7								
1296	TRAVEL BLANK				X									

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature) Tim Read	Date/Time 5/24/89 3:57	Received for Laboratory by: (Signature) Karla Henry	Date/Time 5/26/89 3:57	Remarks	CC: DEB FILE LAB INDEX