Manmohan S. Chopra
4216 Warbler Loop
FREMONT, CA 94555
TEL. 510-790-9252

Alameda County Enviormental Health Dept.
80 Swan Way # 200
OAKLAND, CA 94621

ATTN: Mr. Rob Weston

SUBJECT: Remedial Action Plan
Haber Oil Company, 1401 Grand Ave. San Leandro.

Dear Mr. Weston,

As discussed, Remedial Action Plan pertaining to the above site is hereby submitted for your review and approval.

The plan has been prepared by the consultants BK & Associates of WHITE BEAR, MN. and should be complete in itself. If there are any questions or I could be of any further assistance, please let me know

As required, a check in the amount of $500 towards the deposit for investigation charges is enclosed.

We are very eager to start this valuntary cleanup process, therefore a prompt action will be highly appreciated.

Sincerely,

Mohan

Manmohan S. Chopra
Owner
June 16,1993

cc BK & Associates
Federated Insurance.

REMEDIAL ACTION PLAN

HABER OIL COMPANY
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

6/93

PREPARED BY:

BK & ASSOCIATES
4736 126TH ST. NORTH
WHITE BEAR, MN 55110

Property Owner:
Manmohan S. Chopra
4216 Warbler Loop
FREMONT, CA 94555
TEL. 510-790-9252

date ?

TABLE OF CONTENTS

FIGURES

APPENDICES

REMEDIAL ACTION PLAN

HABER OIL COMPANY
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

1.0 INTRODUCTION

The purpose of this submittal is to present a Remedial Action Plan (RAP) for removal of subsurface petroleum hydrocarbons located at Haber Oil Company, 1401 Grand Avenue, San Leandro, California. The objective of this RAP is to use the best available technology and an economically practical solution to remove hydrocarbons from the soil and ground water.

2.0 BACKGROUND INFORMATION

2.1 Location

The Haber Oil Company is located at the corner of Grand Avenue and U.S. Interstate 580. The site is currently an active convenience market and service station within a commercial/residential area. A site location and regional topographic map is presented as Figure 1.

2.2 Extent of Hydrocarbons

Previous report "Problem Assessment Report" by Aegis Environmental Inc. (Aegis) discussed the nature and extent of petroleum hydrocarbons beneath the site. Figure 2 shows the location of the monitoring wells from which the samples were taken.

2.2 Site Hydrogeology

The site subsurface lithology is comprised of clayey silt, silt or sandy silt from ground surface to the depth of 28 to 34 feet. Below this depth sands, ranging from fine to coarse, extend to end of boring approximately 55 feet below ground surface. (Soil Boring logs are attached in Appendix A). The depth to ground water is 43 to 46 feet below ground surface. Aegis reported a hydraulic conductivity (k) value of 0.23 to 1.34 ft/day.

3.0 CORRECTIVE ACTION ALTERNATIVE

BK & Associates have evaluated various remedial alternatives and concluded that Vapor Extraction (VEX) is the most effective means of remedial action at the site. It is well established that soil venting, accomplished by applying a vacuum to selected monitoring wells, is an effective method of removing hydrocarbons from the vadose zone. VEX operates by producing an air flow applying a vacuum in the unsaturated zone, through a screened well, by a vacuum blower. Contaminant-free air displaces contaminated soil vapor, creating a concentration gradient that causes free-phase compounds to vaporize, and dissolved phase compounds to diffuse and evaporate. VEX also enhances naturally occurring biological degradation within the contaminated area by increasing the oxygen available to the soil microorganisms, which

degrade the organic compounds.

4.0 SITE TESTING AND DESIGN CRITERIA

A VEX pilot test was performed by Aegis on October 7, 1992. Details of the test, selected from the "Problem Assessment Report" by Aegis, can be found in Appendix B.

The VEX test was performed individually on Monitoring Well 1 and Monitoring Well 2. The VEX test at MW-1 indicated an estimated radius of influence of greater than 40 feet, at an applied vacuum of 30 inches of water, The average flow rate from MW-1 was 90 cubic feet per minute (cfm), yielding 3.2 cfm/foot of open screen. MW-2 was tested at lower flow rates with less vacuum. The results were, however, somewhat similar with an average flow rate of 1.9 cfm/foot of open screen.

Based on this information, theoretical extraction curves were developed to estimate the extraction rate and mass removal rate of the purposed system. These curves and supporting data are found in Appendix C.

5.0 SYSTEM DESIGN

5.1 Vapor Extraction System

The proposed VEX system treatment area is shown on Figure 3. A vacuum blower will be connected to MW-1 and MW-2, which will service as point sources for vapor removal. As seen on the soil boring logs approximately 15 feet of open screen is available for venting between the clayey silt and water table. The VEX system will have a flow rate of about 100 cfm at an operating vacuum of approximately 15 inches of water. A Piping and Instrumentation Diagram (P&ID) and Site Layout Map showing system design is found on Figures 3 and 4, respectively.

5.2 Off-Gas treatment

The exhaust stream from the VEX will be directed through a King\Buck Multi-Mode Combustor for Destruction. The Emission Control Unit (ECU) will operate in the thermal mode from start-up until influent TPH concentrations fall below 2800 ppm. The Combustor will then be switched to the catalytic mode for the duration of the vapor extraction. All off-gas will meet the requirements of the Bay Area Air Quality Management District (BAAQMD). Specifications of the off-gas treatment unit are included in this submittal as Appendix D.

6.0 PERMITTING

All salient elements of the proposed remedial system will be permitted with the appropriate regulatory agency prior to construction. Permitting for the off-gas treatment unit will be obtain from BAAQMD before system start up.

7.0 MONITORING AND MAINTENANCE

Remedial activities will be monitored to insure proper system operation and beneficial affect of the corrective action. The proposed monitoring schedule will be as follows:

Bi-Monthly

System operation check
Vapor extraction Screening (airflow, temperature, hydrocarbon content)

Monthly

Vapor extraction sampling (influent and effluent) for laboratory analysis
CO_2 measurements
Depth to ground water and free product measurements

Quarterly

Ground water sampling from MW-1 through MW-5

Throughout the term of remediation, monitoring frequency will be evaluated to determine if the frequency may be decreased.

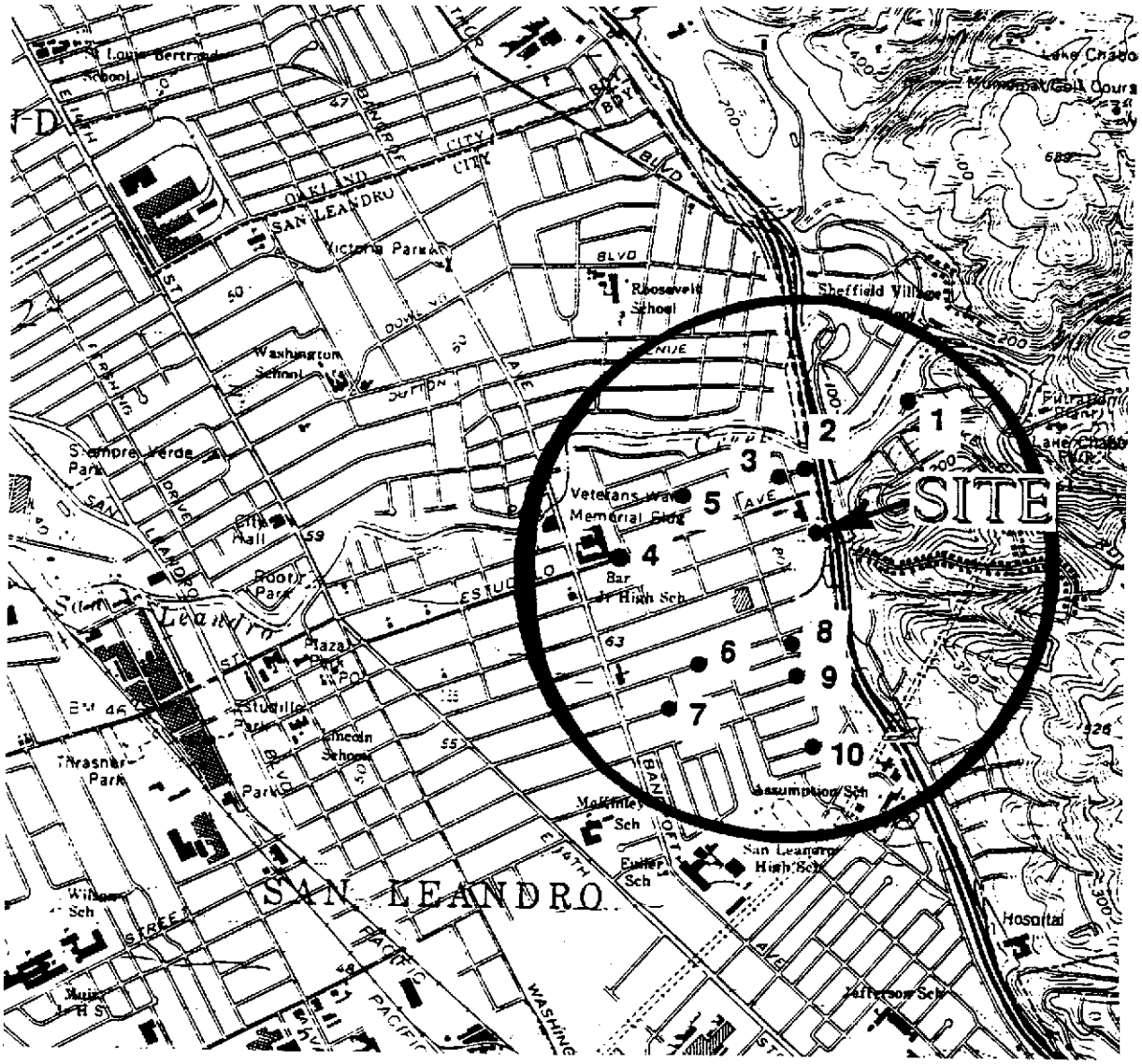
8.0 REPORTING

Quarterly progress reports will be prepared and submitted to the required regulating agencies.

9.0 REMARKS

The discussion and recommendations contained in this report represent our professional opinions. These opinions are based on current available information are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

Brian Krogseng Date: 6-8-93
Brian L. Krogseng
State of California Registered Geologist No. 2303



GENERAL NOTES:

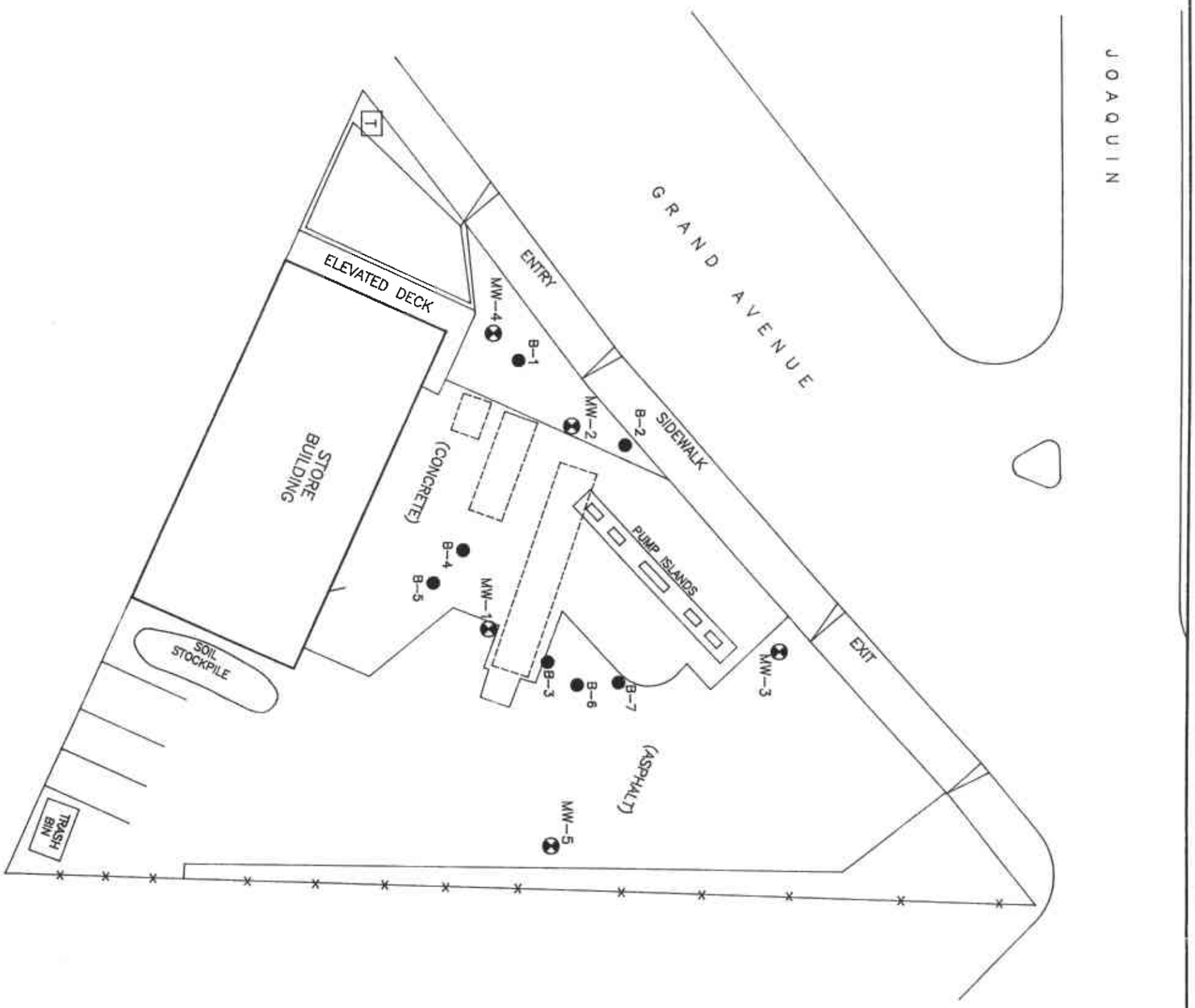
BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
SAN LEANDRO, CALIF.

SCALE: 1" = 2000	
DESIGNED BY:	
CHECKED BY:	
APPROVED BY:	
DRAWN BY:	

FIGURE 1
SITE LOCATION
HABER OIL
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

BK & ASSOCIATES

PROJECT NUMBER:	DRAWING NAME: TOPO	SHEET NO.:

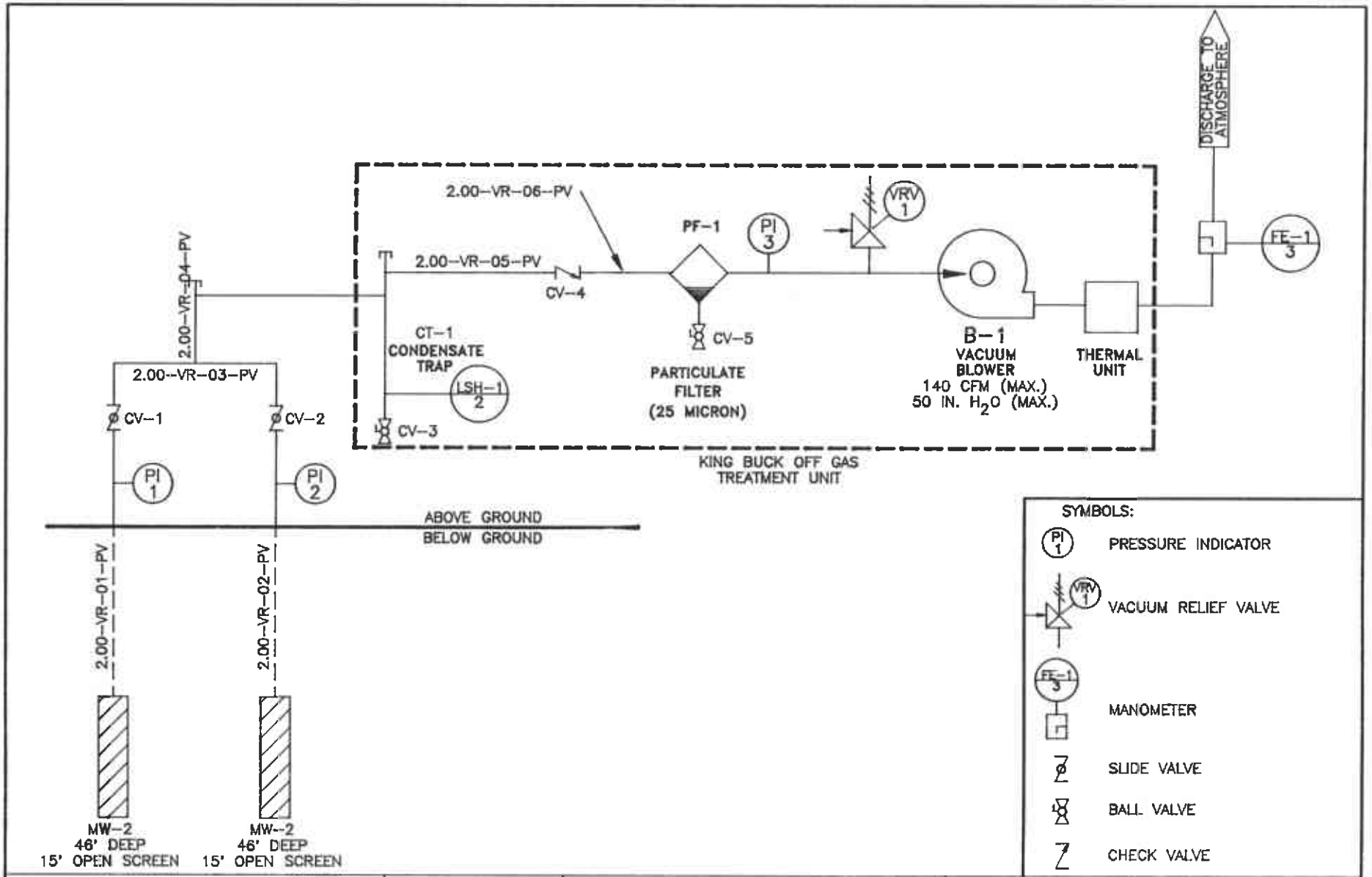


REVISIONS:				SCALE: 1" = 20'	
NO.	BY:	DATE:	DESCRIPTION:	DESIGNED BY:	
				CHECKED BY:	
				APPROVED BY:	
				DRAWN BY:	

FIGURE 2
SITE MAP
HABER OIL
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

BK & ASSOCIATES

PROJECT NUMBER:	DRAWING NAME: PID-S	SHEET NO.:

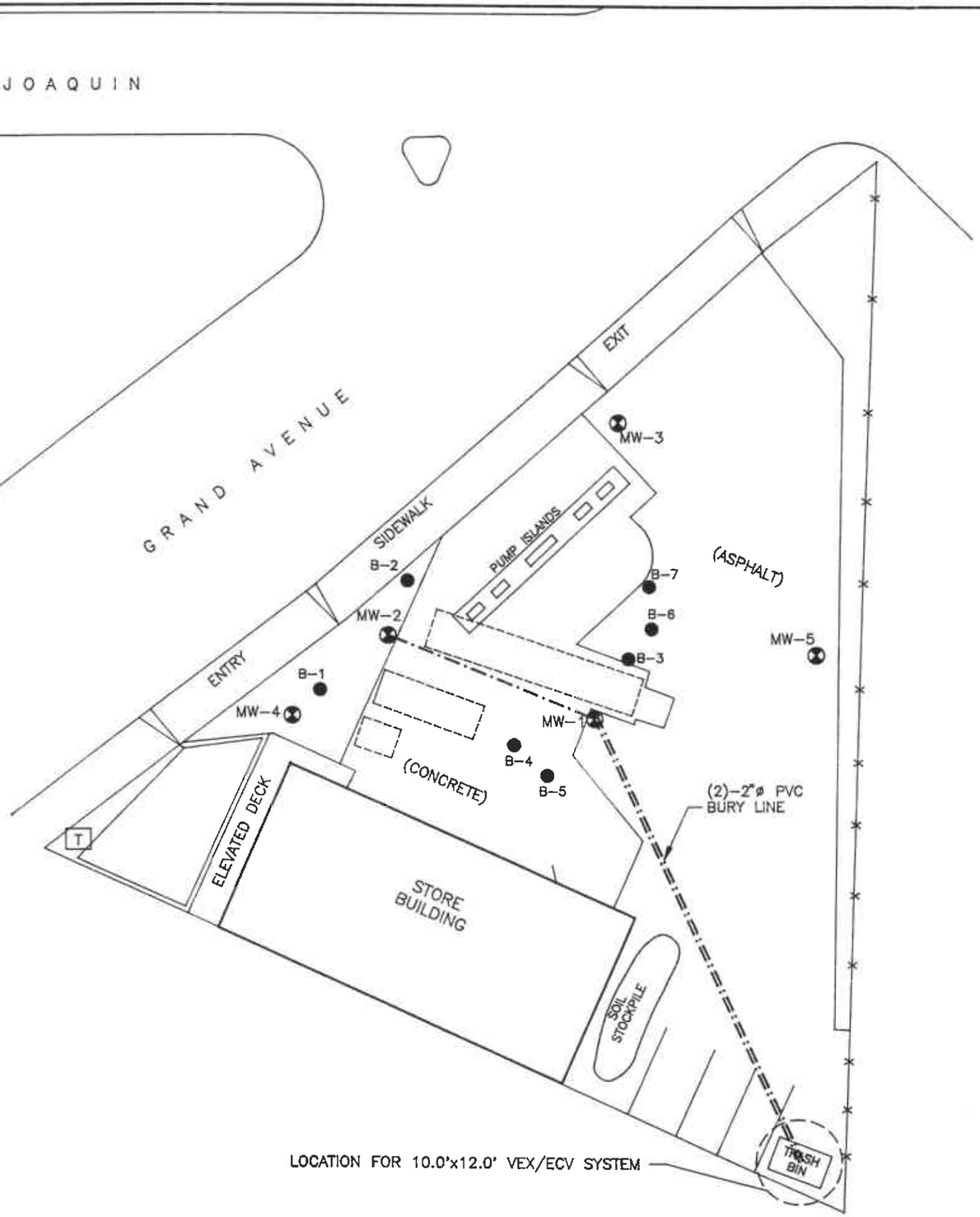


REVISIONS:				SCALE: (NO SCALE)	
NO.	BY:	DATE:	DESCRIPTION:	DESIGNED BY:	
				CHECKED BY:	
				APPROVED BY:	
				DRAWN BY:	

FIGURE 3
PIPING & INSTRUMENTATION DIAGRAM
HABER OIL
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

BK & ASSOCIATES

PROJECT NUMBER:	DRAWING NAME: A-PID	SHEET NO.:



NORTH

0 20

LEGEND:

- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- FENCE
- T — TELEPHONE BOOTH
- VEC — VAPOR EXTRACTION
- ECV — EMISION CONTROL UNIT

FIGURE 4
GENERAL SITE LAYOUT
HABER OIL
1401 GRAND AVENUE
SAN LEANDRO, CALIFORNIA

BK & ASSOCIATES

PROJECT NUMBER: | DRAWING NAME: PID-S | SHEET NO.:

SCALE: 1" = 20'

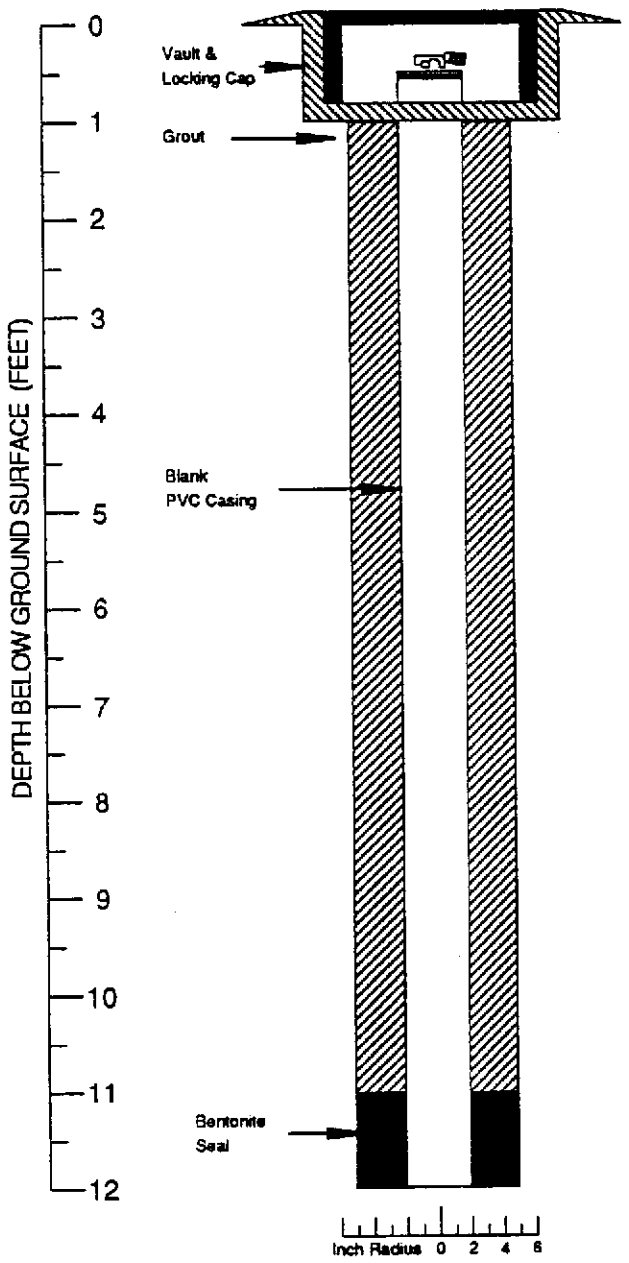
DESIGNED BY:
CHECKED BY:
APPROVED BY:
DRAWN BY:

REVISIONS:

NO.	BY:	DATE:	DESCRIPTION:

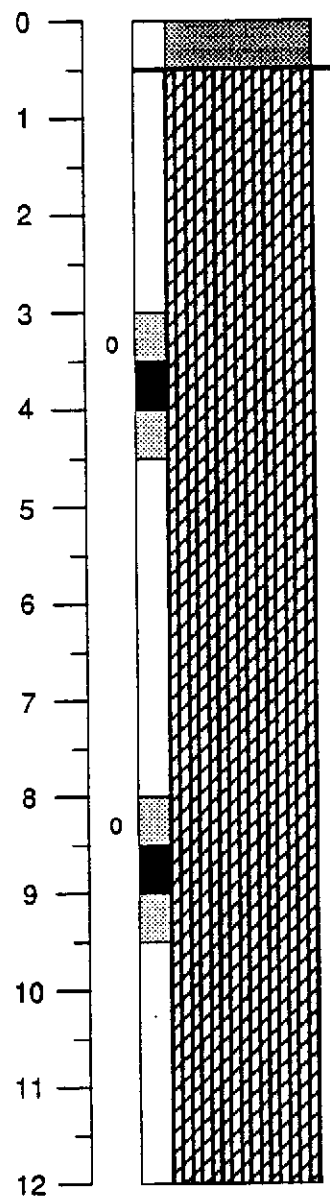
APPENDIX A:
SOIL BORING LOGS

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray , damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 15, 1992 09:20 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 15, 1992 13:50 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

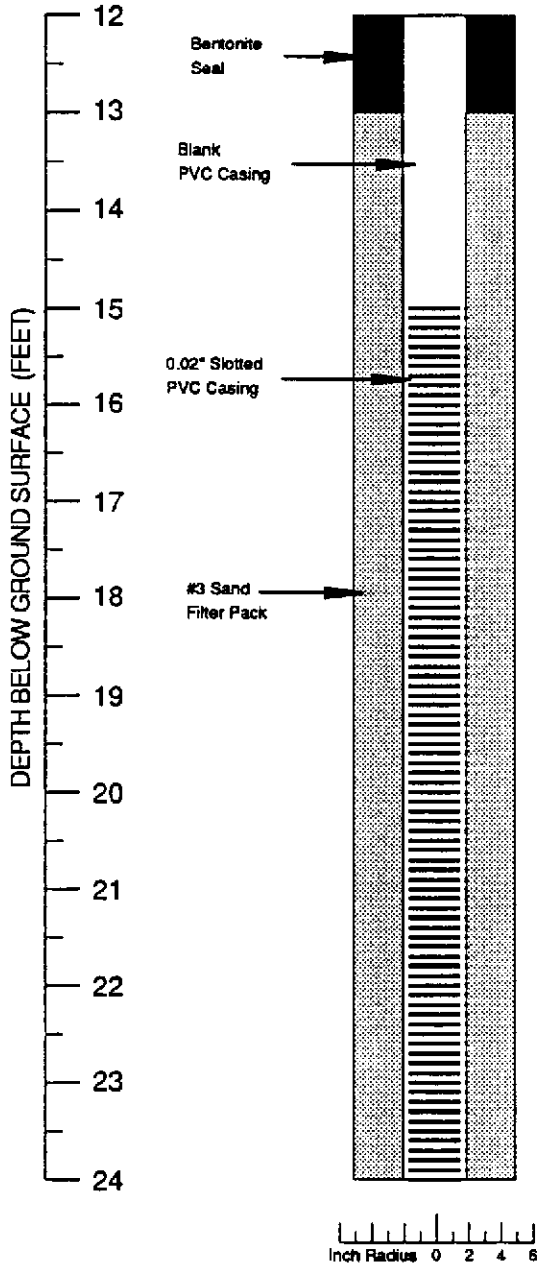
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



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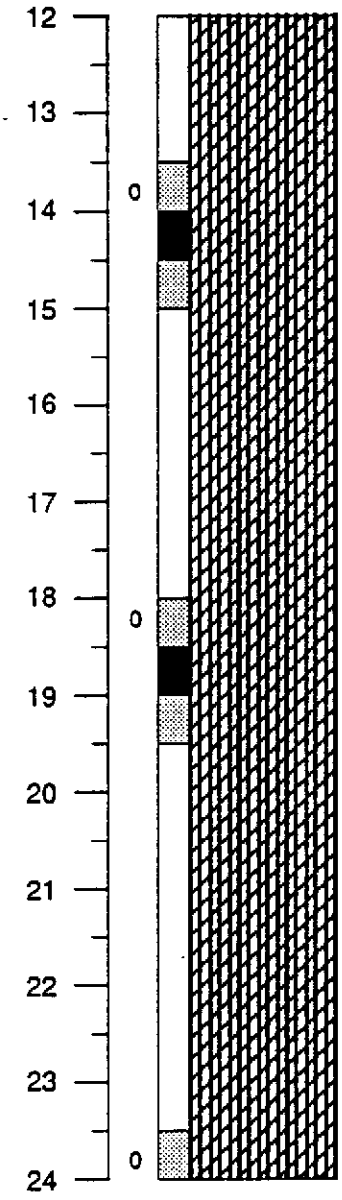


DESCRIPTION

CLAYEY SILT (ML); dark yellowish brown, damp, slightly plastic, soft, no odor

same, sample collected, no odor

same, sample collected, no odor

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

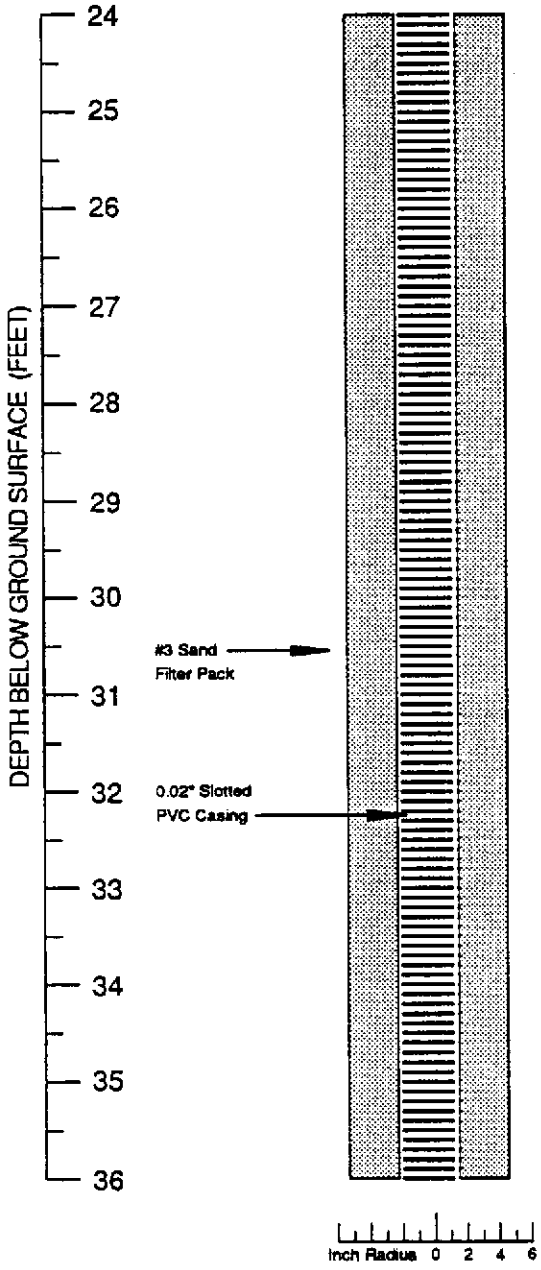
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

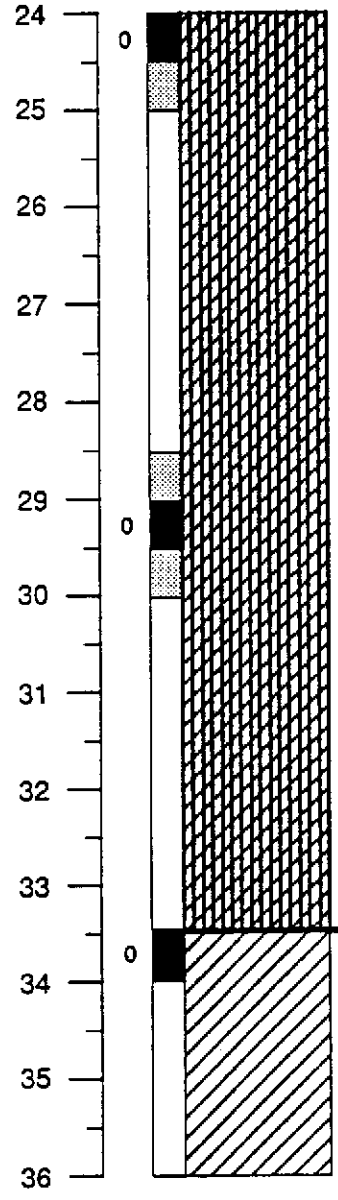
Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

SAND (SM); greenish gray, dry to damp, poorly graded, fine to medium grained, no hydrocarbon odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

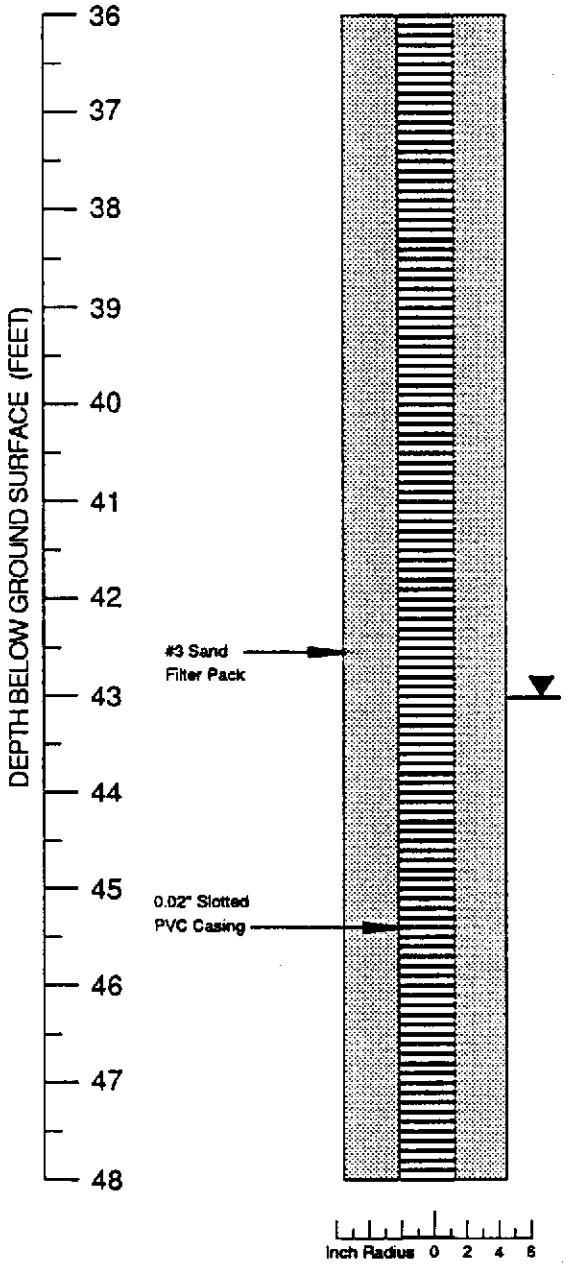
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



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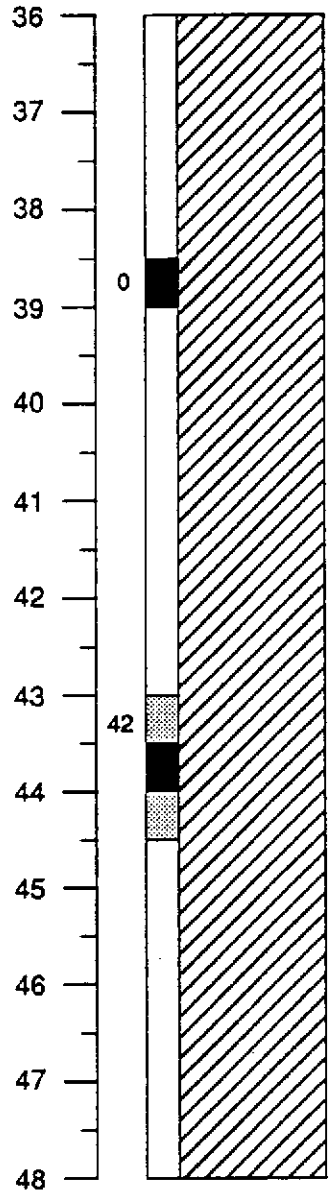


DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, moderate hydrocarbon odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

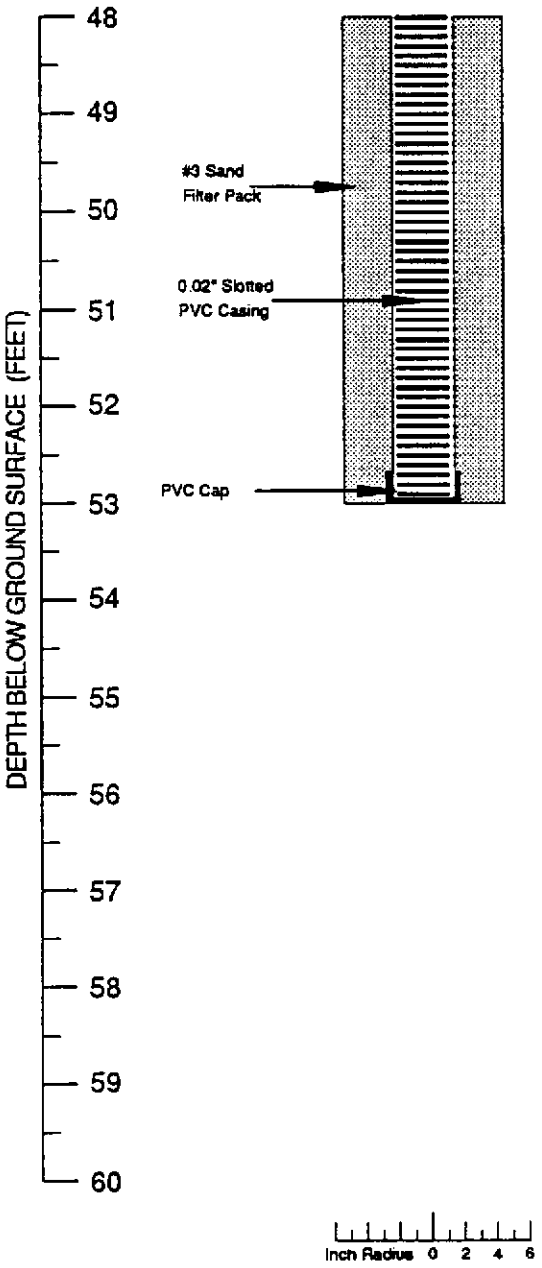
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

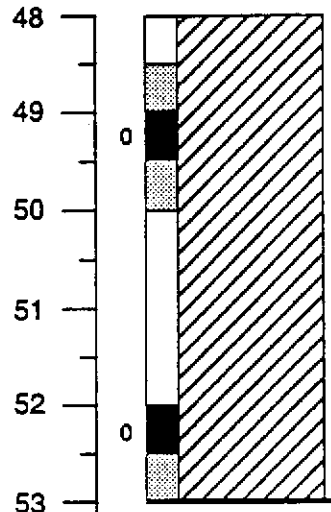
Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

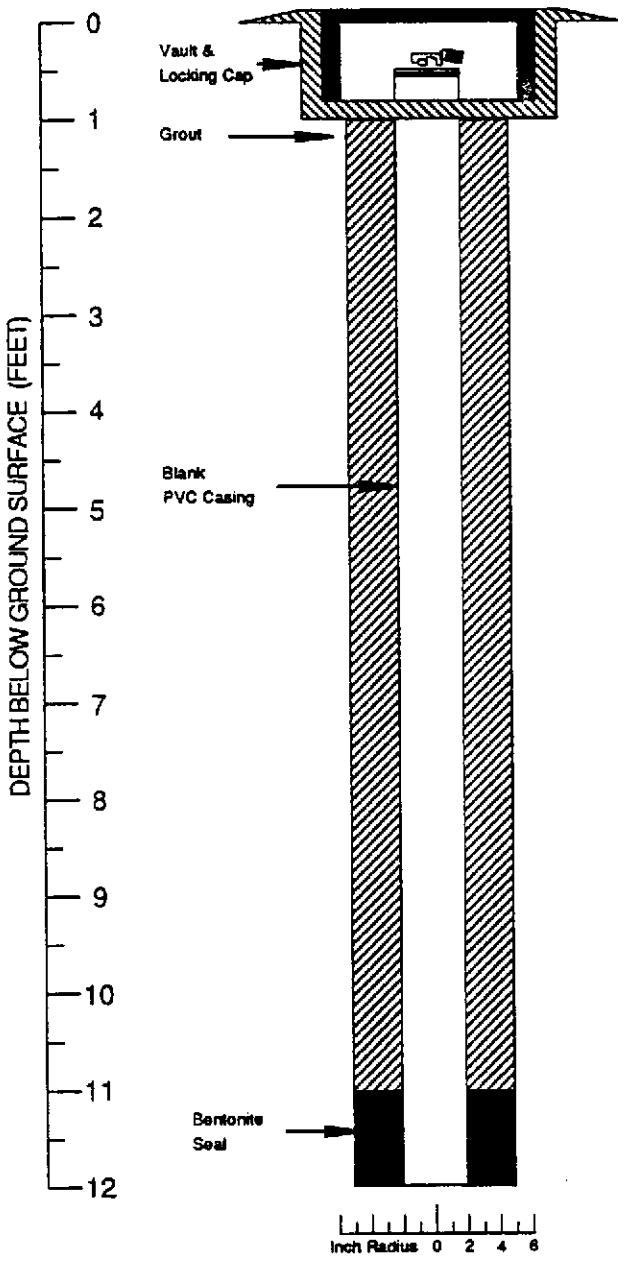
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



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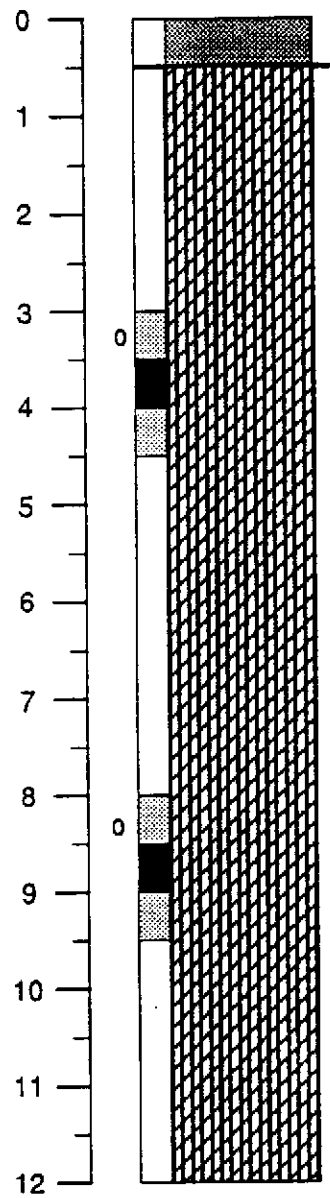


DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 15, 1992 09:20 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 15, 1992 12:50 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

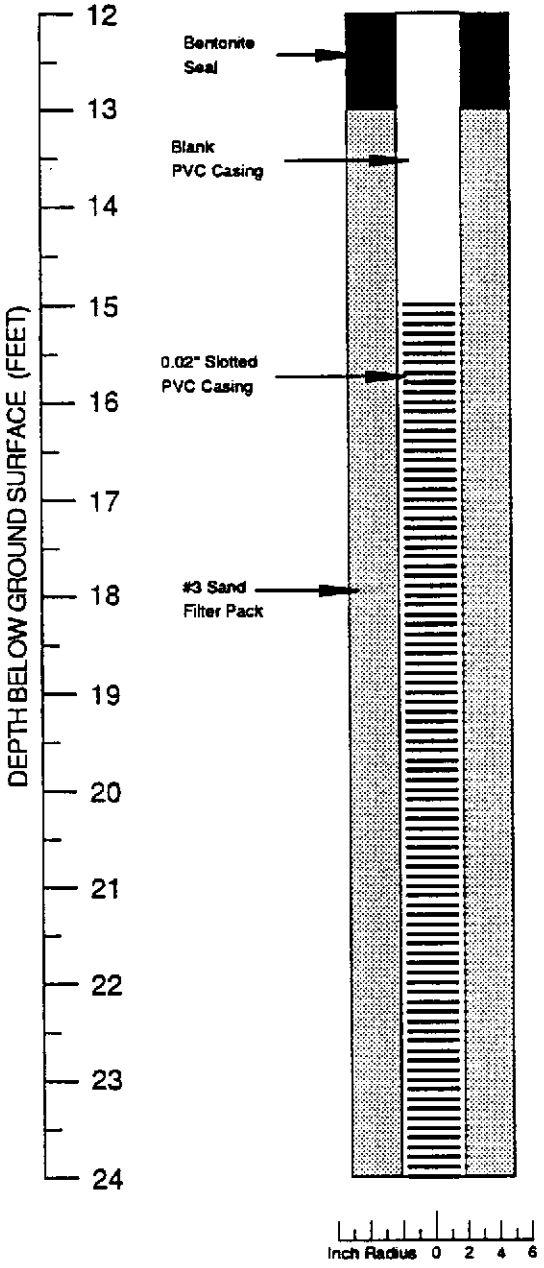
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



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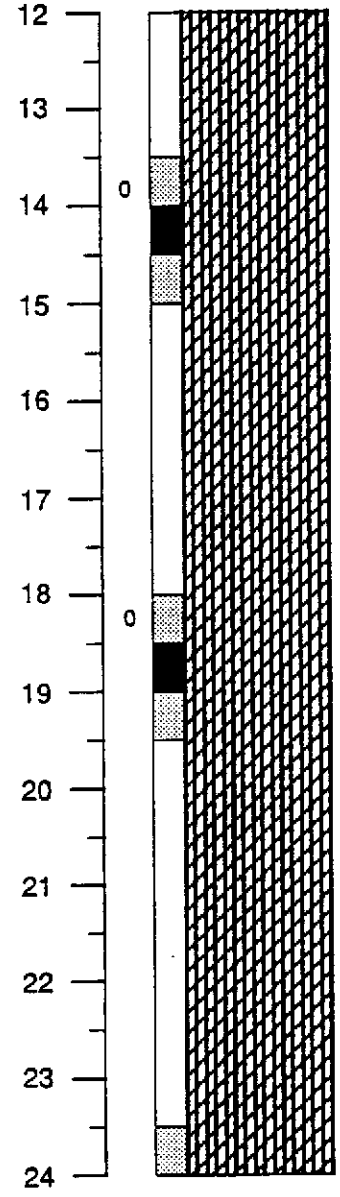


DESCRIPTION

CLAYEY SILT (ML); light olive gray, damp, slightly plastic, soft, no odor.

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

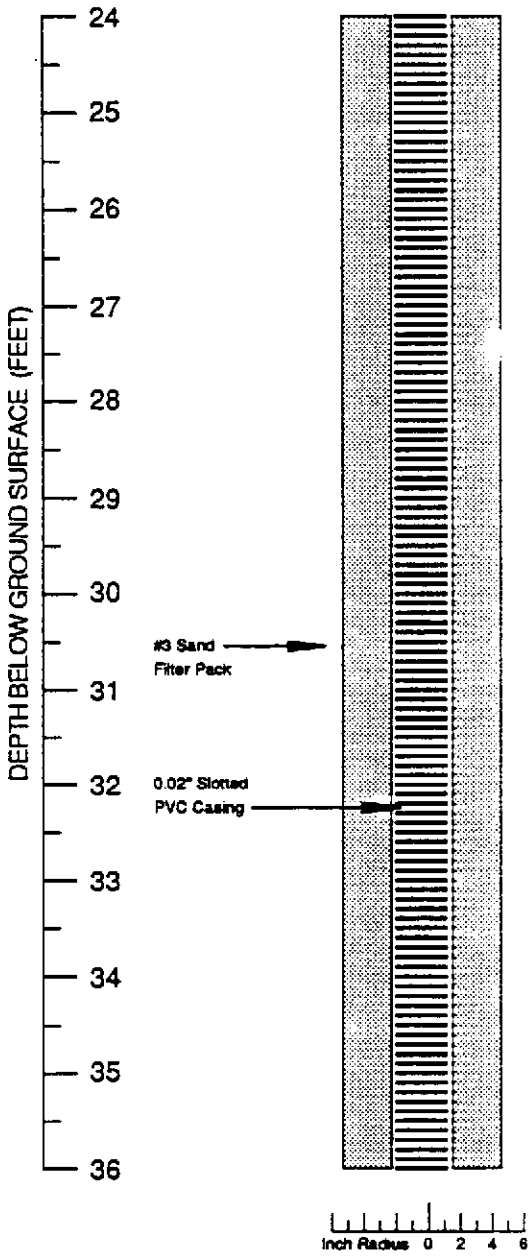
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



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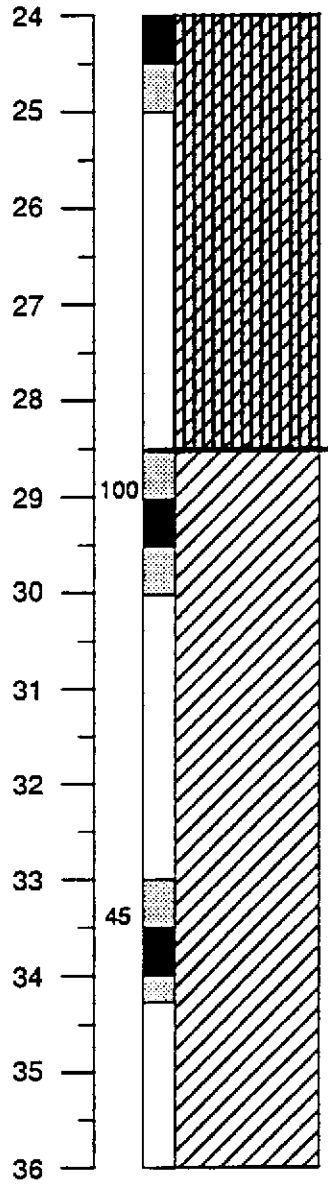


DESCRIPTION

same, sampled collected, no odor.

SAND (SM); greenish gray, damp, moderately graded, medium to coarse grained with gravel, strong hydrocarbon odor.

SAND (SM), dry to damp, poorly graded, fine to medium grained, moderate hydrocarbon odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

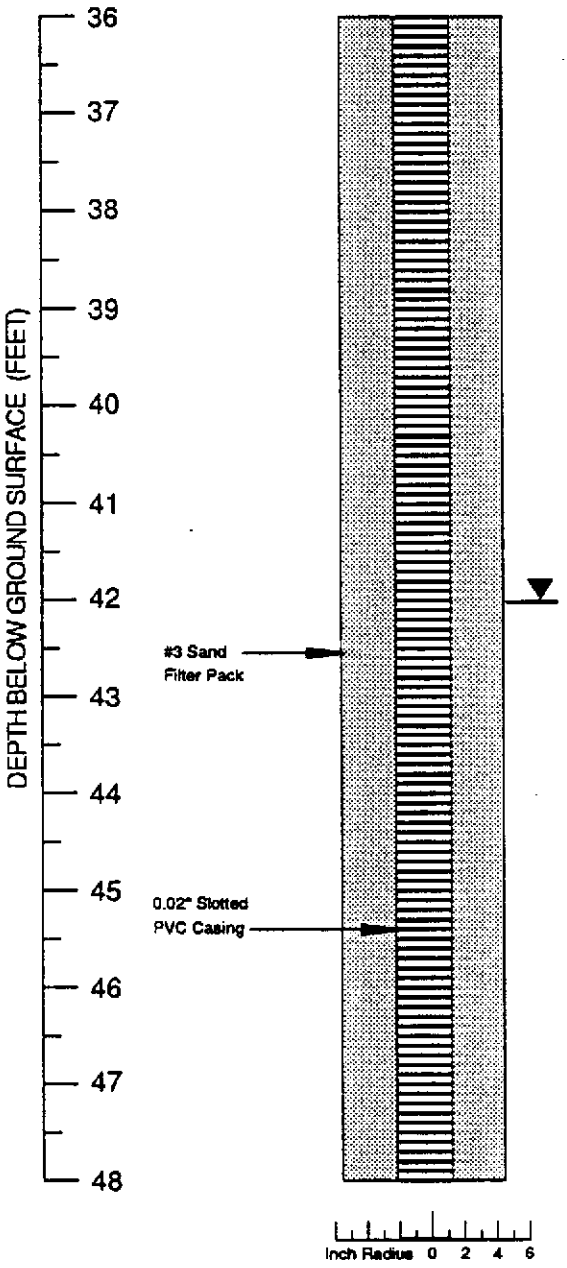
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



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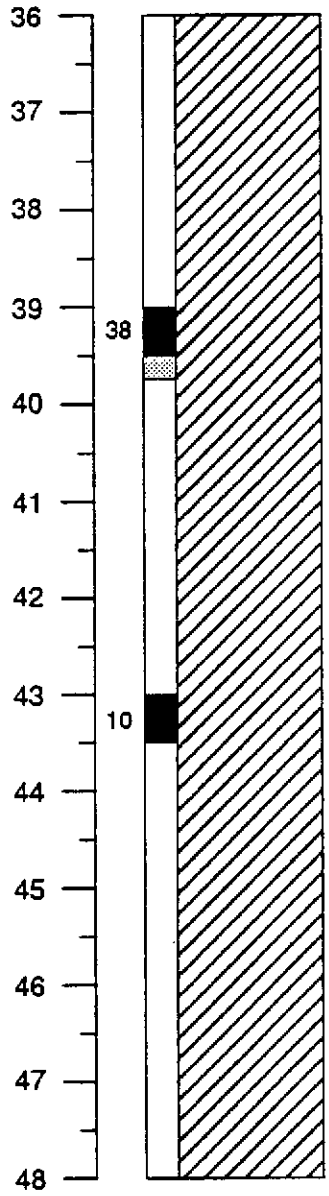


DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, weak odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

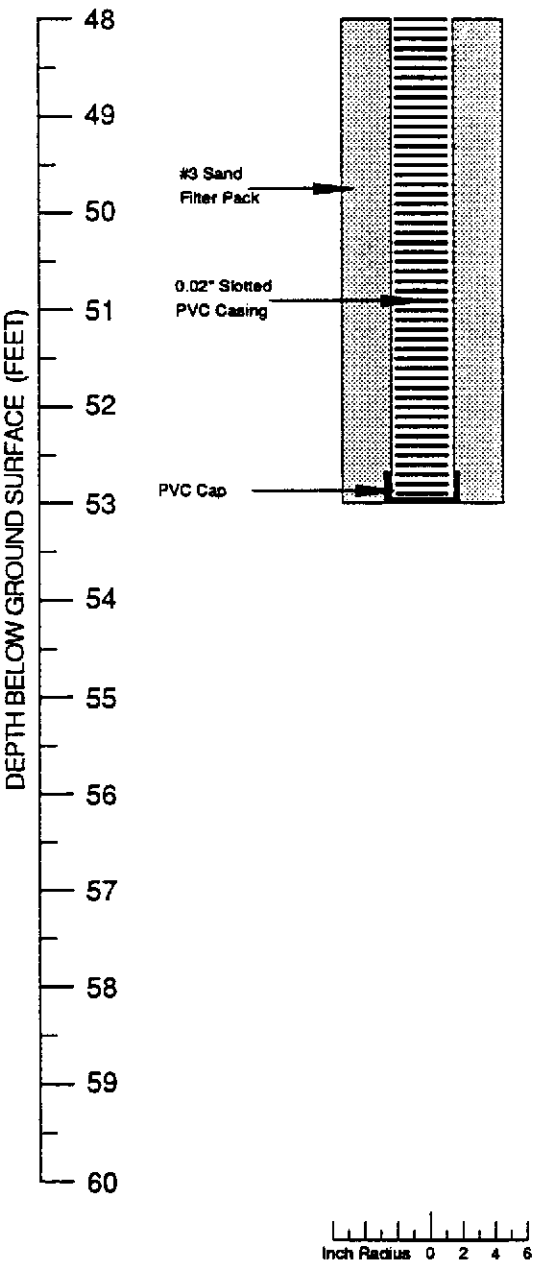
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

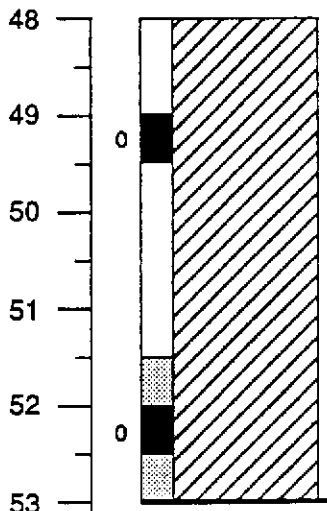
Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

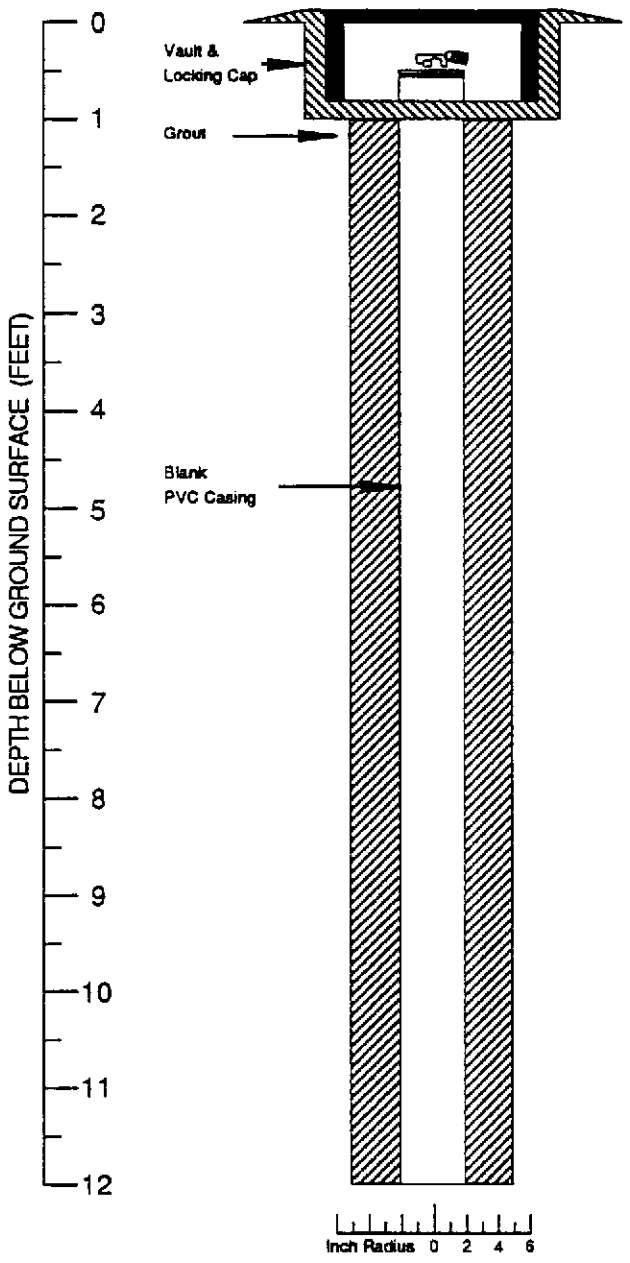
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

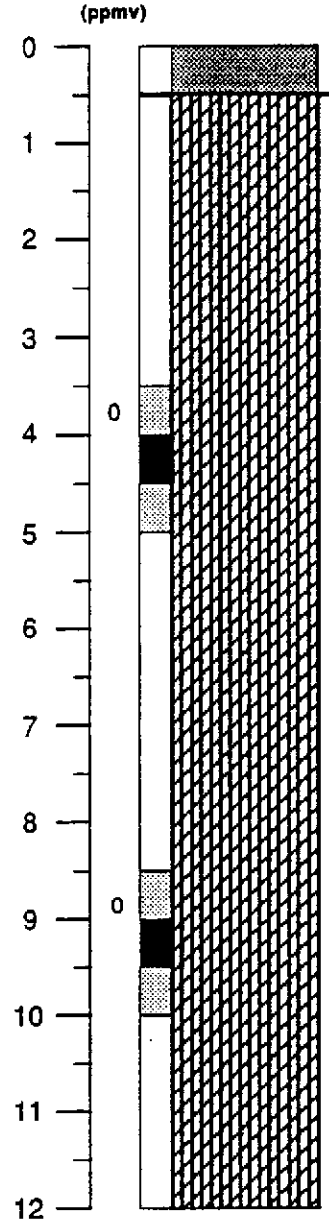
Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft no, odor.

same, sample collected, no odor.

SILTY CLAY (ML); dusky yellowish brown, damp, low plasticity, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 16, 1992 12:55 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 16, 1992 16:45 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 56.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

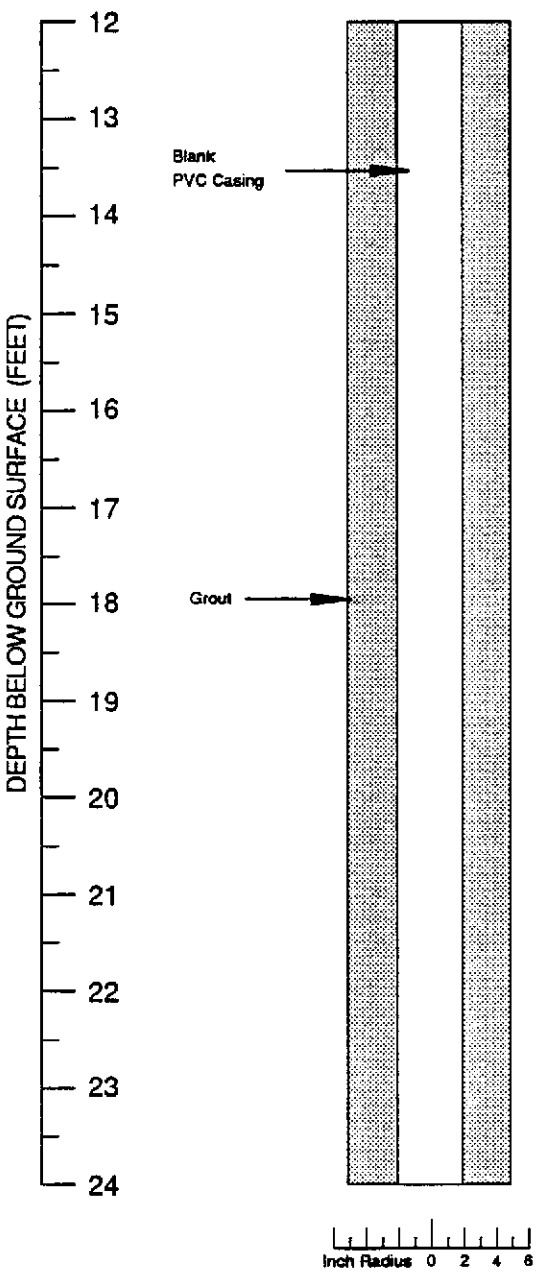
Well Log
MW-3

JOB NUMBER
10-91001

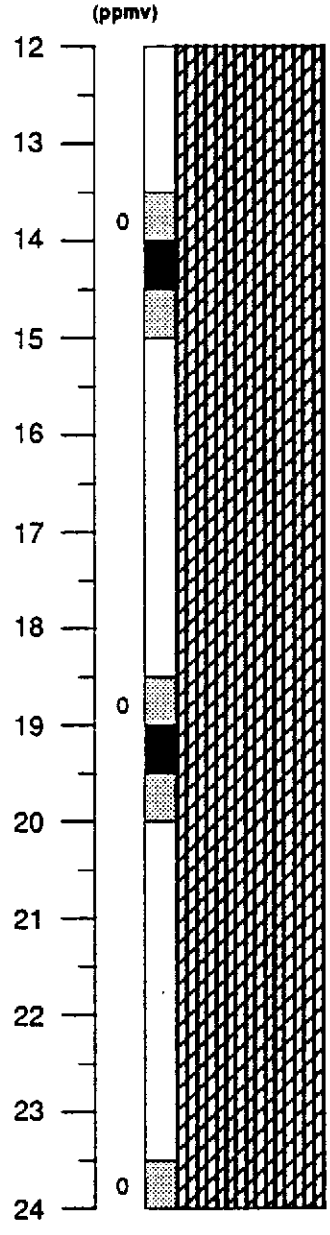
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL
MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sample collected, no odor.

same, dark yellowish brown, no odor.

same, sample collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

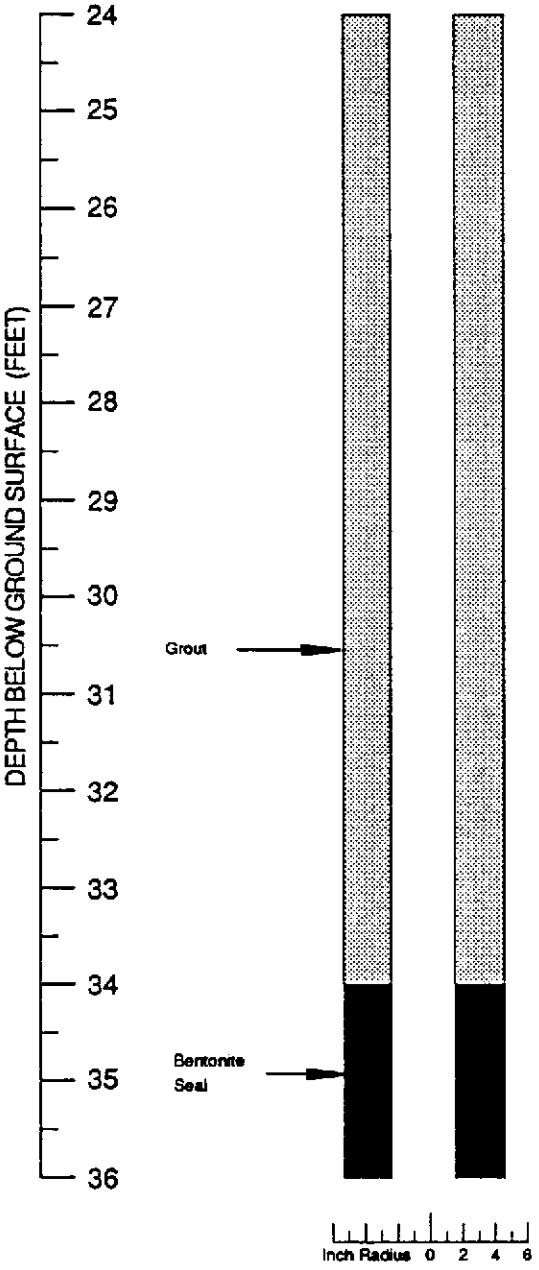
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

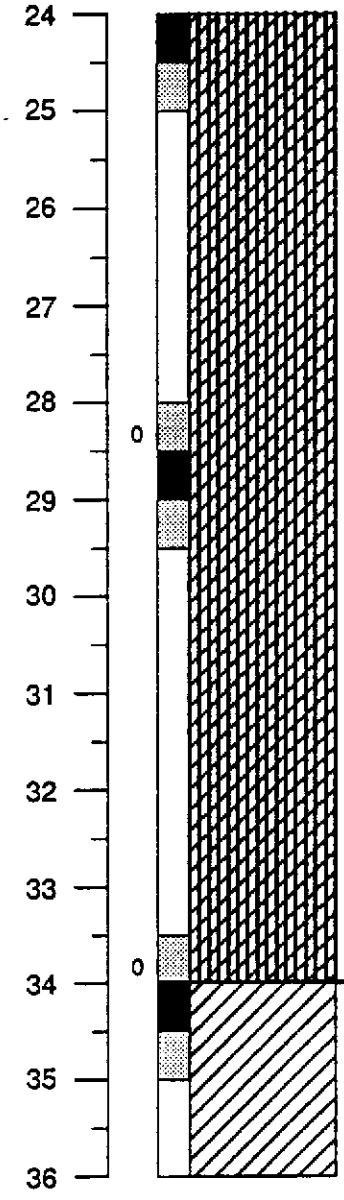
Well Log	JOB NUMBER
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

SAND (SM); greenish gray, damp, moderately graded, find to medium grained.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

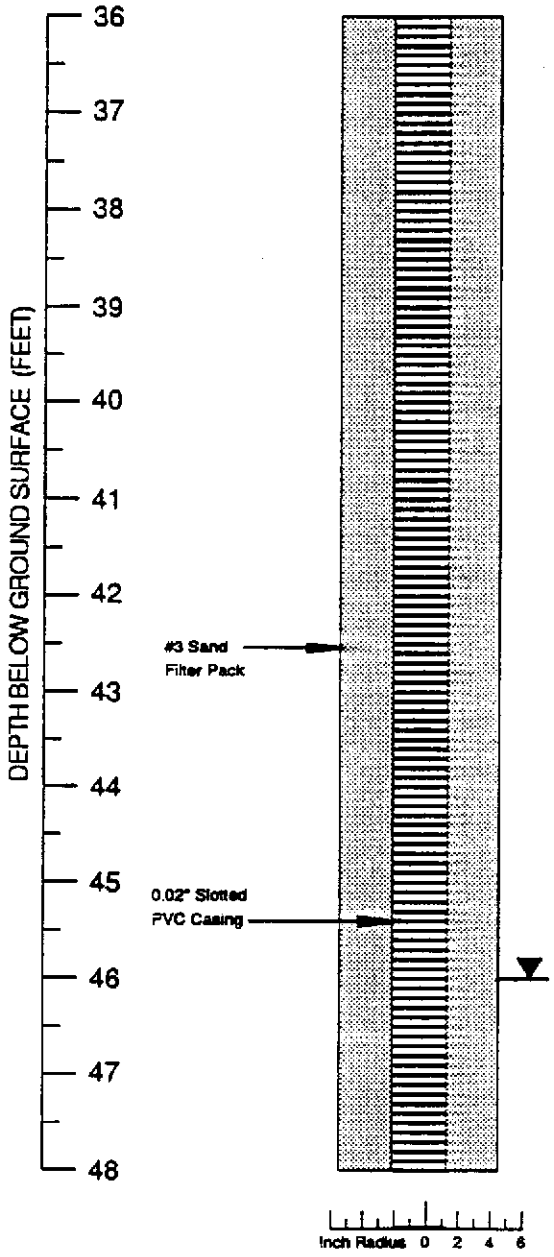
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

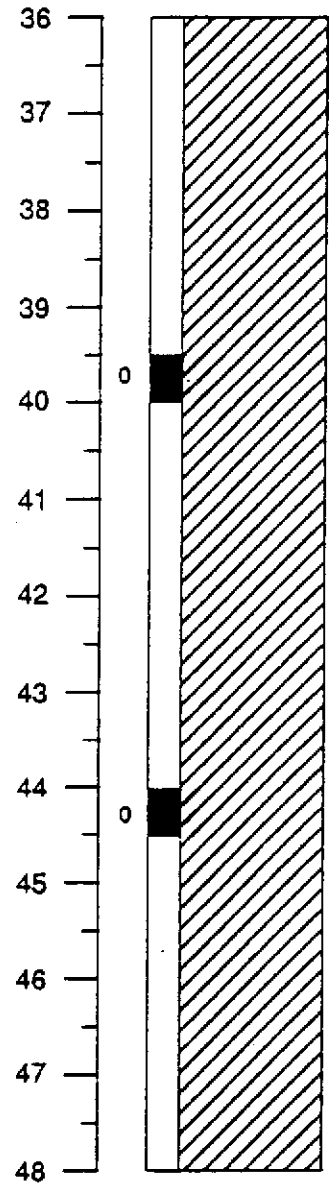
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

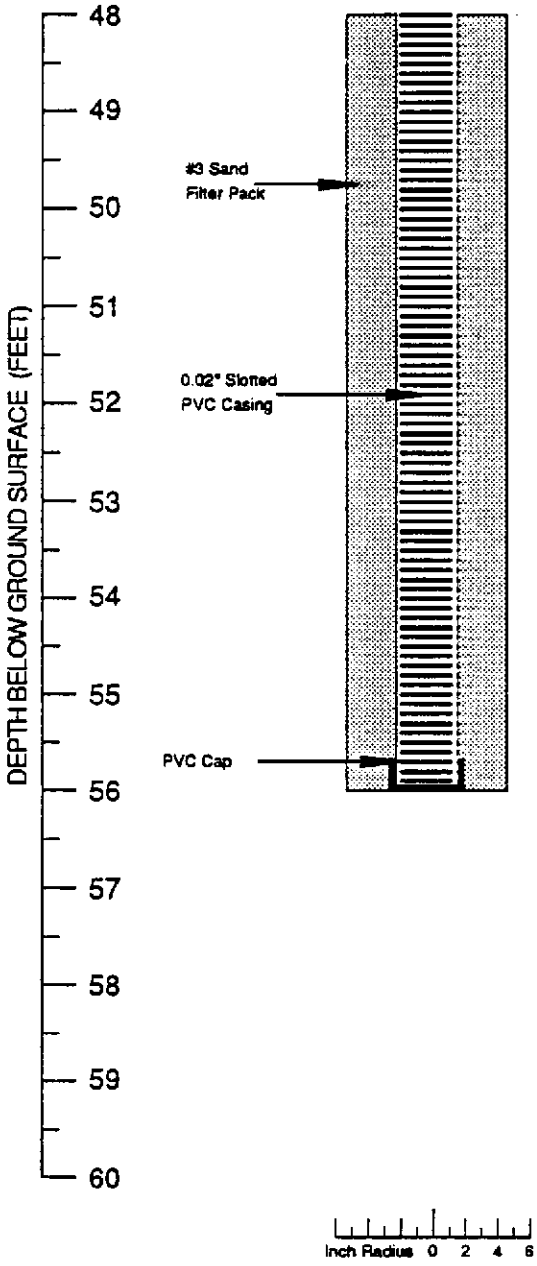
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

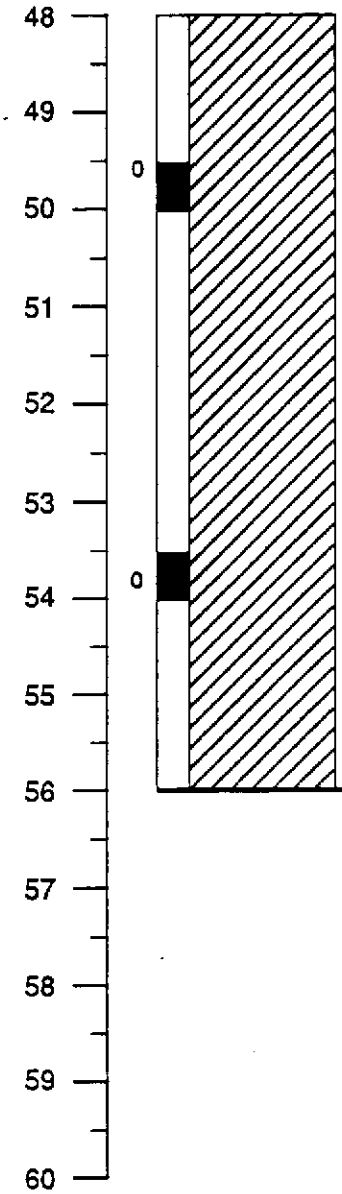
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 56.0 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

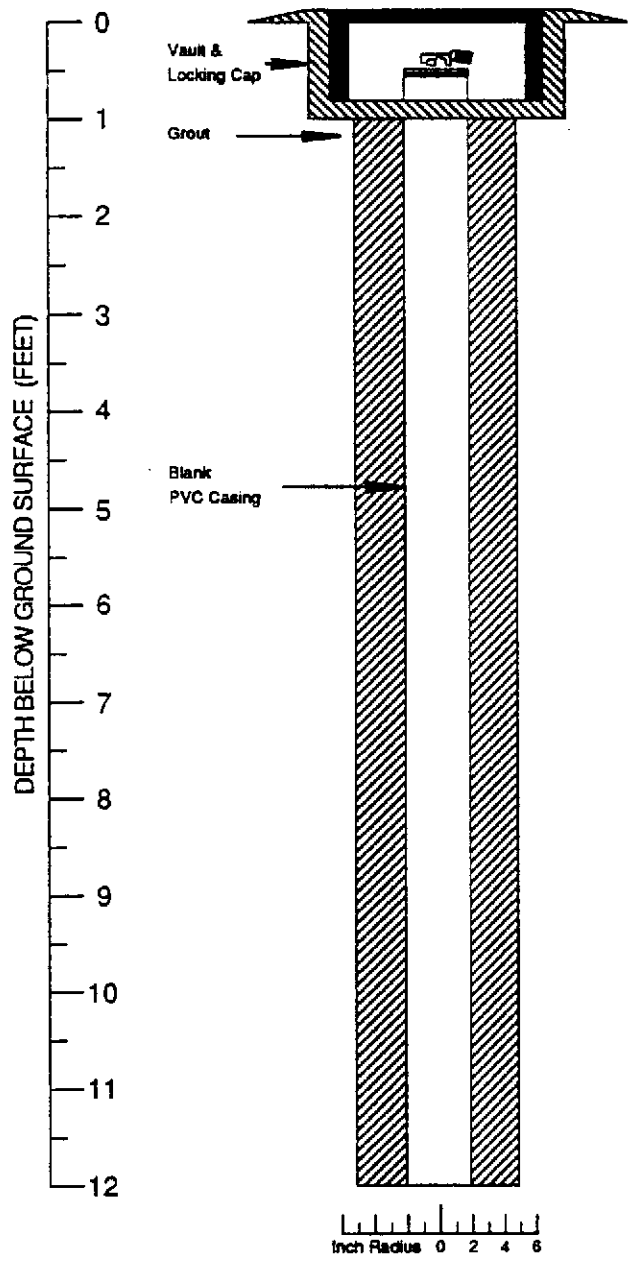
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

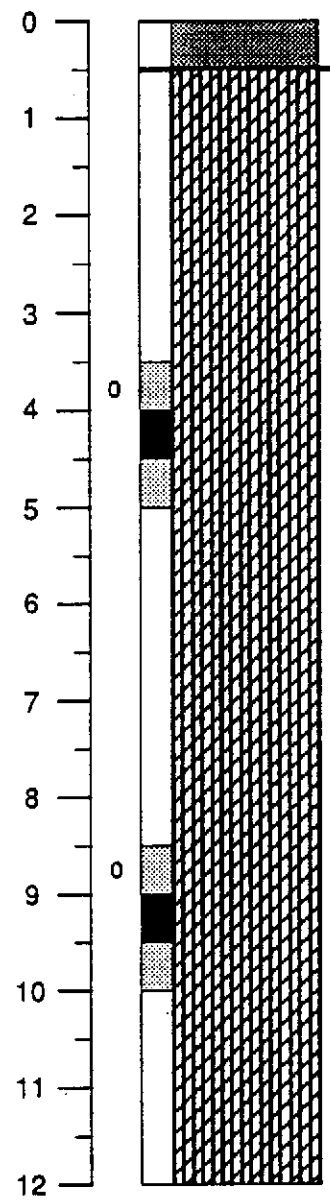
Well Log	JOB NUMBER
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft, no odor.

SILT (ML); moderate yellowish brown, damp, soft, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 18, 1992 10:00 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 18, 1992 14:15 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 53.5 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

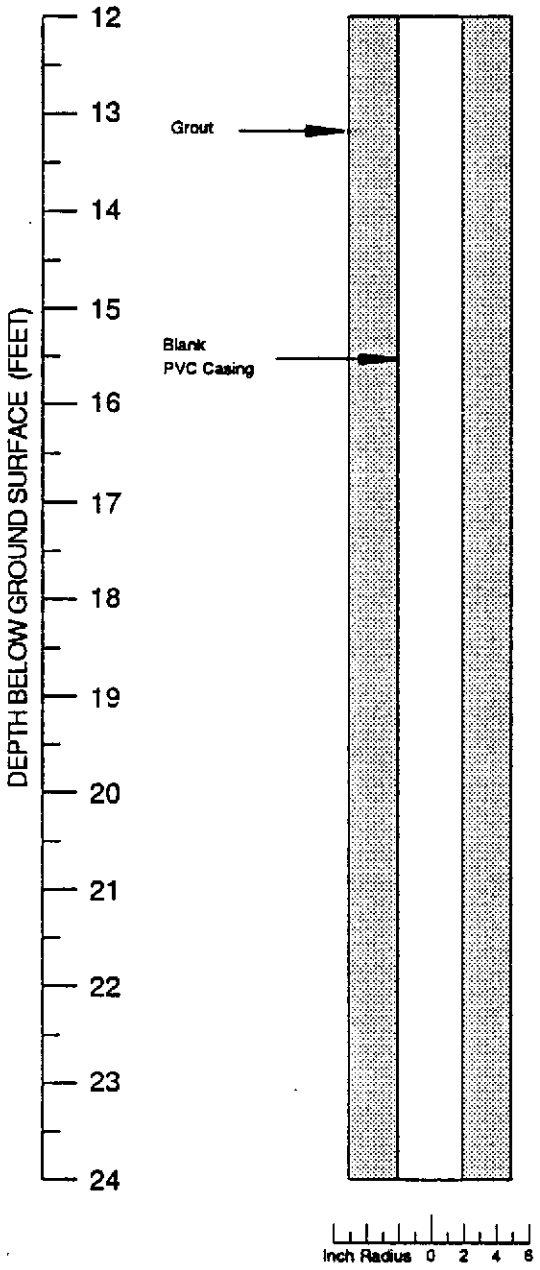
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-4	10-91001

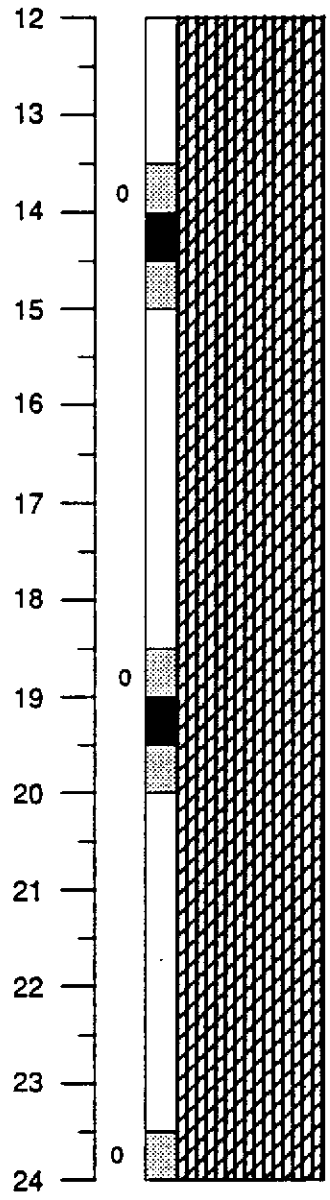
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL
MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same,sample collected, no odor.

same,sample collected, no odor.

same,sample collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

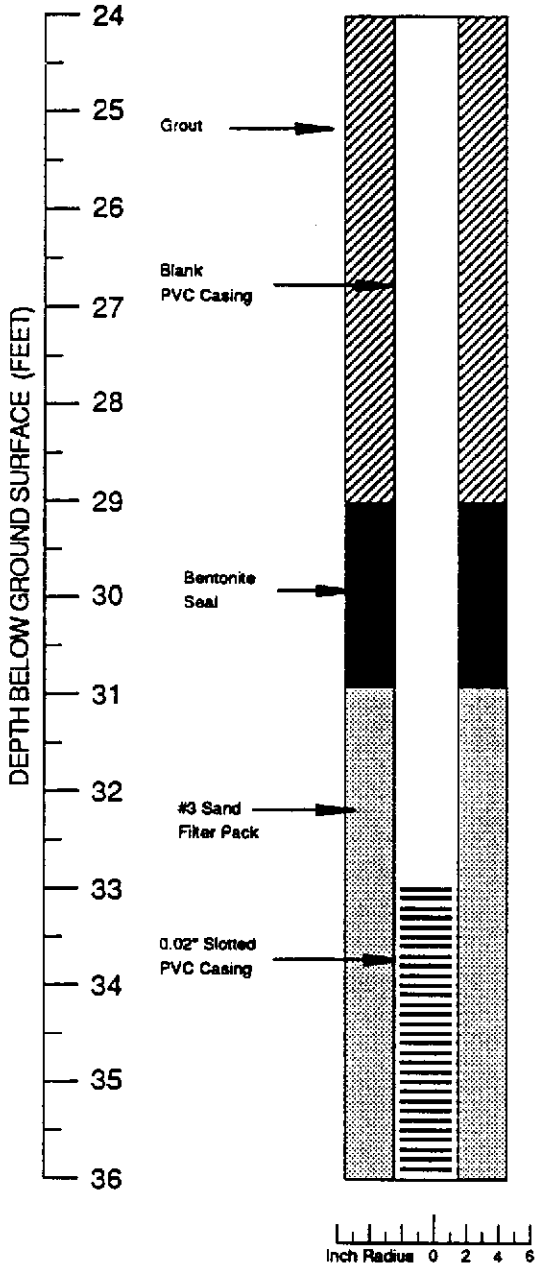
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

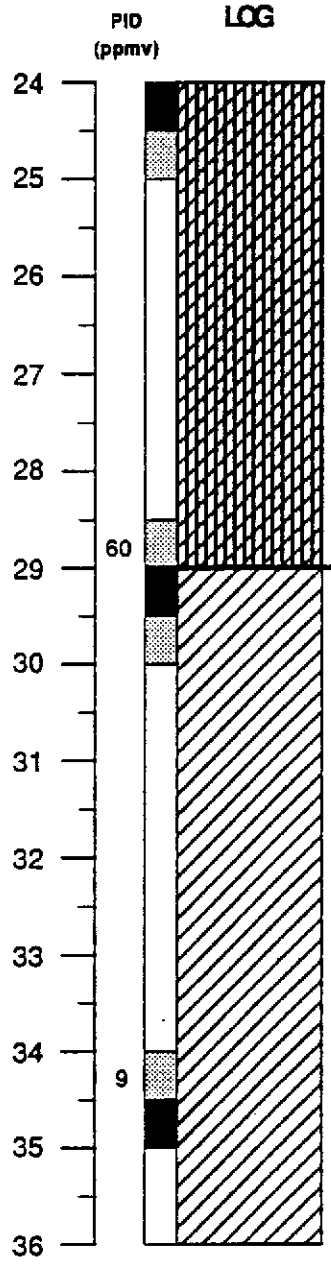
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

SILTY SAND (SM); light olive gray, moist, poorly graded, fine-grained with strong hydrocarbon odor.

SAND (SM); greenish gray, damp, moderately graded, medium to coarse-grained, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

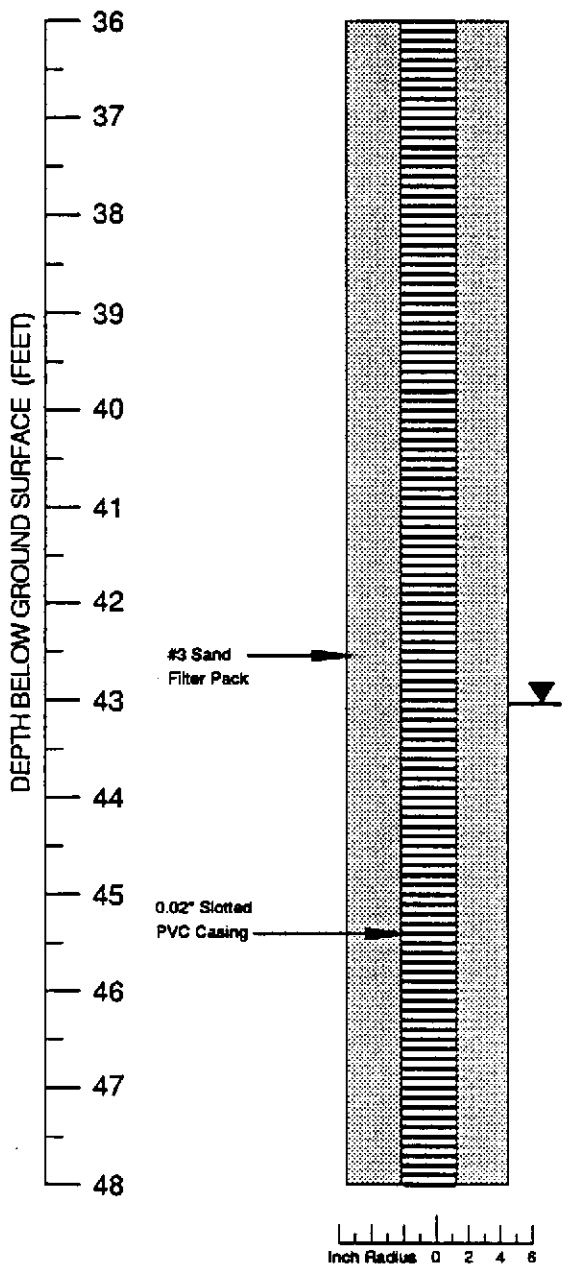
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

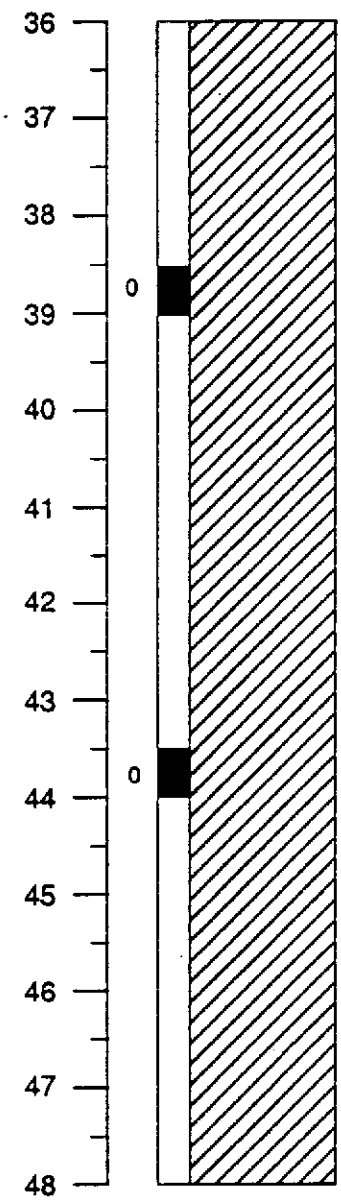
Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

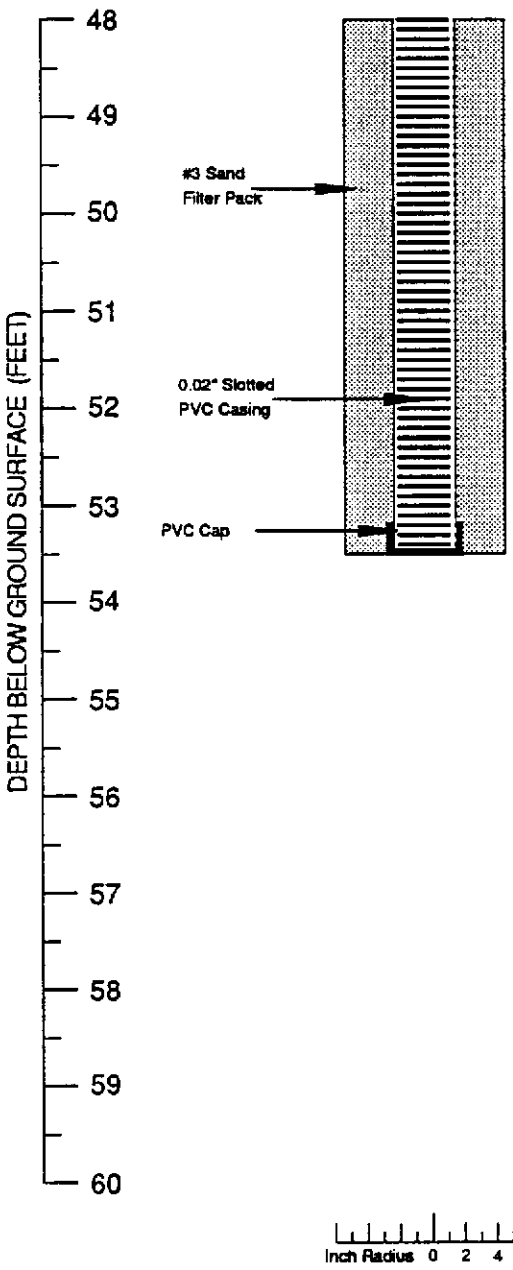
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

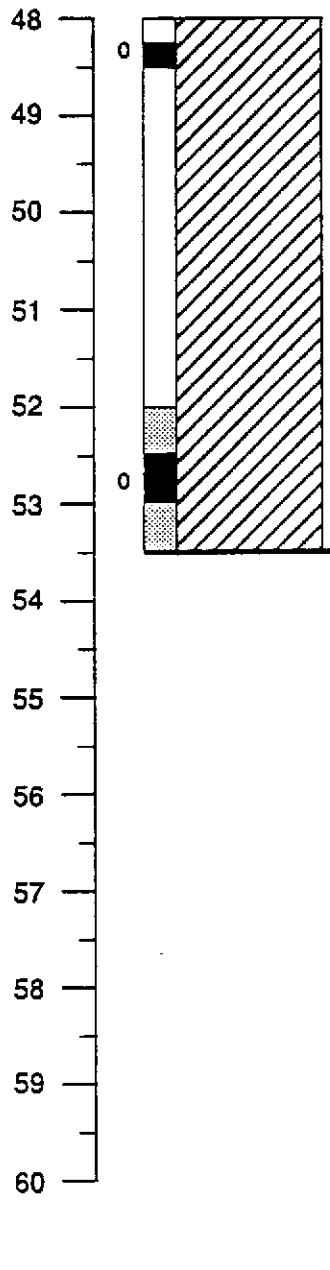
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.5 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

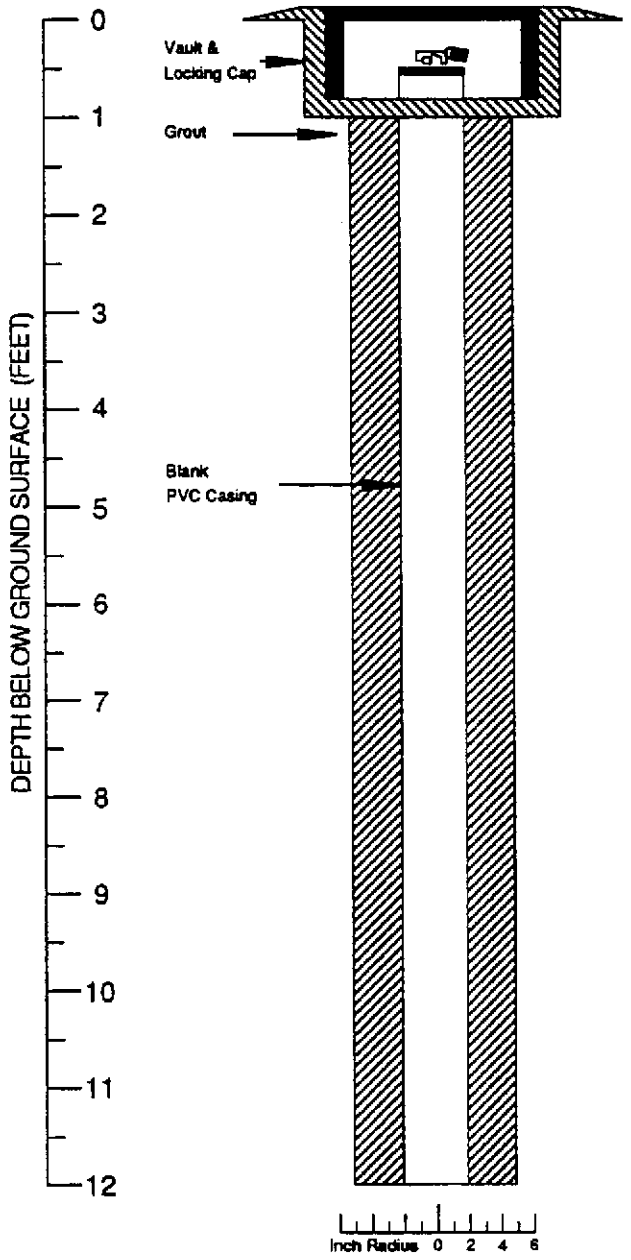
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

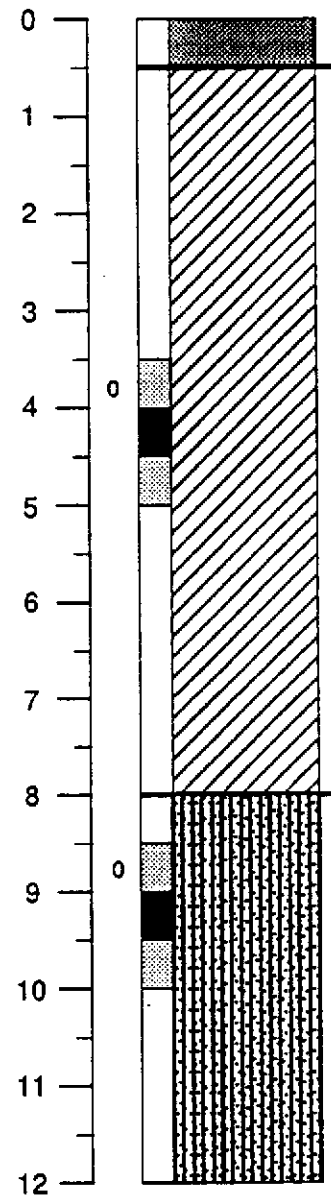
Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

CLAY (CL); dusky yellowish brown, damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

SANDY SILT (ML), dusky yellowish brown, (10 YR 2/2), damp, moderately, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 17, 1992 07:30 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 17, 1992 12:03 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 56.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

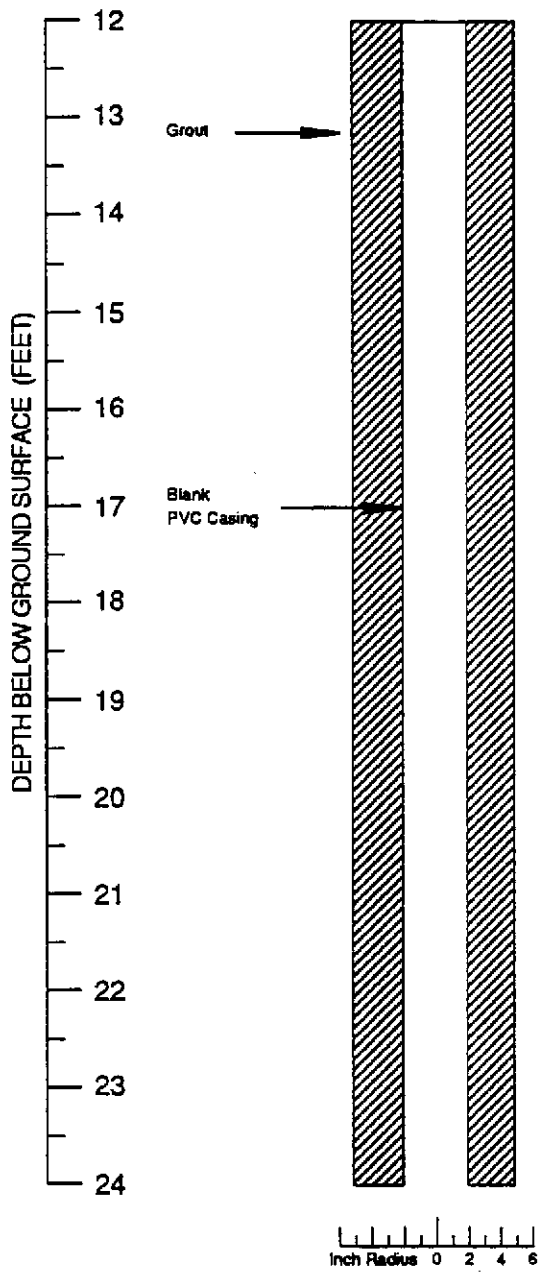
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

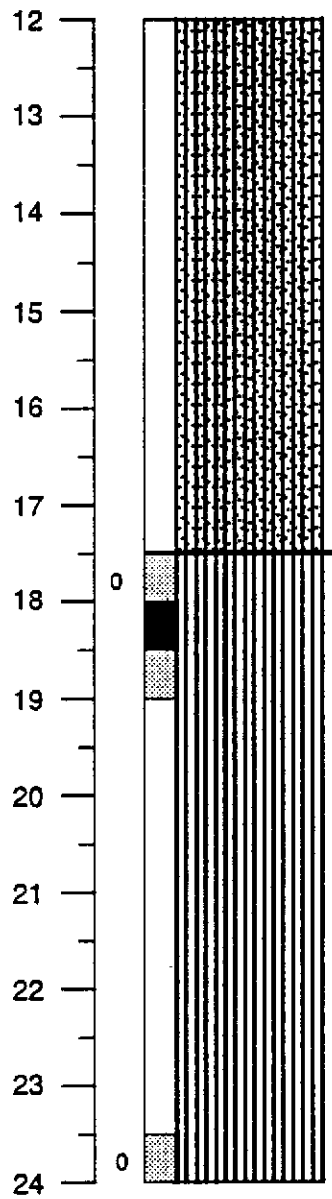
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

gravel, rock (cobble) encountered.

no sample collected - refusal.

SILT (ML); moderate yellowish brown, damp, soft, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

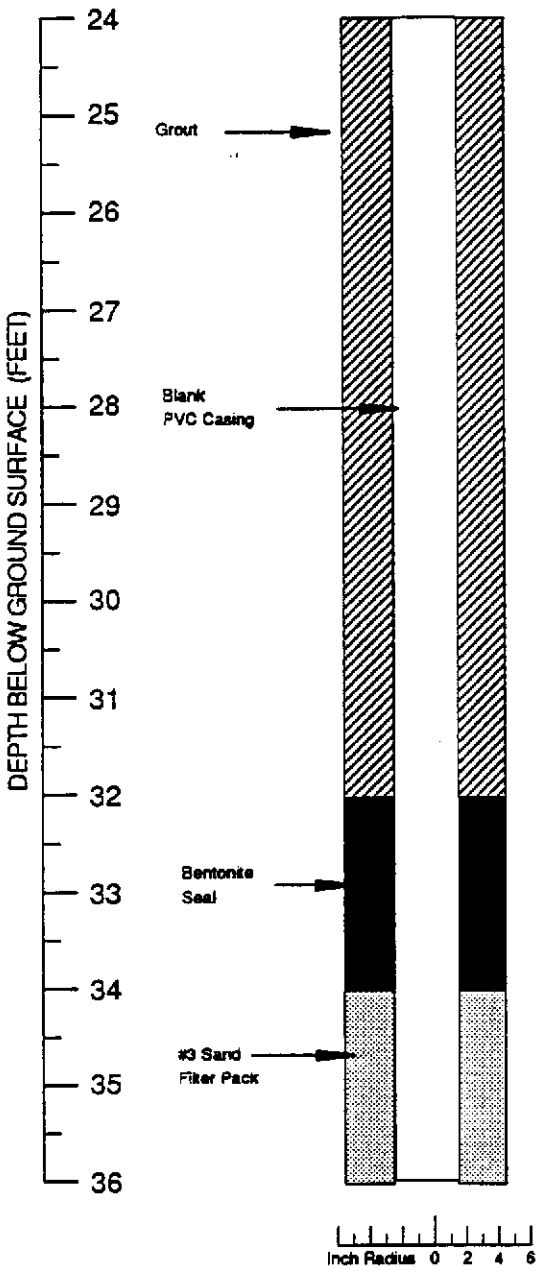
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

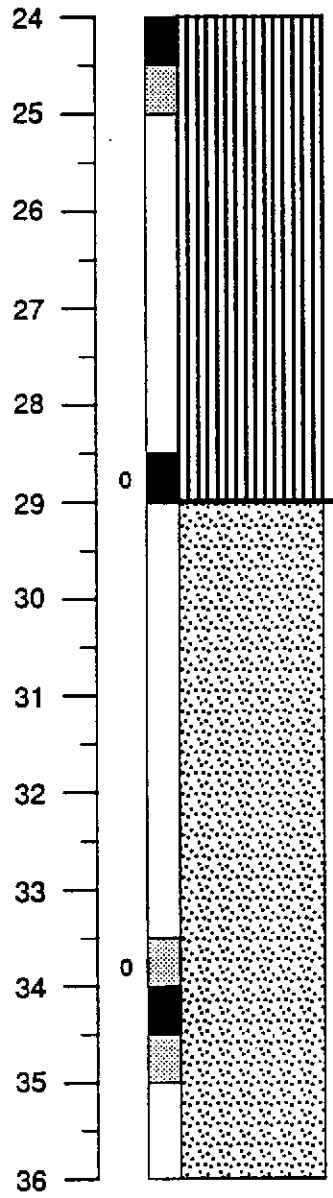
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

SAND (SM); weathered, moderate yellowish brown, damp, poorly graded medium to coarse grained with gravel, no odor.

SAND (SM); greenish gray, damp, moderately graded medium to coarse grained, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

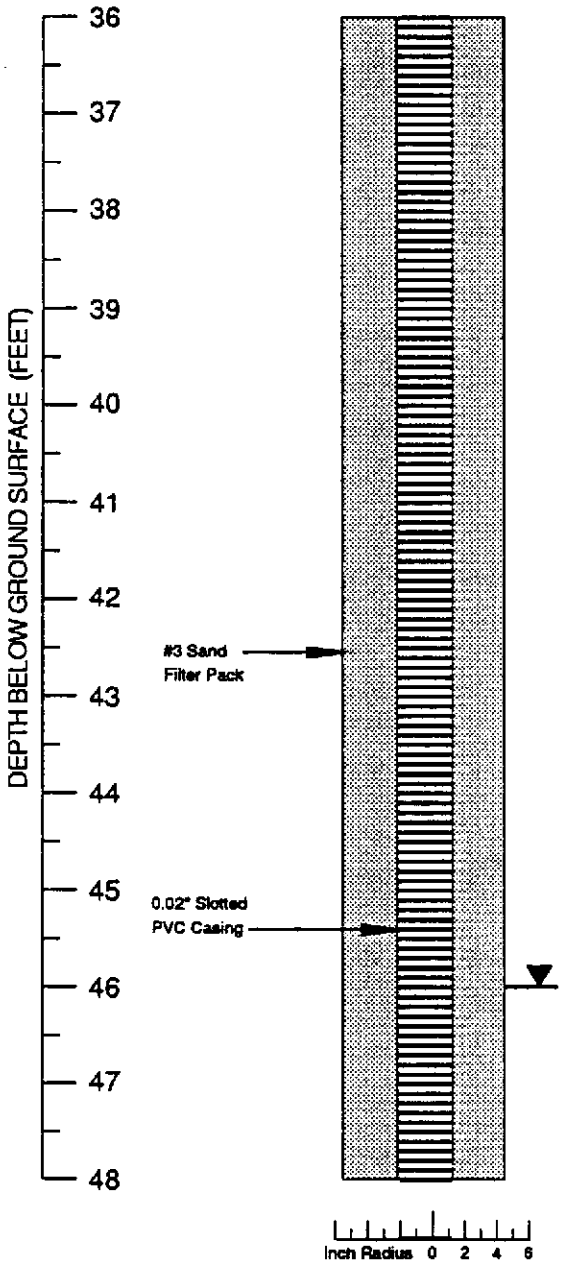
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

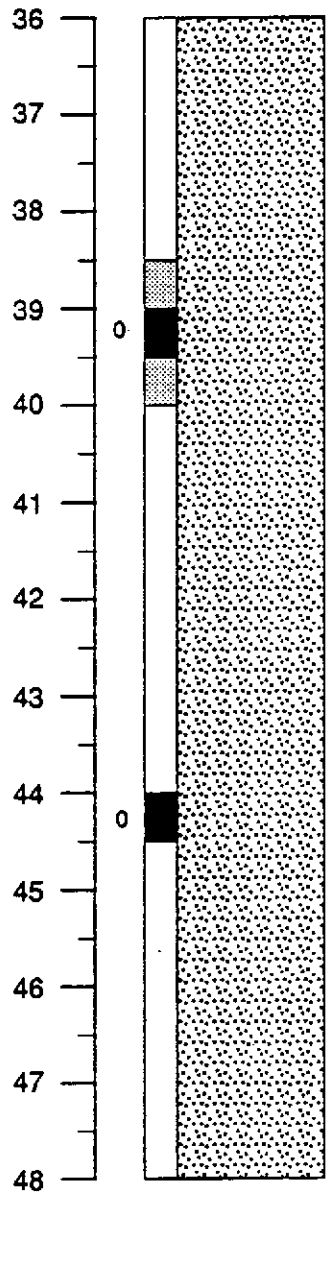
AECIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

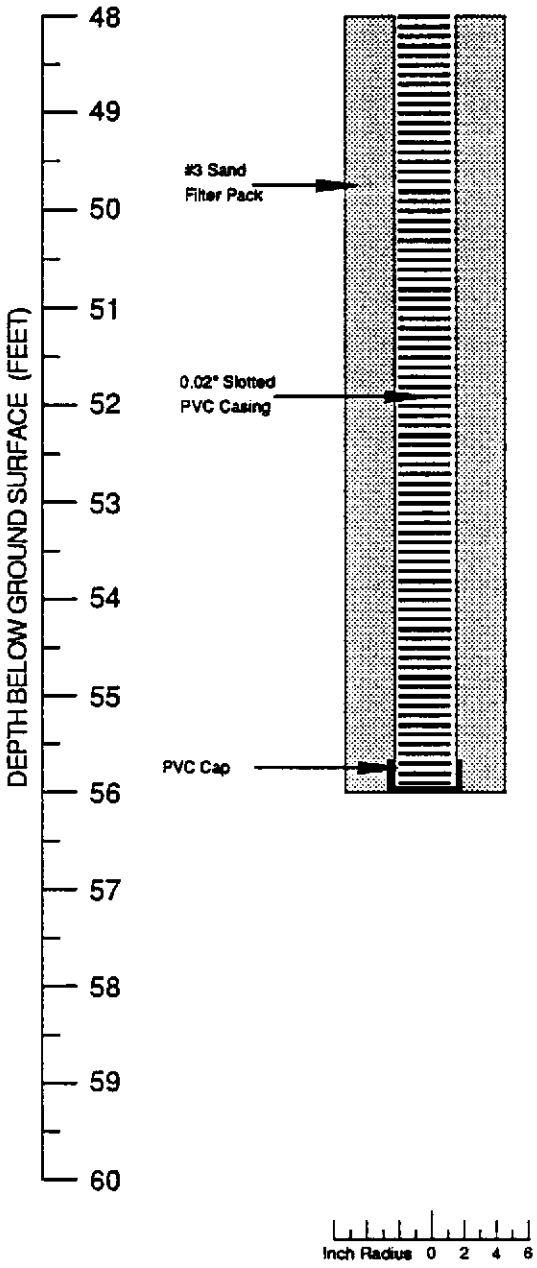
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

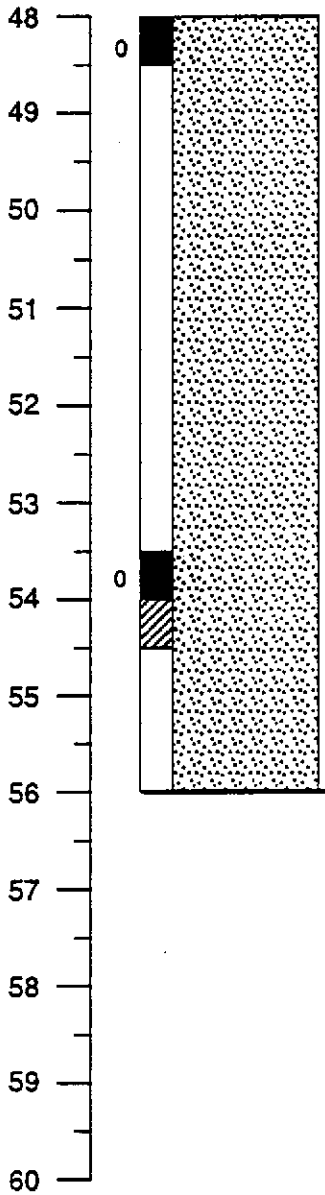
Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 56.0 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

APPENDIX B:
PILOT TEST RESULTS

TABLE 6

VAPOR EXTRACTION PILOT TEST DATA AND SUMMARY
OCTOBER 7, 1992

1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA

TEST 1: WELL MW-2
DURATION OF TEST : 2.6 HOURS

DATE	TIME	INFLUENT VACUUM	WELL TEMP.	WELL AIRFLOW	CONCENTRATION (PPMV)			EXTRACTION RATES			VACUUM MEASUREMENTS(IN.H2O)				COMMENTS
					TPH FID	TPH LAB	BENZENE LAB	TPH FID	TPH LAB	BENZENE LAB	MW-2	MW-3	MW-4	MW-5	
		(IN.H2O)	(DEG.F)	(CFM)				(LB/HR)	(LB/HR)	(LB/HR)	DISTANCE FROM MW-1 38 ft	50 ft	50 ft	38 ft	
10/7/92	12:30 PM	-6	72	48	15250			9.7							Start test.
	1:00 PM							0			-0.1	-0.05	-0.25	0	
	1:30 PM	-7	73	51.2	10000			6.8							
	1:45 PM	-6.75	73	51.2	10000			6.8			-0.09	-0.06	-0.23	0	
	2:00 PM	-7	73	51.2	10000			6.8							
	2:15 PM	-6.75	73	50.7	10000			6.7							
	2:30 PM	-6.75	73	50.7	9250			6.2			-0.1	-0.07	-0.25	0	
	2:45 PM	-6.75	73	50.7	9250			6.2							
	3:00 PM	-6.75	73	50.7	9250	60000	2500	6.2	40.4	1.6	-0.11	-0.08	-0.25	0	Collected soil gas sample
															End of Test

TEST 2 : WELL MW-1
DURATION OF TEST: 2 HOURS

DATE	TIME	INFLUENT VACUUM	WELL TEMP.	WELL AIRFLOW	CONCENTRATION (PPMV)			EXTRACTION RATES			VACUUM MEASUREMENTS(IN.H2O)				COMMENTS
					TPH FID	TPH LAB	BENZENE LAB	TPH FID	TPH LAB	BENZENE LAB	MW-2	MW-3	MW-4	MW-5	
		(IN.H2O)	(DEG.F)	(CFM)				(LB/HR)	(LB/HR)	(LB/HR)	DISTANCE FROM MW-1 38 ft	50 ft	50 ft	38 ft	
10/7/92	3:15 PM	-31.5	79	91.6	11500			13.8							Start test.
	3:30 PM	-31.5	81	90.5	10000			11.8			-0.08	-0.06	-0.02	-0.14	
	3:45 PM	-32	80	90.5	9500			11.3							
	4:00 PM	-31.5	80	91.6	9250			11.1			-0.09	-0.08	-0.02	-0.17	
	4:15 PM	-32	79	91.6	9000			10.8							
	4:30 PM	-32.25	73	83	8750			10.5			-0.09	-0.07	-0.01	-0.17	
	4:45 PM	-32.5	74	83	8750			10.5							
	5:00 PM	-32.5	77	87	8750			10.5			-0.09	-0.07	-0.02	-0.2	
	5:15 PM	-33	78	91.6	8750	65000	1600	10.8	78.5	1.7	-0.09	-0.07	-0.01	-0.17	Collected soil gas sample
	5:30 PM														End test.

Notes:

Airflow approximated from anemometer measurements.

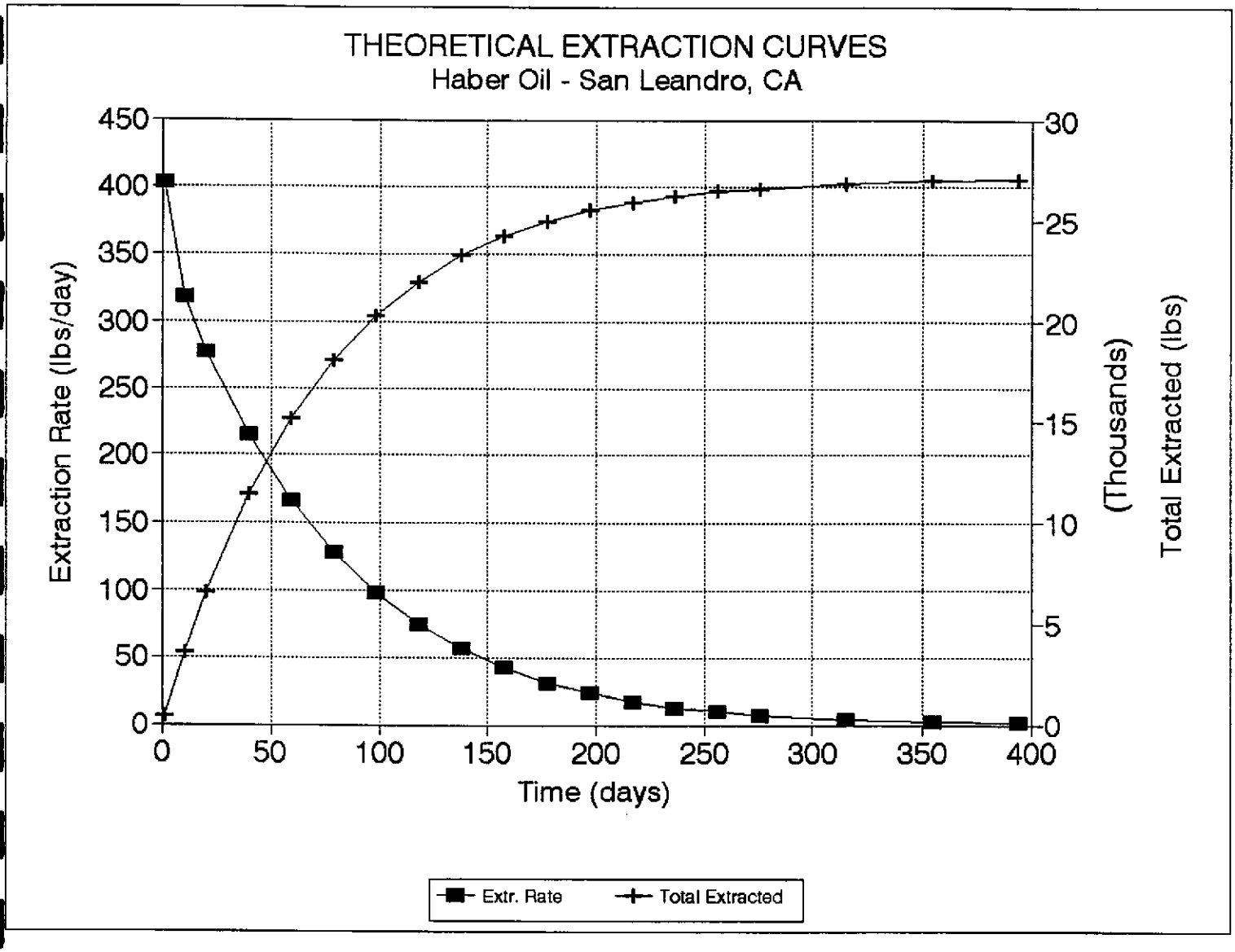
Extraction rate = Airflow X Concentration of constituent

Molecular weight of gasoline assumed as 86 lb/lb mole.

Molecular weight of benzene assumed as 78.12 lb/lb mole.

CONSTRUCTION: 4 IN.DIA., TOTAL DEPTH - 63 FT. SCREENED INTERVEL: 38 FT (15 TO 63 FT BELOW GRADE)

APPENDIX C:
THEORETICAL EXTRACTION CURVES


THEORETICAL EXTRACTION CURVES
Haber Oil - San Leandro, CA
Extraction Rate (lbs/day)
Total Extracted (lbs) (Thousands)
Time (days)
0
50
100
150
200
250
300
350
400
450
5
10
15
20
25
30
Extr. Rate
Total Extracted

APPENDIX D:
OFF-GAS SPECIFICATIONS

SPECIFICATIONS FOR K.B/H MMC-5B15 (150 scfm ThermOx System)

THERMAL OXIDIZER

NOMINAL FLOW CAPACITY:	150 scfm
THERMAL CAPACITY:	1.5 X 10^6 Btu/hr
EQUIVALENT BTEX CONC.	3.4%
DAILY DESTRUCTION RATE	1900 lbs of BTEX
DIMENSIONS:	47" L x 44" W x 72" H
COMBUSTION CHAMBER:	24" diam. x 6'H; Stainless steel Type 304
WEIGHT:	700 lbs
OPERATING TEMPERATURE:	1,450° F
EFFLUENT TEMPERATURE:	800 - 1000°F
TYPICAL DESTRUCTION EFFICIENCY:	99%
SUPPLEMENTARY FUEL:	Natural Gas: 10.8 cu ft/min; Supply Pressure 2 psig Propane: 0.13 gal/min

FEATURES:

- VACUUM INDICATOR
- INLET FILTER
- BLOWER DISCHARGE TEMPERATURE INDICATOR
- BLOWER DISCHARGE MUFFLER
- PROCESS GAS FLOW SENSOR AND INDICATOR
- DILUTION AIR VALVE (MANUAL) WITH FILTER/MUFFLER
- FLOW CONTROL FROM 150 DOWN TO 100 SCFM
- FLAME ARRESTOR WITH SHUTDOWN INTERLOCK
- PROCESS GAS LOW PRESSURE LIMIT SWITCH
- PROPRIETARY PREMIX BURNER
- UV SENSOR
- SUPPLEMENTARY FUEL SYSTEM:
  - MANUAL AND SOLENOID ISOLATION VALVES
  - PRESSURE REGULATOR FOR MAIN AND PILOT FLAMES
  - HIGH/LOW GAS PRESSURE LIMIT SWITCH
  - TEMPERATURE CONTROLLED FUEL FLOW
- HIGH/LOW TEMPERATURE SHUTDOWN
- ADJUSTABLE DRAFT AIR PORTS
- 3', GALVANIZED STEEL, 28 gauge EXHAUST STACK
- SYSTEM EVALUATED BY THE AMERICAN GAS ASSOCIATION (AGA)

STANDARD VACUUM BLOWER (VCU): SELECTED TO MEET CUSTOMER'S SITE REQUIREMENTS.
A typical package would consist of the following:

TYPE:	Rotary Positive Displacement or Regenerative
BRAND (Typical):	M-D Pneumatics 3210
VACUUM @ CUST. P.O.C.:	5" Hg @ 150 SCFM
DRIVE MOTOR:	5 hp TEFC, 230 V, 1 or 3 phase
DIMENSIONS:	48" L x 25" W x 25" H
WEIGHT:	500 lbs

OPTIONS:

- TRAILER MOUNTED*, BED SIZE 5' W x 10' L
- VAPOR-LIQUID SEPARATOR w/ EXPLOSION PROOF FLOAT SWITCH
- VACUUM RELIEF VALVE
- SOUND ENCLOSURE
- MULTIPOINT RECORDER
- COMMUNICATION PACKAGE, PC or FAX
- EXHAUST STACK 9'; GALVANIZED STEEL 28 gauge

* The MMC-5B15 system consists of a thermal oxidizer (ThOx) and vacuum/compressor unit (VCU). The two major components have their own base supports, suitable for forklift, and can be configured to customer's preferred layout. A trailerized option is also available.