9.14.89

ALAMEDA COUNTY
DEPT. OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS

THRIFTY OIL CO.

September 11, 1989

Mr. Scott Seery
Alameda County
Health Care Services
Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

RE: Thrifty Oil Co. Station #054
2504 Castro Valley Blvd.
Castro Valley, CA 94546

Dear Mr. Seery,

Enclosed please find a copy of R.S.I.'s **"Proposed Work Plan"** dated September 5, 1989 for the above referenced location.

Upon review of the plan, you will note that it outlines the off-site wells that you requested. Please do not hesitate to contact me if you have any questions or require more information.

Very truly yours,

Peter D'Amico

Peter D'Amico
Manager
Environmental Affairs

PD/dmt

cc: Scott Hugenberger, R.W.Q.C.B. - San Francisco Bay Region

REMEDIATION SERVICE, INT'L.

P.O. BOX 1601, OXNARD, CALIFORNIA 93032
(805) 644-5892 • FAX (805) 654-0720

PROPOSED WORK PLAN
FOR
ADDITIONAL SITE ASSESSMENT

Thrifty Oil Co.
Station No. 054
2504 Castro Valley Boulevard
Castro Valley, CA

Prepared for:
THRIFTY OIL CO.
10000 Lakewood Boulevard
Downey, CA 90240

Prepared by:
RSI - REMEDIATION SERVICE, INT'L
P. O. Box 1601
Oxnard, CA 93032
(805) 644-5892

September 5, 1989

1.0 INTRODUCTION

The purpose of this report is to outline a plan for further subsurface investigation at Thrifty Oil Co.'s former retail station No. 054. Previous investigations have determined that both the soil and groundwater beneath the site contain elevated levels of petroleum hydrocarbons. This proposed investigation will attempt to delineate the extent of the affected area.

1.1 Site Location and Description

Station No. 054 was located at 2504 Castro Valley Boulevard, Castro Valley, Alameda County, California (Figure 1). The station, which has been closed, consisted of a small building, three pump islands, a cashier's booth and three underground fuel tanks (Figure 2). The fuel tanks have been removed. They contained leaded and unleaded gasoline and each tank had a capacity of 12,000 gallons.

The site has been leased to Circle-K Corporation which has reopened the site as a Circle-K mini-market and retail gasoline station. Three new fiberglass storage tanks have been installed. They are located in the same area as the former tanks (Figure 3).

As can be seen on the Vicinity Map (Figure 4), the site is located on the northeast corner of the intersection of Castro Valley Boulevard and Stanton Avenue. The other three corners of the intersection are also occupied by small businesses. Immediately east of the site, facing Castro Valley Boulevard, is another small business. North of the site, facing Stanton Avenue, is a residential area.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS

There have been at least two previous investigations at this site. The first was by Hydrotech Consultants, Inc. (Subsurface Investigation for Petroleum Hydrocarbon Contamination Assessment. January 14, 1987). Four borings (labeled B-1, B-2, B-3 and B-4 on Figure 2) were drilled around the tanks to depths of 20 feet below ground surface (bgs). Evidence of hydrocarbon contamination was found in soil samples from all four borings (Table 1). The affected soils were generally confined to the upper 10 feet.

A second investigation was conducted by Robert Elbert and Associates (Report of Subsurface Investigation, April 11, 1988) to further define the extent of hydrocarbon contamination. Seven monitoring wells (labeled RE-1 through RE-7 on Figure 2) were drilled and installed at depths ranging from 15 to 25 feet bgs. Laboratory analysis of soil samples (Table 1) indicated that the main zone of soil contamination tends to trend northwest-southeast, through the former tank area.

Soils encountered during drilling operations were reported to be fairly uniform across the site. They consist of clay or clay with gravel and/or evaporite deposits overlying clay with abundant shale gravel. Shale bedrock was encountered at depths of 15 feet or more in all wells or borings except RE-1, which was drilled to 25 feet bgs and did not encounter bedrock.

No groundwater was found by Hydrotech during their site investigation. However, groundwater was found by Robert Elbert & Associates at depths ranging from 6 to 8 feet during drilling operations. On March 30, 1988, after monitoring wells RE-1 through RE-7 were installed, the depth to groundwater was measured and the wellhead elevations were surveyed. Previously existing wells PW-1 and PW-2 (Figure 2) were also measured and surveyed. It was determined that the water table elevation ranged from 158.64 to 161.87 feet above mean sea level (MSL). The gradient sloped approximately 1 foot every 35 feet towards the southeast. Water samples collected from wells RE-1 through RE-7 all contained elevated levels of petroleum hydrocarbons (Table 2). A small amount of free product was found in wells RE-3 (0.01 feet), PW-1 (0.07 feet) and PW-2 (0.03 feet).

As a preliminary step to the formation of this work plan, the relative elevation of each well at the site was resurveyed and the depth to water was measured by RSI on August 22, 1989. The depth to water ranged from 5.04 to 7.78 feet and the water table elevation was calculated to range from approximately 158.79 to 161.74 feet above mean sea level (Table 3). A contour map of this data (Figure 5), indicates an approximate direction of groundwater flow towards the east. The gradient ranges from approximately 1 foot every 10 feet on the south side of the site to 1 foot every 40 feet on the north side of the site.

A small quantity of free product was found in wells RE-3, RE-4, PW-1 and PW-2. The largest amount of free product was found in RE-4 which had 0.10 feet followed by RE-3 with 0.08 feet. PW-1 and PW-2 contained 0.02 and 0.03 feet of free product, respectively. The product in these two wells may be the result of surface runoff, as neither of these wells is correctly sealed. Both PW-1 and PW-2 are constructed of slotted casing which extends into the well box.

3.0 WORK PLAN FOR ADDITIONAL ASSESSMENT

Three additional groundwater monitoring wells will be installed in order to further delineate the extent of hydrocarbon migration beneath this site. One well will be drilled directly downgradient from the underground tanks, on the far eastern portion of the property (proposed well RS-8, Figure 3). The second proposed well (RS-9, Figure 3) will be located upgradient from the underground tanks, to the west of the site on Stanton Avenue. The third well (RS-10, Figure 3) will also be located downgradient from the underground tanks, southeast of the site on Castro Valley Boulevard. The drilling of proposed wells RS-9 and RS-10 is dependent on securing the necessary permits from Alameda County and Cal Trans.

3.1 Drilling, Sampling and Completion Procedures

Under the supervision of a RSI geologist, soil borings will be advanced using a truck mounted hollow-stem auger drilling rig. Soil samples will be collected following the procedures discussed in Appendix B. Due to the shallow water table beneath the site, only one soil sample will be collected from each boring for laboratory analysis. The samples will be collected from above the water table at approximately 5 feet bgs. The samples will be analyzed by a state certified laboratory for total petroleum hydrocarbons (TPH) as well as benzene, toluene, ethylbenzene and xylenes (BTEX) using DOHS methodology and/or modified EPA methods 8015/8020/8260.

Each soil boring will have a diameter of approximately 12 inches and will be completed with 4 inch diameter PVC casing as a groundwater monitoring well. Each well will extend approximately 20 feet past the first encountered groundwater and will be constructed in the manner depicted in Appendix B. It will only be possible to provide a four foot surface seal on these wells due to the shallow depth of groundwater and the necessity of screening above the water in order to detect the possible presence of free product.

After the wells have been completed, the elevations of the wellheads will be surveyed and the wells will be developed and sampled following the procedures outlined in Appendix C. The water samples will be analyzed by a state certified laboratory for TPH and BTEX using DOHS methodology and/or EPA methods 602 or 8260.

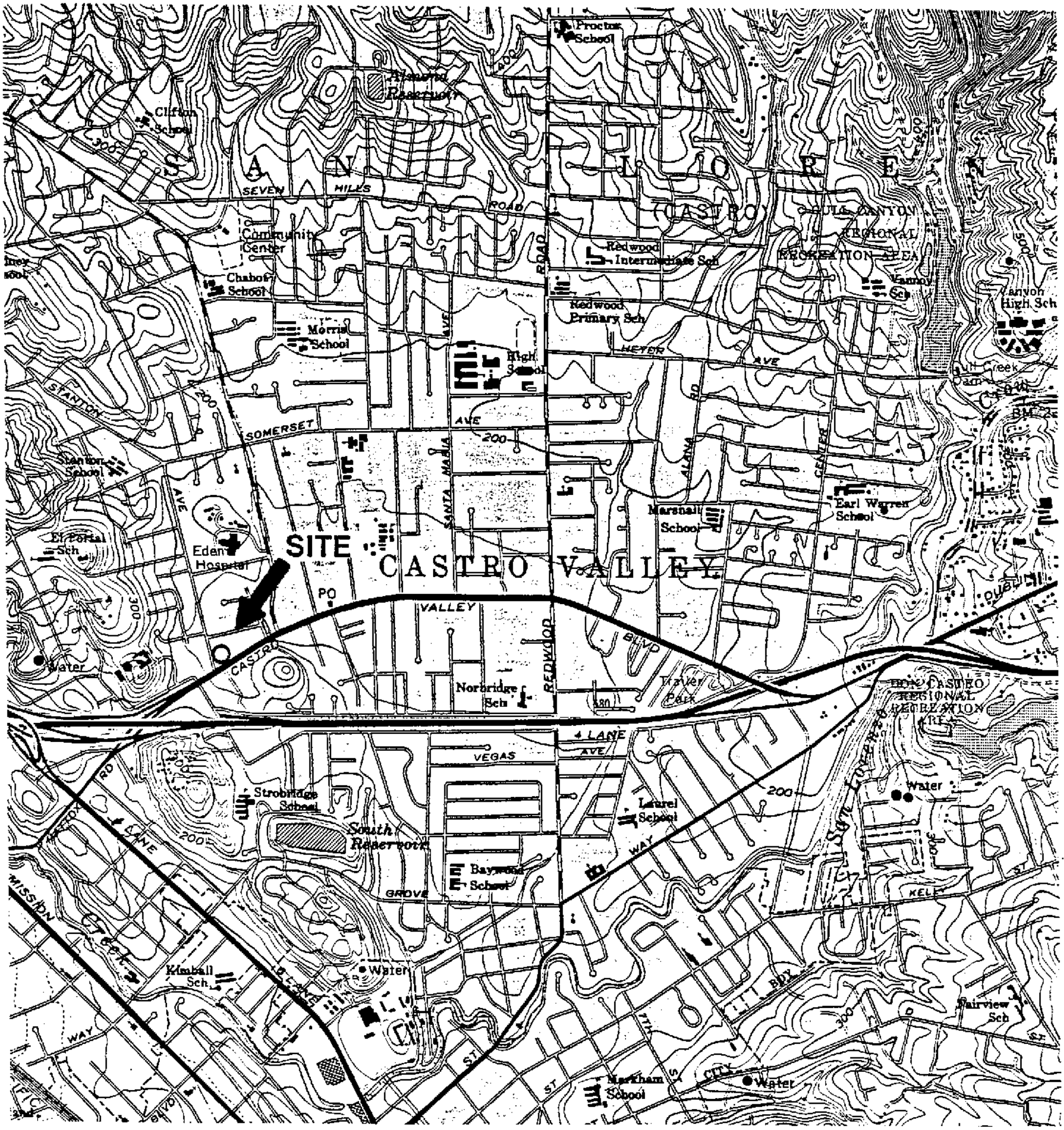
When the proposed work has been completed, a report will be submitted detailing the results. After the acceptance of this work plan, the work at the site will commence as soon as the necessary permits are obtained for drilling on Stanton Avenue and Castro Valley Boulevard. It is not known at this time just how long it will take to secure these permits.

Brian Mossman

Staff Geologist

Robert C. Michael

Registered Geologist No. 3849



A PORTION OF THE U.S.G.S. HAYWARD 7.5' QUADRANGLE

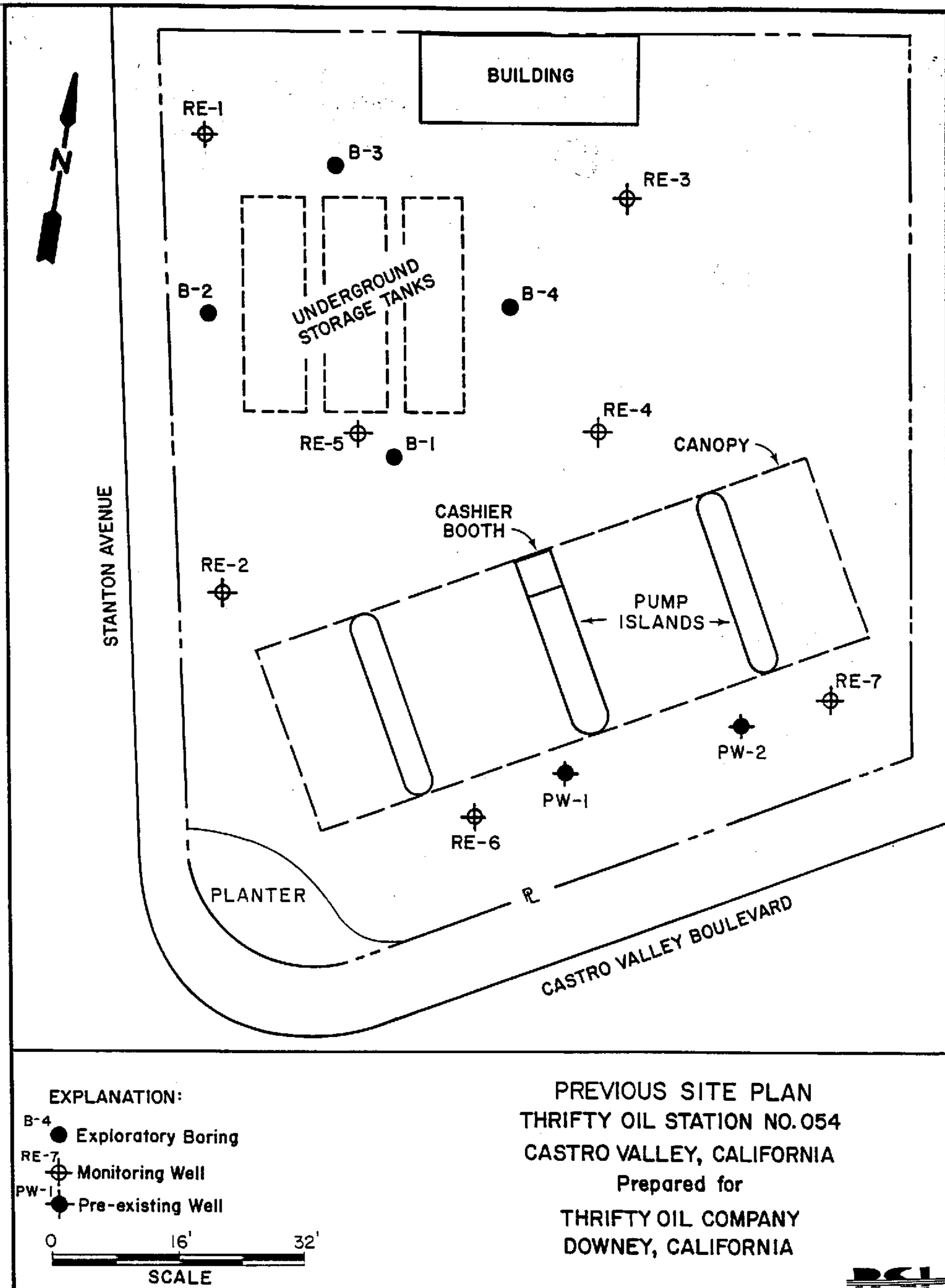
LOCATION MAP
THRIFTY OIL STATION NO. 054
CASTRO VALLEY, CALIFORNIA
Prepared for
THRIFTY OIL COMPANY
DOWNEY, CALIFORNIA

N

0 2000 4000

SCALE IN FEET

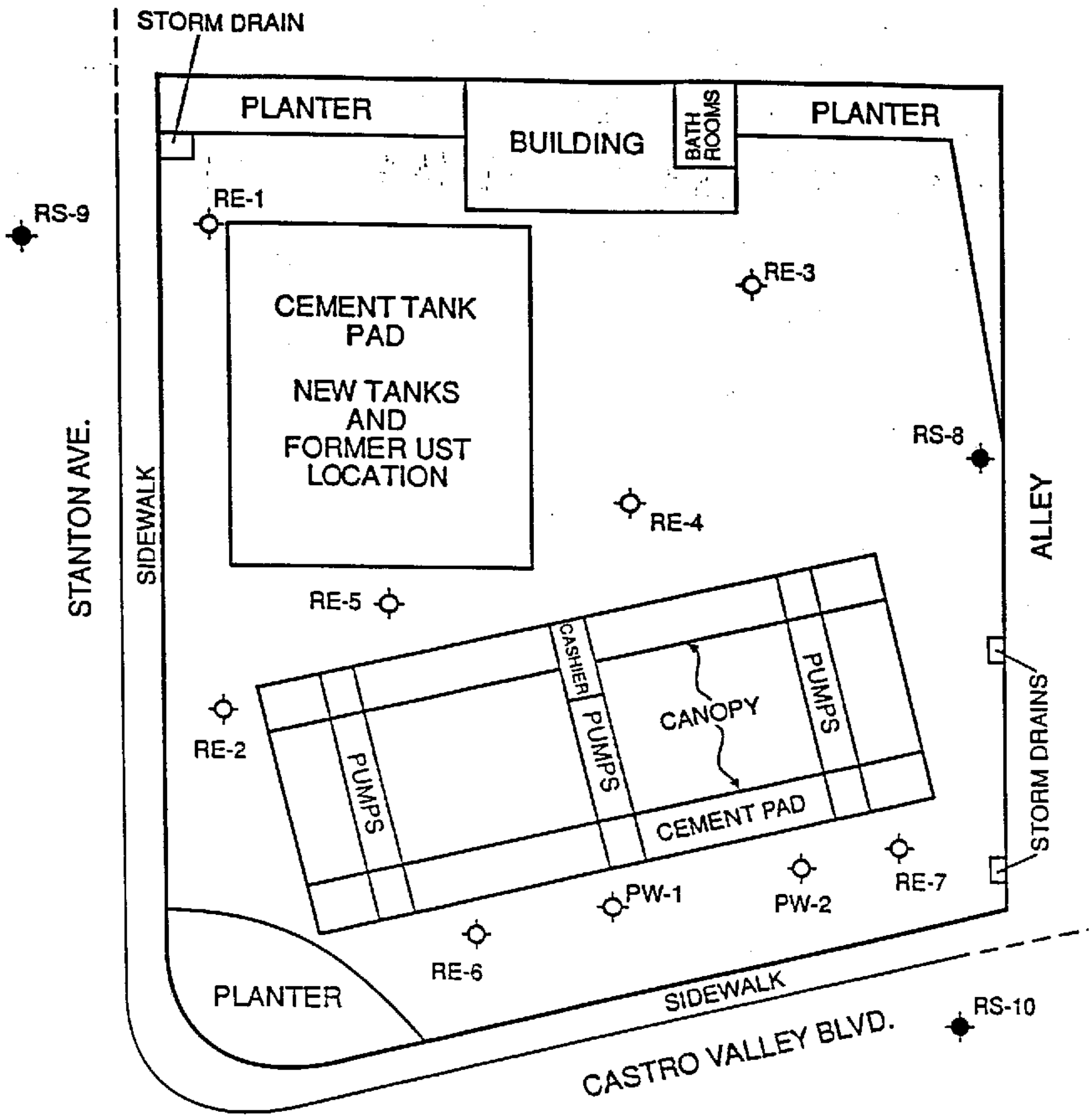
Figure I



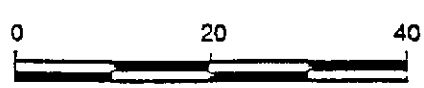
PREVIOUS SITE PLAN
THRIFTY OIL STATION NO. 054
CASTRO VALLEY, CALIFORNIA
Prepared for
THRIFTY OIL COMPANY
DOWNEY, CALIFORNIA

RSI

Figure 2

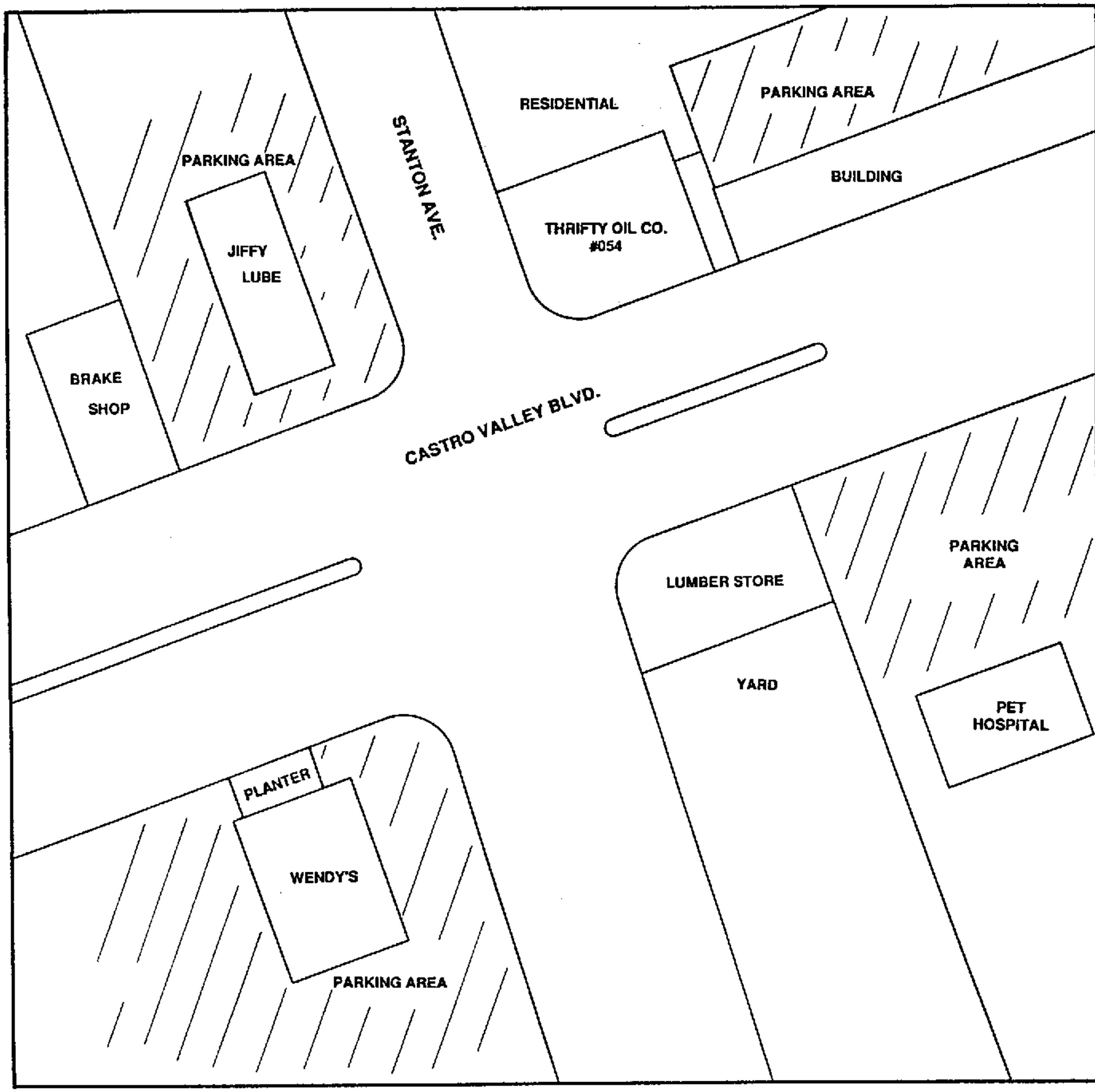


CURRENT SITE PLAN
THRIFTY OIL CO. #054
CASTRO VALLEY, CALIFORNIA
Prepared for
THRIFTY OIL CO.
DOWNEY, CALIFORNIA

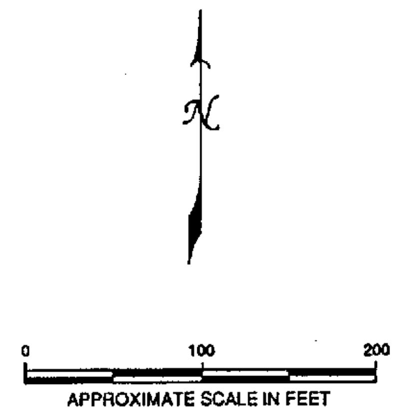


EXISTING MONITORING WELL
PROPOSED MONITORING WELL

FIGURE 3

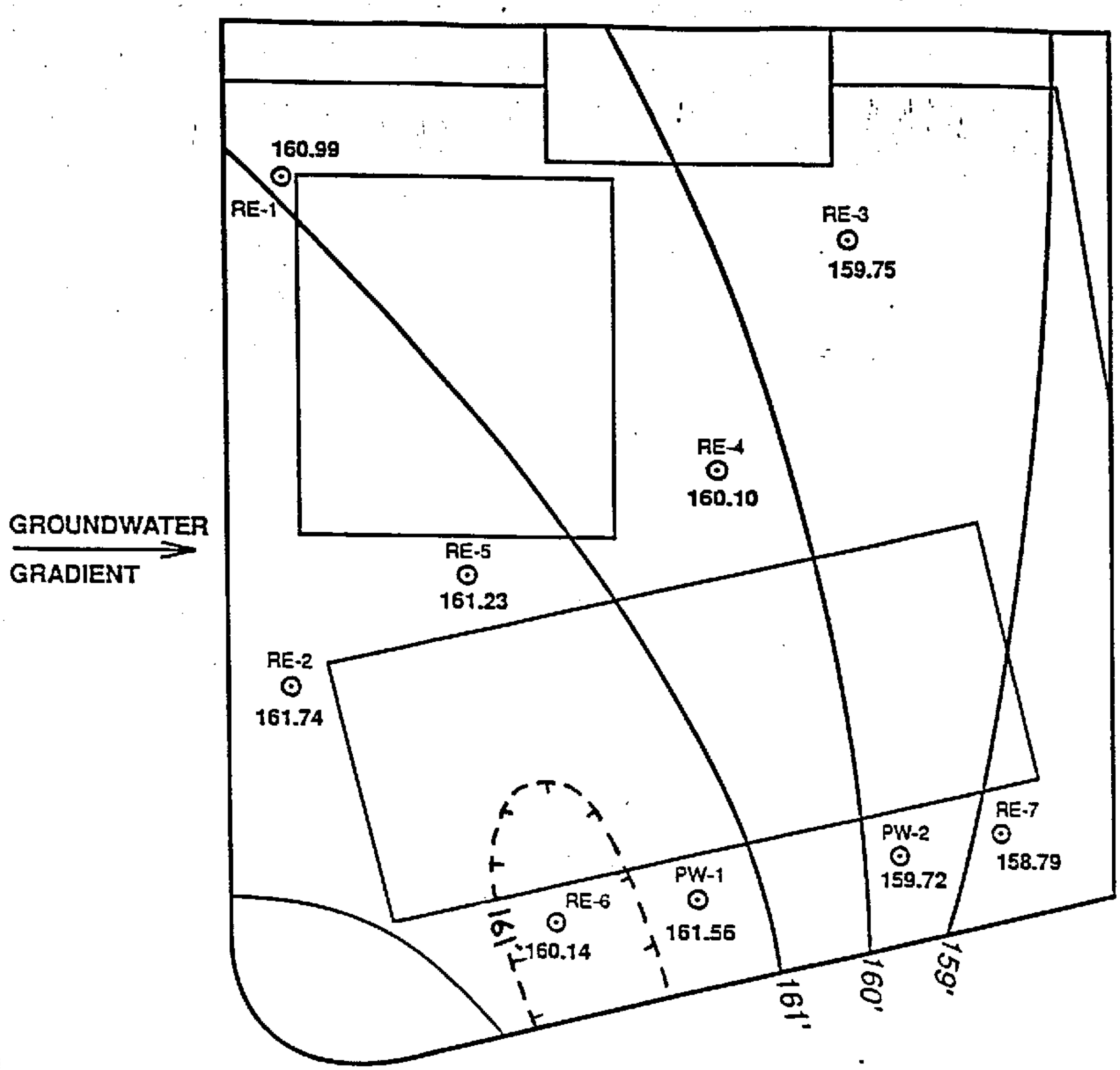


VICINITY MAP
THRIFTY OIL CO. STATION NO. 054
CASTRO VALLEY, CALIFORNIA
Prepared for
THRIFTY OIL CO.
DOWNEY, CALIFORNIA



RSI

Figure 4



WATER TABLE ELEVATION MAP

8-22-89

Elevation shown in feet above mean seal level

THRIFTY OIL CO. #054

CASTRO VALLEY, CALIFORNIA

Prepared for

THRIFTY OIL CO.

DOWNEY, CALIFORNIA

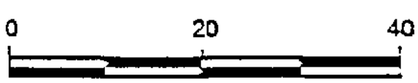


FIGURE 5

TABLE 1

Summary of Laboratory Results of Soil Samples
Thrifty Oil Company #054
Castro Valley, CA

All results reported in parts per million

Well	Depth	Benzene	Toluene	Ethylbenzene	Xylenes	TPH
B-1*	5'	--	--	--	--	230
B-1	10'	--	--	--	--	1120
B-1	20'	--	--	--	--	420
B-2	5'	--	--	--	--	320
B-2	15'	--	--	--	--	<1
B-3	5'	--	--	--	--	830
B-3	15'	--	--	--	--	<1
B-4	5'	--	--	--	--	850
B-4	15'	--	--	--	--	4
RE-1**	5'	10.0	92.0	27.0	180.0	1000.0
RE-1	10'	0.016	0.003	ND	0.005	ND
RE-2	5'	0.004	0.001	ND	ND	1.1
RE-2	10'	0.02	0.02	0.75	0.14	130.0
RE-3	5'	5.3	22.0	7.8	82.0	490.0
RE-3	10'	0.014	0.010	ND	0.013	0.1
RE-4	5'	13.0	120.0	44.0	410.0	1900.0
RE-4	10'	0.057	0.020	0.013	0.13	7.7
RE-5	5'	0.36	0.036	0.029	0.14	17.0
RE-5	10'	0.008	ND	0.007	0.017	3.0
RE-6	5'	0.033	0.003	0.010	0.025	1.2
RE-6	10'	0.025	0.002	0.004	0.005	0.6
RE-7	10'	1.3	2.9	0.6	7.0	50.0
RE-7	25'	0.57	0.05	0.08	0.37	110.0

TPH - total petroleum hydrocarbons (gasoline)
ND - not detected

* Samples for B-1 through B-4 were collected by Hydrotech, Inc., analyzed by the modified EPA method 418.1, results first reported January 14, 1987.

** Samples for RE-1 through RE-7 were collected by Robert Elbert & Associates, analyzed by the EPA method 8240, results first reported April 11, 1988.

TABLE 2

Summary of Laboratory Results for Groundwater Samples
Thrifty Oil Co. #054
Castro Valley, CA

Results are shown in parts per billion

Well	Benzene	Toluene	Ethylbenzene	Xylenes	TPH
RE-1	1.9	8.4	1.2	15.0	37.0
RE-3	6.6	5.3	0.8	13.0	70.0
RE-4	12.0	8.0	1.0	27.0	150.0
RE-5	1.3	1.1	0.1	2.6	14.0
RE-6	3.0	0.04	0.08	0.14	6.0
RE-7	17.0	4.4	0.6	8.4	<50.0

ND - not detected
TPH - total petroleum hydrocarbons (gasoline)

Samples collected by Robert Elbert & Associates, analyzed by EPA method 8240, first reported April 11, 1988.

TABLE 3

GROUNDWATER AND FREE PRODUCT DATA FOR
THRIFTY OIL CO. #054

Measurements are in feet and were taken on 8/22/89
Elevations are in feet above mean sea level

Well	Depth to Free Product	Depth to Water Table	Free Product Thickness	Corrected Depth to Water Table*	Well Head Elevation**	Water Table Elevation
RE-1	---	6.09	---	---	167.08	160.99
RE-2	---	5.47	---	---	167.21	161.74
RE-3	7.70	7.78	0.08	7.72	167.47	159.75
RE-4	6.87	6.97	0.10	6.90	167.00	160.10
RE-5	---	5.90	---	---	167.13	161.23
RE-6	---	6.61	---	---	166.75	160.14
RE-7	---	7.31	---	---	166.10	158.79
PW-1	5.02	5.04	0.02	5.02	166.58	161.56
PW-2	6.55	6.58	0.03	6.56	166.28	159.72

* Method used to correct depth to water table for free product is explained in Appendix D.

** Elevations referenced to RE-3. Elevation of RE-3 was determined during previous investigations.

REFERENCES

Hydrotech Consultants, Inc., January 14, 1987. Subsurface Investigation for Petroleum Hydrocarbon Contamination Assessment.

Robert Elbert and Associates, April 11, 1988. Report of Subsurface Investigation for Thrifty Oil Company #054.

DESCRIPTION OF BORING TECHNIQUES AND SAMPLING PROCEDURES

Under the supervision of a Remediation Service Int'l - (RSI) geologist, the soil borings are advanced using a truck mounted hollow-stem auger. Each auger flight is 5 feet in length with an inner diameter of 3.5 inches and an outer diameter of 8 inches. A pilot assembly, in conjunction with the auger head which is fitted with cutting blades, helps advance the auger through the soil and prevents solids from entering the hollow-stem portion of the auger. The hollow auger acts as a "temporary casing" preventing collapse of the borehole wall. Soil cuttings are carried up to the surface via the auger flights.

When the desired sample depth is reached, the drill bit and center plug are removed from the auger stem and replaced with a Modified California Split Spoon sampler. Usually, sampling is done at the end of each 5 foot auger flight. The sampler consists of an outer 12 to 18 inch long "split barrel" sampler in which a thin-walled set of rings is inserted. These rings are brass or stainless steel cylinders, each 2.0 to 3.25 inches in diameter and 3 to 6 inches long.

A 140 pound hammer is used to drive the sampler into the formation below the bottom of the auger flight, thereby filling all of the sampling rings with soil. This method allows for collection of an undisturbed soil sample, preventing introduction of overburden soil by the drilling process. The number of hammer blows (blows per foot, BPF) to advance the sampler a given distance is recorded on the boring log. This gives an indication of the amount of force required to recover the sample.

After retrieving and dismantling the sampler, all the thin tube rings are removed. The bottom ring is immediately sealed for laboratory analysis by covering both ends with teflon sheeting, plastic caps and securing the caps with tape. If some of the soil in the bottom ring has fallen out or appears to have been disturbed during the recovery operation, the second to last ring is used. This ring is labeled and placed in an ice chest for cold storage pending transportation to the laboratory. This packaging protocol is designed to prevent loss of volatiles from the soil sample, and to prevent any cross contamination. Standard chain of custody procedures are followed for all samples.

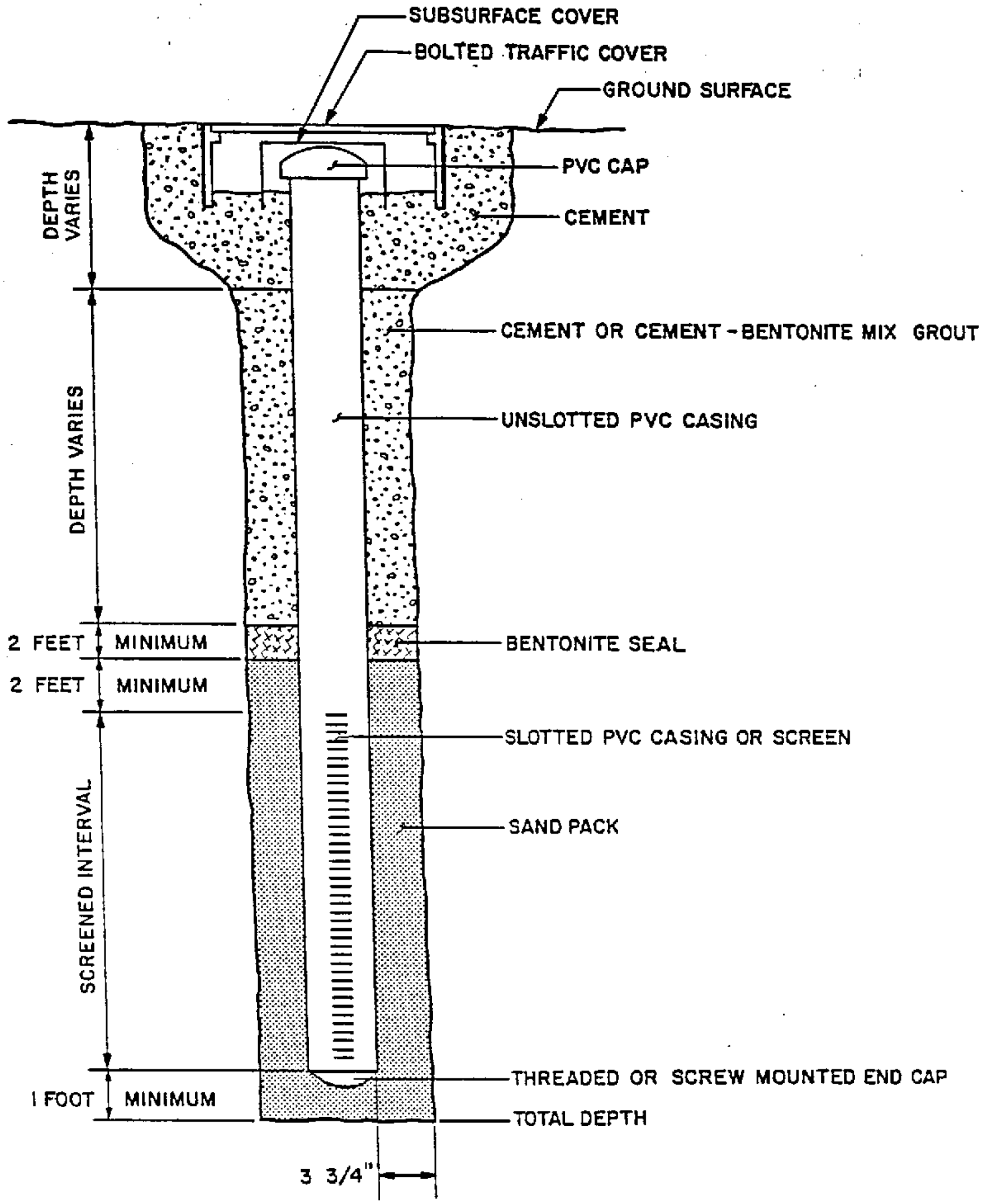
Soil from the second ring is used for field analysis of possible hydrocarbon contamination. The sample is placed in a Ziploc bag, sealed and allowed to volatilize for a HNU Photoionization Analyzer (PID) measurement. A head-space measurement is taken by breaking the seal just enough to insert the probe. The highest reading is recorded. However, if the reading stabilizes at a significantly different level, this also is noted. The PID has a detection range from 0.1 ppm to 2000 ppm for hydrocarbon vapors, when calibrated with a benzene standard.

Soils in the remaining rings are used for the field descriptions. The field data includes a written soils description, the Unified Soil Classification code, and any notable odors, staining or contamination. Also recorded are unusual drilling conditions, equipment malfunctions or other observations of field conditions for future reference. All data are included on the boring logs.

An alternative method to the use of brass rings is glass jars for sample collection. This method still utilizes the split spoon sampler, but no brass rings are inserted. Instead, soil from the base of the sampler is encapsulated in a glass jar. The jar is then treated in the same manner as soil samples in brass rings. The remaining soil in the sampler is used for field analysis and description.

To prevent any cross - contamination, the augers are steam cleaned prior to drilling each boring. The split spoon sampler is cleaned using a three step process commonly referred to as a "three bucket wash". This consist of first a trisodium phosphate wash, followed by a tap water rinse and finally a deionized water rinse. This process is completed between each sample run.

All cuttings and excess sample material recovered during the drilling operations are placed in 55 gallon DOT hazardous waste drums pending laboratory analysis results. Proper disposal is the client's responsibility.



NO SCALE
TYPICAL ONLY

TYPICAL MONITORING WELL CONSTRUCTION

SAMPLING PROCEDURES FOR GROUNDWATER MONITORING WELLS

1. Survey to top of casing from on site reference point for all wells if not already done.

2. Put down new polyethelyene sheeting around well. Designate a "clean" area for decontaminated equipment and a "dirty" area for equipment already used.

3. Measure depth to water and depth to product if present. Measure total depth of well with tape. If free product is present, collect sample with interface sampler - place in vial, label, store.

4. Bail 4-5 casing volumes of water with PVC bailer (.163 gallons per foot of depth for 2" wells, .653 gallons per foot with 4" well) discharge into plastic drum. When finished place bailer on "dirty " area to await decontamination procedure. If water is turbid, continue bailing until clean.

5. Put on surgical gloves and attach new, clean cord to sampling bailer.

6. Rinse sampling bailer and a few feet of the cord with distilled water. Collect sample by lowering bailer into well. Discharge into vial and fill to overflowing. Seal vial, label, place in plastic jar with carbon, seal with security tape, and store in small ice chest.

7. Secure well and cover.

8. Complete Field Data Sheet and pertinent data on chain of custody sheet.

9. Decontaminate water level probe and bailers or pumps with 3 bucket wash and place in clean poly bag.

10. Discard poly sheeting, bailer cords, and gloves.

Sample from the cleanest expected well first to the most contaminated well last.

When sample is withdrawn, be aware of any smoke, vapors, etc... from running engines, etc... that may contaminate the sample. Take at least one field blank per station. This is done by pouring laboratory-provided distilled water into a sample vial at the sampling site.

CORRECTION OF WATER TABLE MEASUREMENTS
FOR PRESENCE OF FREE PRODUCT

When free product (gasoline or oil) accumulates in a groundwater well, the measured water level needs to be corrected in order to determine the true water table elevation. The difference in specific gravity between water and the free product causes the water level in the well to be depressed, and the top of the free product to be elevated relative to the true water table elevation.

In addition to determining the depth to water and depth to free product, the specific gravity (SG) of the free product must be measured. Gasoline we have measured usually has a SG of 0.755. The formula for correcting the depth to water is:

$$CDTW = DTW - (DFP - DTW)\ (SG)$$

or:

$$CDTW = DTW - (T)\ (SG)$$

Where:

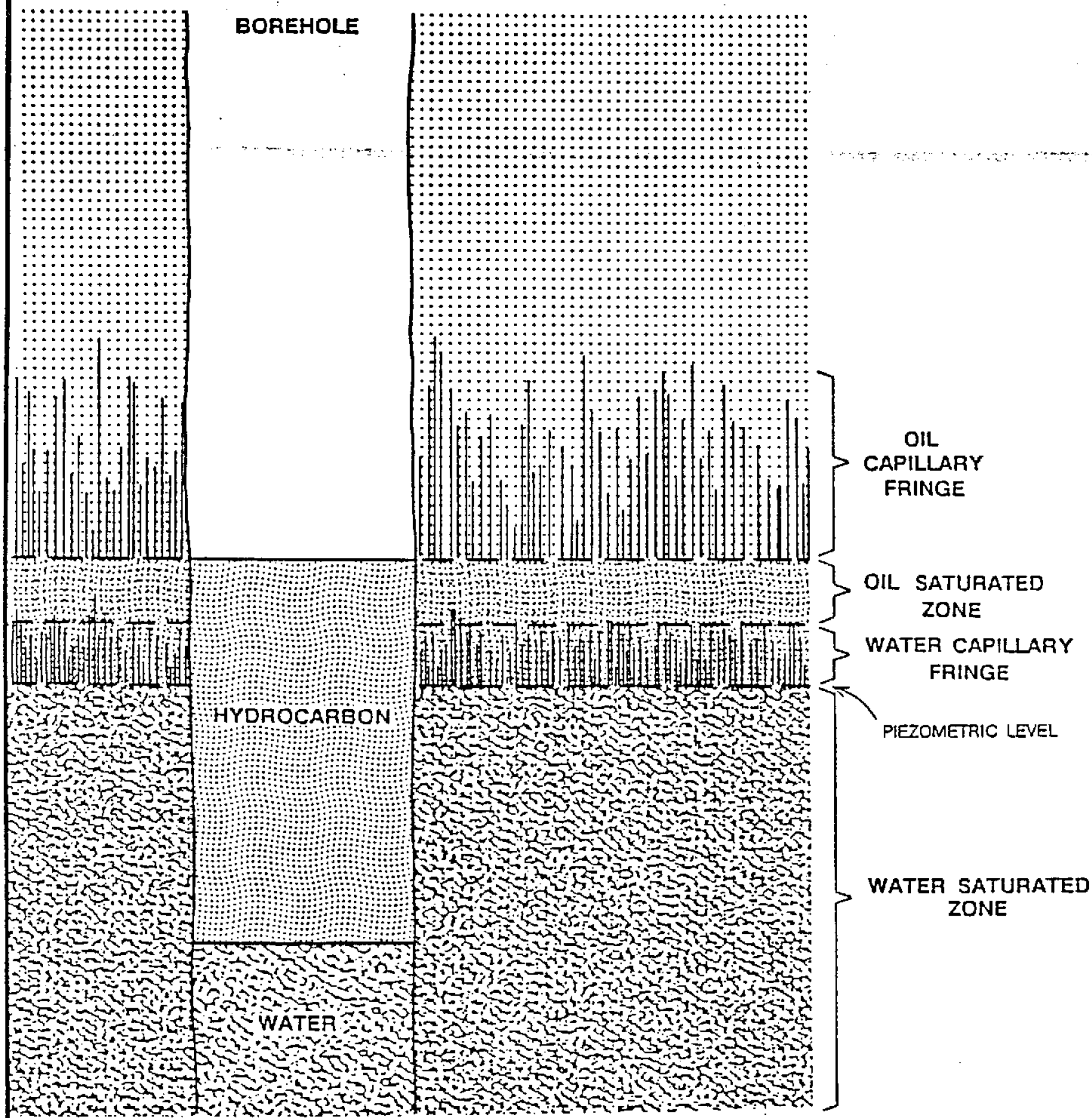
CDTW	=	Corrected Depth to Water
DFP	=	Measured Depth to Free Product
DTW	=	Measured Depth to Water
T	=	Product Thickness (DFP - DTW)
SG	=	Specific Gravity

The corrected water table elevation is obtained by subtracting the corrected depth to water from the measuring point elevation.

The hydrocarbon thickness measured in the well does not represent the actual thickness that is present in the formation. In most cases, the thickness of the free product layer in the formation is much smaller than that which accumulates in the well (Blake and Hall, 1984).

This difference is thought to be due to the effect of the interaction of the well with the capillary fringe of the water in the formation. Research has indicated that the free product in the formation is supported by the capillary fringe above the water table due to the immiscibility of oil and water. Installation of a monitoring well, however, destroys the capillary fringe of the water table and essentially creates a macropore in the formation (see figure).

Because the capillary fringe of the water table no longer exists, it doesn't support the free product and the oil or gasoline begins to migrate into the well. As free product depresses the water level in the well, it continues to flow into the well until equilibrium is established. Thus, a greater thickness of free product is measured in the well than actually exists in the formation. The finer grained the sediments, the greater the discrepancy between product thickness in the well and in the formation due to a thicker capillary fringe in finer sediments (Blake and Hall, 1984).



HYDROCARBON THICKNESS IN WELLS