20372

GeoStrategies Inc.

QUARTERLY GROUND-WATER SAMPLING REPORT

APRIL - JUNE 1989

Former Shell Service Station
15275 Washington Avenue
San Leandro, California

Report No. 7615-2

July 13, 1989

GeoStrategies Inc.
2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545
(415) 352-4800

July 13, 1989

Gettler-Ryan Inc.
1992 National Avenue
Hayward, California 94545

Attn: Mr. John Werfal

Re: QUARTERLY MONITORING REPORT
Former Shell Service Station
15275 Washington Avenue
San Leandro, California

Gentlemen:

This quarterly monitoring report has been prepared for the above referenced site, for the April through June, 1989 quarter.

If you have any questions, please call.

GeoStrategies Inc. by,

Jeffrey L. Peterson/CMP

Jeffrey L. Peterson
Senior Hydrogeologist
R.E.A. 1021

Christopher M. Palmer

Christopher M. Palmer
Senior Geologist
C.E.G. 1262, R.E.A. 285

JLP/CMP/kj

Report No. 7615-2

1.0 INTRODUCTION

This Quarterly Ground-water Sampling Report and related Site Activities have been prepared for the Shell Service Station located at 15275 Washington Avenue in San Leandro, California (Plate 1).

This report describes the results of the second quarterly ground-water sampling for 1989 performed by Gettler-Ryan Inc. (G-R), in accordance with the current quarterly monitoring plan for the site. In addition, this report summarizes field investigation activities performed at the site during this quarter. Five ground-water monitoring wells were installed on April 25 and 26, 1989 (Plate 1). Field and chemical analytical data discussed in this report were collected between April 1 and June 30, 1989.

2.0 SITE HISTORY

In June 1985, four ground-water monitoring wells (S-1 through S-4) were installed to assess soil and ground-water conditions beneath the site. Detected gasoline concentrations in ground-water samples collected from these wells ranged from 0.52 ppm to 32.0 parts per million (ppm). Well S-3 contained approximately 0.5 feet of separate-phase product. Soil samples taken from the borings contained gasoline concentrations ranging from none detected (ND) to 3,900 ppm. A report was prepared by EMCON Associates (EMCON) dated August 12, 1985.

In August 1986, four soil borings (S-A through S-D) were drilled within the underground gasoline storage tank complex prior to removal and replacement. Gasoline concentrations of soil samples ranged from ND to 1,700 ppm. Boring S-B was converted to a temporary tank back-fill monitoring well. Approximately 0.13 feet of separate-phase product was measured in S-B. Boring S-A was drilled adjacent to the former waste oil tank. No waste oil was detected in analyzed soil samples. A report for this work was prepared by EMCON dated September 12, 1986.

In December 1986, one additional ground-water monitoring well (S-5) was installed adjacent to the former waste oil tank. Detected gasoline and benzene concentrations in ground-water samples collected from S-5 were 7.8 ppm and 0.38 ppm, respectively. A report was prepared by EMCON dated January 28, 1987.

In February 1987, a one mile radius well survey was conducted by EMCON. A map and table of findings are attached (Appendix E).

2.0 SITE HISTORY (continued)

In June 1987, the existing underground gasoline storage tanks were removed. The temporary tank backfill Well S-B was also removed during construction. All site wells were inaccessible from June to August of 1987, due to construction activities. Wells S-2 and S-4 were destroyed during the tank removal and replacement project.

In July 1987, a work plan was prepared by Pacific Environmental Group Inc. (PEG), recommending the installation of additional wells to further assess the extent of hydrocarbons in soils and groundwater.

In October 1988, a soil gas survey was conducted by Tracer Research Corporation at 15 selected off-site soil gas locations on Lewelling Boulevard and in a nearby mobile home park west and south of the site. The highest soil vapor concentrations were detected to the south of the site in Lewelling Boulevard (See Appendix C for Soil Vapor Map).

In November 1988, seven ground-water monitoring wells (S-6 through S-12) were installed on and off-site. In addition, G-R began quarterly sampling of all wells at this time. Gasoline concentrations in ground-water samples ranged from ND (S-1) to 70 ppm (S-3). Benzene concentrations ranged from ND (S-1) to 4.6 ppm (S-3). Gasoline concentrations in soil samples ranged from ND (S-6-10', S-8-14', S-10-4', S-10-9', S-11-9') to 5,600 ppm (S-8-4'). Benzene concentrations ranged from ND (S-6-9', S-7-4', S-10-4', S-10-9', S-11-9') to 31 ppm (S-8-4').

In April 1989, Wells S-13 through S-17 were installed by GeoStrategies, Inc. (GSI). Geologic and chemical data are present in this report.

3.0 GROUNDWATER LEVEL MONITORING

3.1 Potentiometric Data

Prior to ground-water sampling, static water-levels were measured in each well using an electric well sounder (Table 1). Static water-levels were measured from the surveyed top of well box and recorded to the nearest $\pm$0.01 foot.

Ground-water elevation data for this quarter have been plotted and contoured and is presented as Plate 2. Water-level data used to prepare the potentiometric map for this quarter were collected on May 3 and 4, 1989.

TABLE 1

GROUND-WATER ANALYSIS DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	ETHYLBENZENE (PPM)	TOLUENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-1	04-May-89	11-May-89	ND	0.001	ND	ND	ND	21.55	14.21	----	7.34
S-3	04-May-89	17-May-89	47.	4.4	2.4	6.3	15.	21.14	14.07	----	7.07
S-5	04-May-89	11-May-89	9.	3.	0.63	0.6	1.7	21.41	13.86	----	7.55
S-6	04-May-89	10-May-89	ND	ND	ND	ND	ND	22.02	14.13	----	7.89
S-7	04-May-89	10-May-89	ND	ND	ND	ND	ND	21.47	13.99	----	7.48
S-8	03-May-89	10-May-89	ND	0.0075	0.002	ND	ND	20.72	13.69	----	7.03
S-9	03-May-89	10-May-89	2.6	0.47	0.24	0.01	0.48	20.96	13.93	----	7.03
S-10	03-May-89	10-May-89	0.22	ND	0.002	0.001	0.007	20.86	13.76	----	7.10
S-11	03-May-89	17-May-89	ND	ND	ND	ND	ND	21.26	13.41	----	7.85
S-12	03-May-89	11-May-89	ND	ND	ND	ND	ND	21.05	13.60	----	7.45
S-13	03-May-89	10-May-89	0.15	0.0049	0.002	0.004	0.014	20.57	13.42	----	7.15

TPH = Total Petroleum Hydrocarbons as Gasoline
PPM = parts per million
ND = None Detected
SF = Field Blank
SD = Duplicate Sample

CURRENT DEPARTMENT OF HEALTH SERVICES ACTION LEVELS
Benzene 0.0007 ppm
Toluene 0.100 ppm
Xylenes 0.620 ppm
Ethylbenzene 0.680 ppm

Note: 1. For chemical parameter detection limits, refer to I.T. laboratory reports in Appendix B
2. Water level elevations referenced to mean sea level

Project No. 7615-1

TABLE 1

GROUND-WATER ANALYSIS DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	ETHYLBENZENE (PPM)	TOLUENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-14	03-May-89	10-May-89	5.3	0.75	0.2	0.4	0.8	20.44	13.70	----	6.74
S-15	03-May-89	11-May-89	ND	ND	ND	ND	ND	22.22	14.25	----	7.97
S-16	04-May-89	19-May-89	0.38	0.044	0.002	0.003	0.04	21.82	14.25	----	7.57
S-17	03-May-89	10-May-89	ND	ND	ND	ND	ND	20.95	13.65	----	7.30
SD-8	03-May-89	11-May-89	ND	0.0052	0.002	ND	ND	----	----	----	----
SD-14	03-May-89	10-May-89	5.	0.72	0.1	0.4	0.7	----	----	----	----
SF-9	03-May-89	11-May-89	ND	ND	ND	ND	ND	----	----	----	----
SF-17	03-May-89	09-May-89	ND	ND	ND	ND	ND	----	----	----	----
TB	03-May-89	09-May-89	ND	ND	ND	ND	ND	----	----	----	----

Project No. 7615-1

3.2 Separate Phase Hydrocarbon Measurements

Each well was monitored for separate phase petroleum hydrocarbon using a portable oil-water interface probe and was measured to the nearest ±0.01 foot. Separate phase product was not observed in any wells during this quarter ground-water sampling. Refer to historical ground-water monitoring data in Appendix C for past occurrence of separate-phase product.

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected from site monitoring wells by G-R on May 3 and May 4, 1989. The ground-water samples were analyzed for Total Petroleum Hydrocarbons (calculated as gasoline) according to EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) according to EPA Method 8020. All samples were analyzed by the California Department of Health Services State Certified Laboratory International Technologies (IT).

A total of nine wells were found to contain aromatic fractions of petroleum hydrocarbon products above established action levels set by the State of California Department of Health Services (DHS). As shown on Table 1, benzene concentrations were identified in ground-water samples above DHS action levels in monitoring wells S-1, S-3, S-5, S-8, S-9, S-13, S-14, and S-16. Benzene concentrations detected were identified in Wells S-1 (0.0010 ppm), S-3 (4.4 ppm), S-5 (3.0 ppm), S-8 (0.0075 ppm), S-9 (0.47 ppm), S-13 (0.0049 ppm), S-14 (0.75 ppm), and S-16 (0.044 ppm). TPH and benzene isoconcentration maps prepared for this quarter are presented on Plates 3 and 4, respectively.

4.1 Quality Control

Quality Control (QC) samples for this quarter ground-water sampling included a trip blank, field blank, and a duplicate sample. The trip blank was prepared in the IT Laboratory using organic-free water to evaluate laboratory handling and analytical procedures. Two field blanks were poured in the field using laboratory prepared organic-free water to assess sampling procedures. Two duplicate samples were collected as a split (second sample) to quantitatively assess laboratory procedures and analytical results. The IT Laboratory chemical analytical reports for this quarter ground-water sampling are presented in Appendix B. G-R Groundwater Sampling Forms and Chain-of-Custody Forms are included in the Ground-Water Sampling Report presented in Appendix B. G-R Sampling Protocol are presented in Appendix A.

4.1 Quality Control (continued)

Water-quality data for this quarterly report are summarized in Table 1. TPH and benzene chemical analytical data were used to prepare a concentration map for this quarter (Refer to Plates 3 and 4).

5.0 GROUNDWATER MONITORING WELL PROCEDURES

Five ground-water monitoring wells were installed by GSI on April 25 and 26, 1989. The Field Methods and Procedures used by GSI are presented in Appendix A. A total of 25 soil samples were collected using a modified California split-spoon sampler fitted with brass tube liners. A GSI geologist supervised the drilling, described soil samples using the Unified Soil Classification System, and prepared a lithology log for each boring. The exploratory boring logs are presented in Appendix D.

Selected samples were collected in four-inch long, two-inch diameter clean brass liners within the sampler. The sample liners retained for laboratory analysis were prepared by wrapping the ends of the liner with aluminum foil and sealing each tube with plastic end caps. The samples were labeled, entered on a Chain-of-Custody form and transported on blue ice in a cooler to IT laboratory in San Jose, California.

5.1 Monitor Well Construction

Monitor wells S-13 through S-17 were installed to a total depth of approximately 24 feet. The wells were constructed using 3-inch-diameter, Schedule 40 PVC casing and 0.020-inch factory slotted well screen. The well screens were placed from 4 to 24 feet, and extended five feet above the static water level. Lonestar 2/12 sand was placed in the annular space across the entire screened interval to one foot above the top of the screen. A 0.5 foot bentonite seal was placed from 3.5 to 4.0 feet, followed by a concrete grout seal from 3.5 feet to just below ground surface. A water-proof well plug, locking well cap, and a traffic-proof Christy Box were installed to safeguard the well. Well Construction details for Wells S-13 through S-17 are contained in Appendix D.

6.0 RESULTS

6.1 Hydrogeologic Conditions

The lithology at the site consisted primarily of clays, silty clays and sandy silts to the total depth explored of 25.5 feet. Generally, the site is underlain by clays and silt with interbedded sand and gravel units throughout the entire section explored (Plate 5). A thin 0.5 to 2-foot silty sand/sandy silt layer was observed in all borings at approximately ten feet below ground surface except S-16. Ground-water was first encountered at about 18 to 19 feet. Ground-water levels stabilized at about 9 feet. Elevated OVM readings were observed in the retrieved five-foot samples. OVM readings in S-13 through S-16 ranged from 55 to 560 ppm. Chemical odors were noted in all borings.

6.2 Soil Sample Analytical Results

Soil samples collected from borings S-13 through S-17 were analyzed for TPH (calculated as gasoline) and BTEX. The State-Certified analytical laboratory that performed gas chromatography analysis on the soil samples was IT, of San Jose, California. Chemical analytical reports for soil samples are presented in Appendix B.

Soil samples analyzed from Borings S-13, S-14, and S-16 detected benzene concentrations ranging from 0.19 ppm (S-13) to 3 ppm (S-16). Detectable TPH concentrations were identified in S-13, S-14, S-16, and S-17 ranging from 13 ppm (S-17) to 1,100 ppm (S-16). Chemical analytical results for soil samples are shown on Table 2.

TABLE 2

SOIL SAMPLE ANALYSIS DATA

BORING NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	ETHYLBENZENE (PPM)	TOLUENE (PPM)	XYLENES (PPM)
S-13-5'	26-Apr-89	02-May-89	31.	0.19	0.6	0.2	0.3
S-14-5'	26-Apr-89	02-May-89	16.	0.33	0.3	0.1	1.6
S-15-5'	26-Apr-89	02-May-89	ND	ND	ND	ND	ND
S-16-5'	25-Apr-89	02-May-89	1,100.	3.	24.	12.	110.
S-17-5'	25-Apr-89	02-May-89	13.	ND	ND	ND	ND

TPH = Total Petroleum Hydrocarbons as Gasoline
PPM = parts per million
ND = None Detected

Note: 1. For chemical parameter detection limits, refer to I.T. laboratory reports i

7.0 SUMMARY

A summary of activities and findings associated with this quarterly report are present below:

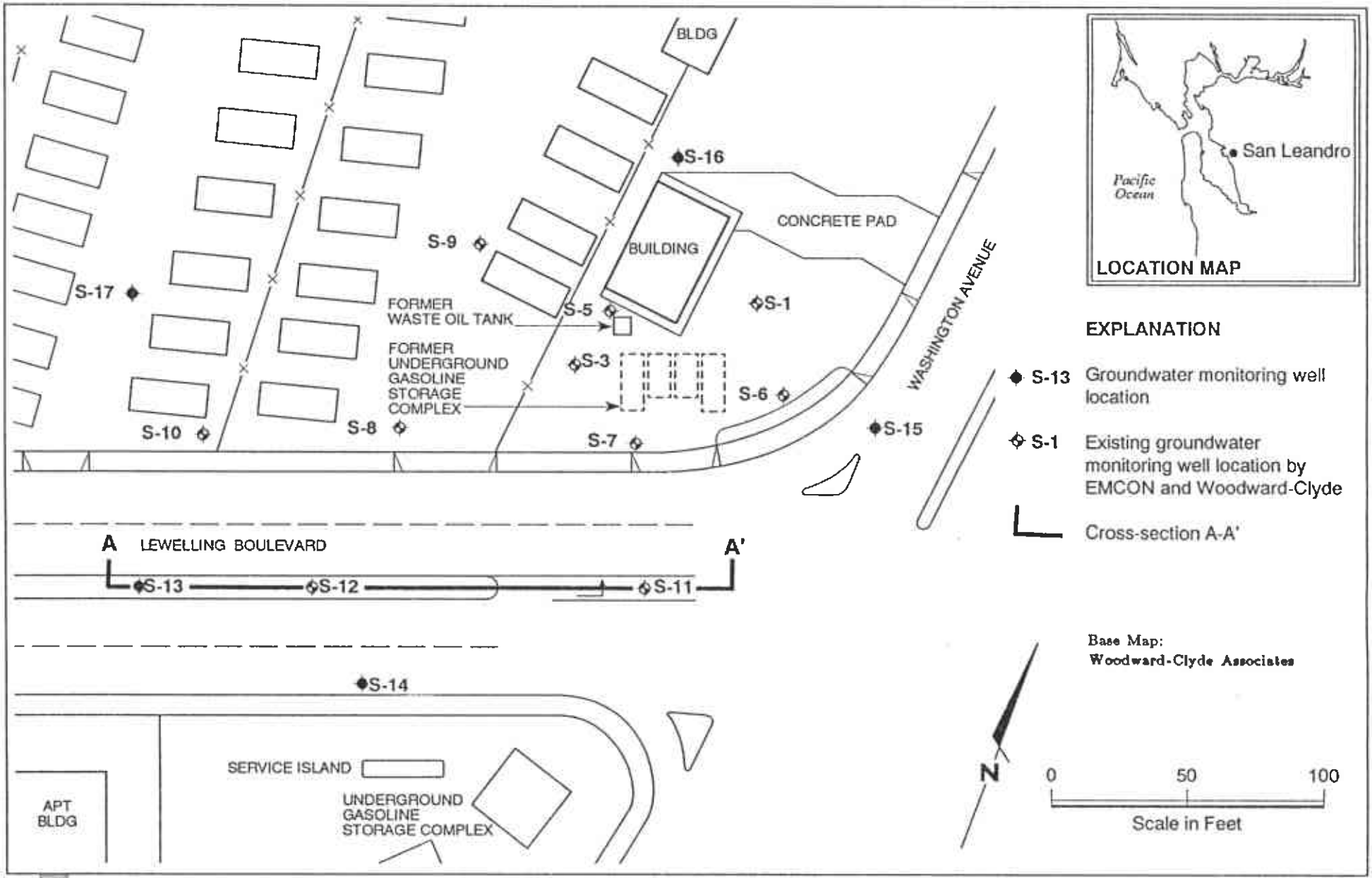
- Ground-water levels were measured in selected monitoring wells (Table 1). A potentiometric map was constructed from static water level data (Plate 2).
- Ground-water TPH concentrations ranged from ND to 47 ppm.
- Ground-water Benzene concentrations ranged from ND to 4.4 ppm.
- Five additional ground-water monitoring wells were installed. Wells S-13, S-14, and S-16 contain concentrations of benzene above current DHS action levels.
- Future scopes of work at this site will be proposed in a separate document and implemented under a site-specific work plan.

8.0 PLANNED SITE ACTIVITIES

The following activities are planned for the third quarter, July through September 1989, at the site:

- All scheduled wells will be sampled and analyzed for Total Petroleum Hydrocarbons (TPH) according to EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) according to EPA Method 8020.
- Ground-water levels will be measured bimonthly (every two weeks) and selected data will be used to prepare a potentiometric map across the site. The local ground-water gradient will be calculated.
- Ground-water chemical data will be used to construct isoconcentration maps for TPH and Benzene.

ILLUSTRATIONS

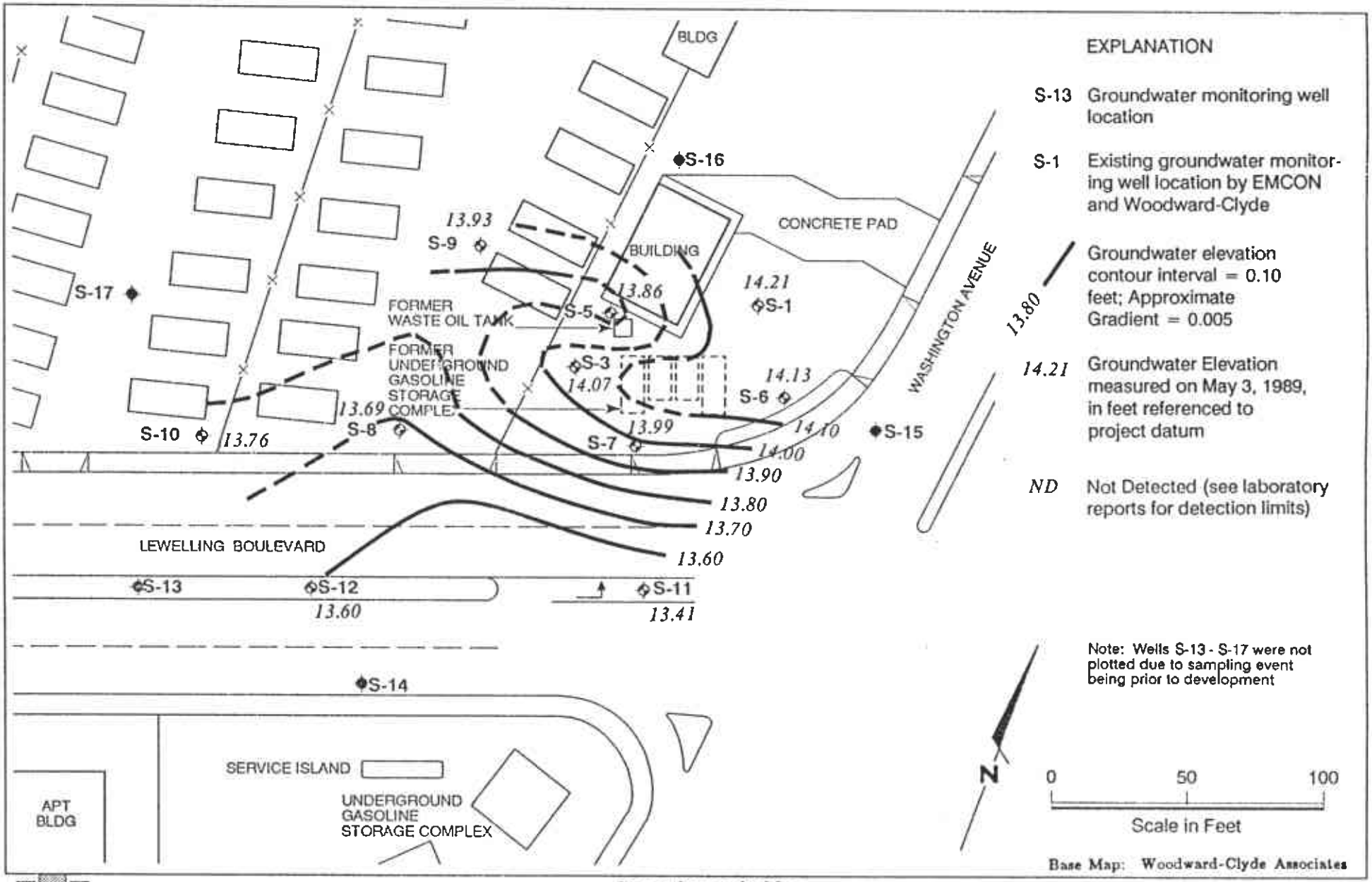


GeoStrategies Inc.

Site Plan
Former Shell Service Station # 1093
15275 Washington Avenue
San Leandro, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CWP CEG 1262	6/89		

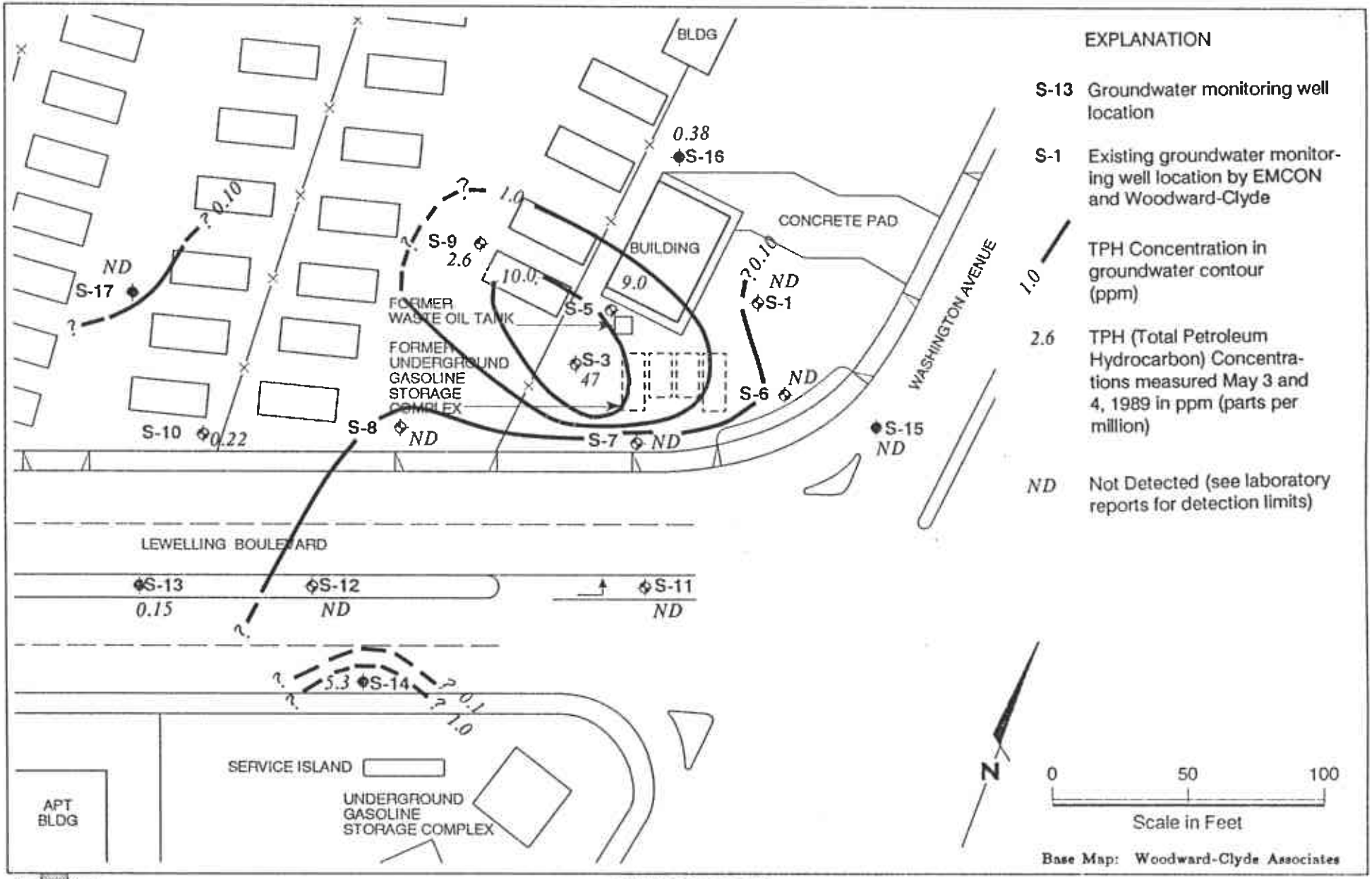


GeoStrategies Inc.

Potentiometric Map
Former Shell Service Station # 1093
15275 Washington Avenue
San Leandro, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CMP CEG 1262	6/89		

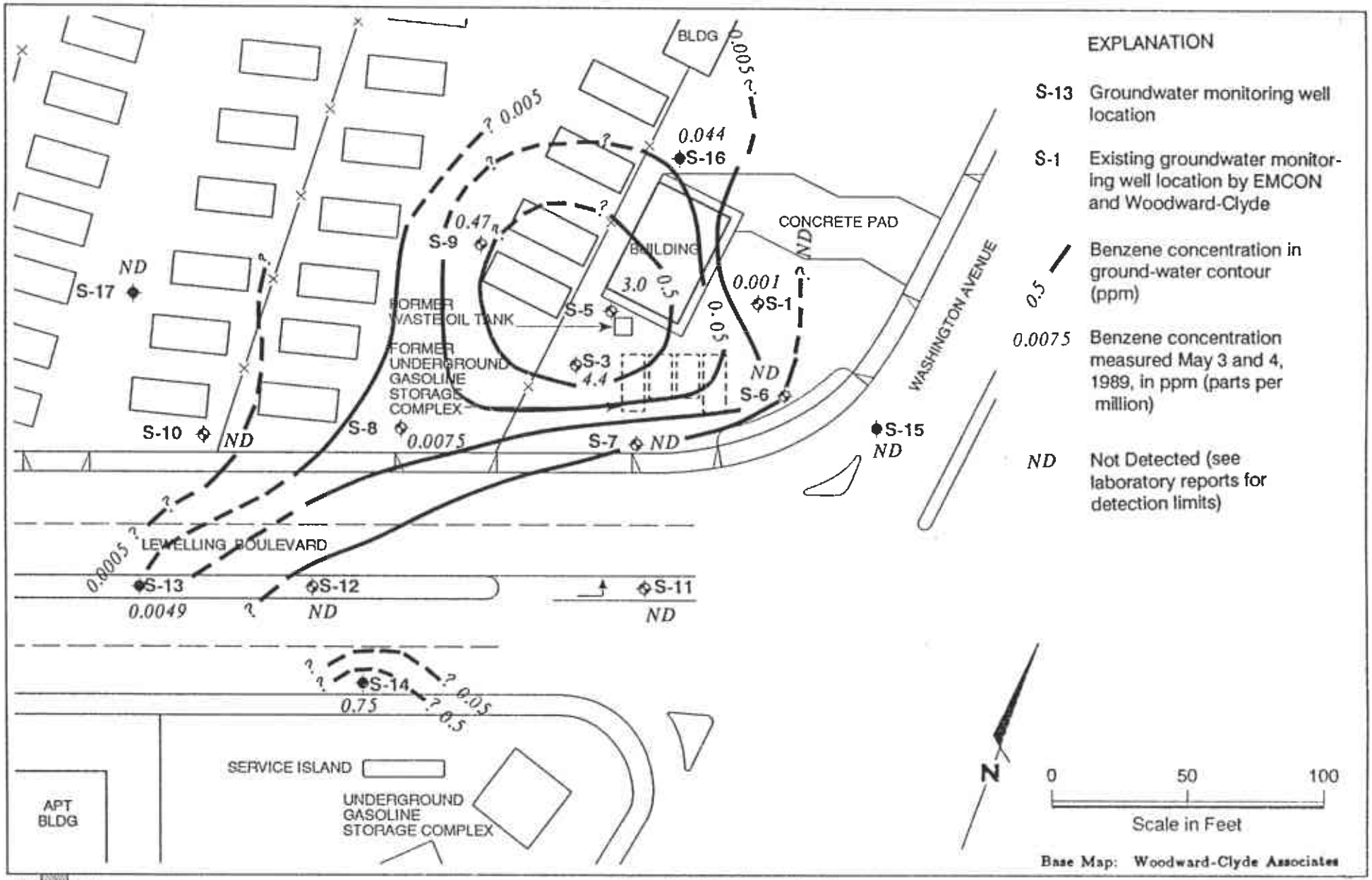


GeoStrategies Inc.

TPH Isoconcentration Map
Former Shell Service Station # 1093
15275 Washington Avenue
San Leandro, California

PLATE
3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	Dwp CEG 1262	6/89		

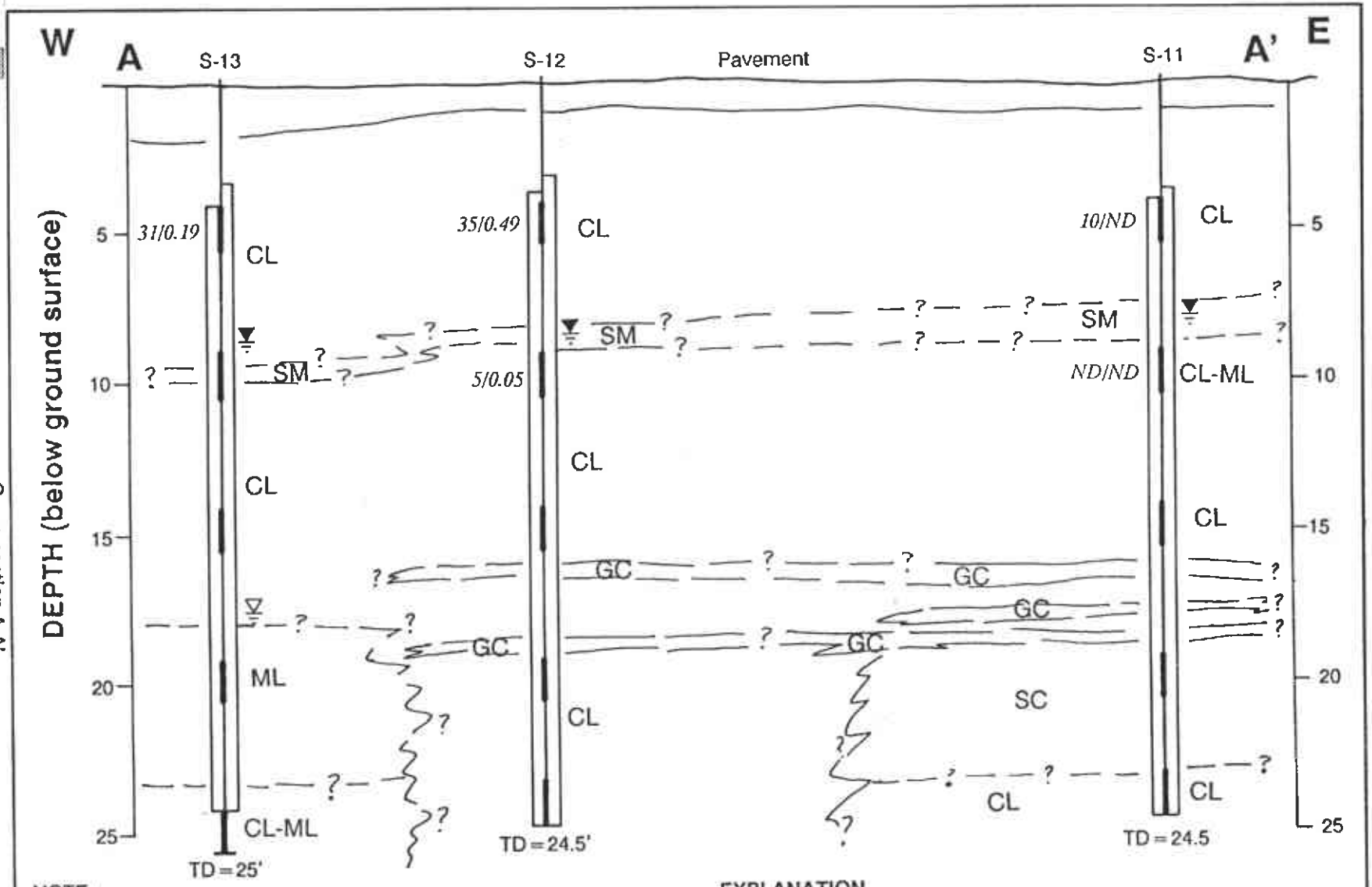


GeoStrategies Inc.

Benzene Isoconcentration Map
Former Shell Service Station # 1093
15275 Washington Avenue
San Leandro, California

PLATE
4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CWP CEG 1262	6/89		



NOTE:

1) General Stratigraphic relationships are displayed. Additional horizontal and vertical variations may exist.

2) Refer to boring logs for descriptions of each soil type.

EXPLANATION

31/0.19 = TPH/Benzene concentrations (see laboratory analytical results)

▽ = First encountered groundwater level

▼ = Static water level (measurements taken 4/26/89)

Well screen interval — Sandpack interval — Sample interval

Horz. Scale: 1" = 30'
Vert. Scale: 1" = 5'

GeoStrategies Inc.

Cross-section A-A'
Former Shell Service Station #1093
15275 Washington Avenue
San Leandro, California

JOB NUMBER 7615
REVIEWED BY RG/CEG
DATE 6/89
REVISED DATE
REVISED DATE
PLATE 5

APPENDIX A

METHODS AND PROCEDURES

FIELD METHODS AND PROCEDURES

EXPLORATION DRILLING

Mobilization

Prior to any drilling activities, GSI will verify necessary drilling permits have been secured.

Utility locations will be located and drilling will be conducted so as not to disrupt activities at a project site. GSI will obtain and review available public data on subsurface geology and if warranted, the location of wells within a quarter-mile of the project site will be identified. Drillers will be notified in advance so that drilling equipment can be properly inspected prior to performing work.

Drilling

The subsurface investigations are typically performed to assess the lateral and vertical extent of petroleum hydrocarbons present in soils and ground water. Drilling methods will be selected to optimize field data requirements as well as be compatible with known or suspected subsurface geologic conditions.

Soil Sampling

Shallow soil borings will be drilled using a truck-mounted hollow-stem auger drilling rig, unless site conditions favor a different drilling method. Drilling and sampling methods will be consistent with ASTM Method D-1452-80. The auger size will be a minimum 6-inch nominal outside-diameter O.D. No drilling fluids will be used during this drilling method. The augers and other tools used in the bore hole will be steam cleaned before use and between borings to minimize the possibilities of cross-contamination between borings.

Soil Sampling (continued)

Soil samples are typically collected at 5-foot intervals as a minimum from ground surface to total depth of boring. Additional soil samples may be collected based on significant lithologic changes and/or potential chemical content. Soil samples from each sampling interval will be lithologically described by a GSI geologist.

Head-space analyses will be performed to check for the presence of volatile organic compounds. Head-space analyses will be performed using an organic vapor analyzer; either an OVA, HNu, or OVM. Organic vapor concentrations will be recorded on the GSI field log of boring (Figure 1). The selection of soil samples for chemical analysis are typically based on the following criteria:

1) Soil discoloration
2) Soil odors
3) Visual confirmation of chemical in soil
4) Depth with respect to underground tanks
5) Depth with respect to ground water
6) OVA reading

Soil samples (full brass liners) selected for chemical analysis are covered with aluminum foil and the ends are capped to prevent volatilization. The samples are labeled and entered onto a Chain-of-Custody form, and placed in a cooler on blue ice for transport to a State-certified analytical laboratory.

Soil cuttings are stock-piled on-site. A composite sample is collected and analyzed for site-specific chemical parameters. Disposition of soils is dependent of chemical analytical results of the composite sample.

Soil borings are backfilled (sealed) to ground surface using either a neat cement or cement-bentonite grout mixture.

Exploratory boring logs are prepared under the direction of registered geologist.

Monitor Well Installation

Monitoring wells are installed using a truck-mounted hollow-stem auger drill rig or mud-rotary drill rig. Typically, the hollow-stem rig is used for wells up to 100 feet, if subsurface conditions are favorable. Wells greater than 100-feet deep are typically drilled using mud-rotary techniques.

Monitoring well casing and screen will be constructed of Schedule 40, flush-joint threaded polyvinylchloride (PVC). The well screen will be factory mill-slotted unless additional open area is required (eg. conversion to an extraction well in a low-yield aquifer). The screen length will be placed adjacent to the aquifer material to a minimum of 2-feet above encountered water. No screen shall be placed in a borehole that creates hydraulic interconnection of two or more aquifer units. Screen slot size will be compatible with encountered aquifer materials.

Monitoring wells will be completed below grade (Figure 2) unless special conditions exist that require above-grade completion design. In the event a monitoring well is required in an aquifer unit beneath an existing aquifer, the upper aquifer will be sealed off by installing a steel conductor casing with an annular neat cement or cement-bentonite grout seal. This seal will be tremied pumped from the bottom of the annulus to ground surface.

The monitoring well sand pack will be placed adjacent to the entire screened interval and will extend a recommended minimum distance of 2-feet above the top of the screen. No sand pack will be placed that interconnects two or more aquifer units. A minimum 2-foot bentonite pellet or bentonite slurry seal will be placed above the sand pack. Sand pack, bentonite, and cement seal levels will be confirmed by sounding the annulus with a calibrated weighted tape. The remaining annular space above the bentonite seal will be grouted with a bentonite-cement mixture and will be placed from the bottom of the annular space to the ground surface. The bentonite content of the grout will not exceed 5 percent by weight. A field log of boring and a field well completion form will be prepared by GSI for each well installed.

Decontamination of drilling equipment will consist of steam cleaning, and/or Alconox wash.

Well Development

Monitoring wells will be developed using a submersible pump, bladder pump or bailer. All well developing equipment will be decontaminated prior to development using a steam cleaner and/or Alconox detergent wash. Wells will be developed until discharge water is visibly clear and free of sediment. The adequacy of well development will be assessed by the GSI geologist. Indicator parameters (pH, specific conductance, and temperature) will be monitored and recorded during well development. Field instrument calibrations will be performed according to manufacturer's specifications.

Well Surveying

Monitoring wells will be surveyed to obtain top of box elevations to the nearest $\pm$0.01 foot. Water level measurements will be recorded to the nearest $\pm$0.01 foot and referenced to either a project site datum or mean sea level (MSL). A project site datum is typically used for the initial three wells installed at a site to obtain ground-water flow direction and gradient. If additional wells are required, existing and newly installed wells are surveyed relative to MSL.

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

The sampling and analysis procedures employed by Gettler-Ryan Inc. (G-R) for ground-water sampling and monitoring follow specific Quality Assurance/Quality Control (QA/QC) guidelines. Quality Assurance objectives have been established by G-R to develop and implement procedures for obtaining and evaluating water quality and field data in an accurate, precise, and complete manner so that sampling procedures and field measurements provide information that is comparable and representative of actual field conditions. Quality Control (QC) is maintained by G-R by using specific field protocols and requiring the analytical laboratory to perform internal and external QC checks. It is the goal of G-R to provide data that are accurate, precise, complete, comparable, and representative. The definitions for accuracy, precision, completeness, comparability, and representativeness are as follows:

- Accuracy - the degree of agreement of a measurement with an accepted referenced or true value.

- Precision - a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of the standard deviation.

- Completeness - the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.

- Comparability - expresses the confidence with which one data set can be compared to another.

- Representativeness - a sample or group of samples that reflects the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

As part of the G-R QA/QC program, applicable federal, state, and local reference guidance documents are followed. The procedures outlined in these regulations, manuals, handbooks, guidance documents, and journals are incorporated into the G-R sampling procedures to assure that; (1) ground-water samples are properly collected, (2) ground-water samples are identified, preserved, and transported in a manner such that they are representative of field conditions, and (3) chemical analysis of samples are accurate and reproducible.

Guidance and Reference Documents Used to Collect Groundwater Samples

U.S.E.P.A. - 330/9-51-002	NEIC Manual for Groundwater/Subsurface Investigation at Hazardous Waste Sites
U.S.E.P.A. - 530/SW611	Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities (August, 1977)
U.S.E.P.A. - 600/4-79-020	Methods for Chemical Analysis of Water and Wastes (1983)
U.S.E.P.A. - 600/4-82-029	Handbook for Sampling and Sample Preservation of Water and Wastewater (1982)
U.S.E.P.A. - 600/4-82-057	Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (July, 1982)
U.S.E.P.A. - SW-846#, 3rd Edition	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (November, 1986)
40 CFR 136.3e,Table II (Code of Federal Regulations)	Required Containers, Preservation Techniques, and Holding Times
Resources Conservation and Recover Act (OSWER 9950.1)	Groundwater Monitoring Technical Enforcement Guidance Document (September, 1986)
California Regional Water Quality Control Board (Central Valley Region)	A Compilation of Water Quality Goals (September, 1988); Updates (October, 1988)
California Regional Water Quality Control Board (North Coast, San Francisco Bay, and Central Valley)	Regional Board Staff Recommendations for Initial Evaluations and Investigation of Underground Tanks: Tri-Regional Recommendations (June, 1988)

May 1, 1989

Guidance and Reference Documents Used to Collect Groundwater Samples

Regional Water Quality Control Board (Central Valley Region)	Memorandum: Disposal, Treatment, and Refuse of Soils Contaminated with Petroleum Fractions (August, 1986)
State of California Department of Health Services	Hazardous Waste Testing Laboratory Certification List (March, 1987)
State of California Water Resources Control Board	Leaking Underground Fuel Tank (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)
State of California Water Resources Control Board	Title 23, (Register #85.#33-8-17-85), Subchapter 16: Underground Tank Regulations; Article 3, Sections 2632 and 2634; Article 4, Section 2647 (October, 1986)
Alameda County Water District	Groundwater Protection Program: Guidelines for Groundwater and Soil Investigations at Leaking Underground Fuel Tank Sites (November, 1988)
American Public Health Association	Standard Methods for the Examination of Water and Wastewaters, 16th Edition
Analytical Chemistry (journal)	Principles of Environmental Analysis, Volume 55, Pages 2212-2218 (December, 1983)
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983

Because many of the ground-water samples collected by G-R are analyzed in the parts per billion (ppb) range for many compounds, extreme care is exercised to prevent contamination of samples. When volatile or semi-volatile organic compounds are included for analysis, G-R sampling crew members will adhere to the following precautions in the field:

1. A clean pair of new, disposable glove are worn for each well being sampled.

2. When possible, samples are collected from known or suspected wells that are least contaminated (i.e. background) followed by wells in increasing order of contamination.

When known or potential organic compounds are being sampled for, the following additional precautions are taken:

1. All sample bottles and equipment are kept away from fuels and solvents. When possible, gasoline (used in generators) is stored away from bailers, sample bottles, purging pumps, etc.

2. Bailers are made of Teflon or Stainless Steel. Other materials such as plastic may contaminate samples with phthalate esters which interfere with many Gas Chromatography (GC) analyses.

3. Volatile organic ground-water samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples): sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the neck of the bottle; the Teflon side of the septum (in cap) is positioned against the meniscus, and the cap screwed on tightly; the sample is inverted and the bottle lightly tapped. The absence of an air bubble indicates a successful seal; if a bubble is evident, the cap is removed, more sample is added, and the bottle is resealed.

4. Extra Teflon seals are brought into the field in case seals are difficult to handle and/or are dropped. Dropped seals are considered contaminated and are not used. When replacing seals or if seals become flipped, care is taken to assure that the Teflon seal faces down.

Laboratory and field handling procedures of samples are monitored by including QC samples for analysis with every submitted sample lot from a project site. QC samples may include any combination of the following:

A. Trip Blank Used for purgeable organic compounds only; QC samples are collected in 40 milliliter (ml) samples vials filled in the analytical laboratory with organic-free water. Trip blanks are sent to the project site, and travel with project site samples. Trip blanks are not opened, and are returned from a project site with the project site samples for analysis.

B. Field Blank Prepared in the field using organic-free water. These QC samples accompany project site samples to the laboratory and are analyzed for specific chemical parameters unique to the project site where they were prepared.

C. Duplicates Duplicated samples are collected "second samples" from a selected well and project site. They are collected as either split samples or second-run samples collected from the same well.

D. Equipment Blank Periodic QC sample collected from field equipment rinsate to verify decontamination procedures.

The number and types of QC samples are determined on a rate-specific basis.

SAMPLE COLLECTION

This section describes the routine procedures followed by G-R while collecting ground-water samples for chemical analysis. These procedures include decontamination, water-level measurements, well purging, physical parameter measurements, sample collection, sample preservation, sample handling, and sample documentation. Critical sampling objectives for G-R are to:

1. Collect ground-water samples that are representative of the sampled matrix, and

2. Maintain sample integrity from the time of sample collection to receipt by the analytical laboratory.

Sample analyses methods, containers, preservation, and holding times are presented in Table 1.

Decontamination Procedures

All physical parameter measuring and sampling equipment are decontaminated prior to sample collection using Alconox or equivalent detergent followed by steam cleaning with deionized water. Any sampling equipment surfaces or parts that might absorb specific contaminants, such as plastic pump valves, impellers, etc., are cleaned in the same manner.

Sample bottles, bottle caps, and septa used for sampling volatile organics are thoroughly cleaned and prepared in the laboratory. Sample bottles, bottle caps, and septa are protected from all potential chemical contact before actual usage at a sample location.

During field sampling, equipment placed in a well are decontaminated before purging or sampling the next well. The equipment are decontaminated by cleaning with Alconox or equivalent detergent followed by steam cleaning with deionized water.

Water-Level Measurements

Prior to purging and sampling a well, the static-water levels are measured in all wells at a project site using an electric sounder and/or calibrated portable oil-water interface probe. Both static water-level and separate-phase product thickness are measured to the nearest $\pm$0.01 foot. The presence of separate-phase product is confirmed using a clean, acrylic or polyvinylchloride (PVC) bailer, measured to the nearest $\pm$0.01 foot with an engineer's scale tape.

Water-Level Measurements (continued)

The monofilament line used to lower the bailer is replaced between wells with new line to preclude the possibility of cross-contamination. Field observations (e.g. well integrity, product color, turbidity, water color, odors, etc.) are noted on the G-R Well Sampling Field Data Sheet shown in Figure A-3. Before and after each use, the electric sounder, interface probe and bailer are decontaminated by washing with Alconox or equivalent detergent followed by rinsing with deionized water to prevent cross-contamination.

As mentioned previously, water-levels are measured in wells with known or suspected lowest dissolved chemical concentrations to the highest dissolved concentrations.

Well Purging

Before sampling occurs, well casing storage water and interstitial water in the artificial sand pack will be purged using (1) a positive displacement bladder pump constructed of inert, non-wetting, Teflon and stainless steel, (2) a pneumatic-airlift pumping system, (3) a centrifigal pumping system, or (4) a Teflon or Stainless steel bailer. Methods of purging will be assessed based on well size, location, accessibility, and known chemical conditions. Individual well purge volumes are calculated from borehole volumes which take into account the sand packed interval in the well annular space. As a general rule, a minimum of 3 to 5 borehole volumes will be purged. Wells which dewater or demonstrate slow recharge periods (i.e. low-yield wells) during purging activities may be sampled after fewer purging cycles. If a low-yield (low recovery) well is to be sampled, sampling will not take place until at least 70 percent of the previously measured water column has been replaced by recharge. Physical parameter measurements (temperature, pH, and specific conductance) are closely monitored throughout the well purging process and are used by the G-R sampling crew as indicators for assessing sufficient purging. Purging is continued until all three physical parameters have stabilized. Specific conductance (conductivity) meters are read to the nearest ± 10 umhos/cm, and are calibrated daily. pH meters are read to the nearest ± 0.1 pH units and are calibrated daily. Temperature is read to the nearest 0.1 degree F. Calibration of physical parameter meters will follow manufacturers specifications. Monitoring wells will be purged according to the protocol presented in Figure A-4. Collected field data during purging activities will be entered on the G-R Well Sampling Field Data Sheet shown in Figure A-3. Copies of the G-R Field Data Sheets will be reviewed by the G-R Sampling Manager for accuracy and completeness.

DOCUMENTATION

Sample Container Labels

Each sample container will be labeled immediately after the sample is collected. Label information will include:

Sample point designation (i.e. well number or code)

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

In the field, the G-R sampling crew will record the following information on the Well Sampling Data Sheet for each sample collected:

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

Pertinent well data (e.g. depth, product thickness, static water-level, pH, specific conductance, temperature)

Calculated and actual purge volumes

Chain-of-Custody

A Chain-of-Custody record (Figure A-3) shall be completed and accompany every sample and every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from time of collections. The record will contain the following information:

- Sample or station number or sample identification (ID)
- Signature of collector, sampler, or recorder
- Date and time of collection
- Place of collection
- Sample type
- Signatures of persons involved in chain of possession
- Inclusive dates of possession

Samples shall always be accompanied by a Chain-of-Custody record. When transferring the samples, the individual relinquishing and receiving the samples will sign, date, and note the time on the Chain-of-Custody record. G-R will be responsible for notifying the laboratory coordinator when and how many samples will be sent to the laboratory for analysis, and what types of analyses shall be performed.

FIGURE 1

GeoStrategies Inc.

FIELD EXPLORATORY BORING LOG

Field location of boring:	Project No.:	Date:	Boring No:
	Client:		
	Location:		
	City:		Sheet
	Logged by:	Driller:	of
Drilling method:	Casing installation data:		
Hole diameter:	Top of Box Elevation:		Datum:

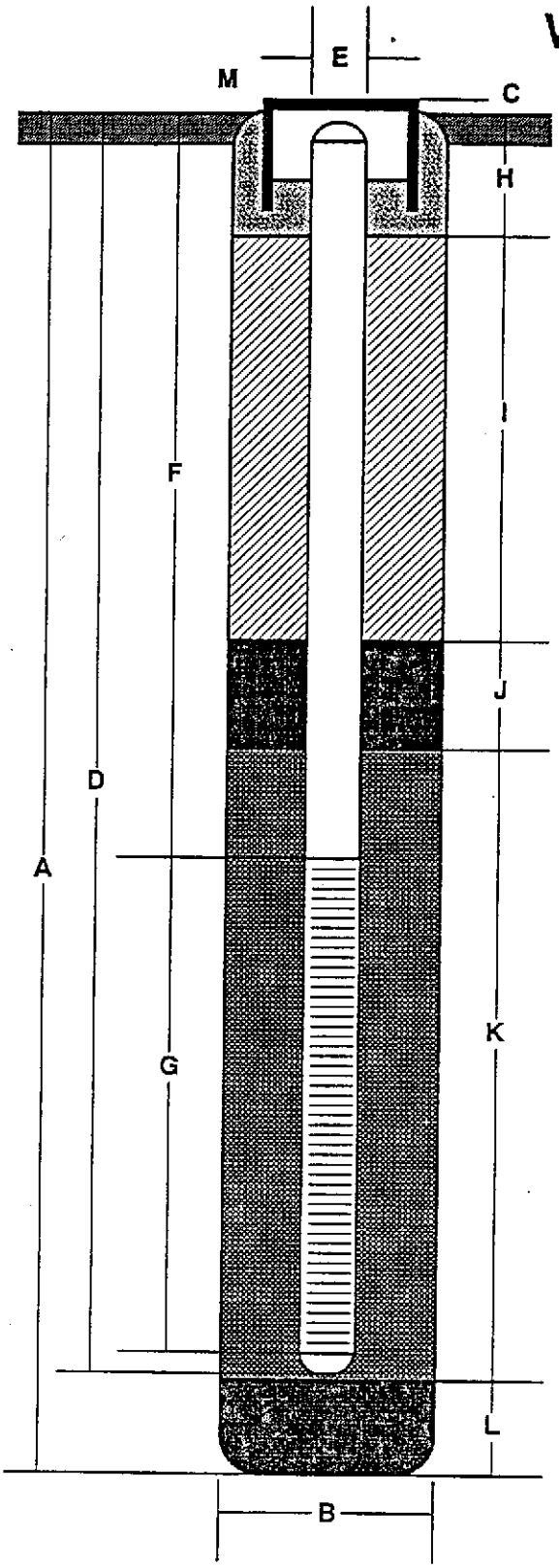
Water Level								
Time								
Date								

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description

Remarks:

FIGURE 2

WELL CONSTRUCTION DETAIL



A Total Depth of Boring _____ ft.

B Diameter of Boring _____ in.
Drilling Method _____

C Top of Box Elevation _____ ft.
☐ Referenced to Mean Sea Level
☐ Referenced to Project Datum

D Casing Length _____ ft.
Material _____

E Casing Diameter _____ in.

F Depth to Top Perforations _____ ft.

G Perforated Length _____ ft.
Perforated Interval from ____ to ____ ft.
Perforation Type _____
Perforation Size _____

H Surface Seal _____ ft.
Seal Material _____

I Backfill _____ ft.
Backfill Material _____

J Seal _____ ft.
Seal Material _____

K Gravel Pack _____ ft.
Pack Material _____

L Bottom Seal _____ ft.
Seal Material _____

M _____

GeoStrategies Inc.

Well Construction Detail

WELL NO.

JOB NUMBER | REVIEWED BY RG/CEG | DATE | REVISED DATE | REVISED DATE

FIGURE 3

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

Depth to Liquid- _____ ft.

(# of casing volumes) _____ x _____ x(VF) _____ = (Estimated Purge Volume) _____ gal.

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

(Estimated Purge Volume) _____ gal. / (Purging Flow Rate) _____ gpm. = (Anticipated Purging Time) _____ min.

Time	pH	Conductivity	Temperature	Volume

Did well dewater? _____ If yes, time _____ Volume _____

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

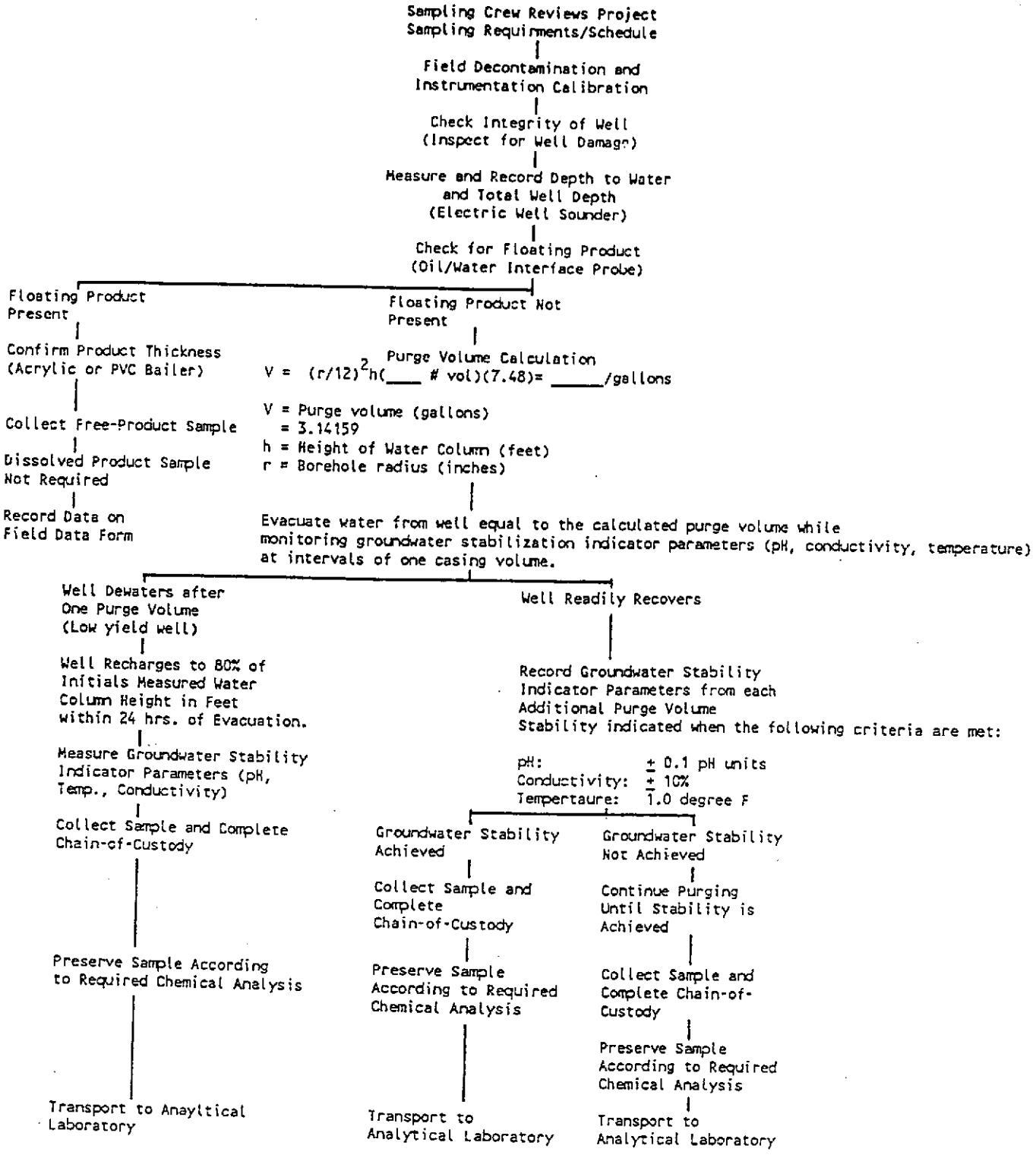
Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 4

Monitoring Well Sampling Protocol Schematic



Geftler - Ryan Inc. FIGURE 5
ENVIRONMENTAL DIVISION

Chain of Custody

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

ORIGINAL

APPENDIX B

CHEMICAL ANALYTICAL REPORTS

GROUNDWATER SAMPLING REPORT

SOIL ANALYSIS DATA

GROUND-WATER SAMPLING REPORT

gettler — ryan inc.

June 6, 1989

GROUNDWATER SAMPLING REPORT

Shell Oil Company
Post Office Box 4023
Concord, California 94520

Referenced Site: Former Shell Service Station
15275 Washington Avenue
San Leandro, California

Sampling Date: May 3 & 4, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on May 3 and 4, 1989 at the referenced location. The site, located on the northwest corner of Washington Avenue and Lewelling Boulevard, is no longer an operating service station. The former station had underground storage tanks which contained petroleum products.

There are currently six groundwater monitoring wells on site and nine off site at the locations shown on the attached site map. Prior to sampling, all wells were inspected for total well depth, water levels, and presence of separate phase product using an electronic interface probe. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase product. Groundwater depths ranged from 6.74 to 7.97 feet below grade. Separate phase product was not observed in any monitoring wells.

The wells were then were purged and sampled. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. Each well was purged while pH, temperature, and conductivity measurements were monitored for stability. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. The purge water was contained in drums for proper disposal. Details of the final well purging results are presented on the attached Table of Monitoring Data.

Samples were collected, using teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. Field blanks (SF-9, SF-17) and a trip blank, supplied by the laboratory, were included and analyzed to assess quality control. Duplicate samples (SD-8, SD-14), were submitted without well designations, to assess laboratory performance. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

1992 national avenue • hayward, california 94545-1787 • (415) 783-7500

The samples were analyzed at International Technology Corporation - Santa Clara Valley Laboratory located at 2055 Junction Avenue, San Jose, California. The laboratory is assigned a California DHS-HMTL Certification number of 137. The results are presented as a Certified Analytical Report, a copy of which is attached to this report.

Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-1	S-3	S-5	S-6	S-7	S-8 SD-8
	5-04-89	5-04-89	5-04-89	5-04-89	5-04-89	5-03-89
Casing Diameter (inches)	3	3	4	3	3	3
Total Well Depth (feet)	20.10	15.10	18.40	24.90	20.50	24.50
Depth to Water (feet)	7.34	7.07	7.55	7.89	7.48	7.03
Free Product (feet)	none	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	19.4	12.2	28.6	25.8	19.8	26.6
Did Well Dewater?	no	no	no	yes	no	yes
Volume Evacuated (gal.)	28	17	36	21	25	19
Purging Device	Suction	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer	Bailer
Time	12:16	10:39	11:15	11:45	10:23	12:51
Temperature (F)*	68.8	67.3	67.4	68.2	69.9	67.9
pH*	7.55	7.03	7.08	7.60	7.51	7.33
Conductivity (umhos/cm)*	1205	1225	1684	1182	1226	1701

* Indicates Stabilized Value

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-9	S-10	S-11	S-12	S-13	S-14 SD-14
	5-03-89	5-03-89	5-03-89	5-03-89	5-03-89	5-03-89
Casing Diameter (inches)	3	3	3	3	3	3
Total Well Depth (feet)	17.90	18.20	24.60	24.10	24.00	20.50
Depth to Water (feet)	7.03	7.10	7.85	7.45	7.15	6.74
Free Product (feet)	none	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	16.6	16.8	25.4	25.3	25.6	20.8
Did Well Dewater?	no	yes	yes	no	no	yes
Volume Evacuated (gal.)	21	10	16	32.5	32.0	13.0
Purging Device	Suction	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer	Bailer
Time	12:16	10:56	09:42	09:06	09:03	10:00
Temperature (F)*	68.5	71.9	66.5	66.5	67.2	66.8
pH*	7.09	7.12	7.53	7.56	7.29	7.40
Conductivity (umhos/cm)*	1308	825	971	1023	1330	1342

* Indicates Stabilized Value

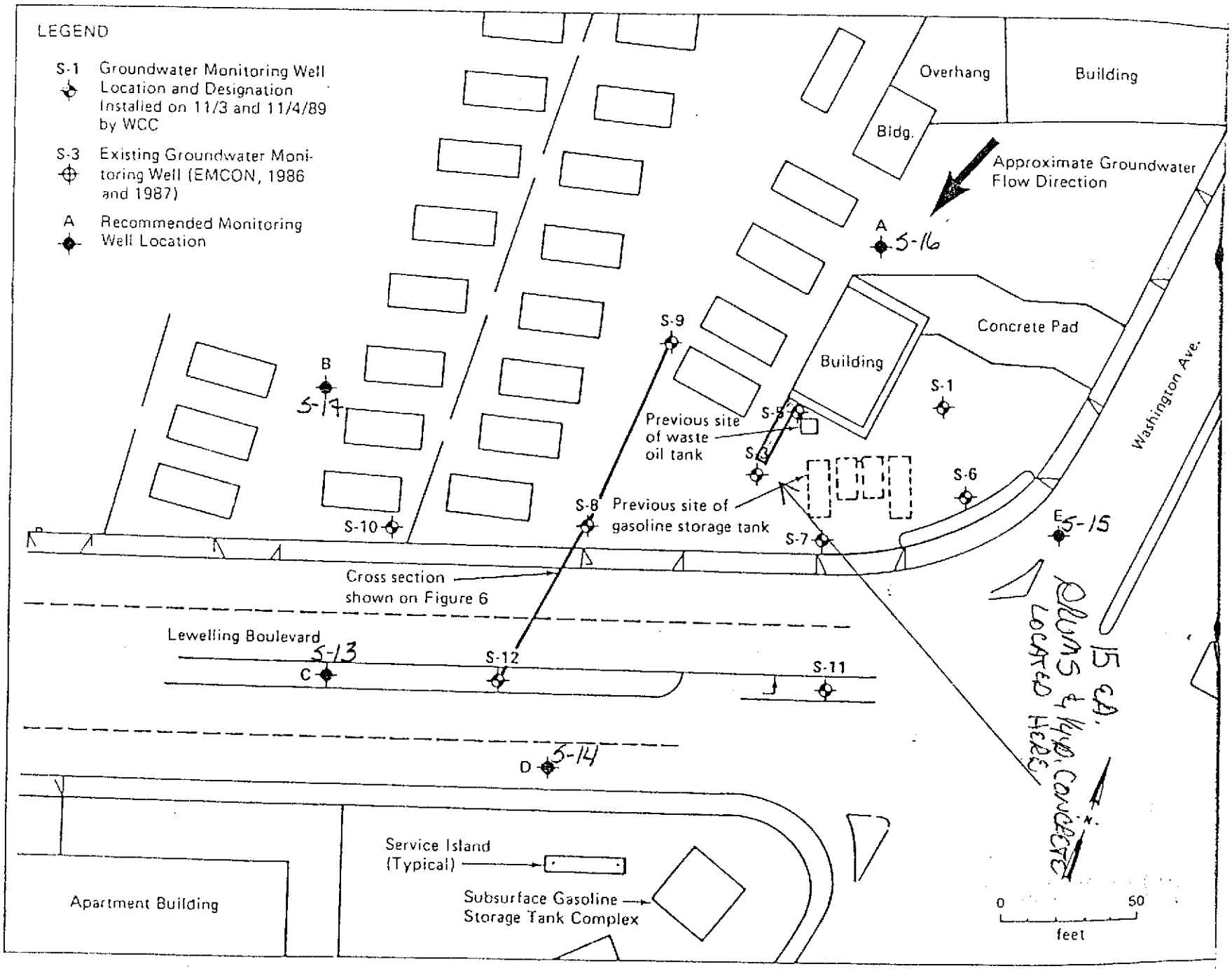
TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-15	S-16	S-17
	5-03-89	5-04-89	5-03-89
Casing Diameter (inches)	3	3	3
Total Well Depth (feet)	24.00	16.50	24.60
Depth to Water (feet)	7.97	7.57	7.30
Free Product (feet)	none	none	none
Reason Not Sampled	----	----	----
Calculated 4 Case Vol.(gal.)	24.4	14.1	26.4
Did Well Dewater?	no	no	no
Volume Evacuated (gal.)	31	17	33
Purging Device	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer
Time	08:50	13:00	11:44
Temperature (F)*	67.6	68.0	74.7
pH*	7.68	7.40	7.58
Conductivity (umhos/cm)*	984	1658	1004

* Indicates Stabilized Value

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
	1									97.21
	3									96.82
	5									97.10
	6									97.70
	7									97.15
	8									96.40
	9									96.65
	10									96.36
	11									97.27
	12									96.72
	13									96.25
	14									96.12
	15									97.90
	16									97.50
	17									96.63
11-Apr-89	1		6.94	0.00					DF	
25-Apr-89	1		7.07	0.00					BH	
10-May-89	1		7.43	0.00					CA	
24-May-89	1		7.54	0.00					CA	
07-Jun-89	1		7.72	0.00					CA	
21-Jun-89	1		7.86	0.00					JF	
11-Apr-89	3		6.60	0.00						
25-Apr-89	3		6.75	0.00						
10-May-89	3		7.24	0.00						
24-May-89	3		7.36	0.00						
07-Jun-89	3		7.58	0.00						
21-Jun-89	3		7.63	0.00						
11-Apr-89	5		N/A							
25-Apr-89	5		7.24	0.00						
10-May-89	5		7.70	0.00						
24-May-89	5		7.79	0.00						
07-Jun-89	5		8.03	0.00						
21-Jun-89	5		8.15	0.00						
11-Apr-89	6		7.47	0.00						
25-Apr-89	6		7.61	0.00						
10-May-89	6		8.01	0.00						
24-May-89	6		8.10	0.00						
07-Jun-89	6		8.32	0.00						
21-Jun-89	6		8.46	0.00						
11-Apr-89	7		7.06	0.00						
25-Apr-89	7		7.22	0.00						
10-May-89	7		7.61	0.00						
24-May-89	7		7.73	0.00						
07-Jun-89	7		7.93	0.00						
21-Jun-89	7		8.05	0.00						
11-Apr-89	8		6.56	0.00						
25-Apr-89	8		6.56	0.00						
10-May-89	8		7.11	0.00						
24-May-89	8		7.25	0.00						
07-Jun-89	8		7.46	0.00						
21-Jun-89	8		7.59	0.00						
11-Apr-89	9		6.61	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
25-Apr-89	9		6.52	0.00						
10-May-89	9		7.14	0.00						
24-May-89	9		7.32	0.00						
07-Jun-89	9		7.50	0.00						
21-Jun-89	9		7.65	0.00						
11-Apr-89	10		6.65	0.00						
25-Apr-89	10		6.62	0.00						
10-May-89	10		7.19	0.00						
24-May-89	10		7.36	0.00						
07-Jun-89	10		7.56	0.00						
21-Jun-89	10		7.70	0.00						
11-Apr-89	11		7.06	0.00						
25-Apr-89	11		7.55	0.00						
10-May-89	11		7.57	0.00						
24-May-89	11		8.10	0.00						
07-Jun-89	11		8.29	0.00						
21-Jun-89	11		8.43	0.00						
11-Apr-89	12		7.43	0.00						
25-Apr-89	12		7.18	0.00						
10-May-89	12		7.96	0.00						
24-May-89	12		7.66	0.00						
07-Jun-89	12		7.92	0.00						
21-Jun-89	12		8.05	0.00						
10-May-89	13		7.26	0.00						
24-May-89	13		7.42	0.00						
07-Jun-89	13		7.61	0.00						
21-Jun-89	13		7.73	0.00						
10-May-89	14		6.89	0.00						
24-May-89	14		7.03	0.00						
07-Jun-89	14		7.20	0.00						
21-Jun-89	14		7.32	0.00						
10-May-89	15		8.06	0.00						
24-May-89	15		8.17	0.00						
07-Jun-89	15		8.37	0.00						
21-Jun-89	15		8.49	0.00						
10-May-89	16		7.74	0.00						
24-May-89	16		7.85	0.00						
07-Jun-89	16		8.05	0.00						
21-Jun-89	16		8.17	0.00						
10-May-89	17		7.40	0.00						
24-May-89	17		7.58	0.00						
07-Jun-89	17		7.74	0.00						
21-Jun-89	17		7.88	0.00						



Project No. 615

Woodward-Clyde Consultants

Gettler Ryan

GROUNDWATER MONITORING WELL LOCATIONS
SHELL SERVICE STATION
LEWELLING BLVD. AND WASHINGTON AVE.
SAN LEANDRO, CALIFORNIA

Figure 1

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545
ATTN: John Werfal

Date: May 31, 1989

Work Order Numbers: S9-05-045, S9-05-049

P.O. Number: 3615

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3615, Shell, 15275 Washington Ave. and Lewelling Blvd., San Leandro
Date Received by Lab:	5/4/89
Number of Samples:	20
Sample Type:	Water

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

David A. Pichette
Project Manager

DAP/an
3 Pages Following - Tables of Results

Date: May 31, 1989
Client Project ID: GR #3615, Shell, 15275 Washington Ave.
and Lewelling Blvd., San Leandro Work Order Numbers: S9-05-045, S9-05-049

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-05-045-01	S-10	5/3/89	5/10/89	cool pH ≤2
S9-05-045-02	S-13	5/3/89	5/10/89	cool pH ≤2
S9-05-045-03	S-14	5/3/89	5/10/89	cool pH ≤2
S9-05-045-04	S-17	5/3/89	5/10/89	cool pH ≤2
S9-05-045-05	SD-14	5/3/89	5/10/89	cool pH ≤2
S9-05-045-06	SF-17	5/3/89	5/9/89	cool pH ≤2
S9-05-045-07	Trip Blank	5/3/89	5/9/89	cool pH ≤2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected — Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-05-045-01	S-10	0.22	ND	0.001	0.002	0.007
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-045-02	S-13	0.15	0.0049	0.004	0.002	0.014
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-045-03	S-14	5.3	0.75	0.4	0.2	0.8
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-05-045-04	S-17	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-045-05	SD-14	5.0	0.72	0.4	0.1	0.7
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-05-045-06	SF-17	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-045-07	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

Date: May 31, 1989
Client Project ID: GR #3615, Shell, 15275 Washington Ave. and Lewelling Blvd., San Leandro
Work Order Numbers: S9-05-045, S9-05-049

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-05-049-01	S-1	5/4/89	5/11/89	cool pH ≤2
S9-05-049-02	S-3	5/4/89	5/17/89	cool pH ≤2
S9-05-049-03	S-5	5/4/89	5/11/89	cool pH ≤2
S9-05-049-04	S-6	5/4/89	5/10/89	cool pH ≤2
S9-05-049-05	S-7	5/4/89	5/10/89	cool pH ≤2
S9-05-049-06	S-8	5/3/89	5/10/89	cool pH ≤2
S9-05-049-07	S-9	5/3/89	5/10/89	cool pH ≤2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-05-049-01	S-1	ND	0.0010	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-049-02	S-3	47.	4.4	6.3	2.4	15.
Detection Limit		20.	0.2	0.5	0.5	2.
S9-05-049-03	S-5	9.0	3.0	0.60	0.63	1.7
Detection Limit		1.0	0.02	0.02	0.02	0.06
S9-05-049-04	S-6	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-049-05	S-7	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-049-06	S-8	ND	0.0075	ND	0.002	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-05-049-07	S-9	2.6	0.47	0.01	0.24	0.48
Detection Limit		0.5	0.005	0.01	0.01	0.03

Date: May 31, 1989
Client Project ID: GR #3615, Shell, 15275 Washington Ave. and Lewelling Blvd., San Leandro

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Numbers: S9-05-045, S9-05-049

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-05-049-08	S-11	5/3/89	5/17/89	cool pH ≤2
S9-05-049-09	S-12	5/3/89	5/11/89	cool pH ≤2
S9-05-049-10	S-15	5/3/89	5/11/89	cool pH ≤2
S9-05-049-11	S-16	5/4/89	5/19/89	cool pH ≤2
S9-05-049-12	SD-8	5/3/89	5/11/89	cool pH ≤2
S9-05-049-13	SF-9	5/3/89	5/11/89	cool pH ≤2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-05-049-08	S-11	ND	ND	ND	ND	ND
S9-05-049-09	S-12	ND	ND	ND	ND	ND
S9-05-049-10	S-15	ND	ND	ND	ND	ND
S9-05-049-11	S-16	0.38	0.044	0.003	0.002	0.040
S9-05-049-12	SD-8	ND	0.0052	ND	0.002	ND
S9-05-049-13	SF-9	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

Gettler - Ryan Inc. 59-05-049 ENVIRONMENTAL DIVISION **Chain of Custody**

COMPANY Shell Oil Company JOB NO. 086

JOB LOCATION 15775 Washington Ave / Leandro Blvd.

CITY San Leandro, CA PHONE NO. (415) 783-7500

AUTHORIZED John Werfal DATE 5/4/89 P.O. NO. 3615

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
01 S-1	3	Liquid	5-4/1210	TPH(Gas)BTXE	Cool/Ok
02 S-3			5-4/1039		
03 S-5			5-4/1115		
04 S-6			5-4/1145		
05 S-7			5-4/1023		
06 S-8			5-3/1251		
07 S-9			5-3/1216		
08 S-11			5-3/0942		
09 S-12			5-3/0906		
10 S-15			5-3/0850		
11 S-16			5-4/1300		
12 SD-8			5-3/ —		
13 SF-9			5-3/ —		

RELINQUISHED BY: Shelly D Pyle 5/4/89 1634

RECEIVED BY: [signature] 5/4/89 16:35

RELINQUISHED BY: [signature] 5/4/89 20:06

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: [signature] 5/4/89 20:06

DESIGNATED LABORATORY: IT SCN DHS #: 137

REMARKS: Normal TAT Results due 5/18/89

DATE COMPLETED May 4, 1989 Sampler FOREMAN Shelly D Pyle

ORIGINAL

59-05-045

Gettler - Ryan Inc. — ENVIRONMENTAL DIVISION — **Chain of Custody**

COMPANY Shell Oil Company — JOB NO. 0271

JOB LOCATION 15775 Washington Ave / Lewelling Blvd

CITY San Leandro, CA — PHONE NO. (415) 783-7500

AUTHORIZED John Werfal — DATE 5/4/89 — P.O. NO. 3615

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
01 S-10	3	Liquid	5-3 / 1056	TPH(Gas) BTXE	Cool/ok
02 S-13			/ 0903		
03 S-14			/ 1000		
04 S-17			/ 1144		
05 SO-14			/ 1000		
06 SF-17			/ 1144		
07 Trip Blank	2	~~Water~~	~~Water~~ 5-2-89		

RELINQUISHED BY: Guadalupe R Sanchez 5/4/89 7:35 — RECEIVED BY: Philip J. Lye 5/4/89 0735

RELINQUISHED BY: Philip J Lye 5/4/89 1630 — RECEIVED BY: [signature] 5/4/89 16:31

RELINQUISHED BY: [signature] 5/4/89 20:06 — RECEIVED BY LAB: [signature] 5/4/89 20:06

DESIGNATED LABORATORY: IT SCV — DHS #: 137

REMARKS: Normal TAT Results due 5/18/89

DATE COMPLETED May 4, 1989 — FOREMAN Samplers Guadalupe Sanchez

ORIGINAL

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545
ATTN: John Werfal

Date: May 31, 1989

Work Order Number: S9-04-288

P.O. Number: 7615

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7615, Shell, 15275 Washington Ave. and Lewelling Blvd., San Leandro
Date Received by Lab:	4/27/89
Number of Samples:	5
Sample Type:	Soil

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

David A. Pichette
Project Manager

DAP/an
1 Page Following - Table of Results

Date: May 31, 1989
Client Project ID: GR #7615, Shell, 15275
Washington Ave. & Lewelling Blvd., San Leandro

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-04-288

Lab Sample ID	Client Sample ID	Sample Date	Extraction Date	Date Analysis Completed	Sample Condition on Receipt
S9-04-288-01	S-14-5'	4/26/89	5/2/89	5/9/89	cool
S9-04-288-02	S-17-5'	4/25/89	5/2/89	5/17/89	cool
S9-04-288-03	S-16-5'	4/25/89	5/2/89	5/10/89	cool
S9-04-288-04	S-15-5'	4/26/89	5/2/89	5/10/89	cool
S9-04-288-05	S-13-5'	4/26/89	5/2/89	5/10/89	cool

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Kilogram

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-04-288-01	S-14-5'	16.	0.33	0.1	0.3	1.6
Detection Limit		5.	0.05	0.01	0.01	0.3
S9-04-288-02	S-17-5'	13.	ND	ND	ND	ND
Detection Limit		5.	0.05	0.1	0.1	0.3
S9-04-288-03	S-16-5'	1,100.	3.	12.	24.	110.
Detection Limit		100.	1.	3.	3.	8.
S9-04-288-04	S-15-5'	ND	ND	ND	ND	ND
Detection Limit		5.	0.05	0.1	0.1	0.3
S9-04-288-05	S-13-5'	31.	0.19	0.2	0.6	0.3
Detection Limit		5.	0.05	0.1	0.1	0.3

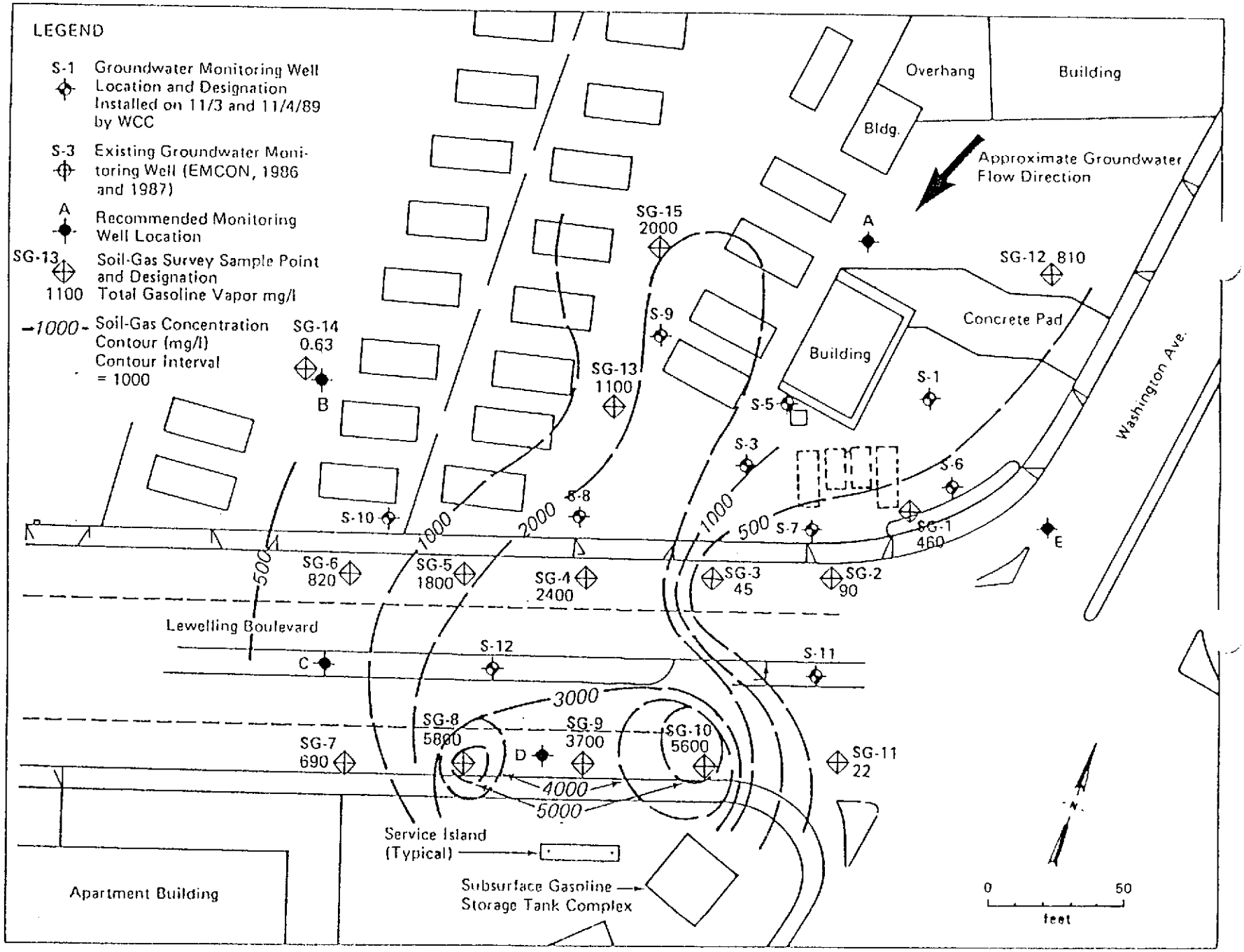
APPENDIX C

HISTORICAL DATABASE

SOIL GAS SURVEY CONTOUR MAP

MONITORING DATA

SOIL GAS SURVEY CONTOUR MAP



Project No. 8820011A

Woodward-Clyde Consultants

Gettler - Ryan

SOIL-GAS SURVEY CONTOUR MAP
SHELL SERVICE STATION
LEWELLING BLVD. AND WASHINGTON AVE.
SAN LEANDRO, CALIFORNIA

Figure 5

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
	1									97.21
	3									96.82
	5									97.10
	6									97.70
	7									97.15
	8									96.40
	9									96.65
	10									96.36
	11									97.27
	12									96.72
	13									96.25
	14									96.12
	15									97.90
	16									97.50
	17									96.63
04-Sep-86	B		7.40	0.71	0.50					
11-Sep-86	B	7.38	(1.00)	0.23	0.50					
18-Sep-86	B	7.24	(1.00)	0.18	0.30					
25-Sep-86	B		7.13	0.00						
02-Oct-86	B	7.23	(1.00)	0.05	1.00					
09-Oct-86	B	7.35	(1.00)	0.08	0.10					
16-Oct-86	B	7.35	(1.00)	0.25	0.50					
23-Oct-86	B	7.47	(1.00)	0.29	0.30					
30-Oct-86	B	7.60	(1.00)	0.93	2.00					
03-Nov-86	B	7.69	(1.00)	0.35	0.50					
10-Nov-86	B	7.82	(1.00)	0.05	0.20					
17-Nov-86	B	7.51	(1.00)	0.22	0.10					
24-Nov-86	B	7.53	(1.00)	0.23	0.20					
01-Dec-86	B	7.73	(1.00)	0.26	1.00				CP	
08-Dec-86	B	7.52	(1.00)	0.21	0.50				GS	
15-Dec-86	B	7.45	(1.00)	0.40	1.00				SM	
22-Dec-86	B	7.35	(1.00)	.00	0.50					
29-Dec-86	B	7.68	(1.00)	0.12						
05-Jan-87	B	6.95	(1.00)	0.01	0.10					
12-Jan-87	B	7.12	(1.00)	0.03	0.10					
19-Jan-87	B	7.38	(1.00)	0.04	0.20					
26-Jan-87	B	7.14	(1.00)	0.04	0.10					
02-Feb-87	B	6.85	(1.00)	.00						
09-Feb-87	B	6.80	(1.00)	.00						
23-Feb-87	B	6.18	(1.00)	.00						
02-Mar-87	B	6.66	(1.00)	.00						
09-Mar-87	B	6.78	(1.00)	.00						
16-Mar-87	B	6.57	(1.00)	.00						
23-Mar-87	B	6.34	(1.00)	.00						
30-Mar-87	B	6.70	(1.00)	0.01	0.10					
14-Apr-87	B	7.14	(1.00)	.00						
28-Apr-87	B	7.13	(1.00)	.00						
12-May-87	B	7.06	(1.00)	.00						
26-May-87	B	7.26	(1.00)	.00						
09-Jun-87	B		N/A CONSTRUCTION							
23-Jun-87	B		N/A FENCED/LOCKED							
07-Jul-87	B		N/A FENCED/LOCKED							

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
21-Jul-87	B		N/A							
04-Aug-87	B		N/A							
18-Aug-87	B		N/A	DESTROYED						
08-Dec-87	B		N/A							
19-Jun-86	1		7.38	0.00					GS	
17-Jul-86	1		7.35	0.00					GS	
04-Sep-86	1		7.49	0.00					SM	
11-Sep-86	1		7.47	0.00					GS	
18-Sep-86	1		7.32	0.00					CA	
25-Sep-86	1		7.15	0.00					SP	
02-Oct-86	1		7.32	0.00					CP	
09-Oct-86	1		7.37	0.00					SM	
16-Oct-86	1		7.47	0.00					GS	
23-Oct-86	1		7.59	0.00					CA	
30-Oct-86	1		7.69	0.00					SP	
03-Nov-86	1		7.77	0.00					GS	
10-Nov-86	1		7.84	0.00					SP	
17-Nov-86	1		7.58	0.00					SM	
24-Nov-86	1		7.62	0.00					CA	
01-Dec-86	1		7.79	0.00						
08-Dec-86	1		7.60	0.00						
15-Dec-86	1		7.56	0.00						
22-Dec-86	1		7.65	0.00					SP	
29-Dec-86	1		7.67	0.00					CP	
05-Jan-87	1		7.04	0.00					CA	
12-Jan-87	1		7.18	0.00					SM	
19-Jan-87	1		7.43	0.00					GS	
26-Jan-87	1		7.19	0.00					SM	
02-Feb-87	1		6.89	0.00					CP	
09-Feb-87	1		6.86	0.00					CA	
23-Feb-87	1		6.28	0.00					GS	
02-Mar-87	1		6.71	0.00					SM	
09-Mar-87	1		6.79	0.00					CP	
16-Mar-87	1		6.64	0.00					CA	
23-Mar-87	1		6.45	0.00					RK	
30-Mar-87	1		6.73	0.00					GS	
14-Apr-87	1		7.08	0.00					RK	
28-Apr-87	1		7.11	0.00					RK	
12-May-87	1		7.09	0.00					SM	
26-May-87	1		7.24	0.00					CA	
09-Jun-87	1		N/A	CONSTRUCTION					GS	
23-Jun-87	1		N/A	FENCED/LOCKED					SM	
07-Jul-87	1		N/A	FENCED/LOCKED					RK	
21-Jul-87	1		N/A						DF	
04-Aug-87	1		N/A						CA	
18-Aug-87	1		N/A						SM	
01-Sep-87	1		6.79	0.00					GS	
15-Sep-87	1		7.88	0.00					DB	
29-Sep-87	1		8.02	0.00					SM	
13-Oct-87	1		8.01	0.00					DB	
27-Oct-87	1		7.92	0.00					SM	
10-Nov-87	1		N/A						CP	
23-Nov-87	1		N/A						SM	

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	BMP	C.ELEV
08-Dec-87	1		6.68	0.00					CP	
22-Dec-87	1		7.04	0.00					SM	
05-Jan-88	1		N/A						CP	
19-Jan-88	1		N/A						SM	
02-Feb-88	1		6.73	0.00					CP	
16-Feb-88	1		7.19	0.00					SM	
01-Mar-88	1		N/A						JJ	
15-Mar-88	1		7.52	0.00					SM	
29-Mar-88	1		7.98	0.00					CP	
12-Apr-88	1		7.72	0.00					SM	
26-Apr-88	1		6.69	0.00					CA	
10-May-88	1		7.17	0.00					GS	
24-May-88	1		7.46	0.00					SM	
07-Jun-88	1		7.38	0.00					GS	
21-Jun-88	1		7.38	0.00					EK	
05-Jul-88	1		7.55	0.00					GS	
19-Jul-88	1		7.64	0.00					DF	
02-Aug-88	1		7.78	0.00					GS	
16-Aug-88	1		7.93	0.00					DF	
30-Aug-88	1		8.03	0.00					DF	
13-Sep-88	1		8.13	0.00					DF	
27-Sep-88	1		8.30	0.00					GS	
11-Oct-88	1		8.32	0.00					DF	
25-Oct-88	1		8.21	0.00					GS	
22-Nov-88	1		8.01	0.00					DF	
06-Dec-88	1		7.87	0.00					GS	
20-Dec-88	1		8.17	0.00					SM	
03-Jan-89	1		7.25	0.00					CA	
17-Jan-89	1		7.49	0.00					SM	
31-Jan-89	1		7.62	0.00					CA	
14-Feb-89	1		7.14	0.00					SM	
28-Feb-89	1		7.56	0.00					CA	
14-Mar-89	1		6.70	0.00					CA	
28-Mar-89	1		6.37	0.00					CA	
11-Apr-89	1		6.94	0.00					DF	
25-Apr-89	1		7.07	0.00					BH	
10-May-89	1		7.43	0.00					CA	
24-May-89	1		7.54	0.00					CA	
07-Jun-89	1		7.72	0.00					CA	
19-Jun-86	2		7.40	0.00						
17-Jul-86	2		7.39	0.00						
04-Sep-86	2		7.55	0.00						
11-Sep-86	2		7.55	0.00						
18-Sep-86	2		7.35	0.00						
25-Sep-86	2		7.12	0.00						
02-Oct-86	2		7.34	0.00						
09-Oct-86	2		7.41	0.00						
16-Oct-86	2		7.52	0.00						
23-Oct-86	2		7.66	0.00						
30-Oct-86	2		7.73	0.00						
03-Nov-86	2		7.86	0.00						
10-Nov-86	2		7.90	0.00						
17-Nov-86	2		7.59	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
24-Nov-86	2		7.66	0.00						
01-Dec-86	2		7.92	0.00						
08-Dec-86	2		7.65	0.00						
15-Dec-86	2		7.61	0.00						
22-Dec-86	2		7.52	0.00						
29-Dec-86	2		7.73	0.00						
05-Jan-87	2		7.07	0.00						
12-Jan-87	2		7.20	0.00						
19-Jan-87	2		7.48	0.00						
26-Jan-87	2		7.10	0.00						
02-Feb-87	2		6.94	0.00						
09-Feb-87	2		6.91	0.00						
23-Feb-87	2		6.34	0.00						
02-Mar-87	2		6.77	0.00						
09-Mar-87	2		6.85	0.00						
16-Mar-87	2		6.67	0.00						
23-Mar-87	2		6.44	0.00						
30-Mar-87	2		6.82	0.00						
14-Apr-87	2		7.20	0.00						
28-Apr-87	2		7.20	0.00						
12-May-87	2		7.15	0.00						
26-May-87	2		7.35	0.00						
09-Jun-87	2		N/A CONSTRUCTION							
23-Jun-87	2		N/A FENCED/LOCKED							
07-Jul-87	2		N/A FENCED/LOCKED							
21-Jul-87	2		N/A							
04-Aug-87	2		N/A							
18-Aug-87	2		7.63	0.00						
01-Sep-87	2		6.42	0.00						
15-Sep-87	2		7.98	0.00						
29-Sep-87	2		8.02	0.00						
13-Oct-87	2		8.11	0.00						
27-Oct-87	2		N/A COVERED							
10-Nov-87	2		N/A							
23-Nov-87	2		N/A							
08-Dec-87	2		N/A							
01-Mar-88	2		N/A							
19-Jun-86	3		7.36	0.00						
17-Jul-86	3		7.36	0.00						
04-Sep-86	3	7.50	(1.00)	0.01	0.01					
11-Sep-86	3	7.51	(1.00)	.00						
18-Sep-86	3	7.26	(1.00)	.00						
25-Sep-86	3	7.00	(1.00)	.00						
02-Oct-86	3		7.29	0.00						
09-Oct-86	3	7.40	(1.00)	.00						
16-Oct-86	3	7.47	(1.00)	.00						
23-Oct-86	3		7.63	0.00						
30-Oct-86	3	7.75	(1.00)	0.01	0.10					
03-Nov-86	3	7.85	(1.00)	.00						
10-Nov-86	3		7.90	0.00						
17-Nov-86	3	7.61	(1.00)	.00						
24-Nov-86	3		7.69	0.00						
01-Dec-86	3	7.88	(1.00)	.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
08-Dec-86	3	7.61	(1.00)	.00						
15-Dec-86	3	7.60	(1.00)	.00						
22-Dec-86	3	7.38	(1.00)	.00						
29-Dec-86	3	7.70	(1.00)	.00						
05-Jan-87	3		6.89	0.00						
12-Jan-87	3	7.10	(1.00)	.00						
19-Jan-87	3		7.43	0.00						
26-Jan-87	3	7.10	(1.00)	.00						
02-Feb-87	3		6.69	0.00						
09-Feb-87	3	6.77	(1.00)	.00						
23-Feb-87	3		6.20	0.00						
02-Mar-87	3	6.67	(1.00)	.00						
09-Mar-87	3		6.74	0.00						
16-Mar-87	3		6.52	0.00						
23-Mar-87	3		6.32	0.00						
30-Mar-87	3		6.67	0.00						
14-Apr-87	3		7.13	0.00						
28-Apr-87	3		7.18	0.00						
12-May-87	3	7.15	(1.00)	.00						
26-May-87	3	7.31	(1.00)	.00						
09-Jun-87	3	7.75	(1.00)	.00						
23-Jun-87	3		N/A	FENCED/LOCKED						
07-Jul-87	3		N/A	FENCED/LOCKED						
21-Jul-87	3		N/A							
04-Aug-87	3		N/A							
18-Aug-87	3	7.53	(1.00)	.00						
01-Sep-87	3		5.62	0.00						
15-Sep-87	3	7.89	(1.00)	.00						
29-Sep-87	3	8.02	(1.00)	.00						
13-Oct-87	3	8.15	(1.00)	.00						
27-Oct-87	3	8.06	(1.00)	.00						
10-Nov-87	3		8.01	0.00						
23-Nov-87	3		N/A							
08-Dec-87	3		5.67	0.00						
22-Dec-87	3	7.00	(1.00)	.00						
05-Jan-88	3		5.76	0.00						
19-Jan-88	3		5.45	0.00						
02-Feb-88	3		6.42	0.00						
16-Feb-88	3	7.18	(1.00)	.00						
01-Mar-88	3		6.95	0.00						
15-Mar-88	3	7.26	(1.00)	.00						
29-Mar-88	3		7.25	0.00						
12-Apr-88	3		7.70	0.00						
26-Apr-88	3		6.11	0.00						
10-May-88	3	7.02	(1.00)	.00						
24-May-88	3	7.31	(1.00)	.00						
07-Jun-88	3	7.45	(1.00)	.00						
21-Jun-88	3	7.34	(1.00)	.00						
05-Jul-88	3	7.57	(1.00)	.00						
19-Jul-88	3		7.68	0.00						
02-Aug-88	3	7.65	(1.00)	.00						
16-Aug-88	3		7.78	0.00						
30-Aug-88	3		7.88	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	BMP	C.ELEV
13-Sep-88	3	8.08	(1.00)	.00						
27-Sep-88	3	8.24	(1.00)	.00						
11-Oct-88	3	8.30	(1.00)	.00						
25-Oct-88	3	8.10	(1.00)	.00						
22-Nov-88	3	7.26	(1.00)	.00						
06-Dec-88	3	7.56	(1.00)	.00						
20-Dec-88	3	8.01	(1.00)	.00						
03-Jan-89	3		6.85	0.00						
17-Jan-89	3	7.10	(1.00)	.00						
31-Jan-89	3		7.34	0.00						
14-Feb-89	3	6.77	(1.00)	.00						
28-Feb-89	3		7.34	0.00						
14-Mar-89	3		6.42	0.00						
28-Mar-89	3		6.06	0.00						
11-Apr-89	3		6.60	0.00						
25-Apr-89	3		6.75	0.00						
10-May-89	3		7.24	0.00						
24-May-89	3		7.36	0.00						
07-Jun-89	3		7.58	0.00						
19-Jun-86	4		7.28	0.00						
17-Jul-86	4		7.27	0.00						
04-Sep-86	4		7.44	0.00						
11-Sep-86	4		7.43	0.00						
18-Sep-86	4		7.22	0.00						
25-Sep-86	4		7.10	0.00						
02-Oct-86	4		7.20	0.00						
09-Oct-86	4		7.31	0.00						
16-Oct-86	4		7.40	0.00						
23-Oct-86	4		7.56	0.00						
30-Oct-86	4		7.63	0.00						
03-Nov-86	4		7.75	0.00						
10-Nov-86	4		8.00	0.00						
17-Nov-86	4	7.51	(1.00)	.00						
24-Nov-86	4		7.61	0.00						
01-Dec-86	4		7.86	0.00						
08-Dec-86	4		7.56	0.00						
15-Dec-86	4		7.48	0.00						
22-Dec-86	4		7.37	0.00						
29-Dec-86	4		7.65	0.00						
05-Jan-87	4		6.93	0.00						
12-Jan-87	4		7.10	0.00						
19-Jan-87	4		7.37	0.00						
26-Jan-87	4		7.13	0.00						
02-Feb-87	4		6.68	0.00						
09-Feb-87	4		6.77	0.00						
23-Feb-87	4		6.22	0.00						
02-Mar-87	4		6.62	0.00						
09-Mar-87	4		6.73	0.00						
16-Mar-87	4		6.50	0.00						
23-Mar-87	4		6.28	0.00						
30-Mar-87	4		6.71	0.00						
14-Apr-87	4		7.04	0.00						
28-Apr-87	4		7.12	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
12-May-87	4		7.19	0.00						
26-May-87	4		7.27	0.00						
09-Jun-87	4		7.58	0.00						
23-Jun-87	4		N/A FENCED/LOCKED							
07-Jul-87	4		N/A FENCED/LOCKED							
21-Jul-87	4		N/A							
04-Aug-87	4		N/A							
18-Aug-87	4		7.58	0.00						
01-Sep-87	4		6.27	0.00						
15-Sep-87	4		7.91	0.00						
29-Sep-87	4		8.02	0.00						
13-Oct-87	4		8.07	0.00						
27-Oct-87	4		8.02	0.00						
10-Nov-87	4		N/A							
23-Nov-87	4		N/A							
08-Dec-87	4		6.20	0.00						
22-Dec-87	4		7.02	0.00						
05-Jan-88	4		6.42	0.00						
19-Jan-88	4		N/A							
02-Feb-88	4		5.99	0.00						
16-Feb-88	4		N/A							
01-Mar-88	4		N/A							
15-Mar-88	4		N/A							
29-Dec-86	5		8.00	0.00						
05-Jan-87	5		7.03	0.00						
12-Jan-87	5		7.29	0.00						
19-Jan-87	5		7.65	0.00						
26-Jan-87	5		7.34	0.00						
02-Feb-87	5		6.91	0.00						
09-Feb-87	5		6.98	0.00						
23-Feb-87	5		6.40	0.00						
02-Mar-87	5		6.85	0.00						
09-Mar-87	5		6.96	0.00						
16-Mar-87	5		6.71	0.00						
23-Mar-87	5		6.47	0.00						
30-Mar-87	5		6.85	0.00						
14-Apr-87	5		7.27	0.00						
28-Apr-87	5		7.30	0.00						
12-May-87	5		7.36	0.00						
26-May-87	5		7.50	0.00						
09-Jun-87	5		7.97	0.00						
23-Jun-87	5		N/A FENCED/LOCKED							
07-Jul-87	5		N/A FENCED/LOCKED							
21-Jul-87	5		8.13	0.00						
04-Aug-87	5		8.17	0.00						
18-Aug-87	5		7.72	0.00						
01-Sep-87	5		6.02	0.00						
15-Sep-87	5		8.11	0.00						
29-Sep-87	5		8.26	0.00						
13-Oct-87	5		8.29	0.00						
27-Oct-87	5		8.23	0.00						
10-Nov-87	5		8.26	0.00						
23-Nov-87	5		N/A							

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
08-Dec-87	5		5.99	0.00						
22-Dec-87	5		7.27	0.00						
05-Jan-88	5		6.15	0.00						
19-Jan-88	5		6.02	0.00						
02-Feb-88	5		6.88	0.00						
16-Feb-88	5		7.40	0.00						
01-Mar-88	5		N/A							
15-Mar-88	5		7.71	0.00						
29-Mar-88	5		8.02	0.00						
12-Apr-88	5		8.00	0.00						
26-Apr-88	5		6.83	0.00						
10-May-88	5		7.49	0.00						
24-May-88	5		7.68	0.00						
07-Jun-88	5		7.66	0.00						
21-Jun-88	5		7.62	0.00						
05-Jul-88	5		7.84	0.00						
19-Jul-88	5		8.01	0.00						
02-Aug-88	5		8.12	0.00						
16-Aug-88	5		8.33	0.00						
30-Aug-88	5		8.41	0.00						
13-Sep-88	5		8.53	0.00						
27-Sep-88	5		8.62	0.00						
11-Oct-88	5		N/A							
25-Oct-88	5		N/A							
22-Nov-88	5		8.28	0.00						
06-Dec-88	5		8.15	0.00						
20-Dec-88	5		N/A							
03-Jan-89	5		7.41	0.00						
17-Jan-89	5		N/A							
31-Jan-89	5		N/A							
14-Feb-89	5		N/A							
28-Feb-89	5		7.82	0.00						
14-Mar-89	5		N/A							
28-Mar-89	5		6.51	0.00						
11-Apr-89	5		N/A							
25-Apr-89	5		7.24	0.00						
10-May-89	5		7.70	0.00						
24-May-89	5		7.79	0.00						
07-Jun-89	5		8.03	0.00						
22-Nov-88	6		8.58	0.00						
06-Dec-88	6		8.48	0.00						
20-Dec-88	6		8.72	0.00						
03-Jan-89	6		7.82	0.00						
17-Jan-89	6		8.07	0.00						
31-Jan-89	6		8.19	0.00						
14-Feb-89	6		7.71	0.00						
28-Feb-89	6		8.10	0.00						
14-Mar-89	6		7.24	0.00						
28-Mar-89	6		6.93	0.00						
11-Apr-89	6		7.47	0.00						
25-Apr-89	6		7.61	0.00						
10-May-89	6		8.01	0.00						
24-May-89	6		8.10	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
07-Jun-89	6		8.32	0.00						
22-Nov-88	7		8.24	0.00						
06-Dec-88	7		8.15	0.00						
20-Dec-88	7		8.38	0.00						
03-Jan-89	7		7.39	0.00						
17-Jan-89	7		7.65	0.00						
31-Jan-89	7		7.83	0.00						
14-Feb-89	7		7.32	0.00						
28-Feb-89	7		7.79	0.00						
14-Mar-89	7		6.84	0.00						
28-Mar-89	7		5.88	0.00						
11-Apr-89	7		7.06	0.00						
25-Apr-89	7		7.22	0.00						
10-May-89	7		7.61	0.00						
24-May-89	7		7.73	0.00						
07-Jun-89	7		7.93	0.00						
22-Nov-88	8		7.76	0.00						
06-Dec-88	8		7.60	0.00						
20-Dec-88	8		7.90	0.00						
03-Jan-89	8		6.78	0.00						
17-Jan-89	8		7.10	0.00						
31-Jan-89	8		7.32	0.00						
14-Feb-89	8		6.71	0.00						
28-Feb-89	8		7.24	0.00						
14-Mar-89	8		6.22	0.00						
28-Mar-89	8		5.76	0.00						
11-Apr-89	8		6.56	0.00						
25-Apr-89	8		6.56	0.00						
10-May-89	8		7.11	0.00						
24-May-89	8		7.25	0.00						
07-Jun-89	8		7.46	0.00						
22-Nov-88	9		7.78	0.00						
06-Dec-88	9		7.61	0.00						
20-Dec-88	9		7.93	0.00						
03-Jan-89	9		6.79	0.00						
17-Jan-89	9		7.10	0.00						
31-Jan-89	9		7.31	0.00						
14-Feb-89	9		6.75	0.00						
28-Feb-89	9		7.33	0.00						
14-Mar-89	9		6.18	0.00						
28-Mar-89	9		6.01	0.00						
11-Apr-89	9		6.61	0.00						
25-Apr-89	9		6.52	0.00						
10-May-89	9		7.14	0.00						
24-May-89	9		7.32	0.00						
07-Jun-89	9		7.50	0.00						
22-Nov-88	10		7.91	0.00						
06-Dec-88	10		7.69	0.00						
20-Dec-88	10		8.00	0.00						
03-Jan-89	10		6.74	0.00						
17-Jan-89	10		7.14	0.00						
31-Jan-89	10		7.43	0.00						
14-Feb-89	10		6.81	0.00						

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
28-Feb-89	10		7.38	0.00						
14-Mar-89	10		6.29	0.00						
28-Mar-89	10		6.91	0.00						
11-Apr-89	10		6.65	0.00						
25-Apr-89	10		6.62	0.00						
10-May-89	10		7.19	0.00						
24-May-89	10		7.36	0.00						
07-Jun-89	10		7.56	0.00						
22-Nov-88	11		8.62	0.00						
06-Dec-88	11		8.45	0.00						
20-Dec-88	11		8.74	0.00						
03-Jan-89	11		7.76	0.00						
17-Jan-89	11		8.00	0.00						
31-Jan-89	11		8.18	0.00						
14-Feb-89	11		7.68	0.00						
28-Feb-89	11		8.10	0.00						
14-Mar-89	11		7.22	0.00						
28-Mar-89	11		6.56	0.00						
11-Apr-89	11		7.06	0.00						
25-Apr-89	11		7.55	0.00						
10-May-89	11		7.57	0.00						
24-May-89	11		8.10	0.00						
07-Jun-89	11		8.29	0.00						
22-Nov-88	12		8.34	0.00						
06-Dec-88	12		8.11	0.00						
20-Dec-88	12		8.42	0.00						
03-Jan-89	12		7.35	0.00						
17-Jan-89	12		7.60	0.00						
31-Jan-89	12		7.78	0.00						
14-Feb-89	12		7.31	0.00						
28-Feb-89	12		7.82	0.00						
14-Mar-89	12		7.13	0.00						
28-Mar-89	12		N/A							
11-Apr-89	12		7.43	0.00						
25-Apr-89	12		7.18	0.00						
10-May-89	12		7.96	0.00						
24-May-89	12		7.66	0.00						
07-Jun-89	12		7.92	0.00						
10-May-89	13		7.26	0.00						
24-May-89	13		7.42	0.00						
07-Jun-89	13		7.61	0.00						
10-May-89	14		6.89	0.00						
24-May-89	14		7.03	0.00						
07-Jun-89	14		7.20	0.00						
10-May-89	15		8.06	0.00						
24-May-89	15		8.17	0.00						
07-Jun-89	15		8.37	0.00						
10-May-89	16		7.74	0.00						
24-May-89	16		7.85	0.00						
07-Jun-89	16		8.05	0.00						
10-May-89	17		7.40	0.00						
24-May-89	17		7.58	0.00						
07-Jun-89	17		7.74	0.00						

APPENDIX D

BORING LOGS

GSI BORING LOGS

WOODWARD-CLYDE BORING LOGS

Field location of boring:

Project No.: 7615	Date: 4/26/89	Boring No: S-13	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 1 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level	8.4'	7.3'		
Time	11:50am			
Date	4/26	5/10		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - 2 feet.
				2				
				3				**CLAY** (CL)- dark gray (10YR 4/1); soft; damp; low plasticity; trace gravel; no chemical odor.
				4				
350	150	S&H	S-13-5'	5				color change to dark olive gray (5Y 3/2); no chemical odor.
		push		6				
				7				
				8				
				9				
50	2	S&H	S-13-	10				**SILTY SAND** (SM)- light olive brown (2.5Y 5/4); loose; damp; 20-30% silt; mottled brown; no chemical odor.
	3		10'					
	6			11				
				12				**CLAY** (CL)- dark olive gray (5Y 3/2), medium stiff; damp; low plasticity; trace gravel; rootholes; no chemical odor.
				13				
				14				
40	3	S&H	S-13-	15				color change to very dark gray (5Y 3/1) mottled; organics present; no chemical odor.
	5		15'					
	7			16				
				17				becoming saturated at 17.5 feet.
				18				
				19				
0	2	S&H	S-13-	20				**SANDY SILT** (ML)- light yellowish brown (2.5Y 6/4); medium stiff; saturated;
	3		20'					

Remarks:

GeoStrategies Inc.

BORING NO. S-13

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CEG 1262	5/89		

Field location of boring:

Project No.: 7615	Date: 4/26/89	Boring No: S-13	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 2 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	4							15% very fine to fine sand; 10% clay; trace organics; rootholes; mottled brown & black; no chemical odor.
				21				
				22				
				23				
				24				
25	2	S&H	S-13-					**SILTY CLAY** (CL-ML)- light olive brown (2.5Y 5/4); medium stiff; moist; trace organics; mottled brown & black; no chemical odor.
	3		25'	25				
	4							
								Bottom of boring 24.0 feet, Sampled to 25.5 feet 4/26/89

Remarks:

GSI GeoStrategies Inc.

BORING NO. S-13

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615		5/89		

Field location of boring:

Project No.: 7615	Date: 4/26/89	Boring No: S-14
Client: Shell		
Location: 15275 Washington Ave/Lewelling		
City: San Leandro		Sheet 1 of 2
Logged by: DAF	Driller: Bayland	

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level	9'			
Time	10:00am			
Date	4/26/89			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - 2 feet.
				2				
				3				**SILTY CLAY** (CL-ML)- dark gray (2.5Y N4); soft; damp.
				4				becoming firm at 5 feet; with slight
500	150	S&H	S-14-5'	5				odor.
		push		6				
				7				**SILTY SAND** (SM)- olive (5Y 4/3); loose;
				8				damp; 30% medium sand; 20% very fine to
				9				fine sand; trace clay; no chemical
50	2	S&H	S-14-	10				odor, comment: drill cuttings.
	3		10'					**CLAY** (CL)- dark gray (2.5Y N4); stiff;
	4			11				damp; low plasticity; no chemical odor.
				12				**CLAY WITH SAND** (CL)- light yellowish
				13				brown (2.5Y 6/4); medium stiff; damp;
				14				10% very fine to fine sand; 5-10% silt;
0	2	S&H	S-14-	15				trace caliche nodules; mottled; no
	6		15'					chemical odor.
	7			16				**CLAY** (CL)- dark gray (2.5Y N4); stiff;
				17				damp; low plasticity; pockets of silt;
				18				trace black & brown organics; no
				19				chemical odor.
50	2	S&H	S-14-	20				color change to grayish brown (2.5Y 5/2) at 15 feet.
	6		20'					becoming saturated at 19 feet.

Remarks:

GeoStrategies Inc.

BORING NO. S-14

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CEG 1262	5/89		

Field location of boring:

Project No.: 7615	Date: 4/26/89	Boring No: S-14	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 2 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	7							
				21				SANDY SILT (ML)- light yellowish brown (2.5Y 6/4); medium stiff; saturated; 30% very fine to fine sand; 5-10% clay; trace caliche nodules; mottled brown & black; no chemical odor.
				22				
				23				
				24				
	2	SPT						
	2			25				CLAY (CL)- grayish brown (2.5Y 5/2); medium stiff; damp; low plasticity; trace caliche nodules; no chemical odor
	4							
								Bottom of boring 24.0 feet, sampled to 25.5 feet 4/26/89

Remarks:

GeoStrategies Inc.

BORING NO. S-14

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615		5/89		

Field location of boring:

Project No.: 7615	Date: 4/26/89	Boring No: S-15	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 1 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level	8.3'			
Time	2:25pm			
Date	4/26/89			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - 2.5 feet.
				2				
				3				CLAY (CL)- very dark grayish brown (2.5Y 3/2); medium stiff; damp; low plasticity; trace gravel.
				4				
55	150	S&H	S-15-5'	5				SILTY CLAY (CL-ML) -olive (5Y 4/3); soft; damp; low plasticity; mottled brown.
		push						
				6				
Driller notes change @ 7'				7				SILTY SAND (SM) -olive brown (2.5Y 4/4); loose; moist; poorly graded; trace clay.
				8				
				9				▼
35	2	S&H	S-15-	10				CLAY (CL) -very dark gray (5Y 3/1); stiff; damp; low plasticity; trace gravel; mottled brown; rootholes.
	2		10'					
	4							
				11				
				12				
				13				
				14				becoming soft; 5% silt; trace caliche nodules at 14 feet.
55	1	S&H	S-15-	15				
	4		15'					CLAY (CL) -olive gray (5Y 4/2); stiff; damp; low plasticity; mottled; trace caliche nodules.
	8							
				16				
				17				
				18				becoming saturated at 18.5 feet.
				19				▽ SILTY CLAY (CL-ML) -light olive brown (2.5Y 5/4); medium stiff; saturated; trace organics; trace caliche nodules.
NM	3	SPT		20				
	2							

Remarks:

GeoStrategies Inc.

BORING NO. S-15

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CEG 1262	5/89		

Field location of boring:

Project No.: 7615 | Date: 4/26/89 | Boring No: S-15

Client: Shell

Location: 15275 Washington Ave/Lewelling

City: San Leandro | Sheet 2 of 2

Logged by: DAF | Driller: Bayland

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: | Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	4							
				21				
				22				
				23				**CLAY** (CL) -very dark gray (5Y 3/1); medium stiff; damp; low plasticity.
				24				
NM	1	SPT						**SILTY CLAY** (CL-ML) - light olive brown
	3			25				(2.5Y 5/4); medium stiff; damp; some
	5							sandy lenses.
								Bottom of boring 24.0 feet,
								Sampled to 25.5 feet
								4/26/89

Remarks:

GSI GeoStrategies Inc.

BORING NO. S-15

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615		5/89		

Field location of boring:

Project No.: 7615	Date: 4/25/89	Boring No: S-16	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 1 of 2	
Logged by: DAF	Driller: Bayland		
Casing installation data:			

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation. Datum:

Water Level	8.5'			
Time	10:30am			
Date	4/25/89			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - 2 feet.
				2				
				3				CLAY WITH GRAVEL (CL) -dark grayish brown (10 YR 4/2); medium stiff; damp; 5% subrounded pebbles; slight mottling.
				4				
560	150	S&H	S-16-5'	5				CLAY (CL) -dark grayish brown (10YR 4/2); medium stiff; moist; 5% silt; slight mottling; strong chemical odor.
		push						
				6				
				7				
				8				
				9				
0	3	S&H	S-16-	10				CLAY (CL) -very dark grayish brown (10YR 3/2); stiff; damp; increasing silt; trace sand; root structures.
	4		10'					
	6							
				11				
				12				
				13				
				14				
0	3	S&H	S-16-	15				CLAY (CL) -grayish brown (10YR 5/2); stiff; damp; trace organics; mottled; root structures.
	6		15'					
	7							
				16				
				17				
				18				
				19				
0	3	S&H	S-16-	20				SANDY CLAY (CL) -pale brown (10YR 6/3); stiff; damp.
	4		20'					

Remarks:

GeoStrategies Inc.

BORING NO. S-16

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	Chip eeg 1262	5/89		

Field location of boring:

Project No.: 7615	Date: 4/25/89	Boring No.: S-16	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 2 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stem Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	5							
				21				**CLAYEY SAND** (SC) -pale brown (10 YR 6/3); loose; ~~saturated~~.
				22				
				23				
				24				
0	1	S&H	S-16-					**SILTY CLAY** (CL-ML) -brown (10YR 5/3); soft; damp; 10% silt; <10% fine sand; trace organics; mottled gray & orange.
	1		25'	25				
	1							
								Bottom of boring 24.0 feet, sampled to 25.5 feet. 4/25/89

Remarks:

GSI GeoStrategies Inc.

BORING NO. S-16

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615		5/89		

Field location of boring:

Project No.: 7615	Date: 4/25/89	Boring No: S-17	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 1 of 2	
Logged by: DAF	Driller: Bayland		
Casing installation data:			

Drilling method: Hollow Stemm Auger

Hole diameter: 8 inch

Top of Box Elevation:		Datum:
Water Level	7.5'	
Time	12.50 pm	
Date	4/25/89	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - 2 feet.
				2				
				3				**SILTY SAND** (SM) -very dark gray (5Y 3/1); loose; dry; >50% very fine to fine sand; trace clay.
				4				
12.5	150	S&H push	S-17-5'	5				**SILTY CLAY** (CL-ML) -dark greenish gray (5GY 4/1); medium stiff; damp; 5% very fine to fine sand; slight mottling - olive green & gray; moderate chemical odor.
				6				
				7				
				8				**SANDY SILT** (ML) -dark greenish gray (5GY 4/1); loose; saturated; 40% fine to very fine sand; 10% clay; weak chemical odor.
				9				
0	3	S&H	S-17-	10				**SILTY CLAY WITH SAND** (CL-ML) -dark gray (5Y 4/1), stiff; damp; 15-20% very fine to fine sand; trace caliche nodules; trace organics; mottled; ~~rootholes~~.
	4		10'					
	7							
				11				
				12				
				13				
				14				gravels up to 1 cm at 14 feet.
NM	2	SPT		15				**CLAY** (CL) -grayish brown (5Y 5/2); stiff; damp; trace caliche nodules up to 1 cm; mottled; occasional sand lens.
	4							
	7							
				16				
				17				
				18				**SANDY SILT** (ML) -light yellowish brown (10 YR 6/4); loose; saturated; 30% very fine to fine sand; trace clay; trace caliche nodules; trace medium grain sized sand.
				19				
NM	2	SPT		20				
	2							

Remarks:

GeoStrategies Inc.

BORING NO. S-17

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CEG 1262	5/89		

Field location of boring:

Project No.: 7615	Date: 4/25/89	Boring No: S-17	
Client: Shell			
Location: 15275 Washington Ave/Lewelling			
City: San Leandro		Sheet 2 of 2	
Logged by: DAF	Driller: Bayland		

Casing installation data:

Drilling method: Hollow Stemm Auger

Hole diameter: 8 inch

Top of Box Elevation: Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	4							increasing clay at 20.5 feet.
				21				
				22				
				23				
				24				**SILTY CLAY** (CL-ML) -olive (5Y 5/3); firm; damp; 10% very fine to fine sand; trace caliche nodules; trace medium to coarse grain sized sand; trace organics; trace saturated silt pockets.
NM	NM	SPT						
				25				
								Bottom of boring 24.0 feet, Sampled to 25.5 feet. 4/25/89

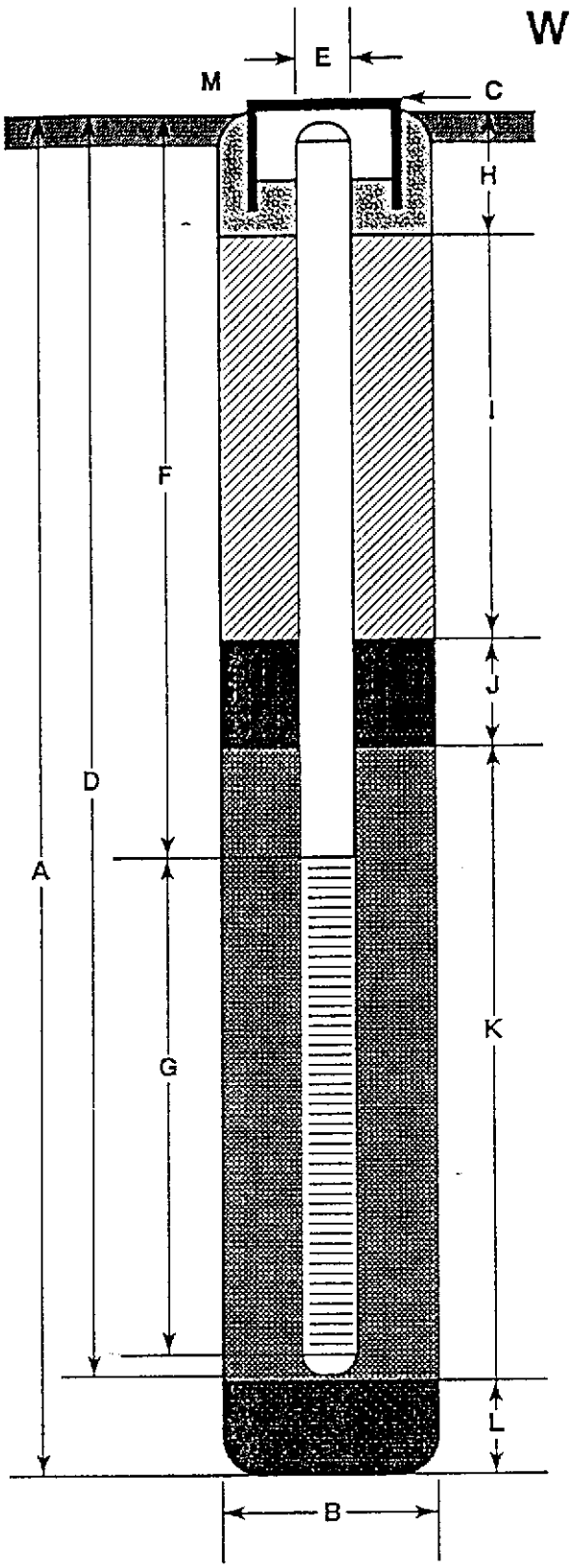
Remarks:

GSI GeoStrategies Inc.

BORING NO. S-17

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615		5/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 24 ft.

B Diameter of Boring 8 in.
Drilling Method HOLLOW STEM AUGER

C Top of Box Elevation 20.57 ft.
☐ Referenced to Mean Sea Level
☒ Referenced to Project Datum

D Casing Length 23.5 ft.
Material SCH 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4 ft.

G Perforated Length 20 ft.
Perforated Interval from 4 to 24 ft.
Perforation Type FACTORY SLOTTED
Perforation Size 0.020

H Surface Seal 2.5 ft.
Seal Material CONCRETE

I Backfill ft.
Backfill Material

J Seal 0.5 ft.
Seal Material BENTONITE

K Gravel Pack 21 ft.
Pack Material LONESTAR 2/12 & #3

L Bottom Seal ft.
Seal Material

M CHRISTY BOX

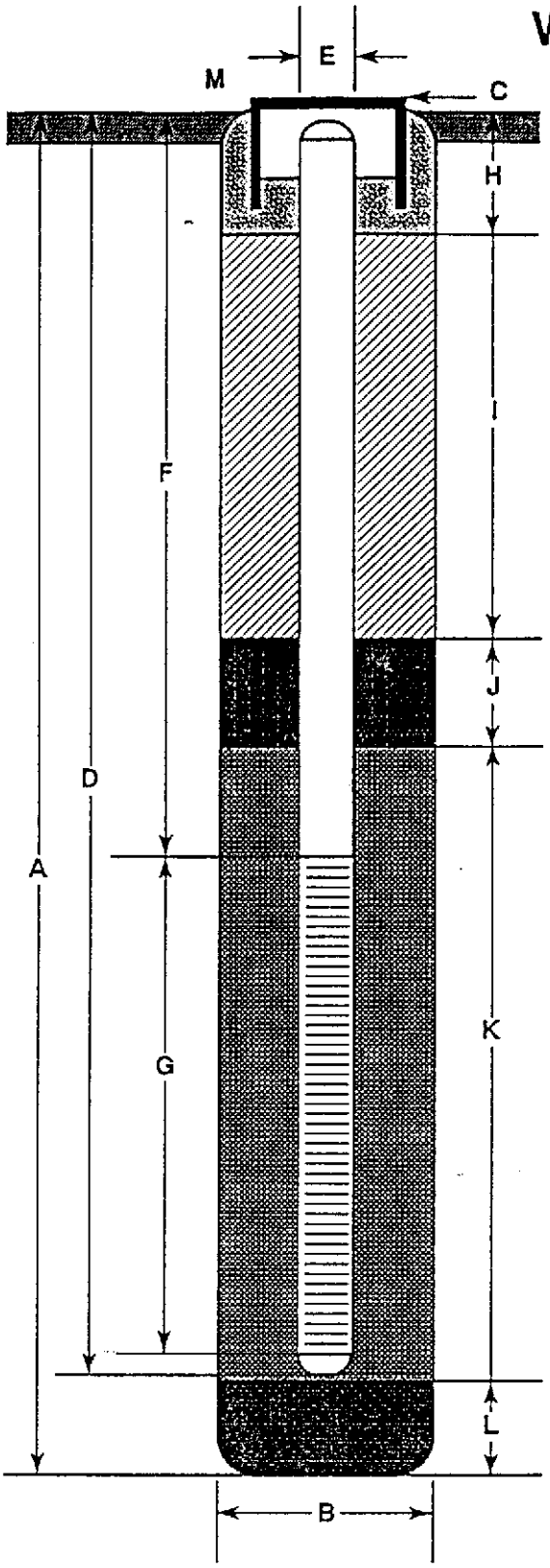
GSI GeoStrategies Inc.

Well Construction Detail
Former Shell Service Station
15275 Washington Ave.
San Leandro

WELL NO. S-13

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CMP CEG 1262	5/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 24 ft.

B Diameter of Boring 8 in.
Drilling Method HOLLOW STEM AUGER

C Top of Box Elevation 20.44 ft.
☐ Referenced to Mean Sea Level
☒ Referenced to Project Datum

D Casing Length 23.5 ft.
Material SCH 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4 ft.

G Perforated Length 20 ft.
Perforated Interval from 4 to 24 ft.
Perforation Type FACTORY SLOTTED
Perforation Size 0.020

H Surface Seal 2.5 ft.
Seal Material CONCRETE

I Backfill ft.
Backfill Material

J Seal 0.5 ft.
Seal Material BENTONITE

K Gravel Pack 21 ft.
Pack Material LONESTAR 2/12 & #3

L Bottom Seal ft.
Seal Material

M CHRISTY BOX

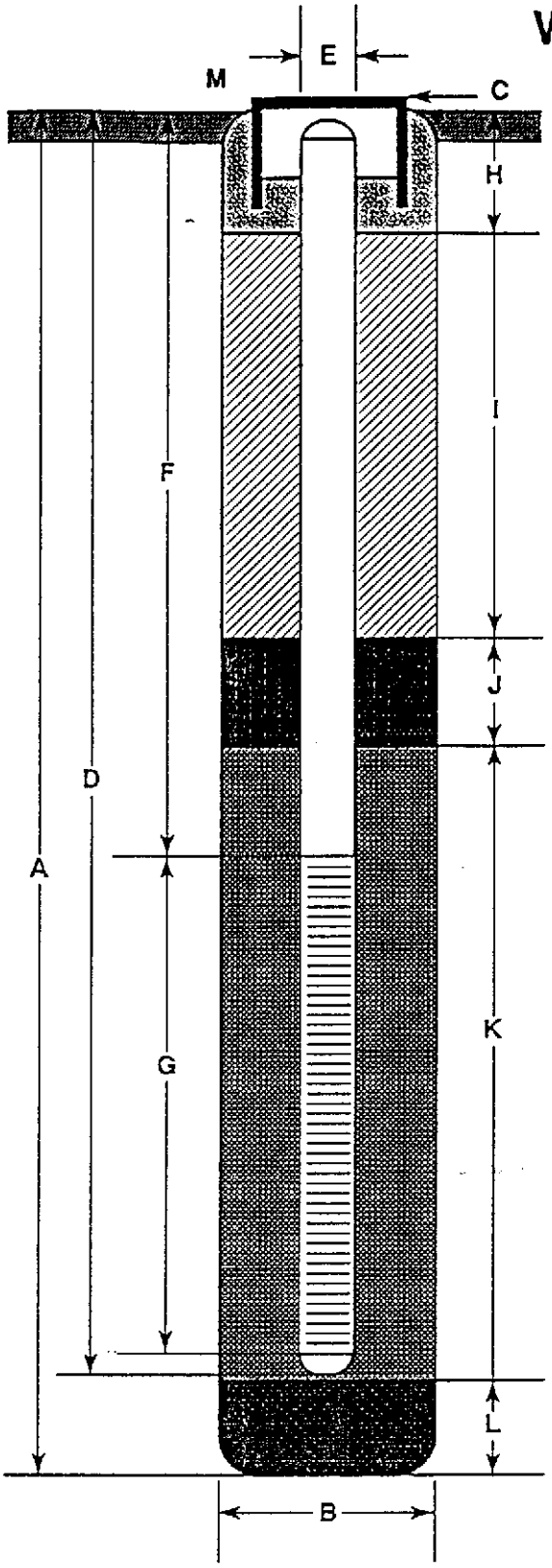
GeoStrategies Inc.

Well Construction Detail
Former Shell Service Station
15275 Washington Ave.
San Leandro

WELL NO.
S-14

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CWP CEG 1262	5/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 24 ft.

B Diameter of Boring 8 in.
Drilling Method HOLLOW STEM AUGER

C Top of Box Elevation 22.22 ft.
☐ Referenced to Mean Sea Level
☒ Referenced to Project Datum

D Casing Length 23.5 ft.
Material SCH 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4 ft.

G Perforated Length 20 ft.
Perforated Interval from 4 to 24 ft.
Perforation Type FACTORY SLOTTED
Perforation Size 0.020

H Surface Seal 2.5 ft.
Seal Material CONCRETE

I Backfill ft.
Backfill Material

J Seal 0.5 ft.
Seal Material BENTONITE

K Gravel Pack 21 ft.
Pack Material LONESTAR 2/12 & #3

L Bottom Seal ft.
Seal Material

M CHRISTY BOX

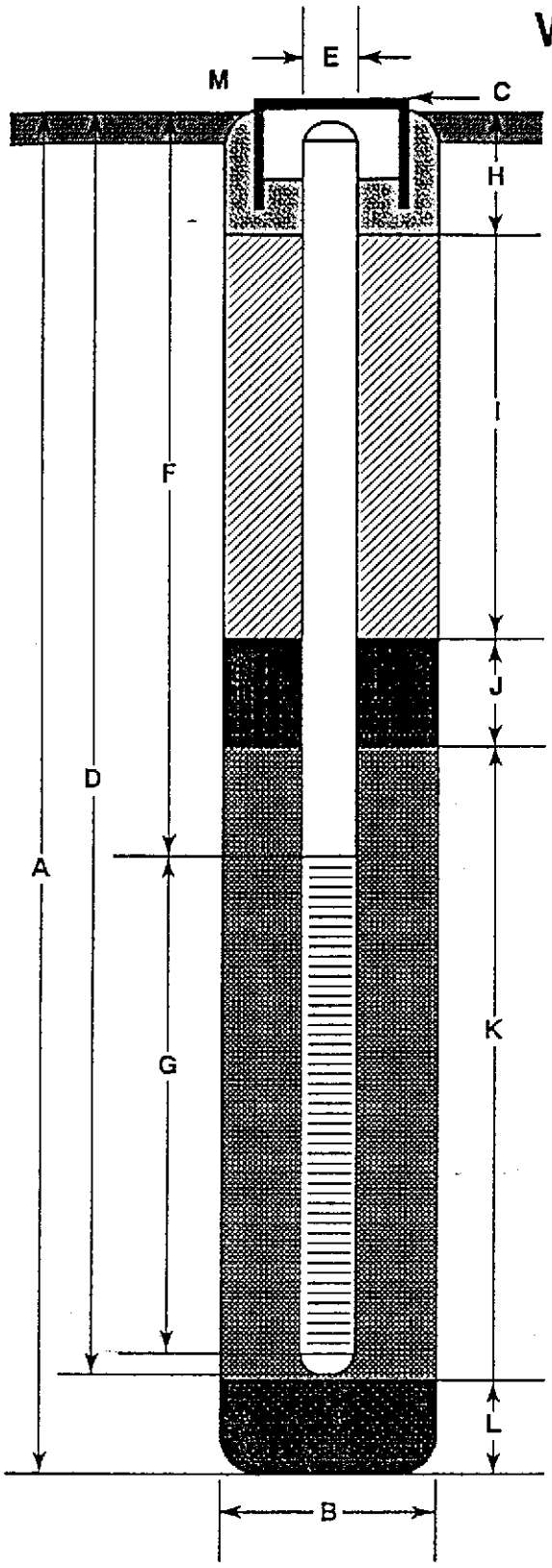
GeoStrategies Inc.

Well Construction Detail
Former Shell Service Station
15275 Washington Ave.
San Leandro

WELL NO.
S-15

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CWP CEG 1262	5/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 24 ft.

B Diameter of Boring 8 in.
Drilling Method HOLLOW STEM AUGER

C Top of Box Elevation 21.82 ft.
☐ Referenced to Mean Sea Level
☒ Referenced to Project Datum

D Casing Length 23.5 ft.
Material SCH 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4 ft.

G Perforated Length 20 ft.
Perforated Interval from 4 to 24 ft.
Perforation Type FACTORY SLOTTED
Perforation Size 0.020

H Surface Seal 2.5 ft.
Seal Material CONCRETE

I Backfill ft.
Backfill Material

J Seal 0.5 ft.
Seal Material BENTONITE

K Gravel Pack 21 ft.
Pack Material LONESTAR 2/12 & #3

L Bottom Seal ft.
Seal Material

M CHRISTY BOX

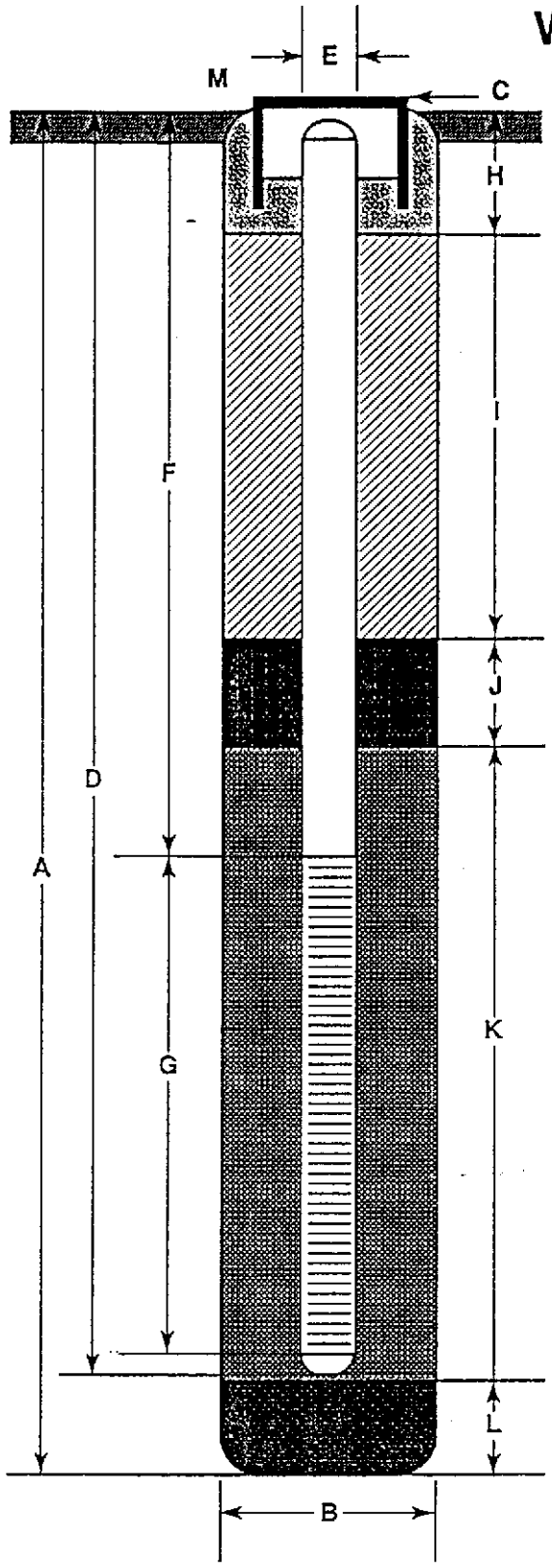
GSI GeoStrategies Inc.

Well Construction Detail
Former Shell Service Station
15275 Washington Ave.
San Leandro

WELL NO. S-16

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CEG 1262	5/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 24 ft.

B Diameter of Boring 8 in.
Drilling Method HOLLOW STEM AUGER

C Top of Box Elevation 20.95 ft.
☐ Referenced to Mean Sea Level
☒ Referenced to Project Datum

D Casing Length 23.5 ft.
Material SCH 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4 ft.

G Perforated Length 20 ft.
Perforated Interval from 4 to 24 ft.
Perforation Type FACTORY SLOTTED
Perforation Size 0.020

H Surface Seal 2.5 ft.
Seal Material CONCRETE

I Backfill ft.
Backfill Material

J Seal 0.5 ft.
Seal Material BENTONITE

K Gravel Pack 21 ft.
Pack Material LONESTAR 2/12 & #3

L Bottom Seal ft.
Seal Material

M CHRISTY BOX

GSI GeoStrategies Inc.

Well Construction Detail
Former Shell Service Station
15275 Washington Ave.
San Leandro

WELL NO. S-17

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7615	CWP RG 1362	5/89		

WOODWARD-CLYDE BORING LOGS

Woodward-Clyde Consulta.

PROJECT NAM GETTLER-RYAN NO. 8220011A

MONITORING WELL LOCATION	15275 Washington Ave., San Leandro, CA (S-11)					ELEVATION AND DATUM			
DRILLING AGENCY	Bay Land Drilling	DRILLER	Tom Mack			DATE STARTED / DATE FINISHED	11/4/88		
DRILLING EQUIPMENT	CME - 55					COMPLETION DEPTH	24.5'	SAMPLER	Modified California
DRILLING METHOD	8" Hollow stem auger	DRILL BIT	CME Carbide			NO. OF SAMPLES	DIST. 5	UNDIST.	5
SIZE AND TYPE OF CASING	Sch 40 3" PVC	FROM	24.5	TO	0.5 FT.	WATER LEVEL	FIRST 8	COMPL. 7.8	24 HRS. —
TYPE OF PERFORATION	0.02"	FROM	24.0	TO	4.0 FT.	LOGGED BY:		CHECKED BY:	
SIZE AND TYPE OF PACK	2/12 Monterey Sand	FROM	24.5	TO	3.5 FT.	~~B. Sagel~~ G. Heyman		M. Borkowski	
TYPE OF SEAL	NO. 1 ½" Bentonite Pellets	FROM	3.5	TO	3.0 FT.				
	NO. 2 Cement grout	FROM	3.0	TO	0.5 FT.				

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION		USCS	Well Construction
			Asphalic Concrete and base rock			
5	1	pushed @ 175 lbs	SILTY to SANDY CLAY greenish gray, silt and very fine grained sand, content varies vertically, low plasticity, firm, moist, numerous vesicles less than 1 mm diameter	OVM = 110 ppm Moderate Hydrocarbon odor	CL	
				Strong Hydrocarbon odor in cuttings at 8'		
10	2	4 7 6	SILTY CLAY to CLAYEY SILT dark brown, little to some very fine sand, low plasticity, moist to wet, few vesicles	OVM = 0 ppm No Hydrocarbon odor	CL-ML	
15	3	5 9 11	SILTY CLAY greenish brown, little to some very fine sand, medium plasticity, wet with saturated areas, gravel layers 1 - 2" thick from 16 - 18' (driller)	OVM = 0 ppm No Hydrocarbon odor	CL	
20	4*	3 2 2	SILTY CLAY with Interbedded CLAYEY SAND to SANDY CLAY Clay is grayish brown, medium plasticity, wet with saturated areas, sand is light yellow brown, very fine grained, loose, wet to saturated, up to 3" thick	OVM = 0.5 ppm No Hydrocarbon odor	CL-SC	
25	5	4 7 8	SANDY CLAY to CLAYEY SAND layers are up to 5" thick, as above	No Hydrocarbon odor	CL	
30			Total Depth = 24.5 feet ~~25'~~ * = Laboratory Sample			
35						

Woodward-Clyde Consultants — Woodward-Clyde PROJECT NAME GETTLER-RYAN NO. 8820011A

MONITORING WELL LOCATION	15275 Washington Ave., San Leandro, CA Well S-12	ELEVATION AND DATUM	
DRILLING AGENCY	Bay Land Drilling	DRILLER	Tom Mack
DRILLING EQUIPMENT	CME - 55	DRILLING EQUIPMENT	
DRILLING METHOD	8" Hollow stem auger	DRILL BIT	CME Carbide
SIZE AND TYPE OF CASING	Sch 40 3" PVC	FROM 24.0 TO 0.5 FT.	
TYPE OF PERFORATION	0.02"	FROM 23.5 TO 3.5 FT.	
SIZE AND TYPE OF PACK	2/12 Monterey Sand	FROM 24.0 TO 3.0 FT.	
TYPE OF SEAL NO. 1	1/2" Bentonite Pellets	FROM 3 TO 2.5 FT.	
TYPE OF SEAL NO. 2	Cement grout	FROM 2.5 TO surface FT.	

DATE STARTED / DATE FINISHED	11/4			
COMPLETION DEPTH	24.5	SAMPLER	Modified California	
NO. OF SAMPLES	DIST. 5	UNDIST. 5		
WATER LEVEL	FIRST 8	COMPL. —	24 HRS. —	
LOGGED BY: R. Siegel		CHECKED BY: M. Borkowski		

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Well Construction
			Asphalic Concrete		
5	1	push@ 200 lbs	CLAYEY SAND to SANDY CLAY grading down to SILTY CLAY TO CLAYEY SILT greenish gray at top with gray mottling in middle and bottom of sample, very fine sand, low plasticity, moist, generally homogeneous OVM jumped to 190 ppm then settled at 120 ppm Weak Hydrocarbon odor	CL	
10	2	4, 5, 7	SILTY CLAY dark brownish gray, some very fine sand, low plasticity, firm, moist to wet, few beds of clay, sand to 1/4" thick OVM = 20 ppm Weak Hydrocarbon odor	CL	
15	3	5, 6, 11	CLAY to SILTY CLAY medium grayish brown, some silt grading to silty clay, medium plasticity, wet homogeneous Driller indiccates drilling through a series of 2 - 4" gravel layers from 16 - 19' OVM = 0 ppm No Hydrocarbon odor	CL	
20	4	3, 4, 5	CLAY to SANDY CLAY medium grayish brown, little to some very fine sand occasionally grading to sandy clay, low to medium plasticity, firm, saturated No Hydrocarbon odor	CL	
			CLAYEY SAND to SANDY CLAY medium yellow brown, very fine sand, saturated OVM = 1 ppm No Hydrocarbon odor		
	5	4, 5, 7	SILTY CLAY to CLAYEY SILT medium yellow brown, up to some very fine sand, low to medium plasticity, saturated OVM = 0 ppm No Hydrocarbon odor	CL	
25			Total Depth = 24.5 feet * = Laboratory Sample		
30					
35					

APPENDIX E

WELL SURVEY AND RADIUS-OF-SURVEY MAP

EMCON
ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

Date February 13, 1987
Project 738-08.03

To: Gettler-Ryan Inc.
1992 National Avenue
Hayward, California 94545

Attention: Ms. Christa Marting

File #9406

We are enclosing

Copies	Description
2	Well survey and radius-of-survey map for above-referenced project, Shell, Washington and Lewelling, San Leandro.

For your X Use
Approval
Information

Sent by First Class/Air Mail
Special Delivery
X Other Hand-Delivered

Comments:

Richard M. Pollard RMP

Headquarters:
1921 Ringwood Avenue, San Jose, California 95131, (408) 275-1444
Branch office: 445 W. Garfield Avenue, Glendale, California 91204

EMCON ASSOCIATES — WATER WELL SURVEY FORM 730-08.03 — SHEET 1 OF 16. — DMO: 2/5/87

EMCON WELL NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
1	1900	Heide	Domestic	?	36			6					
	Owner	90 Grant											
		San Lorenzo											
2	1935	Gianelli	Irrig.	?	113	48-113		10-8					
	Owner	143 Grant											
		San Lorenzo											
3	6/12/48	Modern Veg.	Irrig.	?	?								
	?	Nursery											
		15550 Washington	Ave.	550				12					
		San Lorenzo											
4	?	Gianelli	Irrig.	?	113	48-113							
	?	15841 Nielson Ave											
		San Lorenzo											
5	Owner	Bratton	Irrig.	?	21								
	?	15868 Corte											
		Ulisse, San Lorenzo											
6	Owner	Moyers	Irrig.	?	30								
	?	1508 Via											
		Hermana											
		San Lorenzo											
7	?	Norris	Irrig.	?	20								
	?	16030 Via											
		Nueva											
		San Lorenzo											
8	8/5/56	Lichty	Irrig.	?	30	15-30		6					
	Domestic	16148 Channel											
	Water Well	St. San Lorenzo											
	Company												

EMCON WELL NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
9	1920	Marengo		?	60			8					
	?	14953 Washington											
		San Lorenzo											
10	1936	Twn. Nursery [illegible]		?	335			14				23	
	White	Corp. 14958											
		Washington											
		San Lorenzo											
11	1936	Twn. Nursery Irrig.	?		325			14				23	
	White	Corp. 14958											
		Washington											
		San Lorenzo											
12	5/26/78	McCarthy		?	?								
	AR-GO	2770 Scott Blvd.											
	Pump Co.	Santa Clara											
13	1930	Fara Bros.	Domestic	?	120	99-110		10				20	
	?	391 W. 150th											
		San Lorenzo											
14	1949	Ramirez	Irrig.	?	32	22-32		4					
	Owner	14960 Crosby											
		San Lorenzo											
						453-469							
15	9/28/34	Gansberger		?	545	487-492		12				35	
	G.P. Nelson					518-520							
						521-528							
						530-540							

EMCON WELL NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
16	1977	Bostick		?	29								
	?	15038 Alexandria											
		San Lorenzo											
17	?	Swatman											
	Swatman	15054	Irrig.	28	28								
		Alexandria											
		San Lorenzo											
18	?	Bates	Irrig.	28	25								
	Owner	15028 Grenda											
		San Lorenzo											
19	1977	Andrada	Irrig.	?	?								
	?	15088 Andover											
		San Lorenzo											
20	?	City of	Irrig.	?	106			10					
	?	San Lorenzo											
		Washington											
		Manor Park											
21	1947	Knapp	Irrig.	?	75			6					
	?	Silva Bros.											
		150 West 150th Avenue											
		San Lorenzo											
22	?	Owlson	Irrig.	?	30			6					
	Owner	1146 Bodmin											
		San Lorenzo											
23	?	Kirkley	Domestic	?	60			4					
	?	15008 Dewey											
		San Lorenzo											

EMCON WELL NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
24	?												
	owner	Alameda	Irrig.	?	32			4				10	
		15099 Edgemoore											
		San Lorenzo											
25	?	?	Irrig.	?	?								
	?	15118 Inverness											
		San Lorenzo											
26	1977	Vandenberg	Irrig.	?	40								
		15202 Galt											
		San Leandro											
27	1977	Fassler	Irrig.	30	30								
	?	15205 Galt											
		San Leandro											
28	1952	Reairwin	Irrig.	?	18			6					
	Owner	15211 Nocton											
		San Leandro											
29	1958	Bothell	Irrig.	?	28			6					
	Owner	15049 Fleming											
		San Leandro											
30	?	Albright	Irrig.	46	20								
	Owner	15185 Norton											
		San Leandro											
31	?	Armstrong	Irrig.	?	?								
	Owner	15177 Norton											
		San Leandro											
32	1977	Tisby	Irrig.	20	20								
	?	15193 Endicott											
		San Leandro											

MCON ELL UMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
33	1977	Lapin	Irrig.	38	38								
	?	15105 Beatty											
		San Leandro											
34	?	Christ	Irrig.	?	?								
	?	Prebyterian											
		Church											
		840 Fargo											
		San Leandro											
35	1976	Campilengo	Irrig.	35	35								
	?	15190 Norton St.											
		San Leandro											
36	?	?	Domestic ?		42								
	?	658 Fargo											
		San Leandro											
37	1957	San Leandro	Aband. ?		525	341-354		16					
	Bassett	Nursery	1985			490-511							
		15100 Washington											
		San Lorenzo											
38	1947	"	Inactive ?		720	660-720		12				23	
	Fuentes	"											
		"											
		"											
39	1938	Christensen	Irrig.		370			12				26.5	
	Silva Bros.												

MCON ELL UMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. OPTH (FT.)	COMP OPTH (FT.)	PERF. INTER. (FT.)	SEAL OPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM	SURF. ELEV. (FT.)	
		Modern											
40	1932	Vegetable	Irrig.	?	350	340-350		12				24	
	Western	Nursery											
	Well	15550 Washington											
		San Leandro											
41	1920	Gualco	Irrig.	?	130			10				24	
	Swan	15325 Washington											
		San Leandro											
42	1978	Perry	Irrig.	?	?								
	Wood Co.	15600 Lorenzo											
		San Lorenzo											
43	1925	Pianetta	Irrig.	?	120	100-120		12				17	
	Nunes	915 Lewelling											
		San Lorenzo											
44		Jones	Irrig.	?	42	30-42		6				17	
	Owner	983 Lewelling											
		San Lorenzo											
45		Raele	Irrig.	?	?								
		15547 Sedgeham											
		San Leandro											
46	1957	Pianetta	Irrig.	?	22			6				21	
	Owner	15388 Andover											
		San Leandro											

MCON ELL UMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
47	1953	Burke											
	Owner	15367 Norton Irig		?	30			6					
		San Lorenzo											
48	1956	Stratman	Irrig.	?	36			6					
	Owner	15311 Farnsworth											
		San Lorenzo											
49	?	Rosenquist	Irrig	?	30			6					
	Owner	15301 Farnsworth											
		San Lorenzo											
50	1977	Perino	Irrig.	30	30								
	?	15596 Tilden											
		San Leandro											
51	1977	Elliott	Irrig.	30	30								
		1018 Kramer											
		San Leandro											
52	?	Wollery	Irrig.	?	23								
	?	15340 Churchill											
		San Leandro											
53	?	Howell	Irrig	24	25								
		15302 Farnsworth											
		San Leandro											
54	1977	Stanley		30	30								
	?	15368 Churchill											
		San Leandro											

MCON ELL UMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. OPTH (FT.)	COMP. OPTH (FT.)	PERF. INTER. (FT.)	SEAL OPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM	SURF. ELEV. (FT.)	
		Parodi											
55	?	1508	Domestic	?	?								
	?	Lewelling											
		San Lorenzo											
56		Beuit Enterprises		?	?								
	?	2020 Davis	Abandoned										
		San Leandro											
57	1977	McTigue	Irrig.	21	20								
	?	1500 Sayre											
		San Leandro											
58	?	Bolla	Irrig.	?	?								
	?	1335 Sayre											
		San Leandro											
59	?	Brown	Irrig.	31	31								
		15591 Jutland											
		San Leandro											
60	?	Perry	Irrig	?	60			12	12				
	?	15500 Lorenzo											
		San Lorenzo											
61	1957	Arroyo High	Irrig	?	600							19	
	?	School											
		Grant St.											
		San Lorenzo											
2	?	Corso	?	?	?								
	?	15651 Washington											
		San Lorenzo											

ENGEN WELL NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
		Richols											
63	1946	3000	Domestic ?		197			10					
	Basset	Halcolm											
		San Leandro											
64	1937	Moore	Irrg.	?	50	30-47		6				26	
	Jet	15241 Upton											
		San Leandro											
65	1952	Crane	Irrig	?	20			4				29	
	Owner	487 Lloyd											
		San Leandro											
66	1953	Wilson	Irrig.	?	25			8				27	
	Owner	15360 Dermody											
		San Leandro											
67	1958	Cuimente	Irrig	?	20			6				28	
	Owner	15508 Werner											
		San Leandro											
68	1935	Stewzel	Irrig	?	270			10				38	
	Silva	Sycamore											
		San Leandro											
69	?	Twin	Irrig	?	?							31	
	?	Nursery											
		Washington Street											
		San Leandro											
70	?	Twin	Abandoned	?				8				30	
	?	Nursery											
		Washington St.											
		San Leandro											

MCON ELL UMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
	?	Gonzales											
71	?	15559 Usher Irrg		?	25							38	
		San Leandro											
72	1955	Maciel	Irrig.	?	27			4				44	
	Owner	15594 Sharon											
		San Lorenzo											
73	1951	Hayward	Domestic ?		616			30/14				42	
	Western	Union High	Irrig										
	Well	School Dist.											
		San Lorenzo											
74	1937	Teel	Domestic ?		75			8					
	Swanson	624 Lewelling											
		San Lorenzo											
75	1949	Ratti	Domestic ?		410								
	Anderson	Lewelling?	Irrig.										
		Hesperian											
		San Lorenzo											
76	?	Levy	Irrig.	?	22			4				28	
	?	646 Via Del Oro											
		San Lorenzo											
77	1920	Kino Nurs-	Irrig	?	150			12				33	
	?	ery											
		880 Lewelling											
		San Lorenzo											

CONLL NBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS: TOT. OPTH (FT.)	COMP. OPTH (FT.)	PERF. INTER. (FT.)	SEAL OPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	EDITED DRILLER REPORTS
		P. Duncan	Irrig.	?	?								
78	?	16089 Via Alamitos											
	?	San Lorenzo											
		Avansino											
79	1951	1441	Irrig.	?	701			12				36	
	Bassett	Washington											
		San Leandro											
80	1951	Abansino	Irrig.	?	701							35	
	?	Mortenson Nursery Co.											
		14441 Washington											
		San Leandro											
81	1952	Abansino	Irrig.	?	701							32	
	?	Mortenson Nursery Co.											
		14441 Washington											
		San Leandro											
82	1937	Abansino	Irrig	?	288			10				35	
	?	Mortenson Nursery Co											
		14441 Washington											
		San Leandro											
83	?	Abansino	Irrig	?	135			8/10				38	
	?	Mortenson Nursery Co.											
		14441 Washington											
		San Leandro											
84	1931	Abansino	Irrig.	?	235			12				34	
	?	Mortenson Nursery Co.											
		14441 Washington											
		San Leandro											

CON LL MBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
85	?	Abansino	Irrig.	?	254			12					
	?	Mortenson	Nursery	Co.									
		14441 Washington											
		San Leandro											
86	1931	Avansino	Irrig.	?	235			12				34	
	?	Mortenson	Nursery	Co.									
		14441 Washington											
		San Leandro											
87	?	Avansino	Irrig.	?	135			12					
	?	Mortenson											
		14441 Washington											
		San Leandro											
88	1956	Clark	Irrig.	?	30			6					
	Domestic	417 Bradrick											
	Well	San Leandro											
89	1930	Cardoza	Domestic	?	150			10					
	?	14700	Irrig.										
		Washington											
		San Leandro											
90	?	Olsen	Irrig.	62	60								
	AAA Drill	14737 Harold											
	ing	San Leandro											
91	1951	K-Mart	Irrig.	?	701			12				35	
	Bassett	14441 Washington											
		San Leandro											

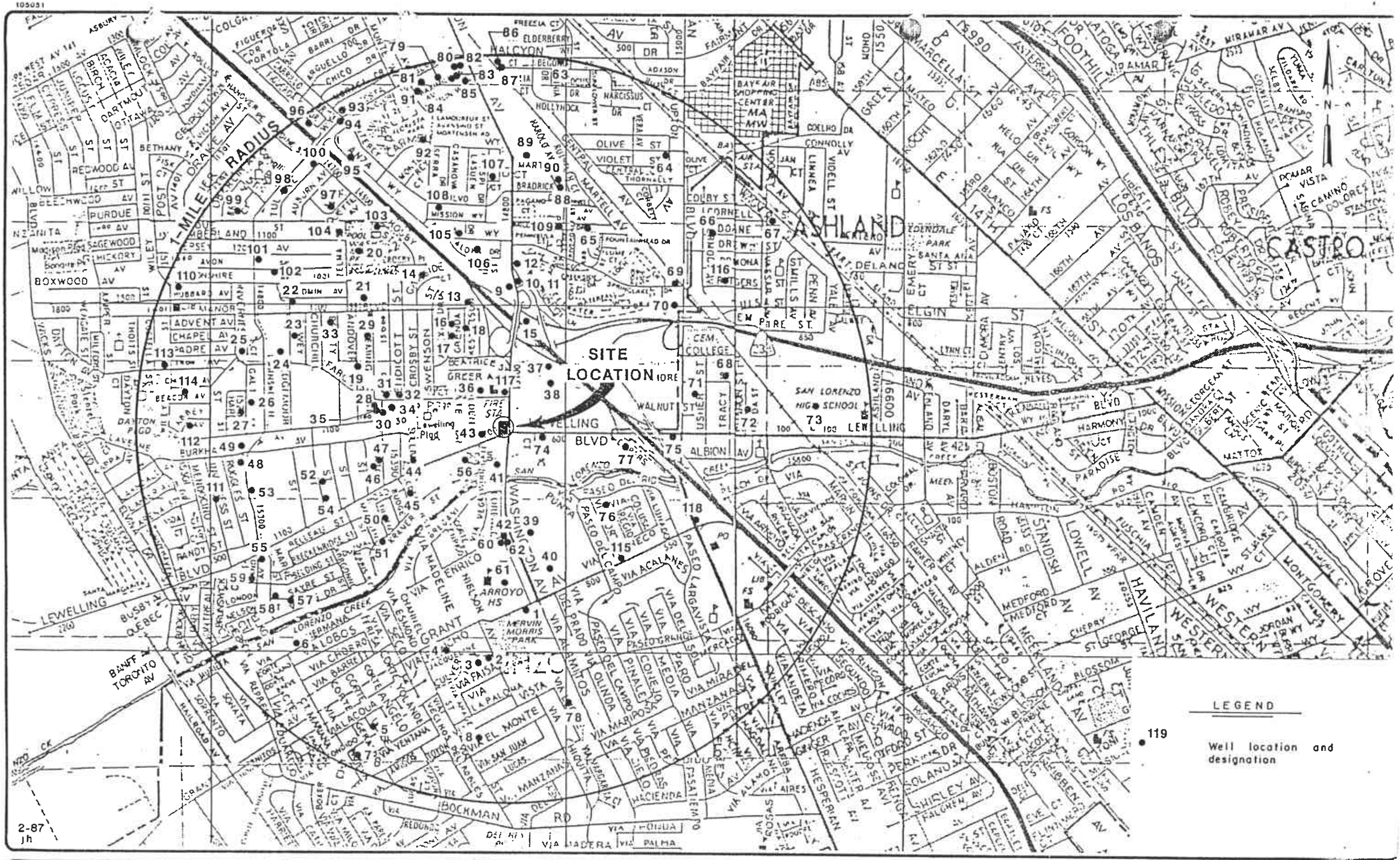
:ON :L :BER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM	SURF. ELEV. (FT.)	
92	1957	Graves	Irrig.	?	23			4					
	Owner	3894 Carmel											
		San Leandro											
93	1958	Kirkland	Irrig.	?	19			4					
	Owner	883 Halycon											
		San Leandro											
94	1956	Grego	Irrig.	?	125			5				30	
	Murphy	3701 Monterey											
		San Leandro											
95	?	Hastie											
	?	3712 Awravy	Irrig	?	?								
		San Leandro											
96	1955	Thomas	Irrig.	?	29			4					
	Owner	3689 Figueroa											
		San Leandro											
97	?	Bolesworth	Irrig.	?	?								
	?	1044 Marquette											
		San Leandro											
98	1977	Spitznagle	Irrig.	?	38								
	?	1075 Tulane											
		San Leandro											
99	1956	Smith	Irrig.	?	16			5					
	Owner	1227 Purdue											
		San Leandro											

CON. NUMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
100	1957	Hawks	Irrig.	?	60			4				27	
	Owner	1051 Tulane											
		San Leandro											
101	?	Tavis	Irrig.	?	?								
	?	1144 Avon											
		San Leandro											
102	1977	Brannon	Irrig.	?	36								
	?	1075 Avon											
		San Leandro											
103	1957	Heisler	Irrig.	?	37			6					
	Leite	14861 Crosby											
		San Leandro											
104	1952	Souza	Irrig.	?	27			6					
	Owner	1009 Cumberland											
		San Leandro											
105	1977	Friesen	Domestic	?	84								
	?	324 Anza											
		San Leandro											
106	?	Chuck	Irrig.	?	30			4					
	Owner	335 Aloha											
		San Lorenzo											
107	1958	Calvao	Irrig.	?	23	15-23		5					
	Owner	830 Crespi											
		San Leandro											

ON L BER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP. DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	MAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
108	1957	Payne	Irrig.	?	14								
	Owner	916 Sierra											
		San Leandro											
109	1955	Davies	Irrig.	?	28								
	Owner	418 Lloyd											
		San Leandro											
110	1977	Brooks	Irrig.	?	?								
	?	1341 Devonshire											
		San Leandro											
111	1977	Henwood	Irrig.	18	18								
	?	15700 Inverness											
		San Leandro											
112	1977	Knupler	Irrig.	25	25								
	?	1439 Abbey											
		San Leandro											
113	1977	Tatman	Irrig.	27	27								
	?	15149 Wiley											
		San Leandro											
114	1977	Gietzen	Irrig.	28	27								
	?	1435 Church											
		San Leandro											
115	1977	Frink	Irrig	?	?								
	?	754 Grant											
		San Lorenzo											

ICON LL JMBER	DATE DRILLED, DRILLER	WELL OWNER LISTED	STATUS IF KNOWN	WELL CONSTRUCTION DETAILS									EDITED DRILLER REPORTS
				TOT. DPTH (FT.)	COMP DPTH (FT.)	PERF. INTER. (FT.)	SEAL DPTH (FT.)	CASE DIA. (IN.)	CASE MAT.	WAT. LEV. (FT.)	EST. Q (GPM)	SURF. ELEV. (FT.)	
116	1977	Maxwell	Irrig.	?	?								
	?	538 Rutgers											
		San Leandro											
117	1986	Mobil Oil	Mon.	?	?								
	?	Washington & Fargo											
		San Leandro											
118	1986	Mobil Oil	4 Mon	?	?								
	?	15884 Hesparian											
		San Lorenzo											

105051



EMCON Associates

SCALE 0 1/2 1.0 MILES

GETTLER-RYAN INC.
SUBSURFACE HYDROGEOLOGIC INVESTIGATION
SHELL SERVICE STATION, 15275 WASHINGTON AVE.
SAN LORENZO, CALIFORNIA

WELL SURVEY MAP

FIGURE 1

PROJECT NO. 738-08.03