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TO: **Ms Amy Leach**
of **Alameda County Health, /UST LOP**
DATE: **January 9, 1996**

PROJECT/**Gasoline and Pump Station Diesel Tank Areas, Investigations**
PROJECT No.:3022.7

SUBJECT: **Work Plan Submittal**

INITIATOR: John R. Sutton, PE

On behalf of Oro Loma Sanitary District, we submit the attached: "Work Plan For Soil And Ground Water Investigations At The Former sites of the 1,000 Gallon Gasoline Tank at the Oro Loma Sanitary District Service Center and the pair of Diesel Tanks at the Pump Station Building, Oro Loma Sanitary District Sewage Treatment Plant San Lorenzo, California".

Please contact Mr. Mike Cortez at Oro Loma (510) 276-4700 x131 or me at (510) 631-1688 should you have any comments or questions. We are most anxious to commence the work.

sg/olsd/30227lt3.doc

January, 1996
Project No. 3022.7

WORK PLAN
for
SOIL AND GROUND WATER INVESTIGATIONS
at the former sites of the
1,000 Gallon Gasoline Tank at the
Oro Loma Sanitary District Service Center
and the pair of Diesel Tanks at the Pump Station Building
Oro Loma Sanitary District Sewage Treatment Plant
San Lorenzo, California

PREPARED FOR

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for
SOIL AND GROUND WATER INVESTIGATIONS
at the former sites of the
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and the pair of Diesel Tanks at the Pump Station Building
at the adjacent
Oro Loma Sanitary District Sewage Treatment Plant
San Lorenzo, California

1.0 INTRODUCTION

1.1 Statement of Scope of Work

This project entails the performance of a soil and ground water investigation to clarify the horizontal and vertical extent, and the severity of soil and groundwater pollution at the site of a former 1,000 gallon, underground gasoline storage tank. The tank was located adjacent to the Ora Loma Sanitary District (OLSD) Service Center, at 2600 Grant Avenue, in unincorporated Alameda County. Additionally, the work plan includes for performing additional subsurface soil and ground water sampling at the former location of two above ground diesel storage tanks at the adjacent OLSD sewage treatment plant. The facility location is identified in relation to the Service Center and the adjacent Treatment Plant on Figure 1 "Site Location Map".

1.2 Gasoline Tank Area

1.2.1 Site Location

The tank was located in the parking lot of the OLSD Service Center. The tank location was to the west of the Engineering Building and south of the Maintenance Building, as generally shown on Figure 2.

1.2.2 Background / Site History

A 1,000 gallon tank was installed by OLSD in 1978 and used to store leaded gasoline until 1985. At that time it was converted to unleaded gasoline service. No leakage had been noted with this tank. The tank was removed as part of the District's program to eliminate excess infrastructure. This tank replaced a pre-existent 1,000 gallon, leaded gasoline tank in the same location, which was part of the original construction of OLSD's maintenance facility in 1961. The original tank was replaced in 1978 because it was known to have leaked. The amount of leakage was not documented.

A subsurface investigation of the tank area, was commenced by Levine Fricke in August, 1993. That program comprised drilling six hollow stem auger borings, collection of soil samples, and grab ground water samples from selected borings. Samples analysis revealed soil contamination by gasoline to as much as 4,300 mg/kg (ppm) and ground water contamination to 1,600 mg/l.

Ground water was recorded at 6 feet depth in all 6 borings and no free product was reported. The project was terminated due to interference with seismic retrofit work on the adjacent maintenance building. Test results are summarized on Table 1.

The Sutton Group was engaged by OLSD to complete the investigation and to manage removal of the tank and subsequent remediation. The supplementary investigation comprised the excavation of seven test trenches in the parking lot. Trenches were sited in the probable down-gradient fan from the previous borings. The results of this investigation were documented in a report titled "Stage II Tank Removal Investigation, 1,000 Gallon Gasoline Tank Site..." dated November 23, 1994. OLSD submitted the report to the Alameda County Department of Environmental Health's UST Local Oversight Program. In summary the investigation showed concentrations of degraded gasoline in a plume emanating from the tank in granular fill soils and Bay Mud at depths shallower than the observed groundwater. Degraded gasoline was present at up to 1,600 mg/kg in the soils. Test results are summarized on Table 2.

Following a public bidding process, OLSD contracted the tank removal with "VCI of California". VCI removed the tank on May 3, 1995 under permit issued by, and under observation of ACEH/LOP and the San Lorenzo Fire Marshal. The contractor excavated a 17 feet long by 11 feet wide pit to remove the 1,000 gallon tank. Some of the soil overlying the tank was stained in the vicinity of the fill pipe suggesting overfill spillage, and also near the short pump line, suggesting fuel pipe leakage. The bottom of the 4 foot diameter tank was at 7 feet depth. The tank was founded in pea gravel, and water was initially noted to be seeping at 7.5 feet depth in the pit. Little gasoline odor was noted in the shallow fill soil, including the vicinity of the service piping. No free product was observed. Excavation of the pea gravel to expose "native" soils revealed similar soil conditions to those exposed in the November investigation. Excavation walls were relatively stable and shoring was not used. Water was later noted to be seeping from the pit end walls at approximately 6 feet depth, which was in the zone of bayland soils. Soil samples were collected from each end of the tank pit and from beneath the supply line elbow in the fuel island as required by Tri-Regional Guidelines (10 August, 1990). The seepage inflow rate was insufficient to provide a water sample. We also collected an additional sample from native soils beneath the bottom of the tank as an indicator of plume depth. Test results are summarized on Table 3.

The results of these investigations are summarized on Figure 4 . On the basis of these findings, The Sutton Group performed a feasibility study and concluded that the best solution for tank site closure, based on then-current guidelines from RWQCB, was removal of significantly contaminated soil. This soil was located within a zone extending generally south from the tank through the parking lot to about the south end of the Engineering Building. To provide data for contractor's use in design of shoring for protection of the Engineering Building, a geotechnical investigation was performed in July, 1995. This investigation comprised two borings extended to depths of 51 and 36 feet. The borings were logged during drilling by a geotechnical engineer and selected samples were tested in the geotechnical laboratory. These boring locations are shown on Figure 4. (Please note boring prefixes for these geotechnical borings have been modified to GB-

1,2.) Table 4 is a generalized soil profile of the site that was developed from shallow trench excavations and these geotechnical borings.

1.3 Diesel Tank Area

1.3.1 Site Location

The pair of above ground diesel tanks were located in the Treatment Plant, on the west side of the Pump Station Building which houses emergency backup power generators for the facility. The site location is generally shown on Figure 1.

1.3.2 Background / Site History

Two 2,500 gallon diesel storage tanks were mounted above ground in concrete saddles on a concrete slab. This thick slab was supported on four concrete foundation piers, each three feet in diameter. The slab had a perimeter curb. Service lines from the two tanks passed beneath the slab and into the adjacent building. In January 1993 Levine Fricke investigated soil quality near the tank slab, drilling three soil borings and installing a shallow ground water monitoring well in one of the borings. The conclusion of the investigation was that "diesel affected soils surrounded the tank site in some areas". Test results for soils water are included on Table 5

The tanks, piping and contaminated soil were removed in September 1993 by the District's contractor, Trummp Brothers General Engineering Contractors assisted by Levine Fricke. Levine Fricke documented the tank removal and also provided engineering oversight during the subsequent soil removal and backfilling.

2.0 SITE DESCRIPTION

2.1 Site Conditions

The OLSD sewage treatment plant facility is a generally level area, bordered on the south by an effluent channel that services the waste treatment plant. South of the channel, and beyond the San Lorenzo/Hayward boundary, is a wildlife preserve, part of Hayward Marsh. Three hundred yards west of the plant site is the San Francisco Bay shore. Approximately 300 yards to the north, and parallel to Grant Avenue, San Leandro Creek enters the Bay. Commercial and industrial establishments are located to the East of the facility, the nearest residential area is one mile farther east. The area on which the OLSD plant was built was at one time bayland with man-made material used as fill above Bay Mud to the San Francisco Bay shore.

The OLSD sewage treatment plant site was developed similarly to the industrial area that lies generally west of the Southern Pacific Railroad Line. The area of reclaimed bayland is shown on Figure 2. The bayland zone, on which the OLSD is situated, is typical of the area and the siting of other commercial and industrial facilities in the area. The site at the gasoline tank area is a paved parking lot. The area of the diesel tank is partially paved with concrete (tank slab), asphalt (local plant roadway) and partially unpaved (site fill)

2.2 Regional and Local Geology and Hydrology

The facility lies on the San Francisco Bay margin of the East Bay Plain. The East Bay Plain is a three to five miles wide, gently sloping alluvial plain which falls from the foot of the Oakland Hills, south westward to the San Francisco Bay shore. The local topography comprises a typical filled bay setting with bayland deposits covered with manmade fill material to provide stability for structures sited in the area. Prior to filling, the land was tidal wetlands and mudflats of the East Bay. The bay land, clays known regionally as Bay Mud are about 20 feet thick at the site. Clays and sands extend to significant depth. Bedrock is many hundreds of feet deep beneath the site.

Local hydrogeology consisted of briny groundwater caused by intrusion of bay waters into the shallow brackish aquifers. These aquifers extend down to various levels. Underlying these brackish aquifers at levels from 50 to 500 feet is a groundwater aquifer currently not used by the community.

2.3 Gasoline Tank Area

2.3.1 Subsurface Conditions

The site subsurface profile comprises man-made fill placed over bayland deposits. Borings and test trenches excavated in the parking lot for the two investigations show the asphalt surfacing is about 2-1/2 inches thick over 3/4 inch sized crushed rock aggregate base, and 1-1/2 inch sized quarry stone sub base which extends to from 2 to 4.5 feet depth. The sub base is typically a very gravely sand or sandy gravel with some clayey phases, and is brown to tan to blue colored. The thickness of the fill increased from a minimum near Grant Avenue to a maximum nearer the maintenance building. This well-compacted fill material is underlain from 2.5 to 4 feet depth by a "bridging fill" about one half to one foot thick. The bridging fill includes broken concrete and general construction debris in a (typically crusted) Bay Mud matrix. This zone was absent in some locations. The bayland deposits as seen in the test trenches was variable in constituency, ranging from moderate to highly plastic clay to very silty and "peaty" organic clay. These bayland deposits are black to green in color and are locally referred to as Bay Mud. Bay mud was shown to be approximately 20 feet thick at this site, underlain by gray-green clays and clayey sands, with brown clays at approximately 25 feet depth. Table 1 is a generalized subsurface profile.

2.3.2 Extent of Known Soil and Ground Water Contamination

Analytical results indicate some presence of leaded gasoline contamination in the upper eleven feet of subsurface profile as identified during the tank excavation. Significant contamination is adjudged to extend to less than 10 feet depth. The analytical results from the two stages of investigation and the tank removal sampling are summarized on Tables 1, 2, and 3, respectively, The laboratory results are included in the cited reports we have generated.

Horizontal contamination boundaries, based on the original subsurface investigations done by Levine Fricke in August, 1993, subsequent investigations done by The Sutton Group in November 1994, and observations at the time the tank was removed in May, 1995, strongly

suggest ground contamination is of limited extent, as shown by results in TT-1, TT-2, TT-4, TT-5, and TT-8 on Figure 5.

2.3.3 Migration Control/Interim Remediation

To mitigate the migration of the contamination, soils with the highest contaminant concentrations in the immediate area of the tank, were excavated and removed when the tank and associated piping were removed.

2.4 Diesel Tank Area

2.4.1 Subsurface Conditions

Soil conditions in the diesel tank area, as reported by Levine Fricke, comprised silty sandy gravel overlaying silty clay. The silty sandy gravel was 3.5 feet deep on the south side of the excavation to 7 feet on the north sidewall. These soils are interpreted to be fill materials which overly the bayland deposits, similar to those at the Engineering Building. The generalized subsurface profile in Table 4 would thus typify this area.

2.4.2 Extent of Known Soil and Ground Water Contamination

Based on the three borings, the tank site soil removal, subsequent sampling, and data from ground water monitoring, the soil contamination has been mitigated. The extent of significant ground water contamination is unknown due to the single well, which most recently indicates 0.38mg/l (380µg/l) TPHd, which is the highest reading since mid 1993, and historic absence of BETX. The last well sampling was in February 1995, in the midst of a very wet winter. Soil analytical test results are included on Table 5. Ground water well sampling was performed quarterly, beginning in January 1993, prior to soil removal and continuing through February 1995, and test results are included on Table 6.

2.4.3 Migration Control/Interim Remediation

The tank removal, soil excavation, backfilling and sampling process are documented in Levine Fricke's report "Report on Soil Excavation at the Oro Loma Sanitary District Treatment Plant, 2600 Grant Avenue, San Lorenzo, California" dated March 29, 1994. Some 275 Cubic yards of soil were removed during the work. The excavation limits were somewhat restricted by the presence of the building to the east, by an underground sewer outfall culvert on the north and west sides of the site, and by a paved roadway on the south side. The presence of the building, the foundation piers and the concrete slab precluded removal of all the contaminated soil. Excavation closure samples collected in October 1993 indicated diesel impacted soil was essentially removed. Samples from the south and west sides at 3½ feet depth showed soil remained with 1,700 and 360 mg/kg. An exploratory test pit located on the south side of the access road indicated that contaminated soil was not present, however, no samples were collected. Test results are included on Table 5. Ground water well sampling was performed quarterly through February 1995. Test results, on Table 6 show a net decrease in ground water contamination since soil removal.

3.0 PROPOSED SOIL AND GROUND WATER INVESTIGATIONS

3.1 Gasoline Tank Area

This investigation of the Gasoline Tank Area will comprise five new borings. Two of the borings will be located close to the west wall of the Engineering Building. These will be angled in an attempt to intercept ground water beneath the building, and if possible, to detect the presence of free gasoline product and vapors. One of the borings will be located on the south side of the Maintenance Building near the break room, and similarly angled towards the building for the same purpose. The other two borings will be located towards the south boundary of the parking lot in an attempt to delineate the southerly limit of the ground water contamination plume.

Soil samples will be collected at approximately three foot depth intervals. Selected soil samples collected from shallower than the ground water depth will be scheduled for chemical analysis. Based on our experience, ground water will be at approximately six to eight feet depth in this area. The borings will be extended to about 12 feet depth and slotted well screen will be installed to facilitate collection of a ground water sample at each boring location.

The locations of previously drilled borings, test trench excavations, sampling locations, and their chemical test results are presented on Figure 4, as are the locations of the proposed new borings. The results of chemical analyses compiled from the two previous investigation phases and the tank removal sampling are summarized on Tables 1, 2 and 3 respectively.

3.2 Diesel Tank Area

This investigation of the Diesel Tank Area will comprise two new borings. These borings will be located on the south side of the paved road which formed the south limit of excavation of diesel-impacted soil in the former tank area. The borings will be located east and west of an exploratory trench which was excavated on the south side of the road for the purpose of evaluating the south extent of diesel contamination.

Soil samples will be collected at approximately three foot depth intervals to provide closure information about the horizontal and vertical extent of contamination. Selected soil samples collected from shallower than the ground water depth will be scheduled for chemical analysis. Based on the previous reports, ground water will be at approximately six feet depth in this area. The borings will be extended to about 12 feet depth and slotted well screen will be installed to facilitate collection of a ground water sample at each boring location.

The locations of previously drilled borings, the monitoring well, source removal excavations, sampling locations, and their chemical test results are presented on Figure 6, as are the locations of the proposed new borings. The results of chemical analyses compiled from the source removal sampling are summarized on Table 5. Results of the ground water sampling are provided on Table 6.

3.3 Soil Sampling Plan

Soil cores and ground water samples will be obtained for The Sutton Group by Precision Sampling, Inc. (PSI), a soil and ground water sampling company located in San Rafael, California. PSI uses portable, hydraulically driven soil coring systems to obtain soil and ground water samples for lithologic and chemical analysis. PSI holds California Well Drilling Contractor's (C57) license No. 636387. The Sutton Group will assist PSI in obtaining a drilling permit for the work from Alameda County Drainage and Flood Control District (Zone 7).

Boring locations will be marked on the ground or staked based on measurements from the site boundaries or other landmarks. The boring sites will be surveyed by Underground Service Alert (USA) in advance of rig mobilization. Borings will not be relocated without the approval of the engineer-of-record.

3.3.1 Soil Sampling Procedure

The Soil borings will be logged by an engineer or geologist from The Sutton Group. Soil samples will be classified in the field using the Unified Soil Classification System. All soil samples will be screened on-site using a portable photo-ionization detector (PID). Samples will be labeled with the project number, boring number, sample depth interval and date of collection. The soil samples will be appropriately packed, refrigerated and transported to the chemical analytical laboratory for testing.

A chain-of-custody form will be initiated by the sampler and accompany the samples to the analytical laboratory. All samples collected will be delivered under chain-of custody to the District's chemical analysis contractor.

3.3.2 Ground Water Sampling

Ground water sampling will entail recovery of water from temporary wells. The temporary well construction is described in Appendix 3. Additionally, the existing well in the diesel tank area will be sampled.

3.4 Chemical Analysis Of Samples

The District has contracted Sequoia Analytical Laboratory of Redwood City California to transport and analyze the samples. Sequoia is an independent, California EPA-certified hazardous waste testing laboratory (ELAP No. 1210), accredited to perform the analyses in accordance with the San Francisco Bay Regional Water Quality Control Board, and the Alameda County Health Department's Hazardous Materials Program's guidelines for analysis of petroleum fuels releases from underground tanks.

3.4.1 Gasoline Tank Area

Soil samples from the gasoline tank area will be analyzed for total petroleum hydrocarbons as gasoline, benzene, toluene, ethyl benzene and xylenes using EPA methods 5030, and 8020, total and soluble lead by method 6010, all in accordance with Table 2 of the "Tri-Regional Guidelines, dated August 1990. + MTBE

The ground water samples will be analyzed for the same chemical components as are the soil samples. Water samples will be filtered prior to analysis.

3.4.2 Diesel Tank Area

Soil samples from the diesel tank area will be analyzed for total petroleum hydrocarbons as diesel, benzene, toluene, ethyl benzene and xylenes using EPA methods 5030, and 8020, and semi-volatile compounds including naphthalene and benzo(a)pyrene, by EPA 8270.

The ground water samples will be analyzed for the same chemical components as are the soils, with the addition of total dissolved solids (TDS). Water samples will be filtered prior to analysis.

3.5 Soil Cuttings And Collected Water Management

The soil cuttings will be placed on visqueen at a designated location on the site, for eventual disposition by the District. Excess recovered ground water and l rinsate from the cleaning will be temporarily contained in 55-gallon drums at the project site and later, with approval, discharged into the sanitary sewer system for treatment at the District's POTW.

3.6 Evaluation and Report

The Sutton Group will evaluate the data and draft a written report describing field and laboratory results for subsurface soil and ground water conditions. The submittal to the District will first be in draft form to be discussed during a meeting at the District's offices. Conclusions and recommendations will be discussed and the final report will be submitted within five working days of the meeting. The District should then submit a copy of the final report to Alameda County Environmental Health Department, Hazardous Materials Division, to the attention of Ms. Amy Leach.

4.0 PERSONNEL

This Work Plan has been prepared by, and the work will be performed by The Sutton Group. The Engineer-of-Record for the soil and water quality investigation will be John R. Sutton, P.E./G.E. Mr. Sutton has over 20 years of geo-environmental experience, and has been responsible for, and directly involved in hazardous waste investigations in northern California since 1986.

The work will be performed under appropriate health and safety guidelines, by technical staff, including subcontractors who have been trained in the hazardous waste operations requirements "HAZWOPER". of 29CFR 1910.120.

5.0 LIMITATIONS

This work plan has been prepared according to generally accepted geologic, geotechnical and environmental engineering practices. No other warranty, either expressed or implied is made. The analysis, conclusions and recommendations contained in this work plan are based on review of customer-provided data and other available documents relevant to the site conditions Changes in the information or data gained from any of these sources could result in the need for changes in conclusions and recommendations. If such changes do occur, we should be advised so that we can review this document in light of these changes.

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TABLE 1
ANALYTICAL RESULTS FOR SOILS & WATERS
GASOLINE TANK AREA
1993 INVESTIGATION
ANALYTICAL RESULTS FOR SOILS

BORING	DEPTH Ft.	TPH-GAS mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	LEAD,Total mg/kg
SB1	5.5	**2,100**	**23**	**200**	**55**	**330**	NA
SB2	3.5	**4,300**	**14**	**250**	**130**	**680**	NA
SB4	3.5	**1,100**	**11**	**51**	**39**	**210**	NA
SB5	3.5	**3.2**	**0.25**	ND	**0.27**	**0.83**	NA
SB6	3.5	**160**	**2.8**	**14**	**5.9**	**26**	NA
SB6	5.5	**2,100**	**14**	**210**	**80**	**430**	NA
SB6	7.5	**1,500**	**4.8**	**120**	**61**	**340**	NA
MDLs*	SOIL, mg/kg	0.2	0.005	0.005	0.005	0.005	5

ANALYTICAL RESULTS FOR WATERS

		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SB3	GW	**0.12**	**0.0007**	ND	ND	ND	NA
SB4	GW	**1,600**	**27**	**39**	**4.2**	**22**	NA
SB5	GW	**1,100**	**8**	**29**	**4.2**	**20**	NA
MDLs*	WATER,mg/kg	0.05	0.0005	0.0005	0.0005	0.0005	NA

* Refer to Laboratory Report for complete listing of results

TABLE 2

ANALYTICAL RESULTS FOR SOILS

GASOLINE TANK AREA

1994 INVESTIGATION

TRENCH No	DEPTH Ft.	TPH-GAS mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	LEAD,Total mg/kg	LEAD, Sol. mg/kg
TT-1	4.5-5.0	ND	ND	ND	ND	ND	**57**	**1.8**
TT-2	2.5-3.0	ND	ND	ND	ND	**0.007**	ND	--
TT-2	6.0-6.5	ND	ND	ND	ND	ND	**21**	--
TT-2	7.0-7.5	ND	**0.015**	ND	ND	**0.015**	**15**	--
TT-3	2.0-2.5	ND	ND	ND	ND	ND	ND	--
TT-3	3.5-4.0	**160**	**4.7**	**25**	**4.6**	**22**	**31**	**5.3**
TT-3	6.0-6.5	**1600**	**8.8**	**77**	**25**	**130**	**7.4**	--
TT-4	5.0-5.5	ND	ND	**0.009**	ND	**0.008**	**9.3**	--
TT-5	2.5-3.0	ND	ND	ND	ND	ND	ND	--
TT-5	5.5-6.0	ND	ND	ND	ND	ND	**37**	**0.2**
TT-8	2.0-2.5	ND	ND	ND	ND	ND	ND	--
MDLs*		1.0	0.005	0.005	0.005	0.005	5	0.1

* Refer to Laboratory Report for complete listing of results

TABLE 3

TANK REMOVAL ANALYTICAL RESULTS

GASOLINE TANK AREA
TEST RESULTS FOR SOILS

SAMPLE ID	LOCATION	DEPTH Ft.	TPH-GAS mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	LEAD,Total mg/kg	LEAD, Sol. mg/kg
S1	East End of Tank Pit	5.8	**1,900**	**7.1**	**57**	**39**	**190**	**18**	NA
S2	West End of Tank Pit	6	**3,300**	**37**	**18**	**61**	**350**	**260**	**6.4**
S3	Center of Tank Pit	11.5	**43**	**0.3**	**0.56**	**0.41**	**1.7**	ND	NA
S4	Island: beneath fuel pipe	1.5	**49**	**0.25**	**0.28**	**0.45**	**2.6**	**15**	NA
MDLs*			0.2	0.005	0.005	0.005	0.005	5	0.1

* Refer to Laboratory Report for complete listing of results

TABLE 4
GASOLINE TANK AREA
GENERALIZED SOIL PROFILE

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description
0		--	**ASPHALT,** 2 to 2.5" thick
.2		GP/GM	**FILL:**Base Course (¾") Gravel, well graded, dry,brown (typ 1.0 ft thick) on 1.3 to 3 ft crushed quarry stone to 1½" max gravelly sand to sandy gravel with some clayey phases, brown, tan or blue. Total fill thickness is 2.5 to 7 ft. 0.5 to 1 ft bridging fill: broken concrete, construction debrisin clay or sand matrix. Occasional odor of aged
2.5 to 7 ▽		CL/CH, CL. CH	**CLAY** very soft to soft, moderately high to high plasticity with peat zones clays, moist to very moist, black, gray or green, BAY MUD **groundwater noted at 7 ft depth in trenches** Dry Density 59 to 78 pcf Moisture contents 40 to 70% LL=39 to 48, PI = 15 to 23
21		CL, CH, SC	**CLAYS** and **Clayey SANDS**, stiff, shell cemented, moderately high to high plasticity, gray-green Dry Density 103 to 111 pcf Moisture contents 18 to 24% LL=53, PI = 31
25 51.5		CL	**CLAY**, silty, medium stiff to stiff,. brown Dry Density 90 to 112 pcf Moisture contents 19 to 29% LL=40, PI=20 @ 32 to 45 feet: some fine sand zones Maximum depth investigated

TABLE 5
DIESEL TANK AREA
SUMMARY OF EXCAVATION SOIL SAMPLING RESULTS

Concentrations reported in mg/l (ppm)

Sample Number	Date Sampled	TPH-Diesel	Benzene	Toluene	Ethyl Benzene	Total Xylenes
B-N	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005
B-S	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005
B-W	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005
SW-N-4.5	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005
SW-W-3.5	05-Oct-93	**360**	<0.005	<0.005	<0.005	<0.005
SW-NE-5	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005
SW-S-3.5	05-Oct-93	**1,700**	<0.005	<0.005	<0.005	<0.005
SW-SW-7	05-Oct-93	<1	<0.005	<0.005	<0.005	<0.005

Source: Levine Fricke report dated March 28, 1994

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TABLE 6
DIESEL TANK AREA
SUMMARY OF GROUND WATER SAMPLING RESULTS

Concentrations reported in mg/l (ppm)

Sample Number	Date Sampled	TPH-Diesel	Benzene	Toluene	Ethyl Benzene	Total Xylenes
	Results prior to excavation of petroleum affected soils					
MW-1	**28-Jan-93**	**0.59**	<0.0005	<0.0005	<0.0005	<0.0005
	29-Jul-93	**0.72**	<0.0005	<0.0005	<0.0005	<0.002
	Results after excavation of petroleum affected soils					
MW-1	**01-Dec-93**	**0.3**	<0.0005	<0.0005	<0.0005	<0.002
	duplicate	**0.3**	<0.0005	<0.0005	<0.0005	<0.002
	15-Mar-94	**0.2**	<0.0005	<0.0005	<0.0005	<0.002
	duplicate	**0.2**	<0.0005	<0.0005	<0.0005	<0.002
	15-Jun-94	**0.17**	<0.001	<0.001	<0.001	<0..001
	01-Feb-94	**0.38**	<0.0005	<0.0005	<0.0005	<0.002

Source: Levine Fricke report dated March 17, 1995

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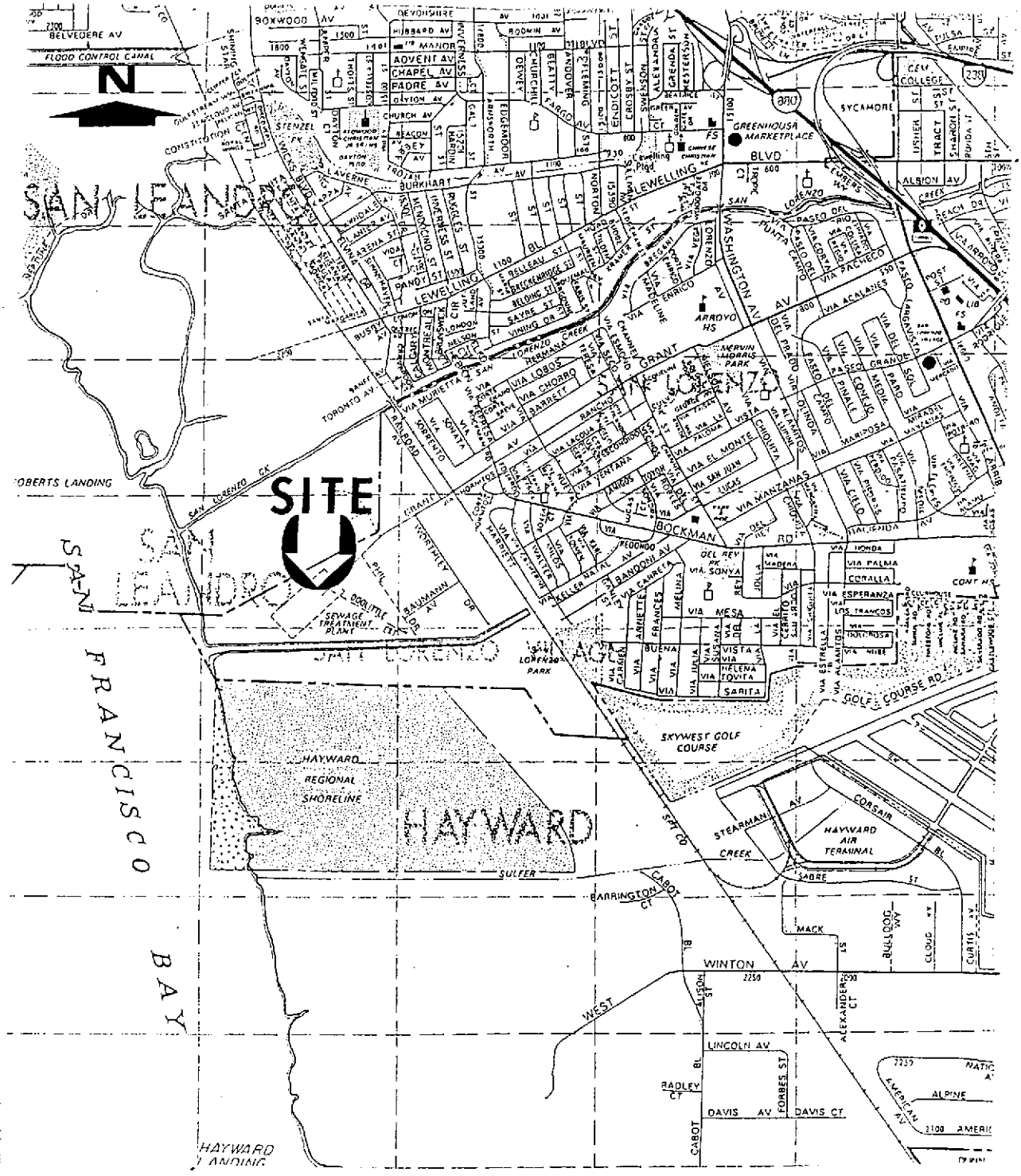
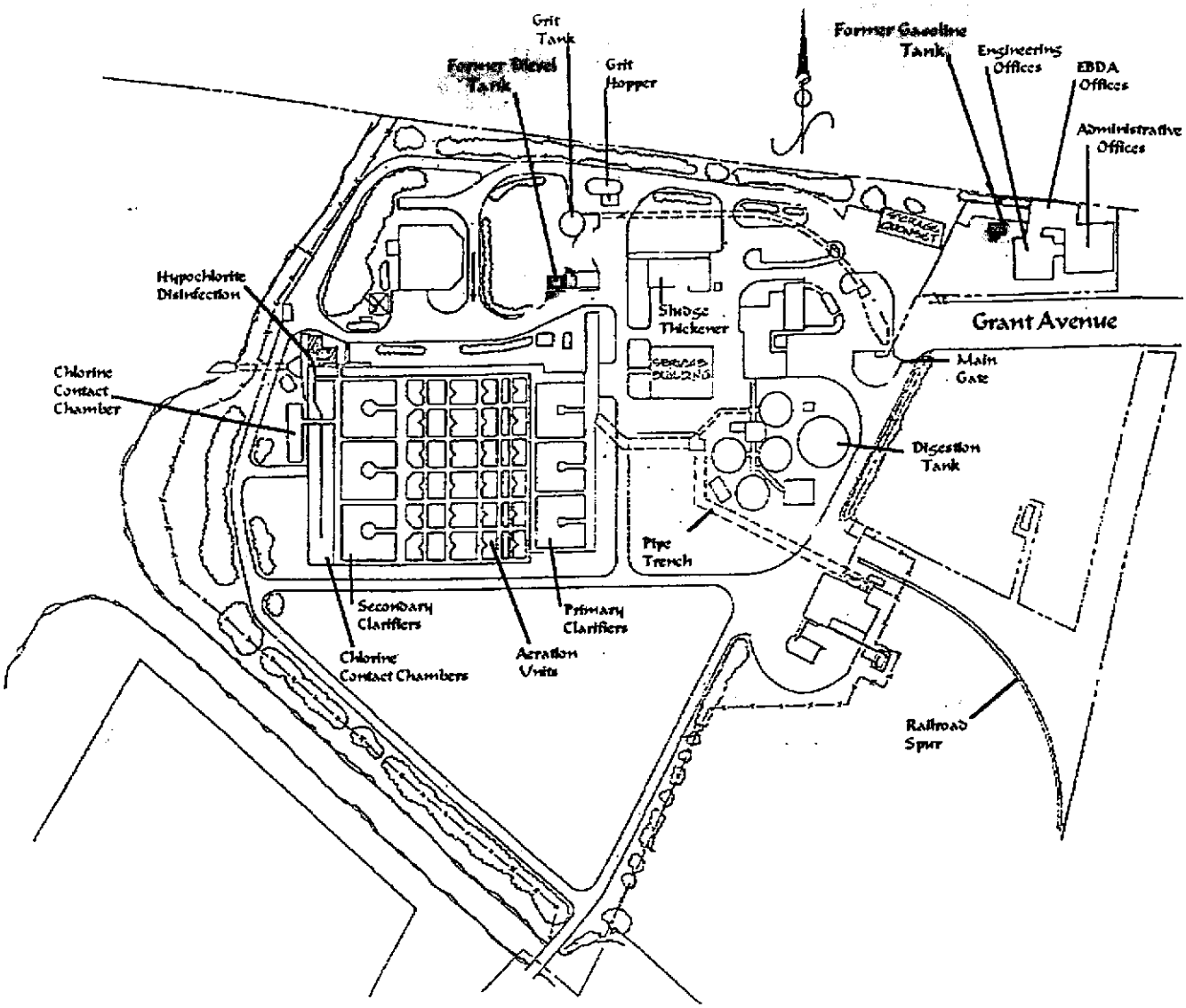


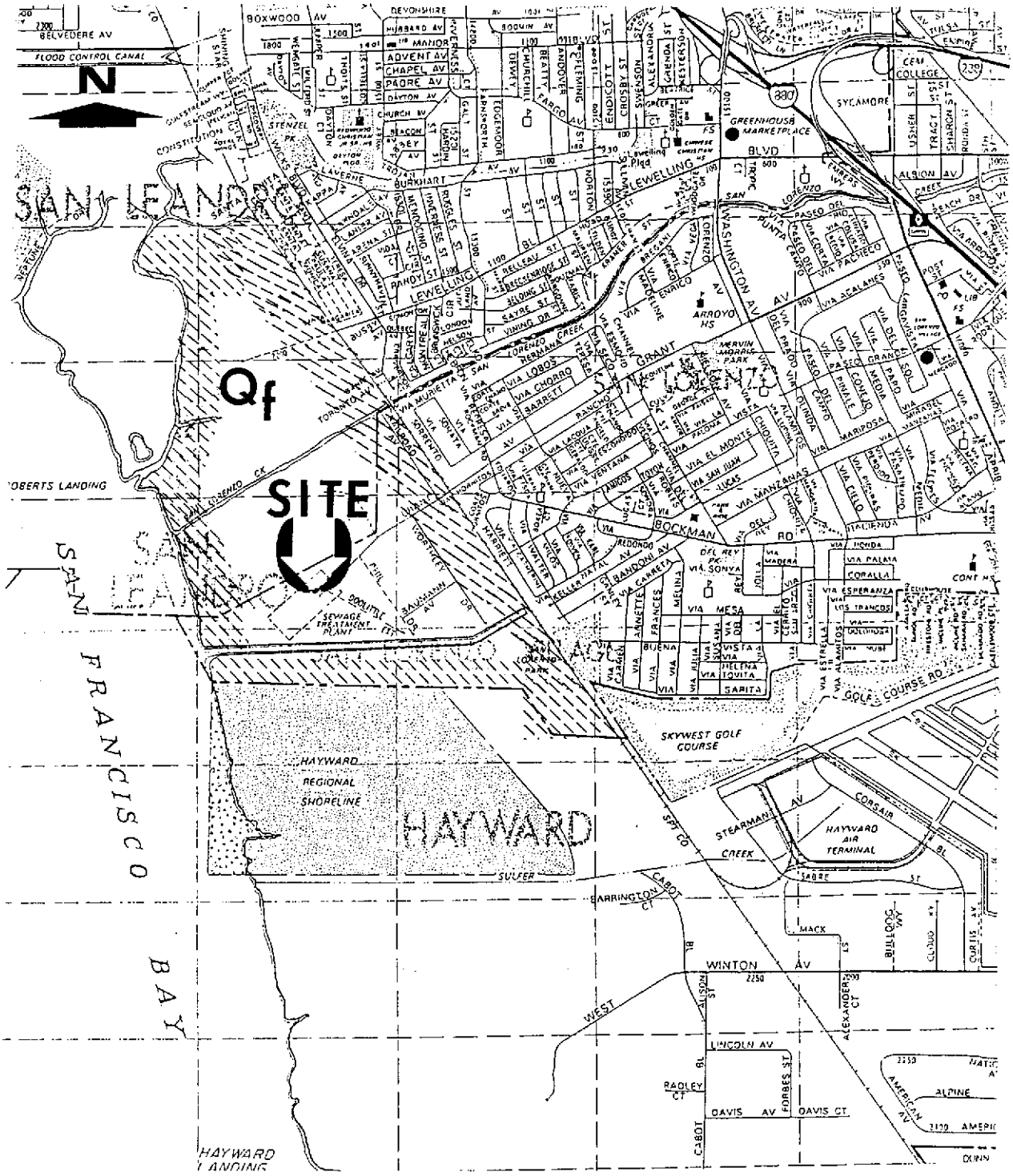
SOURCE: THOMAS BROS MAPS, ALAMEDA COUNTY, CALIFORNIA Scale 1" = 2500 feet

THE SUTTON GROUP Engineering and Environmental Services 51 Shuey Drive Moraga, California 94556-2620 phone (510) 631-1688 fax (510) 631-1371	**SITE LOCATION MAP** **SOIL AND WATER INVESTIGATION** **WORK PLAN** **GASOLINE & DIESEL TANK AREAS** **ORO LOMA SANITARY DISTRICT** **SAN LORENZO, CALIFORNIA**	PROJECT NO. 3022 PHASE 7 **FIGURE** **1** Revision-0.12/28/95



SITE PLAN

THE SUTTON GROUP Engineering and Environmental Services 51 Shuey Drive Moraga, California 94556-2620 phone (510) 631-1688 fax (510) 631-1371	PLANT LOCATION MAP SOIL AND WATER INVESTIGATION WORK PLAN GASOLINE & DIESEL TANK AREAS ORO LOMA SANITARY DISTRICT SAN LORENZO, CALIFORNIA	PROJECT NO. 3022 PHASE 7 FIGURE 2 Revision-0.12/28/95



Q_f= Filled Bayland

THE SUTTON GROUP Engineering and Environmental Services 51 Shuey Drive Moraga, California 94556-2620 phone (510) 631-1688 fax (510) 631-1371	**HYDROLOGIC SETTING** **SOIL AND WATER INVESTIGATION** **WORK PLAN** **GASOLINE & DIESEL TANK AREAS** **ORO LOMA SANITARY DISTRICT** **SAN LORENZO, CALIFORNIA**	PROJECT NO. 3022 PHASE 7 **FIGURE** **3** Revision-0.12/28/95

BORING LOCATIONS

SOIL & WATER INVESTIGATION WORK PLAN
GASOLINE & DIESEL TANK AREAS
ORO LOMA SANITARY DISTRICT
SAN LORENZO, CALIFORNIA

PROJECT NO. 3022
PHASE 7

FIGURE 4

Revision-

THE SUTTON GROUP
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Moraga, California 94556-2620
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fax (510) 631-1371

Project North
True North

MAINTENANCE BUILDING
CARPORT
QUONSET BLDG
(STORAGE)
OFFICE BUILDING
CONC. RAMP
CONC. RAMP

EP-3
6.0 3300
5.8 1900
1.5 49
SB-3
SB-2
3.5 4300
TT-1
5.0 ND
SB-1
5.5 2100
SB-5
3.5 3.2
FORMER GASOLINE TANK LOCATION
EP-1
GB-2
SB-4
3.5 1100
TT-5
TT-2
3.0 ND
6.5 ND
SB-6
3.5 160
5.5 2100
TT-3
2.5 ND
6.5 1600
GB-1
EP-2
TT-4
5.5 ND
TT-6
EP-4
TT-8
2.5 ND
EP-5

GATE
FENCE
GATE
FENCE
6" CURB

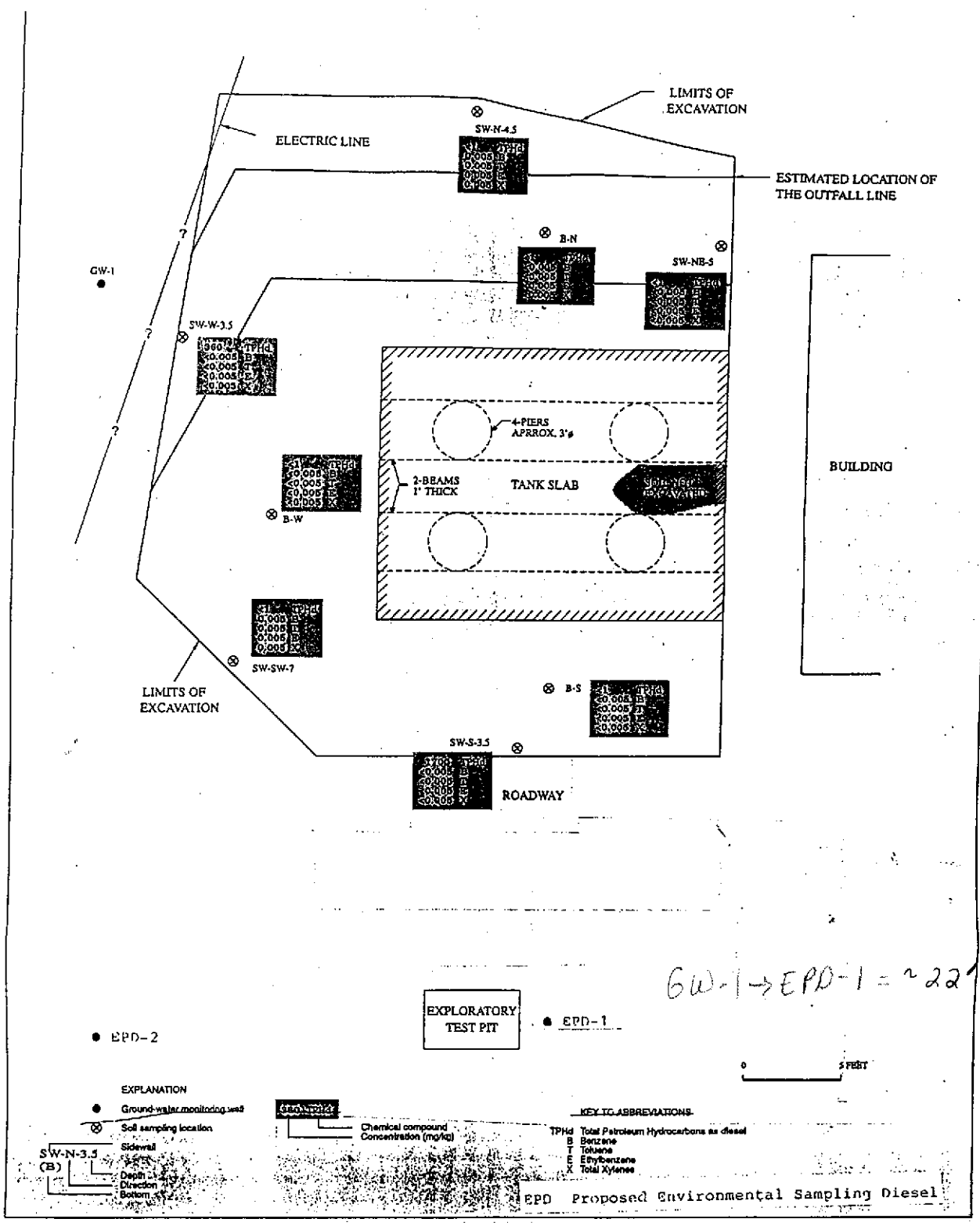
GRANT AVENUE

LEGEND

SB	SOIL BORING, LEVINE-FRICKE, 1993
TT	TEST TRENCH, SUTTON GROUP, 1994
S	SOIL SAMPLE TANK REMOVAL, SUTTON GROUP, 1995
GB	GEOTECH. SOIL BORING, SUTTON GROUP, 1995
EP	PROPOSED S.W.I. BORING, SUTTON GROUP, 1996

SB-4 ● — BORING LOCATION
3.5 1100 — PPM TPH
— DEPTH

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.



From Levine-Fricke project # 2793

THE SUTTON GROUP Engineering and Environmental Services 51 Shuey Drive Moraga, California 94556-2620 phone (510) 631-1688 fax (510) 631-1371	**BORING LOCATIONS DIESEL TANK AREA** **SOIL AND WATER INVESTIGATION** **WORK PLAN** **GASOLINE & DIESEL TANK AREAS** **ORO LOMA SANITARY DISTRICT** **SAN LORENZO, CALIFORNIA**	PROJECT NO. 3022 PHASE 7 **FIGURE** **5** Revision-0.12/28/95

APPENDIX A

SOIL CORING AND SAMPLING,

AND

GROUND WATER SAMPLING PROCEDURES

APPENDIX A

SOIL CORING AND SAMPLING, AND GROUND WATER SAMPLING PROCEDURES

Soil cores and ground water samples will be obtained for The Sutton Group by PRECISION SAMPLING, INC. (PSI), a soil and ground water sampling company. located in San Rafael, California. PSI uses portable, hydraulically driven soil coring systems to obtain soil and ground water samples for lithologic and chemical analysis. PSI holds California Well Drilling Contractor's (C-57) license No.636387. The Sutton Group will assist PSI in obtaining a drilling permit for the work from Alameda County Drainage and Flood Control District (Zone 7).

SOIL CORING PROCEDURES

PSI's difficult access rig, the DA-1, utilizes a hydraulic hammer to drive Enviro-Core™ sampling rods into the ground to collect continuous soil cores. The larger sampling rigs, the XD-1 and MD-1, are mounted on 4-wheel-drive vehicles, and the Enviro-Core™ rods are advanced with vibrators, a hydraulic hammer, or pushed into the ground. With any rig, two nested sampling rods are driven simultaneously; small-diameter inner sampling rods are used to obtain and retrieve the soil cores; the larger diameter (2 112" OD) outer rods serve as temporary drive casing.

As the Enviro-Core™ rods are advanced, soil is driven into a 1-7/8 inch diameter, 3-foot long, sample barrel that is attached to the end of the inner rods, Soil samples are collected in 1¾-inch diameter by 6-inch long stainless steel sleeves inside the sample barrel as both rods are advanced. After being driven 3 feet, the inner rods are removed from the borehole with a hydraulic winch The stainless sleeves containing the soil samples are removed from the inner sample barrel, and can then be preserved for chemical analyses or used for lithologic identification. After adding new stainless steel sleeves, the drive sampler and inner rods are then lowered back into the borehole to the previous depth, an additional 3-foot section of Enviro-Core™ casing is attached, and the process is repeated until the desired depth is reached.

The use of outer rods prevents sloughing of the formation while the inner rods are withdrawn from the hole. This ensures that the drive sampler will always be sampling soil from the desired interval, rather than potentially contaminated soil that has sloughed in from higher up in the hole

All drive casing, inner sample barrels, inner rods, and tools will be cleaned with a high-pressure, hot water washer between holes. Sample barrels will be washed with trisodium phosphate and double-rinsed with deionized water between samples collected in the same hole All rinsate from the cleaning will be temporarilly contained in 55-gallon drums at the project site and later, with approval, discharged into the sanitary sewer system for treatment at OLSD's POTW.

GROUND WATER SAMPLING PROCEDURES

After the targeted water-bearing zone has been penetrated, the sample barrel and inner rods will be removed from the borehole, and the drive casing will be pulled up approximately three feet to allow groundwater to flow into the borehole. A 1-inch-diameter Schedule 40 PVC casing with a five foot section of 0.010" slotted well screen may be installed in the borehole to facilitate the collection of groundwater samples. Threaded sections of PVC are lowered into the borehole inside the drive casing. The drive casing is then pulled up to expose the slotted interval of the PVC. Groundwater samples may then be collected from within the PVC casing with a 1-inch diameter Teflon or stainless steel bailer uptil adequate sample volume is obtained.

BOREHOLE GROUTING

On completion of soil and water sampling, boreholes will be abandoned with a grout mixture of Type II cement with 4% pure sodium bentonite. The grout will be pumped through a 1-inch-diameter grouting tube positioned at the bottom of the boreholes, prior to withdrawing the outer rods.

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