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REPORT
OF

SUPPLEMENTAL
SOIL AND GROUND WATER INVESTIGATIONS

AT THE FORMER SITE OF A
1,000 GALLON GASOLINE TANK
AT THE
Oro Loma Sanitary District Service Center
San Lorenzo, California

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

REPORT
OF
SUPPLEMENTAL SITE EVALUATION
IN THE VICINITY OF THE FORMER SITE OF THE
1,000 GALLON GASOLINE TANK AT THE
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SAN LORENZO, CALIFORNIA

1. INTRODUCTION

1.1 REGULATORY FRAMEWORK

This report documents supplemental environmental investigations and evaluations performed by this firm for the Oro Loma Sanitary District (The District) in response to a request from Alameda County Environmental Health Services Department (ACEH), Environmental Protection Division. ACEH requested additional evaluation of subsurface conditions in the area downgradient of the site of a former 1,000 gallon underground fuel storage tank.

A work plan for this investigation, dated October 23, 1997, was prepared by this firm and Submitted to ACEH. It was approved by ACEH in their letter to the District dated January 26, 1998. In the interim, The District submitted a supplemental application for reimbursement of expenses for this work to the California Underground Tank Cleanup Fund. Following the absence of appropriate response by the Fund, The District proceeded with the investigation as a mark of good faith to ACEH.

1.2 SITE CONDITIONS

1.2.1 Site Location

The subject 1,000 gallon, underground gasoline storage tank was located in the parking lot of the District's Service Center at 2600 Grant Avenue, San Lorenzo, in unincorporated Alameda County. The tank location was to the west of the Engineering Building and south of the Maintenance Building. The site vicinity is shown on Figure 1, and the site location in relation to the District facilities is shown on Figure 2.

1.2.2 Surface Conditions

The site vicinity of the District Service Center is generally level. The grade ranges from elevations 8 to 9 feet above mean sea level (msl). The area was at one time bayland, at an approximate elevation 3 feet above msl.. Man-made fill was placed to raise the area above the unstable marshy bayland deposits. The gasoline tank site is approximately 1,000 feet inland from the current shoreline. The subject tank site is within a paved parking lot at approximate elevations 8 to 9 feet msl. The District's Maintenance Building and the Engineering Building,

a part of the District's Service Center complex, lie north and east of the former tank location, as shown on Figure 2. To the west of the District's Service Center is Grant Avenue, the entire 100 foot width of which is asphalt paved for industrial traffic loadings. Within Grant Avenue, and beneath the paving, lie a water line, storm drains and the District's trunk sewers which grade towards the District's sewage treatment plant.

1.2.3 Regional 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 bayland deposits, including peat, sand layers and soft, plastic 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 consists of saline groundwater caused by intrusion of bay waters into the shallow brackish aquifers. These aquifers extend down to about 50 feet depth in the region. Underlying these brackish aquifers at depths of from 50 to 500 feet is a groundwater aquifer, currently not being used by the community. Figure 3 depicts the local geology and hydrogeology.

1.2.4 Site Area Hydrogeology

Site area subsurface conditions have been characterized in past subsurface investigations, copies of which are in ACEH files. In the Work Plan, Figure 6 presented the site geohydrologic model as it relates to the plume emanating from the subject tank site. The model is based on past subsurface investigation. Essentially, the model shows that the generally southwesterly flow direction of the plume spreads to the east, and beneath the westerly portion of the Engineering Office Building, to the west until it is intercepted by a sewer branch which crosses the District's parking lot, and to the south (downgradient) until intercepted by the line of an abandoned sewer main trench within the Grant Avenue sidewalk. The on site sewer branch directs flow into the 'sidewalk main' trench. The gravel backfill and westerly grade of the trench provides a preferential pathway which transports the flow west into the treatment plant.

1.3 Site History

In 1961 a 1,000 gallon, leaded gasoline tank was installed as part of the original construction of the District's Maintenance Facility. In 1978, the tank was noted to be leaking and a new 1,000 gallon tank was reinstalled in the same pit. The amount of leakage from the 1961 tank was not documented. The 1978 tank stored leaded gasoline until 1985, at which time it was converted to unleaded gasoline storage. Use continued until 1994, at which time its use was discontinued. No leakage had been noted with the 1978 tank. The tank was removed in 1995 as part of the District's program to eliminate excess infrastructure.

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. Sample 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 for this investigation are summarized on Table 1, below.

The Sutton Group was engaged by the District to complete the investigation and to manage removal of the tank and subsequent remediation. The supplementary investigation comprised the excavation of seven shallow (6± foot depth) 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, on file with ACEH. In summary the investigation showed concentrations of degraded gasoline in a plume emanating from the tank via 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. Water samples were not collected since caving of trench walls necessitated immediate back-filling. Test results from this investigation are summarized on Table 2.

Following a public bidding process, the District 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 and also near the short service pump line, suggesting overfill spillage, and fuel line 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 1994 trench investigation. Excavation walls were relatively stable and the contractor did not mobilize shoring. 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 (RWQCB, 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.

On the basis of these findings, The Sutton Group performed a Feasibility Study, based on then-current guidelines from RWQCB, and concluded that the best solution for tank site closure, 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 alongside the engineering building which were 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. Locations of geotechnical borings GB-1 and GB-2 are shown on Figure 4.

In May 1996, The Sutton Group concluded a soil and ground water investigation of the site vicinity. This investigation comprised drilling seven soil borings with a 'hydro-push' rig Soil samples were recovered at selected depths and ground water samples were collected from temporarily installed well screen in each borehole. The study identified a pervious, relatively continuous, thin, sand layer immediately beneath the fill/Bay Mud interface. Based on field organic vapor readings and petroleum odor, this layer appeared to be the significant conduit for ground water-borne contaminant transport emanating from the source area. The presence of such a saturated layer of clean fine sand at this depth is retrospectively considered reasonable cause for the trench caving that limited the excavation depth in the November 1994 investigation.

1.4 Risk Based Corrective Action Program

1.4.1 Tier 1 Analysis and Site Model

An 'ASTM-RBCA (Risk Based Corrective Action)[1] Tier-1' evaluation of risk to human health and the environment was prepared and the results published in the work plan. The objective of the screening was to identify those chemicals and exposure pathways that have a potential to cause adverse health effects. All feasible exposure pathways were evaluated in the screening process.

The analysis found that of all the chemical/exposure pathway combinations, the only pathways that have the potential to cause an unacceptable health impact at this site are volatilization of benzene and toluene into enclosed spaces, and volatilization of benzene into outdoor air. Due to the conservative approach used in this Tier 1 screening, these chemical/exposure pathway combinations may not pose an actual hazard. The chemical/exposure pathway combinations that were found not to pose a potential risk are very unlikely to pose an actual unacceptable hazard since the screening exaggerates potential exposures and risks

A conceptual site model was developed as part of the Tier 1 (RBCA) evaluation. The chemicals of potential concern for this site and the potential current and future receptors, were identified. These were based on present and potential land- and ground water uses at the site and surrounding area, and the potentially complete exposure pathways for each receptor.

1.4.2 Screening Analysis

In the Work Plan, Risk Based Screening Levels (RBSLs) were identified from the ASTM RBCA Guide. The applicable Tier 1 default values were compared with exposure parameters,

[1] ASTM E1739-95 "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites."

building characteristics, soil characteristics and ground water characteristics. This comparison suggested that the ASTM Tier 1 RBSLs are very conservative measures of potential risk for receptors at the site. In particular, the ASTM RBSLs are based on a homogeneous sandy subsurface soil.

Two study models were developed for this project. These were the outdoor exposure (OD) area and the Engineering Office Building (EOB) exposure area. Both models are directed to the gasoline constituents in the ground water plume.

The OD area generally comprises the paved parking area and landscaped areas. The EOB has a crawl space beneath the floor. There is a two inch thick concrete ground slab placed over a waterproof membrane which effectively shield the building floor, as distinct from having soil gas transport directly into the enclosed crawl space as is assumed in the ASTM model. The crawl space results in greater dispersion of soil gases and lower concentrations of Chemicals Of Potential Concern (COPCs) potentially infiltrating into the enclosed space than considered in the ASTM exposure model. This is due in part to the ground slab and waterproofing barrier.

In the Tier 1 screening analysis, Exposure Point Concentrations (EPCs) were compared to RBSLs using a Hazard Quotient (HQ) approach. An HQ exceeding unity entails further evaluation of the area represented by the model.

Within the OD exposure area, of the several chemical/exposure pathway combinations studied, the only combination that had a hazard quotient greater than 1 was inhalation of benzene volatilizing from ground water. All hazard quotients associated with subsurface soil excavation in the outdoor exposure area were shown to be less than unity, thus not of concern.

In the EOB exposure area, the chemical/exposure pathway combinations that had hazard quotients greater than 1 were:

- inhalation of benzene volatizing from soil,
- inhalation of toluene volatizing from soil, and
- inhalation of benzene volatizing from ground water.

1.4.3 Evaluation of Results

It is reasonable to compare the potential risk of the outdoor (OD) and indoor (EOB) exposure areas in evaluating risk as it relates to each of these significant chemical/exposure pathway combinations. The open outdoor areas are subject to vapor dispersion due to the ambient radiation effects, and also the diurnal onshore breeze from the adjacent San Francisco Bay. The EOB exposure area is subject to the confining effect of the building walls and crawl space on potentially volatizing benzene from beneath the floor, especially the shielding effect of the building on the dispersive elements of wind and sunlight. These two dispersion elements will result in less comparative risk from exposure in the OD as compared to the EOB. Further,

there is no indication of distress of the flora in the landscaped areas. Since the EOB will result in greater potential risk level, it is reviewed first. On this basis, a favorable evaluation for the EOB area would alleviate the need to study the OD exposure area.

1.5 SUPPLEMENTAL INVESTIGATION PLAN

The purpose of the investigation was to provide data for use in closure of the two questions:

a) Is the sewer trench in the north sidewalk of Grant Avenue an effective barrier to ground water flow off site and across Grant Avenue, and does its gravel backfill provide the conduit which directs gasoline-contaminated water into the treatment plant ('offsite area').
b) Does significant benzene and/or toluene volatize from the ground water plume beneath the Engineering Office Building ("EOB" or 'office area'), rise through the soil, permeating the concrete rat-proofing slab, and enter the workspace in significant concentrations to impact the health of personnel in the EOB.

1.5.1 Off Site Ground Water Plume Boundaries

To investigate the offsite area and to validate the thesis of the barrier/conduit effect of the sewer trenches, a boring program was performed. Borings were located to intercept, and confirm the existence of, the trench backfill prism. Borings were also located beyond the line of the 'containment.' To verify the thesis, ground water samples from the borings within the conduit/ containment barrier should have measureable levels of the gasoline indicator constituents benzene and toluene. In borings beyond this containment barrier, ground water samples should, in support of this hypothesis, be essentially free of these gasoline constituents.

1.5.2 Engineering Office Building Exposure Conditions

To evaluate the exposure path scenario that benzene or toluene vapors from the ground water plume beneath the Engineering Office Building (EOB) could rise and potentially impact the health of workers in the offices above, a passive air sampling program was performed. The volatizing/vapor transport scenario would entail petroleum vapors from the ground water plume, with its surface some five feet below ground level, to (1) rise through the densified Bay Mud clays and overlying granular structural fill layer, and (2) permeate the plastic water proofing membrane, and the overlying two inch thick, concrete, 'rat proofing' slab, then (3) disperse into the ventilated crawl space, (4) permeate the suspended structural timber floor system, including the linoleum tile or carpeting, and (5) enter the work space. The crawl space was identified as the space in which vapors would collect immediately before permeating into the work space.

Additionally, use was made of the drill rig while on site to collect soil samples from within the 'hot area' of the plume close to the EOB. These soil samples were analyzed in chemical and geotechnical laboratories to provide data for input into a possible Tier 2 RBCA evaluation, should that be necessary.

2. SUPPLEMENTAL INVESTIGATION

The investigation comprised five new borings from which soil and grab-ground water samples were collected. In addition, three air samples were collected. Soil samples were analyzed in the environmental chemical, and geotechnical laboratories. Air samples were analyzed in a specialty air sample laboratory. Details of the investigations follow.

2.1 SOIL AND GROUND WATER INVESTIGATIONS

Six new borings were drilled in this program. Five were in the locations proposed in the work plan. An additional boring was added in the field to further investigate one area as described below. The new borings were numbered EP-8, EP-9/9A, EP-9B, EP-10, EP-11, and EP-12/12A. The locations of these borings are shown on Figure 3.

The borings were advanced by the subcontractor, Precision Sampling, Inc., of San Rafael, California using a hydraulic hammer mounted on a rubber-tired carrier. Soil samples were collected using PSI's continuous sampling Enviro-Core® equipment. Samples for physical and environmental chemical testing were thus collected in 1¾ in diameter by 6 in. long. stainless steel inner liners. Details of the boring and sample collection equipment and procedures are presented in Appendix A. Soil samples recovered from the borings were logged in the field by soil engineer from *THE SUTTON GROUP*. Boring Logs are presented in Appendix B. Selected soil samples were identified for chemical and/or physical properties testing. Grab ground water samples were later collected from temporary well casing installed in each of the borings.

All ground water, and selected soil samples were dispatched under chain-of-custody to Sequoia Analytical Laboratories in Redwood City, CA. for chemical analysis and/or physical properties testing. Samples for geotechnical (physical) properties testing were shipped to the Cooper Testing Laboratory in Mountain View, CA.

2.2 INDOOR AIR SAMPLING

To provide definitive information about the potential for benzene and/or toluene vapors to travel this exposure path, we collected timed-exposure air samples from two locations in the the underfloor crawlspace. We collected a third sample in the adjacent parking lot as a measure of background ambient air quality.

2.2.1 Sampling Procedure

Three 6 litre SUMMA canisters with flow control valves were laboratory-pre-calibrated and evacuated in the Santa Rosa, California, laboratories of K-Prime, Inc., and shipped to the site. At the site, each canister was placed in its pre-designated location and its valve opened, allowing ambient air to be drawn into the vessel. The canisters were allowed to draw for eight hours in accordance with EPA procedure TO14. After eight hours, the valve on each canister was closed and the time recorded. The valves and gauges were removed, ports capped, canisters re-packaged, then shipped back to K-Prime under chain-of-custody.

- Sample AOO1 was located in the parking lot, against the outside wall of the Engineering Building near its northwest corner. The location was adjacent to, but outside the wall from sample location AOO2.
- Sample AOO2 was placed in the crawl space at a location 10 feet south and 2 feet east of the northwest corner. This was as close as possible to the boring EP-1. Low underfloor clearance and the presence of conduit, and plumbing and heating lines, precluded locating the canister any closer to the corner of the building.
- Sample AOO3 was located in the crawl space eight feet due east of borings EP-2 and EP-8, near southwest corner of the building. Low underfloor clearance prevented the canister being located any closer to the exterior wall.

2.2.2 Laboratory Analysis

The air samples were analyzed for benzene and toluene in accordance with the EPA Method TO14 (GC-MS). Results of the analysis are presented on Table 3. The laboratory certificates are included in Appendix D.

3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

3.1.1 Shallow Soil Profile

Shallow subsurface conditions in the areas explored comprise paving materials and man-made fills placed over bayland deposits. The sources of manmade fill under the OLSD parking lot, the sidewalk and the street areas have been modified during the construction of these improvements. Figure 4 includes a cross section which typifies these different conditions.

The subsurface profile on the District property comprises man-made fill placed over bayland deposits. Borings and test trenches excavated in the parking lot area for the this, and the three previous investigations, show the parking lot asphalt surfacing is about 2½ inches thick over ¾ inch sized crushed rock aggregate base. In the area of borings EP-2 and EP-8 adjacent to the Engineering Building there is garden and about two feet of clayey fill. This overlies two to three feet of compacted subbase (or structural fill beneath the building). The structural fill is a 1½ inch sized crushed rock extending to from about 2 to 4.5 feet depth. This material is typically a sandy gravel or very gravely sand with some clayey phases noted, and is brown to tan to blue colored (crushed Leona rhyolite). The thickness of the fill increased from a minimum near Grant Avenue to a maximum nearer the maintenance building. This fill material sometimes is underlain at from 2.5 to 4 feet depth by a "bridging fill" which appears to be one half to one foot thick. The bridging fill, where present, includes broken concrete and general construction debris in a (typically crusted) Bay Mud matrix. This zone was not observed in all locations.

The bayland soils immediately underlying the fill soils at this site often have a peat layer or crusted clay surface, which is typically brown to black, about one foot thick, and with a noticeable organic odor.

A layer of fine, gray to black sand, which is typically clean but with silty or clayey stringers, and varying in thickness from one to three feet, was noted in many of the borings. The top of this sand layer was at from three to six feet depth where found, which is at the approximate native soil interface. This layer was typically wet, and in a number of the parking lot area borings, had a pronounced petroleum odor. Boring EP-8 showed the typical profile.

In the borings in Grant Avenue, gravelly fill extended to approximately five feet depth. In the Grant Avenue sidewalk, borings EP-9B and 10 intercepted the non-native gravel and sand backfill of the abandoned sanitary sewer trench. Borings EP-9 and 9A (sited 3 feet north of EP-9) were sited to the west of the sewer line alignment. The gravel fill was not indicated in the samples from EP-9 and -9A, confirming that this sewer line turned south at manhole Q5 since abandoned and buried beneath the sidewalk. Borings EP-11 and 12 were drilled in Grant Avenue between the main sewer and trunk sewer locations to confirm the effectiveness of the 'barrier.' Boring 12A was drilled 2 feet east of EP-12, the former being abandoned at 7

feet depth due to continued poor sample recovery in shallow gravelly fill soils. The profile was typical, except for a layer of brown, fibrous peat found at 12 to 13½ feet depth. The boring locations are shown on Figure 3 and the sewer lines on Figure 4.

3.1.2 Deeper Soil Profile

The sand layer was bounded beneath by characteristic green to black, moderately to highly plastic, Bay Mud clays which are organic. Previous investigations have shown that these extend to about 25 feet, with brown clays below. Previous geotechnical investigations have extended to as deep as 51 feet.

3.2 Ground Water Conditions

Ground water depth was typically identified from the appearance of recovered soil samples. Additionally, depth to ground water was measured the day following drilling, prior to collection of water samples. Ground water depth ranged between 4½ and 5½ feet depth. This range of ground water readings is higher than measured in previous investigations. Ground water depths in the two borings in Grant Avenue, EP-11 and -12A, were the shallowest. The record high rainfall this past winter is reasonable cause for the ground water elevation increase. The gravel backfill in the trunk sewers in Grant Avenue likely collect and transport waters infiltrating from the District's service area to the east of the site, and provide a positive gradient to the bay.

4. LABORATORY RESULTS FOR SOIL SAMPLES

4.1 CHEMICAL ANALYSES

Five soil samples from the borings were selected for chemical analysis. The samples analyzed were collected from depths between 2.5 and 6.5 feet depth. Each of the samples was analyzed for the characteristic gasoline indicators benzene, toluene, ethyl benzene, and xylenes. Analysis was in accordance with the San Francisco Bay Regional Water Quality Control Board (RWQCB)'s 1990 'Tri-Regional Guidelines'[2].

4.1.1 Results of Chemical Analyses of Soil Samples

None of the samples analyzed indicated the presence of benzene. Two of the samples indicated a presence of toluene. The highest result was 0.007 mg/kg (7 ppb). Both of these samples were collected from borings located outside the 'plume containment area.' Similarly, no samples indicated an ethyl benzene presence, and only one sample indicated a xylenes presence. Analytical laboratory results for this investigation are summarized on Table 2. The laboratory certificates are included in Appendix C. The indicator chemical results have been added to Figure 5, which was originally prepared for the Work Plan..

4.1.2 Discussion of Results

The absence of benzene in soil samples indicates that the potential for its volatizing from soil is not significant. The toluene result is well below any risk based screening level (RBSL) and ASTM default level for toluene exposure. The xylenes presence was 0.014 mg/kg (14 ppb), which is also well below the RBSLs for soils.

4.2 RESULTS OF GEOTECHNICAL TESTS ON SOIL SAMPLES

Selected soil samples were testedfor physical properties and organic constituents to further characterize the various soil groups encountered. Tests for field moisture content, dry unit weight, specific gravity, total organics and/or organic carbon content. Tests for the first three characteristics were performed in accordance with the respective ASTM procedures. Porosity and void ratio were calculated from these test results. Organic carbon contrent was tested in the analytical laboratory using the EPA procedure. There is no correlation factor which can relate the two organic content test results. Results of geotechnical laboratory testing are presented on Table 4 and the laboratory certificates are in Appendix E. The results of the organics and carbon tests are summarized on Table 5. The geotechnical laboratory reports by Cooper are included in Appendix E. The organic carbon test results by Sequoia are included in Appendix C.

[2] Refer to 'References', Section 7 of this report.

5. EVALUATION OF GROUND WATER CONTAMINATION

5.1 RESULTS OF CHEMICAL ANALYSES OF GROUND WATER SAMPLES

Ground water samples were collected the day following drilling. Samples from the six temporary wells installed in the open boreholes EP-8, 9, 9B, 10, 11, and 12A were recovered using disposable plastic bailers. A new bailer and string were used for collecting each sample. Details of the water sample collection procedures are included in Appendix A.

The sample from boring EP-8 had a heavy petroleum odor and surface sheen, though the thickness was not measurable. Benzene, toluene and MTBE results from EP-8 mirrored those obtained in the adjacent boring EP-2 in 1996. A gasoline odor was noted, and a positive PID reading were noted upon initial removal of the well cover. The sample from boring EP-10 also had a relatively high result for benzene, toluene and MTBE, greater than the 1996 results from the nearby EP-5, however, there was not noticeable well head odor, nor significant PID reading. The sample from boring EP-12A was effervescent, though odorless.

Test results are presented in Table 1. Also on Table 1 are results from the 1996 program are included on the table for comparison. The Laboratory Report is included in Appendix C.

5.2 EVALUATION OF GROUND WATER SAMPLING RESULTS

Ground water sample analysis results validate our postulation that the sewer line trenches in the Grant Avenue sidewalk act as a lateral containment barrier to off-site transport of petroleum contaminants south and westward from the property. Borings EP-8, EP-9B and EP-10 were located within the contained zone bounded by the barrier/conduit. Ground water samples from all three had detectable presence of the indicator analytes benzene and toluene. Further, our postulation that the pervious trench backfill provides a conduit which channels this tainted ground water directly into the adjacent sewage treatment plant appears also to have been validated. Three borings, EP-9, EP-11 and EP-12/12A. were located outside, i.e. down gradient of this barrier/conduit. None of these ground water samples showed detectable presence of the indicator analytes that were present in the ground water samples from borings EP-8, EP-9B and EP-10.

Borings EP-9 and 9A confirm the absence of the pervious backfill envelope acts as a 'sink' beyond the line of the now-abandoned sewer trench. Based upon these and the previous data, an iso-concentration map of benzene concentrations in ground water has been included as Figure 6.

Due to the inability to locate the abandoned sewer manhole Q5, which according to the plans is between borings EP-9/9A and EP-9B, (see Figure 4) but buried during sidewalk construction in 1992, the horizontal alignment of the abandoned sewer could not be precisely determined. The 10 inch sewer line and the manhole shafts, in accordance with the construction plans, were filled with concrete, thus precluding electronic survey. Based on the

boring log of recovered soil samples, it is concluded that boring EP-9B was on the edge of the sewer trench. This would account for the positive, though low concentrations of the indicator analytes in EP-9B. The high concentration of benzene and other indicator analytes in EP-10, which is west of manhole P6, is positive indication that the contaminant plume is entering the backfill conduit.

Analytical results in the May 1996 investigation report concurred with the earlier findings which limited the depth of gasoline contamination. The vertical extent of significant contamination, was essentially confirmed to be contained within a shallow sand zone that immediately underlies the clay/peat (former) surficial cap of the Bay Mud deposits. This clay cap, which lies at from 4 to 6 feet below site grade, appeared to be an effective barrier confining the gasoline constituents to that depth. Deeper clays have sufficient thickness and plasticity to confine the gasoline contamination precluding downward vertical transport. The high-permeability and width of trench backfill materials preclude lateral flow across the width of the trench backfill, effectively containing the plume.

5.3 GROUND WATER FLOW DIRECTION

The significant direction of onsite ground water movement has been shown to be normal to the alignment of Grant Avenue, i.e. to the south east and south[3]. Interception of the plume by the trench backfill is evident based on the total absence of gasoline indicators in ground water samples from borings EP-11 and 12/12A. This can be interpreted from Figure 6.

[3] The District's sewage treatment plant (POTW) was initially constructed in the 1940s. Trunk sewers were layed down Grant Avenue. It is reasonable to believe that the local service sewer mains on the east and west sides of Grant Avenue date to the 1960s. corresponding to the age of the industrial development along lower Grant Avenue west of the SP railroad tracks. Of the four trunk sewers in Grant Avenue, one 39 inch line was abandoned in place and another removed to allow construction of the replacement 66 inch trunk in 1992. The trunks combine into a single pipe at the foot of Grant Avenue, also reconstructed in 1992. As part of that project, the local service mains in the east and west sidewalks were replaced and the old lines abandoned in place as discussed above. Thus there are at least five significant flow conduits in Grant Avenue, all graded into the POTW. (See Figure 4)

6. INDOOR AIR SAMPLING PROGRAM

6.1 SAMPLE COLLECTION

Samples were collected from the crawl space beneath the Engineering Office Building. The samples were collected over an eight hour period, representative of air chemistry over a normal work day. EPA protocols were followed. The two sample canisters placed in the crawl space drew air from areas representative of the strongest ground water contamination, based on past subsurface investigations.

None of the samples reported a presence of the carcinogenic gasoline constituent benzene. All three of the samples reported a very minor presence of the non-carcinogenic gasoline constituent toluene, at levels close to the method reporting limit. The results of the sample analyses are presented on Table 3. The laboratory report is included in Appendix D.

6.2 DISCUSSION OF RESULTS

The levels of toluene reported from these air samples from the crawlspace were very similar to the toluene level collected from the parking lot sample. These levels, approximately 5 micrograms per cubic meter ($\mu g/m^3$) are just ten percent of the ASTM Tier 1 RBSL 'look-up level' of 54.5 $\mu g/m^3$. Since all three samples had uniformly low toluene detection, the hazard quotient may reasonably be reduced from the 2.2 that was calculated in the Modified Tier 1 analysis to one tenth of that value. On that basis, the toluene cannot be considered an impact upon office workers.

7. CONCLUSIONS

1. The ground water investigations confirmed that the sewer trench in the Grant Avenue sidewalk does indeed provide a barrier to off site transport of gasoline-tainted ground water emanating from the former gasoline tank site. Further, the trench backfill envelope acts as a collection and transport conduit for this tainted water. Via this preferential flow channel, the water is transported into the Districts nearby sewage treatment plant. Native soils upon which the treatment plant is founded are organic-rich bayland deposits enhanced by the POTW presence. By their nature, the soils beneath the sewage treatment plant comprise an active bio-reactor, known to be entirely capable of digesting and decomposing gasoline constituents in ground water. It is concluded that tainted groundwater emanating from the former tank location are contained and thus do not threaten the public, nor waters of the State.

2. Air samples were collected beneath the floor of the District's Engineering Office Building representing a full work-day's exposure to benzene and toluene. These resulted in no detection of benzene in any of the samples, and toluene approximately the EPA test method's reporting limits. It is concluded that these levels present no measurable impact to occupants of the building. On this basis, outdoor exposure is similarly not of potential concern to the public nor the environment.

8. RECOMMENDATIONS

1. No additional collection or treatment of gasoline-tainted ground water at the District's service center is recommended.

2. Since no finding of significant vapor concentrations was made in relation to the underfloor areas of the Engineering Office Building, no precautions are recommended in regard to providing protection of occupants from vapors that might, under certain scenarios, theoretically might volatize from the ground water plume beneath the building.

9. LIMITATIONS

This work herein has been performed according to generally accepted geologic, geotechnical and environmental engineering practices. Laboratory testing has been performed by accredited laboratories operating under published quality assurance programs. No other warranty, either expressed or implied is made. The analysis, conclusions and recommendations contained herein are based on the data collected for this study, review of past studies performed by this firm, customer-provided data, and 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 the recommended scope of work. If such changes are found to have occurred, we should be advised so that we can review this document and the conclusions in light of these different conditions.

10. REFERENCES

RWQCB, 1990 Tri-Regional Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites, Prepared jointly by staff of the North Coast, the San Francisco Bay, and the Central Valley Regional Water Quality Control Boards, dated 10 August 1990

RWQCB, 1992 Water Quality Control Plan, San Francisco Bay Basin Region (2), San Francisco Bay Regional Water Quality Control Board, 1986, and amended through 1992

The Sutton Group, 1994 Stage II Tank Removal Investigation, 1,000 Gallon Gasoline Tank Site at 2600 Grant Avenue, San Lorenzo, California, prepared for Oro Loma Sanitary District, San Lorenzo, California, dated November 23, 1994.

The Sutton Group, 1995 Report of Removal of 1,000 Gallon Gasoline Tank Oro Loma Sanitary District Service Center, San Lorenzo, California, dated June 7, 1995.

The Sutton Group, 1995a Report of Geotechnical Investigation for 1,000 Gallon Gasoline Tank Site Closure at 2600 Grant Avenue, San Lorenzo, California, prepared for Oro Loma Sanitary District, San Lorenzo, California, dated August 30, 1995

The Sutton Group, 1995b Remedial Investigation, Feasibility Study and Proposed Corrective Action Plan for 1,000 Gallon Gasoline Tank Site at 2600 Grant Avenue, San Lorenzo, California, prepared for Oro Loma Sanitary District, San Lorenzo, California, dated December 6, 1995.

The Sutton Group, 1996. Report of Soil and Ground Water Investigations at the Former Site of a 1,000 Gallon Gasoline Tank at the Oro Loma Sanitary District Service Center, San Lorenzo, California. Prepared for Mike Cortez, Oro Loma Sanitary District. May 15, 1996.

The Sutton Group, 1997. Work plan for Supplemental Site Evaluations in the vicinity of the former site of the 1,000 Gallon Gasoline Tank at the Oro Loma Sanitary District Service Center, San Lorenzo, California. Prepared for Mike Cortez, Oro Loma Sanitary District. October 23, 1997.

TABLE 1

SUMMARY OF ANALYTICAL RESULTS

WATER SAMPLES

1996 SAMPLES

BORING	Benzene ug/l	Toluene ug/l	MTBE ug/l
EP-1	31*	7.4*	19*
EP-2	23,000*	47,000*	3,900*
EP-3	5.8	2.6	5.4
EP-4	2.3	0.97	36
EP-5	8,800*	4,800*	ND*
EP-6	ND	0.99	ND
EP-7	0.53	2.1	ND
MDLs*	0.50	0.50	2.5

1998 SAMPLES

BORING	Benzene ug/l	Toluene ug/l	MTBE ug/l	
EP-8	24,000*	44,000*	4,900	ON-SITE BORINGS (BOUNDARY OF CONTAINED AREA)
EP-10	12,000*	13,000*	1,100*	SIDEWALK AREA BORINGS (WITHIN CONTAINED AREA)
EP-9B	0.81	ND	5.2	
EP-9	ND	ND	ND	BORINGS DOWNGRADIENT OF CONTAINED AREA
EP-11	ND	ND	ND	
EP-12	ND	ND	ND	
MDLs*	0.50	0.50	2.5	

* Indicates detection limits raised due to positive gasoline result. Refer to laboratory report in Appendix C for raised detection limits for each noted sample .
For complete listing of 1998 results, refer to Laboratory Report in Appendix C

TABLE 2
ANALYTICAL RESULTS FOR SOILS

SUPPLEMENTARY SITE INVESTIGATION, 1998

BORING	DEPTH Ft	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg
EP-8	3.5-4.0	ND	ND	ND	ND
EP-9	3.5-4.0	ND	**0.005**	ND	ND
EP-9B	6-6.5	ND	ND	ND	ND
EP-10	no sample	n/s	n/s	n/s	n/s
EP-11	2.5-3.0	ND	ND	ND	ND
EP-12	3.5-4.0	ND	**0.007**	ND	**0.014**
MDLs*	SOIL, mg/kg	0.0050	0.0050	0.0050	0.0050

Refer to Laboratory Report in Appendix C for complete listing of results

TABLE 3
ANALYTICAL RESULTS FOR AIR SAMPLES

SUPPLEMENTARY SITE INVESTIGATION, 1998

SAMPLE No.	LOCATION	BENZENE	TOLUENE	BENZENE	TOLUENE
		VOLUME BASIS ppb (vol/vol)		UNIT. WT. BASIS ug/g	
AOO1	Parking lot against Engr Bldg wall, near NW bldg cor. Adj to AOO2	ND	1.02	ND	3.84
A002	Crawl space: 10 ft So, 2 ft E. of NW bldg cor. Adj to AOO1	ND	1.32	ND	4.97
AOO3	Crawl space: Adj. EP-2 / EP-8 but 8 ft E (inside) of bldg. wall	ND	1.38	ND	5.20
MRLs*	ppb ug/cu.m	1.00	1.00	3.19	3.77

*Refer to Laboratory Report in Appendix D for complete listing of results

Job No. 3022.8

TABLE 4
GEOTECHNICAL LABORATORY TEST RESULTS FOR SOILS

SUPPLEMENTARY SITE INVESTIGATION, 1998

BORING	DEPTH Ft.	SOIL CLASSIFICATION	MOISTURE %	DRY UNIT WEIGHT, pcf	SPECIFIC GRAVITY	BULK DENSITY (Note 1)	POROSITY % (Note 2)	VOID RATIO (Note 3)
EP-8	2.5-3	brown, clayey SAND w/ gravel	14.4	115.8		1.86	31.3	0.46
EP-8	3.5-4	brown clayey SAND	14.7	116.7		1.87	30.8	0.44
EP-8	7.5-8	Dark gray SILT	42.5	78.4	2.71	1.26	53.7	1.16
EP-8	8-8.5	Gray sandy SILT	21.9	102.7		1.65	39.1	0.64
EP-9	6-6.5	Darkbrown CLAY	26	98.6		1.58	41.5	0.71
EP-9	9-9.5	Gray siltySAND	21.9	105		1.68	37.7	0.61
EP-10	6.5-7	Gray sandy SILT grading tosilty SAND	21.5	103.1	2.70	1.65	38.8	0.64
EP-11	3.5-4	Yellow brown SAND w/ gravel	8.8	122.8	2.75	1.97	28.5	0.4

NOTES

1. Bulk density = Dry Unit Weight (pcf) / 62.4 pcf.
2. Porosity = volume of voids as % of total volume
3. Void ratio = volume of voids as ratio of volume of solids. Specific gravity as measured, or assumed as 2.70
4. Refer to Laboratory Report in Appendix D for complete listing of results

TABLE 5
LABORATORY TEST RESULTS FOR SOILS
CARBON / ORGANICS TEST RESULTS

SUPPLEMENTARY SITE INVESTIGATION, 1998

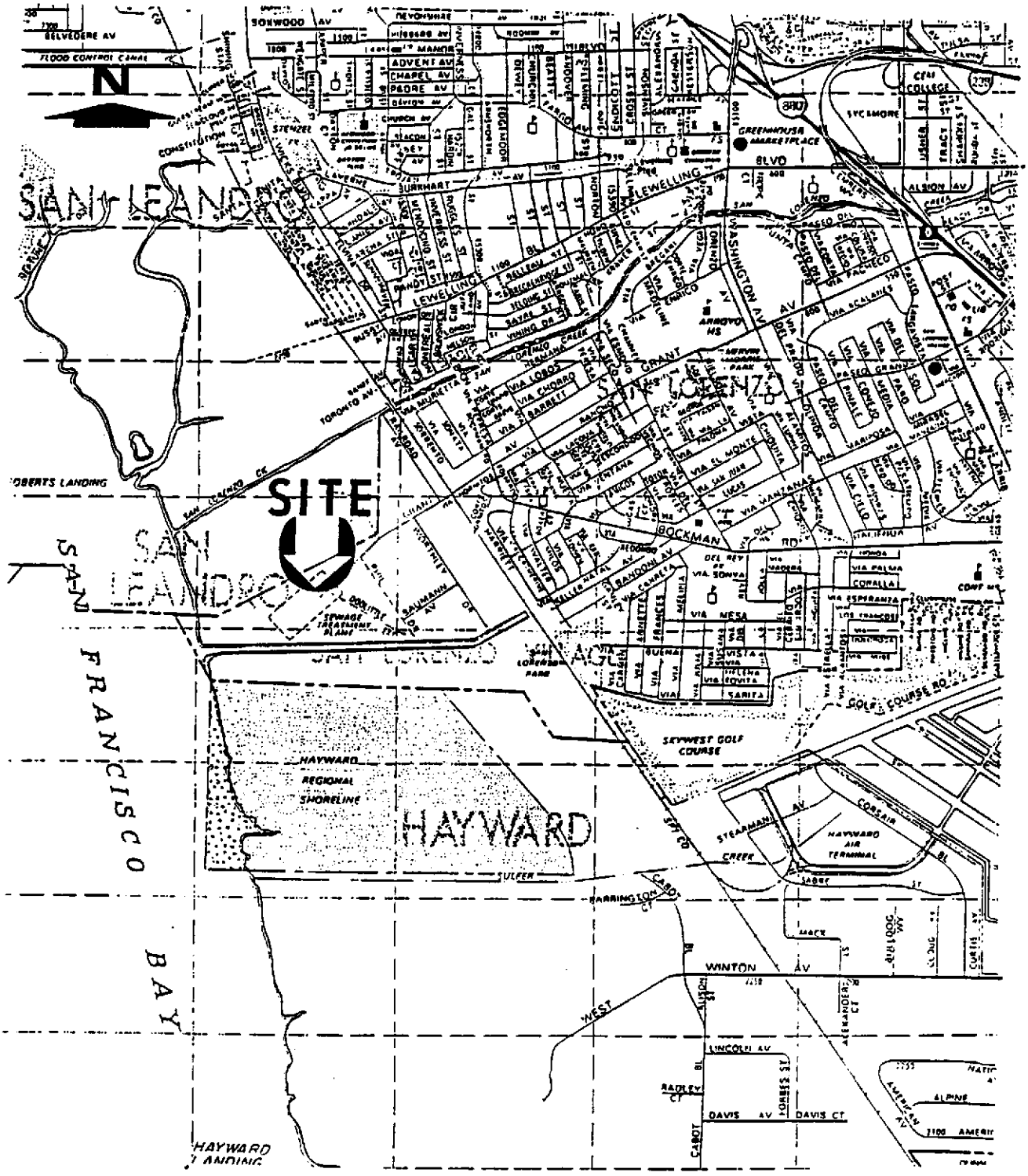
BORING	DEPTH ft	SOIL CLASSIFICATION	ORGANIC CONTENT[1] %	ORGANIC CARBON[2] mg/kg
EP-8	3-3.5	Tan sandy GRAVEL (FILL)	--	1090
EP-8	7.5-8	Dark Gray SILT	2.9	--
EP-9B	6-6.5	Brown fine SAND (FILL)	--	1560
EP-10	6.5-7	Gray sandy SILT grading to silty SAND	1.9	--
EP-11	6.5-7	Green silty SAND	2.4	--
EP-12A	3.5-4	Brown CLAY and angular GRAVEL (FILL)	--	4590

NOTES

1 Samples analyzed by ASTM Method D2974 at Cooper Testing Labs. See Laboratory Report in Appendix E

2 Samples analyzed by EPA Method 9060 at Sequoia Analytical. See Laboratory Report in Appendix C

Job No. 3022.8



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

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SITE LOCATION MAP

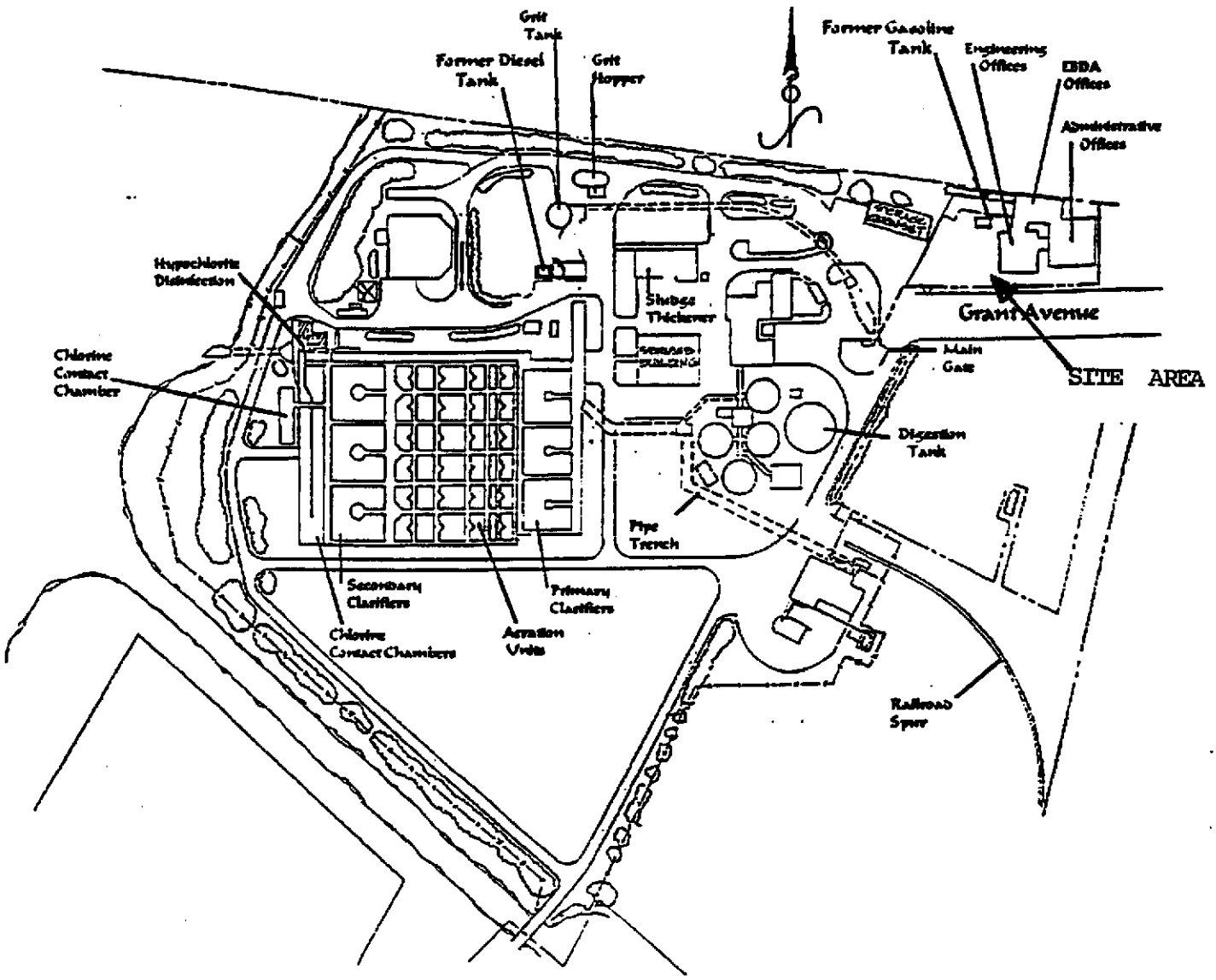
SUPPLEMENTAL SITE EVALUATION
1,000 Gallon Gasoline Tank Site

ORO LOMA SANITARY DISTRICT
San Lorenzo, California

PROJECT No. 3022.8

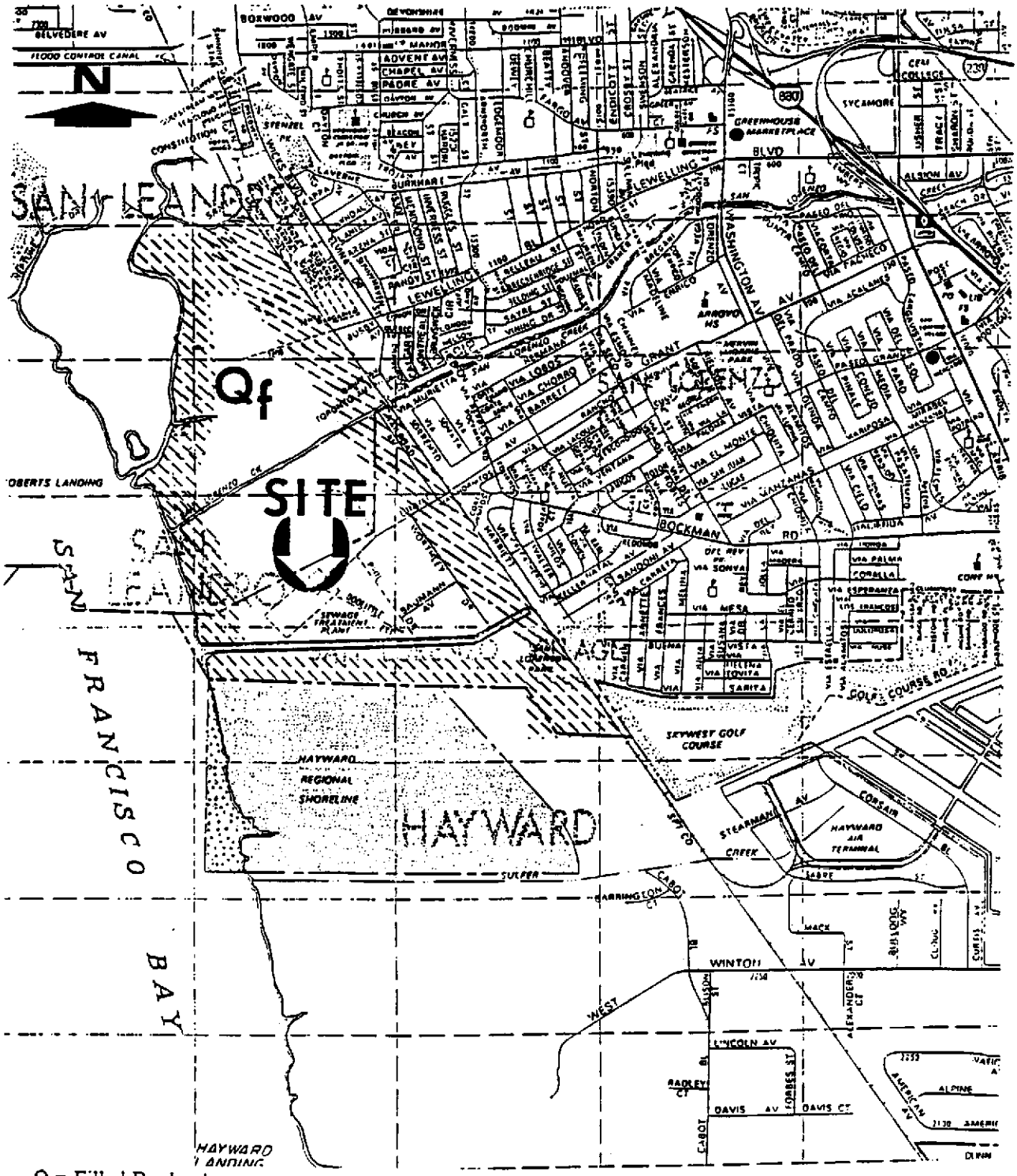
FIGURE 1

7/13/98



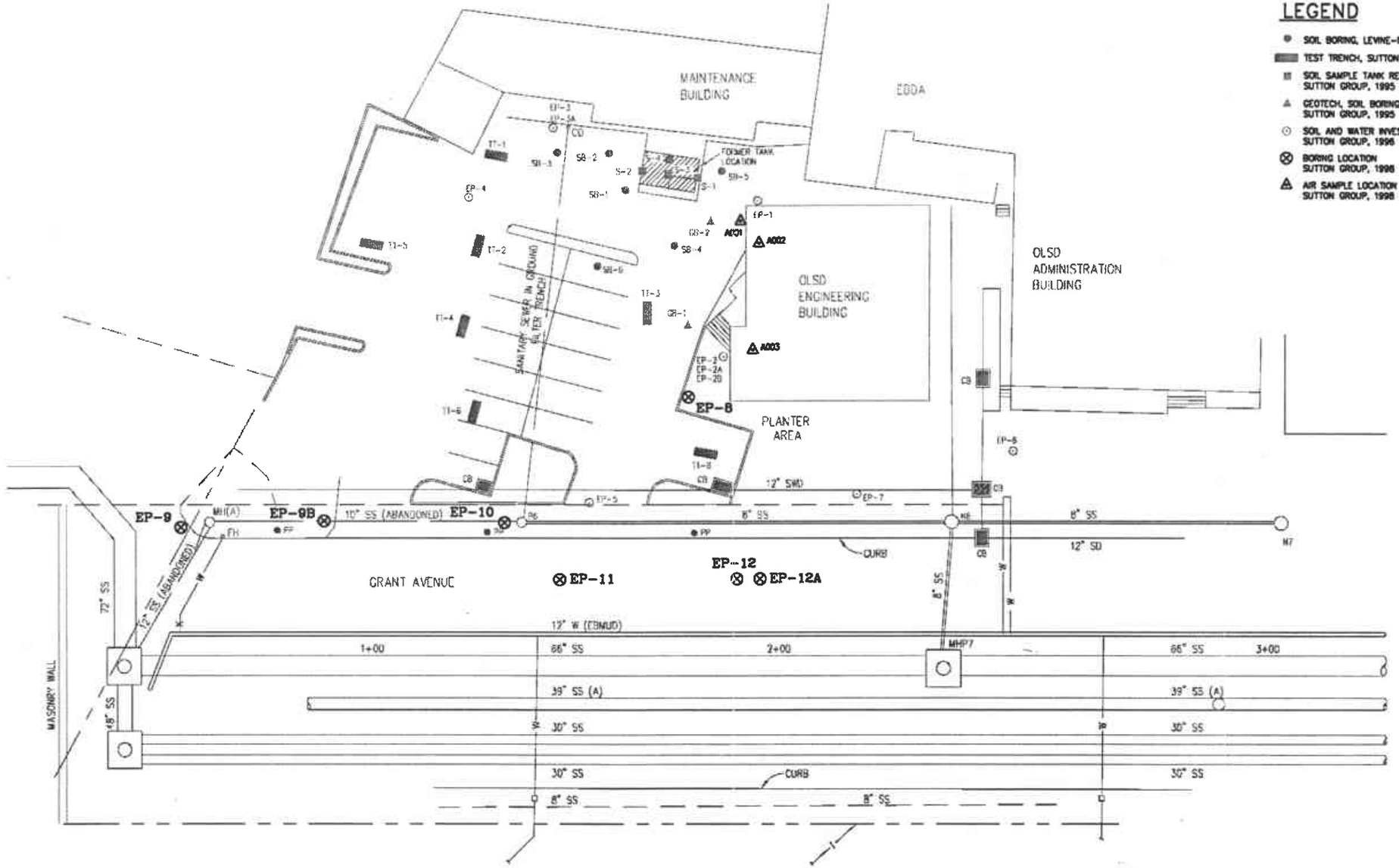
SITE PLAN

THE SUTTON GROUP *Engineering and Environmental Services* *1480 Moraga Road, Suite I* *Moraga, California 94556* *phone (925) 631-1688* *FAX (925) 631-1371*	**PLANT LOCATION MAP** **SUPPLEMENTAL SITE EVALUATION** **1,000 Gallon Gasoline Tank Site** **ORO LOMA SANITARY DISTRICT** **San Lorenzo, California**	PROJECT No. 3022.8 FIGURE 2 7/13/98



Q_f = Filled Bayland

THE SUTTON GROUP *Engineering and Environmental Services* *1480 Moraga Road, Suite I* *Moraga, California 94556* *phone (925) 631-1688* *FAX (925) 631-1371*	**HYDROLOGIC SETTING** **SUPPLEMENTAL SITE EVALUATION** **1,000 Gallon Gasoline Tank Site** **ORO LOMA SANITARY DISTRICT** **San Lorenzo, California**	PROJECT No. 3022.8 FIGURE 3 7/13/98



PLOTTING PLOT 1/300

PROJECT NO. 3022.8

FIGURE 3

06/30/98

Sampling Location Map

Gasoline Tank Area

ORO LOMA SANITARY DISTRICT
SAN LORENZO, CALIFORNIA

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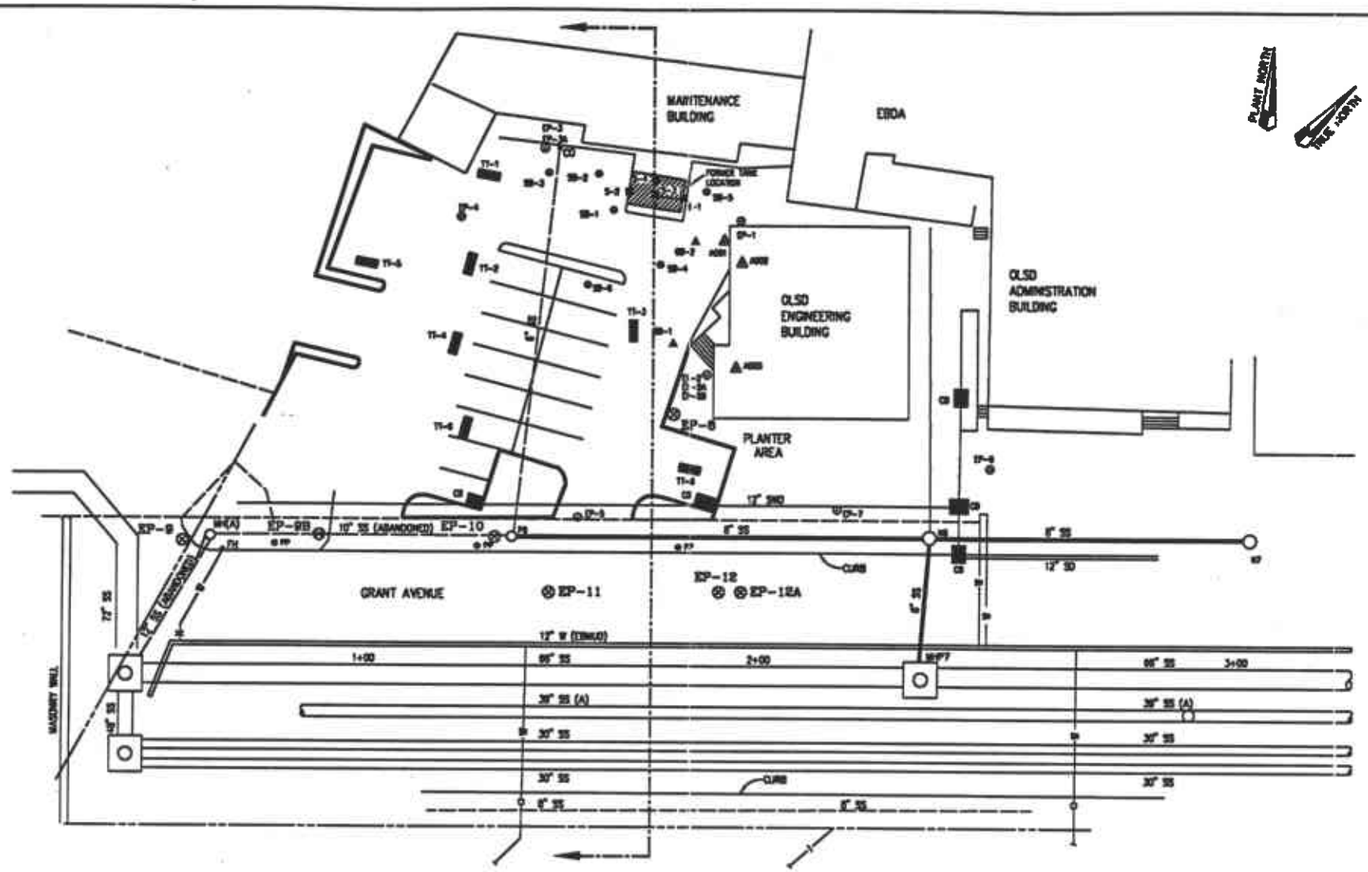
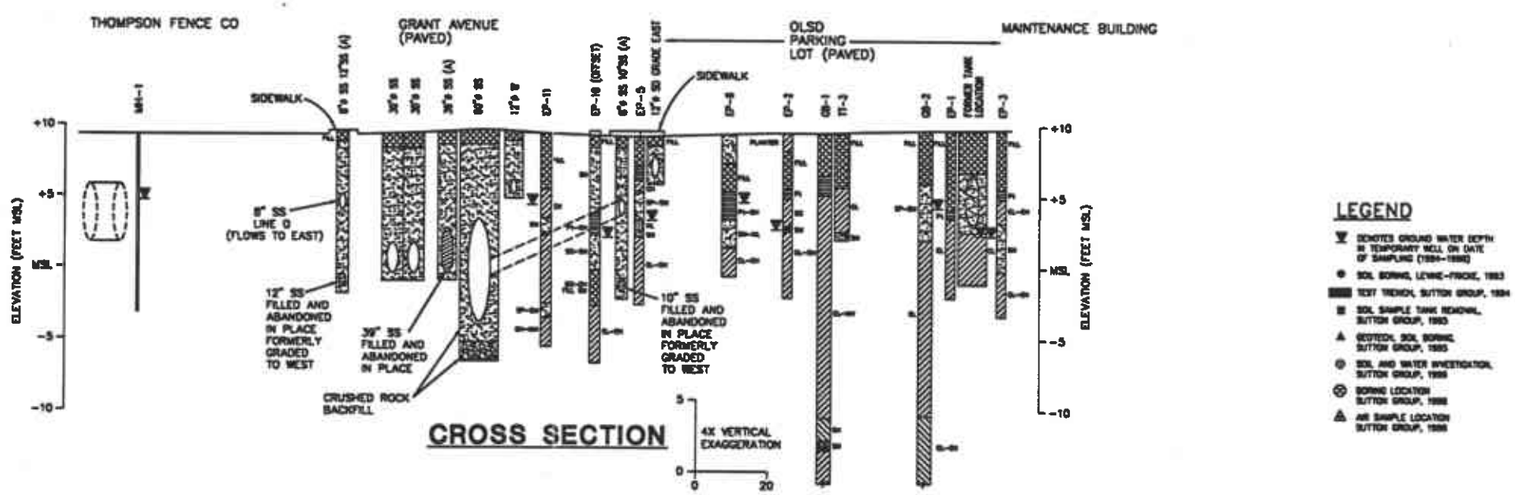


PLAN VIEW

SCALE: 1"=20'-0"



CROSS SECTION

LEGEND

- DENOTES GROUND WATER DEPTH IN TEMPORARY WELL ON DATE OF SAMPLING (1994–1998)
- SOIL BORING, LEVINE–FRICKE, 1993
- TEST TRENCH, SUTTON GROUP, 1994
- SOIL SAMPLE TANK REMOVAL, SUTTON GROUP, 1993
- GEOTECH. SOIL BORING, SUTTON GROUP, 1995
- SOIL AND WATER INVESTIGATION, SUTTON GROUP, 1998
- BORING LOCATION SUTTON GROUP, 1998
- AIR SAMPLE LOCATION SUTTON GROUP, 1998

Revision	Description	Submit	Appr'd	Date
Refer to Original for Latest Revision				

Reference Information and Notes:

Designed
Drawn
Checked
Date 06/30/98

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Submitted:

ORO LOMA SANITARY DISTRICT

Gasoline Tank Area Plan and Cross Section

Scale: AS SHOWN
Job No.: 3022.8
Sheet:
Fig No.: FIGURE 4

Benzene Concentrations in Soil

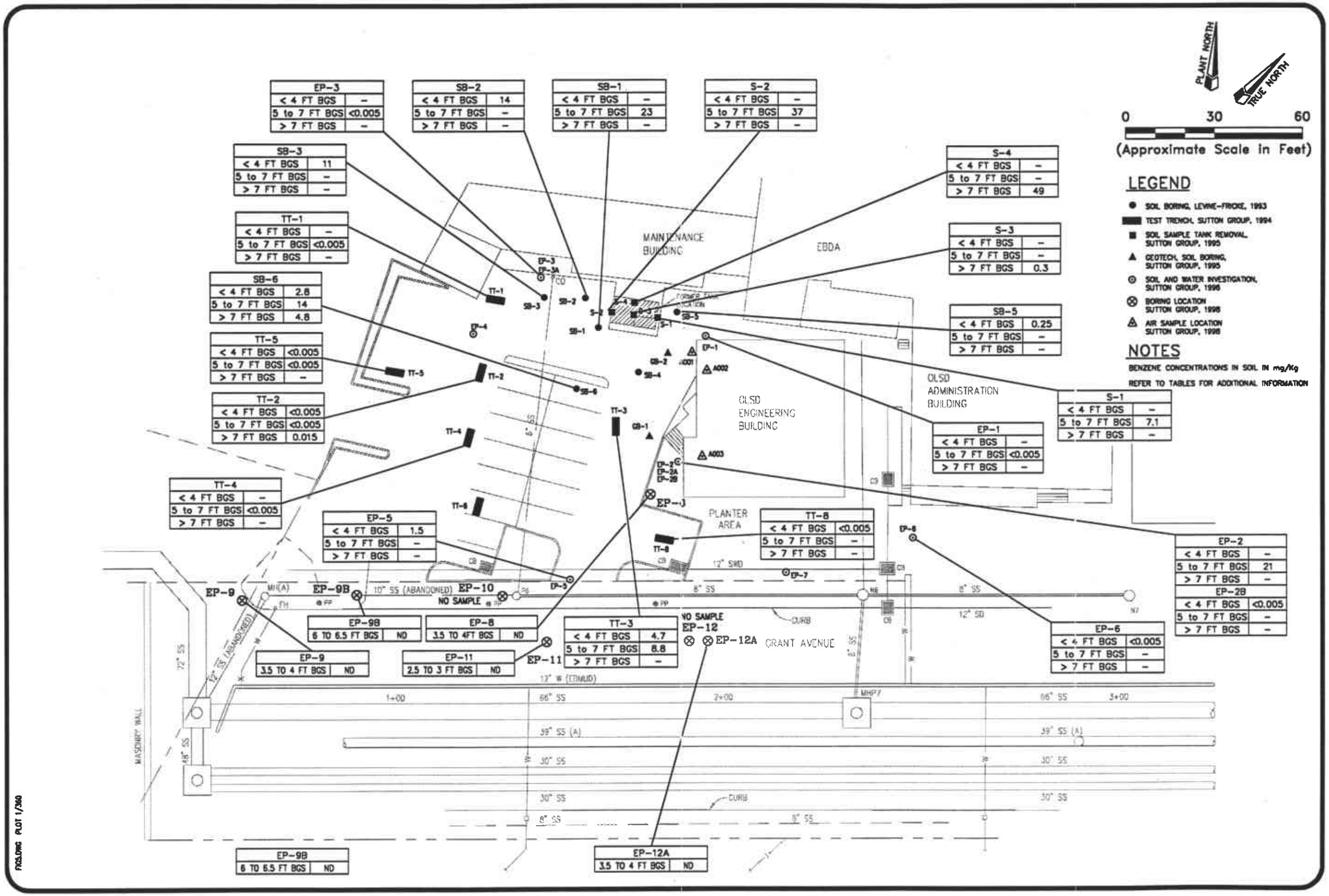
Gasoline Tank Area

ORO LOMA SANITARY DISTRICT
SAN LORENZO, CALIFORNIA

PROJECT NO. 3022.8

FIGURE 5

06/30/98



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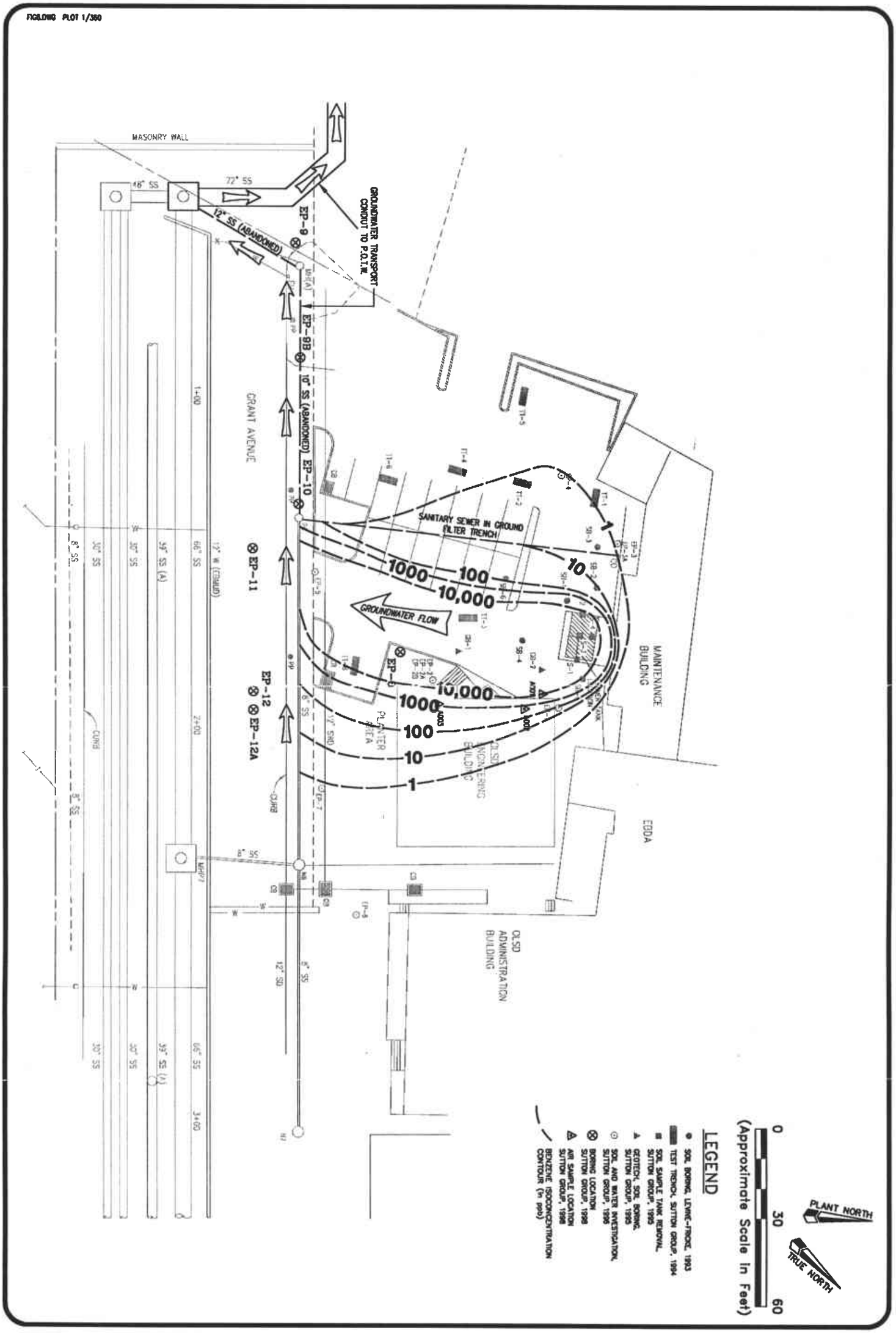
FIGSLDWG PLOT 1/360



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Benzene Concentrations Map
Benzene in Groundwater, ug/l.

Gasoline Tank Area
ORO LOMA SANITARY DISTRICT
SAN LORENZO, CALIFORNIA

PROJECT NO. 3022.8

FIGURE 6

06/30/98

APPENDIX A

SOIL CORING AND SAMPLING, AND GROUND WATER SAMPLING PROCEDURES

Soil cores and ground water samples were 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 rig, the MD-1, utilizes a hydraulic hammer to drive Enviro-Core™ sampling rods into the ground to collect continuous soil cores. The MD-1 sampling rig is mounted on a 4-wheel-drive vehicle. The Enviro-Core™ rods are advanced into the ground with a hydraulic hammer. 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 ½" 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 de-ionized water between samples collected in the same hole All rinsate from the cleaning are temporarily contained in a portable container at the project site and later discharged into the sanitary sewer system for treatment at OLSD's adjacent 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 was installed in the borehole to facilitate the collection of groundwater samples. Threaded sections of PVC were lowered into the borehole inside the drive casing. The drive casing was then removed to expose the slotted interval of the PVC.

Groundwater samples were collected from within the PVC casing the following day. At each boring, the cover was removed, and the HNu photo ionization detector was used to identify the presence of any volatized vapors. For each boring, a new, disposable plastic, ¾-inch diameter, 3 foot long, bailer with new string was lowered until ground water was contacted. This depth was measured. The bailer was then lowered until about half full. Upon retrieval, this first bailer was examined to determine whether any free product was present, and water turbidity. The sample was then decanted into the sample containers. The bailer was again lowered into the casing until adequate sample volume was retrieved.

BOREHOLE GROUTING

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

*****000****

BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-8**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	9.5' approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	5.4' on 5/14/98		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details			PID ppm	Remarks
1		FILL (CL)	FILL, Clay and topsoil, moist, organics, brown					
2			(Garden)	X	1-4'			
3		FILL(GM)	2' GRAVEL, sandy to very sandy, dry to moist,	X	R=26/36		1	
4			tan. Crushed rock structural fill.	X				
5		CL-CH	4.4' CLAY, very moist, black/brown. Bay Mud	X				
		SM	≈6 SAND, silty to clean, fine, wet, gray	X	▽			
		SP-SM		X				
			8.' Same: Gasoline odor, gray to green	X			1,000	
		CL-CH	8.5' CLAY, silty, V.moist. Dk. gray to gray-green.,	X			180	
10				X			60	
			10' BORING TERMINATED					
			5' x 1" temp. **well casing** installed at 10 ft for					
			water sample collection. Water sampled 5/14/98					
15								
			Casing removed, Borehole **tremie grouted**					
			following collection of water sample on 5/14/98					

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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-9A**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	8.5' approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	NA		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details	PID ppm	Remarks
1		FILL	Asphalt, Base rock.			
2		FILL	@ 0.5: CLAY, black, dry. No gravel in fill			
3						
4			1' BORING TERMINATED			
5						
10						
15						

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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-9B**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	8.5' approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	5.6' on 5/14/98		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details	PID ppm	Remarks
1		Conc.	5" Concrete sidewalk			
2		FILL	GRAVEL, sandy, silty, tan,/green	X 1-4'		
3		GP,		X R=13/36	0	
4		GM		X		
5				X 4'-7'		
				X R=16/36	0	
		FILL	SAND, fine, dry gray and brown mottled	X		
		SP		X 7-10'	0	
		ML	SILT, m.stiff, no odor.	X R=20/36		
10		CL	CLAY, stiff, moist, black/gray BAY MUD	X	0	
		CL-CH	CLAY, soft, silty, with silt layers, (MH) soft, gray to green	X 10-13		
			and black	X R=30/36		
				X		
				X 13-15'		
15		SP	SAND, fine, some shell, gray to green	X R=24/24	0	
			15' BORING TERMINATED			
			10' x 1" temp. **well casing** installed at 5-15ft for water sample collection. Water sampled 5/14/98			
			Casing removed, Borehole **tremie grouted** following collection of water sample on 5/14/98			

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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-10**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	9.0 approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	7.7 on 5/14/98		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details			PID ppm	Remarks
1		Conc.	5" Concrete sidewalk				0	
2		FILL	GRAVEL, angular sandy, silty, tan,/green wet	X	1-4'			
3		GP		X	R=4/36		0	
4				X				
5		OH/Pt	CLAY/Peat, highly organic, black/brown	X	4'-7'		9	
		SP-SM	SAND, fine, clean to slightly silty,wet, gray	X	R=18/36			
		SC-SM	SAND, some gravel, clayey, silty, wet, green and	X			0	
			black	X	7-10'			
		SM	@ 9 SAND layer , silty, silty, gray, wet	X	R=21/36		0	
10		CL-CH	CLAY, m. Plastic stiff, black/gray BAY MUD	X			15	
			@ 10 GRAVEL in clay matrix (GC), strong org.	X	10-13		40	
			odor soft, silt layers, (MH) gray blue green, black	X	R=8/36			
			with decayed wood (fill ?)	X				
			Gravelly sand layers (blue minerals), blue, black	X	13-16'			
15			CLAY, m.plastic, soft, wet., gray	X	R=33/36		0	
			@ 13' some pea gravel (trench fill?)	X				
			16' BORING TERMINATED					
			caved to 13 ft					
			10' x 1" temp. **well casing** installed 3-13ft for					
			water sample collection. Water sampled 5/14/98					
			Casing removed, Borehole **tremie grouted**					
			following collection of water sample on 5/14/98					

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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-11**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	7.5 approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	4.9 on 5/14/98		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details	PID ppm	Remarks
1		FILL	Asphalt, Base rock.		0	
2		FILL	GRAVEL, silty, clayey, angular, coarse, moist,	X 1-4'		
3			brown	X R=2236	0	
4		CH	CLAY, silty, m.stiff, green/black (FILL)	X		
5			GRAVEL, angular, black, asphalt pieces (FILL)	X 4'-7'		
		SM	SAND, very silty, moist, green.	X R=141/36	0	
		CL-CH	CLAY, very silty, m. plastic, stiff to soft, sandy	X		
			zones,	X 7-10'	0	
10			@ 9.5 V. stiff to hard. Dessication cracks.	X R=24/36 X	0	
		CH-MH	CLAY-SILT, m.plastic s.sandy, soft gray	X 10-13		
			Sand layers (SP-SM) fine, green.	X R=27/36	0	
			@13-15 v. Soft, dark gray	X	0	
				X 13-15'		
15				X R=24/24	0	
			15' BORING TERMINATED			
			10' x 1" temp. **well casing** installed at 5-15ft for			
			water sample collection. Water sampled 5/14/98			
			Casing removed, Borehole **tremie grouted**			
			following collection of water sample on 5/14/98			

THE SUTTON GROUP
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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-12**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	7.5 approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	4.9 on 5/14/98		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details	PID ppm	Remarks
1		FILL	Asphalt, Base rock.		0	
2		FILL	GRAVEL, sandy, angular, coarse, moist,	X 1-4'		
3		(GP)	brown	X R=3/36	0	
4				X		
5				X 4-7'		
				X R=0/36		
				X		
			7' Borehole abandoned due to rock jammed in			
			sampler.			
10			Borehole **tremie grouted** on 5/14/98			
15						
20						

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BOREHOLE LITHOLOGIC LOG

Project No. 3022.8 Boring No **EP-12A**

Date Drilled	May 13, 1998	Drilling Company	Precision Sampling, Inc.
Client	Oro Loma Sanitary District	Driller	Jose
Site Name	Supplementary Investigation	Rig Model	PSI: MD-1
City/Town	San Lorenzo, CA	Drilling Method	Enviropush continuous core
Logged By	J. Sutton	Borehole Diameter	2 ½"
Surface Elevation	7.5 approx msl	Sampling Method	Envirocore, 1 5/8" ID x 6" long
Grd Water Depth	4.8 @ 5/14		liners

Depth (ft)	Graphic Symbol	USCS Symbol	Soil Description	Sample Loc'n/ Well Details	PID ppm	Remarks
1		FILL	Asphalt, Base rock. Gravel, sandy		0	
2		FILL	GRAVEL, sandy, angular, >1½," coarse, moist,	X 1-2'		
3		(GP)	brown	X R=6/12	0	
4			@3.5: 6" CLAY layer, v.gravelly, stiff, brown, (CL)	X 4'-5.5'	0	
5		SP	SAND, fine green	X R=12/18		
		SM	SAND, v. Silty, wet, gray. wood fragmernts	X 5.5-7'	0	
			(Native/ Bay land soils)	X R=16/18		
		CL-CH	CLAY, silty, stiff v.moist, gray/black, green	X 7-10'	0	
			BAY MUD	X R=21/36		
10			@ 10': roots in sampler	X	0	
				X 10-13		
			@12.3 Peat layer, 1.2 ft thick, brown.	X R=31/36	0	
			Strong sulfide odor	X	0	
		MH	SILT, clayey, v.Stiff, gray-green	X 13-15'		
15				X R=18/24	0	
			15' BORING TERMINATED			
			10' x 1" temp. **well casing** installed at 5-15ft for			
			water sample collection. Water sampled 5/14/98			
			Casing removed, Borehole **tremie grouted**			
			following collection of water sample on 5/14/98			

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228

Lab Proj. ID: 9805A95

Sampled: 05/13/98
Received: 05/15/98
Analyzed: see below

Reported: 05/31/98

LABORATORY ANALYSIS

Analyte		Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9805A95-07					
Sample Desc : **SOLID,EP-8@ 3-3.5**					
#1267	**Organic Carbon : Total**	**mg/kg**	**05/26/98**	**50**	**1090**
Lab No: 9805A95-09					
Sample Desc : **SOLID,EP-9B@ 6-6.5**					
#1267	**Organic Carbon : Total**	**mg/kg**	**05/26/98**	**50**	**1560**
Lab No: 9805A95-11					
Sample Desc : **SOLID,EP-12A@ 3.5-4**					
#1267	**Organic Carbon : Total**	**mg/kg**	**05/26/98**	**50**	**4590**

Analytes reported as N.D. were not present above the stated limit of detection.

ELAP Number
SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

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The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/14/98
51 Shuey Drive	Sample Descript: EP-8/1	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: LIQUID	
	Analysis Method: EPA 8020	Analyzed: 05/28/98
Attention: John Sutton, PE	Lab Number: 9805A95-01	Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	**500**	**24000**
Toluene	**500**	**44000**
Ethyl benzene	**500**	**3400**
Xylenes (Total)	**500**	**17000**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	102

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/14/98
51 Shuey Drive	Sample Descript: EP-8/1	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: LIQUID	
	Analysis Method: EPA 8020	Analyzed: 05/28/98
Attention: John Sutton, PE	Lab Number: 9805A95-01	Reported: 05/31/98

QC Batch Number: GC052898BTEX03A
Instrument ID: GCHP03

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	**500**	**4900**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	131 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/14/98
51 Shuey Drive	Sample Descript: EP-9/1	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: LIQUID	
	Analysis Method: EPA 8020	Analyzed: 05/28/98
Attention: John Sutton, PE	Lab Number: 9805A95-02	Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	95

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/14/98
51 Shuey Drive	Sample Descript: EP-9/1	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: LIQUID	
	Analysis Method: EPA 8020	Analyzed: 05/28/98
Attention: John Sutton, PE	Lab Number: 9805A95-02	Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	2.5	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	95

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-9B/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-03

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	**0.50**	**0.81**
Toluene	0.50	N.D.
Ethyl benzene	**0.50**	**3.6**
Xylenes (Total)	**0.50**	**9.8**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	101

Analytes reported as N.D. were not present above the stated limit of detection.

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-9B/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-03

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	2.5	5.2

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	101

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-10/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-04

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX02A
Instrument ID: GCHP02

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	**100**	**12000**
Toluene	**100**	**13000**
Ethyl benzene	**100**	**960**
Xylenes (Total)	**100**	**5200**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	77

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-10/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-04

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX03A
Instrument ID: GCHP03

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	**25**	**1100**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	81

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-11/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-05

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX03A
Instrument ID: GCHP03

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	76

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
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Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-11/1
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-05

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX03A
Instrument ID: GCHP03

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	2.5	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	76

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-12A
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-06

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

BTEX Distinction

Analyte	Detection Limit ug/L	Sample Results ug/L
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	88

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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Project Manager

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556-2620

Attention: John Sutton, PE

Client Proj. ID: SG30228
Sample Descript: EP-12A
Matrix: LIQUID
Analysis Method: EPA 8020
Lab Number: 9805A95-06

Sampled: 05/14/98
Received: 05/15/98

Analyzed: 05/28/98
Reported: 05/31/98

QC Batch Number: GC052898BTEX17A
Instrument ID: GCHP17

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	2.5	N.D.

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	88

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/13/98
51 Shuey Drive	Sample Descript: EP-8@ 3-3.5	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: SOLID	Extracted: 05/27/98
	Analysis Method: 8015Mod/8020	Analyzed: 05/27/98
Attention: John Sutton, PE	Lab Number: 9805A95-07	Reported: 05/31/98

QC Batch Number: GC052798BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	85
4-Bromofluorobenzene	60	140	100

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

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Project Manager

Sequoia Analytical

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404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100
1455 McDowell Blvd. North, Ste. D, Petaluma, CA 94954, (707) 792-1865, FAX (707) 792-0342

The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/13/98
51 Shuey Drive	Sample Descript: EP-9@ 3.5-4	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: SOLID	Extracted: 05/27/98
	Analysis Method: 8015Mod/8020	Analyzed: 05/27/98
Attention: John Sutton, PE	Lab Number: 9805A95-08	Reported: 05/31/98

QC Batch Number: GC052798BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	**0.0050**	**0.0059**
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	87
4-Bromofluorobenzene	60	140	97

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (650) 364-9600, FAX (650) 364-9233
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1455 McDowell Blvd. North, Ste. D, Petaluma, CA 94954, (707) 792-1865, FAX (707) 792-0342

The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/13/98
51 Shuey Drive	Sample Descript: EP-9B@ 6-6.5	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: SOLID	Extracted: 05/27/98
	Analysis Method: 8015Mod/8020	Analyzed: 05/27/98
Attention: John Sutton, PE	Lab Number: 9805A95-09	Reported: 05/31/98

QC Batch Number: GC052798BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	83
4-Bromofluorobenzene	60	140	97

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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1455 McDowell Blvd. North, Ste. D, Petaluma, CA 94954, (707) 792-1865, FAX (707) 792-0342

The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/13/98
51 Shuey Drive	Sample Descript: EP-11@ 2.5-3	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: SOLID	Extracted: 05/27/98
	Analysis Method: 8015Mod/8020	Analyzed: 05/27/98
Attention: John Sutton, PE	Lab Number: 9805A95-10	Reported: 05/31/98

QC Batch Number: GC052798BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	89
4-Bromofluorobenzene	60	140	96

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (650) 364-9600, FAX (650) 364-9233
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1455 McDowell Blvd. North, Ste. D, Petaluma, CA 94954, (707) 792-1865, FAX (707) 792-0342

The Sutton Group	Client Proj. ID: SG30228	Sampled: 05/13/98
51 Shuey Drive	Sample Descript: EP-12A@ 3.5-4	Received: 05/15/98
Moraga, CA 94556-2620	Matrix: SOLID	Extracted: 05/27/98
	Analysis Method: 8015Mod/8020	Analyzed: 05/27/98
Attention: John Sutton, PE	Lab Number: 9805A95-11	Reported: 05/31/98

QC Batch Number: GC052798BTEXEXB
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	**0.0050**	**0.0070**
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	**0.0050**	**0.014**
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	100
4-Bromofluorobenzene	60	140	100

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (650) 364-9600, FAX (650) 364-9233
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The Sutton Group
51 Shuey Drive
Moraga, CA 94556
Attention: John Sutton

Client Project ID: SG30228

QC Sample Group: 9805A95

Reported: May 31, 1998

QUALITY CONTROL DATA REPORT

Matrix:	Liquid
Method:	EPA 8015
Analyst:	C. DEMARTINI
ANALYTE	Gasoline

QC Batch #: GC052898BTEX17A

Sample No.:	GW9805D58-1
Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP17
Sample Conc., ug/L:	N.D.
Conc. Spiked, ug/L:	250
Matrix Spike, ug/L:	240
% Recovery:	96
Matrix Spike Duplicate, ug/L:	250
% Recovery:	100
Relative % Difference:	4.1
RPD Control Limits:	0-25

LCS Batch#: GAWBLK052898A

Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP17
Conc. Spiked, ug/L:	250
LCS Recovery, ug/L:	250
LCS % Recovery:	100

Percent Recovery Control Limits:

MS/MSD	60-140
LCS	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556
Attention: John Sutton

Client Project ID: SG30228

QC Sample Group: 9805A95

Reported: May 31, 1998

QUALITY CONTROL DATA REPORT

Matrix:	Liquid
Method:	EPA 8015
Analyst:	C. DEMARTINI
ANALYTE	Gasoline

QC Batch #: GC052898BTEX03A

Sample No.:	GW9805958-7
Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP03
Sample Conc., ug/L:	N.D.
Conc. Spiked, ug/L:	250
Matrix Spike, ug/L:	230
% Recovery:	92
Matrix Spike Duplicate, ug/L:	230
% Recovery:	92
Relative % Difference:	0.0
RPD Control Limits:	0-25

LCS Batch#: GAWBLK052898A

Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP03
Conc. Spiked, ug/L:	250
LCS Recovery, ug/L:	240
LCS % Recovery:	96

Percent Recovery Control Limits:

MS/MSD	60-140
LCS	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556
Attention: John Sutton

Client Project ID: SG30228

QC Sample Group: 9805A95

Reported: May 31, 1998

QUALITY CONTROL DATA REPORT

Matrix:	Liquid
Method:	EPA 8015
Analyst:	
ANALYTE	Gasoline

QC Batch #: GC052898BTEX02A

Sample No.:	GW9805G58-2
Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP02
Sample Conc., ug/L:	N.D.
Conc. Spiked, ug/L:	250
Matrix Spike, ug/L:	240
% Recovery:	96
Matrix Spike Duplicate, ug/L:	240
% Recovery:	96
Relative % Difference:	0.0
RPD Control Limits:	0-25

LCS Batch#: GAWBLK052898A

Date Prepared:	5/28/98
Date Analyzed:	5/28/98
Instrument I.D.#:	GCHP02
Conc. Spiked, ug/L:	250
LCS Recovery, ug/L:	240
LCS % Recovery:	96

Percent Recovery Control Limits:

MS/MSD	60-140
LCS	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556
Attention: John Sutton

Client Project ID: SG30228

QC Sample Group: 9805A95

Reported: May 31, 1998

QUALITY CONTROL DATA REPORT

Matrix:	Solid
Method:	EPA 8015
Analyst:	R. GECKLER
ANALYTE	Gasoline

QC Batch #: GC052798BTEXEXB

Sample No.:	GS9805D69-6
Date Prepared:	5/27/98
Date Analyzed:	5/27/98
Instrument I.D.#:	GCHP01
Sample Conc., mg/Kg:	N.D.
Conc. Spiked, mg/Kg:	5.0
Matrix Spike, mg/Kg:	4.7
% Recovery:	94
Matrix Spike Duplicate, mg/Kg:	5.2
% Recovery:	104
Relative % Difference:	10
RPD Control Limits:	0-25

LCS Batch#: GSBLK052798B

Date Prepared:	5/27/98
Date Analyzed:	5/27/98
Instrument I.D.#:	GCHP01
Conc. Spiked, mg/Kg:	5.0
Recovery, mg/Kg:	5.2
LCS % Recovery:	104

Percent Recovery Control Limits:

MS/MSD	60-140
LCS	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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The Sutton Group
51 Shuey Drive
Moraga, CA 94556
Attention: John Sutton

Client Project ID: SG30228

QC Sample Group: 9805A95

Reported: May 31, 1998

QUALITY CONTROL DATA REPORT

Matrix:	Liquid
Method:	EPA 9060
ANALYTE	TOC
QC Batch #:	
Sample No.:	
Date Prepared:	
Date Analyzed:	
Sample Conc., ug/L:	
Conc. Spiked, ug/L:	
Matrix Spike, ug/L:	
% Recovery:	
Matrix Spike Duplicate, ug/L:	
% Recovery:	
Relative % Difference:	
RPD Control Limits:	

LCS Batch#:	580855
Date Prepared:	5/26/98
Date Analyzed:	5/26/98
Conc. Spiked, ug/L:	N.D.
Recovery, ug/L:	2730
LCS % Recovery:	109

Percent Recovery Control Limits:

MS/MSD	70-130
LCS	80-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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1455 McDowell Blvd. North, Ste. D, Petaluma, CA 94954, (707) 792-1865, FAX (707) 792-0342

The Sutton Group	Client Proj. ID: SG30228	Received: 05/15/98
51 Shuey Drive		
Moraga, CA 94556-2620	Lab Proj. ID: 9805A95	Reported: 05/31/98
Attention: John Sutton, PE		

LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 2L pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

MTBE: Sample 9805A95-01 had high surrogate recoverry, due to matrix effect.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

THE SUTTON GROUP

Engineering and Environmental Services

~~51 Shuey Drive~~ 1480 Moraga Rd, Ste I
Moraga, California, 94556-~~2620~~
phone ~~(510)~~ 925 631-1688 fax ~~(510)~~ 925 631-1371

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Reporting Information:

1. Client: ORO LOMA SANITARY DISTRIC
Address: 2600 Grant Avenue
San Lorenzo CA, 94580
Contact: Michael Cortez
Alt. Contact:

Address Report To:

2. John Sutton, PE
The Sutton Group
~~51 Shuey Drive~~
Moraga, CA, 94556-2620

Send Invoice To:

3. Oro Loma Sanitary District
2600 Grant Ave
San Lorenzo, CA, 94580
Att. Mr. Michael Cortez

Lab Job Number:
Lab Destination:
Date Samples Shipped: 5/14/98
Lab Contact: TODD Granicher
Date Results Required: 5/28/98
Date Report Required: 5/28/98
Client Phone No.: 925-631-1688
Client FAX No.: 925-631-1371

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: SG30228

Sample Team Member (s) _____

ANALYSIS

9805A95 15 12 24

Lab Number	Client Sample Indentification	Air Volume	Date/ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	BTEX by 8020	MTBE	Comments / Hazards
1	EP-8/1		5/14/98	~~VOA~~	HCl	3	VOA	/	/	
2	EP-9/1		5/14/98	Water	HCl	3	VOA	/	/	
3	EP-9B/1		5/14/98	water	HCl	3	VOA	/	/	
4	EP-10/1		5/14/98	Water	HCl	3	VOA	/	/	
5	EP-11/1		5/14/98	water	HCl	3	VOA	/	/	
6	EP-12A		5/14/98	water	HCl	3	VOA	/	/	

Use SFRWQCB Procedure

Relinquished by: (Signature) John Sutton	DATE 5/14/98	TIME 3:15pm	Received by: (Signature) Jeff Bonnette DATE 5-15-98 TIME 11:24
Relinquished by: (Signature) OLSD Lab, FRCOGG	DATE	TIME	Received by: (Signature) DATE TIME
Relinquished by: (Signature) Jeff Bonnette	DATE 5-15-98	TIME	Received by: (Signature) Jim Burns DATE 5-15-98 TIME 1224
Method of Shipment Sequoia Courier			Lab Comments

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. _____ pore size _____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

Reporting Information:

1. Client: ORO LOMA SANITARY DISTRIC
Address: 2600 Grant Avenue
San Lorenzo CA, 94580
Contact: Michael Cortez
Alt. Contact: _____

THE SUTTON GROUP

Engineering and Environmental Services

~~51 Shuey Drive~~ 1480 Moraga Rd, Ste I
Moraga, California, 94556-2620
phone (510) 631-1688 fax (510) 631-1371

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Lab Job Number: _____
Lab Destination: _____
Date Samples Shipped: 5/14/98
Lab Contact: Todd Granville
Date Results Required: 5/28/98
Date Report Required: 5/28/98
Client Phone No.: 925-631-1688
Client FAX No.: 925-631-1688

Address Report To:

2. John Sutton, PE
The Sutton Group
~~51 Shuey Drive~~
Moraga, CA, 94556-~~2620~~

Send Invoice To:

3. Oro Loma Sanitary District
2600 Grant Ave
San Lorenzo, CA, 94580
Att. Mr. Michael Cortez

Send Report To: 1 or (2) (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: SG30228

Sample Team Member (s) _____

9805A95

E 15 12 24

Lab Number	Client Sample Indentification	Air Volume	Date/ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS: GAS BTEX / Total Organic Content	Comments / Hazards
7	EP-8@ 3-3.5'		5/13	Soil	—	1	Tube	/	
8	EP-9@ 3.5-4'		5/13	Soil	—	1	Tube	/	
9	EP-9B@ 6-6.5		5/13	Soil	—	1	Tube	/	
10	EP-11@ 2.5-3		5/13	Soil	—	1	Tube	/	
11	EP-12A@ 3.5-4 EP		5/13	Soil	—	1	Tube	/	
								5 3	

Relinquished by: (Signature) John Sutton	DATE 5/14/98	TIME 3:15pm	Received by: (Signature) Jeff Barnville
Relinquished by: (Signature) OLSD Lab Fridge	DATE	TIME	Received by: (Signature)
Relinquished by: (Signature) Jeff Barnville	DATE 5-15-98	TIME	Received by: (Signature)
Method of Shipment Sequoia Courier			Lab Comments

	DATE 5-15-98	TIME 10:24	
	DATE	TIME	
	DATE	TIME	

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

K PRIME, Inc.
CONSULTING ANALYTICAL CHEMISTS

3621 Westwind Blvd.
Santa Rosa CA 95403
Phone: 707 527 7574
Fax: 707 527 7879

TRANSMITTAL

DATE: 06.02.98

TO: Mr. JOHN SUTTON
THE SUTTON GROUP
1480 MORAGA ROAD SUITE I
MORAGA CA 94556

Acct: 9815
Project: 3022.8

Phone: 925.631.1688
FAX: 925.631.1371

FROM: Richard A. Kagel, Ph.D. RAK 6/2/98
Laboratory Director

SUBJECT: YOUR PROJECT "3022.8 OLSD" LABORATORY RESULTS

Enclosed please find K Prime's laboratory reports for the following samples:

SAMPLE ID	SAMPLE TYPE	DATE	KPI LAB #
A001	AIR	05.14.98	14776
A002	AIR	05.14.98	14777
A003	AIR	05.14.98	14778

These samples were received in our laboratory on 05.19.98 and tested as requested on the chain of custody document.

Please call me if you have any questions or need further information. Thank you for this opportunity to be of service.

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9815
YOUR PROJECT: 3022.8

METHOD: VOC'S IN AIR
REFERENCE: TO14 (GC-MS-SCAN)

SAMPLE ID: A001
LAB NO: 14776
SAMPLE TYPE: AIR/SUMMA
DATE SAMPLED: 5/14/98
TIME SAMPLED: NA

DATE ANALYZED: 6/1/98

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
BENZENE	71-43-2	1.00	ND	3.19	ND
TOLUENE	108-88-3	1.00	1.02	3.77	3.84

NOTES:
ND - NOT DETECTED ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

APPROVED BY: BMC
DATE: 6/2/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9815
YOUR PROJECT: 3022.8

METHOD: VOC'S IN AIR
REFERENCE: TO14 (GC-MS-SCAN)

SAMPLE ID: A002
LAB NO: 14777
SAMPLE TYPE: AIR/SUMMA
DATE SAMPLED: 5/14/98
TIME SAMPLED: NA

DATE ANALYZED: 6/1/98

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
BENZENE	71-43-2	1.00	ND	3.19	ND
TOLUENE	108-88-3	1.00	1.32	3.77	4.97

NOTES:
ND - NOT DETECTED ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

APPROVED BY: [signature]
DATE: 6/2/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9815
YOUR PROJECT: 3022.8

METHOD: VOC'S IN AIR
REFERENCE: TO14 (GC-MS-SCAN)

SAMPLE ID: A003
LAB NO: 14778
SAMPLE TYPE: AIR/SUMMA
DATE SAMPLED: 5/14/98
TIME SAMPLED: NA

DATE ANALYZED: 6/1/98

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
BENZENE	71-43-2	1.00	ND	3.19	ND
TOLUENE	108-88-3	1.00	1.38	3.77	5.20

NOTES:
ND - NOT DETECTED ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

APPROVED BY: RHK
DATE: 6/2/98

K PRIME, INC.

CHAIN OF CUSTODY RECORD

CONSULTING ANALYTICAL CHEMISTS 4197 Lakeside Drive, Suite 170, Richmond, CA 94806 FAX: (510) 222/4817 PHONE: (510) 222-4815

→ The Sutton Group : Invoice to : 1480 Moraga Road, Ste I, Moraga CA 94556

Client/Project ID	Address/Phone	KPI Project No.
3022.8 OLSD. Indoor Air Sampling	San Lorenzo	9815
Project Location	**Client Project No.**	
Engineering Buildup	3022.8	
Contact	**Sampler (Signature)**	
John Sutton		

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	No. of Containers	Benzene & Toluene by TO3	Expected Turnaround Time	Remarks
A001	5/14/98		14776	S/MMA	1	/	Normal	
A002	5/14/98		14777	"	1	/	"	
A003	5/14/98		14778	"	1	/	"	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	5/15/98	1330PM	Courier : UPS	5/15/98	1330
Relinquished by: (Signature) UPS TRACKING# 1ZE982910310128316	Date 5/19/98	Time 1000	Received by: (Signature) NIELS WORLOFEN	Date 5/19/98	Time 1000
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Disposal Method

Disposed by: (Signature) Date Time

White Copy : Accompanies Samples
Yellow Copy : Sampler

COOPER TESTING LABORATORY

1951 Colony, Unit X
Mountain View, California 94043
Tel: 650 968-9472 FAX: 650 968-4228

LETTER OF TRANSMITTAL

TO: The Sutton Group
51 Shuey Drive
Moraga, CA 94556

DATE: May 26, 1998

PROJECT: SG30288

CTL#: 221-002

ENCLOSED: Laboratory soil test data.

REMARKS:

COOPER TESTING LAB

COOPER TESTING LABS

MOISTURE DENSITY - POROSITY DATA SHEET

Job #	221-002A
Client	Sutton
Project/Location	SG30228
Date	5/22/98

Boring #	EP-9	EP-9	EP-11		
Depth (ft)	9-9.5	6-6.5	3.5-4		
Soil Type	gray silty SAND	dark brown CLAY	yellow brown clayey SAND w/ gravel		
Specific Gravity	2.70 ASSUMED	2.70 ASSUMED	2.75		
Volume Total cc	189.694	195.225	162.362		
Volume of Solids	118.160	114.168	116.143		
Volume of Voids	71.534	81.057	46.219		
Void Ratio	0.605	0.710	0.398		
Porosity %	37.7%	41.5%	28.5%		
Saturation %	97.7%	98.9%	60.8%		
Moisture %	21.9%	26.0%	8.8%		
Dry Density (pcf)	105.0	98.6	122.8		

Remarks

COOPER TESTING LABS

MOISTURE DENSITY - POROSITY DATA SHEET

Job #	221-002
Client	Sutton
Project/Location	SG30228
Date	5/22/98

Boring #	EP-8	8	EP-8	EP-8	EP-10
Depth (ft)	2.5-3	3.5-4	7.5-8.0	8-8.5	6.5-7
Soil Type	brown clayey SAND w/ gravel	brown clayey SAND	dark gray SILT	gray sandy SILT	gray sa SILT grading to silty SAND
Specific Gravity	2.70 ASSUMED	2.70 ASSUMED	2.71	2.70 ASSUMED	2.70
Volume Total cc	39.251	186.103	184.482	92.028	93.964
Volume of Solids	26.968	128.871	85.479	56.087	57.461
Volume of Voids	12.283	57.232	99.003	35.941	36.503
Void Ratio	0.455	0.444	1.158	0.641	0.635
Porosity %	31.3%	30.8%	53.7%	39.1%	38.8%
Saturation %	85.4%	89.4%	99.4%	92.3%	91.4%
Moisture %	14.4%	14.7%	42.5%	21.9%	21.5%
Dry Density (pcf)	115.8	116.7	78.4	102.7	103.1

Remarks

Specific Gravity
ASTM D-854

Cooper Testing Lab

Job#: 221-002a Client: Sutton Project: SG30228			Date: 05/22/98 By: DC			
Boring:	EP-8	EP-10	EP-11			
Sample:						
Depth, ft.:	7.5-8.0	6.5-7	3.5-4			
Soil Classification: (visual)	see porosity					
Wt. of Pycnometer Soil & Water, gm:	341.35	334.15	716			
Temp. centigrade:	20	20	20			
Wt. of Pycnometer & Water, gm:	316.19	302.27	662.89			
Wt. Dry Soil, gm:	39.91	50.67	83.5			
Temp. Correction Factor:	1	1	1			
Specific Gravity:	2.71	2.70	2.75	ERR	ERR	ERR

Remarks: The temperature correction factor is shown as 1 if the weight of the pycnometer is taken from the lab temperature correction curve.

Organic Content
ASTM D2974

Cooper Testing Lab

JOB NO.: 221-002					
CLIENT: Sutton			DATE:	05/22/98	
PROJECT SG30228			BY:	DC	
BORING:	EP-8	EP-10	EP-11		
SAMPLE:					
DEPTH, ft.:	7.5-8	6.5-7	6.5-7		
SOIL CLASSIFICATION: (visual)	see Porosity				
SOIL, ORGANICS & DISH, gm:	132.73	112.99	135.39		
SOIL & DISH, gm:	131.23	112.31	134.08		
DISH, gm:	81.07	77.24	81.76		
SOIL, gm:	50.16	35.07	52.32	0	0
SOIL & ORGANICS, gm:	51.66	35.75	53.63	0	0
% ORGANICS:	2.9	1.9	2.4	ERR	ERR