June 3, 1993

REPORT ON
SOIL EXCAVATION AND
GROUND WATER EXPLORATION

PROJECT #004-189-02

SAN ANTONIO PUMP STATION
5555 CALAVERAS ROAD
SUNOL, CA

PREPARED BY ENVIRONMENTAL BIO-SYSTEMS, INC.
FOR
POWER ENGINEERING CONTRACTORS, INC.

Timothy M. Babcock
Environmental Scientist

Reviewed by:

James A. Jacobs
R.G. #4815

REGISTERED GEOLOGIST
JAMES A. JACOBS
NO. 4815
STATE OF CALIFORNIA

25 November 1992

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

Environmental Bio-Systems, Inc. (EBS) has prepared this report at the request of Power Engineering Contractors, Inc. (the Client). Included is a description of subsurface exploration and excavation performed at the City of San Francisco Water Department (the City) San Antonio Pumping Station located at 5555 Calaveras Road in Sunol, California (the site).

The principal site contacts are:

Principal Client Contact - Mr. Robert Beltramo, Power Engineering Contractors, Inc., 1275 San Antonio Road, Palo Alto, CA 94303-4312, (415) 969-9696

Consultant - Environmental Bio-Systems, Inc., 30028 Industrial Parkway Southwest, Suite C, Hayward, CA 94544, (510) 429-9988, Timothy M. Babcock - Project Manager

2. PURPOSE AND SCOPE OF WORK

The Alameda County Health Agency (ACHA) requested this work in response to the discovery of hydrocarbons and semi-volatile constituents found in soil samples collected subsequent to the removal of an underground storage tank (UST), formerly located at the site. The former tank contained used motor oil generated from the maintenance of 3 large power generators which serviced the pumping station.

The scope of work outlined in this report included the following tasks:

- Preparation of a work plan for submittal to the ACHA.
- Excavation of approximately 1,400-cubic yards (cys) of soil.
- Collection and analysis of confirmation soil samples from the walls and floor of the excavation.
- Collection and analyses of samples from storage piles of the excavated soil.
- Profiling of the excavated soil.
- Drilling and installation of 3 ground water monitoring wells.
- Survey of well elevations and evaluation of ground water gradient.
- Development of ground water monitoring wells.
- Collection and analysis of water samples from the ground water monitoring wells.
- Interpretation of field observations and analytical results.

3. SITE DESCRIPTION

The site is located at 5555 Calaveras Road in Sunol, California. A Site Location Map and a Site Diagram have been included in this report as Figures 1 and 2, respectively.

One building of concrete construction occupies the site. Activities carried out at the site include tasks related to the installation, operation, and maintenance of 3 high volume pumps and associated diesel powered generators. During the progression of work, diesel fuel was stored in a portable 10,000-gallon UST located adjacent to the southwest corner of the building. Both new and used motor oil, and small quantities of cleaning solvents were stored in drums and smaller containers located in a bermed containment structure which was demolished during the progression of this scope of work.

4. PROJECT BACKGROUND

On 11 November 1991, 3 USTs were excavated and removed from the site by Power on behalf of the property owner. EBS performed soil sampling and documentation of the tank removals.

An Underground Storage Tank Unauthorized Release (Leak) Contamination Site Report was filed with the ACHA on 11 August 1992. Appendix A includes a copy of this report.

Two 10,000-gallon diesel tanks were removed from the front of the building, adjacent to the southeast corner of the building. The tanks were approximately 30% embedded in a concrete slab which completely enclosed the lower 2 to 3-feet of the tanks. At the direction of Inspector Scott Seery of the ACHA, no soil samples were collected from beneath the concrete slabs which encased the tanks. Analysis of soil samples taken from excavated overburden indicated low levels of total petroleum hydrocarbons as diesel (TPHd). Approximately 100-cys of overburden soil was subsequently transported and disposed of at BFI Vasco Road Landfill in Livermore, California.

140 yds^3 ?

A 550-gallon UST was also excavated and removed from the site on this date. The former waste oil tank was previously located approximately at the center of the west wall of the building. Analyses performed on soil samples collected from beneath the tank included total petroleum hydrocarbons as gasoline (TPHg), TPHd, total petroleum oil and grease (TOG), chlorinated volatile and semi-volatile compounds, and low levels of heavy metals.

Exploratory trenches and soil borings were excavated at the site between the dates of 21 November and 18 December 1991. The results of analyses performed on soil samples collected in the area of the former waste oil UST indicated up to 410-milligrams per kilogram (mg/Kg) of TPHd.

5. HYDROGEOLOGICAL SETTING

The site is located in the Sunol Valley, an elongate northwest-southeast trending structural trough bounded to the east by the Calaveras Fault, and to the west by the Sinbad Fault. The Welch Fault has been mapped as intersecting the Calaveras Fault approximately 300-feet north of the site. The Sunol Valley is drained by Alameda Creek, which is located approximately 1,000-feet west of the site (California Department of Water Resources, October, 1975, Bulletin 63-5).

The site is underlain by highly permeable Quaternary Alluvium characteristic of stream bed deposits which were derived from the ancestral Alameda Creek. These deposits consist of unconsolidated beds of sand, gravel and boulders with discontinuous layers of clay. According to the State of California Department of Water Resources Bulletin No. 118-2, June 1974, these deposits have a permeability of up to 10-feet per day.

Soils encountered during the scope of this project included clayey silt and sandy clay, underlain by silty sand with minor amounts of clay and gravel, which in turn is underlain by gravel and sand.

Recharge of the ground water occurs largely through infiltration and percolation of precipitation, stream flow along the Alameda Creek, and water applied for irrigation and other uses on the valley alluvium.

The largest extraction of ground water in the Sunol sub-basin is at the Sunol filter galleries, located approximately 2.5-miles northeast of the site. Significant discharge is also achieved by effluent flow into Alameda Creek. Infiltration and percolation of this effluent flow helps to recharge the

ground water reservoirs underlying the Niles Cone at its apex in the vicinity of the Niles district in Fremont.

6. WORK PLAN

The scope of work was performed according to EBS work plan #WP92001 dated 3 February 1992 and approved by Inspector Scott Seery of the ACHA. Appendix B includes a copy of the work plan submitted for this project.

7. EXCAVATION PROCEDURES

Soil removal and sampling were performed from 1 April to 7 May 1992. Excavation was performed by Power (Contractor's License #488215) using a track mounted backhoe. Figure 3 shows the location and surface dimensions of the excavation. Appendix C includes photographs taken during the excavation phase.

Excavation on the northeast side of the main was executed through a series of trenches dug to a maximum depth of 13.5-feet. The extent of digging in this area was severely limited by the proximity of the 54-inch water main (primary main) to the building and the obstructing pipe headers leading from the building down to the main.

Preliminary subsurface explorations performed by EBS (report #004-189-01) were used to plan the direction of excavation. Conditions encountered during trench excavation indicated that the extent of soil impact extended to the north beyond the previously estimated limits on the northeast side of the primary main.

The locations of the trenches were staggered to explore the extent of soil impact between the primary main and the building. Two trenches were also excavated and sampled to the southwest of the primary main in preparation for the bulk of excavation. Figure 4 shows the positions of exploratory trenches dug for this effort overlaid with soil sample locations.

Native soil was found beneath the former UST at approximately 9-feet bgs, below a coarse sand backfill. Field observations indicated a typical hydrocarbon odor and discoloration in the native soil. Sample E3 was collected from the trench wall in soil below the foundation of the building. The depth at which the sample was collected was 9-feet bgs.

Sample E1 and E1s (E1-split) were also collected a depth of 9-feet bgs in rocky soil noted to have a gelatinous substance present in the pore spaces. The substance was found in soil from approximately 9 to 11-feet bgs. Split samples were taken to utilize a mobile laboratory running TPHd and TOG. The split sample was taken to a stationary laboratory for volatile and semi-volatile analysis. The gelatinous substance was encountered in soil directly beneath the former UST location at a depth of 9 to 11-feet bgs.

"Gelatinous substance"

A cast iron drain pipe was found at a depth of approximately 6-feet bgs along the west side of the building. The Client determined that the pipe was connected to floor drains inside the building. Moisture and discoloration were noted in soil surrounding the drain pipe, indicating the probability that leakage had occurred at the joints. The pipe was cut to provide access for excavation. Water continued to flow through the pipe occasionally after it had been cut. A sample of this water was collected and analyzed for semi-volatile organics at the request of the Client. Table 1 shows the results of analyses performed both on water from the pipe and the unknown gelatinous substance.

"ND" for all analytes

The Client attempted to prevent leakage from the floor drain pipe from entering the pit during excavation by placing large containers under the exposed ends. Periodic overflowing of water from the containers resulted in occasional releases of water into the pit.

The final extent of the excavation occupied a roughly rectangular area measuring approximately 90 by 25-feet. The depth of excavation ranged from approximately 13 to 21-feet bgs. The actual depth of excavation was highly variable throughout the work area due to the presence of both above-ground and subsurface obstructions.

Excavation was limited throughout the project due to the presence of both the primary main and a 78-inch water main (secondary main) which lies 50-feet to the west and parallel to the primary main. The movement and placement of machinery around the work area was limited by the need to protect the structural integrity of the mains. The maximum depth of excavation was limited to 21-1/2-feet bgs.

Guidelines set by the City on linear exposure of the primary main limited soil removal to a maximum trench width of 9-1/2-feet. Hydraulic trench shoring was used to prevent collapse of the trenches during excavation.

Water was periodically noted to enter the pit sidewalls during excavation at depths from 9 to 15-3/4-feet bgs. Accumulations of water at the pit bottom were typically light. Volumes of less than 25-gallons of water were pumped from the excavation into DOT 55-gallon drums on 2 occasions during the project. On 2 May 1992, approximately 300-gallons of water was pumped from the northern most section of the excavation.

7.1. SAMPLE COLLECTION

Soil samples were analyzed from 30 locations around the pit perimeter as well as from locations within the excavation and at its bottom. Samples were collected at vertical intervals roughly corresponding to the upper depth (9-feet bgs), mid-depth (13-1/2 to 16-feet bgs), and maximum depth (19 to 21-1/2-feet bgs). Table 2 lists the results of samples collected during excavation with the exception of samples E1, E1s, as well as sampled water from the severed floor drain pipe (see Table 1).

Soil samples were collected either from the backhoe bucket, or by driving a brass tube directly into a freshly exposed surface of the pit wall using a slide-hammer driven sampler. Soil stockpile samples were collected using a wooden mallet to drive brass tubes directly into exposed surfaces of the piles. Stockpile samples were collected from a minimum depth of 2-feet within the pile. After completely filling the sample tubes to exclude head

space, the ends were covered with Teflon tape, and sealed with snug fitting plastic caps.

The pipe water sample was collected in laboratory cleaned 1-liter amber glass bottles and 40-milliliter (ml) volatile organic analysis vials (VOAs) containing hydrochloric acid as a preservative.

Sealed sample tubes and bottles were labeled, refrigerated, and transported to the laboratory. Chain of custody documents were kept with the samples and signed by an accepting party during each transmittal to the laboratory(s).

7.2. SOIL STORAGE PILES

how much soil ?

Soil was segregated into 2 general storage areas during excavation according to the results of OVM screening. Soil found to contain more than 20-parts per million vapor (ppm-v) was stored in a segregated pile. All excavated soil was stored at a City owned gravel parking area approximately 350-feet to the northwest of the excavation site.

All soil storage piles were placed on top of 10-mil visqueen. Following sample collection, the piles were covered with visqueen plastic to inhibit uncontrolled aeration and rainwater intrusion.

Two additional soil samples (SP2E and SP3B) were collected from the piles and analyzed at a different laboratory. The reported results of 40 and 200-mg/Kg TOG support the initial findings. Table 3 shows the results of initial sample analyses performed on soil from the storage piles during the progression of work.

7.3. SAMPLE ANALYSIS

Copies of all laboratory reports and chain of custody documentation generated from the sampling of soil during excavation are included in Appendix C. The samples collected during this phase of work were transported to one of the laboratories listed below. All of the laboratories used during this project are certified by the State of California to perform the required analyses.

- Anametrix, Inc. of San Jose, California
- ChromaLab, Inc. of San Ramon, California
- Mobile Chem Labs, Inc. of Martinez, California
- Sequoia Analytical of Redwood City, California

7.3.1. Excavation Wall and Floor Samples

Figures 5, 6, and 7 show the locations of soil samples from the excavation overlaid with detected concentrations of TPHd, TOG, and semi-volatile organic compounds (SVOCs), respectively. The samples collected from the walls and floor of the excavation were analyzed for some or all of the following analytes using the stated methods:

- TPHg using Environmental Protection Agency (EPA) Method 8015.
- TPHd using a modified EPA Method 8015.
- TOG using Standard Method 5520.
- SVOCs using EPA Method 8270.

7.3.2. Soil Storage Pile Samples

Samples initially collected from the soil storage piles were analyzed for some or all of the following analytes using the stated methods:

- TPHd using a modified EPA Method 8015.
- TOG using Standard Method 5520.

Additional sampling of the excavated soil was subsequently performed pursuant to the requirements of Vasco Road Landfill. Toxicity Characteristic Leaching Potential (TCLP) protocol was followed for the analysis of 8 composite samples. A single sample of this soil was also analyzed for hazardous characteristics. Analyses included for profiling of the excavated soil included the following:

- TCLP TPHg using EPA Method 8015.
- TCLP TPHd using EPA Method 8015.
- TCLP TOG using Standard Method 5520.
- TCLP SVOCs using EPA Method 8270.

- TCLP Volatile organic compounds (VOCs) using EPA Method 8240.
- Reactivity, corrosivity, and ignitability (RCI).

8. DRILLING AND WELL INSTALLATION PROCEDURES

Drilling and well installation was performed on 1 June 1992. EBS retained Exploration Geoservices, Inc. of San Jose California (Drilling Contractor's License C57 #484288), and Bayland Drilling (C57 #374152) to provide drilling services. The logs of borings were prepared by an EBS project Geologist under supervision of an Associate California Registered Geologist. Copies of the logs of borings and accompanying well construction details have been included in Appendix E. Appendix F contains copies of the well permits procured for this project. Appendix G includes photographs taken during drilling and monitoring well construction.

Three soil borings were drilled at the locations designated on Figure 8 using a mobile B-61 drill rig equipped with 10-inch diameter, hollow stemmed augers. Attempts at drilling borings MW1 and MW2 using a mobile CME-55 drill rig resulted in refusal within 10-feet of the surface. The B-61 rig subsequently overd-drilled the borings and completed the wells.

Boring MW1 was drilled to a total depth of 16-feet bgs ending in refusal. Boring MW2 was drilled to a total depth of 42 ~~26~~ feet bgs and backfilled with cement grout to its' completed depth of 22-feet bgs.

1 log indicate GW @ 14.7'

Ground water was not encountered in boring MW1 during drilling. Initial depth to water in borings MW2 and MW3 was measured at 20-1/2-feet.

Soil cuttings generated during drilling were piled on top of visqueen plastic at the northwest corner of the building and covered pending addition to the existing soil storage piles by Power.

8.1. SOIL BORING SAMPLING

Boring MW1 was drilled within the area of the backfilled excavation. Backfill material was encountered in the boring to a depth of approximately 14-feet bgs. One soil sample was collected from this boring in native soil (MW1; 14.5-15'). Soil samples from borings MW2 and MW3 were collected at approximate intervals of 5-feet, or at significant changes in lithology.

One soil sample from each boring was selected for chemical analysis. Samples MW1; 14.5-15', MW2; 20.5-21', and MW3; 20.5-21' were chosen as the deepest, unsaturated samples collected from their respective borings.

minimum of two (2) samples were requested from the wells other than that from well closest to UST pit

Samples were taken using a California modified split-spoon sampler. For collection, the sampler was driven 18-inches (the total sampler length) into the soil by a 140-pound weight falling a distance of approximately 30-inches. After the first 6-inches, the number of blows required to drive it the remaining 12-inches was counted as an indicator of the relative density of granular soil and the consistency of cohesive soil. These blow counts were subsequently converted to approximately equal the blows of a Standard Penetration Test sampler, and these converted values are shown

along with a description of the soil types and conditions encountered in the enclosed soil boring logs.

Soil samples were removed from the sampler as soon as it was opened, and the ends of the brass tubes containing soil designated for laboratory analysis were covered with Teflon tape and sealed with plastic caps. The sample tubes were labeled, refrigerated, and transported to Anametrix, Inc. of San Jose California. Anametrix, Inc. is California State certified hazardous materials testing laboratory (HMTL #1234).

The sampler was washed with Alconox (non-phosphate) detergent and triple rinsed with distilled water between the collection of soil samples. The augers used to drill the borings were steam cleaned on-site between the drilling of borings and following completion of well installation procedures. All decontamination water was collected and stored on-site in Department of Transportation (DOT) approved 55-gallon drums.

8.2. Soil Boring Sample Analyses and Results

Soil samples numbered MW1; 14.5-15', MW2; 20.5-21', and MW3; 20.5-21' were submitted to Anametrix, Inc. for chemical analysis. The samples were analyzed for the following constituents:

- TPHd using a modified EPA Method 8015.
- TOG using Standard Method 5520.
- SVOCs using EPA Method 8270.

The chain of custody forms and certified analytical reports documenting the results of soil boring samples are presented in Appendix H. The results of these soil sample analyses have also been summarized in Table 4.

8.3. WELL CONSTRUCTION

Four-inch diameter ground water monitoring wells were constructed in soil borings MW1, MW2, and MW3. The wells were labeled with the same designation of the borings in which they were installed.

A graphic depiction of well construction details is included in the boring logs shown in Appendix E. The wells were constructed of polyvinyl chloride (PVC) casing and screen connected with threaded joints, and threaded bottom-end plugs. The screened intervals of the wells were perforated by the factory with 0.020-inch wide slots. Un-perforated pipe was used to complete the upper portions of the wells. Filter sand (#3) was used to pack the annular spaces around the wells. The sand filter pack was extended to approximately 1/2-foot above the perforated intervals, and 1-foot long bentonite clay pellet seals were placed above the filter packs. The upper annuli of the wells (to a depth of approximately 1-foot bgs), were sealed with cement-grout.

Bolted well covers were placed over the well heads and secured in place with cement. Locking plugs fitted with watertight gaskets were secured in place over the tops of the casings.

8.4. WELL DEVELOPMENT

Development of wells was conducted on 8 June 1992. The depths to water and total well depths were measured upon opening of the well using a water level indicator (Slope Indicator Co., Model #51453). Initial depth to water was measured in well MW1 at 14.82-feet bgs, in well MW2 at 15.4-feet bgs, and in well MW3 at 14.78-feet bgs. The total depth of the wells was measured at 15.9, 21.22, and 21.2-feet bgs, respectively.

The wells were developed by Gregg Drilling of Concord California using a Smeal 5-ton development rig. The Smeal rig utilizes alternate surging and bailing of the wells to remove sediment from the well screen and to increase well production efficiency. All water evacuated from the wells was contained on-site in DOT approved 55-gallon drums pending disposal.

8.5. WATER SAMPLING

The shallow water column encountered in well MW1 (6-inches) necessitated multiple samplings to collect the approximate sample volume of 6-liters. EBS sampled from this well on 12; 16, and 18 June 1992.

Sampling of wells MW2 and MW3 and depth measurement of well MW1 was performed on 11 June 1992. The depths to water and total well depths were measured upon opening of the wells using a water level indicator. Initial depth to water was measured in wells MW1, MW2, and MW3 at 14.95, 14.74, and 15.43-feet bgs, respectively. The total depth of the wells was measured at 15.90, 21.20, and 21.22-feet bgs respectively.

Prior to sampling, approximately 50-gallons of water was purged from each well using a 3-foot long, 3.5-inch diameter PVC bailer (1-gallon capacity). Periodic measurements of pH, temperature, and conductivity were then taken from the purged effluent until the readings were found to stabilize. Table 5 lists the measurements of pH, temperature, and conductivity taken during purging prior to sampling. Copies of well monitoring log sheets are included in Appendix I. All water evacuated from the wells and generated from decontamination procedures was contained on-site in DOT approved 55-gallon drums pending disposal.

Water samples were collected after each well recharged to at least 80% of its initial volume. The samples were labeled with the same designation as the well from which they were collected. Disposable bailers were used to collect the samples from the wells. The sampled water was contained within laboratory cleaned 40-milliliter (ml) VOAs containing hydrochloric acid as a preservative.

The sample bottles were labeled, refrigerated, and transferred to Anametrix, Inc. for analysis. A chain of custody was maintained for each transmittal of the sample.

8.6. WATER SAMPLE ANALYSIS AND RESULTS

Water samples MW1, MW2, and MW3 were submitted to Anametrix, Inc. for chemical analysis. The samples were analyzed for the following constituents:

- TPHg and BTEX using EPA Method 8015/8020.
- TPHd using a modified EPA Method 8015.
- TOG using Standard Method 5520.
- SVOCs using EPA Method 8270.
- VOCs using EPA Method 8240.

The chain of custody forms and certified analytical reports documenting the results of the water sample analysis are presented in Appendix J. The results of water sample analysis have been presented in Table 6.

9. DISPOSAL OF PURGED AND DECONTAMINATION WATER

All water purged from the excavation and wells, as well as that used in the decontamination of equipment and personnel, was stored on-site in 55-gallon drums approved by the DOT for such use. The drums were emptied and the contents disposed of by Allied Oil and Pumping of San Jose, California. Allied Oil and Pumping is a licensed used oil hauler (EPA #CAT080014277). A copy of the receipt is included in Appendix K.

10. EVALUATION OF GROUND WATER FLOW DIRECTION AND GRADIENT

The elevations of the tops of casings of wells MW1, MW2, and MW3 were surveyed on 15 June 1992 by HMH, Incorporated of San Jose, California. The survey data and the ground water level measurements taken on 2 July 1992, were used to evaluate the direction and gradient of ground water flow across the site and to construct the gradient map presented as Figure 9. The estimated direction and gradient of ground water flow are to the southeast and 0.01, respectively. The gradient map generated from the accumulated data is included in this report as Figure 9. Well elevations and survey data are presented in Appendix L.

11. CONCLUSIONS

- Approximately 1,500-cys of soil was excavated from the site and disposed of by the Client at Vasco Road Landfill in Livermore, California (a Licensed Class III landfill).

- The subsurface lithology of the work area reduced the depth of excavation throughout much of the work zone. The presence of 2 large diameter water mains and several above-ground pipe headers further restricted the extents of excavation.

- A gelatinous substance was found in soil from below a portion of a drain pipe extending from the building. Analysis of a sample of the affected soil did not indicate hazardous characteristics. It was

concluded that the gelatinous substance was probably a bio-film associated with leakage from the drain pipe.

- Water from the drain pipe was collected and analyzed for SVOCs. No SVOCs were found in the sampled water.

- A total of 33 soil samples were collected from the floor and walls of the excavation and submitted to a laboratory for chemical analysis.

- Water was periodically noted to seep into the excavation from a more porous soil strata found throughout much of the excavation. This strata was typically noted at depths of from 9 to 15-3/4-feet bgs.

- Approximately 300 to 400-gallons of water collected at the pit bottom during work on the northernmost area of excavation. The water was pumped into DOT approved 55-gallon drums prior to backfill of the section.

Where is it now? → See pg. 19, section 9

- The results of analyses indicated detectable concentrations of TPHd in only 3 of the 18 samples analyzed for this analyte. The highest reported concentration (2,600-mg/Kg) was found in sample E3 which was collected from directly adjacent to the former UST in soil below the building. The laboratory reported this value as being "primarily due to the presence of a heavier petroleum product, possibly motor oil". Samples E1 and E18 showed respective TPHd concentrations of 28 and 12-mg/Kg.

- TOG was found in 15 of the 22 samples analyzed for this analyte. With the exception of sample E3 which showed 1,700-mg/Kg, only sample E18 showed a concentration greater than 100-mg/Kg (130-mg/Kg).

TOG was found in the remaining 12 samples at concentrations ranging from 30 to 80-mg/Kg.

- SVOCs were found in only 5 of the 25 samples analyzed for these constituents. Three of the 5 samples showing positive results were found to contain levels of bis (2-ethylhexyl) phthalate as the sole detected compound. Bis (2-ethylhexyl) phthalate was only found in samples in which no other SVOCs were detected.

  Samples collected subsequent to E15 were subjected to measures taken to prevent contact of the sampled soil with latex gloves worn by samplers. This step was taken to isolate the latex gloves as a potential source of this compound. Bis (2-ethylhexyl) phthalate was not found in any of the subsequently collected excavation samples. Positive results for this compound were, however, subsequently recovered from profile samples taken from the storage piles of excavated soil.

- Total petroleum hydrocarbons as gasoline were not detected in any of the 13 samples for which this analysis was selected.

- Soil sample E3 was collected from the sidewall of the excavation to evaluate the presence of residual concentrations of impacting constituents left in place below the building. The elevated levels of TOG, TPHd, and SVOCs found in this sample and in sample E6 (from a maximum excavated depth to the north of the former UST) indicate that an undefined volume of impacted soil remains at the site.

- The results of 9 initial composite profile samples performed on the storage piles of excavated soil indicated an average detectable concentration of 157 mg/Kg TOG. The soil storage piles were profiled

for acceptance into Vasco Road Landfill following the conclusion of excavation .

- The excavated soil was subsequently transported to Vasco Road Landfill and disposed of by the Client.

- The excavation was backfilled to grade by the Client. Compaction testing of the backfilled material met or exceeded 95%.

- Approximately 4-inches of hot asphaltic concrete was used to repave the excavation area.

- Five soil borings were drilled at the site (B1, B2, MW1, MW2, and MW3). Borings B1 and B2 resulted in refusal at shallower than 5-feet into native soil and were immediately abandoned. Borings MW1, MW2, and MW3 were logged and sampled. Ground water was not initially encountered in MW1. Initially depths to ground water within borings MW2 and MW3 were 22 and 26-feet bgs, respectively.

22' is what boring log indicates!

* • Soil samples were collected at 5-foot intervals within the borings during drilling. Samples from just above the saturated zone were retained from each boring for chemical analysis. The selected samples were analyzed for TPHg, BTEX, TPHd, TOG, and SVOCs. Sample MW2; 20.5-21', collected from boring MW2, was found to contain 370-mg/Kg TPHd and 560-mg/Kg TOG. TOG was found at a concentration of 270-mg/Kg in sample MW3; 20.5-21' (collected from boring MW3).

Due to laboratory error the selected sample from boring MW1 was not analyzed. The missing sample (MW1; 14.5-15') was collected in backfill material at its' interface with native rock.

- Four-inch diameter ground water monitoring wells were subsequently constructed within each of the borings. The wells were designated to correspond with the borings in which they were constructed (MW1, MW2, and MW3).

- Well MW1 was set at a depth of only 14-feet due to refusal. A previous attempt to drill this boring using a lighter drill rig ended in refusal and was abandoned at less than 10-feet bgs. The well was constructed in this boring despite its' shallow depth given the depth of rock found during excavation throughout the area adjacent to the former UST, on the west side of the primary main. The assessed low likelihood of successfully advancing a boring in this area as well as the documented presence of water in the excavations at depths of shallower than 14-feet bgs were deciding factors in the placement of this well.

- The depth to water stabilized at from 10 to 12-feet within the wells.

- Subsequent surveying to the top of the PVC well casings showed respective elevations of 289.50, 288.98, and 289.74-feet above mean sea level for wells MW1, MW2, and MW3. The direction and gradient of ground water flow were subsequently evaluated at southeast and 0.01 as of 2 July 1992.

- Samples of water were collected from wells MW1, MW2, and MW3 and analyzed for TPHg, BTEX, TPHd, TOG, VOCs, and SVOCs. None of the chosen analytes were detected at concentrations above the stated laboratory detection limits.

- Water which was purged from the excavation and wells as well as that accumulated from the decontamination of equipment and personnel was contained on-site in DOT approved 55-gallon drums. All water was removed from the site and disposed of through a licensed used oil hauler.

- The direction and gradient of groundwater flow was evaluated at southeast and 0.01, respectively.

12. RECOMMENDATIONS

The almost ubiquitous occurrence of residual concentrations of TOG in soil samples from various depths of the excavation of up to 130-mg/Kg and in soil sampled from borings MW2 and MW3 at levels of up to 560-mg/Kg may not be consistent with impact originating from the former UST. Past uses of the site may have resulted in a regional impact by this constituent. The extent of impact from the former UST may have co-mingled with such a wider source resulting in a combined plume.

The scope of work outlined in this report is insufficient to completely define the lateral extents of impact by TOG. A detailed research (Phase I environmental assessment) of past hazardous materials storage and handling practices at the site should be undertaken to attempt to locate a source for the widespread levels of TOG found. The results of a search of historical practices at the site could be used to develop a more comprehensive soil sampling protocol to be carried out over a broader area around the site to define the lateral extent of TOG impact to soil.

Sampling beneath the building and at the maximum depth of excavation in the area of the former UST indicates the presence of elevated residual levels of TPHd, TOG and SVOCs in soil. Site access restrictions and subsurface lithology acted to prohibit further excavation in this area. We recommend that a remedial options proposal be prepared to evaluate potential methods to address the remaining volume of impacted soil. If the City elects to leave residual levels of the detected compounds at the concentrations found, we recommend that a risk assessment be performed to evaluate the potential for impact to human health and the environmental from this source.

We recommend that the City continue to monitor wells MW1, MW2, and MW3 on a quarterly basis in compliance with the guidelines set by the Regional Water Quality Control Board-San Francisco Bay Region (RWQCB). Due to the presence of semi-volatile organics compounds, we recommend that the City also forward a copy of this report to the RWQCB Toxics Division.

12.1. DISTRIBUTION OF REPORTS

We recommend that the responsible party forward copies of this report to the regulatory agencies and representatives listed below. Copies of this report have been included for this purpose. Copies submitted to the ACHA and the RWQCB must be accompanied by a letter attesting to the validity of this report to the best of the knowledge of the responsible party. This letter must be prepared appropriate letterhead and signed by an appropriately authorized individual.

Water Quality Control Board
San Francisco Bay Region
2101 Webster Street
Suite 500
Oakland, CA 94612
ATTN: Mr. Eddy So

Water Quality Control Board
North Bay Toxics Division
2101 Webster Street
Suite 500
Oakland, CA 94612
ATTN: Mr. Donald Dalke

Alameda County Health Agency
Division of Hazardous Materials
Department of Environmental Health
80 Swan Way
Room 200
Oakland, CA 94621
ATTN: Mr. Scott Seery

13. LIMITATIONS

The recommendations in this report were developed in accordance with generally accepted standards of current environmental practice in Northern California. These recommendations are time-dependent and should not be considered valid after a 1-year period from the issue of this report. After 1-year from the issue of this report, site conditions and recommendations contained within this report should be reviewed.

This study was performed solely for the purpose of evaluating environmental conditions of the site subsurface relative to hydrocarbon impact at the subject site. No engineering or geotechnical references are implied or should be inferred. Studies of the success of compaction included in this report were performed and reported to EBS by the Client.

Evaluation of the condition of the site, for the purpose of this study, was made from a limited number of observation points. Subsurface conditions may deviate away from these points. Additional work, including further study of the subsurface, can reduce the inherent uncertainties associated with this type of work.

This study was performed, and the report was prepared for the sole use of our client, Power Engineering Contractors, Inc. This report and the findings contained herein shall not be disclosed to nor used by any other party without the prior written consent of Environmental Bio-Systems, Inc. It is the responsibility of the responsible party to convey these recommendations to regulatory agencies and other parties, as appropriate.

The recommendations herein are professional opinions that our firm has endeavored to provide with competence and reasonable care. We are not able to eliminate the risks associated with environmental work. No guarantees or warrants, express or implied, are provided regarding our recommendations.

14. REFERENCES

Environmental Bio-Systems, Inc., 10 January 1991, Soil Sampling Report, San Antonio Pump Station 5555 Calaveras Road, Sunol, California. Project #004-189-01.

California Department of Water Resources, October, 1975, Bulletin 63-5

California Department of Water Resources, June 1974, Bulletin 118-2

United States Geological Survey (USGS), Topographic Map, La Costa Valley Quadrangle, 7.5-minute with 10-foot contour intervals, 1929, photorevised 1968.

[redacted] **ANALYTICAL RESULTS FOR UNKNOWN GELATINOUS SUBSTANCE AND PIPE WATER**

(soil results in mg/Kg, water results in mg/L)

SAMPLE	TPHD	TOG	VOLATILES	SEMI-VOLATILES
E1	28	40	NA[1]	NA
E1-s	NA	NA	ND[2]	ND
PIPE WATER	NA	NA	NA	ND

why ?

1. Sample not analyzed for this analyte.

2. Analyte not detected above laboratory detection limits.

Note: See lab reports for detection limits used.

TABLE 2 ANALYTICAL RESULTS FOR EXPLORATORY TRENCH AND EXCAVATION SOIL SAMPLES (results in mg/Kg)

SAMPLE	TPHg	TPHd	TOG	SEMI-VOLATILES	
E2	NA	NA	NA	ND	
E3	NA	2,600[3]	1,700	bis (2-ethylhexyl) phthalate	0.43
E4	NA	NA	NA	napthalene	1.7
				2-methylnapthalene	15
				acenapthene	2.8
				dibenzofuran	1.1
				flourene	2.1
				phenanthrene	4.6
E5	NA	NA	NA	ND	
E6	NA	NA	NA	acenapthene	0.15
				flourene	0.17
				phenanthrene	0.09
				anthracene	0.09
				di-n-butyl phthalate	0.07
				flouranthrene	0.05
				pyrene	0.06
E7	ND	ND	ND	ND	
E9	ND	NA	NA	bis (2-ethylhexyl) phthalate	5.9
E11	NA	NA	NA	ND	
E12	NA	NA	NA	ND	
E13	ND	NA	NA	ND	
E14	NA	NA	NA	ND	
E15	NA	NA	NA	bis (2-ethylhexyl) phthalate	0.35
E16	NA	ND	57	NA	
E17	NA	ND	40	NA	
E18	NA	12	130	NA	
E20	ND	ND	ND	ND	
E21	ND	ND	37	ND	
E22	ND	ND	ND	ND	
E23	ND	ND	30	ND	
E25	ND	ND	57	ND	
E26	ND	ND	43	ND	

Table 1 (cont'd)

SAMPLE	TPHg	TPHd	TOG	SEMI-VOLATILES
E27	ND	ND	80	ND
E29	ND	ND	30	ND
E30	ND	ND	63	ND
E31	ND	ND	63	ND
E32	ND	ND	ND	ND
E33	NA	NA	ND	NA
E34	NA	NA	ND	NA
E35	NA	NA	ND	NA
E37	NA	ND	57	NA
E38	NA	ND	30	NA

1. **Sample not analyzed for this analyte.**

2. **Analyte not detected above laboratory detection limits.**

3. **Detection limit raised to 200-mg/Kg due to interference by elevated levels of impacting constituents.**

Note: **See lab reports for detection limits used.**

[redacted] **ANALYTICAL RESULTS FOR SOIL STORAGE PILE SAMPLES (results in mg/Kg)**

SAMPLE	TPHd	BTEX	TOG
SP1A	ND[1]	ND	320
SP1B	ND	ND	130
SP1C	ND	ND	240
SP2A	ND	ND	100
SP2B	ND	ND	200
SP2C	15	ND	130
SP2E	45[2]	NA[3]	200
SP3A	NA	ND	50
SP3B	ND	NA	40

1. **Analyte not detected above laboratory detection limits.**

2. **Sample not analyzed for this analyte.**

3. **Concentration reported by laboratory as being primarily due to the presence of heavier petroleum product, possibly motor oil.**

Note: See lab reports for detection limits used.

[redacted] ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM BORINGS MW1, MW2, & MW3 (results in mg/Kg)

SAMPLE	TPHg&BTEX	TPHd	TOG	SEMI-VOLATILES
MW1; 14.5-15'	NA[1]	NA	NA	NA
MW2; 20.5-21'	ND[2]	370	560	ND[3]
MW3; 20.5-21'	ND	ND	270	ND

1. **Sample not analyzed for this analyte.**
2. **Analyte not detected above laboratory detection limits.**
3. **Detection limits raised due to nature of sample matrix.**

Note: **See lab reports for Detection limits used.**

TABLE 5 MEASUREMENTS OF pH, TEMPERATURE, AND CONDUCTIVITY IN PURGED WATER FROM WELLS MW1, MW2, AND MW3

WELL	VOL. (gallons)	pH	TEMP. (Fahrenheit)	COND. (x1000)
MW1	0	7.99	64.0	1.33
	0.5	7.93	63.1	1.30
	1.0	7.91	62.5	1.32
	1.5	7.90	62.5	1.31
	2.0	7.90	62.5	1.32
	2.5	7.91	62.5	1.31
MW2	0	8.54	61.2	1.11
	2.5	8.50	61.3	1.16
	5.0	8.46	60.07	1.16
	7.5	7.99	61.3	1.16
	10.0	8.04	61.8	1.16
	12.5	8.12	61.4	1.18
	15.0	8.03	61.8	1.17
MW3	0	6.51	64.0	1.89
	2.5	7.10	62.1	1.90
	5.0	7.27	61.2	1.87
	7.5	7.43	61.2	1.85
	10.0	7.52	61.6	1.85
	12.5	7.53	61.5	1.82
	15.0	7.52	61.6	1.82

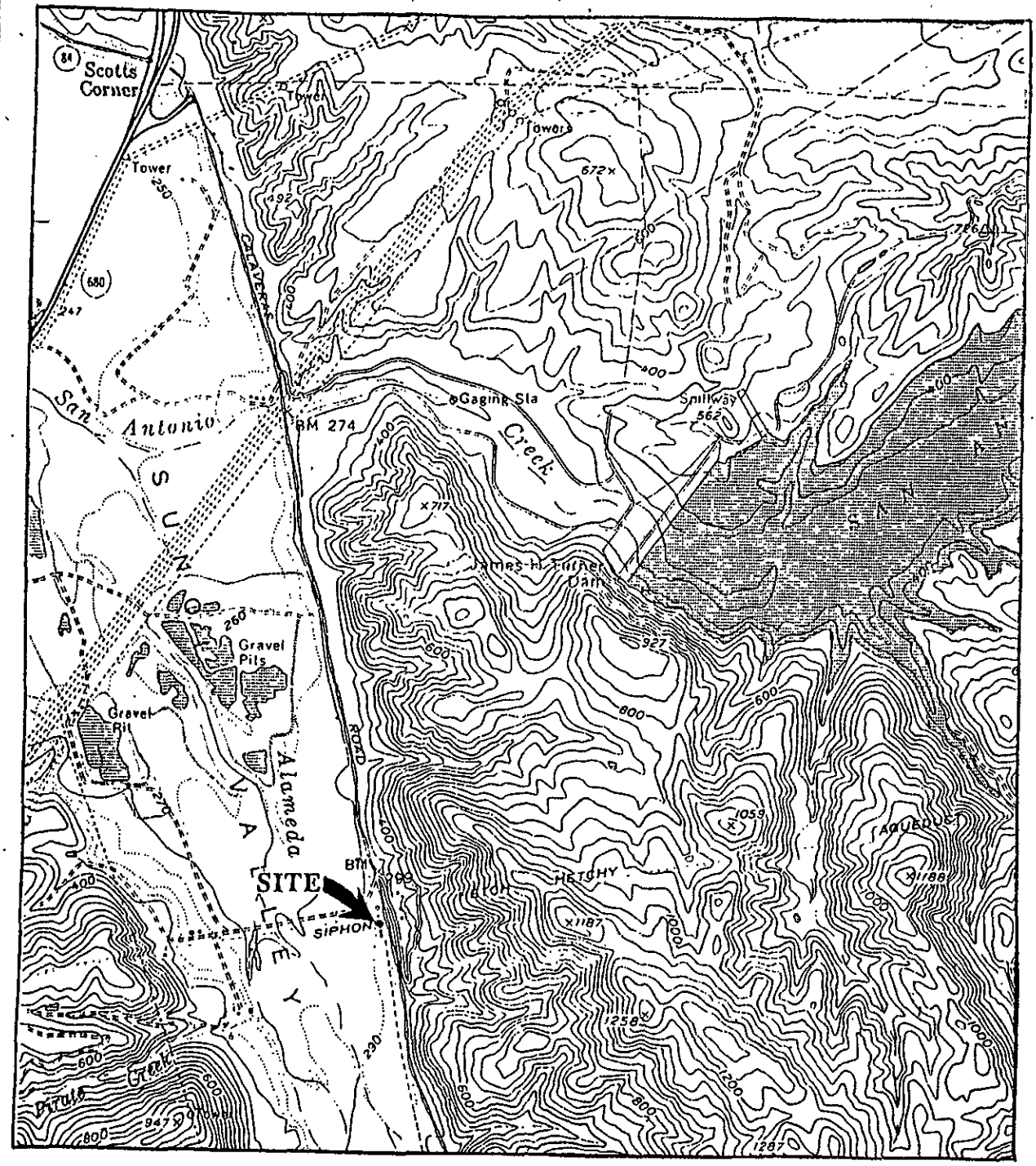
[redacted] **ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED FROM WELLS MW1, MW2, & MW3 (results in ug/L)**

SAMPLE	TPHg&BTEX	TPHd	TOG	VOCs	SEMI-VOLATILES
MW1	ND[1]	ND	ND	ND	ND
MW2	ND	ND	ND	ND	ND[2]
MW3	ND	ND	ND	ND	ND[2]

1. **Analyte not detected above laboratory detection limits.**

2. **Sample extracted out of hold time.**

Note: **See lab reports for Detection limits used.**



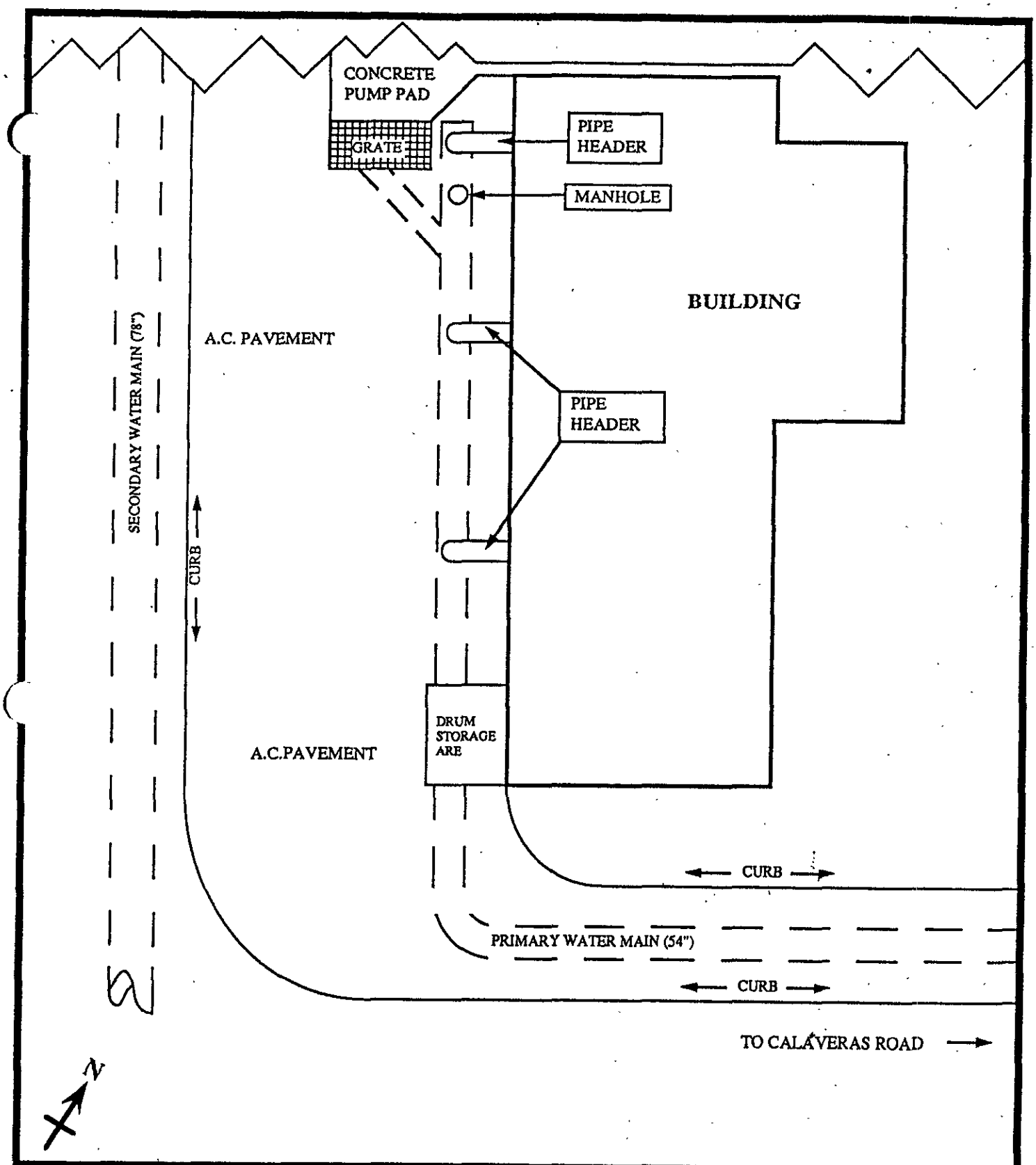
Source: USGS Topographic Map, La Costa Valley Quadrangle

SCALE - 1:24,000

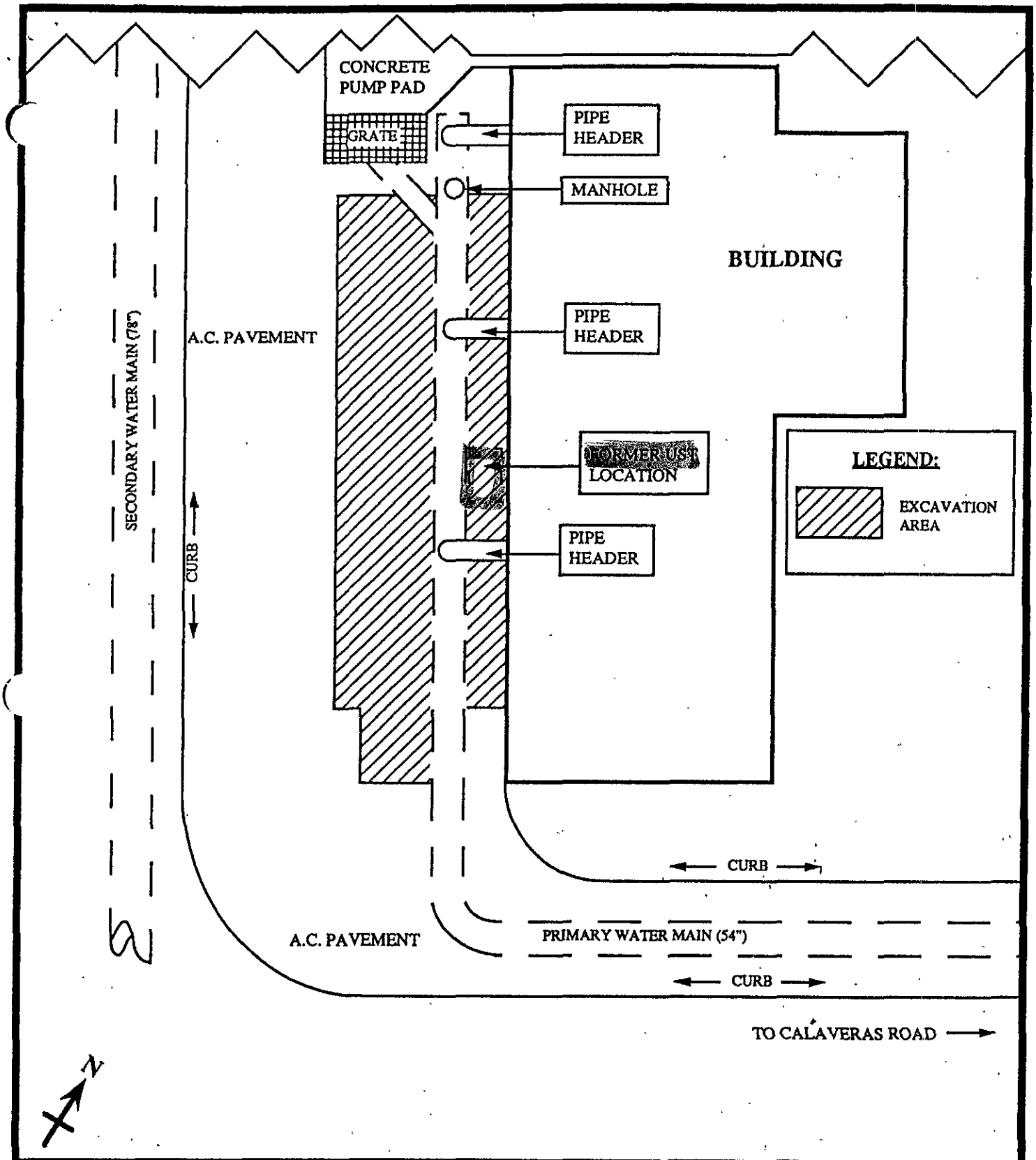
ENVIRONMENTAL BIO-SYSTEMS, INC.
Innovative Solutions for a Better Environment

30028 Industrial Pkwy., S.W.
Suite C
Hayward, CA 94544

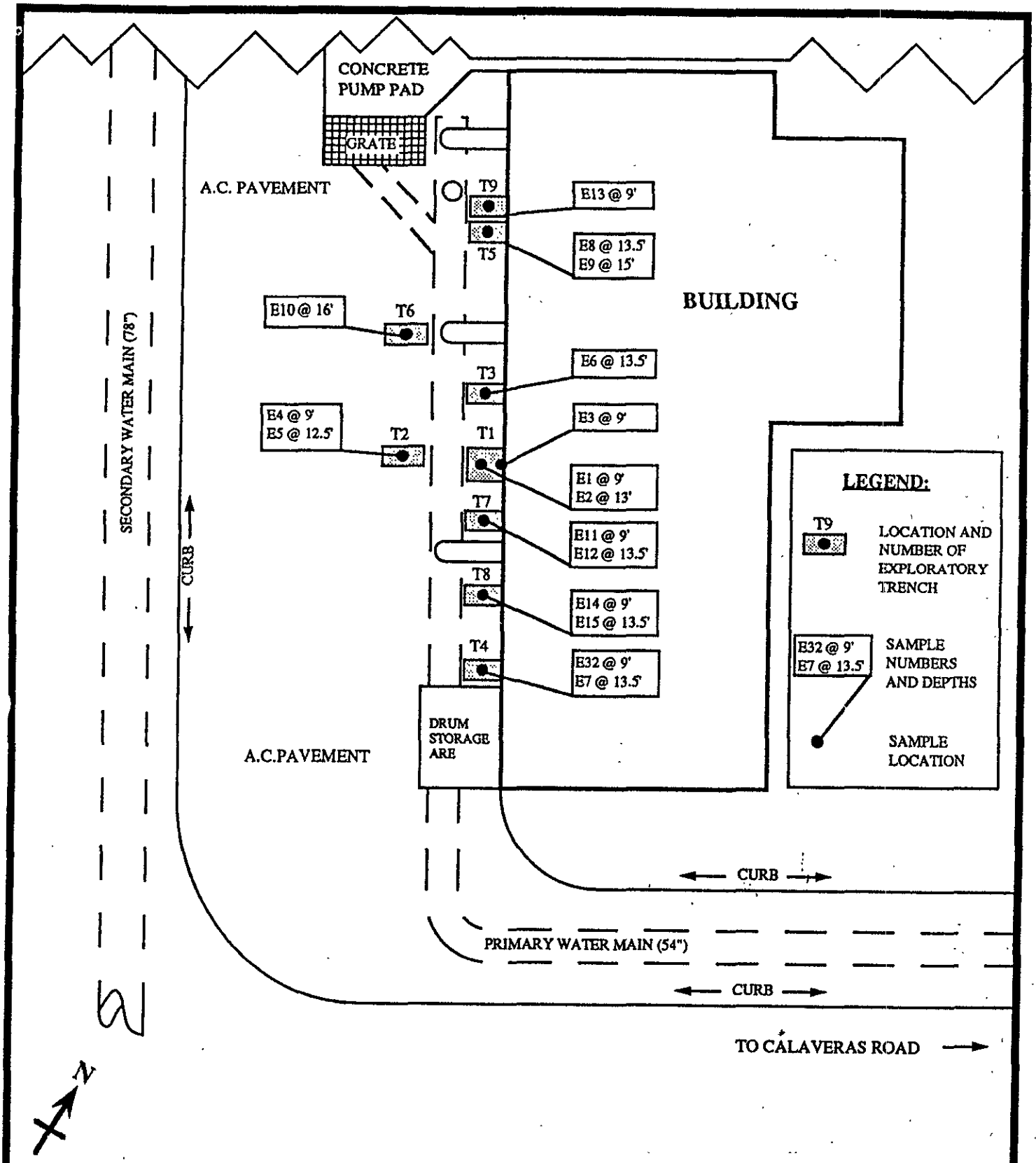
DATE: JAN 1991	FIGURE 1: SITE LOCATION MAP
DRWN BY: SLS	SAN ANTONIO PUMP STA. 5555 CALAVERAS ROAD SUNOL, CALIFORNIA
APPRVD: TMB	



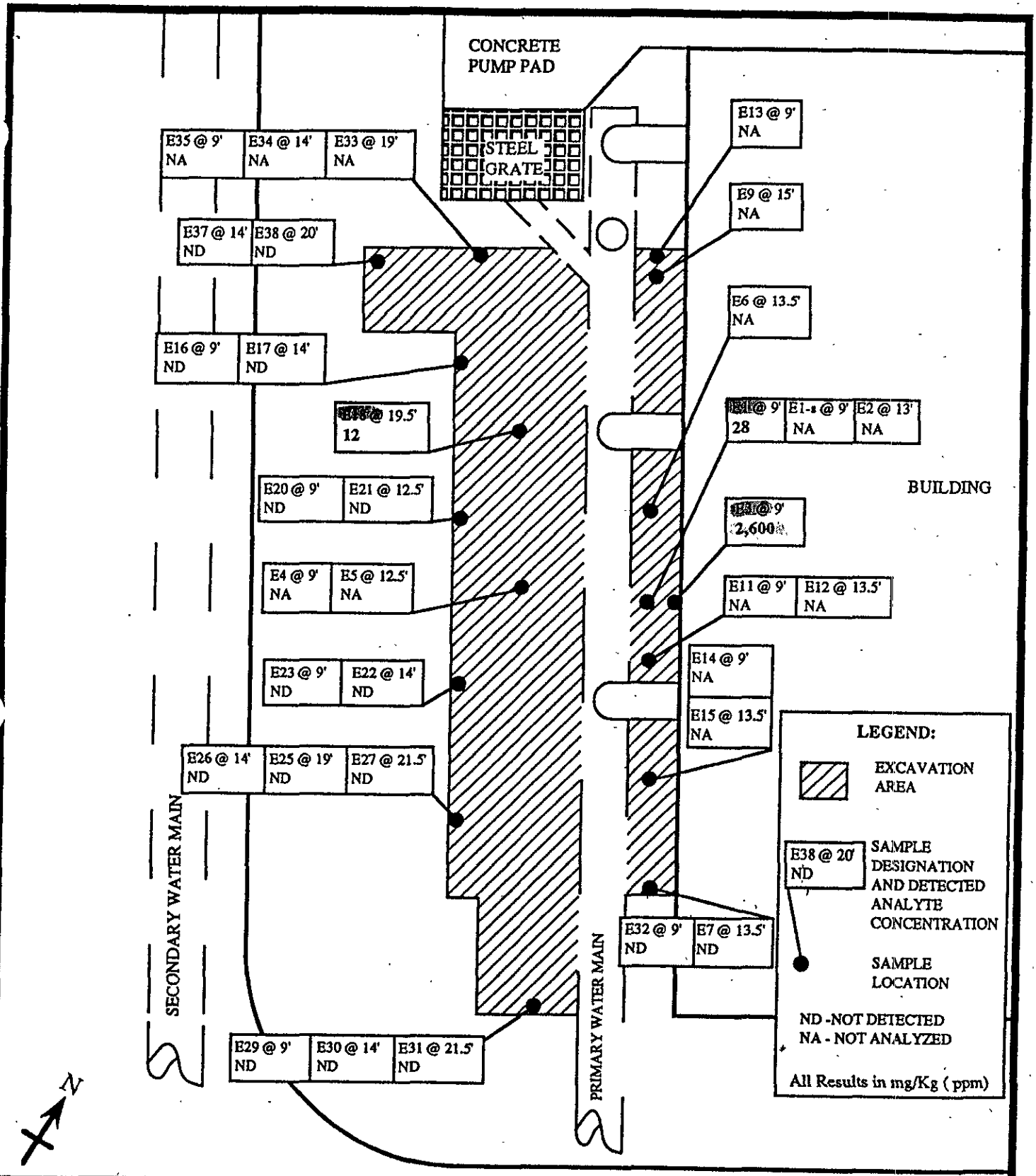
ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment 30028 Industrial Pkwy. S.W. Suite C Hayward, CA 94544	DATE: 11/25/92 DRAWN BY: LMG SCALE: 1" = 20'	FIGURE 2: SITE DIAGRAM SAN ANTONIO PUMP STATION 5555 CALAVERAS ROAD SUNOL, CA



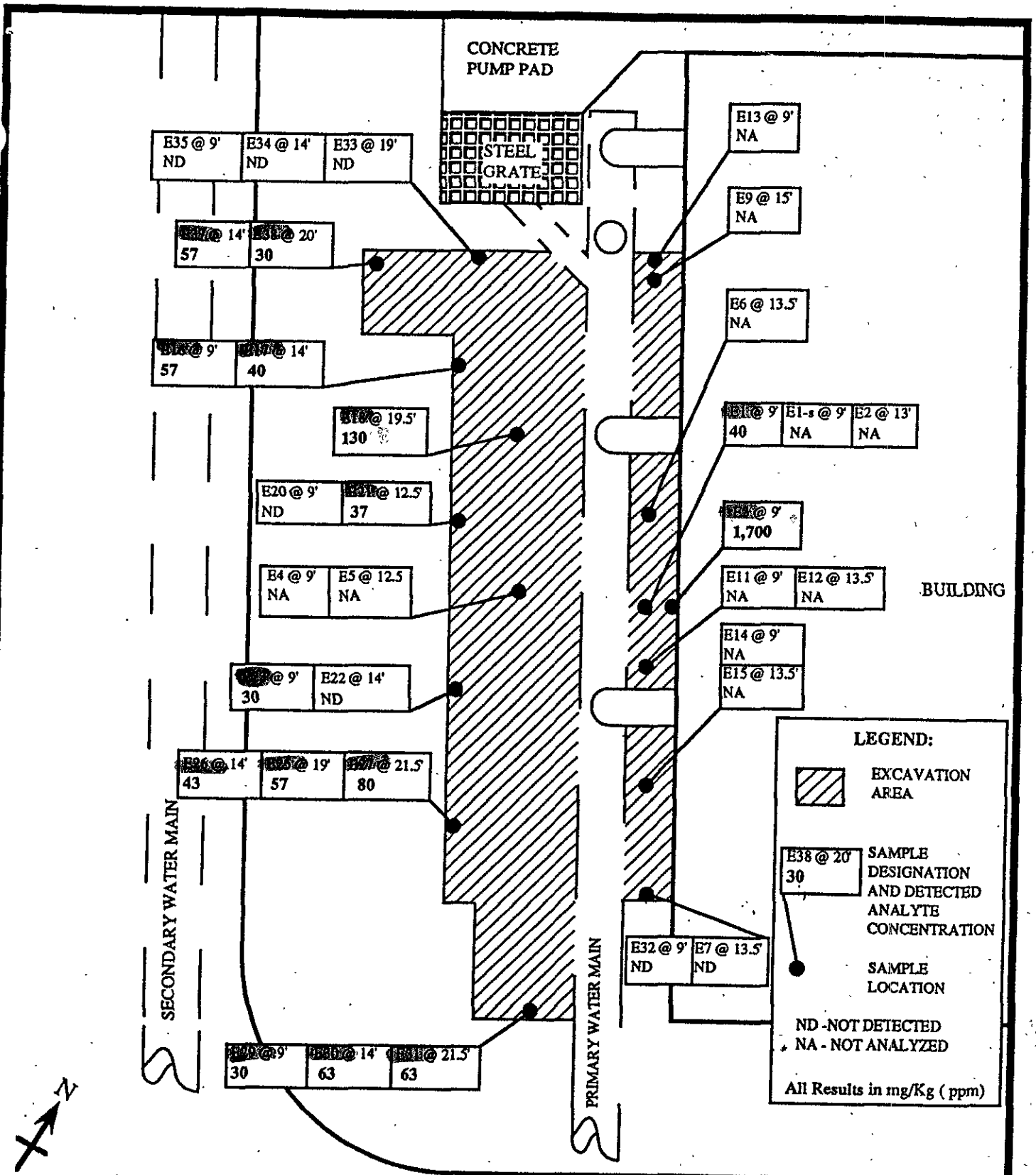
ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment 30028 Industrial Pkwy. S.W. Suite C Hayward, CA 94544	DATE: 11/25/92 DRAWN BY: LMG SCALE: 1" = 20'	FIGURE 3: EXCAVATION DIMENSIONS SAN ANTONIO PUMP STATION 5555 CALAVERAS ROAD SUNOL, CA



ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment 30028 Industrial Pkwy. S.W. Suite C Hayward, CA 94544	DATE: 11/25/92 DRAWN BY: LMG SCALE: 1" = 20'	**FIGURE 4: LOCATIONS OF EXPLORATORY TRENCH SAMPLES** **SAN ANTONIO PUMP STATION** **5555 CALAVERAS ROAD** **SUNOL, CA**



ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment **30028 Industrial Pkwy. S.W.** **Suite C** **Hayward, CA 94544**	DATE: 11/25/92 DRAWN BY: LMG SCALE: 1" = 15'	**FIGURE 5: CONCENTRATIONS OF TPH IN SELECTED SOIL SAMPLES** **SAN ANTONIO PUMP STATION** **5555 CALAVERAS ROAD** **SUNOL, CA**



ENVIRONMENTAL BIO-SYSTEMS, INC.
Innovative Solutions for a Better Environment

30028 Industrial Pkwy. S.W.
Suite C
Hayward, CA 94544

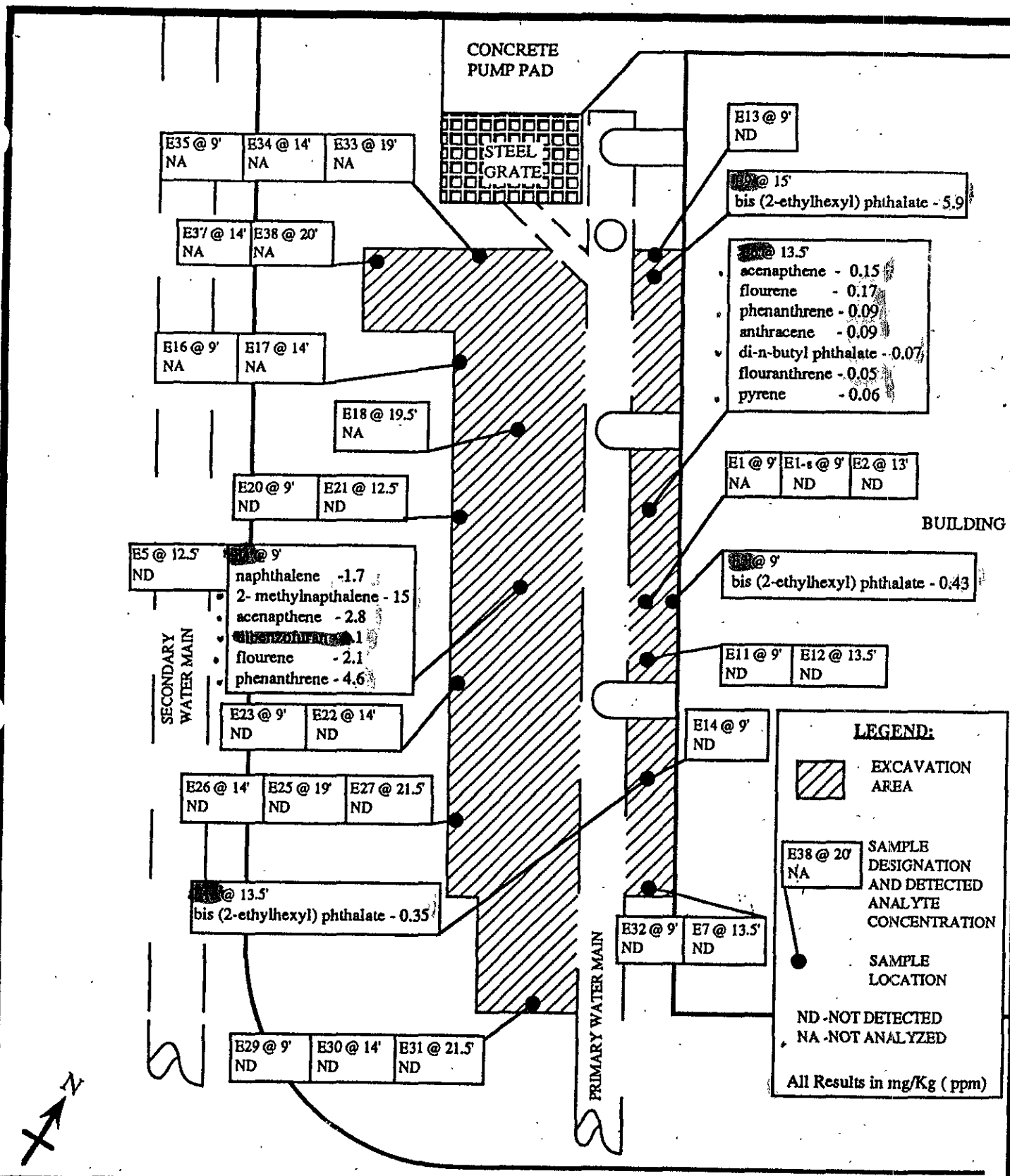
DATE: 11/25/92

DRAWN BY: LMG

SCALE: 1" = 15'

FIGURE 6: CONCENTRATIONS OF TOG IN SELECTED SOIL SAMPLES

SAN ANTONIO PUMP STATION
5555 CALAVERAS ROAD
SUNOL, CA



ENVIRONMENTAL BIO-SYSTEMS, INC.
Innovative Solutions for a Better Environment

30028 Industrial Pkwy. S.W.
Suite C
Hayward, CA 94544

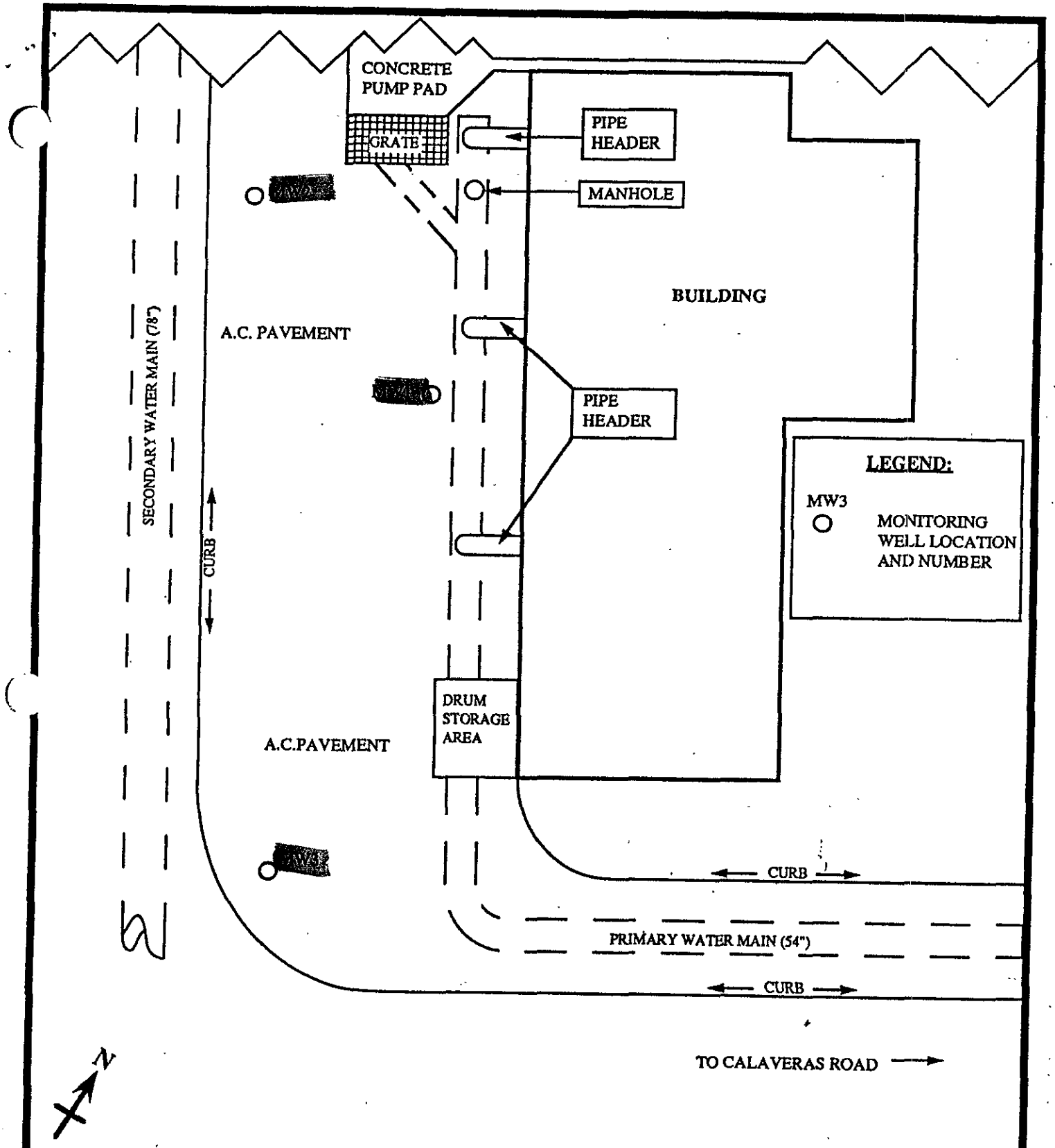
DATE: 11/25/92

DRAWN BY: LMG

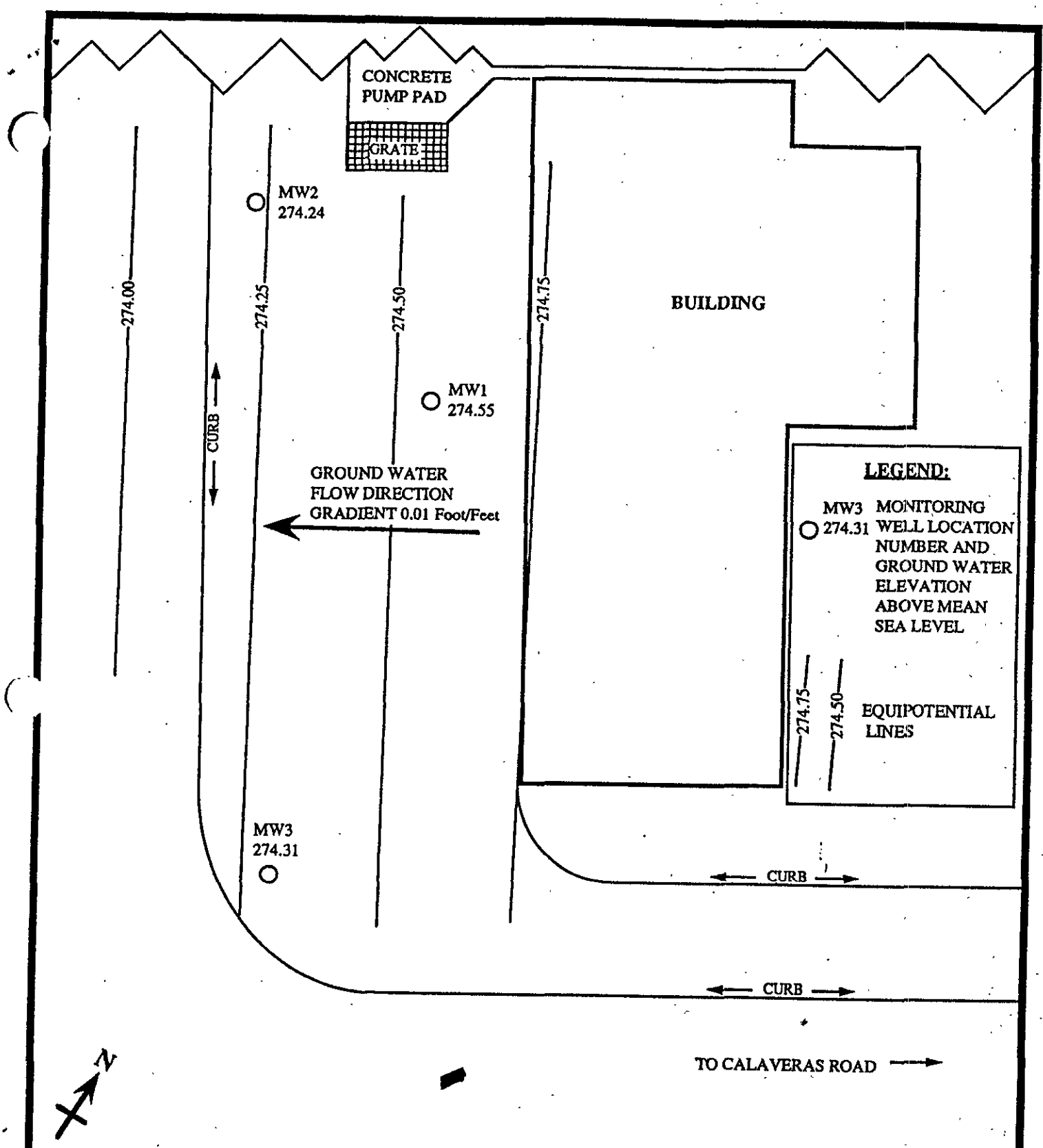
SCALE: 1" = 15'

FIGURE 7: CONCENTRATIONS OF SVOCS IN SELECTED SOIL SAMPLES

SAN ANTONIO PUMP STATION
5555 CALAVERAS ROAD
SUNOL, CA



ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment 30028 Industrial Pkwy. S.W. Suite C Hayward, CA 94544	DATE: 11/25/92 DRAWN BY: LMG SCALE: 1" = 20'	FIGURE 8: LOCATIONS OF MONITORING WELLS AND SOIL BORINGS SAN ANTONIO PUMP STATION 5555 CALAVERAS ROAD SUNOL, CA



ENVIRONMENTAL BIO-SYSTEMS, INC. Innovative Solutions for a Better Environment **30028 Industrial Pkwy. S.W.** **Suite C** **Hayward, CA 94544**	DATE: 11/17/92 DRAWN BY: LMG SCALE: 1" = 20'	**FIGURE 9: DIRECTION AND GRADIENT OF GROUND WATER FLOW ON 11/6/92** **SAN ANTONIO PUMP STATION** **5555 CALAVERAS ROAD** **SUNOL, CA**