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WORK PLAN

FOR

SOIL EXCATION AND TREATMENT,

MONITORING WELL INSTALLATION,

AND QUARTERLY GROUNDWATER MONITORING

PROJECT SITE:

2552 SAN CARLOS AVENUE
CASTRO VALLEY, CALIFORNIA

PREPARED FOR:

MR. MEL KAUFMAN
TRUE-FIT MANUFACTURING
3515 WEST YOSEMITE AVENUE
LATHROP, CALIFORNIA 95330
(800)-431-9999

PREPARED BY:

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140 WEST INDUSTRIAL WAY
BENICIA, CALIFORNIA 94510-1016

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MARCH 1992

DR. STANLEY L. KLEMETSON, P.E.

POSITION WITH COMPANY:

Vice President of Certified Environmental Consulting, Inc.

COMPANY ASSIGNMENT:

Engineering and Hydrogeology

EXPERIENCE SUMMARY:

- o Project Manager for management, testing and closure of underground tanks.
- o Project Manager for site characterization and remediation projects.
- o Project Manager for property transaction audits.
- o Project Manager for air quality study; also taught air pollution and set up air quality analysis laboratory.
- o Project Engineer for flood control studies at refineries and for toxicity testing and treatment of refinery wastewaters.
- o Project Manager for evaluation of water reuse alternatives in water resources.
- o Project Manager for evaluation of the movement and effects of combined sewer overflow sediments in receiving waters.
- o Wrote dynamic computer programming models for the regionalization and staging of wastewater treatment systems and for temperature predictions for ponds and cooling ponds.
- o Co-Project Manager for study and book on the analysis of the relationship of energy development and water reuse in Colorado.
- o Dr. Klemetson has presented 28 papers, written 55 journal articles and reports, has authored or co-authored several books and has several other books and journal publications in preparation.

PROFESSIONAL HISTORY:

Certified Environmental Consulting, Inc. Vice President, 1989 - Present
Hunter/Gregg, Chief Engineer, 1987-1989
ERM-West, Principal Engineer, 1986-1987
Klemetson Engineering & Construction, President, 1975-1986
Brigham Young University, Associate Professor, Civil Engineering, 1981-1986
Colorado State University, Associate Professor, Civil Engineering, Acting Environmental Engineering Program Leader, 1978-1979
North Dakota State University Assistant Program, 1979-1977

EDUCATION:

Ph.D., Civil/Environmental Engineering, Utah State University-Logan, 1975
M.S., Civil/Sanitary Engineering, University of Missouri-Rolla, 1973
B.S., Civil Engineering, San Jose State University, 1968

PROFESSIONAL REGISTRATIONS:

Professional Engineer, Colorado, North Dakota, Utah, California
General Engineering Contractor, Asbestos, Hazardous Materials, California
AHERA Certified Asbestos Graduate
Registered (Calif.) Environmental Assessor No. REA 01342

PROFESSIONAL AFFILIATIONS:

Water Pollution Control Federation
American Water Works Association
American Society of Civil Engineers
WPCF Hazardous Waste Committee
WPCF Program Committee
CWPCA Hazardous Waste Program Committee
California Building Industry Association

SYNOPSIS:

Dr. Klemetson has over 20 years experience in Civil and Environmental Engineering. He also provides CEC with licensing as a general engineering contractor (A,B,C61-D40, ASB, HAZ) with asbestos and hazardous materials certifications. He has been responsible for environmental site audits, underground tank investigations underground tank monitoring plans, hazardous waste management, industrial waste water treatment, reservoir studies, laboratory analysis, air pollution monitoring, traffic engineering, energy resources studies and light/ heavy construction supervision for Northern California Naval facilities and other clients. He was a college professor for 12 years and taught civil and environmental engineering and has taught a course on environmental impact reports.

CERTIFICATION

This report has been prepared by CERTIFIED ENVIRONMENTAL CONSULTING, INC., (CEC) under the professional supervision of the principal(s) and /or staff whose seal(s) and signatures(s) appear hereon.

The findings, interpretations, recommendations, specifications, or professional opinions are presented, within the limits prescribed by the client, in accordance with generally accepted professional geologic and engineering practices. There is no other warranty either expressed or implied.

REGISTERED PROFESSIONAL ENGINEER
STANLEY LOUIS KLEMETSON
No. 40087
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

Stanley L. Klemetson, PH.D., P.E.
Vice President

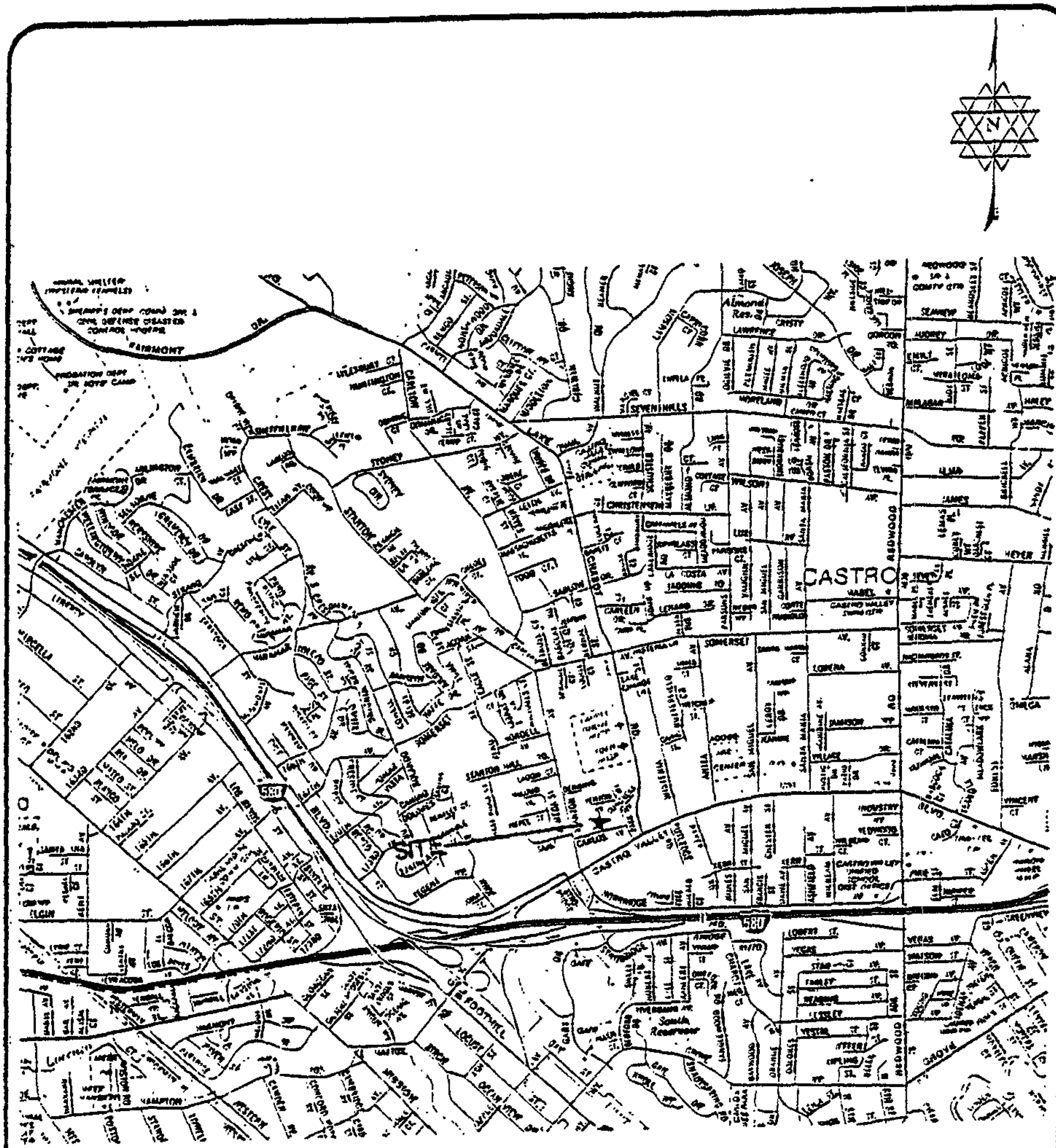

FIGURE 1

SITE LOCATION MAP
2552 SAN CARLOS AVENUE
CASTRO VALLEY, CALIFORNIA

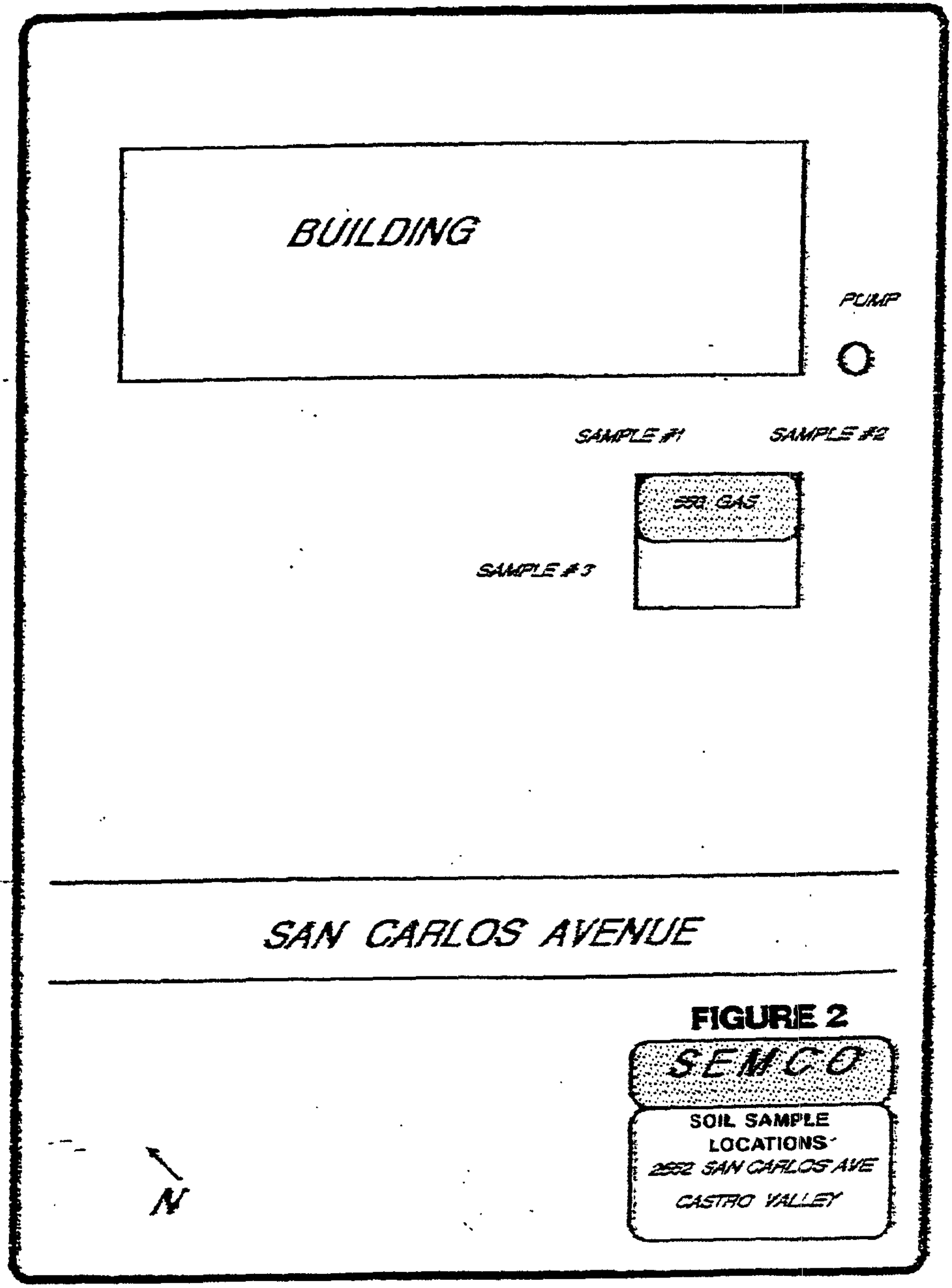
BUILDING
PUMP
SAMPLE #1
SAMPLE #2
550 GAS
SAMPLE # 3
SAN CARLOS AVENUE
SEMCO
SOIL SAMPLE LOCATIONS
2552 SAN CARLOS AVE
CASTRO VALLEY
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FIGURE 2

GEOLOGY AND HYDROGEOLOGY

The site is underlain by Pleistocene to Recent unconsolidated to semi-consolidated valley fill. The valley fill is probably derived from the surrounding undivided Cretaceous sandstone, shale, chert, and conglomerate associated with the Franciscan Complex. The soils at the site are silty clay. In the area around the site, groundwater is encountered at a depth of approximately four feet bgs. The groundwater gradient is assumed to be west to southwest.

SITE WORK

The proposed work at the site has been divided into the following four tasks:

TASK 1:	Excavate Soil
TASK 2:	Install One Groundwater Monitoring Well
TASK 3:	Remediate and Dispose of Excavated Soil
TASK 4:	Quarterly Monitoring of Groundwater for a One-Year Period

TASK 1: Soil Excavation

At present, it is estimated that approximately 50 cubic yards of soil will need to be excavated in the area of the former tank pit location. Given that groundwater at the site is shallow (4 to 6 feet bgs), it is estimated that the maximum depth of excavation will be eight feet bgs. The dimensions of the proposed excavation will be approximately 13' X 13' X 8'. If it is necessary to excavate soils below the water table, then water will be pumped from the pit and contained in D.O.T.-approved 55-gallon drums on site. Any such water will be sampled, and the results will be forwarded to the appropriate agency for approval of disposal method. It is anticipated that the excavation will extend slightly under the on-site building, but the excavation activities are not expected to threaten the integrity of this structure.

If groundwater is present in the excavation pit, two soil samples will be collected from the excavation sidewalls just above the soil-groundwater interface and analyzed for Total Petroleum Hydrocarbons as Gasoline (TPH-G), Benzene, Toluene, Ethylbenzene, and Xylene (BTEX), and total lead (see Appendix A, Soil Sampling in Excavations). One groundwater sample will also be collected from the excavation. Prior to collection of the groundwater sample, one volume of water will be pumped from the pit and contained in drums at the site. In the event that groundwater is not encountered during excavation activities, one additional soil sample will be collected from the bottom of the excavation. During the excavation activities, soil samples will be placed in plastic bags and "field screened" for contamination with an Organic Vapor Meter (OVM). This will allow CEC personnel at the site to evaluate and direct the excavation activities. All soil and/or groundwater samples collected during the excavation process will be submitted to a California State-certified laboratory and analyzed on an 8-hour turn-around in order to

which sidewalls?

evaluate the need for additional excavation. If any of the sample results indicate that contamination is still present in the excavation pit, then additional soil will be removed and additional samples collected.

Once it has been determined that sufficient soil has been removed, clean fill will be used to backfill the excavation. For any portion of the excavation below the water table, pea gravel will be used to backfill up to the level of the water table. Any water remaining in the excavation will then be pumped out, and the remainder of the excavation will be backfilled with clean soil. Compaction testing of the backfilled soil will be performed.

Soil from the excavation will be stockpiled on visqueen at the site. Berms will be built around the soil stockpile, and visqueen will be used to cover the soil pile to prevent any run-off of contaminants due to inclement weather. One composite sample will be collected from the stockpiled soil and analyzed for TPH-G, BTEX, and total lead. If the concentration of lead in the excavated soil is within acceptable limits for disposal at a Class III landfill, then the stockpiled soil will be bioremediated on site and disposed of at a Class III landfill after treatment (see Task 3). Should the concentration of lead in the soil preclude disposal at a Class III landfill, then the soil will be transported to a Class I landfill for disposal.

<u>Task 2: Installation of One Groundwater Monitoring Well</u>

CEC believes that it will be possible to identify other groundwater wells in the immediate vicinity of the site in order to obtain information needed to calculate groundwater gradient and direction. As such, CEC will install one four-inch diameter groundwater monitoring well within 10 feet of the tank pit in a verified downgradient direction. The total depth of this well will be contingent upon the lithology encountered during drilling operations, but it is estimated that the total depth of the well will be approximately 20 feet bgs. During drilling, soil samples will be collected continuously from five feet below grade to the bottom of the boring (see Appendix B, Soil Sampling in Boreholes and During Construction of Monitoring Wells). Should a review of lithologic logs from nearby wells indicate there is a potential for encountering a shallow aquiclude greater than three feet in thickness, then soil samples will be collected at one and a half foot intervals starting at a depth that is three feet above the expected depth of the top of the aquiclude. These soil samples will be analyzed for TPH-G, BTEX, and total lead. The well installation will be conducted in a manner consistent with Regional Water Quality Control Board requirements (see Appendix C, Well Construction).

In the event there is insufficient water level data from nearby wells to establish groundwater gradient at the site, then it is likely that two additional wells will need to be installed near the excavation. Should this occur, an amended work plan will be submitted to ACDEH.

MONITORING WELL DRILLING AND INSTALLATION

1. Obtain a drilling permit from the Alameda County Water ^ District at (510) ~~659-1970~~. 484-2600

Conservation and Flood Control

2. Research existing well information in order to establish groundwater gradient in the area around the site.

3. Locate and mark drilling area with white paint and notify the property owner, Mel Kaufman, at (800)-431-9999 at least forty-eight hours prior to commencing work.

4. Notify the Alameda County Health Department, Environmental Health Division, (510)-271-4320, at least forty-eight hours prior to commencing work.

5. Notify Underground Service Alert (USA) at (800)-227-2600 forty-eight hours prior to commencing work.

6. Drill bore hole to a depth of twenty feet bgs with a hollow stem auger. This bore hole will be placed within ten feet of the former UST in a verified down-gradient direction. Soil samples will be collected continuously from five feet below grade to the bottom of the boring. If a review of lithologic logs for nearby wells indicates that an aquiclude greater than three feet in thickness exists within the anticipated drilling interval, then, starting at a depth three feet above the projected depth of the top of the aquiclude, continuous samples will be collected in one and a half foot intervals. Four soil samples, from depths of 5, 10, 15, and 20 feet bgs, will be submitted for laboratory analysis for TPH-G, BTEX, and total lead. Soil cuttings produced during drilling will be stockpiled on site with the excavated soil and will be bioremediated.

7. The specifics of the construction and development of the monitoring well are discussed in detail in Appendix A, Well Construction. As per Alameda County Monitoring Well Guidelines, the well will not be developed until at least 72 hours have elapsed after completion of construction. After development of the well has occurred, a minimum of three casing volumes of water will be purged from the well, and a water sample will be collected from the well and analyzed for TPH-G, BTEX, and total lead (see Appendix D, Water Sampling in Wells and Boreholes). Additionally, as specified in Alameda County regulations, the well will not be sampled until at least 72 hours have elapsed following completion of well development. All purge water generated during the sampling process will be contained on site in DOT-approved 55-gallon drums. Disposal of this purge water will be goverened by the laboratory results for the associated water sample.

<u>TASK 3: Remediation and Disposal of Excavated Soil</u>

CEC will initially collect one composite sample from the stockpiled soil. This sample will be analyzed for TPH-G, BTEX, and total lead. If the concentration of lead in the stockpiled soil will allow disposal of the soil at a Class III landfill, CEC will then apply petroleum-consuming bacteria to the stockpiled soil. A variety of factors (temperature, contaminant concentration, etc.) affect the rate at which bacteria are able to degrade petroleum compounds. Consequently, it is difficult to provide a specific estimate of the amount of time it will take to remediate the soils at the site. Based on past experience, it is expected that remediation of these soils will be completed within two to three months of the initial application of the bacterial solution.

The Bay Area Air Quality Management District (BAAQMD) is the principal agency responsible for issuing air quality permits for the area in which the site is located. BAAQMD does not require an air quality permit for bioremediation of soils if such remediation will be completed within a period of 90 days. Additionally, the excavated soils will be bioremediated anaerobically and will be covered with visqueen throughout the remediation process.

One composite soil sample will be collected and analyzed for TPH-G and BTEX when it is believed that soil contamination has been degraded to acceptable concentrations. If necessary, a second application of bacterial solution will be performed, and another composite soil sample will be collected and analyzed for TPH-G and BTEX. When it has been documented that concentrations of contaminants in soil have been degraded to acceptable levels, the treated soil will be transported off-site to a Class III landfill for disposal.

TASK 4: Groundwater Monitoring

Following the initial sampling event discussed in Task 2, Part 7, CEC will sample the monitoring well at the site on a quarterly basis for three additional quarters. This will generate one full year of groundwater monitoring data for the site. Prior to each sampling event, the water level elevation in the well will be measured. The depth of any free product present in the well will also be measured. CEC will collect, store, and transport the water samples in accordance with existing regulatory guidelines (see Appendix D, Water Sampling in Wells and Boreholes). The groundwater samples collected during each quarterly monitoring event will be analyzed for TPH-G, BTEX, and total lead at a laboratory certified by the State of California. A report containing the analytical results will be submitted to the appropriate regulatory agency(ies) on a quarterly basis. The quarterly report will also include a map showing the groundwater gradient and the extent of any contamination, if present.

HEALTH AND SAFETY PLAN

A site health and safety plan which encompasses the proposed tasks at the site and complies with the requirements of 29 CFR Part 1910.120 is presented in Appendix E.

TECHNICAL REPORTS

A technical report discussing the soil excavation, preliminary soil treatment results, monitoring well installation, and the initial groundwater sampling event at the site will be submitted to the appropriate regulatory agency(ies) shortly after completion of the initial sampling event. Additional reports detailing groundwater monitoring activities and results will be submitted on a quarterly basis for a period of one-year. A report detailing the remediation and disposal of the excavated soil will be submitted following the completion of this task.

SITE CLOSURE

CEC's goal is to achieve closure of this site in the minimum possible time.

APPENDIX A

SOIL SAMPLING IN EXCAVATIONS

COLLECTION

Undisturbed soil samples will be obtained for chemical analysis and geotechnical classification using a slide hammer. Samples will be contained in 2-inch inside diameter, 6-inch long brass tubes.

HANDLING

Sample tubes will be sealed at each end with Teflon sheeting and PVC end caps. Samples will then be placed in ziplock bags, stored in an ice chest with dry ice, and maintained at 4o C. Samples will be labeled with self-adhesive, pre-printed labels indicating project name (or number), sample number, boring/well number, sample depth, date and time, and sampler's name. Samples will be transported under chain-of-custody to a State-certified laboratory.

DOCUMENTATION

A sample location sketch will be recorded in the geologist's field notebook. Collection methods, signs of contamination, soil type, preferential flow paths in the excavation, names of regulators and contractors, and any other appropriate information will also be recorded. Copies of field notes will be submitted to the Project Manager.

FIELD EQUIPMENT DECONTAMINATION PROCEDURES

Sampling equipment will be decontaminated before and after each use by washing in an Alconox solution, followed by tap water and deionized water rinses. Equipment will be sealed in plastic bags or other sealed containers to prevent contact with solvents, dusts, or other contamination.

All rinseate used in the decontamination process will be stored on site in steel DOT approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. The drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results.

APPENDIX B

SOIL SAMPLING IN BOREHOLES AND DURING CONSTRUCTION OF MONITORING WELLS

SOIL SAMPLING IN BOREHOLES AND DURING CONSTRUCTION OF MONITORING WELLS

U.S. Environmental Protection Agency standards serve as the foundation for all field sampling operations performed by CEC. EPA SW 846 is the primary publication from which procedures are derived. While some aspects of field and laboratory work may be delegated to the California Department of Health Services, the California Water Resources Control Board, the San Francisco Regional Water Quality Control Board, and the Department of Environmental Health establish the general and specific criteria for sampling.

SAMPLE INTERVALS

Undisturbed soil samples will be obtained for chemical analysis and geotechnical classification at five-foot intervals or at distinct lithologic changes, beginning at five feet below grade.

COLLECTION DEVICES

Samples will be collected using a 2-inch or 2.5-inch inside diameter Modified California split spoon sampler containing three, six-inch-long brass tubes. The sample collection device and tubes will be decontaminated before and after each use by steam cleaning or by an Alconox solution wash. The sampler will be driven ahead of the augers using a 140-pound drop hammer. The average blow counts required to drive the sampler the last 12 inches will be recorded on the boring logs.

PRESERVATION AND HANDLING

Sample tubes will be labeled, sealed at each end with Teflon sheeting and PVC end caps, placed in ziplock bags, and stored in an ice chest with dry ice. Samples will be delivered under chain-of-custody to a State-certified laboratory.

SOILS CLASSIFICATION

Soils exposed at the ends of each brass tube will be examined by a geologist for obvious signs of contamination and classified according to the Unified Soil Classification System. These observations will be recorded in the boring logs. If only one boring is done, it will be logged continuously from five feet below grade to the bottom of the bore.

Selection of samples for laboratory analysis will be based primarily on headspace readings and position within the boring. In general, samples with headspace readings over 50 ppm or that have visual or olfactory indications of contamination will be submitted for analysis. One sample will also be selected from one or two sampling intervals below the apparent lower limit of contamination to obtain a "zero line" value. In addition, the sample closest to the depth of the storage tank invert (i.e. 12-13 feet) will be submitted for analysis. If the water table is above the tank invert, the sample closest to the water table will be selected.

If the water table is below the tank invert, a sample from the capillary fringe zone above the water table will be collected and analyzed.

SAMPLE LABELING AND CHAIN OF CUSTODY

Samples selected for analysis will be labeled with self-adhesive, pre-printed labeled indicating project name (or number), sample number, boring/well number, sample depth, date and time of sample collection, and required analyses. The same information will be recorded on the chain of custody.

APPENDIX C

WELL CONSTRUCTION

GENERAL PRACTICES

Each monitoring well will be designed to register the potentiometric surface, facilitate soil sampling, and permit water sampling. CEC's standard procedures for well installation and soil/water sampling meet or exceed guidelines set forth by the EPA, California State Regional Water Quality Control Board, and the Alameda County Department of Environmental Health. Drilling, construction, and completion of all exploratory borings and monitoring wells will be in conformance with procedures in this appendix.

DRILLING PROCEDURES

Monitoring wells will be drilled with a hollow-stem, continuous-flight auger. All boring and logging will be supervised by a geologist with special attention given to the avoidance of cross contamination of underlying aquifers. The following procedures used by CEC geologists prevent pollution of clean aquifers underlying contaminated zones:

1. Drilling will cease if five feet of saturated impermeable material is encountered. It will be assumed that any significant saturated, impermeable layer, such as a clay layer, is an aquitard separating the shallow and deep aquifers and should not be penetrated.

2. Drilling will be terminated 20 feet below any perched or unconfined water table.

3. Drilling will be terminated at 45 feet below ground surface if groundwater is not encountered. This is above nearly all deep aquifers currently supplying groundwater in the Bay Area.

The drill rig operator and CEC geologist will discuss significant changes in material penetrated by the drill, changes in drilling conditions, hydraulic pressure, and drilling action. The CEC geologist will be present during the drilling of exploratory borings and will observe and record changes by time and depth, evaluate the relative moisture and content of the samples, and note water producing zones. This record will be used later to prepare a detailed lithologic log. Lithologic descriptions will include soil or rock type, color, grain, size, texture, hardness, degree of induration, carbonate content, presence of fossils or other materials (gypsum, hydrocarbons), and other pertinent information. A copy of the logs will be retained in the field file at the project site.

Soil Cuttings

Soil cuttings generated during drilling will be placed in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, name and phone number of technical contact, and name of generator. Drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results. Disposal of soil cuttings will be the responsibility of the owner/generator, although CEC may arrange for disposal if so requested.

SCREEN AND CASING

The monitoring well assembly will consist of new schedule-40 (minimum), flush-threaded, polyvinyl chloride (PVC) casing from the bottom of the boring to the ground surface. Casing will be shipped in protective wrappers and carefully rinsed before installation.

From the base of the well to approximately five feet above the ground water surface, casing will consist of perforated casing (well screen); the remainder of the well will be solid PVC casing. Perforated casing (well screen) will be factory slotted. Screen sizes are intended to facilitate hydraulic connection between the monitoring well and the surrounding aquifer while retaining 70 to 90% of the filter pack material.

Upon completion of drilling, well casing will be assembled and lowered to the bottom of the boring. Since using glue to connect casing sections could cause false analytical interpretations of water quality, the casing will be connected with dry threads or slip joints. The bottom of the casing will be approximately flush with the bottom of the boring and will be capped with a threaded PVC cap or plug. Using the lithologic log for control, the CEC geologist will specify the exact depths of screened intervals so that the well screen is approximately opposite the water-bearing zone to be monitored.

Where possible, the casing will extend six inches above the ground surface. When monitoring wells are placed in traffic areas where they cannot extend above the surface, locking, pre-cast concrete or cast iron boxes and covers will be installed.

FILTER PACK

After the monitoring well assembly has been lowered to the specified depth, filter pack will be placed in the annular space between the well casing and borehole from the bottom of the well to approximately two feet above the top of the well screen. The depth to the top of the filter pack will be verified using the tremie pipe or a weighted steel tape. Filter pack will be at least 95% silica sand. Sand will be hard, durable, well-rounded, spherical grains that have been washed until free of dust and contamination.

ASTM recommends the following guidelines for screen slot and filter pack selection based on the anticipated strata:

Anticipated Soil Type	Recommended Well Screen Slot Size (in)	Recommended Filter Pack Material (U.S. sieve sizes)
Sand & Gravel	0.030	20 to 4
Silt & Sand	0.020	30 to 8
Clay & Silt	0.010	50 to 16

Reference: Development Methods for Water Wells: An Anthology: NWWA Water Well Journal June 1988

GROUT SEAL

A layer of bentonite pellets approximately one foot thick will be placed above the filter pack and charged with water. The depth to the top of the bentonite pellet layer will be verified using the tremie pipe or a weighted steel tape.

A cement-bentonite grout mixture will be tremied into the annular space from the bentonite seal to the top of the well. The grout material will be a mixture of Portland Type I/II cement (94 lb) to five gallons of clean water or a sand-cement slurry with a minimum of 11 sacks of Portland Type I/II cement per cubic yard. Only clean water from a municipal supply shall be used to prepare the grout. Well development will not begin until the grout has set for a minimum of 72 hours.

CAPPING WELLS

Following well construction, a steel or pre-cast concrete well vault (or valve box) will be completed below ground surface. A metal tag containing well number and construction data will be permanently attached to the well vault. A steel well cover clearly marked "monitoring well" will be bolted to the vault. A suitable watertight, locking well cap will be fitted to the riser casing to prevent the entry of surface runoff or foreign matter.

WELL DEVELOPMENT

When well installation is complete, the well will be developed by surging, and/or bailing, and/or pumping to remove fines from the formation and filter pack. Well development generally restores natural hydraulic properties to the adjacent soils and improves hydraulic properties near the borehole so the water flows more freely in the well. At the least, pumping should continue until water in casing storage has been removed. There are at least two common methods for determining that water in casing storage has been removed and water is flowing freely from the aquifer: (1) Monitor water level while pumping. When the pumping water level has "stabilized," it is likely that little or no water from casing storage is being pumped. (2) Monitor the temperature, pH, conductivity, and turbidity of the water while pumping. When these parameters "stabilize," it is probable that little or no water from casing storage is being pumped and that most of the water is coming from the aquifer. CEC will use the latter method. During development, pH, specific conductance, and temperature of the return water from the water pump will be measured. Well development will proceed until these field-measured water quality parameters have stabilized and the water is, in the judgment of the geologist, at its greatest possible clarity.

Temperature, pH, specific conductance, and turbidity meters will be calibrated per manufacturer's guidelines. Calibration shall be documented in the field log book or data sheets and will include a description of the calibration method, identification number of equipment, and/or regents used in calibration.

Temperature will be measured with a mercury-filled, Centigrade-scaled, bimetallic-element thermometer, or electronic thermistor.

pH measurements will be made shortly after collection of the sample preferably within a few minutes.

Conductivity will be measured by dipping the conductivity probe in the water source or sample. The probe must be immersed above the vent. The temperature of the sample will be used to calculate specific conductance from the conductivity measurement. Conductivity will be reported in units of micromhos per centimeter (mmho/cm) at 25° C.

Turbidity will be measured by placing a vial of development/purge water into a turbidity meter for measurement. The instrument will be calibrated to read in a range between 1 and 400 Nephelometric turbidity units (NTUs). This is a measure of the amount of light scattered at right angles to the path of light passing through the water. The greater the NTU reading, the greater the amount of light scattered by particles in the water, therefore, the greater the turbidity.

WELL PURGING AND WATER SAMPLING

Purging and sampling will not begin for at least 72 hours following construction to allow grout to set. Purging and sampling will be in accordance with procedures in Appendix D, Water Sampling in Wells and Boreholes.

DOCUMENTATION

A well construction diagram for each monitoring well will be completed by the geologist and submitted to the project manager when the work has been completed. In addition, the details of well installation, construction, development, and field measurements of water quality parameters will be summarized as daily entries in a field notebook or data sheets which will be submitted to the project manager when the work has been completed.

DRILLING EQUIPMENT DECONTAMINATION PROCEDURES

The sampling equipment will be decontaminated before and after each use by steam cleaning or washing in an Alconox solution, followed by tap water and deionized water rinses. Only clean water from a municipal supply will be used for decontamination of drilling equipment. Equipment will be sealed in plastic bags or other sealed containers to prevent contact with solvents, dusts or other contamination.

All rinseate used in the decontamination process will be stored on site in steel DOT approved drums. Drums will be labeled as to contents, suspected contaminants, date container was filled, expected removal date, company name, contact and phone number. These drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results.

APPENDIX D

WATER SAMPLING IN WELLS AND BOREHOLES

GENERAL CONSIDERATIONS

In general, the composition of water within the well casing and in close proximity to the well is not representative of groundwater quality. This may be due to contamination by drilling fluids or equipment or disparities between the oxidation-reduction potential in the well and the redox potential in the aquifer. To obtain a representative sample of groundwater, the well should be pumped or bailed until the well is thoroughly flushed of standing water and contains fresh water from the aquifer. One common procedure is to pump or bail the well until a minimum of three boring volumes (or alternatively, 10 well volumes) have been removed.

At the least, pumping should continue until water in casing storage has been removed. There are at least two common methods for determining that water in casing storage has been removed and water is flowing freely from the aquifer: (1) Monitor water level while pumping. When the pumping water level has "stabilized," it is likely that little or no water from casing storage is being pumped. (2) Monitor the temperature, pH, conductivity, and turbidity of the water while pumping. When these parameters "stabilize," it is probable that little or no water from casing storage is being pumped and that most of the water is coming from the aquifer. CEC utilizes the latter method.

PURGING

During each round of sampling, static water level will be measured prior to purging using an electronic sounder. All water-level measurements will be recorded to the nearest 0.01 foot with respect to mean sea level.

A minimum of three bore volumes will be purged from the well prior to sampling. Bore and well volumes will be calculated using the table in this Appendix. To ensure that water in the well has been exchanged, pumping or bailing shall commence at the top and work downward. The well will be allowed to return to 80 percent of the original water level before sampling.

Temperature, pH, specific conductance, and turbidity will be measured for each boring volume pumped. Purging will continue until these field-measured water quality parameters have stabilized and the water is, in the judgment of the geologist, representative of water in the aquifer. Data obtained from field water quality measurements will be recorded in the field log book or data sheets. A separate aliquot of groundwater collected from the purge water outlet stream will be used for field measurements; samples intended for laboratory analysis will not be used.

Temperature, pH, specific conductance, and turbidity meters will be calibrated per manufacturers guidelines. Calibration will be documented in the field log book or data sheets and will include a description of the calibration method, identification number of equipment, and/or regents used in calibration.

VOLUME OF WATER IN CASING OR HOLE

Diameter of Casing or Hole (In)	Gallons per foot of Depth	Cubic Feet per Foot of Depth	Liters per Meter of Depth	Cubic Meters per Meter of Depth
1	0.041	0.0055	0.509	0.509×10^{-3}
1½	0.092	0.0123	1.142	1.142×10^{-3}
2	0.163	0.0218	2.024	2.024×10^{-3}
2½	0.255	0.0341	3.167	3.167×10^{-3}
3	0.367	0.0491	4.558	4.558×10^{-3}
3½	0.500	0.0668	6.209	6.209×10^{-3}
4	0.653	0.0873	8.110	8.110×10^{-3}
4½	0.826	0.1104	10.26	10.26×10^{-3}
5	1.020	0.1364	12.67	12.67×10^{-3}
5½	1.234	0.1650	15.33	15.33×10^{-3}
6	1.469	0.1963	18.24	18.24×10^{-3}
7	2.000	0.2673	24.84	24.84×10^{-3}
8	2.611	0.3491	32.43	32.43×10^{-3}
9	3.305	0.4418	41.04	41.04×10^{-3}
10	4.080	0.5454	50.67	50.67×10^{-3}
11	4.937	0.6600	61.31	61.31×10^{-3}
12	5.875	0.7854	72.96	72.96×10^{-3}
14	8.000	1.069	99.35	99.35×10^{-3}
16	10.44	1.396	129.65	129.65×10^{-3}
18	13.22	1.767	164.18	164.18×10^{-3}
20	16.32	2.182	202.68	202.68×10^{-3}
22	19.75	2.640	245.28	245.28×10^{-3}
24	23.50	3.142	291.85	291.85×10^{-3}
26	27.58	3.687	342.52	342.52×10^{-3}
28	32.00	4.276	397.41	397.41×10^{-3}
30	36.72	4.909	456.02	456.02×10^{-3}
32	41.78	5.585	518.87	518.87×10^{-3}
34	47.16	6.305	585.68	585.68×10^{-3}
36	52.88	7.069	656.72	656.72×10^{-3}

1 Gallon = 3.785 Liters
1 Meter = 3.281 Feet
1 Gallon Water Weighs 8.33 lbs. = 3.785 Kilograms
1 Liter Water Weighs 1 Kilogram = 2.205 lbs.
1 Gallon per foot of depth = 12.419 liters per foot of depth
1 Gallon per meter of depth = 12.419×10^{-3} cubic meters per meter of depth

Temperature will be measured with a mercury-filled, Centigrade-scaled, bimetallic-element thermometer, or electronic thermistor.

Acidity/alkalinity (pH) will be measured by dipping the conductivity probe in the water source or sample; pH will be measured soon after collection of the sample, preferably within a few minutes.

Conductivity will be measured by dipping the conductivity probe in the water source or sample. The temperature of the sample will be used to calculate specific conductance from the conductivity measurement. Measurements shall be reported in units of micromhos per centimeter at 25 degrees Centigrade.

Turbidity will be measured using a vial of development/purge water and a turbidity meter. The instrument will be calibrated to read between 1 and 400 Nephelometric turbidity units (NTUs). This is a measure of the amount of light scattered at right angles to the path of light passing through the water. The greater the NTU reading, the greater the amount of light scattered by particles in the water, the greater the turbidity.

SAMPLE COLLECTION

Wells and borings will be sampled using a new, clean, disposable Teflon bailer attached to new, clean string. Sample vials and bottles will be filled to overflowing and sealed so that no air is trapped in the vial or bottle. Once filled, samples shall be inverted and tapped to test for air bubbles. Samples will be contained in vials and bottles approved by the US EPA and the RWQCB, San Francisco Bay Region. Some analyses may require separate sample containers in accordance with EPA methods described in 40 CFR Part 136 and SW-846.

Water samples intended for volatile hydrocarbon analysis will be contained in 40 ml VOA vials prepared according to EPA SW 849 and capped with Teflon-lined septa caps. Samples intended analysis by EPA Method 602 will contain a small amount of preservative (HCl) in the voa. Samples intended for analysis by EPA Method 601 and EPA 624 GCMS procedures will not be preserved. Water samples intended for low level diesel analysis will be stored in amber glass 1-liter bottles to reduce degradation by sunlight. Antimicrobial preservative (HCl) may be added to the sample if a prolonged holding time is expected prior to analysis.

Sample containers will be labeled with self-adhesive, pre-printed tags. Labels will contain the following information in waterproof ink:

1. Project number (or name)
2. Sample number (or name)
3. Sample location (well number, etc.)
4. Date and time samples were collected
5. Treatment (preservative added, filtered, etc.)
6. Name of sample collector

All purged water will be stored on site in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. The drums will be left on-site for subsequent disposal pending receipt of analytical results.

DOCUMENTATION

Sampling information will be recorded in ink in a bound notebook with consecutively numbered pages. Pages will not be removed for any reason. Alternatively, specially formatted field data sheets may be used to record the information collected during water quality sampling. Errata may be marked out with a single line and initialed by the person making the change. The log book and data sheets will be placed in the project file when sampling is completed.

FIELD EQUIPMENT DECONTAMINATION PROCEDURES

Bailers and string will be properly disposed of off site. All other sampling equipment, such as buckets and stands, will be decontaminated after each use by washing in an Alconox solution, followed by tap water and deionized water rinses. Equipment will be sealed in plastic bags or sealed containers to prevent contact with solvents, dusts, or other types of contamination.

All rinseate used in the decontamination process will be stored on site in steel DOT approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. These drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results.

SITE SPECIFIC
HEALTH AND SAFETY PLAN

I. Site: 2552 San Carlos Avenue, Castro Valley, California.

II. Key Personnel and Project Assignments

PROJECT ASSIGNMENT	NAME/AGENCY	PHONE
Principal Investigator	Bradford Webb/ CEC	(707) 745-0171
Geologist	Bradford Webb/ CEC	(707) 745-0171
Project Manager	Stanley Klemetson/ CEC	(707) 745-0171
Certified Industrial Hygienist (Site Safety Officer)	Michael T. Noble/CEC	(707) 745-0171

III. WORK PLAN

A. **Objectives:** Excavate and bioremediate contaminated soil, install one groundwater monitoring well, and monitor groundwater for a one-year period.

B. **Field activities:** **job tasks**

1. Excavate soil in former tank location to approximately 8 foot depth, collect soil samples at specified depths (6 and 8 feet below ground surface) and backfill excavation. Will collect one water sample in place of one soil sample if groundwater is encountered during excavation activities.
2. Containment of soil and/or water thought to be contaminated until it can be treated on site or removed for disposal.
3. Construct one 4-inch diameter monitoring well to a depth of 20 feet below ground surface.
4. Develop, purge and sample one on-site groundwater monitoring well. This well will be sampled for an additional three quarters as well.

C. **Duration:** A total of 4 days on site (two days for excavation, soil sampling, and backfilling.) One day for monitoring well installation, one day for well development, and one day for well sampling.

D. **Personnel requirements:** Excavation and soil sampling: One field geologist and excavation contractor; Well construction: one field geologist and drill crew; well development and water sampling: one field technician.

IV. JOB HAZARD ANALYSIS

Toxicological hazards of wastes (including local and systemic health effects): The primary constituents of gasoline are benzene, ethylbenzene, toluene, and xylene. The principle hazards of exposure include inhalation of vapors and dermatitis. To prevent dermatitis, the best protection is to avoid skin contact, refrain from wearing gasoline-soaked clothing, and wash any affected skin areas with soap and warm water.

Substance	ACGIH TWA	Exposure Symptoms
Benzene*	10 ppm	irritated eyes, nose, respiratory system, headache
Toluene	100 ppm	weakness, confusion, dizziness, dermatitis
Ethylbenzene	100 ppm	irritated eyes, headache, dermatitis
Xylene	100 ppm	dizziness, drowsiness, dermatitis, irritated eyes and throat

* Benzene is a suspected carcinogen and precautions should be taken to avoid inhalation of the vapors.

Physical hazards associated with site activities: Slip, trip and fall hazards; safety hazards associated with construction equipment; excessive noise.

V. SITE CHARACTERIZATION AND ANALYSIS

A. Site Information

1. **Location of site:** 2552 San Carlos Avenue, Castro Valley, California (See Figure 1, Hospital Location Map).

2. **Approximate size of site:** Approximately 150 feet by 200 feet

3. **Site topography:** Flat, asphalt-paved surfaces or covered with structures.

4. **Site accessibility:** All areas of the site are readily accessible.

5. **Pathways for hazardous substance dispersion:** The hazardous substance is gasoline, which is likely to volatilize into the air. The secondary path for dispersion is through the soil and groundwater aquifers.

6. **Anticipated weather conditions (temperature, humidity) and potential for heat/cold stress:** Mild weather conditions.

7. **Past use of site:** The site was used as an office and shop by a scaffold company.

8. **Current use of site:** Used as a base of operations for a drayage service.

B. **Description of on-site wastes (based on preliminary site evaluation)**

1. **Location:** Soil northeast of and beneath the former tank location is contaminated with gasoline.

2. **Physical state of wastes:** Solid (soil); liquid (dissolved in water and possibly free product)

3. **Chemical characteristics of wastes:** Gasoline (volatile constituents).

4. **Range of concentration found to date:** Soil up to 2000 mg/kg petroleum hydrocarbons, 5.4 mg/kg benzene and 81 mg/kg xylene.

C. **Site Map**

1. **Site control and security measures:** Site access will be controlled during excavation and drilling activities. Only authorized personnel will be allowed in the excavation and drilling area.

VI. PERSONAL PROTECTIVE EQUIPMENT (PPE)

A. **Level of protection required for this visit (see the next page for descriptions):**

A________ B________ C________ D___X___

B. **Respiratory protection:** Half-mask dual cartridge equipped with organic vapor cartridge. Only required if the airborne concentrations of contamination are above the action levels specified in Section IV.

C. **Protective clothing:** Level D protection, including hard hats, safety shoes, and coveralls as necessary.

D. **Action levels regarding limitations in tasks assigned, PPE requirements and/or withdrawal from the site:** Withdrawal from the site if detected organics in the breathing zone exceed 10 mg/kg (constant).

VII. LIST PPE FOR EACH JOB CLASSIFICATION AT THE SITE IF DIFFERENT LEVELS OF PROTECTION ARE SPECIFIED.

TASK	NAME	RESP	CLOTH	GLOVES	BOOTS	OTHER

All persons at the site who will be working within the contaminated area shall use the same Personal Protective Equipment, as outlined in paragraph VI.

NOT	APPLICABLE					

Key:

B = Butyl

C = Covers

F = Fireman's

K = Kaysams

L = Latex

N = Neoprene

S - Saranex

T = Tyvek

V = Viton

VIII. EXPOSURE MONITORING PLAN

A. **Frequency and types of air, personnel, and environmental monitoring:** Air will be continually monitored during the sampling process and every 30 minutes while excavating in areas suspected to be contaminated. Monitoring will be performed using an organic vapor analyzer. During drilling, air monitoring will be performed at 30-minute intervals.

B. **Methodology:** Monitor down wind in the breathing zone of the field samples.

C. **Equipment calibration procedures:** Equipment will be calibrated according to the manufacturer's directions.

IX. DECONTAMINATION PROCEDURES

A. **PPE:** Leave the sampling area. Remove protective clothing (coveralls, gloves) inside out. Lastly, remove respirator. All disposable clothing will be disposed of in an appropriate receptacle. Respirators will be cleaned and placed into their storage container.

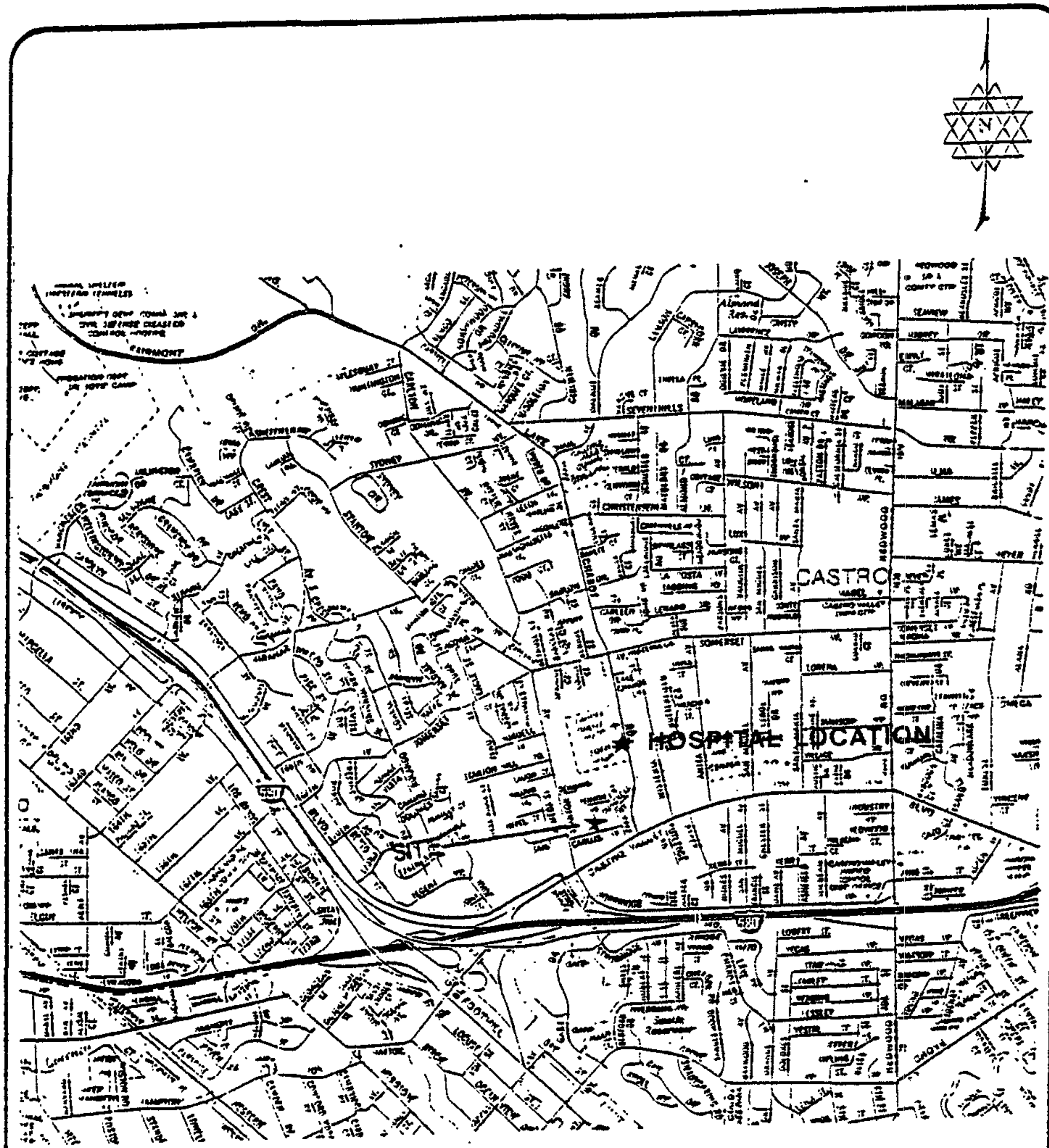

FIGURE 1

HOSPITAL LOCATION MAP

EDEN HOSPITAL

20103 LAKE CHABOT ROAD

CASTRO VALLEY, CALIFORNIA

PHONE:510-537-1234