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WORKPLAN FOR EXCAVATION OF CONTAMINATED SOIL AND INSTALLATION OF GROUNDWATER MONITORING WELLS

CREDIT WORLD AUTO SALES
2345 E. 14TH STREET
OAKLAND, CA 94601 1-26-94

2116

Prepared For:
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Submitted By:
TANK PROTECT ENGINEERING
Of Northern California, Inc.
August 26, 1994

Project Number 267

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This workplan has been prepared by the staff of **Tank Protect Engineering of Northern California, Inc.** under direction of an Engineer and/or Geologist whose seal(s) and/or signature(s) appear hereon.

The findings, recommendations, specifications or professional opinions are presented, within the limits prescribed by the client, after being prepared in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied.

John V. Mrakovich, Ph.D.
Sr. Registered Geologist

Expiration Date 4/30/96

Jeff J. Farhoomand, M.S.
Civil Engineer

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1.0 INTRODUCTION

The subject site is located at 2345 E. 14th Street in the city of Oakland in Alameda County, California (see Figure 1) and is owned by Messrs. Aaron and Stanley Wong [(Wong), telephone number (510) 532-1672]. The site is occupied by a used car dealership known as Credit World Auto Sales. The only onsite structure is a building which includes an office and automotive service bay. Previous work by others and Tank Protect Engineering of Northern California, Inc. (TPE) has documented soil and groundwater contamination apparently due to leaks or spills associated with a former underground gasoline tank complex.

This [illegible] of Contaminated Soils and Installation of Groundwater Monitoring Wells (WP) summarizes TPE's understanding of site history and documents work conducted by others and TPE. The WP presents a scope of work for investigating and remediating vadose zone soil and groundwater contamination. The WP was requested by the Alameda County Health Care Services Agency (ACHCSA) in an August 4, 1994 letter to Wong (see Appendix A).

2.0 SITE HISTORY

The following background of work conducted by others is summarized from documents provided to TPE by Wong.

2.1 Tank Removal

On August 5, 1988, one 8,000-gallon, underground, gasoline storage tank; two 6,000-gallon, underground, gasoline storage tanks; one 1,000-gallon, underground, waste oil storage tank; 2 dispenser islands; and associated piping were removed from the site by West Coast Tank Company of Campbell, California. Subsequent soil sampling was conducted by SCS Engineers (SCS) of Dublin, California.

2.1.1 Tank Removal Soil Sampling

On August 25, 1988, two soil samples were collected from beneath each gasoline tank and analyzed for total petroleum hydrocarbons as gasoline (TPHG) by the United States Environmental Protection Agency (EPA) Method 8015; for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020; and for lead by EPA Method 7420. Samples collected from beneath the waste oil storage tank were analyzed for total petroleum hydrocarbons as diesel (TPHD) by EPA Method 8015, for total oil & grease (TOG) by Standard Method 503E, and for volatile organics by EPA Method 624.

2.1.1.1 Results of Chemical Analyses

All samples analyzed for TPHG, BTEX, and lead contained concentrations of all constituents. TPHG ranged in concentration from 130 parts per million (ppm) to 1,500 ppm. BTEX chemicals ranged in concentration from a low of .17 ppm for benzene to a high of 160 ppm for xylenes. Lead ranged in concentration from 4.6 ppm to 316 ppm.

TOG and TPHD were detected in both soil samples collected beneath the waste oil tank. TOG was detected at concentrations of 570 ppm and 780 ppm. TPHD was detected at concentrations of 65 ppm and 110 ppm.

EPA Method 624 detected only ethylbenzene and total xylenes in soil beneath the waste oil tank.

The reader is referred to SCS's September 19, 1988 letter report to Mr. Dino Gonis for documentation of the above work and analytical results.

2.2 Excavation Closure

Earth Systems Environmental, Inc. (ESE) documented that the excavations were backfilled "with the stockpiled spoils and imported fill, compacted, graded to surface contours and capped with concrete" (see ESE's December 23, 1991 Phase I Soil and Ground Water Assessment report).

2.3 Soil Boring and Groundwater Investigation - October 3, 1988

On October 3, 1988, California Environmental Consultants (CEC) drilled 3 soil borings, B-1 through B-3 (see Figure 2), to characterize the soil in the vicinity of the tanks. Borings B-1 and B-2 were drilled in the area of the former underground gasoline tanks and boring B-3 was drilled in the area of the former waste oil tank. One soil sample and 1 "grab" groundwater sample were collected from each boring. Soil samples were collected at depths of about 15 feet.

CEC also reported collecting samples SP-1, SP-2, and SP-3 from 3 aerated stockpiles, 2 associated with the fuel tanks excavation and 1 associated with the waste oil tank excavation. The stockpiles were aerated for use as excavation backfill material.

2.3.1 Results of Chemical Analyses

2.3.1.1 Soil Samples

Soil samples from SP-1, SP-2, and borings B-1 and B-2 were analyzed for TPHG and BTEX by EPA Method 5030 or 3810/8015/8020. TPHG was detected in samples SP-1 and SP-2 at concentrations of 1.3 ppm and 13 ppm, respectively. TPHG was detected in samples B-1 and B-2 at concentrations of 3.4 ppm and 83 ppm, respectively. All BTEX chemicals were nondetectable in samples SP-1 and SP-2. Low concentrations of some or all BTEX chemicals were detected in samples B-1 and B-2.

The soil samples from SP-3 and boring B-3 were analyzed for BTEX, TOG, and halogenated volatile organics by EPA Methods 5030/8020, 3550, and 5030/8010, respectively. All BTEX chemicals were nondetectable in sample SP-3; however, all BTEX chemicals were detected in sample B-3 ranging in concentration from a low of .360 ppm for benzene to a high of .850 ppm for xylenes. [redacted] in samples B-2 and B-3 at concentrations of 1,300 ppm and 88 ppm, respectively. No chemicals were detected by EPA Method 5030/8010 in either sample.

2.3.1.2 "Grab" Groundwater Samples

One "grab" groundwater sample was collected from each boring and analyzed as discussed above under section 2.3.1.1 Soil Samples.

TPHG was detected in water samples from borings B-1 and B-2 at concentrations of 67,000 parts per billion (ppb) and 110,000 ppb, respectively; all BTEX chemicals were detected in both samples with concentrations ranging from a low of 2,400 ppb for toluene to a high of 17,000 ppb for benzene.

The water sample from boring B-3 detected all BTEX chemicals ranging in concentration from a low of 160 ppb for toluene to a high of 1,300 ppb for xylenes. TOG was detected at a concentration of 290,000 ppb and no chemicals were detected by EPA Method 5030/8010.

The reader is referred to CEC's November 21, 1988 letter report to Mr. Dino Gonis for documentation of the above scope of work and analytical results.

2.4 Soil Boring and Groundwater Investigation - August 21 and 22, 1991

On May 22, 1991, ESE, under subcontract to Mobile Labs, Inc., installed 1 groundwater monitoring well, MW-1, and on August 21 and 22, 1991, drilled 5 soil borings, TH-1 through TH-5, and installed 2 groundwater monitoring wells, MW-2 and MW-3, (see Figure 2) as a further characterization of soil and groundwater contamination.

The soil borings were located, generally, along an east-west treading line that runs through the center of the location of the former gasoline tank complex and generally in the direction of the anticipated groundwater gradient. Boring TH-2 is located at the easterly end of the line; boring TH-1 is located in the center of the former complex; boring TH-3 is located at the westerly end of the line near the waste oil tank; and boring TH-4 is located about a third the distance from TH-3 to TH-1. Boring TH-5 was not located in line with the other borings, but was located in the southerly corner of the site (see Figure 2).

Monitoring well MW-1 is located south of the former tank complex; wells MW-2 and MW-3 are located near the northerly and westerly corners of the site, respectively (see Figure 2).

Two soil samples were analyzed from each boring and monitoring well with the exception of boring TH-1 in which only 1 sample was analyzed. All samples were collected at depths of about 10 or 18 feet, with the exception of the deeper sample in boring TH-2 which was collected at a depth of 30.0 feet.

2.4.1 Results of Soil Sample Chemical Analyses

All soil samples from borings and monitoring wells located in the area of the former gasoline tank complex were analyzed for TPHG by EPA Method 8015 Modified and BTEX by EPA Method 8020. All soil samples from borings and monitoring wells located in the area of the former waste oil tank were analyzed for total recoverable hydrocarbons (TRH) by EPA Method 418.1, TPHG, and BTEX. Soil samples from boring TH-5, located farthest from either former tank area, were analyzed for TPHG and BTEX.

All soil samples in all borings, with the exception of the deeper sample in boring TH-5, detected TPHG with concentrations ranging from 10 ppm to 4,320 ppm. All soil samples analyzed for TRH detected concentrations ranging from 20 ppm to 1,600 ppm. BTEX chemicals were detected almost exclusively in samples collected only in the area of the former gasoline tank complex.

2.4.2 Results of Groundwater Sample Chemical Analyses

Groundwater samples were collected from the monitoring wells on August 23, 1991, one day after their construction and development, and analyzed for TPHG by EPA Method 8015 Modified and BTEX by EPA Method 602. No TPHG or BTEX chemicals were detected in well MW-3. TPHG was detected in wells MW-1 and MW-2 at concentrations of 2,090,000 ppb and 10,000 ppb, respectively. BTEX chemicals were detected only in well MW-1 and ranged in concentration from 2,145 ppb for ethylbenzene to 23,150 ppb for xylenes.

? higher than soluble

The reader is referred to ESE's December 23, 1991 Phase I Soil and Ground Water Assessment report for documentation of the above scope of work and analytical results.

2.5 Groundwater Monitoring - April 16, 1992

On April 16, 1992, NKJ Environmental Monitoring (NKJ) measured depth-to-groundwater in each well and found floating product present in all 3 wells. The thickness of product ranged from 0.16 feet to 5.12 feet.

The reader is referred to NKJ's May 1, 1992 letter report to Mobile Labs, Inc. for documentation of the above scope of work.

2.6 ACHCSA Letters Dated October 19 and 30, 1992

In an October 19, 1992 letter to Wong, Request for Report of Subsurface Investigation and Workplan Addendum for Former Taxi Taxi, Inc. at 2345 E. 14th St., Oakland, CA 94601, the ACHCSA requested additional information about the tank closure, disposition of stockpiled soil, and requested an additional workplan to further characterize soil and groundwater contamination.

In an October 30, 1992 letter to Wong, Subsurface Investigation at Former Taxi Taxi at 2345 E. 14th St., Oakland, CA 94601, the ACHCSA approved a recommendation from ESE for installation of 2 additional groundwater monitoring wells and a product removal system.

2.7 Groundwater Gradient - June 11, 1993

On April 26, 1993, Wong contracted with TPE to conduct the above work proposed by ESE and approved by the ACHCSA. Prior to installing 2 additional wells, a representative of TPE visited the site on June 11, 1993 to measure depth-to-groundwater in each well (for evaluation of groundwater gradient and flow direction) and free product thickness, if any. The purpose of determining groundwater flow direction was to assist TPE in optimally locating the 2 new wells. Depth-to-groundwater and top of free product were measured by using a KECK Model KIR-89 interface meter. Gradient was .0357 feet per foot in a northwesterly direction and no significant product thickness was measured.

2.8 Soil Boring and Groundwater Investigation - July 22 and 23, 1993

On June 18, 1993, TPE submitted a Workplan for Construction of Groundwater Monitoring Wells for installation of 2 additional groundwater monitoring wells and up to 2 free product removal systems if free product was present in any of the wells. The workplan was subsequently approved by the ACHCSA in a June 25, 1993 letter to Wong.

On July 22 and 23, 1993, TPE installed groundwater monitoring wells TMW-4 and TMW-5 at the locations shown in Figure 2. The locations of the wells were based on groundwater gradient determined on June 11, 1993. Well TMW-4 was installed as an upgradient well and well TMW-5 was installed as a downgradient well located within 10 feet of the former location of the underground gasoline tank complex. Soil samples were collected for chemical analysis for TPHG and BTEX from each well at depths of about 5.5, 10.5, and 15.5 feet.

TPE measured depth-to-groundwater and sampled all 5 wells on August 17, 1993 for chemical analysis for TPHG and BTEX.

The reader is referred to TPE's November 4, 1993 Preliminary Site Assessment Report (PSAR) for documentation of the above scope of work.

2.8.1 Results of Soil Sample Chemical Analyses

All soil samples were analyzed for TPHG and BTEX by the California Department of Health Services (DHS) Method and Modified EPA Method 8020, respectively.

Chemical analyses of soil samples collected from the boring for well TMW-4 detected only TPHG at a concentration of .940 ppm in the soil sample collected at a depth of about 15.5 to 16.0 feet.

Chemical analyses of soil samples collected from the boring for well TMW-5 detected TPHG and benzene in all samples. TPHG and benzene were detected at depths of about 5.5 to 6.0 feet, 10.5 to 11.0 feet, and 15.5 to 16.0 feet at concentrations of 2.4 ppm, 14 ppm, and 16 ppm; and .026 ppm, .900 ppm, and .840 ppm, respectively. Ethylbenzene was detected in the soil samples collected at depths of about 10.5 to 11.0 feet and 15.5 to 16.0 feet at concentrations of 1.6 ppm and .690 ppm, respectively. Xylenes were detected in the samples collected at depths of about 5.5 to 6.0 feet and 15.5 to 16.0 feet at concentrations of .053 ppm and 1.3 ppm, respectively. Toluene was nondetectable in all the soil samples.

2.8.2 Results of Groundwater Sample Chemical Analyses

All groundwater samples and a trip blank sample were analyzed for TPHG and BTEX by EPA Methods 5030/8015 and 602, respectively.

Chemical analyses detected TPHG and BTEX chemicals in all 5 wells. TPHG was detected in wells MW-1, MW-2, MW-3, TMW-4, and TMW-5 at concentrations of 110,000 ppb, 49,000 ppb, 9,600 ppb, 150 ppb, and 120,000 ppb, respectively. All BTEX chemicals were detected in all wells with the exception of no benzene detected in well TMW-4. No TPHG or BTEX chemicals were detected in the trip blank sample.

Well TMW-4, the farthest upgradient well, detected the lowest concentrations of TPHG and BTEX. Toluene, ethylbenzene, and xylenes were detected at concentrations of .8 ppb, 1.4 ppb, and 3.7 ppb, respectively. Benzene was not detected.

2.9 ACHCSA Letters Dated February 1 and 18, 1994

In a February 1, 1994 letter to Wong, Request for Technical Reports for 2345 E. 14th St., Oakland, CA 94601, Former Taxi Taxi Site, the ACHCSA requested technical information detailing the installation of wells, installation of free product removal systems, and quarterly monitoring data (see Appendix A).

In a February 18, 1994 letter to Wong, Comment on November 4, 1993 Preliminary Site Assessment Report for 2345 E. 14th St., Oakland, CA 94601, Credit World Auto Sales, the ACHCSA recommended initiating quarterly groundwater monitoring and a phased approach to further site investigation and remediation. The ACHCSA suggested the initial phase of remediation begin with excavation of contaminated soil in the former tank locations (see Appendix A).

2.10 Quarterly Groundwater Monitoring

TPE has conducted quarterly groundwater monitoring on March 31 and June 27, 1994.

The reader is referred to TPE's May 18, 1994 First Quarter Report, 1994, Credit World Auto Sales, 2345 E. 14th Street, Oakland, CA 94601 and July 29, 1994 Second Quarter Report, 1994, Credit World Auto Sales, 2345 E. 14th Street, Oakland, CA 94601 for documentation of the quarterly groundwater monitoring events.

3.0 PROPOSED WORKPLAN FOR INVESTIGATION AND REMEDIATION OF CONTAMINATED VADOSE ZONE SOIL AND GROUNDWATER

As a further investigation and preliminary remediation of vadose zone soil and groundwater contamination, TPE proposes the following scope of work:

- Excavate contaminated soil from the location of the former underground gasoline tank complex.

- After excavating contaminated soil in the above task, collect verification soil samples from the sidewalls and floor (if groundwater is not present) of the excavation for chemical analysis for TPHG and BTEX.

- If groundwater enters the excavation and contains apparent hydrocarbon contamination, conduct groundwater remediation by pumping contaminated groundwater from the excavation.

- Dispose of the contaminated stockpiled soil at a recycling facility or an appropriate landfill.

- Backfill the excavation with clean imported fill material.

- D[redacted] of v[redacted] wells.

- Collect soil samples from each soil boring at approximately 5-foot depth intervals, changes in lithology, and occurrence of apparent contamination for construction of a boring log and for selection for chemical analysis.

- Analyze vadose zone soil samples from the borings for [redacted].

- Convert the 3 borings into groundwater monitoring wells and develop and purge groundwater from each well.

- Collect groundwater samples from all 8 onsite monitoring wells.

- Analyze 8 groundwater samples and 1 trip blank sample for TPHG and BTEX.

- Survey elevation of top-of-casings (TOC) of the 3 installed wells with respect to a permanent benchmark to the nearest .01 foot above Mean Sea Level (MSL).

- Prepare a Site Assessment Report (SAR).

Details of the proposed scope of work are presented below.

Soils disposition?

3.1 Prefield Activities

Prior to beginning excavation activities, TPE will notify the Bay Area Air Quality Management District (BAAQMD) and conduct an Underground Service Alert location request to minimize the potential for encountering any buried utilities or underground objects while conducting excavation and drilling activities.

3.2 Excavate Contaminated Soil

TPE proposes to re-excavate the former gasoline tanks excavation and, if necessary, conduct horizontal excavation of contaminated vadose zone soil to a distance of up to about 15 feet outward from the former limit of excavation (see Figure 2) and vertical excavation to the depth of groundwater or to the depth that can be safely reached by the equipment used. Excavation will not be conducted to the extent of endangering buildings, sidewalk areas, utilities, or any other known structures or objects. If, after excavating to the above limits, soil contamination is still present in the walls and/or floor of the excavation and appears to be widespread horizontally and/or vertically, TPE may advise the client to conduct soil borings as a second phase of investigation to assess other remedial options such as vapor extraction.

The extent of excavation will be based on field-screening methods that will include the detection of apparent soil contamination as evidenced by visible hydrocarbon stains, odors, and headspace field screening of excavated soil samples for volatile organic compounds using a Gastech Inc., Trace-Techtor hydrocarbon vapor tester (HVT).

Headspace analysis will be conducted on each vadose zone soil sample collected to determine if apparent contamination is present. The analysis will be performed by sealing each sample in a quart-size plastic bag and warming the bagged sample in the sun to promote volatilization of any hydrocarbons that may be present in the soil. After allowing for volatilization, the sample will be tested by inserting the probe of a HVT into the headspace of the plastic bag (while minimizing the entry of new air into the bag) and recording the response in ppm.

Excavated soil will be stockpiled on site on top of plastic sheeting unless the ground surface is covered with asphalt or concrete. When leaving the site, TPE personnel will cover the stockpile with plastic sheeting. The client will be responsible to maintain the cover when TPE personnel are not working with the stockpile.

3.3 Verification Soil Sampling

When the horizontal and vertical extent of contaminated vadose zone soil has been reached, based on the above field-screening, or the horizontal and vertical limits discussed above have been reached, verification soil samples will be collected for chemical analysis to document cleanup concentrations of TPHG and BTEX. As a minimum, soil samples will be collected at about 15 to 20-foot intervals horizontally and vertically. If groundwater is encountered, the first and/or last vertical soil sample will be collected at a depth of about 1 foot above the groundwater's surface. Additional soil samples may be collected where contaminated soil is suspected and in permeable materials that may act as conduits for contaminant transport. Additional excavation may be recommended if all contaminated soil has not been removed, based on results of chemical analyses.

Soil samples will be collected from the sidewalls of the excavation by removing about 1 foot of soil to expose a fresh surface and driving a clean 2-inch diameter by 6-inch long brass tube into the newly exposed surface with a slide-hammer corer. Samples may also be collected by excavating soil with the bucket of a backhoe and collecting a sample in a brass tube from soil in the bucket. After collecting each sample, the brass tube ends will be quickly covered with Teflon sheeting and capped with plastic end-caps. The tubes will be labeled to show site name, project number, sample name and depth, time and date collected, and sampler name; sealed in quart size plastic bags; and placed in an iced-cooler for transport to a DHS certified laboratory accompanied by chain-of-custody documentation.

Appendix B documents TPE's protocol relative to sample handling procedures.

3.3.1 Chemical Analyses

All verification soil samples are proposed to be analyzed for TPHG and BTEX by the DHS Method and EPA Method 8020, respectively.

3.4 Pump Groundwater From Excavation

If groundwater enters the excavation and contains apparent hydrocarbon contamination, TPE will recommend to the client that groundwater be pumped from the excavation. The volume of pumped groundwater will be agreed upon between Wong and TPE when Wong agrees to the recommendation.

3.5 Dispose of Stockpiled Soil

Based on concentrations of contaminants and volume of soil excavated, TPE will recommend to the client proper disposal of contaminated soil at an appropriate landfill or recycling facility.

3.6 Excavation Closure

After soil excavation is completed, TPE will backfill the excavation with clean imported fill material. The fill material will be placed in the excavation in 2 to 3-foot compacted lifts to final grade.

3.7 Groundwater Investigation

Before commencing drilling activities, TPE will obtain well installation permits from the Alameda County Flood Control and Water Conservation District, Water Resources Management, Zone 7 and visit the site to select the proposed soil boring locations.

3.7.1 Soil Boring and Sampling Procedures

The vertical and horizontal limits of soil contamination will be further investigated while drilling 3 soil borings for the construction of groundwater monitoring wells. The locations of 3 proposed soil borings/monitoring wells are tentatively shown in Figure 3. These locations are chosen to better define the groundwater plume. Well TMW-6 is located in the farthest downgradient direction along the preferred flow path (see Figure 8 in TPE's PSAR) to evaluate the potential offsite migration of the plume. Wells TMW-7 and TMW-8 are located cross and upgradient, respectively, to further evaluate gradient variability and the areal extent of floating product detected in well MW-1.

The monitoring well exploratory borings will be drilled by a State of California licensed water well driller (C-57 Water Well Driller contractor's license) using 8-inch diameter, hollow-stem, auger drilling equipment. The augers will be steam-cleaned before drilling each boring to prevent cross-contamination between borings or the introduction of offsite contamination for the initial boring. Representative soil samples will be collected for construction of a lithologic log and for potential chemical analysis in the vadose zone at approximately 5-foot depth intervals below the ground surface, and at any changes in lithology or any indications of apparent contamination, by advancing a California split-spoon sampler, equipped with 2-inch diameter by 6-inch long brass tubes, into the undisturbed soil beyond the tip of the augers. Soil samples will be collected in the saturated zone with either a split spoon sampler or standard penetration test sampler.

All sampling equipment will be cleaned before each sampling event by washing with a trisodium phosphate solution and rinsing in tap water.

Headspace analysis will be conducted on each vadose zone soil sample collected to determine if apparent contamination is present.

Soil samples collected at depths of about 5.5, 10.5, and 15.5 feet will be submitted for chemical analysis from each boring. Each sample will be preserved in the tubes by quickly covering the open ends with Teflon sheeting capped with plastic end-caps. The samples will be labeled and handled as discussed above in section 3.3 Verification Soil Sampling.

A detailed boring log will be prepared from auger return material and soil samples. The soil will be logged according to the Unified Soil Classification System under the supervision of a California Registered Geologist.

Drill cuttings will be stored on site, contained in plastic or 55-gallon steel drums. The stored cuttings will be labeled to show contents, date stored, suspected chemical contaminant, expected date of removal, company name, contact person, and telephone number. Maintenance of plastic or drums and disposal of the cuttings is the responsibility of the client. After the cuttings are characterized by chemical analysis, TPE will provide recommendations to the client and, upon their request, assist them in remediation or disposal of the cuttings, or both in an appropriate manner as an additional work item.

Appendices C and D document TPE's protocols relative to hollow-stem auger drilling and soil sampling procedures and waste handling and decontamination procedures.

3.7.1.1 Chemical Analyses

Soil samples collected from soil borings are proposed to be analyzed for TPHG and BTEX by the DHS Method and EPA Method 8020, respectively.

3.7.2 Groundwater Monitoring Well Installation

The exact depth of each boring and screen length will be determined by the geologic stratigraphy and occurrence of groundwater in the boring at each location. Generally, the boring will be drilled into the first water-bearing aquifer until reaching a clay layer or aquitard or until drilling 15 feet below the stabilized water level in the boring of an unconfined aquifer or 20 feet below the top of a confined aquifer, whichever occurs first.

In an unconfined aquifer, at least 5 feet of screen will be placed above the stabilized water level to allow for monitoring of floating product during rising water levels due to seasonal fluctuations. In a confined aquifer, the top of the screen will be placed at the top of the aquifer. Total screen length in either case will not exceed 20 feet.

Based on an estimated depth of about 18 feet to groundwater, exploratory borings for 3 groundwater monitoring wells are proposed to be drilled to maximum depths of about 38 feet. Each boring will be converted into a monitoring well by installing 2-inch diameter, flush-threaded, schedule 40, polyvinyl chloride (PVC) casing and .010-inch machine-slotted screen. A sand pack of number 2/12 filter sand will be placed in the annular space from the bottom of the boring to a maximum of 2 feet above the top of the screened interval. Approximately 1 to 2 feet of bentonite will be placed above the sand pack. An annular seal of neat Portland Type I/II cement will be placed from the top of bentonite to ground surface. A traffic rated, bolt-locked, vault box with a cover indicating "Monitoring Well" will be set in concrete to protect the well and a water tight, locking well cap with lock will be installed on each well casing.

The TOC elevation (relative to MSL) of each well will be surveyed by a professional civil engineer or registered land surveyor relative to a permanent benchmark. This information will be used for construction of a groundwater gradient map.

Appendix E documents TPE's protocol relative to groundwater monitoring well construction.

3.7.3 Groundwater Monitoring Well Development

The installed groundwater monitoring wells will be developed a minimum of 48 hours after well construction is completed. Before development, depth to water will be measured from the TOC to the nearest 0.01 foot using an electronic Solinst water level meter. A minimum of 3 repetitive measurements will be made for each level determination to ensure accuracy. Each well will be checked for floating product using a dedicated polyethylene bailer. If floating product is present, the thickness of product will be measured with a KECK Model KIR-89 interface meter and recorded to the nearest .01 foot. TPE will recommend to the client that removal of floating product should commence as soon as possible.

The wells will be developed by using a 1.7-inch, positive displacement, PVC hand pump or by bailing with dedicated PVC bailers until the well is free of sand, silt, and turbidity or no further improvement is apparent.

Development water will be stored on site in 55-gallon steel drums properly labeled to show contents, date filled, suspected chemical contaminant, company name, contact person, and telephone number. Maintenance and disposal of the drummed water is the responsibility of the client. After the water is characterized by chemical analysis, TPE will provide recommendations to the client and, upon their request, assist them in remediation or disposal of the fluids, or both in an appropriate manner as an additional work item.

Appendix F documents TPE's protocol relative to groundwater monitoring well development procedures.

3.7.4 Groundwater Monitoring Well Sampling

After a minimum of 48 hours after well development, depth to stabilized water will be measured and recorded as discussed above under section 3.7.3 <u>Groundwater Monitoring Well Development</u> and the wells will be sampled.

Prior to sampling, the wells will be purged a minimum of 3 wetted well volumes with dedicated polyethylene bailers. Temperature, pH, and electrical conductivity will be monitored and purging will continue until they are stabilized. Since dedicated bailers will be used for each well sampled, no decontamination will be necessary between sampling events. After purging is completed, turbidity will be measured and the water samples will be collected in sterilized glass vials having Teflon-lined screw caps, immediately sealed in the vials, and labeled to include: date, time, sample location, project number, and sampler name. The samples will be immediately stored in an iced-cooler for transport to a DHS certified laboratory accompanied by chain-of-custody documentation.

Appendices D and G document TPE's protocols relative to waste handling and decontamination procedures, and quality assurance and quality control procedures.

Purge water will be stored on site in labeled 55-gallon drums. After the drummed water is characterized by chemical analysis, TPE will provide recommendations to the client and, upon their request, assist them in remediation or disposal of the fluids, or both in an appropriate manner as an additional work item.

Appendix H documents TPE's protocol relative to groundwater monitoring well sampling procedures.

3.7.4.1 Chemical Analyses

Water samples and the trip blank sample are proposed to be analyzed for TPHG and BTEX by the DHS Method and EPA Method 8020, respectively.

3.8 Groundwater Gradient Evaluation

The groundwater gradient will be evaluated by triangulation of all onsite wells. The stabilized depth to water in the wells, when subtracted from their respective TOC, will provide the groundwater elevations on the dates measured. From this information, the groundwater gradient and flow direction will be evaluated.

3.9 Site Assessment Report

The information collected, analytical results, and TPE's conclusions and recommendations will be summarized in a report. The report will describe the work performed and include: copies of all required permits, an area map, a detailed site plan showing limits of excavation, locations of verification soil samples and installed monitoring wells, graphic boring logs, graphic monitoring well construction details, geologic cross section(s), a groundwater gradient map, tables summarizing results of chemical analyses, and copies of certified analytical reports and chain-of-custodies. Conclusions regarding the extent and type(s) of contamination will be presented within the context of this workplan. Recommendations for feasible remedial alternatives and/or supplemental sampling and analyses will be included.

4.0 SITE SAFETY PLAN

A Site Safety Plan for conducting work under this workplan is included in Appendix I.

5.0 TIME SCHEDULE

The projected time schedule for implementation of the activities described in this workplan is presented below. The schedule reflects a relatively problem-free program. However, delays in the workplan review, permitting, or laboratory analyses could lengthen the project schedule. Access difficulties, adverse weather, and regulator review could also delay the proposed time schedule. TPE will make every effort to adhere to the project schedule.

Week 1: Client Submits Workplan for Regulator Approval. TPE Submits Application for Well Permits and Fees for Regulator Approval.

Week 2: Regulator Approval Received; Well Permits Received; Subcontracting, Conduct Underground Utility Survey, if Necessary.

Week 3: Conduct Excavation and Chemical Analyses of Verification Soil Samples.

Week 4: Collect Samples From Stockpiled Soil and Conduct Chemical Analyses.

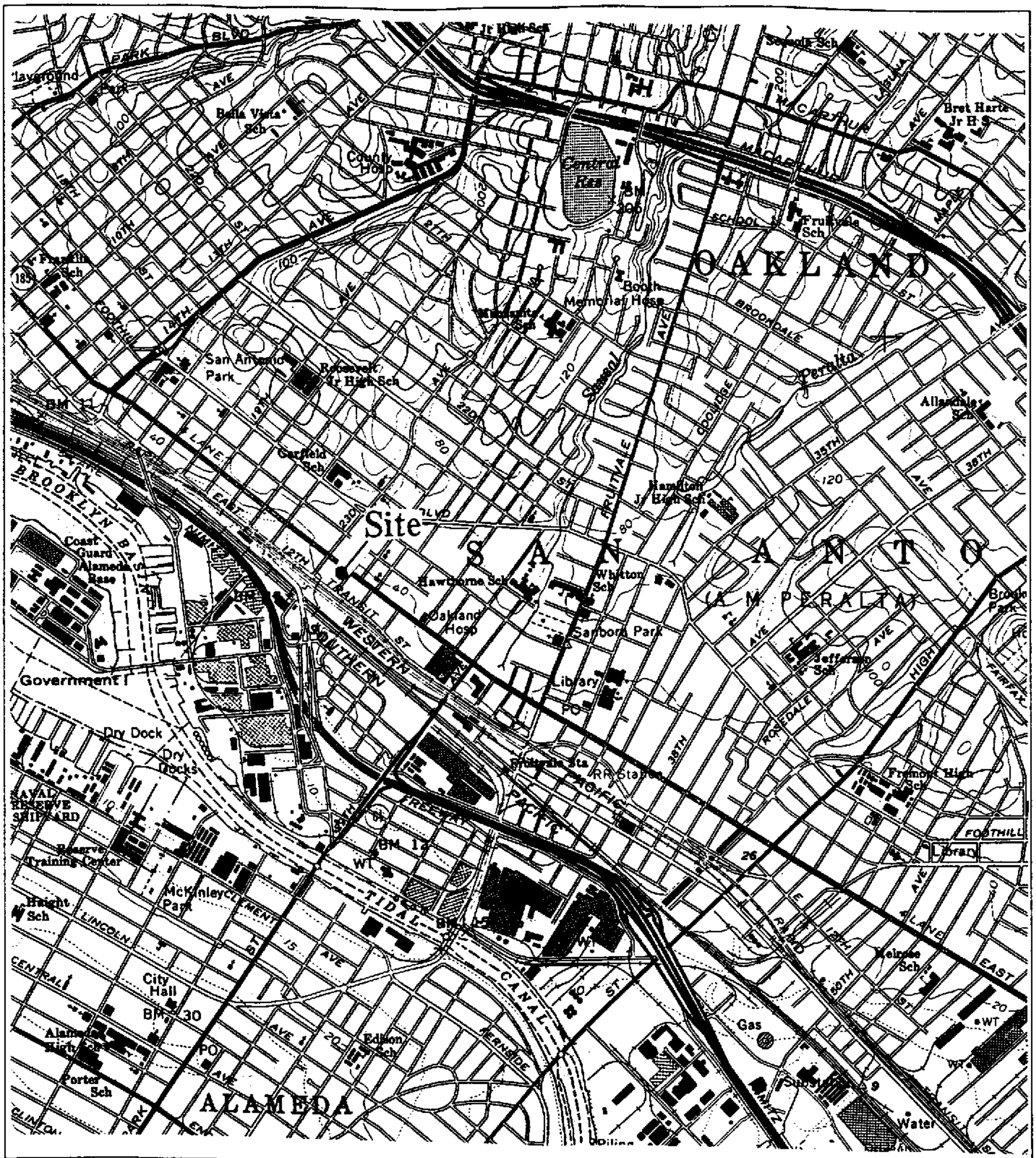
Week 6: Receive Chemical Analyses; Dispose of Stockpiled Soil.

Week 7: Close Excavation.

Week 8: Install 3 Groundwater Monitoring Wells and Submit Soil and Groundwater Samples for Chemical Analyses.

Week 9: Receive Chemical Analyses, Interpret Data and Write SAR.

Week 12: Submit SAR to Client.



LEGEND

REFERENCE: USGS 7.5 MINUTE SERIES QUADRANGLE MAP OAKLAND EAST, CALIFORNIA, PHOTOREVISED 1980

-N-

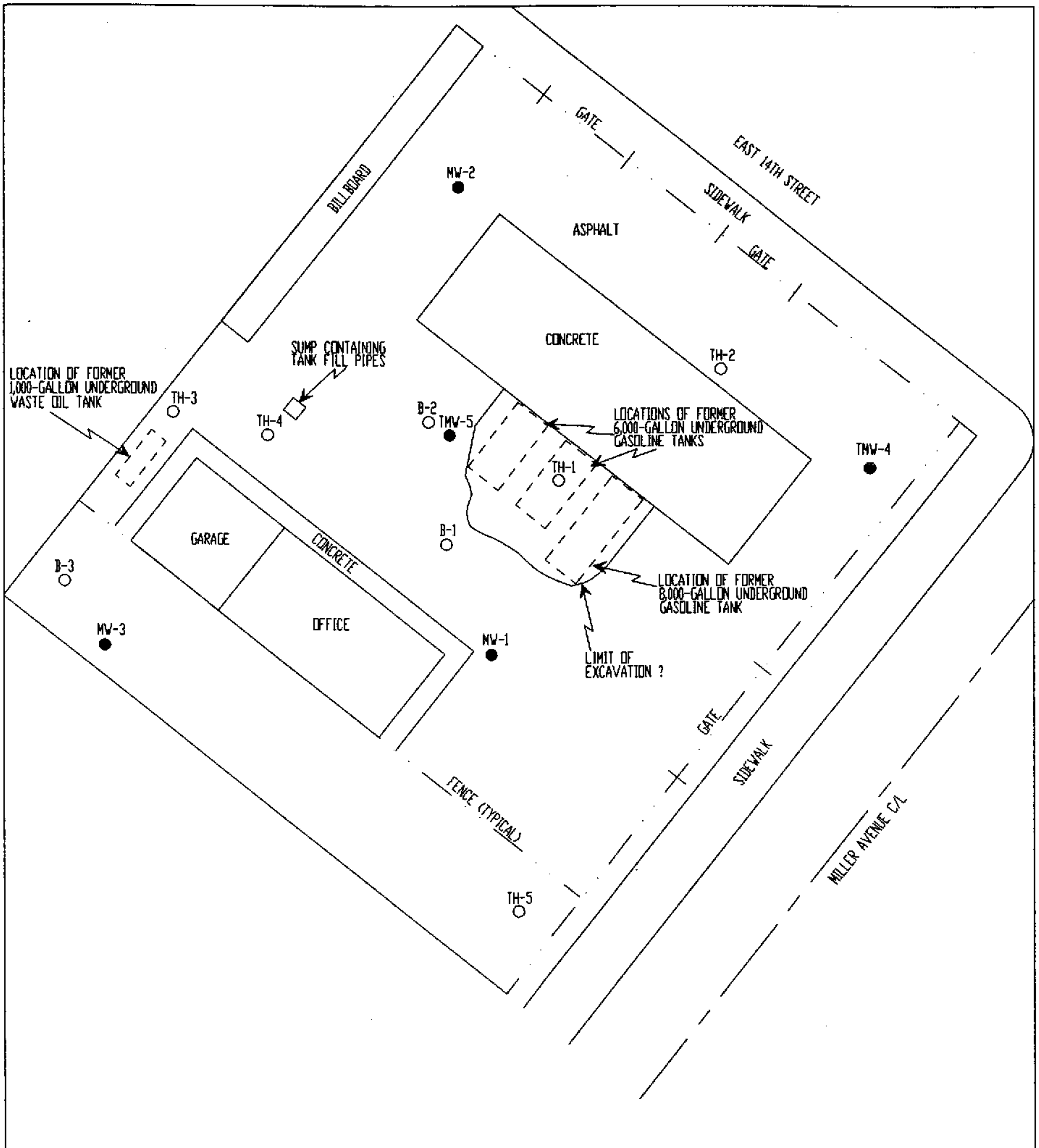
0 2,000
SCALE IN FEET

TANK PROTECT ENGINEERING

SITE VICINITY MAP

CREDIT WORLD AUTO SALES
2345 E. 14TH STREET
OAKLAND, CA 94601

DATE	6/14/93
FIGURE	1
FILE #	267-1
DRAWN BY	AK
CHECKED BY	JVN



LEGEND

TMW-4 ● NAME AND LOCATION OF MONITORING WELL INSTALLED BY TPE

MW-1 ● NAME AND LOCATION OF MONITORING WELL INSTALLED BY OTHERS

B-1 ○ NAME AND APPROXIMATE LOCATION OF SOIL BORING DRILLED BY OTHERS

-N-

0 30
SCALE IN FEET

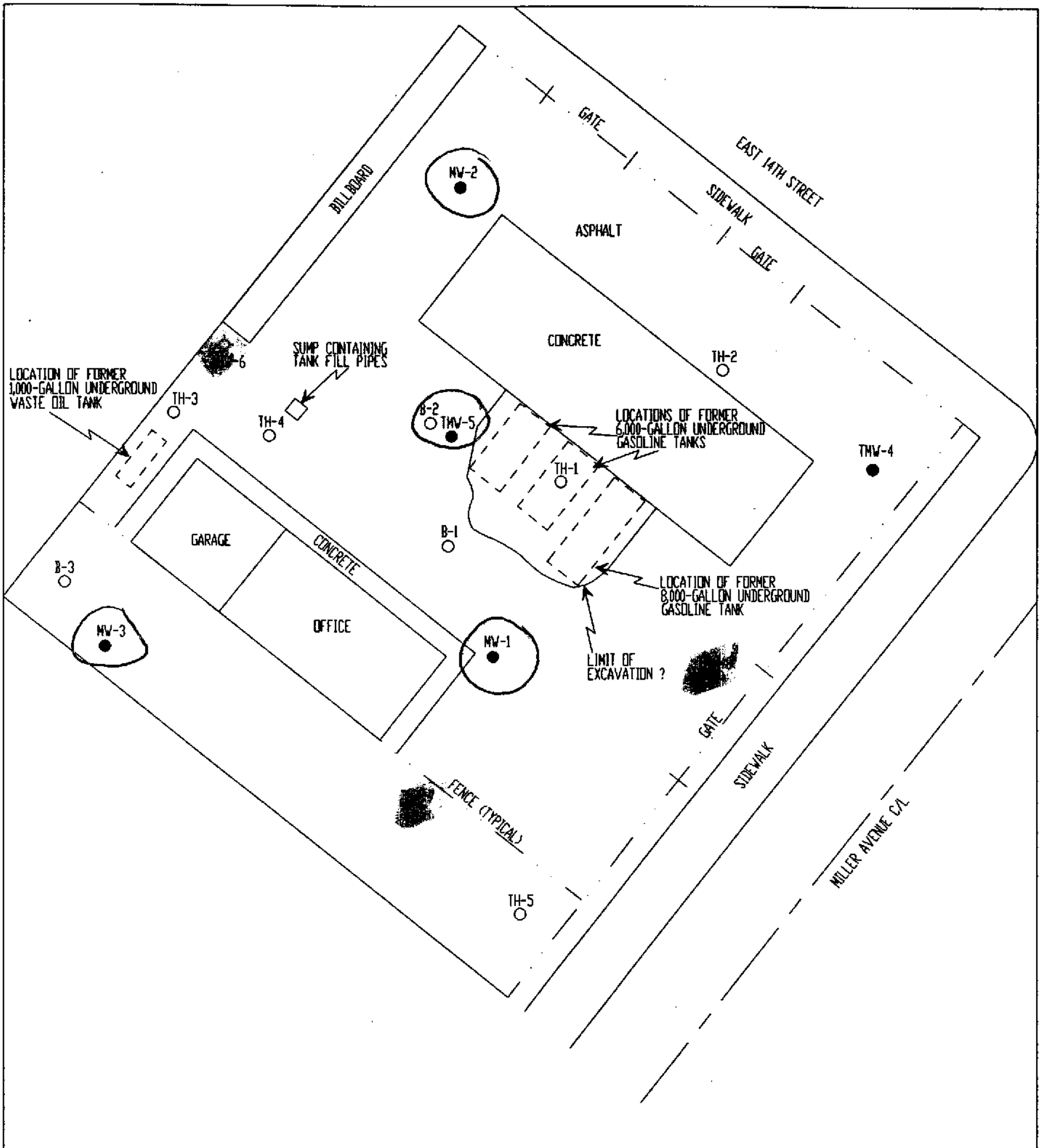
TANK PROTECT ENGINEERING

SITE PLAN

CREDIT WORLD AUTO SALES
2345 E. 14TH STREET
OAKLAND, CA 94601

DATE	8/24/94
FIGURE	2
FILE #	267-2
DRAWN BY	AK
CHECKED BY	JVN

→ (1) consider pumping bacteria into well.



LEGEND

TMW-4 ●	NAME AND LOCATION OF MONITORING WELL INSTALLED BY TPE
MW-1 ●	NAME AND LOCATION OF MONITORING WELL INSTALLED BY OTHERS
B-1 ○	NAME AND APPROXIMATE LOCATION OF SOIL BORING DRILLED BY OTHERS
TMW-6 ⌖	NAME AND LOCATION OF PROPOSED GROUNDWATER MONITORING WELL

-N-

0 30
SCALE IN FEET

TANK PROTECT ENGINEERING

SITE PLAN:
PROPOSED GROUNDWATER MONITORING WELL LOCATIONS

CREDIT WORLD AUTO SALES
2345 E. 14TH STREET
OAKLAND, CA 94601

DATE	8/24/94
FIGURE	3
FILE #	267-15
DRAWN BY	NT
CHECKED BY	JVN

APPENDIX A

- ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY, AUGUST 4, 1994 LETTER
- ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY, FEBRUARY 1, 1994 LETTER
- ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY, FEBRUARY 18, 1994 LETTER

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
Alameda County
Health Care Services Agency
Dept. Of Environmental Health
1131 Harbor Bay Pkwy 2nd Flr.
Alameda Ca 94502-6577

August 4, 1994
StID # 2116

Mr. Stanley Wong
2200 E. 12th St.
Oakland CA 94606

NOTICE OF VIOLATION

Re: Request for Work Plan Addendum for the Further Investigation and Remediation of 2345 E. 14th St., former Taxi Taxi

Dear Mr. Wong:

Our office has received and reviewed the July 29, 1994 report prepared by Tank Protect Engineering (TPE). This report indicates that significant groundwater contamination still exists on this site and potentially offsite. Remediation of this contamination must be initiated immediately. Certainly, the free fuel product being found in monitoring wells MW-1 and MW-2 must be removed on a regular basis as required by Section 2655 of Article 5, Chapter 16 of the Underground Storage Tank Regulations. Please describe what will be done to satisfy this requirement.

Recall, the November 4, 1993 Preliminary Site Assessment (PSA) for this site prepared by TPE recommended the following future actions:

a. Limited overexcavation of contaminated soils and possible removal of contaminated water from the excavation pit;
b. Installation of three additional monitoring wells and
c. Institute quarterly groundwater monitoring.

Our office agreed with this approach and requested that a specific work plan be submitted to perform this work by **March 21, 1994.** Although quarterly monitoring has been initiated, our office has not received the specific work plan. Please submit the requested report to our office **within 30 days or by August 8, 1994.** This report should also include a time schedule for implementation.

You are reminded that this letter constitutes a formal request for technical reports pursuant to the California Water Code Section 13267 (b). Failure to submit and complete the work plan may subject you to civil liability.

Please be aware that our offices have recently moved to:
1131 Harbor Bay Parkway, Room 250, Alameda CA 94502.

You may reach me at (510) 567-6700 if you have any questions.

Sincerely,

Barney M. Chan

Barney M. Chan
Hazardous Materials Specialist

cc: G. Jensen, Alameda County District Attorney Office
J. Mrakovich, Tank Protect Engineering, 2821 Whipple Rd., Union City, CA 94587-1233
E. Howell, files

NOV2345

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
State Water Resources Control Board
Division of Clean Water Programs
UST Local Oversight Program
80 Swan Way, Rm 200
Oakland, CA 94621
(510) 271-4530

February 1, 1994
StID # 2116

Mr. Stanley Wong
2200 E. 12th St.
Oakland CA 94606

Re: Request for Technical Reports for 2345 E. 14th St., Oakland CA 94601, former Taxi Taxi Site.

Dear Mr. Wong:

As you are aware, two monitoring wells were installed at the above site in June of 1993 by Tank Protect Engineering (TPE) as the initial step of resuming the subsurface investigation of the petroleum fuel release. From previous soil and water samplings, it was apparent that considerable fuel contamination still exists at this site. Up to two automated free product removal systems were also to be installed in the wells exhibiting free product. As of this date, our office has not received the report detailing the installation of these wells and the sampling of up to five monitoring wells. You should also be aware that our office requires **quarterly monitoring** of these wells, therefore such monitoring should have occurred in October of 1993 and in January of 1994. The results of these monitoring events should be sent to our office in the form of a report, signed and stamped by the registered professional of your consultant.

Please provide all the above technical reports to our office **within 15 days or by February 18, 1994.** You should consider this a formal request for technical reports pursuant to the California Water Code Section 13267 (b). Failure to submit the requested reports may subject you to civil liability.

Keep in mind that the complete characterization of this site along with quarterly monitoring is required before our office can make any recommendation for site closure. You should contact me at (510) 271-4530 if you have any questions.

Sincerely,

Barney M Chan

Barney M. Chan
Hazardous Materials Specialist

cc: L. Huckin, Tank Protect Engineering, 2821 Whipple Rd., Union City, CA 94587
E. Howell, files
Req-2345E14

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
State Water Resources Control Board
Division of Clean Water Programs
UST Local Oversight Program
80 Swan Way, Rm 200
Oakland, CA 94621
(510) 271-4530

February 18, 1994
StID # 2116

Mr. Stanley Wong
2200 E. 12th St.
Oakland CA 94606

Re: Comment on November 4, 1993 Preliminary Site Assessment Report for 2345 E. 14th St., Oakland CA 94601, Credit World Auto Sales

Dear Mr. Wong:

Our office has recently received and reviewed the above report as prepared by your consultant, Tank Protect Engineering. This report describes the results of the installation of two additional monitoring wells plus the sampling of all five wells. The conclusion of the report states that considerable groundwater contamination exist beneath this site. In fact, 0.77 feet of free product was found and removed from monitoring well, MW-1, on 8/17/93. Considerable soil contamination also exists in soil near the groundwater depth, the capillary zone.

Tank Protect recommends initiating quarterly groundwater monitoring of all wells at this site. They also recommend the removal of contaminated soils within the original tank pit location and possibly around MW-2 and the installation of three additional monitoring wells. Contaminated groundwater pumping may also be done at that time. Our office agrees with their recommendations and this work would be best done in a phased approach. We understand that the initial phase would be the excavation of the tank pit area. You recently gave me a copy of Tank Protect's proposal. This makes sense since when the tanks were initially removed there was no attempt to perform any overexcavation of contaminated soils. Removal of such soils and contaminated water would likely reduce the contamination within the groundwater beneath this site, which is our ultimate goal.

The groundwater gradient has been shown to vary due to the irregular soils pattern beneath the site. Because of this varying gradient, a large portion of the site has been impacted by the gasoline contamination. You may choose to address the soil contamination by treating the groundwater, but it has not been determined whether groundwater extraction is a viable remediation method for this site.

The three additional monitoring wells have been proposed in locations which are meant to determine the extent of soil and groundwater contamination. These wells, though important and necessary, may be installed after the initiation of some type of active remedial approach. Quarterly groundwater monitoring should be performed until any change has been agreed to by our office or the Regional Water Quality Control Board,(RWQCB).

In any event, in order to proceed with the investigation, you should provide a specific work plan addendum to our office **within 30 days or by March 21, 1994** , which details your next investigation step.

You may contact me at (510) 271-4530 if you have any questions.

Sincerely,

Barney M Chan

Barney M. Chan
Hazardous Materials Specialist

cc: L. Huckin, Tank Protect Engineering, 2821 Whipple Rd., Union City, CA 94587
E. Howell, files

4-2345E14

APPENDIX B

SAMPLE HANDLING PROCEDURES

APPENDIX B

SAMPLE HANDLING PROCEDURES

Soil and groundwater samples will be packaged carefully to avoid breakage or contamination, and will be delivered to the laboratory in an iced-cooler. The following sample packaging requirements will be followed.

- Sample bottle/sleeve lids will not be mixed. All sample lids will stay with the original containers and have custody seals affixed to them.

- Samples will be secured in coolers to maintain custody, control temperature, and prevent breakage during transportation to the laboratory.

- A chain-of-custody form will be completed for all samples and accompany the sample cooler to the laboratory.

- Ice, blue ice, or dry ice (dry ice will be used for preserving soil samples collected for the Alameda County Water District) will be used to cool samples during transport to the laboratory.

- Each sample will be identified by affixing a pressure sensitive, gummed label, or standardized tag on the container(s). This label will contain the site identification, sample identification number, date and time of sample collection, and the collector's initials.

- Soil samples collected in brass tubes will be preserved by covering the ends with Teflon tape and capped with plastic end-caps. The tubes will be labeled, sealed in quart size bags, and placed in an iced-cooler for transport to the laboratory.

All groundwater sample containers will be precleaned and will be obtained from a State Department of Health Services certified analytical laboratory.

<u>Sample Control/Chain-of-Custody</u>: All field personnel will refer to this workplan to verify the methods to be employed during sample collection. All sample gathering activities will be recorded in the site file; all sample transfers will be documented in the chain-of-custody; samples are to be identified with labels and all sample bottles are to be custody-sealed. All information is to be recorded in waterproof ink. All TPE field personnel are personally responsible for sample collection and the care and custody of collected samples until the samples are transferred or properly dispatched.

The custody record will be completed by the field technician or professional who has been designated by the TPE project manager as being responsible for sample shipment to the appropriate laboratory. The custody record will include, among other things, the following information: site identification, name of person collecting the samples, date and time samples were collected, type of sampling conducted (composite/grab), location of sampling station, number and type of containers used, and signature of the TPE person relinquishing samples to a non-TPE person with the date and time of transfer noted. The relinquishing individual will also put all the specific shipping data on the custody record.

Records will be maintained by a designated TPE field employee for each sample, site identification, sampling locations, station numbers, dates, times, sampler's name, designation of the samples as a grab or composite, notation of the type of sample (e.g. groundwater, soil boring, etc.), preservatives used, on-site measurement data, and other observations or remarks.

APPENDIX C

HOLLOW-STEM AUGER DRILLING AND SOIL SAMPLING PROCEDURES

APPENDIX C

HOLLOW-STEM AUGER DRILLING AND SOIL SAMPLING PROCEDURES

Undisturbed soil samples will be recovered from soil without introducing liquids into the borings. At a minimum, soil samples as core will be taken at 5-foot depth intervals, changes in lithology, and when encountering apparent soil contamination to termination depth, or through the aquifer zone of interest for lithologic logging.

Borings will be drilled with a hollow-stem auger and sampled with a California or modified California-type split-spoon sampler. Soil samples will be of sufficient volume to perform the analyses which may be required, including replicate analyses.

Soil from all borings will be described in detail using the Unified Soil Classification System and will be logged under the direction of a geologist, civil engineer, or engineering geologist who is registered or certified by the State of California and is experienced in the use of the Unified Soil Classification System.

All wet zones above the free water zone will be noted and accurately logged.

Soil samples will be collected in clean brass or stainless steel sampling tubes in the split-spoon. Sediment traps will be used when unconsolidated sands and gravels fall from the sampler during retrieval. The brass tubes will be cut apart using a clean knife. The ends of the tubes will be covered with Teflon sheets or aluminum foil beneath plastic end caps and sealed with electrical or duct tape and properly labeled. In lieu of electrical or duct tape, the tubes may be individually sealed in plastic bags. The samples will be stored on ice at a temperature of 4 degrees Celsius.

Drill cuttings will be stored on site in 55-gallon drums or covered with plastic sheeting. Analytical results will be submitted immediately to the site owner for determination of appropriate disposal procedures. The soil borings not completed as wells will be backfilled with a cement grout.

APPENDIX D

WASTE HANDLING AND DECONTAMINATION PROCEDURES

APPENDIX D

WASTE HANDLING AND DECONTAMINATION PROCEDURES

Decontamination: Any drilling, sampling or field measurement equipment that comes into contact with soil or groundwater will be properly decontaminated prior to its use at the site and after each incident of contact with the soil or groundwater being investigated. Proper decontamination is essential to obtain samples that are representative of environmental conditions and to accurately characterize the extent of soil and groundwater contamination. Hollow-stem auger flights and the drill bit will be steam-cleaned between the drilling of each well.

All sample equipment, including the split-tube sampler and brass tubes, will be cleaned by washing with trisodium phosphate detergent, followed by rinsing with potable water. Where required by specific regulatory guidelines, a nonphosphate detergent will be used.

Waste Handling: Waste materials generated during site characterization activities will be handled and stored as hazardous waste and will be stored on site in appropriately labeled containers. Waste materials anticipated include excavated soil, drill cuttings, development and purge water, water generated during aquifer testing, water generated during decontamination, and used personnel protection equipment such as gloves and Tyvek. The site owner will be responsible for providing the storage containers and will be responsible for the disposal of the waste materials. Drill cuttings from individual borings will be stored separately in drums or covered by plastic sheeting and the appropriate disposal procedure will be determined by the site owner or TPE following receipt of the soil sample analytical results. Drums will be labeled to show material stored, known or suggested contaminant, date stored, expected removal date, company name, contact, and telephone number.

APPENDIX E

GROUNDWATER MONITORING WELL CONSTRUCTION PROCEDURES

APPENDIX E

GROUNDWATER MONITORING WELL CONSTRUCTION PROCEDURES

BOREHOLE DESIGN

Casing Diameter: The minimum diameter of well casings will be 2 inches (nominal).

Borehole Diameter: The diameter of the borehole will be a minimum of 4 inches and a maximum of 12 inches greater than the diameter of the well casing. The minimum annular space will be 2.5 inches as measured from the outside diameter of the casing to the drill hole wall.

Shallow (Unconfined Zone) Wells: When unconfined groundwater is encountered the borehole will be advanced through the aquifer to an underlying clay layer or aquitard or to a maximum depth of 15 feet into the saturated zone, or the maximum depths required by regulatory guidelines. The screened interval will begin a minimum of 5 feet above the saturated zone or above the anticipated seasonal high level of groundwater. The screen will extend the full thickness of the aquifer or no more than 15 feet (or 20 feet if required by regulatory guidelines) into the saturated zone, whichever is reached first. The well screen will not extend into the aquitard, nor will the screened interval exceed 20 feet in length (or 30 feet if required by regulatory guidelines).

Deep (Confined Zone) Wells: Any monitoring well to be screened below the upper aquifer will be installed as a double-cased well. A steel conductor casing will be placed through the upper water-bearing zone to prevent aquifer cross-contamination.

The conductor casing will be installed in the following manner: a large diameter borehole (typically 18 inches) will be drilled until it is determined that the first competent aquitard has been reached. A low carbon steel conductor casing will be placed in the borehole to the depth drilled. Centralizers will be used to center the casing in the borehole. The annular space between the conductor casing and the formation will be cement-grouted from bottom to top by tremie pipe method. The grout will be allowed to set for a minimum of 72 hours.

Drilling will continue inside the conductor casing, with a drill bit of smaller diameter than the conductor casing. If additional known aquifers are to be fully penetrated, the procedure will be repeated with successively smaller diameter conductor casings.

The bottom of the well screen in a confined aquifer will be determined by presence or lack of a clay layer or aquitard as described above. The screened interval in a confined zone shall extend across the entire saturated zone of the aquifer or up to a length of 20 feet, whichever is less. The screened zone and filter pack will not cross-connect to another aquifer.

CONSTRUCTION MATERIALS

Casing and Screen Materials: Well casing and screen will be constructed of clean materials that have the least potential for affecting the quality of the sample. The most suitable material for a particular installation will depend upon the parameters to be monitored. Acceptable materials include PVC, stainless steel, or low carbon steel.

Casing Joints: Joints will be connected by flush threaded couplers. Organic bonding compounds and solvents will not be used on joints.

Well Screen Slots: Well screen will be factory slotted. The size of the slots will be selected to allow sufficient groundwater flow to the well for sampling, minimize the passage of formation materials into the well, and ensure sufficient structural integrity to prevent the collapse of the intake structure.

Casing Bottom Plug: The bottom of the well casing will be permanently plugged, either by flush threaded screw-on or friction cap. Friction caps will be secured with stainless steel set screws. No organic solvents or cements will be applied.

Filter Pack Material: Filter envelope materials will be durable, water worn, and washed clean of silt, dirt, and foreign matter. Sand size particles will be screened silica sand.

Particles will be well rounded and graded to an appropriate size for retention of aquifer materials.

Bentonite Seal Material: Bentonite will be pure and free of additives that may affect groundwater quality. Bentonite will be hydrated with potable or tap water.

Grout Seal Material: Neat cement grout or sand-cement grout will consist of a proper mixture of Type I/II Portland cement, hydrated with potable or tap water. Up to 3% bentonite may be added to the mixture to control shrinkage.

CONSTRUCTION PROCEDURES

Decontamination: All downhole tools, well casings, casing fittings, screens, and all other components that are installed in the well shall be thoroughly cleaned immediately before starting each well installation. When available, each component shall be cleaned with a high temperature, high pressure washer for a minimum of 5 minutes. When a washer is not available, components shall be cleaned with water and detergent, rinsed in potable or tap water, then rinsed in distilled water.

Soil and water sampling equipment and material used to construct the wells shall not donate to, capture, mask, nor alter the chemical composition of the soil and groundwater.

Drilling Methods: Acceptable drilling methods include solid and hollow-stem auger, percussion, direct circulation mud and air rotary, and reverse rotary. The best alternative is that which minimizes the introduction of foreign materials or fluids. If drilling fluid is employed, drilling fluid additives shall be limited to inorganic and non-hazardous compounds. Compressed air introduced into the borehole shall be adequately filtered to remove oil and particulates.

Casing Installation: The casing will be set under tension, when necessary, to ensure straightness. Centralizers will be used where necessary to prevent curvature or stress to the casing.

Sand Pack Installation: The sand pack will be installed so as to avoid bridging and the creation of void spaces. The tremie pipe method will be used where installation conditions or local regulations require. Drilling mud, when used, will be thinned prior to pack placement. The sand pack shall cover the entire screened interval and rise a minimum of 2 feet above the highest perforation.

Bentonite Seal Placement: A bentonite seal will be placed above the sand pack by a method that prevents bridging. Bentonite pellets can be placed by free fall if proper sinking through annular water can be assured. Bentonite slurry will be placed by the tremie pipe method from the bottom upward. The bentonite seal will not be less than 1 to 3-feet in thickness, depending on regulatory guidelines.

Grout Seal Placement: The cement grout mixture will be hydrated with potable or tap water and thoroughly mixed prior to placement. If substantial groundwater exists in the bore hole, the grout shall be placed by tremie pipe method from the bottom upward. In a dry borehole, the grout may be surface poured to a depth of 30 feet. Below a depth of 30 feet grout will be placed by tremie pipe. Grout will be placed in 1 continuous lift and will extend to the surface or to the well vault if the well head is completed below grade. A minimum of 5 feet of grout seal will be installed, unless impractical due to the shallow nature of the well.

Surface Completion: The well head will be protected from fluid entry, accidental damage, unauthorized access, and vandalism. A watertight, locking cap will be installed on the well casing. Access to the casing will be controlled by a keyed lock.

Well heads completed below grade will be completed in a concrete and/or steel vault, installed to drain surface runoff away from the vault.

Well Identification: Each well will be labeled to show well number, depth, hole and casing diameter, and screened interval.

APPENDIX F

GROUNDWATER MONITORING WELL DEVELOPMENT PROCEDURES

APPENDIX F

GROUNDWATER MONITORING WELL DEVELOPMENT PROCEDURES

INTRODUCTION

Newly installed groundwater monitoring wells will be developed to restore natural hydraulic conductivity of the formation, remove sediments from well casing and filter pack, stabilize the filter pack and aquifer material, and promote turbidity-free groundwater samples.

Wells may be developed by bailing, hand pumping, mechanical pumping, air lift pumping, surging, swabbing, or an effective combination of methods. Wells will be developed until the water is free of sand, silt, and minimum turbidity has stabilized.

In some cases where low permeability formations are involved or the drilling mud used fails to respond to cleanup, initial development pumping may immediately dewater the well casing and thereby inhibit development. When this occurs, clean, potable grade water may be introduced into the well, followed by surging of the introduced waters with a surge block. This operation will be followed by pumping or bailing. The procedure may be repeated as required to establish full development.

METHODOLOGY

Seal Stabilization: Cement and bentonite annular seals shall set and cure not less than 24 to 72 hours (according to local regulatory guidelines) prior to well development.

Decontamination: All well development tools and equipment shall be thoroughly cleaned immediately before starting each well installation. When available, each component shall be cleaned with a high temperature, high pressure washer for a minimum of 5 minutes. When a washer is not available, components shall be cleaned with potable or tap water, then rinsed with distilled water.

Development equipment shall not donate to, capture, mask, nor alter the chemical composition of the soil and groundwater.

Introduction of Water: Initial development of wells in low permeability formations may dewater the casing and filter pack. When this occurs, clean, potable or tap water will be introduced into the well to enhance development.

Bailing: Development will begin by bailing to remove heavy sediments from the well casing. Care will be taken to not damage the well bottom cap during lowering of the bailer.

Surging: Care will be exercised when using a surge block to avoid damaging the well screen and casing. When surging wells screened in coarse (sand/gravelly) aquifers, the rate of surge block lifting shall be slow and constant. When surging wells screened in fine (silty) aquifers, more vigorous lifting may be required. Between surging episodes, wells will be bailed to remove accumulated sediments.

Pumping: Development pumping rates shall be less than the recharge rate of the well in order to avoid dewatering.

Discharged Water Containment and Disposal: All water and sediment generated by well development shall be collected in labeled 55-gallon steel drums. Development water will be temporarily contained on site, pending sampling and laboratory analysis. No hazardous development water will be released to the environment. Disposal of development water will be the responsibility of the client

APPENDIX G

QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

APPENDIX G

QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The overall objectives of the field sampling program include generation of reliable data that will support development of a remedial action plan. Sample quality will be checked by the use of proper sampling, handling, and testing methods. Additional sample quality control methods may include the use of background samples, equipment rinsate samples, and trip and field blanks. Chain-of-custody forms, use of a qualified laboratory, acceptable detection limits, and proper sample preservation and holding times also provide assurance of accurate analytical data.

TPE will follow a QA/QC program in the field to ensure that all samples collected and field measurements taken are representative of actual field and environmental conditions and that data obtained are accurate and reproducible. These activities and laboratory QA/QC procedures are described below.

Field Samples: Additional samples may be taken in the field to evaluate both sampling and analytical methods. Three basic categories of QA/QC samples that may be collected are trip samples, field blanks, and duplicate samples.

Trip blanks are a check for cross-contamination during sample collection, shipment, and in the laboratory. Analytically confirmed organic-free water shall be used for organic parameters and deionized water for metal parameters. Blanks will be prepared by the laboratory supplying the sample containers. The blank shall be numbered, packaged, and sealed in the same manner as the other samples. One trip blank will be used for each sample set of less than 20 samples. At least 5% blanks will be used for sets greater than 20 samples. The trip blank is a water sample that remains with the collected samples during transportation and is analyzed along with the field samples to check for residual contamination. The trip blank is not to be opened by either the sample collectors or the handlers.

The field blank is a water sample that is taken into the field and is opened and exposed at the sampling point to detect contamination from air exposure. The water sample is poured into appropriate containers to simulate actual sampling conditions. Contamination for air exposure can vary considerably from site to site.

The laboratory will not be informed about the presence of field and trip blanks and a false identifying number will be put on the label. Full documentation of these collection and decoy procedure will be made in the site log book.

Duplicate samples are identical sample pairs (collected in the same place and at the same time), placed in identical containers. For soils, adjacent sample liners will be analyzed. For the purpose of data reporting, one is arbitrarily designated the sample, and the other is designated as a duplicate sample. Both sets of results are reported to give an indication of the precision of sampling and analytical methods.

The laboratory's precision will be assessed without the laboratory's knowledge by labeling one of the duplicates with false identifying information. Data quality will be evaluated on the basis of the duplicate results.

<u>Laboratory QA/QC:</u> Execution of a strict QA/QC program is an essential ingredient in high-quality analytical results. By using accredited laboratory techniques and analytical procedures, estimates of the experimental values can be very close to the actual value of the environmental sample. The experimental value is monitored for its precision and accuracy by performing QC test designed to measure the amount of random and systematic errors and to signal when correction of these errors is needed.

The QA/QC program describes methods for performing QC tests. These methods involve analyzing method blanks, calibration standards, check standards (both independent and EPA-certified standards), duplicates, replicates, and sample spikes. Internal QC also requires adherence to written methods, procedural documentation, and record keeping, and the observance of good laboratory practices.

APPENDIX H

GROUNDWATER MONITORING WELL SAMPLING PROCEDURES

APPENDIX H

GROUNDWATER MONITORING WELL SAMPLING PROCEDURES

Groundwater monitoring wells will not be sampled until at least 24 to 72 hours (according to local regulatory guidelines) after well development. Groundwater samples will be obtained using either a bladder pump, clear Teflon bailer, or dedicated polyethylene bailer. Prior to collecting samples, the sampling equipment will be thoroughly decontaminated to prevent introduction of contaminants into the well and to avoid cross-contamination. Monitoring wells will be sampled after 3 to 10 wetted casing volumes of groundwater have been evacuated and pH, electrical conductivity, and temperature have stabilized as measured with a Hydac Digital Tester. If the well is emptied before 3 to 10 well volumes are removed, the sample will be taken when the water level in the well recovers to 80% of its initial water level or more.

When a water sample is collected, turbidity of the water will be measured and recorded with a digital turbidimeter. Degree of turbidity will be measured and recorded in nephelometric turbidity units (NTU).

TPE will also measure the thickness of any floating product in the monitoring wells using an interface or probe clear Teflon or polyethylene bailer. The floating product will be measured after well development but prior to the collection of groundwater samples. If floating product is present in the well, TPE will recommend to the client that product removal be commenced immediately and reported to the appropriate regulatory agency.

Unless specifically waived or changed by the local, prevailing regulatory agency, water samples shall be handled and preserved according to the latest EPA methods as described in the Federal Register (Volume 44, No. 233, Page 69544, Table II) for the type of analysis to be performed.

Development and/or purge water will be stored on site in labeled containers. The disposal of the containers and development and/or purge water is the responsibility of the client.

MEASUREMENTS

Purged Water Parameter: During purging, discharged water will be measured for the following parameters.

Parameter	Units of Measurement
pH	None
Electrical Conductivity	Micromhos
Temperature	Degrees F or C
Depth to Water	Feet/Hundredths
Volume of Water Discharged	Gallons
Turbidity	NTU

Documentation: All parameter measurements shall be documented in writing on TPE development logs.

APPENDIX I

SITE SAFETY PLAN

SITE SAFETY PLAN

TANK PROTECT ENGINEERING OF NORTHERN CALIFORNIA, INC.

Site: **2345 E. 14th Street**
Oakland, CA 94601

Project Number: **267**

Original Site Safety Plan: Yes (X) No ( )
Revision Number:

Plan Prepared by: **John Mrakovich** Date: **8/23/93**

Plan Approved by: **Lee Huckins** Date: **8/24/93**

Please respond to each item as completely as possible. Where an item is not applicable, please mark "N/A".

1. KEY PERSONNEL AND RESPONSIBILITIES

Project Manager	**Lee Huckins (510) 429-8088**
Site Safety Manager	**Lee Huckins (510) 429-8088**
Alternate Site Safety Manager	**N/A**
Field Team Members	**N/A**

Agency Reps: [Please specify by one of the following symbols: Federal: (F), State: (S), Local: (L), Contractor(s): (C)

(L) Alameda County Department of Health Services (510) 567-6700

2. JOB HAZARD ANALYSIS

2.1 OVERALL HAZARD EVALUATION

Hazard Level: High ( ) Moderate ( ) Low (X) Unknown ( )
Hazard Type: Liquid (X) Solid (X) Sludge ( ) Vapor/Gas (X)

Known or suspected hazardous materials present on site

Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)

Characteristics of hazardous materials included above (complete for each chemical presents):

MATERIAL #1
Corrosive ( ) Ignitable (X) Toxic (X) Reactive ( )
Volatile (X) Radioactive ( ) Biological Agent ( )
Exposure Routes: Inhalation (X) Ingestion (X) Contact (X)

MATERIAL #2
Corrosive ( ) Ignitable ( ) Toxic ( ) Reactive ( )
Volatile ( ) Radioactive ( ) Biological Agent ( )
Exposure Routes: Inhalation ( ) Ingestion ( ) Contact ( )

MATERIAL #3
Corrosive ( ) Ignitable ( ) Toxic ( ) Reactive ( )
Volatile ( ) Radioactive ( ) Biological Agent ( )
Exposure Routes: Inhalation ( ) Ingestion ( ) Contact ( )

MATERIAL #4
Corrosive ( ) Ignitable ( ) Toxic ( ) Reactive ( )
Volatile ( ) Radioactive ( ) Biological Agent ( )
Exposure Routes: Inhalation ( ) Ingestion ( ) Contact ( )

2.2 JOB-SPECIFIC HAZARDS

For each labor category specify the possible hazards based on information available (i.e., Task-driller, Hazards-trauma from drill rig accidents, etc.). For each hazard, indicate steps to be taken to minimize the hazard.

Backhoe/Excavator Operator/Driller/Geologist-Trauma from equipment accidents, wear hard hat, gloves, steel-toed boots.

The following additional hazards are expected on site (i.e., snake infested area, extreme heat, etc.):

Temporary open excavation and boreholes.

Measures to minimize the effects of the additional hazards are:

Protect with barricades, caution tape, or traffic cones when unattended.

3. MONITORING PLAN

3.1 (a) Air Monitoring Plan

Action levels for implementation of air monitoring. Action levels should be based on published data available on contaminants of concern. Action levels should be set by persons experienced in industrial hygiene.

Level (i.e., .5 ppm)	Action Taken (i.e., commence perimeter monitoring)
5 ppm	**Cease work and commence perimeter monitoring until contamination disperses.**

(b) Air Monitoring Equipment

Outline the specific equipment to be used, calibration method, frequency of monitoring, locations to be monitored, and analysis of samples (if applicable).

Gastech, Inc., Trace-Techtor, hexane calibration. Monitor at excavation and borehole during each sampling event if vapors detected.

If air monitoring is not to be implemented for this site, explain why:

N/A

3.2 Personnel Monitoring
(Include hierarchy of responsibilities decision making on the site)

Site safety manager to make decision.

3.3 Sampling Monitoring

(a) Techniques used for sampling: **Sample air at excavation and borehole.**

(b) Equipment used for sampling: **Gastech, Inc., Trace-Techtor.**

(c) Maintenance and calibration of equipment: **Calibrate to hexane prior to operation.**

4. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Equipment used by employees for the site tasks and operations being conducted. Be Specific (i.e., hard hat, impact resistance goggles, other protective glove, etc.).

Hard hat, protective gloves (when necessary), steel-toed boots.

5. SITE CONTROL AND SECURITY MEASURES

The following general work zone security guidelines should be implemented:

- Work zone shall be delineated with traffic cones.
- Boreholes shall be delineated with traffic cones when drilling and sampling activities are not actually taking place.
- Visitors will not be allowed to enter the work zone unless they have attended a project safety briefing.

6. DECONTAMINATION PROCEDURE

List the procedures and specific steps to be taken to decontaminate equipment and PPE.

Wash equipment with a trisodium phosphate/tap water solution and rinse with clean tap water.

7. TRAINING REQUIREMENTS

Prior to mobilization at the job site, employees will attend a safety briefing. The briefing will include the nature of the wastes and the site, donning personal protection equipment, decontamination procedures and emergency procedures.

Supervisory and key contractor personnel will take an instruction course and pass an airports operations test.

8. MEDICAL SURVEILLANCE REQUIREMENTS

If any task requires a very high personnel protection level (OSHA Level A or B), personnel shall provide assurances that they have received a physical examination and they are fit to do the task. Also personnel will be instructed to look for any symptom of heat stress, heat stroke, heat exhaustion or any other unusual symptom. If there is any report of that kind it will be immediately followed through, and appropriate action will be taken.

9. STANDARD OPERATION PROCEDURES

Tank Protect Engineering of Northern California, Inc. (TPE) is responsible for the safety of all TPE employees on site. Each contractor shall provide all the equipment necessary to meet safe operation practices and procedures for their personnel on site and be responsible for the safety of their workers.

A "Three Warning" system is utilized to enforce compliance with Health and Safety procedures practices which will be implemented at the site for worker safety:

* Eating, drinking, chewing gum or tobacco, and smoking will be allowed only in designated areas.
* Wash facilities will be utilized by workers in the work areas before eating, drinking, or use of the toilet facilities.
* Containers will be labeled identifying them as waste, debris or contaminated clothing.
* All excavation/drilling work will comply with regulatory agency requirements.
* All site personnel will be required to wear hard hats and advised to take adequate measures for self protection.
* Any other action which is determined to be unsafe by the site safety officer.

10. CONFINED SPACE ENTRY PROCEDURES

No one is allowed to enter any confined space operation without proper safety measures. Specifically in case of an excavated Tank Pit no one should enter at any time.

11. EMERGENCY RESPONSE PLAN

Fire extinguisher(s) will be on site prior to excavation. Relevant phone numbers:

Person	Title	Phone No.
Lee N. Huckins	Project Manager	**(510) 429-8088**
	Fire	911 or
	Police	911 or
	Ambulance	911 or
	Poison Control Center	(800) 523-2222
	Nearest off-site no.	
Alameda Hospital	Medical Advisor	**(510) 523-4357**
Aaron & Stanley Wong	Client Contact	**(510) 532-1672**

U.S EPA - ERT	(201) 321-6660
Chemtrec	(800) 424-9300
Centers for Disease Control	Day (404) 329-3311
	Night (404) 329-2888
National Response Center	(800) 424-8802
Superfund/RCRA Hotline	(800) 424-8802
TSCA Hotline	(800) 424-9065
National Pesticide Information Services	(800) 845-7633
Bureau of Alcohol, Tobacco, and Firearms	(800) 424-9555

HEALTH AND SAFETY COMPLIANCE STATEMENT

I, ______________________________, have received and read a copy of the project Health and Safety Plan.

I understand that I am required to have read the aforementioned document and have received proper training under the occupational Safety and Health Act (29 CFR, Part 1910.120) prior to conducting site activities at the site.

______________________________ ______________________________

Signature Date

______________________________ ______________________________

Signature Date

Nearest Hospital:

Alameda Hospital
2070 Clinton Avenue
Oakland, CA
Emergency # (510) 523-4357
Gen. Info # (510) 522-3700

Directions From Site:

Drive southeast on East 14th Street to 29th Avenue. Turn right (southwest) on 29th Avenue. Proceed on 29th Avenue, it will become Park Street. Proceed on Park Street to Clinton Avenue. Turn right (northwest) on Clinton Avenue. Look for the hospital on the left side.