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March 17, 1994

Ms. Sharon L. Hugo
Senior Hazardous Materials Specialist
Alameda Health Care Services Agency
Department of Environmental Health
80 Swan Way, #200
Oakland, California 94621

SUBJECT: WORKPLAN FOR PRELIMINARY SITE ASSESSMENT
AUTOPRO, 5200 TELEGRAPH AVENUE
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
ESE PROJECT NO. 6-94-5219

Dear Ms. Hugo:

Environmental Science & Engineering, Inc. (ESE) presents this Workplan for a Preliminary Site Assessment (PSA) at the subject site for review and comment by the Alameda County Health Care Services Agency, Department of Environmental Health (Alameda County). The objectives of the scope of work outlined herein are to define the direction and magnitude of ground water flow beneath the site and to delineate the occurrence of petroleum hydrocarbons in the subsurface in the vicinity of former gasoline, diesel, and waste oil underground storage tanks (USTs). A description of tasks associated with the proposed work is presented below. A progress and reporting schedule for implementation of the PSA and quarterly ground water monitoring is also presented.

The contents of this Workplan are consistent with the requirements for site investigation presented in your October 28, 1993 compliance letter to Messrs. George Tuma and Ondrej Kojnok, site representatives. All aspects of the work described in this workplan will be conducted under the direct oversight of a Registered California Geologist.

1.0 BACKGROUND

Investigation at the subject site (see Figure 1 - Location Map) was initiated in December 1990, when two 5,000-gallon gasoline USTs and one 5,000-gallon diesel UST were removed from a common excavation ("diesel/gasoline excavation"; Figure 2 - Site Plan), a 1,000-gallon waste oil UST was removed from a single excavation ("waste oil excavation"; Figure 2), and an 8,000-gallon gasoline UST was removed from a single excavation ("gasoline only

excavation"; Figure 2). UST removal was performed by Pacific Excavators of Martinez, California (Pacific). At the time the USTs were removed, Pacific reported that the tanks were tight and had not leaked.

During UST removal, Pacific excavated tank backfill materials, but did not overexcavate native materials. Pacific did not remove existing product lines or vent lines, which remained exposed in the excavation sidewalls.

After UST removal, Sampling Specialists of Pacheco, California collected verification samples from the excavations and stockpiles of excavated soil. These samples included 10 soil samples from the excavations (two from beneath each of the former USTs) and five samples from four stockpiles. Sampling Specialists also collected two "grab" samples of standing ground water within the diesel/gasoline excavation.

Soil and ground water samples collected from the diesel/gasoline excavation, and soil samples collected from the gasoline only excavation, were analyzed for total petroleum hydrocarbons as gasoline (TPHg); TPH as diesel (TPHd); benzene, toluene, ethylbenzene, and total xylenes (BTEX); and total lead. Soil samples collected from the waste oil excavation were analyzed for TPHg, TPHd, BTEX, oil & grease (O&G), and purgeable halocarbons (PHs). Ranges of constituents detected in the December 1990 soil and ground water samples are summarized in the following table. For soil and stockpile samples, results are presented in milligrams per kilogram (mg/Kg) or parts per million (ppm). For ground water samples, results are presented in milligrams per liter (mg/L) or ppm.

Analyte	Soil Samples Diesel/Gasoline Excavation	Ground Water Sample Diesel/Gasoline Excavation	Soil Samples Waste Oil Excavation	Soil Samples Gasoline Only Excavation	Soil Samples Stockpiles
TPHg	38 - 2,900	110.0	19.0 - 36.0	8.8 - 340	ND<1.0 - 130
TPHd	ND<1.0 - 4,500	68.0	32.0 - 47.0	NM	ND<1.0 - 56
Benzene	ND<.005 - 4.5	0.13	ND<.005	ND<.005 - .0078	ND<.005
Toluene	ND<.005 - 2.4	0.71	ND<.005 - .034	ND<.005 - 0.18	ND<.005
Ethylbenzene	0.23 - 11.0	0.19	.066 - 0.12	ND<.005 - 0.17	ND<.005 - 0.11
Total Xylenes	0.11 - 30.0	0.18	0.12 - 0.37	ND<.005 - 0.19	ND<.005 - 1.1
Total Lead	11.6 - 39.6	1.61	NM	9.38 - 17.1	5.32 (1)
O&G	NM	NM	8,000 - 12,000	NM	240 (2)
Phs	NM	NM	ND<.005	NM	NM

ND: Not detected at the reporting limit indicated
NM: Not measured
(1): Sample collected from gasoline only excavation stockpile
(2): Sample collected from waste oil excavation stockpile

Records available to ESE indicate that the gasoline only excavation stockpile was transported offsite to BFI's Vasco Road facility in February 1991.

At least three additional overexcavation and soil sampling events in one or more of the pits have occurred since the original UST removal. Available file information indicates that in May 1991, Pacific collected eight additional samples of soil stockpiled (and presumably overexcavated) from the gasoline only and diesel/gasoline excavations. Analytical results indicated that detectable concentrations of BTEX constituents were present in all but three samples. Where detected, the ethylbenzene and total xylenes fractions occurred in the highest proportions relative to the benzene and toluene fractions, suggesting the presence of diesel fuel and/or weathered gasoline.

In July 1991, Pacific apparently performed additional overexcavation in the gasoline only excavation, and subsequently collected six samples from the excavation sidewalls and three samples from the resultant stockpile. Analytical results for sidewall samples reported TPHd concentrations ranging from ND < 10 mg/Kg to 730 mg/Kg, the latter being quantified by the analytical laboratory as both diesel fuel and weathered gasoline. Stockpile soil samples reported TPHd concentrations ranging from 20 to 50 mg/Kg.

Based on your October 28, 1993 compliance letter to site representatives, there appears to have been additional overexcavation of the waste oil excavation in May 1993. ESE has not reviewed the results of that investigation.

At the present time, all excavations have been backfilled. No stockpiled soil remains on site.

2.0 SCOPE OF WORK

ESE will perform the following activities as part of this PSA:

- Obtain appropriate permits for monitoring well installation;
- Prepare a site specific health and safety plan (HASP);
- Drill four soil borings and install a ground water monitoring wells in each boring;
- Sample soil and ground water in the borings/wells;
- Measure ground water elevations in the wells and estimate the direction and magnitude of ground water flow beneath the site; and
- Prepare a report of findings.

Additionally, ESE will develop a program of quarterly monitoring and reporting, as required by Alameda County and the State of California.

2.1 TASK 1 - PRE-FIELD ACTIVITIES

Upon receiving approval from Alameda County to proceed with the proposed work, ESE will prepare and submit appropriate applications for proposed onsite and offsite wells to the Alameda County Zone 7 Water Agency (Zone 7). When those permits have been obtained, ESE will schedule field activities described below.

To ensure the safety of ESE field personnel and representatives of the client, Alameda County, and the City, ESE will prepare a site specific HASP that addresses potential physical and chemical hazards associated with the proposed work. The HASP will be reviewed and approved by ESE's Concord Office Health & Safety Officer prior to its implementation. All personnel who are to be present during any of the proposed activities will be required to review the plan and acknowledge its receipt and review before being allowed within the work zone. Development of the HASP will be performed concurrently with monitoring well permitting.

In conjunction with permitting activities and HASP development, ESE will make appropriate notification to Underground Service Alert (USA) regarding well locations. Additionally, ESE will coordinate with site representatives to identify any potential underground drilling obstructions in the vicinity of proposed locations.

2.2 TASK 2 - SOIL AND GROUND WATER INVESTIGATION

Consistent with State Board and Tri-Regional guidelines, ESE will oversee the drilling of four shallow soil borings at locations shown in Figure 2 for the purpose of determining concentrations of petroleum hydrocarbons and other target constituents in soil at those locations, and installing ground water monitoring wells. Based on limited existing information for the site, first ground water should be found between 10 and 15 feet below ground surface (bgs). Borings will be advanced to maximum depths of 25 feet bgs, and two-inch diameter ground water monitoring wells will be installed in all four borings in accordance with State Board and Tri-Regional Guidelines. Borings for monitoring wells will be drilled in accordance with ESE Standard Operating Procedure (SOP) No. 1 for Soil Borings and Soil Sampling with Hollow-Stem Augers in Unconsolidated Formations, which is attached.

Drilling and well construction activities will be performed by Soils Exploration Services, Inc. (SES), a State-licensed C-57 drilling contractor from Vacaville, California, under the supervision of a California Registered Geologist. All proposed activities will be in strict accordance with applicable State Board and Tri-Regional guidelines and with California Well Standards established by the Department of Water Resources.

ESE will collect soil samples at five-foot intervals while drilling to visually evaluate soil characteristics and to screen soil for organic vapors using a photoionization detector (PID). ESE will preserve for laboratory analyses one sample collected at the approximate saturated zone/unsaturated zone interface in each boring, which roughly corresponds with the former tank bottoms. Soil samples will be analyzed on a standard two-week turnaround basis by Coast-to-Coast Analytical Services (CCAS), a State-certified laboratory as follows:

- Total petroleum hydrocarbons as gasoline and diesel (TPH-g and TPH-d), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8260;
- Total Petroleum Oil & Grease (TOG) using EPA Method 413.1; and
- Total concentrations of the heavy metals cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and zinc (Zn) using appropriate EPA 7000 Series analytical methodology.

These analyses are consistent with those required for compliance at the site by Alameda County.

SES will construct two-inch diameter monitoring wells in the borings in accordance with California Well Standards and ESE SOP No. 2 for Monitoring Well Installation and Development (attached). Based on the most recent ground water elevation data available for the site and area, ESE anticipates the wells will be screened from approximately 10 feet below ground surface (bgs) to total depth of 25 feet bgs. Blank casing will be used from 10 feet bgs to surface, with emplacement of sand pack and annular seal in accordance with ESE SOP No. 2 and installation of a traffic rated well box. Subsequent to installation, SES will develop the wells in accordance with California Well Standards using surging, bailing, and overpumping techniques.

After the proposed monitoring wells have been appropriately installed and developed, ESE will measure depth to water levels and collect ground water samples from each well in accordance with ESE SOP No. 3 for Ground Water Monitoring and Sampling from Monitoring Wells (attached). Ground water samples will be analyzed by CCAS for the analyses listed above. Additionally, ESE will have a laboratory prepared travel blank analyzed for TPH-g and BTEX as a measure of sample handling and transport quality assurance and quality control (QA/QC).

Concurrent with ground water sampling, ESE will oversee the surveying of locations and top of casing elevations for the new wells. Top of casing elevations will be used in conjunction with depth to water level measurements to determine ground water elevations to the nearest .01 foot and to prepare ground water elevation contour maps, from which ground water flow direction and gradient for the site will be estimated.

Soil cuttings from borings, decontamination rinsate, and development/purge water from wells will be stored onsite in appropriately labelled DOT-rated 55-gallon drums pending profiling and disposal through a licensed waste hauler. Disposition of these wastes, along with related wastes associated with quarterly ground water monitoring, are presented below for Task 5.

2.3 TASK 3: REPORT PREPARATION

Upon receiving analytical results for soil and ground water samples generated as a result of the proposed PSA, ESE will prepare a report of findings documenting field activities and findings. Contents of the report will be consistent with Tri Regional Board guidelines and LUFT Manual requirements. The report will contain a detailed discussion of findings, and will present ground water elevation data and analytical results in tabular and graphical form. Laboratory reports, field and boring logs, and other pertinent data will be presented as appendices to the report.

The report will be prepared under the direct supervision of a California Registered Geologist, and will be submitted to Alameda County in accordance with the progress and reporting schedule presented below. ESE will also submit a copy of the final document to the San Francisco Bay Regional Water Quality Control Board (Regional Board) as well.

2.4 TASK 4: QUARTERLY GROUND WATER MONITORING AND REPORTING

Consistent with Alameda County requirements, ESE will establish a program of quarterly ground water sampling and analysis, data evaluation, and reporting. Using standard practices for ground water monitoring, ESE will measure depth to water levels and collect ground water samples from each of the four wells on a quarterly basis. Ground water samples will be analyzed for TPH-g, TPH-d, BTEX, TOG, Cd, Cr, Pb, Ni, and Zn using the methodologies described above.

Ground water elevation and analytical data will be incorporated into reports to be submitted to Alameda County and the Regional Board on a quarterly basis. These reports will be submitted consistent with the progress and reporting schedule presented below.

2.5 TASK 5: DISPOSAL OF SOIL AND WATER

As a result of the proposed PSA, ESE estimates that approximately six drums of soil and three drums of decontamination rinseate/purge water will be generated. These "spoils" will require appropriate manifesting and disposal consistent with State guidelines. ESE will coordinate the appropriate analytical profiling and disposal of these waste materials at a qualified facility through a licensed waste hauler. A composite sample of soil cuttings, collected at the time the wells are installed, will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Title 22 metals (CAM metals), reactivity/corrosivity/ignitability (RCI), TPHg, TPHd, and BTEX. Water sample profiling will consist of submittal of ground water sample results from the PSA.

Quarterly monitoring activities will generate approximately one drum of rinsate and purge water each quarter. Profiling and disposal of this water will be performed on a quarterly basis.

ESE will coordinate the disposal of soil and water through Integrated Wastestream Management (IWM) of Milpitas, California. IWM is a licensed waste contractor, and will secure appropriate locations for disposal and/or recycling of the waste materials.

3.0 PROGRESS AND REPORTING SCHEDULE

ESE will perform the referenced tasks in a timely manner subject to the tentative schedule presented below. This schedule assumes Alameda County approval of this Workplan by April 1, 1994.

Task/Activity	Estimated Start Date	Estimated Compl. Date
1) Pre-Field Activities	04/04/94	04/08/94
2) Soil/Ground Water Investigation	04/13/94	04/22/94
3) PSA Report Preparation	04/25/94	05/13/94
4) Quarterly Monitoring/Reporting		
Third Quarter 1994	07/11/94	07/29/94
Fourth Quarter 1994	10/10/94	10/31/94
First Quarter 1995	01/12/95	01/30/95
5) Coordinate Disposal of Soil/Water		
PSA	05/16/94	05/27/94
Third Quarter 1994	08/01/94	08/12/94
Fourth Quarter 1994	11/01/94	11/11/94
First Quarter 1995	02/01/95	02/12/95

If you have any questions or require additional information regarding this Workplan, please contact Mike Quillin at (510) 685-4053. We look forward to your earliest possible approval so that the proposed work can be implemented.

Sincerely,

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

Michael E. Quillin, R.G. 5315
Senior Hydrogeologist

REGISTERED GEOLOGIST
MICHAEL E. QUILLIN
#5315
STATE OF CALIFORNIA

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Attachments: Figures (2)
ESE SOPs (3)

pc: Mr. Ondrej Kojnok

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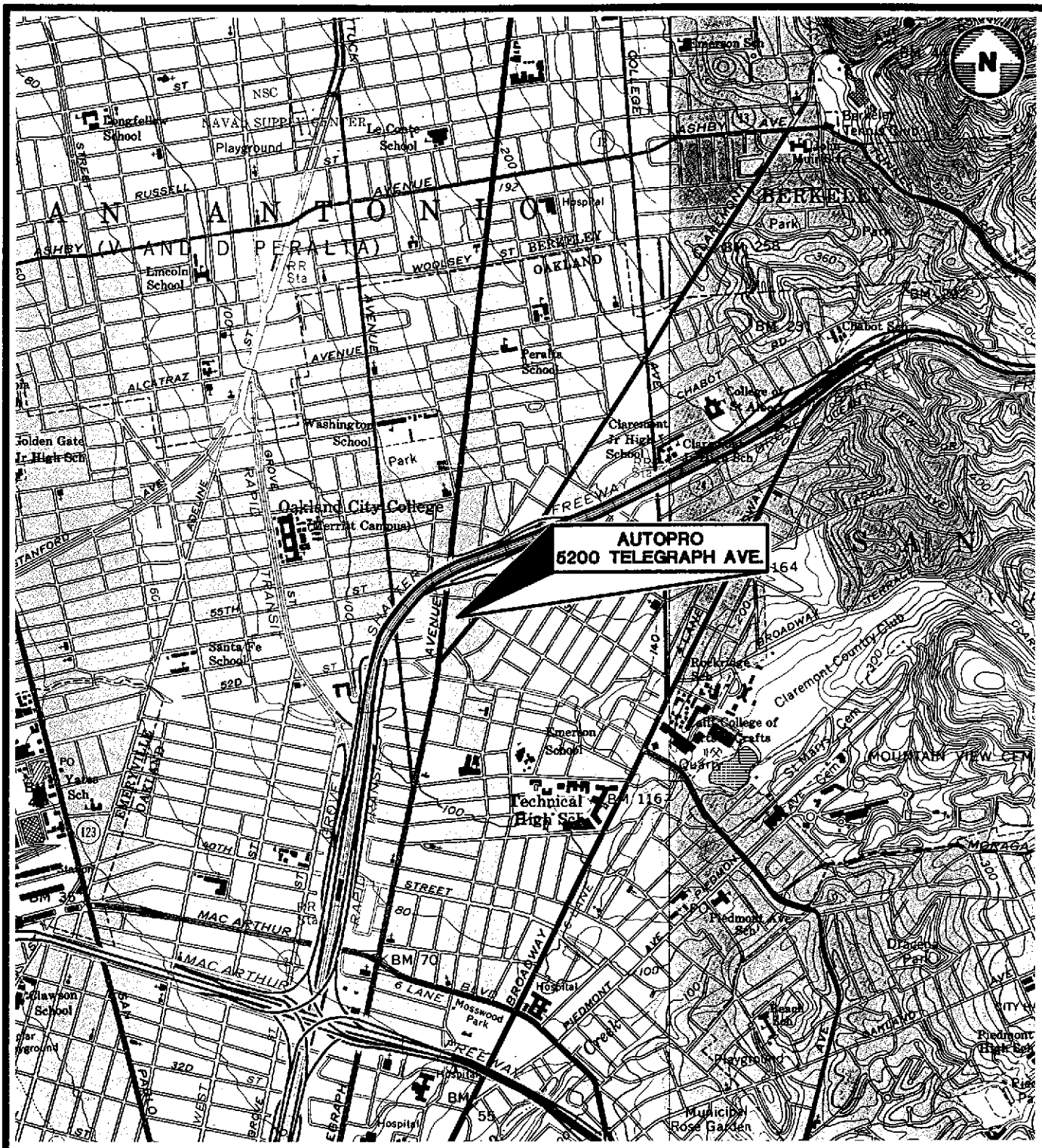
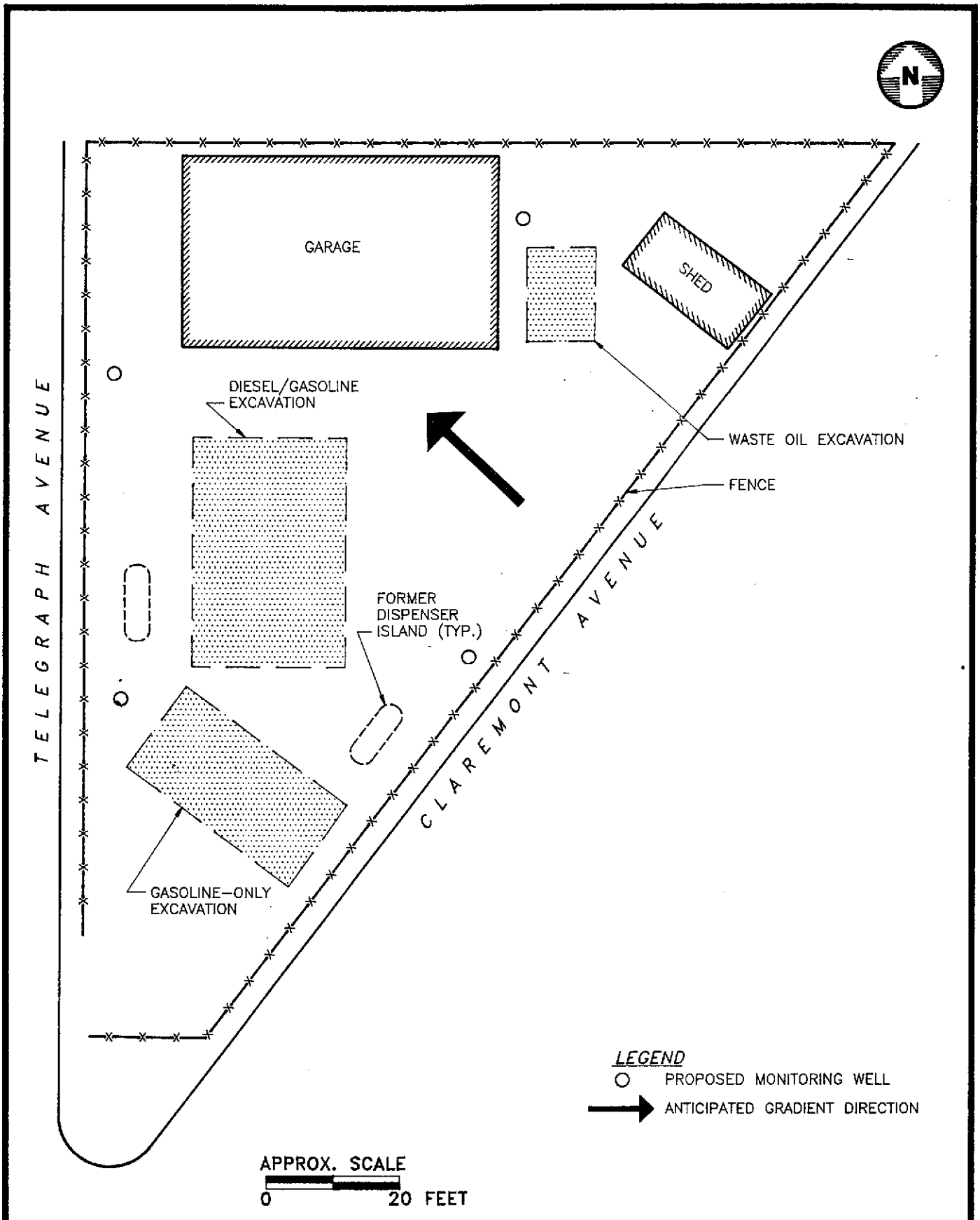


ADAPTED FROM U.S.G.S. OAKLAND EAST AND OAKLAND WEST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS, 1959, PHOTOREVISED 1980.

ESE A CILCORP Company — Environmental Science & Engineering, Inc.	DATE 3/94	LOCATION MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	AUTOPRO 5200 TELEGRAPH AVENUE OAKLAND, CALIFORNIA	PROJ. NO. 6-94-5219
	CAD FILE 52191001		



ESE A CILCORP Company — Environmental Science & Engineering, Inc.	DATE 3/94	SITE PLAN	FIGURE NO. 2
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	AUTOPRO 5200 TELEGRAPH AVENUE OAKLAND, CALIFORNIA	PROJ. NO. 6–94–5219
	CAD FILE 52191002		

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 1
FOR SOIL BORINGS AND SOIL SAMPLING WITH HOLLOW-STEM AUGERS IN UNCONSOLIDATED FORMATIONS

Environmental Science & Engineering, Inc. (ESE) typically drills soil borings using a truck-mounted, continuous-flight, hollow-stem auger drill rig. The drill rig is owned and operated by a drilling company possessing a valid State of California C-57 license. The soil borings are conducted under the direct supervision and guidance of an experienced ESE geologist. The ESE geologist logs each borehole during drilling in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist observes and notes the soil color, relative density or stiffness, moisture content, odor (if obvious) and organic content (if present). The ESE geologist will record all observations on geologic boring logs.

Soil samples are collected during drilling at a minimum of five-foot intervals by driving an 18-inch long Modified California Split-spoon sampler (sampler), lined with new, thin-wall brass sleeves, through the center of and ahead of the hollow stem augers, thus collecting a relatively undisturbed soil sample core. The brass sleeves are typically 2-inches in diameter and 6-inches in length. The sampler is driven by dropping a 140-pound hammer 30-inches onto rods attached to the top of the sampler. Soil sample depth intervals and the number of hammer blows required to advance the sampler each six-inch interval are recorded by the ESE geologist on geologic boring logs. The ends of one brass sleeve are covered with Teflon sheeting, then covered with plastic end caps. The end caps are sealed to the brass sleeve using duct tape. Each sample is then labeled and placed on ice in a cooler for transport under chain of custody documentation to the designated analytical laboratory. A portion of the remaining soil in the sampler is placed in either a new Ziploc® bag or a clean Mason Jar® and set in direct sunlight to enhance the volatilization of any Volatile Organic Compounds (VOCs) present in the soil. After approximately 15-minutes that sample is screened for VOCs using a photoionization detector (PID). The PID measurements will be noted on the geologic boring logs. The PID provides qualitative data for use in selecting samples for laboratory analysis. Soil samples from the saturated zone (beneath the ground-water table) are collected as described above, are not screened with the PID, and are not submitted to the analytical laboratory. The samples from the saturated zone are used for descriptive purposes. Soil samples from the saturated zone may be retained as described above for physical analyses (grain size, permeability and porosity testing).

If the soil boring is not going to be completed as a well, then the boring is typically terminated upon penetrating the saturated soil horizon or until a predetermined interval of soil containing no evidence of contamination is penetrated. This predetermined interval is typically based upon site specific regulatory or client guidelines. The boring is then backfilled using either neat cement, neat cement and bentonite powder mixture (not exceeding 5% bentonite), bentonite pellets, or a sand and cement mixture (not exceeding a 2:1 ratio of sand to cement). However, if the boring is to be completed as a monitoring well, then the boring is continued until either a competent, low estimated-permeability, lower confining soil layer is found or 10 to 15-feet of the saturated soil horizon is penetrated, whichever occurs first. If a low estimated-permeability soil layer is found, the soil boring will be advanced approximately five-feet into that layer to evaluate its competence as a lower confining layer, prior to the termination of that boring.

All soil sampling equipment is cleaned between each sample collection event using an Alconox® detergent and tap water solution followed by a tap water rinse. Additionally, all drilling equipment and soil sampling equipment is cleaned between borings, using a high pressure steam cleaner, to prevent cross-contamination. All wash and rinse water is collected and contained onsite in Department of Transportation approved containers (typically 55-gallon drums) pending laboratory analysis and proper disposal/recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 2
FOR MONITORING WELL INSTALLATION AND DEVELOPMENT
PAGE 1

Environmental Science & Engineering, Inc. (ESE) typically installs ground-water monitoring wells in unconsolidated sediments drilled using a truck-mounted hollow-stem auger drill rig. The design and installation of all monitoring wells is performed and supervised by an experienced ESE geologist. Figure A - Typical ESE Monitoring Well Construction Diagram (attached) graphically displays a typical ESE well completion. Prior to the construction of the well, the portion of the borehole that penetrates a lower confining layer (if any) is filled with bentonite pellets. The monitoring well is then constructed by inserting polyvinylchloride (PVC) pipe through the center of the hollow stem augers. The pipe (well-casing) is fastened together by joining the factory threaded pipe ends. ESE typically uses two-inch or four-inch diameter pipe for ground-water monitoring wells. The diameter of the borehole is typically 6-inches greater than that of the diameter of the well-casing, but is at least four-inches greater than that of the well casing. The lowermost portion of the well-casing will be factory perforated (typically having slot widths of 0.010-inch or 0.020-inch). The slotted portion of the well-casing will extend from the bottom of the boring up to approximately five-feet above the occurrence of ground water. A PVC slip or threaded cap will be placed at the bottom end of the well-casing, and a locking expandable well cap will be placed over the top (or surface) end of the well-casing. A sand pack (typically No. 2/12 or No. 3 Monterey sand) will be placed in the borehole annulus, from the bottom of the well-casing up to one to two-feet above the top of the slotted portion, by pouring the clean sand through the hollow stem augers. One to two-feet of bentonite pellets will be placed on top of the sand pack. The bentonite pellets will then be hydrated with three to four-gallons of potable water, to protect the sand pack from intrusion during the placement of the sanitary seal. The sanitary seal (grout) will consist of either neat cement, a neat cement and bentonite powder mixture (containing no more than 5% bentonite), or a neat cement and sand mixture (containing no more than a 2:1 sand to cement ratio). If, the grout seal is to be greater than 30-feet in depth or if standing water is present in the boring on top of the bentonite pellet seal, then the grout mixture will be tremied into the boring from the top of the bentonite seal using either a hose, pipe or the hollow-stem augers, which serve as a tremie. The well will be protected at the surface by a water tight utility box. The utility box will be set into the grout mixture so that it is less than 0.1-foot above grade, to prevent the collection of surface water at the well head. If the well is set within the public right of way, then the utility box will be Department of Transportation (DOT) traffic rated, and the top of the box will be set flush to grade. If the well is constructed in a vacant field a brightly painted metal standpipe may be used to protect the well from traffic. If a standpipe is used, it will be held in place with a grout mixture and will extend one to two-feet above ground surface. All well completion details will be recorded by the ESE geologist on the geologic boring logs.

Subsequent to the solidification of the sanitary seal of the well (a minimum of 72 hours), the new well will be developed by an ESE geologist or field technician. Well development will be performed using surging, bailing and overpumping techniques. Surging is performed by raising and lowering a surge block through the water column within the slotted interval of the well casing. The surge block utilized has a diameter just smaller than that of the well casing, thus, forcing water flow through the sand pack due to displacement and vacuum caused by the movement of the surge block. Bailing is performed by lowering a bailer to the bottom of the well and gently bouncing the bailer off of the well end cap, then removing the full bailer and repeating the procedure. This will bring any material (soil or PVC fragments) that may have accumulated in the well into suspension for removal. Overpumping is performed by lowering a submersible pump to the bottom of each well and pumping at the highest sustainable rate without completely evacuating the well casing. Effective well development will settle the sand pack surrounding the well-casing, which will improve the filtering properties of the sand pack and allow water to flow more easily through the sand pack; improve the communication between the aquifer and the well by aiding the removal of any smearing of fine sediments along the borehole penetrating the aquifer; and, remove fine sediments and any foreign objects (PVC fragments) from the well casing. The ESE geologist or

technician will monitor the ground water purged from the well during development for clarity, temperature, pH and conductivity. Development of the well will proceed until the well produces relatively clear, sand-free water with stable temperature, pH and conductivity measurements. At a minimum, 10 well-casing volumes of ground water will be removed during the development process. Measurements of temperature, conductivity, pH and volume of the purged water and observations of purge water clarity and sediment content will be recorded on the ESE Well Development Data Forms. All equipment used during the well development procedure will be cleaned using an Alconox® detergent and tap water solution followed by a tap water rinse prior to use in each well. All ground water purged during the well development process and all equipment rinse water will be collected and contained onsite in DOT approved containers (typically 55-gallon drums) pending analytical results and proper disposal or recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 3
FOR GROUND-WATER MONITORING AND SAMPLING FROM MONITORING WELLS

Environmental Science & Engineering, Inc. (ESE) typically performs ground-water monitoring at project sites on a quarterly basis. As part of the monitoring program an ESE staff member will first gauge the depth to water and free product (if present) in each well, then collect ground-water samples from each well. Depth to water measurements are taken by lowering an electric fiberglass tape measure into the well and recording the occurrence of water in feet below a fixed datum set on the top of the well-casing. If free-phase liquid hydrocarbons (free product) are known or suspected to be present in the well, then an electric oil/water interface probe is used to determine the depth to the occurrence of ground-water and the free product in feet below the fixed datum on the top of the well-casing. Depth to water and depth to product measurements are measured and recorded within an accuracy of 0.005-foot. The electric tape and the electric oil/water interface probe are washed with an Alconox® detergent and tap water solution then rinsed with tap water between uses in different wells.

Ground-water samples are collected from a well subsequent to purging a minimum of three to four well-casing volumes of ground water from the well, if the well bails dry prior to the removal of the required minimum volume, then the samples are collected upon the recovery of the ground water in that well to 80% of its initial static level. Ground water is typically purged from monitoring wells using either a hand-operated positive displacement pump, constructed of polyvinylchloride (PVC); a new (precleaned), disposable polyethylene bailer; or, a variable-flow submersible pump, constructed of stainless steel and Teflon®. The hand pumps and the submersible pumps are cleaned between each use with an Alconox® detergent and tap water solution followed by a tap water rinse. During the well purging process the conductivity, pH and temperature of the ground water are monitored by the ESE staff member. Ground-water samples are collected from the well subsequent to the stabilization of the of the conductivity, pH and temperature of the purge water, and the removal of four well-casing volumes of ground-water (unless the well bails dry). The parameters are deemed to have stabilized when two consecutive measurements are within 10% of each other, for each respective parameter. The temperature, pH, conductivity and purge volume measurements, and observations of water clarity and sediment content will be documented by the ESE staff member on ESE Ground-Water Sampling Data Forms.

Ground-water samples are collected by lowering a new (precleaned), disposable polyethylene bailer into the well using new, disposable nylon cord. The filled bailer is retrieved, emptied, then filled again. The ground water from this bailer is decanted into appropriate laboratory supplied glassware and/or plastic containers (if sample preservatives are required, they are added to the empty containers at the laboratory prior to the sampling event). The containers are filled carefully so that no headspace is present to avoid volatilization of the sample. The filled sample containers are then labeled and placed in a cooler with ice for transport under chain of custody documentation to the designated analytical laboratory. The ESE staff member will document the time and method of sample collection, and the type of sample containers and preservatives (if any) used. These facts will appear on the ESE Ground-Water Sampling Data Forms. ESE will collect a duplicate ground-water sample from one well for every ten wells sampled at each site. The duplicate will be a blind sample (its well designation will be unknown to the laboratory). The duplicate sample is for Quality Assurance and Quality Control (QA/QC) purposes, and provides a check on ESE sampling procedures and laboratory sample handling procedures. When VOCs are included in the laboratory analyses, ESE will include a trip blank, if required, in the cooler with the ground-water samples for analysis for the identical VOCs. The trip blank is supplied by the laboratory and consists of deionized water. The trip blank is for QA/QC purposes and provides a check on both ESE and laboratory sample handling and storage procedures. Since disposable bailers are used for sample collection, and are not reused, no equipment blank (rinsate) samples are collected.