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Clayton
ENVIRONMENTAL
CONSULTANTS

Work Plan
for
Limited Subsurface Investigation
at the
Keep On Trucking Site
370 8th Street
Oakland, California

Clayton Project No. 58560.15
February 21, 1995

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1.0 INTRODUCTION

Clayton Environmental Consultants, Inc. was retained by the Port of Oakland to prepare a work plan and perform a soil and groundwater investigation at the Keep On Trucking facility located at 370 8th Street in Oakland, California (see Figure 1 and 2). The scope of work in this work plan responds to the request in the Alameda County Health Care Services Agency (ACHCSA) letter dated December 30, 1994. The ACHCSA letter requested that a work plan for delineation of soil and groundwater contamination be submitted, which was identified during removal of an underground storage tank (UST) adjacent to Building H-107.

This work plan describes the activities required to further characterize the soil and groundwater contamination at the site.

2.0 BACKGROUND AND TECHNICAL APPROACH

The scope of work for the soil and groundwater investigation is based on the following documents:

- Underground Storage Tank Removal Report prepared by ERM-West Inc., dated November 22, 1994
- ACHCSA letter to Mr. Neil Werner, dated December 30, 1994

The UST was removed in October 1994 by Environmental Investigations and Actions of Hayward, California. ERM-West, Inc. collected soil and groundwater samples from the sidewalls and base of the excavation. TPH-D concentrations in the soil samples ranged from 120 to 44,000 mg/kg.

Soil samples from the sidewalls of the UST excavation identified petroleum hydrocarbons at concentrations of 44,000, 3,300, and 550 at the east, south, and west sides of the excavation. The sidewall soil sample collected adjacent to the building (north), contain total petroleum hydrocarbons quantitated as diesel (TPH-D) at a concentration of 320 milligrams per kilogram (mg/kg). Soil borings BH-1, BH-2, and BH-3 will be installed to further delineate soil and groundwater contamination adjacent to the sidewalls.

Based on a review of groundwater monitoring flow data from an adjacent AST investigation at Building H-213, (***re:*** Quarterly Groundwater Monitoring Report; Uribe and Associates; November 10, 1994), the groundwater flow direction appears to vary from southwest to northwest. Therefore, borehole BH-3, which is approximately 13 feet from the former UST excavation, will be converted to a groundwater monitoring well (MW-7).

3.0 SCOPE OF WORK

In order to perform this investigation and delineate extent of soil and possible groundwater contamination at the site, Clayton proposes to drill two boreholes and install one monitoring well at the subject property. The following subsections describe Clayton's proposed activities.

3.1 TASK 1: HEALTH AND SAFETY PLAN

A health and safety plan will be prepared for the work outlined in this work plan in accordance with the requirements of Title 29 of the Code of Federal Regulations, Section 1910.120 (29 CFR 1910.120) and California Occupational Safety and Health Administration (Cal/OSHA) General Industry Safety Order (GISO) 5192.

3.2 TASK 2: UNDERGROUND UTILITIES IDENTIFICATION AND PERMITTING

Upon ACHCSA approval of the work plan, Clayton will implement the drilling and well installation activities outlined in the work plan. Prior to drilling the boreholes, Clayton will obtain any necessary permits from the Zone 7 Water Agency. Clayton will also contact Underground Service Alert to locate and identify the underground utility lines on or near the subject site. Clayton will not drill within 5 feet of each side of a known utilityline.

3.3 TASK 3: BOREHOLE DRILLING AND SOIL SAMPLE COLLECTION

Clayton will observe installation of three boreholes (BH-1, BH-2 and BH-3) at the locations shown in Figure 2. Soil boring BH-3 will be converted to monitoring well MW-7. During the drilling of the boreholes and monitoring well, a Clayton geologist will log the soil characteristics in the field. Distinguishing features such as color, odor, and relative soil moisture content will be noted. All drilling and field activities will be supervised by a civil engineer or a geologist registered in the State of California.

The boreholes will be drilled to an approximate depth of 15 feet below ground surface (bgs). Clayton will collect soil samples at 5-foot intervals from the boreholes for laboratory analysis. We anticipate that the groundwater table will be encountered at approximately 5 feet bgs.

To aid in locating any contamination, Clayton will screen the soil cuttings during drilling using a photoionization detector (PID) and visual senses to detect petroleum compounds. If contamination is encountered other than at the specified sampling depth, Clayton will collect additional samples until groundwater is encountered. No soil sample will be collected below the saturated zone for laboratory analysis.

The soil samples will be collected in precleaned brass tubes. The brass tubes selected for analysis will be sealed with aluminum foil or teflon sheeting, plastic end caps, and immediately placed in an iced cooler for shipment to state-certified laboratory, for analysis. Standard chain-of-custody procedures will be followed for handling of soil samples.

Monitoring well MW-7 will be extended approximately 10 feet into the saturated zone, to approximately 15 feet bgs.

The soil cuttings and rinsate water generated by the drilling process will be placed into individually labeled, Department of Transportation (DOT)-approved, 55-gallon drums and left onsite until the proper disposal option can be determined based on laboratory analysis.

3.4 TASK 4: MONITORING WELL INSTALLATION

The monitoring well will be constructed of 2-inch diameter (0.02-inch slotted) PVC casing. Screened casing will be placed from approximately 5 to 15 feet bgs (approximately 1-foot above the anticipated water table). Solid casing will then be installed to the surface. The sand pack will extend to 1-foot above the screen. A 1-foot thick bentonite seal will be placed on top of the sand pack, and the well will be sealed to the surface using cement grout. A locking cap will secure the well in a Christie box raised above the surface grade by approximately 1 to 2 inches.

Drilling and sampling activities will be conducted in accordance with Clayton's drilling, well construction and sampling protocols for borehole/monitoring well installation (see appendix), under the supervision of a Clayton geologist registered in the State of California.

3.5 TASK 5: MONITORING WELL DEVELOPMENT AND SAMPLING

The well seal in the newly constructed well will be allowed to set for 48 to 72 hours prior to well development. Development of the well can volatilize contaminants that may be present; therefore, the well will be allowed to settle for at least 48 to 72 hours between development and the first purging/sampling event. The first site visit will involve well development, and the actual sampling of the well will occur during the second site visit.

The well will be developed until water turbidity and specific conductance stabilize. Water samples from the well will be collected using clean disposable bailers. Water will be collected in precleaned, laboratory-supplied containers and placed immediately into an iced cooler for transport to state-certified laboratory for analysis. One trip blank will be furnished in accordance with Clayton's quality assurance/quality control (QA/QC) program.

The water generated from the drilling equipment decontamination process and well development and sampling will be placed into DOT-approved, 55-gallon drums until laboratory results from groundwater and soil samples can be evaluated to determine proper disposal methods.

3.6 TASK 6: WELL HEAD SURVEY

The monitoring wells will be surveyed by a licensed land surveyor using a surveyed benchmark. The surveyed elevations and locations of the wells will be used to calculate the local groundwater flow direction and gradient.

3.7 TASK 7: LABORATORY ANALYSIS

Three soil and one groundwater samples will be collected and delivered to a state-certified laboratory using proper chain-of-custody procedures. The soil and groundwater samples will be analyzed using the following United States Environmental Protection Agency (USEPA) methods:

- USEPA Method 8015 for TPH-D
- USEPA Method 8020 for benzene, toluene, ethylbenzene, and xylenes (BTEX)

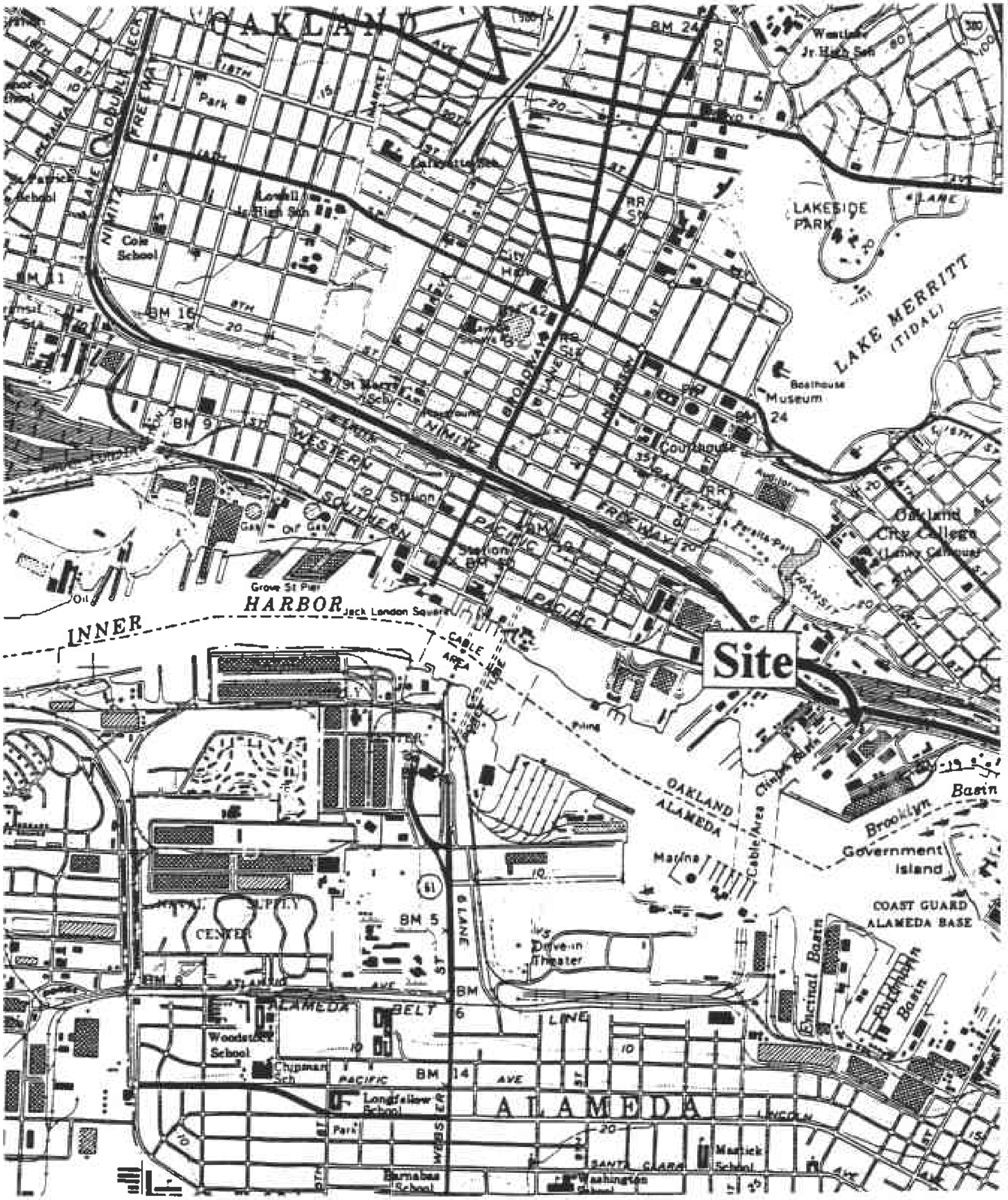
3.8 TASK 8: REPORT PREPARATION

A report summarizing the findings of the investigative work will be prepared upon completion of the laboratory analysis. The report will include a discussion of the site, investigation techniques, laboratory procedures, a tabulation of analytical results, laboratory data sheets, conclusions, and recommendations.

This work plan prepared by: _____
Richard J. Silva
Geologist

This work plan reviewed by: _____
John F. Vargas, R.G.
Supervisor, Geosciences and Remediation
Western Operations

February 21, 1995



Site Location and Topographic Map
KEEP ON TRUCKING
370 8th Avenue
Oakland, California

Clayton Project No. 59007.00

Figure

1

59007-00-17

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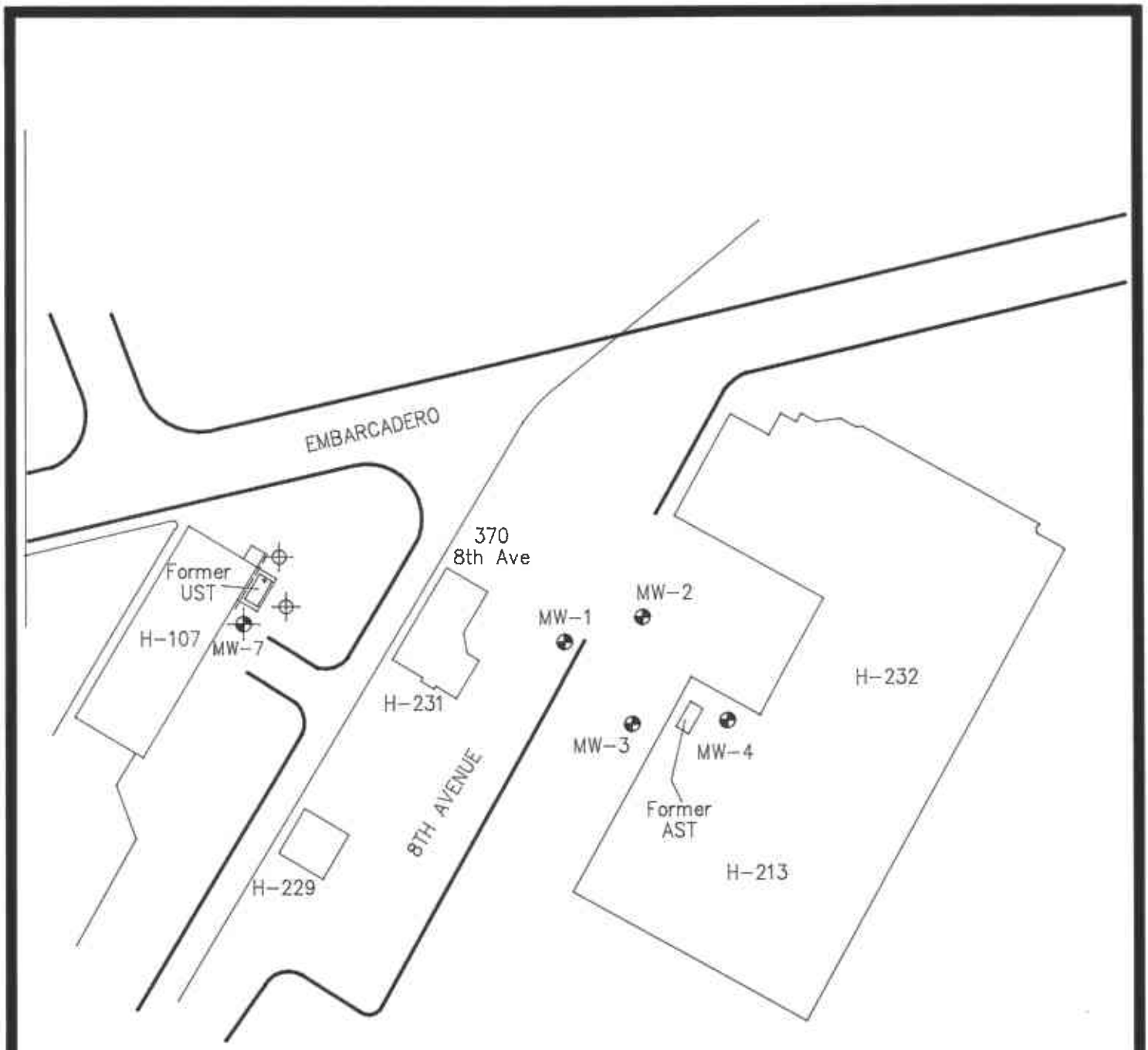

Existing Monitoring Wells and Proposed Monitoring Well Locations
KEEP ON TRUCKING FACILITY
370 8th Street
Oakland, California
Clayton Project No. 58560.15

Figure
2
58560-15-17

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APPENDIX

DRILLING, WELL CONSTRUCTION, AND SAMPLING PROTOCOLS FOR BOREHOLE/MONITORING WELL INSTALLATION

DRILLING, WELL CONSTRUCTION, AND SAMPLING PROTOCOLS FOR BOREHOLE/MONITORING WELL INSTALLATION

BOREHOLE INSTALLATION

Clayton Environmental Consultants, Inc. acquires the proper governmental agency permits to bore, drill, or destroy all proposed boreholes and monitoring wells that intersect with groundwater aquifers and writes a health and safety plan.

Clayton subcontracts only with drillers who possess a current C-57 water well contractor's license issued by the State of California and whose personnel have attended the OSHA 40-hour Hazardous Materials Safety Training. Prior to starting work, a "tailgate" safety meeting including discussion of the safety hazards and precautions relevant to the particular job will be held with all personnel working on the job. Well drillers are identified on permit applications.

Borings are drilled dry by hollow- or solid-stem, continuous flight augers. Augers, drill rods, and other working components of the drilling rig are steam-cleaned before arriving onsite to prevent the introduction of contaminants. These components are also steam-cleaned between borings away from boring locations. Cleaned augers, rods, and other components are stored, and/or covered when not in use.

Our bore logs include a detailed description of subsurface stratigraphy. Clayton examines the soil brought to the surface by drilling operations, and samples undisturbed soil every 5 feet or as otherwise specified. Soil cuttings are screened for hydrocarbon contamination using a photoionization detector. Boring logs are filled out in the field by a professional geologist, civil engineer, engineering geologist who is registered by the State of California, or a technician who is trained and working under the supervision of one of the previously mentioned persons, using the Unified Soil Classification System.

SOIL SAMPLING

Soil samples are taken every 5 feet, at areas of obvious contamination, or as otherwise specified, with a California modified split-spoon sampler that is lined with three six-inch brass tubes. The sampler and rod are inserted into the borehole to the current depth and a hammer of known weight and height above the sampler are allowed to free-fall onto the rod, advancing the assembly 18 inches into undisturbed soil. Clayton uses the number of blows necessary to drive the sampler into the ground to help evaluate the consistency of materials encountered. The sampler is then pulled from the borehole and disassembled, and the three brass tubes are separated for inspection and labeling.

Clayton uses new brass liners or liners cleaned with a trisodium phosphate (TSP) solution, double rinsed with clean tap water, and air dried prior to each sampling. The sampler is also cleaned with TSP and rinsed with tap water between sampling events.

Soil samples selected for laboratory analysis are left in the brass liners, sealed with aluminum foil and plastic caps, taped for air tightness, labeled, and immediately placed into a pre-cooled ice

chest chilled to less than 4°C. Labels contain the following information: site name, date and time sampled, borehole number and depth, and the sampler's initials. The samples are transported under chain-of-custody to a state-certified laboratory. The laboratory analyzes soil samples within the prescribed holding time, storing them at temperatures below 4°C at all times.

Pending results of laboratory analysis, excess drilling and sampling cuttings are placed into Department of Transportation (DOT)-approved drums, labeled with the name of the site, address, and well number, and left at the site. Uncontaminated soil may be disposed of by the client. Soil found to contain levels of contaminants above local or state action levels will require that the client dispose of it in accordance with hazardous waste regulations. At the client's request, we will assist with the disposal of contaminated soil.

WELL CONSTRUCTION

Boreholes are converted to monitoring wells by placing 2-inch or 4-inch diameter well casing with flush-threaded joints and slotted screen into the borehole. Construction materials include polyvinyl chloride (PVC), stainless steel, or low carbon steel. The most suitable material for a particular installation will depend on the parameters to be monitored. All screens and casings used are in a contaminant-free condition when placed in the ground. No thread lubrication is used, other than teflon tape, for connecting the casing segments.

Wells extend at least 10 feet into the upper saturated zone, but do not extend through any clay layers greater than 5 feet that are below the shallow water table. The standard practice for wells installed at hydrocarbon contamination sites is to construct a well with a 20-foot long perforated interval extending 15 feet below and 5 feet above the water table in an unconfined aquifer. The top of the well is solid casing. The annular space of the borehole is backfilled with washed, kiln-dried sand to a point at least 1 foot above the slotted screen. A seal above the filter pack is formed by placing a 1- to 2-foot layer of bentonite pellets on top of the sand. The bentonite pellets are moistened by pouring clean tap water down the hole so that they can expand and seal the annulus. A neat cement grout is placed above the bentonite seal and brought to the ground surface.

Well casings are protected from surface contamination, accidental damage, and unauthorized entry or tampering with water-tight locking caps on the well casings. The caps are usually surrounded by a concrete vault. Wells are clearly identified with a metal tag or other device where the following information is recorded: well number, depth to water, depth of well, casing data including location of screened interval.

WELL DEVELOPMENT

The well seal in newly developed wells must set up for 48 to 72 hours prior to development. Since development of the well can volatilize contaminants present, the well must also settle for at least 48 to 72 hours between development and the first purging/sampling incident.

All monitoring wells are initially developed to clean the well and stabilize sand, gravel, and disturbed aquifer materials around the screened internal perforations. Wells are developed by pumping (or bailing) and surging until water turbidity and specific conductance stabilize. In some cases, where wells are installed in low permeability formations and the wells purge dry, the well

is allowed to recover and is purged dry three times. Clean tap water is introduced into the well if it does not recover rapidly enough.

Pending results by laboratory analysis, purge water from well development and sampling is placed into DOT-approved drums, labeled with the name of the site, address, well number, and left at the site. Uncontaminated water may be disposed of by the client. Water found to contain levels of contaminants above local or state action levels requires that the client dispose of it in accordance with hazardous waste requirements. At the client's request, we can assist with the disposal of contaminated purge water.

GROUNDWATER SAMPLING

To collect a representative sample of the groundwater, stagnant water within the well casing and filter material must be purged and fresh aquifer water allowed to replace it. The water is purged from the well by pumping or bailing at least three well volumes. Well volumes are calculated by measuring depth to groundwater to the nearest 0.01 foot upon arrival at the well before any purging has begun. Groundwater samples are collected only after purging has been of sufficient duration for pH, temperature, and electrical conductivity to stabilize. When purging low-yield wells, the wells are purged to dryness. When the well recovers to 80% of the depth measured upon arrival, samples are collected.

Field sampling logs maintained for each well include:

- Monitoring well identification
- Static water level, before and after pumping
- Well depth
- Condition of water prior to purging (e.g., amount of free product)
- Purge rate and volume
- pH, temperature, and conductivity during purging
- Time purged
- Time of sample collection
- Sampling method
- Name of sampler
- Climatic conditions

Water samples are collected using clean teflon bailers. All equipment that contacts samples is thoroughly cleaned before arrival at the site and between sampling events.

Water is collected in clean laboratory-supplied containers, labeled, placed immediately into an ice chest pre-cooled to 4°C, and transported to Clayton's laboratory for analysis. One trip blank will be furnished in accordance with our quality assurance/quality control (QA/QC) program.

All samples are collected in such a manner so as to minimize the volatilization of a sample due to agitation and/or transfer from bailer to sample container. Samples are collected so that contaminants most sensitive to volatilization are sampled first.

Preservatives are not added to any sample, unless instructed. If requested, they are supplied by Clayton's laboratory.

All sample containers are labeled in the field. Labels contain the following information: project name, sample identification number, project number, date and time of collection, and sampler's initials.

Under no circumstances are sealed sample containers opened by anyone other than the laboratory personnel who perform the requested analyses. If it is necessary for samples or sample chests to leave the immediate control of the sampler prior to delivery to the laboratory, for example during shipment by an overnight shipper, a custody seal is placed on each sample container and/or sample chest to ensure that the samples have not been tampered with during transportation. The custody seal is signed by the sampler, and the date and time that the seal was placed is recorded. The elapsed time between sample collection and delivery to the laboratory never exceeds 48 hours. Water samples are not held for more than 14 days prior to analysis and are kept at 4°C at all times.

To document and trace samples from time of collection, a signed chain-of-custody record is filled out by the sampler and accompanies the samples through the laboratory analyses. The completed chain-of-custody is included with the analytical report from the laboratory.

REFERENCES

Groundwater Monitoring Guidelines, Revised February 1990. Alameda County District Groundwater Protection Program.

Leaking Underground Fuel Tank (LUFT) Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Tank Closure, May 1988. State of California LUFT Task Force.

Regional Board Staff Recommendations for Initial Evaluation and Investigation of Underground Tanks, Revised November 1989. North Coast, San Francisco Bay, and Central Valley regions of the California State Water Quality Control Board.

Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, Revised June 1989. Santa Clara Valley Water District.