Workplan to Perform Additional Site Activities at the Former Carnation Facility at 1310 14th Street Oakland, California

Prepared for

Nestlé USA, Inc.

Prepared by

EA Engineering, Science, and Technology

March 1996

60966.01.0005

EA Engineering, Science, and Technology

3468 Mt. Diablo Boulevard
Suite B-100
Lafayette, CA 94549
Telephone: 510-283-7077
Fax: 510-283-3894

15 March 1996

Ms. Jennifer Eberle
Hazardous Materials Specialist
Alameda County Health Agency
1131 Harbor Bay Parkway
2nd Floor
Alameda, California 94502

Re: Workplan to Install Air Sparge Wells and to Perform an Air Sparge/Vapor Extraction Pilot Test

Dear Ms. Eberle:

Attached is the workplan to install three aquifer air sparge wells and to perform air sparge/vapor extraction pilot tests. The purpose of the test is to evaluate the feasibility of using air sparging to enhance soil and groundwater remediation at the site.

If you have any questions please call me at (510) 283-7077.

Sincerely,

Mark C. Litzau
Project Manager

MCL 6096601WP396
Attachments
cc: Binayak Acharya
File

60966.01.0005

Workplan to Perform Additional Site Activities at the Former Carnation Facility 1310 14th Street Oakland, California

Prepared for

Nestlé USA, Inc.
800 North Brand Boulevard
Glendale, California 91203

Prepared by

EA Engineering, Science, and Technology
3468 Mt. Diablo Boulevard, Suite B-100
Lafayette, California 94549
(510) 283-7077

3/15/96

Mark C. Litzau
Project Manager

Date

March 1996

EA Engineering, Science, and Technology (EA) has prepared this workplan to perform additional site activities at the former Carnation facility at 1310 14th Street, Oakland, California, (Figure 1). The proposed activities include the installation of three aquifer air sparge wells and performing an aquifer air sparge test in conjunction with a soil vapor extraction test, using the existing vapor extraction wells and the proposed air sparge wells. The data collected from the combined tests will be used to evaluate the feasibility of using air sparging with soil vapor extraction to enhance the remediation system previously in operation at the site. The data obtained through evaluation of the pilot tests will also assist in the design of an upgraded remediation system for the site. In addition, the results will provide information on the rates of natural attenuation and biodegradation at the site.

A site-specific health and safety plan will be prepared prior to initiation of any field work at the site. The following describes the work to be performed.

BACKGROUND

Nestlé has been active in characterizing and remediating petroleum hydrocarbon-impacted soil and groundwater at its Oakland facility since 1992. Free product was identified in wells at the northwest corner of the property, and dissolved petroleum products were identified downgradient from these wells. A total of 128 wells have been installed at the facility. These wells function as product recovery, groundwater monitoring, vapor extraction, and groundwater extraction wells.

Groundwater is present at approximately 7–10 feet below ground surface (bgs). The groundwater elevation varies over a range of 1–2 feet in the course of the year. The lithology of the site consists primarily of silty to clayey sand, with layers of silts and sands.

AIR SPARGE WELL INSTALLATION

Three air sparge wells are proposed for installation at locations shown in Figure 2. The wells will be installed in accordance with EA's protocols, provided in Appendix A. The boreholes will be drilled with a truck-mounted rotary drill, using 8-inch diameter hollow-stem continuous-flight augers. The soil borings will be drilled to a depth of approximately 21 feet bgs. One boring will be continuously logged from approximately 10 to 21 feet by an EA geologist to determine the lithology of the saturated zone; the other borings will be logged at a minimum of 5-foot intervals. The boring logs will contain detailed geological information, including descriptions of the soils, classified according to the Unified Soil Classification System, blow counts, OVA readings, moisture content of the soils, and initial and static water levels.

The air sparge wells will be constructed using 2-inch-diameter Schedule 40 PVC threaded blank casing and 0.020-inch slot Schedule 40 PVC screened casing. The screened interval will be from approximately 18 to 20 feet bgs, and the blank casing will extend from 18 feet bgs to the ground surface. The annular space between the air sparge casing and the borehole will be filled with No. 3 Monterey sand from the bottom of the soil boring to a depth of 16 feet bgs. A bentonite plug will be constructed over the sand filter from 14 feet to 16 feet bgs. To seal the air sparge well, a slurry of 95 percent cement/5 percent bentonite will be tremied into the annular space from 14 feet bgs to the ground surface. The air sparge wells will be capped and enclosed in traffic-rated well boxes for protection. A well completion diagram for the proposed air sparge well is shown in Figure 3.

All augers, sampling rods, samplers, and other downhole equipment will be steam-cleaned before drilling and before each new borehole is drilled. All drill cuttings and fluids from the steam cleaning will be contained on the site in sealed 55-gallon drums. The drums will be labeled with the borehole number, site description, depth interval of soil contents, date, and monitoring equipment readings. The drill cuttings will be disposed of at proper facilities upon receipt of soil sample analysis.

AQUIFER AIR SPARGE AND VAPOR EXTRACTION TESTS

The aquifer air sparge and soil vapor extraction tests will be conducted primarily to assess steady-state hydrocarbon removal rates before and after the injection of air into the shallow aquifer. Additional data collected will include vacuum, pressure, and helium concentration readings at the extraction wells and selected monitoring points, to evaluate the extent of the lateral influence of the soil vapor extraction and air sparge wells.

Before the air sparge test is done, a vapor extraction test will be performed. Grab vapor samples will be collected from selected existing vapor extraction wells to measure the oxygen and carbon dioxide content in the extraction well. These parameters are essential in determining the level of subsurface microbial activity.

A trailer-mounted electrical positive-displacement blower rated at 200 cubic feet per minute (cfm) with 10 inches of mercury vacuum (136 inches of water column) will be used to induce the subsurface vacuum. Each extraction well will be manifolded to the other wells by PVC pipe and connected to the blower. Air flow induced by the applied vacuum will be measured with an electronic flow meter. To abate petroleum hydrocarbons in the effluent air stream, air exhausted from the blower will be routed to two 200-pound vapor-phase activated carbon units connected in series. Treated air will be discharged directly to the atmosphere.

The extraction unit will be allowed to stabilize so that steady-state flow conditions can be obtained. During this time, vapor samples will be collected at regular intervals from the manifold and screened in the field to determine the hydrocarbon content. The distance from the extraction well to monitoring points will be recorded, along with vacuum readings at the monitoring points. The influence of vacuum on flow rates will be evaluated by collecting vacuum readings at various predetermined flow rates.

When the non-air-sparge data collection is complete, air with a helium tracer will be injected at various flow rates to the shallow aquifer through the installed sparge points. Vapor samples will be collected from the extraction well manifold and analyzed in the field. Helium concentrations and pressure and/or vacuum readings will be recorded at the monitoring points.

The hydrocarbon concentrations and the vacuum and/or pressure readings will be compared with those collected prior to air sparging. Changes in hydrocarbon concentrations and pressures will give an indication of the effectiveness of air sparging. The radial influence of the air sparge well will be determined by comparing the change in helium concentrations over distance.

After the air sparge test, a respiration test will be performed by monitoring oxygen levels in the monitoring wells over time. The oxygen data collected from the monitoring wells will be used to evaluate the rates of biodegradation and natural attenuation.

PREPARATION OF REPORT

A detailed report will be prepared which documents all site activities and analytical results. The report will include the following:

- soil boring logs and well construction diagrams
- blower capacity and vacuums required to induce flow through the soil
- the zones of influence of the wells used to extract soil vapor
- the concentrations of hydrocarbons in vapor samples collected from the vapor wells
- the injection pressures and the injection flow rates for the air sparge wells
- the zones of influence of the air sparge wells
- the increase in hydrocarbon concentrations extracted by the vapor extraction system due to air sparging
- the oxygen levels in the monitoring wells in the post-air-sparge respiration test.

Results from the air sparge and soil vapor extraction tests will provide necessary data for the design and upgrade of the vapor extraction system previously installed at the site. The results will also provide information on the rates of natural attenuation and biodegradation at the site.

SCHEDULE OF SITE ACTIVITIES

The air sparge wells will be installed pending approval and receipt of the well installation permits. EA plans to mobilize equipment and begin the combined vapor extraction and air sparge test in the week of 1 April 1996. The test will be conducted for a minimum of 4 continuous days. The Bay Area Air Quality Management District will be notified before the test is begun.

Figures

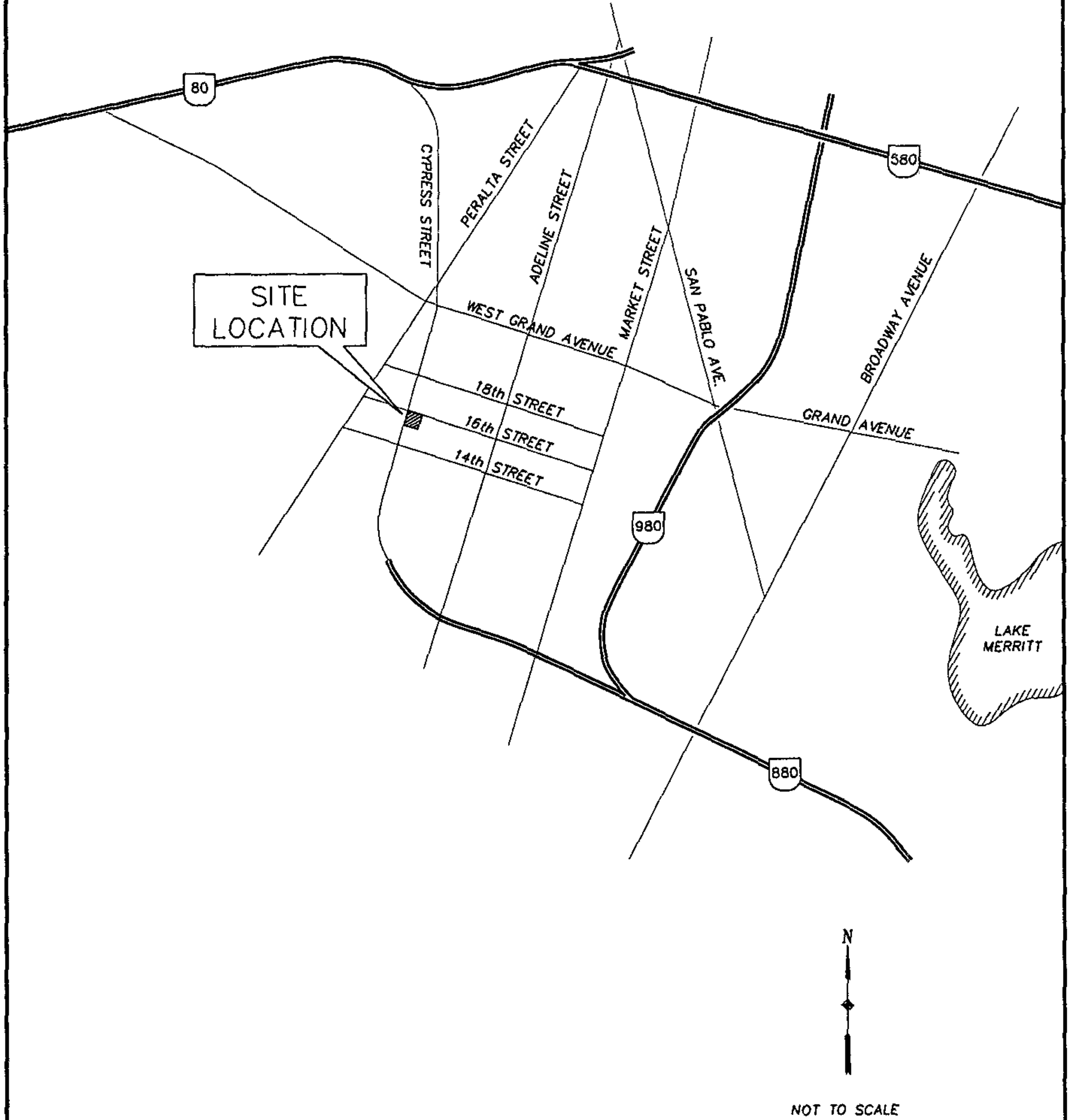

FIGURE 1.
SITE LOCATION MAP
NESTLE FACILITY
OAKLAND, CALIFORNIA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

PROJECT NO: 60966.01.0008	DATE: 2/8/96
FILE NAME: NESTLE3.DWG	REVIEWED BY: A. MOORE

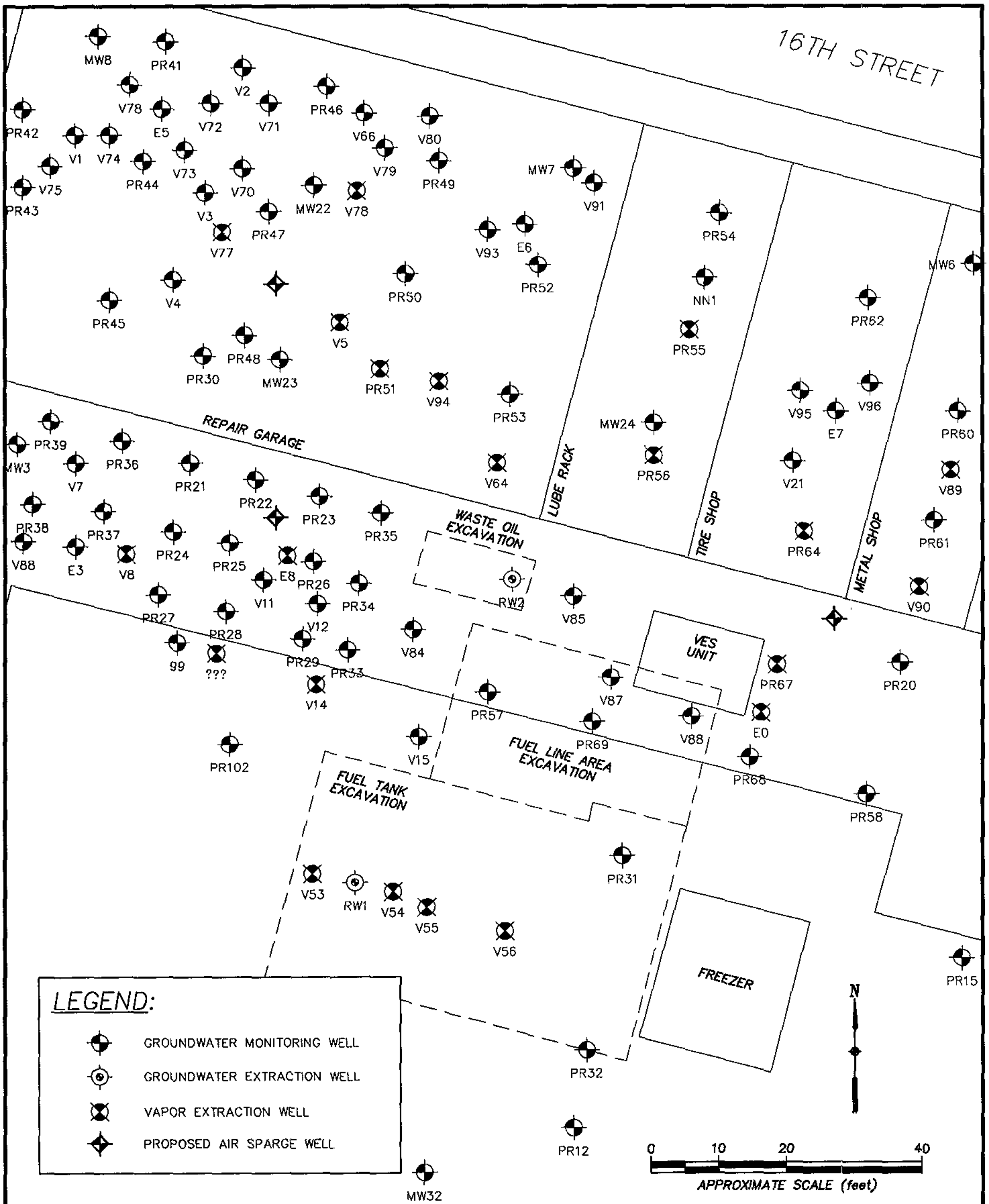

FIGURE 2.
PROPOSED AIR SPARGE WELL LOCATIONS
NESTLE FACILITY, OAKLAND, CALIFORNIA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

PROJECT NO.	DATE
60966.01.0008	3/6/96
FILE NAME: NESTLE4.DWG	REVIEWED BY: C. MARTING

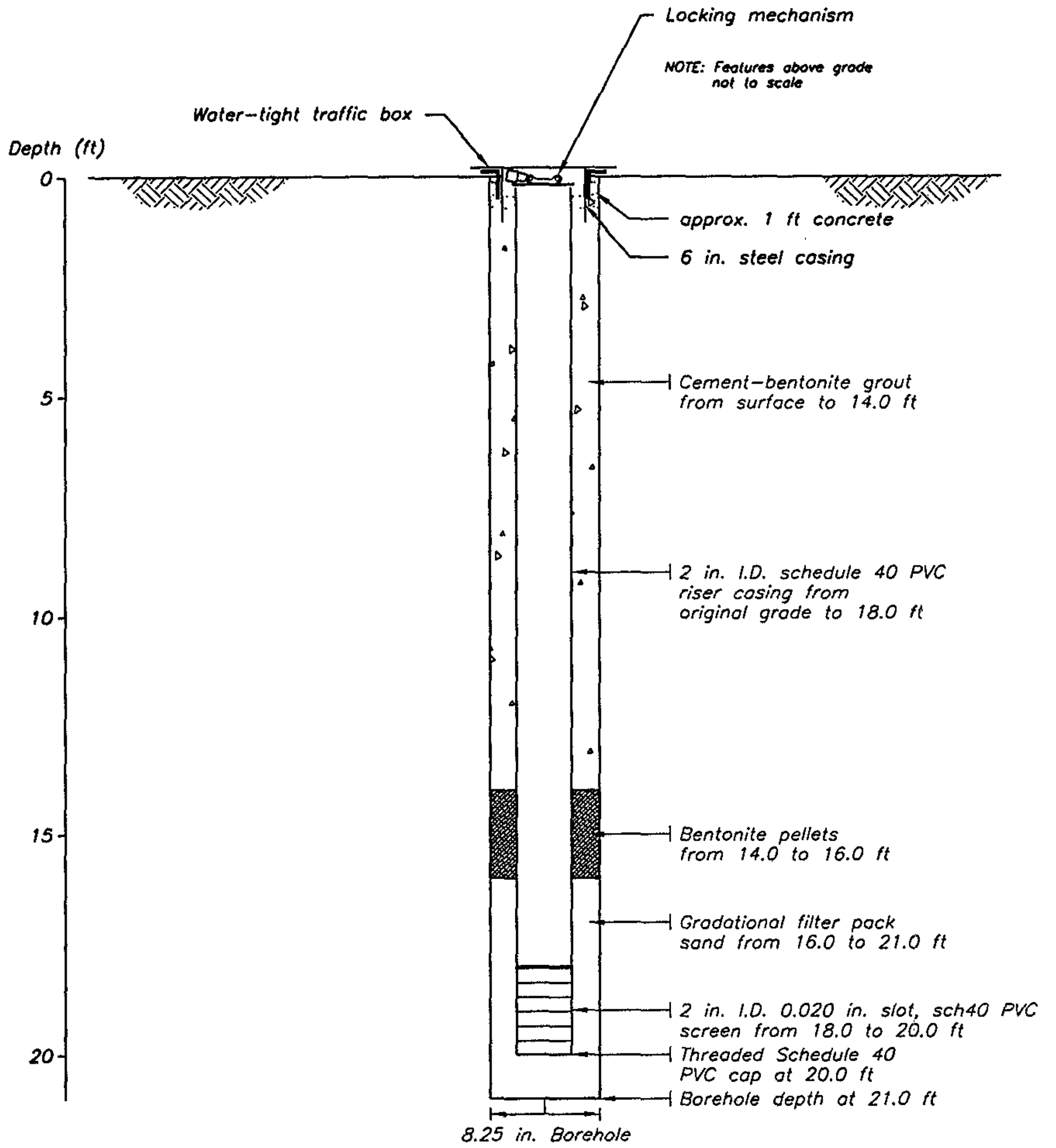

FIGURE 3.
PROPOSED AIR SPARGE WELL
NESTLE FACILITY
OAKLAND, CALIFORNIA

EA Engineering, Science, And Technology

PROJECT NO.: 60966.01.0006	DATE: 3/11/96
FILE NAME: AS_PROP.DWG	REVIEWED BY: C. MARTING

Appendix A

Protocols for Well Drilling, Completion, Development, and Sampling

APPENDIX A

PROTOCOLS FOR WELL DRILLING, COMPLETION, DEVELOPMENT, AND SAMPLING

A.1 DRILLING

Boreholes are drilled with a truck-mounted rotary drill, using hollow-stem continuous-flight augers. The diameter of the augers is selected to provide an annular space between the boring wall and the well casing of no less than 2 inches. The borehole is drilled 10 feet below the static water level but will not be allowed to penetrate a competent clay layer that might act as an effective aquitard: drilling is terminated after two consecutive samples indicate comparable, apparently impermeable clays below static water.

All augers, sampling rods, samplers, and other pieces of downhole equipment are steam cleaned before drilling begins and before each new borehole is drilled. All drill cuttings and fluids from the steam cleaning are contained on the site in sealed 55-gallon drums. The drums are labeled with the borehole number, site description (including owner's name), depth interval of soil contents, date, and monitoring equipment readings. The drill cuttings are disposed of at proper facilities on the basis of soil sample analysis.

A log of drilling and the borehole are recorded by an EA geologist overseeing the drilling operations and well installation. The boring logs, which are signed and dated by the geologist, contain detailed geological information, including descriptions of the soils classified according to the Unified Soil Classification System, blow counts, OVA readings, moisture content of the soils, and initial and static water levels.

A.2 SOIL SAMPLING

Soil samples are collected at of 5-foot or smaller intervals and at any substantial change of soil type, beginning at 5 feet below ground surface, with a 2-inch-diameter, 18-inch modified California split-spoon sampler containing three 6-inch brass liners. The sampler and liners are steam cleaned before use in each hole; they are scrubbed in deionized water and Alconox detergent and rinsed with deionized water after use at each sampling interval. Soil samples are collected to the total depth of the borehole unless heaving sand is encountered. Every attempt is made to collect a soil sample just above or at the water table.

At each sample depth, the sampler is driven 18 inches ahead of the augers into undisturbed soil. When the sampler is retrieved, either the lowermost or the middle sample liner is removed and the ends of the tube are covered with aluminum foil and sealed with plastic caps, which are secured to the liner with tape. The soil-filled liner is labeled with the location, sample number, date, time, depth, sampler, and borehole number. The samples are placed in zip-lock bags and stored in a cooler containing ice.

Soil is removed from the other two liners and examined. The soil is scanned with a Foxboro Century 128 organic vapor analyzer with a flame ionization detector (FID), and the OVA readings are noted on the logs. The soil is examined and classified according to the Unified Soil Classification System.

Selected soil samples are delivered, under chain of custody, to a laboratory certified by the California Department of Health Services (DHS) for hazardous materials analyses. The samples are analyzed for petroleum hydrocarbons in accordance with Table 2 of the "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" (RWQCB 1990).

A.3 WELL INSTALLATION

The boreholes are completed as groundwater monitoring wells, vapor extraction wells, or air sparging wells. The wells are constructed by installing Schedule 40 PVC flush-threaded casing through the inner opening of the auger. The screened interval consists of slotted casing of the appropriate slot size, placed from 10 feet below the water table to 5 feet above it for groundwater monitoring wells. Vapor extraction wells are completed with the screened interval placed in the vadose zone. Air sparging wells are completed with a 2-foot screened interval placed approximately 10 feet below first encountered groundwater. A threaded end plug or a slip cap secured with a stainless steel screw is placed on the bottom of the well.

A filter pack of clean sand of the appropriate size is placed in the annular space around the well screen to approximately 2 feet above the top of the screen. The sand is placed through the inner opening of the augurs as they are slowly removed. The sand is sealed by adding 1–2 feet of bentonite pellets and hydrating them with deionized water. A surface seal is then created by placing a cement grout containing less than 5 percent bentonite from the bentonite spacer to the surface with a tremie pipe or grout pump.

The well is finished at the surface with a slightly raised, 12-inch-diameter traffic-rated, water-tight steel traffic box set in concrete. The traffic box is secured against unauthorized entry with a cap that requires a special wrench to open; the casing is further secured with a locking well cap.

A.4 WELL DEVELOPMENT

The wells are developed 2–3 days after completion. Development consists of surging the screened interval of the well with a flapper valve surge block of appropriate size for approximately 15 minutes. The well is then purged, with a submersible electric pump, centrifugal pump, air-lift pump, or PVC bailer, of 2–6 casing volumes of water. The surging and pumping are repeated until the water is free of silt and apparent turbidity, for a maximum of 4 hours.

A record of the purging methods and volumes of water purged is maintained. All purge water is contained on the site in properly labeled 55-gallon drums and disposed of at an appropriate facility on the basis of the laboratory analytical results.

A.5 WELL SURVEY

The elevation of the top of the well casing is surveyed relative to an established datum with a Lietz C-3 automatic level and a stadia rod. A small notch is cut in the top of the well casing to mark the survey point, to ensure that this point is used for all future water level measurements. A loop originating and ending at the datum is closed to ±0.01 feet according to standard methods (Brinker and Wolfe 1977).

A.6 GROUNDWATER SAMPLING

The new groundwater monitoring wells are sampled at least 24 hours after development.

A.6.1 Sampling Equipment Preparation

To the extent possible, well measurement and sampling equipment is constructed of inert material. Sampling bailers are made of Teflon. Stainless steel submersible or airlift pumps, surface centrifugal pumps with dedicated polyethylene tubing, or PVC bailers are used to purge the well prior to sampling, depending on the depth to water. All sampling equipment is decontaminated in the following manner prior to introduction into each well:

1. Bailers, pumps, suspension rope and lines, and well sounding tapes are rinsed thoroughly with clean, fresh water to remove dust and dirt.

2. All equipment is cleaned with Alconox detergent and deionized (DI) water inside and out. The equipment may be cleaned offsite and stored and transported in steam-cleaned and protected inert containers. Fluids that have been used to decontaminate equipment on the site are stored with other purge water. Nitrile gloves are worn at all times during sample equipment cleaning, handling, and sample collection.

3. All equipment is thoroughly rinsed with deionized (DI) water immediately after cleaning.

4. All equipment is thoroughly rinsed with DI water twice before insertion into a well.

5. Bailers and pumps are suspended on clean, DI-water-rinsed lengths of polypropylene rope. The rope is discarded after use in a single well.

A.6.2 Presampling Measurements

Prior to purging and sampling, the depth to standing water and the total depth of the well are measured with a decontaminated optical or sonic interface probe. A decontaminated clear acrylic bailer is then inserted into the well to just below the static water level and removed to confirm the presence or absence of any floating liquid-phase hydrocarbons. These presample measurement data are recorded on a Record of Well Gauging and Purging and used to calculate the volume of standing water in the well (one well casing volume). Measurements are made to the nearest 0.01 foot, referenced to the survey reference point on the well casing.

A.6.3 Well Purging

To ensure that the sample collected is as representative as possible of groundwater in the aquifer, standing water in the well and the surrounding sand pack is purged. Between 4 and 6 casing volumes of well water are purged to ensure that all stagnant water has been removed. The well is purged with a submersible, airlift, or surface pump or with a bailer, decontaminated as described above in Section A.6.1.

Should the well pump dry after the casing is initially dewatered, purging is discontinued and the well allowed to recover. Purging is continued to obtain the desired purge volume.

Field parameters of pH, temperature, and electrical conductance are measured as the well is purged. Measurements are taken and recorded approximately every 5 gallons. If any of the three field parameters has not stabilized by the time the 4–6 casing volumes have been purged, additional well water is pumped until the parameters have stabilized (but no more than 10 casing volumes). "Stabilized" is defined as a change in the reading amounting to less than 10 percent of the previous reading.

All purge water is contained in 55-gallon drums labeled with well number, date, contents, and facility identification. After the well has been purged of the required volume of water, the purging equipment is removed. A Teflon sampling bailer is used to collect four separate samples for presample field parameter measurements, to confirm field parameter stability and, therefore, representative aquifer samples.

A.6.4 Well Sampling

All samples are collected with a Teflon bailer cleaned as discussed in Section A.6.1. The bailer is operated by hand on a new, 1/4-inch polypropylene rope or on Teflon-coated stainless steel wire. The sampling personnel wear clean Nitrile gloves during sampling operations and while handling sample bottles.

The collected groundwater samples are emptied from the bailer with a bottom-emptying device directly into the sample bottles. The samples are collected in either 40-ml glass VOA vials or 1-liter amber bottles with Teflon-lined septum caps. The sample bottles contain appropriate preservatives, typically hydrochloric acid. The samples are contained in the containers free of headspace (i.e., with no air bubbles).

The filled sample containers are labeled with well number, date, location, sampler's initials, and preservative in indelible ink, and the sample labels are covered with clear waterproof tape.

The sample vials are placed in an iced cooler for delivery to a DHS-certified laboratory for analysis. Standard chain-of-custody procedures are followed.

A.6.5 Blanks

In addition to the groundwater samples, a trip blank and a decontamination blank are analyzed during each sampling round. A 40-ml glass VOA bottle with a Teflon septum lid, filled with DI water at the laboratory, functions as a trip blank. This trip blank travels with the sample kit from the laboratory to the facility and back to the laboratory again in the sample cooler. The blank is analyzed for the same parameters as the samples to indicate if the samples have been contaminated, from whatever source, during the trip from the site to the laboratory.

A decontamination blank is prepared in the field during well sampling. After the first well is sampled, DI water is poured into the clean, rinsed sampling bailer that is to be used for sampling the next well. This DI water is then emptied, as a sample, into a preserved 40-ml VOA bottle for analysis with the samples and trip blank. The decontamination blank indicates if any of the samples are contaminated from the sampling equipment or decontamination process.

A.6.6 Sample Analysis

All groundwater well samples, the trip blank, and the decontamination blank are analyzed by the laboratory according to Table 2 of the "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites," typically for Total Petroleum Hydrocarbons as gasoline (TPH-g) by DHS-modified EPA Method 8015 and for the aromatic hydrocarbons benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020.