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Clayton
ENVIRONMENTAL
CONSULTANTS

September 6, 1994

Ms. Juliet Shin
Hazardous Materials Specialist
ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
1131 Harbor Bay Parkway, 2nd Floor
Alameda California 94502

Clayton Project No. 57787.00

Subject: Further Subsurface Investigation at the Ballena Isle Marina Facility at 1150 Ballena Boulevard in Alameda, California

Dear Ms. Shin:

On behalf of the Ballena Isle Marina Clayton Environmental Consultants, Inc. is pleased to submit the work plan for further subsurface investigation at the Ballena Isle Marina facility located at 1150 Ballena Boulevard in Alameda, California.

If you have Any questions please call me or Mr. John Vargas at (510) 426-2600.

Sincerely,

Dariush Dastmalchi
Geologist

DD/dd
cc: Mr. Don Anderson, Ballena Isle Marina

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Work Plan to Install a Monitoring Well
at
Ballena Isle Marina
1150 Ballena Boulevard
Alameda, California

Clayton Project No. 57787.00
September 8, 1994

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1.0 INTRODUCTION

Ballena Isle Marina retained Clayton Environmental Consultants, Inc. to prepare a work plan for the future activities planned for the Ballena Isle Marina facility located at 1150 Ballena Boulevard in Alameda, California.

The subject facility is located on an artificial island in a commercial area of the City of Alameda (Figure 1). The site is currently used as a yacht harbor by Ballena Isle Marina.

A waste oil underground storage tank (UST) was located under the sidewalk, approximately 30 feet from the San Francisco Bay shoreline. A site diagram showing the tank location is included in Figure 2.

2.0 BACKGROUND

In September 1991 a 250-gallon waste oil UST was removed from the subject facility by the owner of the site. The soil around the tank appeared to be impacted with petroleum hydrocarbons. One soil sample was collected from the excavation pit and transported to Trace Analysis Laboratory (TAL). The soil sample was analyzed using the following methods:

- Department of Health Services (DHS) Method for total petroleum hydrocarbons as gasoline (TPH-G)
- DHS Method for total petroleum hydrocarbons as diesel (TPH-D)
- United States Environmental Protection Agency (USEPA) Method 8020 for benzene, toluene, ethylbenzene, and xylenes (BTEX)
- USEPA Method 8010 for chlorinated hydrocarbons
- Standard Method (SM) 5520 for total oil and grease (TOG)
- USEPA 7000 series Methods for cadmium, chromium, lead, nickel, and zinc

Analytical results of the soil samples collected from the excavation pit identified TPH-G, TPH-D, and TOG above the analytical detection limits. Analytical results for organic compounds are summarized in Table 1.

Table 1

Analytical Results for Soil Samples Collected by TAL in September 1991
All Concentrations in Milligrams per Kilogram (mg/kg)

Sample	TPH-D	TPH-G	TOG	Toluene	Ethylbenzene	Xylenes
1	5,700	860	11,000	3.9	13	140

Subsequently, the excavation pit was overexcavated to remove petroleum hydrocarbon impacted soils. According to the ENSR Consulting and Engineering (ENSR) report dated May 21, 1992, two soil samples were collected from the overexcavated tank pit. One sample was collected from the north wall of the pit (SW-1) and the other sample was collected from the bottom of the pit (PB-1). The soil samples were analyzed for the following:

- USEPA Method 8015 for TPH-G
- USEPA Method 8015 for TPH-D
- USEPA Method 8020 for BTEX
- USEPA Method 8240 for volatile organic compounds (VOCs)
- SM 5520 for TOG
- Cadmium, chromium, lead, nickel, and zinc

Analytical results of the soil samples collected by ENSR identified TPH-D and TPH-G in the soil samples from the excavation pit. Analytical results for petroleum hydrocarbons are summarized in Table 2.

Table 2

Analytical Results for Soil Samples Collected by ENSR in May 1992
All Concentrations in Milligrams per Kilogram (mg/kg)

Sample	TPH-D	TPH-G	TOG	Benzene	Toluene	Ethylbenzene	Xylenes
SW-1	2,200	91	5,300	ND	ND	ND	1.9
PB-1	1,800	79	4,200	ND	1	0.84	9.2

ND = Not detected at or above the analytical detection limits

Further excavation of the contaminated soil was not possible because the excavation pit is bounded by a building foundation on the south and southwest, and utility vaults on the north.

In December 1992 Law/Crandall, Inc. drilled five soil borings and collected five samples (B-1 through B-5) from the surrounding area of the former waste oil UST. The soil samples were collected from approximately 10 feet below ground surface (bgs) and approximately 8 to 34 feet away from the excavation pit. In addition, one grab water sample was collected from hydropunch (HP-1) located approximately 8 feet northwest of the pit.

The soil and grab water samples were analyzed for the following:

- USEPA Method 8015 for TPH-G
- USEPA Method 8015 for TPH-D
- USEPA Method 8020 for BTEX
- USEPA Method 8240 for VOCs
- USEPA Method 8270 for semivolatile organic compounds (SVOCs)

- USEPA Method 8080 for polychlorinated biphenyls (PCBs) and pesticides
- SM 5520 for TOG
- Cadmium, chromium, lead, nickel, and zinc

TOG was detected in the soil samples ranging from 53 mg/kg in soil sample B-5 to 110 mg/kg in soil sample B-1. The grab water sample contained a toluene concentration of 0.3 micrograms per liter (µg/L). The other analytes in the soil and grab water samples were not detected at or above the analytical detection limits.

On October 2, 1993, Hydrocarbon Consultants collected a grab water sample from the excavation pit (OP-1). Sample OP-1 was analyzed for the following:

- TPH-G using USEPA Method 8015
- TPH-D using USEPA Method 8015
- BTEX using USEPA Method 8020
- SVOC using USEPA Method 8270
- PCBs using USEPA Method 8080
- TOG using SM 5520
- Cadmium, chromium, lead, nickel, and zinc

Analytical results for the soil sample OP-1 are summarized in Table 3.

Table 3

Analytical Results for Grab Water Sample OP-1
Collected by Hydrocarbon Consultant in September 1993
All concentrations in µg/L

Sample	TPH-D	TPH-G	TOG	Toluene	Ethylbenzene
OP-1	9,100	580	43,000	3.9	19

SVOCs, PCBs, and metals were not detected at concentrations at or above the analytical detection limit.

In March 1994 Clayton prepared a work plan to collect a soil sample from the excavation pit, and install a temporary monitoring well (TW-1) and collect a grab water sample. This work plan was prepared at the request of Alameda County Health Care Services (ACHCS). The work plan was approved by the ACHCS on March 17, 1994.

The soil and groundwater samples were analyzed for TPH-D, TPH-G, BTEX, and TOG. The groundwater sample was also analyzed for total dissolved solids (TDS). Analytical results identified TPH-D in the soil and groundwater samples. TPH-G and TOG were detected in the soil sample from the excavation pit. The groundwater sample did contain TPH-G, TOG, or BTEX at concentrations at or above the analytical detection limits.

3.0 SCOPE OF WORK

On July 19, 1994, ACHCS requested that Ballena Isle Marina prepare a work plan to install a permanent monitoring well (MW-1) and collect quarterly groundwater samples for a period of at least 1 year. A copy of the ACHCS letter is included in Appendix A.

This work plan describes activities planned at the Ballena Isle Marina site to install monitoring well MW-1 and collect groundwater samples near the former UST. This work plan is based on the ACHCS letter dated July 19, 1994. The tasks required to perform this investigation are described in the following subsections.

3.1 TASK 1: HEALTH AND SAFETY PLAN

Before commencing the field activities Clayton will prepare a health and safety plan for the work outlined in the work plan. The health and safety plan will be 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: DRILLING AND MONITORING WELL INSTALLATION PERMITS

Before commencing the field activities, Clayton will obtain the necessary permits from the Zone 7 Water Agency.

3.3 TASK 3: IDENTIFICATION OF UNDERGROUND UTILITY TRENCHES

Clayton will contact Underground Service Alert (USA) to identify the utilities in the vicinity of the soil boring location. The identified utilities will be clearly marked on the ground. Clayton will not drill within 3 feet of a known utility line.

3.4 TASK 4: MONITORING WELL INSTALLATION AND SAMPLING

Clayton will install monitoring well MW-1 near the previous location of temporary well TW-1 to monitor the groundwater for the presence of petroleum hydrocarbons and TDS. The proposed monitoring well location is shown in Figure 2.

During drilling of the 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. Drilling activities will be conducted in accordance with the Regional Water Quality Control Board (RWQCB) guidelines and Clayton's Drilling, Well Construction, and Sampling Protocols for Borehole/Monitoring Well Installation (Appendix B), under the supervision of a geologist registered in the State of California.

The monitoring well will be drilled to an approximate depth of 20 feet (bgs). Clayton will collect soil samples at 5 foot intervals from the monitoring well for laboratory analysis. We anticipate that the groundwater will be encountered at approximately 10 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 indications of contamination are observed using the PID at depths other than at the

specified sampling depth, Clayton will collect additional samples until groundwater is encountered.

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

The monitoring well will be extended approximately 10 feet into the first encountered groundwater and constructed of 2-inch polyvinyl chloride (PVC) casing. Screened casing will be used extending 1 to 3 feet above the water table. Solid casing will then be installed to the surface. The sand pack will extend 2 feet above the screen. A 1-foot 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 inch to prevent surface runoff from entering the well head.

The soil cuttings and sampling spoils generated by the drilling process will be placed on plastic sheeting, covered with plastic, and left onsite until the material can be properly disposed of at a landfill.

3.5 TASK 5: MONITORING WELL DEVELOPMENT AND SAMPLING

Following completion of the well, the seal in the newly installed well will be allowed to set for 72 hours prior to well development. The new well will then be developed to increase its yield and to prevent native material from entering the well casing. Well development is accomplished by removing finer materials from the natural formations surrounding the perforated sections of the well and sorting the sand pack to retard migration of finer materials. Development of the well can volatilize present contaminants; therefore, the well will be allowed to settle for another 72 hours between development and the first purging/sampling event.

A water sample from the well will be collected using clean disposable bailers. Water will be collected in clean laboratory supplied containers and placed immediately into an iced cooler for transport to Clayton's laboratory for analysis. One trip blank will be furnished in accordance with Clayton's quality assurance/quality control (QA/QC) program. The trip blank will be analyzed only if cross-contamination is suspected.

The water generated from well development and sampling will be placed into DOT-approved 55-gallon drums until laboratory results from groundwater samples can be evaluated to determine the proper disposal method.

3.6 TASK 6: LABORATORY ANALYSIS

One soil and one water sample will be collected and transported to the state-certified laboratory.

The soil and groundwater samples will be analyzed using the following methods:

- USEPA Method 8015 for TPH-D

- USEPA Method 8015 for BTEX
- USEPA Method 160.1 for TDS
- SM 5520 for TOG

3.7 TASK 7: QUARTERLY SAMPLING AND ANALYSIS

Clayton will collect and analyze groundwater samples from the monitoring well on a quarterly basis for a total of four quarters (Including the initial sampling after the monitoring well installation). The water generated from the well sampling events will be placed into DOT approved 55-gallon drums until laboratory results from groundwater and soil samples can be evaluated to determine proper disposal method. These drums will be closed, labeled, and stored on onsite.

3.8 TASK 8: DATA ANALYSIS AND REPORT PREPARATION

Upon completion of the each quarterly sampling and laboratory analysis, a report summarizing the findings of the investigation will be prepared. A discussion of the site investigation technique, soil and water sampling, analytical results, conclusions, and recommendations will be included in the reports.

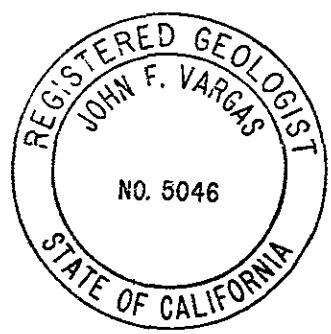
4.0 SCHEDULE

The work on this project can begin within 10 days after receipt of authorization to proceed from the ACHCS.

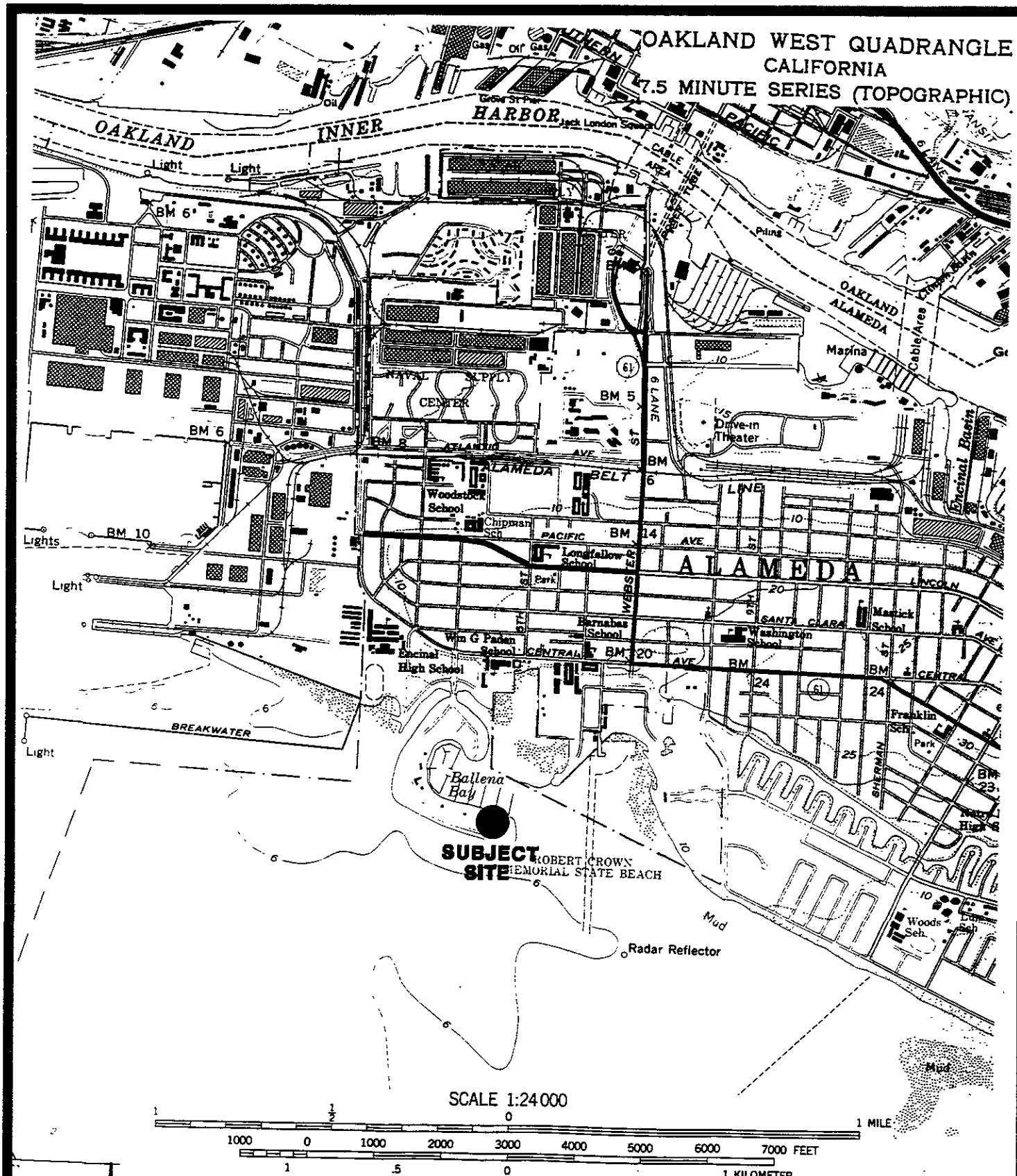
This work plan prepared by: _____
Dariush Dastmalchi
Geologist

This work plan reviewed by: _____
John F. Vargas, R.G.
Supervisor, Geosciences and Remediation
San Francisco Regional Office

September 8, 1994



FIGURES



Site Location and topographic Map
BALLENA ISLE MARINA
1150 Ballena Boulevard
Alameda, California

Clayton Project No. 57787.00

Figure
1

57798-00-16

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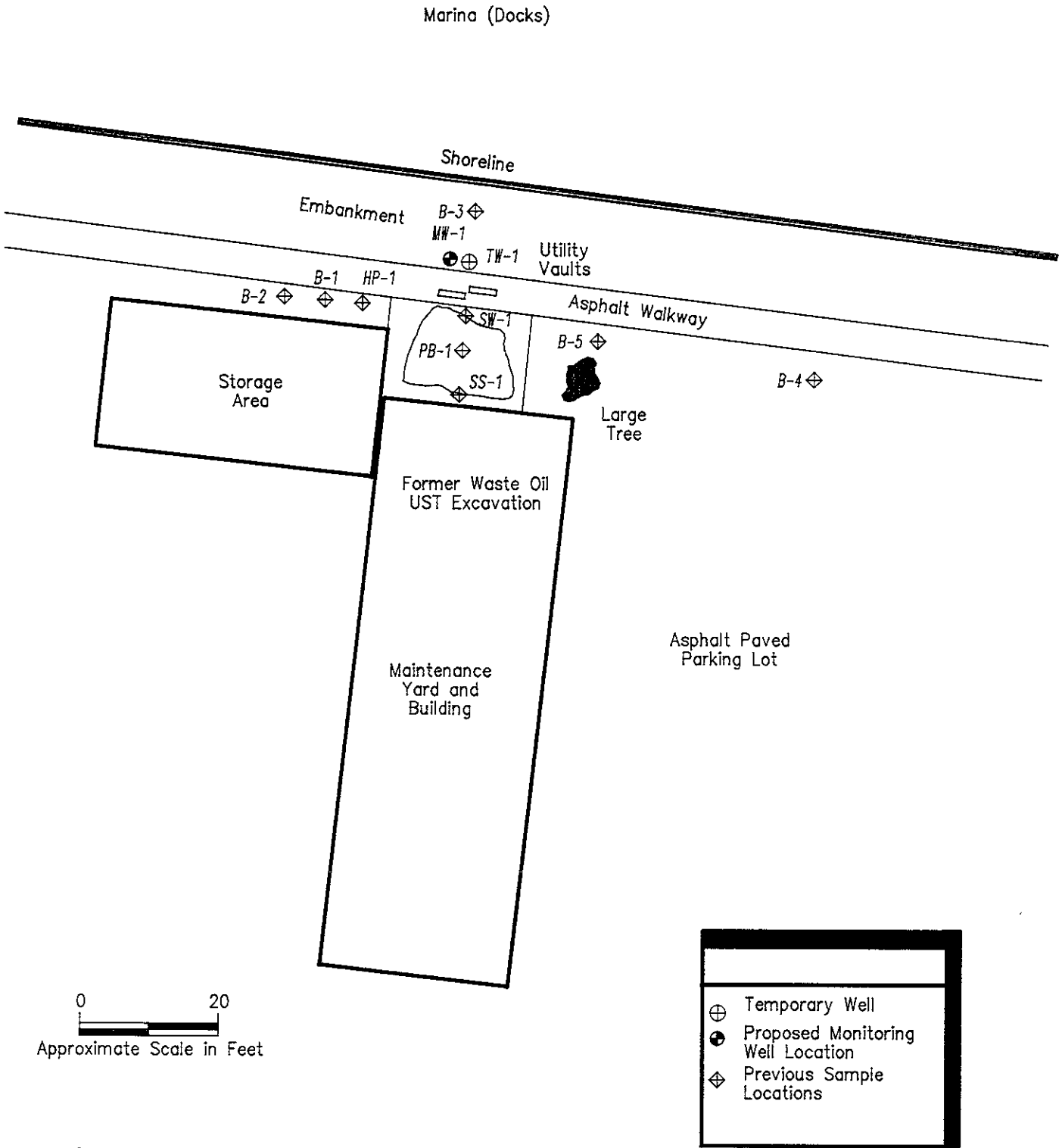

Site Map
BALLENA ISLE MARINA
1150 Ballena Boulevard
Alameda, California

Clayton Project No. 55434.00

Figure
2
55434-00-17

Clayton
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APPENDIX A

ACHCS LETTER DATED JULY 19, 1994

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

RAFAT A. SHAHID, Assistant Agency Director

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
1131 HARBOR BAY PARKWAY, 2ND FLOOR
ALAMEDA, CA 94502-6577

July 19, 1994

Mr. Don Anderson
Ballena Isle Marina
Ballena Bay Yacht Harbor
1150 Ballena Blvd.
Alameda, CA 94501

STID 3822

Re: Investigations at 1150 Ballena Blvd., Alameda, California

Dear Mr. Anderson,

This office has reviewed Clayton Environmental's Subsurface Investigation Report, dated June 24, 1994. The soil sample collected from the south side of the tank pit identified 2,100 parts per million (ppm) Total Oil & Grease and 460 ppm Total Petroleum Hydrocarbons as diesel (TPHd). The ground water sample collected from the temporary well, TW-1, identified 260 parts per billion (ppb) TPHd. Based on the levels of soil contamination remaining in place and the results of the ground water "grab" sample, this office is requiring that a permanent monitoring well be installed between the marina and the tank pit, and be monitored on a quarterly basis for a minimum of four quarters. If unacceptable levels of contaminants continue to be identified from the monitoring well, one of the following actions may be required:

- An ecological risk assessment - to assess the potential threat of observed contaminant levels on aquatic life.
- Remediate the remaining source of ground water contamination.

However, if contaminant concentrations attenuate to acceptable levels, the site may be considered for closure.

A work plan addressing the installation and sampling of a permanent monitoring well shall be submitted to this office **within 60 days of the date of this letter**. This is a formal request for a technical report, pursuant to **Section 2722(c), Title 23 California Code of Regulations**.

If you have any questions or comments, please contact me at (510) 337-2874 or (510) 337-2864. Please be aware that these phone numbers are temporary and will only be in operation for the next four to five weeks.

Sincerely,

Juliet Shin
Hazardous Materials Specialist

cc: Dariush Dastmalchi
Clayton Environmental
P.O. Box 9019
Pleasanton, CA 94566

Edgar Howell-File(JS)

APPENDIX B

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.