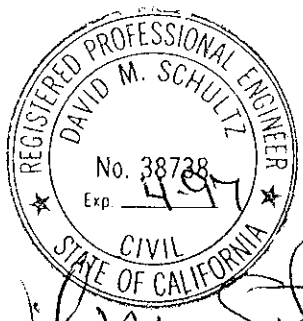
aqua science engineers inc.

October 15, 1996

# WORKPLAN
for
# SOIL AND GROUNDWATER ASSESSMENT
at
Zima Center Corporation
2951 High Street
Oakland, California




Submitted by:
AQUA SCIENCE ENGINEERS, INC.
2411 Old Crow Canyon Road, #4
San Ramon, CA 94583
(510) 820-9391
(436)-4700

## 1.0 INTRODUCTION

This submittal outlines Aqua Science Engineer's, Inc. (ASE) workplan for a soil and groundwater assessment at the Zima Center Corporation located at 2951 High Street in Oakland, California (Figure 1). The proposed site assessment activities were initiated by Mr. Mohammad A. Mashhoon, owner of the property, as required in a letter from the Alameda County Health Care Services Agency (ACHCSA) dated September 17, 1996 (Appendix A).

## 2.0 SITE HISTORY

The site is an operating gasoline service station and mini-market. The following site history is based on a review of the following reports prepared by ASE, Soil Tech Engineering, Inc. (STE) and from conversations with Mr. Mohammad A. Mashhoon, owner of the property.

* "Soil Sampling Below Removed Underground Storage Tank from the Property Located at 2951 High Street, Oakland, California" prepared by STE dated September 30, 1993.

* "Remedial Excavation Activities and Soil Sampling at the Property Located at 2951 High Street, Oakland, California" prepared by STE dated December 15, 1993.

* "Preliminary Site Assessment for the Property Located at 2951 High Street, Oakland, California" prepared by STE dated March 8, 1995.

* "Quarterly Groundwater Monitoring and Sampling at the Property Located at 2951 High Street, Oakland, California" prepared by STE dated August 31, 1995.

* "Report of Soil and Groundwater Assessment at Zima Center Corporation, 2951 High Street, Oakland, California" prepared by ASE dated July 17, 1996.

In September 1993, one (1) 300-gallon waste oil underground storage tank (UST) was removed by Alpha Geo Services of Santa Clara, California. One soil sample was collected by STE approximately two (2) feet beneath the former UST. This sample contained 40 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G), 120 ppm total oil and grease (TOG), 0.13 ppm benzene, 0.33 ppm toluene, 0.018 ppm ethylbenzene, 0.50 ppm total xylenes, 0.091 ppm 1,1,2,2-tetrachloroethane and 0.034 ppm

1,1,2-trichloroethane. A soil sample collected from the stockpiled soil produced during the UST removal contained 48 ppm TPH-G, 70 ppm TOG, 0.65 ppm benzene, 1.8 ppm toluene, 0.38 ppm ethylbenzene, 2.5 ppm total xylenes, 0.036 ppm 1,1,2,2-tetrachloroethane and 0.085 ppm 1,1,2-trichloroethane. No total petroleum hydrocarbons as diesel (TPH-D), semi-volatile organic compounds (SVOCs) or elevated metal concentrations were detected in these samples.

In October 1993, STE overexcavated approximately 40 cubic yards of contaminated soil from the former waste oil UST area. Confirmation soil samples were then collected from each excavation sidewall as well as from the floor of the excavation. Up to 2.6 ppm TPH-G, 3,700 ppm TOG, 0.014 ppm benzene, 0.013 ppm toluene, 0.005 ppm ethylbenzene, 0.018 ppm total xylenes and 0.042 ppm tetrachloroethylene (PCE) were detected in the confirmation soil samples. The TOG concentration of 3,700 ppm was, however, only in one location. The other samples contained TOG concentrations ranging from non-detectable to 120 ppm. The contaminated soil was subsequently disposed of at the Forward Landfill in Stockton, California under manifest.

In February 1995, STE drilled four (4) soil borings at the site and installed groundwater monitoring wells in the borings. No hydrocarbons were detected in soil samples collected from borings MW-1 and MW-3. Up to 3.5 ppm TPH-G, 21 ppm TOG, 0.005 ppm toluene, 0.0058 ppm ethylbenzene and 0.054 ppm total xylenes were detected in soil samples collected from monitoring well MW-2. Up to 110 ppm TPH-D, 1,900 ppm TPH-G, 200 ppm TOG, 3.5 ppm benzene, 4.7 ppm toluene, 3.9 ppm ethylbenzene and 11 ppm total xylenes were detected in the soil sample collected from 6-feet below ground surface (bgs) in monitoring well MW-4. Much lower hydrocarbon concentrations (4.6 ppm TPH-G, 0.048 ppm benzene, 0.026 ppm toluene, 0.037 ppm ethylbenzene and 0.06 ppm total xylenes) were detected in the soil sample collected from 11-feet bgs in boring MW-4, and no hydrocarbons were detected in the soil sample collected from 16-feet bgs in boring MW-4. Groundwater samples were collected following the installation and development of the monitoring wells. 3,300 parts per billion (ppb) TPH-G, 470 ppb TPH-D, 18,000 ppb TOG, 9.6 ppb benzene, 13 ppm toluene, 8 ppb ethylbenzene and 28 ppb total xylenes were detected in groundwater samples collected from monitoring well MW-2. Only 280 ppb TPH-D and 600 ppb TOG were detected in groundwater samples collected from monitoring well MW-1 with no TPH-G or benzene, toluene, ethylbenzene and total xylenes (BTEX) concentrations detected. No hydrocarbons were detected in the groundwater samples collected from monitoring well MW-3, and no

volatile organic compounds (other than BTEX) were detected in groundwater samples collected from any of the monitoring wells. Monitoring well MW-4 contained a sheen and was not sampled. The groundwater flow direction at the time of this initial assessment was to the north.

Following the initial assessment, the site was placed on a quarterly groundwater sampling schedule. During the next two quarters, up to 4,600 ppb TPH-G, 39 ppb benzene, 18 ppb toluene, 21 ppb ethylbenzene and 39 ppb total xylenes were detected in groundwater samples collected from monitoring well MW-2. No hydrocarbons were detected in groundwater samples collected from monitoring wells MW-1 and MW-3 during this period. In addition, no TPH-D, TOG or VOCs (other than BTEX) were detected in any of the groundwater samples during this period. Monitoring well MW-4 contained a sheen throughout this period and was not sampled. During the May and August 1995 sampling periods, the groundwater flow direction was to the south.

In June 1996, ASE drilled five soil borings at the site and collected soil and groundwater samples for analysis. ASE also collected groundwater samples from monitoring well MW-4. 39 ppm TPH-G, 0.43 ppm benzene, 0.086 ppm toluene, 0.47 ppm ethylbenzene, 1 ppm total xylenes and 0.90 ppm MTBE were detected in the soil sample collected from 5.0-feet bgs in boring BH-A. 0.045 ppm benzene, 0.043 ppm toluene, 0.021 ppm total xylenes and 2.0 ppm MTBE were detected in the soil sample collected from 15.0-feet bgs in boring BH-B. No TPH-G or BTEX were detected in the soil samples collected from borings BH-C, BH-D and BH-E. MTBE concentrations in these samples ranged from non-detectable at a detection limit of 0.005 ppm to 1.7 ppm. Relatively high hydrocarbon concentrations were detected in most of the water samples analyzed, especially those from borings BH-A, BH-B and monitoring well MW-4. These borings are to the north or west of the existing USTs. Groundwater concentrations were as high as 23,000 ppb TPH-G, 4,600 ppb benzene, 2,800 ppb toluene, 700 ppb ethylbenzene, 2,700 ppb total xylenes and 13,000 ppb MTBE in boring BH-A. 4,000 ppb TPH-G, 490 ppb benzene, 680 ppb toluene, 100 ppb ethylbenzene, 520 ppb total xylenes and 620 ppb MTBE were detected in groundwater samples collected from boring BH-B. 2,500 ppb TPH-G, 230 ppb benzene, 64 ppb toluene, 99 ppb ethylbenzene, 110 ppb total xylenes and 5,700 ppb MTBE. Much lower hydrocarbon concentrations were detected in groundwater samples collected from borings BH-C and BH-E. Groundwater was encountered in these borings at 26-feet bgs which is much deeper than in the pre-existing site monitoring wells. No groundwater was encountered in boring BH-D.

## 3.0 PROPOSED SCOPE OF WORK (SOW)

Based on the site history and requirements outlined in the ACHCSA September 17, 1996 letter, ASE's proposed SOW is as follows:

1) Prepare a workplan for approval by the ACHCSA.

2) Obtain all necessary permits from the appropriate agencies including an Alameda County Flood Control and Water Conservation District - Zone 7 well construction permit and City of Oakland encroachment and excavation permits. ASE will also notify Underground Service Alert (USA) to have all known public utility lines marked.

3) Drill one (1) soil boring in the City of Oakland right-of-way downgradient of the site assuming a groundwater flow direction to the north.

4) Analyze one soil sample from the boring at a CAL-EPA certified environmental laboratory for total petroleum hydrocarbons as gasoline (TPH-G) by modified EPA Method 5030/8015 and benzene, toluene, ethylbenzene and total xylenes (BTEX) and MTBE by EPA Method 8020.

5) Install a 2-inch diameter groundwater monitoring well in the boring described in task 3.

6) Develop the well and collect groundwater samples for analyses.

7) Analyze the groundwater samples at a CAL-EPA certified environmental laboratory for TPH-G, BTEX and MTBE.

8) Survey the top of casing elevation of the well relative to the existing on-site wells and determine the groundwater flow direction and gradient beneath the site.

9) Prepare a report detailing the methods and findings of the assessment.

10) Collect groundwater samples at the site on a quarterly basis, analyze the samples for TPH-G, BTEX and MTBE at a CAL-EPA certified analytical laboratory, and prepare quarterly monitoring reports.

Each of these tasks are described in detail below.

*TASK 1 - PREPARE A WORKPLAN AND HEALTH AND SAFETY PLAN*

Based on the site history and requirements outlined in the ACHCSA letter dated September 17, 1996, ASE has prepared this workplan. A site specific health and safety plan was previously prepared for the site and was included in ASE's June 19, 1996 workplan. This health and safety plan will be implemented again for this phase of work.

*TASK 2 - OBTAIN ALL NECESSARY PERMITS FROM THE APPROPRIATE AGENCIES FOR MONITORING WELL INSTALLATION*

ASE will obtain a well construction permit from the Alameda County Flood Control and Water Conservation District (Zone 7). ASE will also obtain encroachment and excavation permits from the City of Oakland to allow for the installation of a monitoring well in the City of Oakland right of way. ASE will also contact Underground Service Alert (USA) to mark all known utilities in the immediate site vicinity. After the well is completed, ASE will send well completion reports to Zone 7 and the California Department of Water Resources (DWR) as required.

*TASK 3 - DRILL ONE SOIL BORING AND COLLECT SOIL SAMPLES*

ASE will drill one soil boring with an 8-inch diameter hollow-stem auger drill rig downgradient of the former tank location in the assumed downgradient direction (Figure 2). The downgradient direction is assumed to be to the north for this assessment based on hydrocarbon concentrations detected during ASE's June 1996 groundwater assessment. Since groundwater was not encountered until 26-feet bgs during the June 1996 assessment, and the on-site monitoring wells are only 20-feet deep and have groundwater depths of only 5-feet bgs, it appears that either the on-site wells are constructed in tank backfill or the wells are constructed in a perched zone.

The drilling will be directed by a qualified ASE geologist. Undisturbed soil samples will be collected at least every 5-feet, at lithographic changes, and from just above the water table for subsurface hydrogeologic description and possible chemical analysis. The samples will be described by the ASE geologist according to the Unified Soil Classification System. The samples will be collected in brass tubes using a split-barrel drive sampler advanced ahead of the auger tip by successive blows from a 140-lb. hammer dropped 30-inches. The samples will be immediately removed from the sampler, trimmed, sealed with Teflon tape, plastic end caps and duct tape, labeled, placed into plastic bags and placed on ice for delivery under chain

of custody to a CAL-EPA certified analytical laboratory. Soil from the remaining brass tubes not sealed for laboratory analysis will be removed for hydrogeologic description and will be screened for volatile compounds with an OVM. The soil will be screened by emptying soil from one of the brass tubes into a plastic bag. The bag will be sealed and placed in the sun for approximately 10 minutes. After the hydrocarbons have been allowed to volatilize, the OVM will measure the vapor through a small hole, punched in the bag. These OVM readings will be used to decide which samples to analyze at the analytical laboratory. Soil cuttings will be placed in Department of Transportation (DOT) approved 55-gallon DOT 17H drums. Soil disposal will be arranged by the client at a later date.

All sampling equipment will be cleaned in buckets with brushes and a TSP or Alconox solution, then rinsed twice with tap water. The drill rig and augers will be steam cleaned on-site before departure. Rinsates will be contained on-site in sealed and labeled 55-gallon DOT 17H drums for disposal by the client at a later date.

*TASK 4 - ANALYZE AT LEAST ONE SOIL SAMPLE FROM THE BORING*

At least one soil sample from the boring will be analyzed at a CAL-EPA certified environmental laboratory for TPH-G by modified EPA Method 5030/8015 and BTEX and MTBE by EPA Method 8020.

*TASK 5 - COMPLETE THE BORING AS A MONITORING WELL*

ASE will complete the soil boring described in task 3 as a 2-inch diameter groundwater monitoring well. The well will be constructed with 2-inch diameter, flush-threaded, schedule 40, 0.020-inch slotted PVC well screen and blank casing. The well will be screened to monitor the first water-bearing zone encountered. Wells will typically be screened with 5-feet of screen above the water table and 10 to 15-feet of screen below the water table. The well casing will be lowered through the augers and #3 Monterey sand will be placed in the annular space between the well casing and the borehole to about 2-feet above the screened interval. Approximately 1 to 2 feet of bentonite pellets will be placed on top of the sand pack and hydrated with deionized water. This bentonite layer will prevent the cement sanitary seal from infiltrating into the sand pack. Neat cement will be used to fill the annular space between the bentonite layer and the surface to prevent surface water from infiltrating into the well. The well head will be protected by a locking well plug and an at-grade, traffic-rated well box (Figure 3).

*TASK 6 - DEVELOP AND SAMPLE THE MONITORING WELL*

The well will be developed 48 hours following the well installation. Prior to well development, the groundwater will be checked for sheen or free-floating hydrocarbons using an acrylic bailer which will be lowered slowly to the groundwater surface and filled about half full for direct observation. ASE will also measure the depth to groundwater in the well prior to the well being purged. The well will be developed using at least two episodes of surge block agitation and bailer evacuation. At least ten well casing volumes of water will be removed during the development, and development will continue until the water appears to be reasonably clear.

Approximately 72 hours following the well development, groundwater samples will be collected from the well for analysis. Prior to sampling, at least four well casing volumes of groundwater will be purged from the well using a polyethylene bailer. The pH, temperature and conductivity of the purge water will be monitored during evacuation and samples will not be collected until these parameters stabilize. Groundwater samples will then be decanted from the bailer into 40-ml glass volatile organic analysis (VOA) vials, preserved with hydrochloric acid, labeled and stored on wet ice for transport to the analytical laboratory under chain of custody. Purged groundwater will be stored on-site in sealed and labeled DOT 17H drums for disposal by the client at a later date.

*TASK 7 - ANALYZE THE GROUNDWATER SAMPLES*

The groundwater samples will be analyzed by a CAL-EPA certified analytical laboratory for TPH-G by modified EPA Method 5030/8015 and BTEX and MTBE by EPA Method 8020.

*TASK 8 - SURVEY THE TOP OF CASING ELEVATION OF THE NEW WELL AND DETERMINE THE GROUNDWATER FLOW DIRECTION BENEATH THE SITE*

ASE will survey the top of casing elevation of the new well relative to elevations of the existing wells. These elevations will be used in conjunction with depth to groundwater measurements to determine the groundwater flow direction and gradient beneath the site.

*TASK 9 - PREPARE A SUBSURFACE INVESTIGATION REPORT*

ASE will submit a subsurface assessment report outlining the methods and findings of this assessment. The report will be submitted under the seal of

a state registered civil engineer or geologist. This report will include a summary of the results, the site background and history, rational for well placement and design, description of the well construction, development and sampling, tabulated soil and groundwater analytical results, conclusions and recommendations. Formal boring logs, analytical reports, and chain of custodies will be included as appendices.

*TASK 10 - PERFORM QUARTERLY GROUNDWATER MONITORING*

ASE will collect groundwater samples at the site on a quarterly basis. Since the well construction details of monitoring well MW-4 are not known, and since the depth to water data in this well suggests that this may be a tank backfill well, ASE does not feel that water samples from this well are representative of groundwater conditions at the site and suggests that it be removed from quarterly sampling although the depth to water in this well will continue to be measured on a quarterly basis. In addition, monitoring wells MW-1, MW-2 and MW-3 have groundwater at a much shallower depth than ASE's borings suggesting that these wells may be constructed in either a perched zone or fill material. Groundwater samples collected from monitoring wells MW-1 and MW-2 have never contained a detectable concentration of either TPH-G or BTEX. For these reasons, ASE suggests that only monitoring well MW-2 be sampled in the quarterly groundwater monitoring program along with the monitoring well which will be installed for this assessment. The cost savings from this reduction in the number of wells to be sampled will assist in allowing remedial options to be explored at the site.

Prior to purging any groundwater at the site, the depth to groundwater will be measured in each monitoring well. At least four well casing volumes of groundwater will be purged from each well using polyethylene bailers. The pH, temperature and conductivity of the purge water will be monitored during evacuation and samples will not be collected until these parameters stabilize. Groundwater samples will then be decanted from the bailers into 40-ml glass volatile organic analysis (VOA) vials, preserved with hydrochloric acid, labeled and stored on wet ice for transport to the analytical laboratory under chain of custody. These groundwater samples will be analyzed by a CAL-EPA certified analytical laboratory for TPH-G by modified EPA Method 5030/8015 and BTEX and MTBE by EPA Method 8020. Purged groundwater will be stored on-site in sealed and labeled DOT 17H drums for disposal by the client at a later date. A quarterly groundwater monitoring report will be submitted approximately two weeks following each sampling period.

## 4.0 FUTURE REMEDIATION

ASE will begin to explore remedial options for this site. A remedial action plan will be submitted during the next quarter which will outline whether any remedial options may be cost effective in closing the site in a timely manner.

## 5.0 SCHEDULE

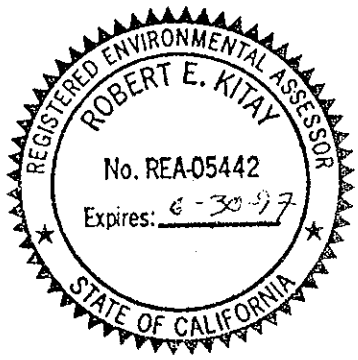
We anticipate beginning work at this site in early November 1996 pending approval of this workplan by the ACHCSA and the timely issuance of all the permits required for this project.

Should you have any questions or comments, please feel free to call us at (510) 820-9391.

Respectfully submitted,

AQUA SCIENCE ENGINEERS, INC.

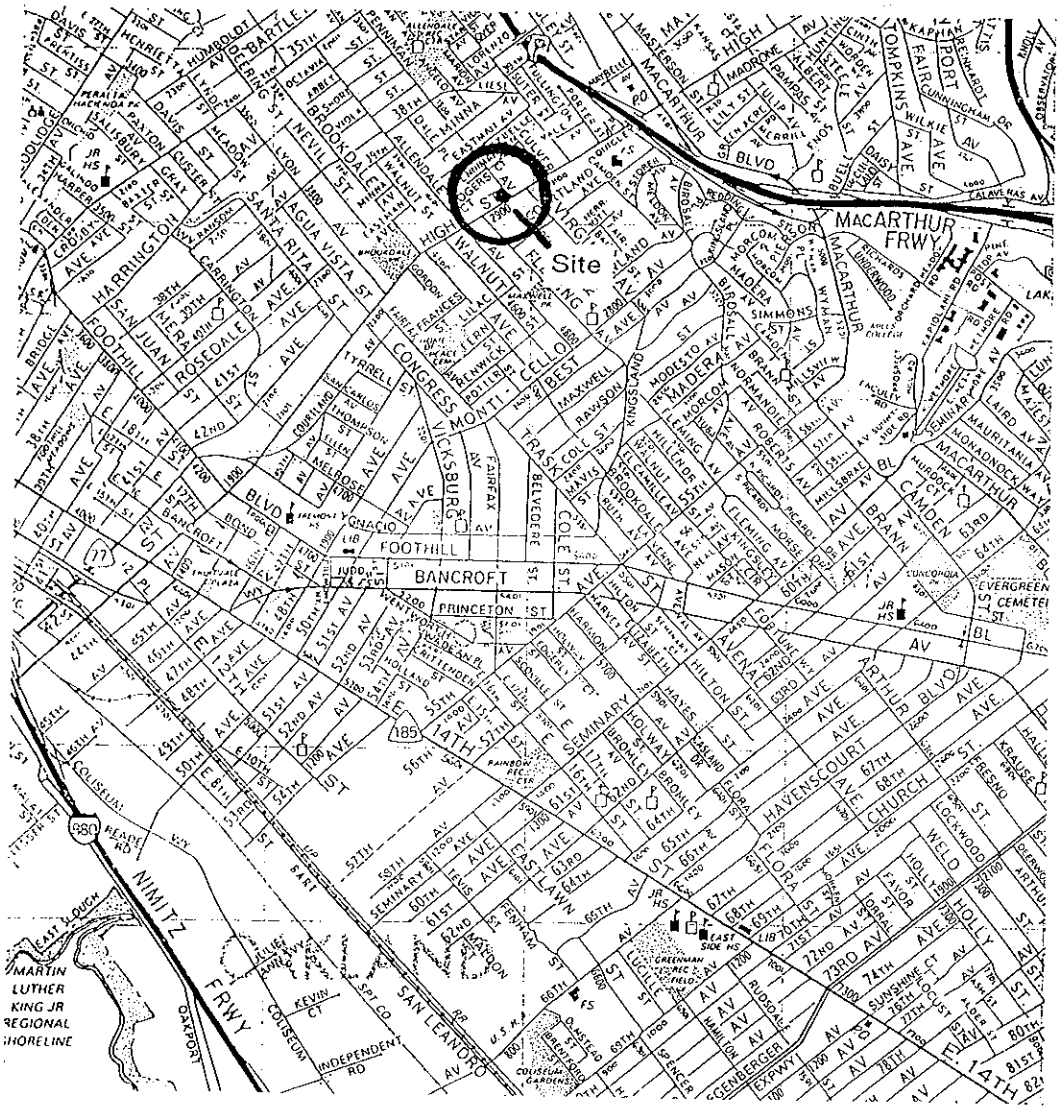
Robert E. Kitay, R.E.A.
Project Geologist




Attachments: Figures 1, 2 & 3
Appendix A

cc: Ms. Madhulla Logan, Alameda County Health Care Services Agency, 1131 Harbor Bay Parkway, Suite 250, Alameda, CA 94502-6577

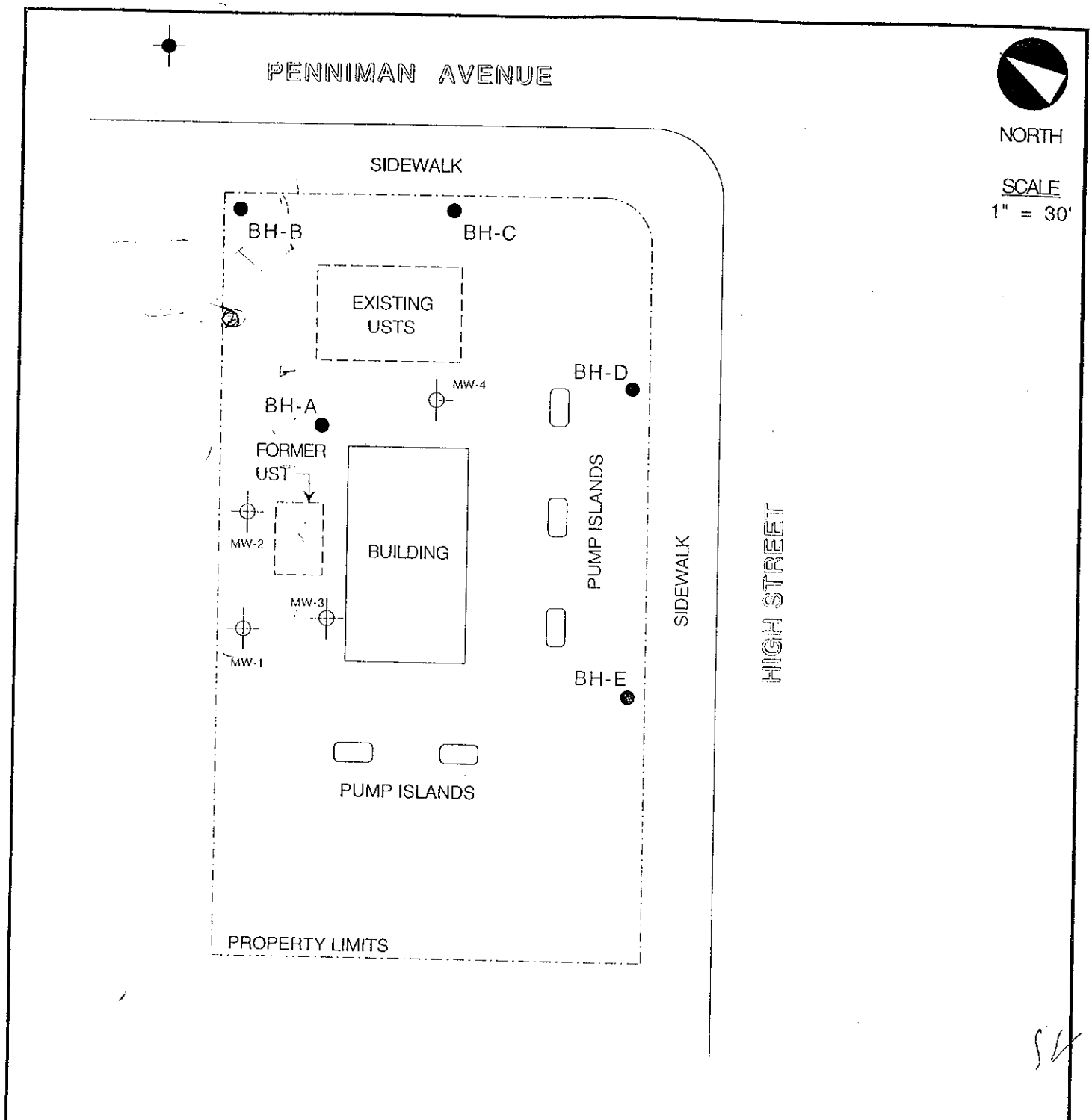
Mr. Kevin Graves, RWQCB, San Francisco Bay Region, 2101 Webster Street, Suite 500, Oakland, CA 94612




# SITE LOCATION MAP

ZIMA CENTER CORPORATION
2951 HIGH STREET
OAKLAND, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | FIGURE 1




LEGEND

MW-1 EXISTING MONITORING WELL

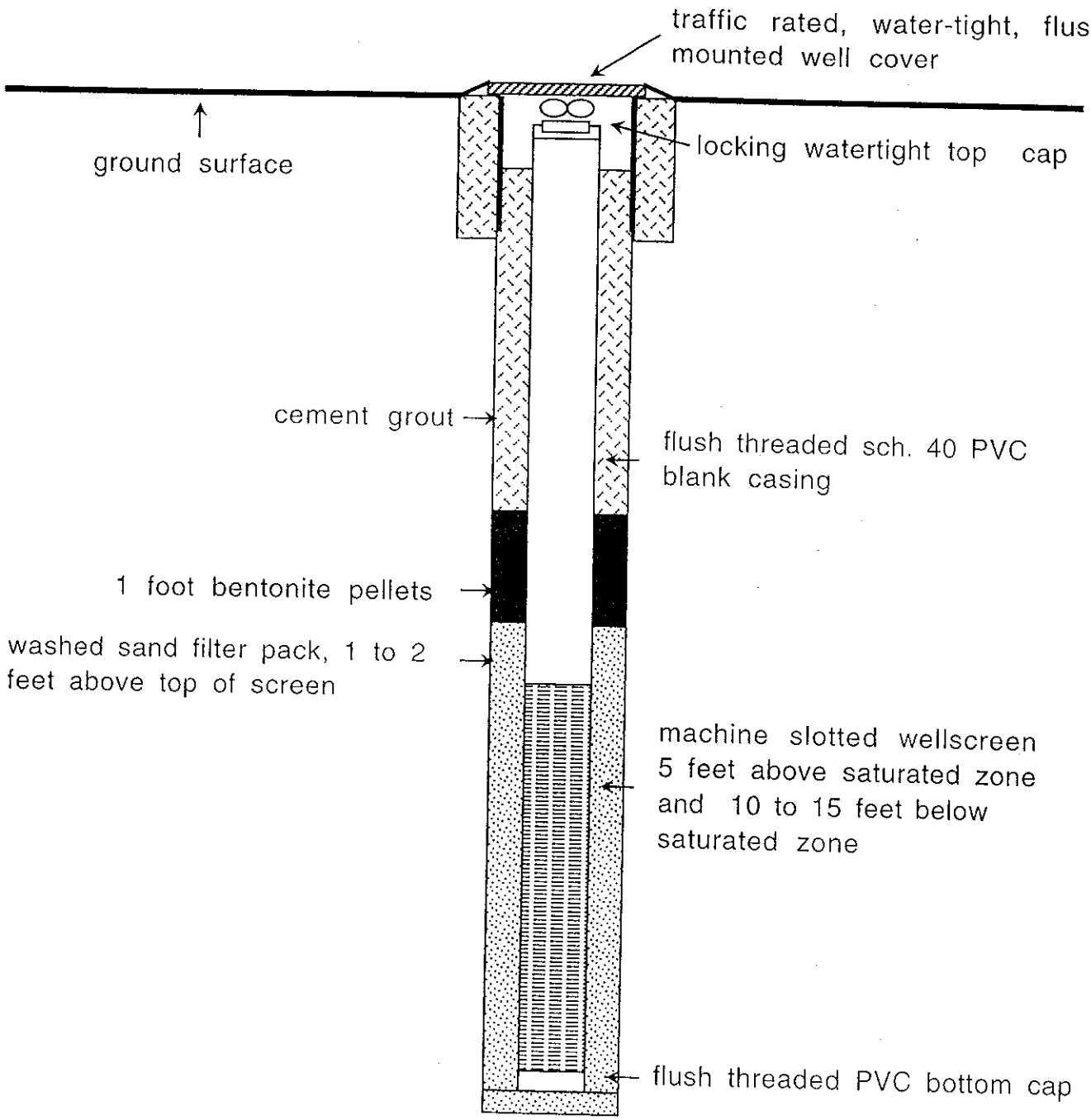
PROPOSED MONITORING WELL

PREVIOUS SOIL BORING

# PROPOSED MONITORING WELL LOCATION MAP

ZIMA CENTER CORPORATION
2951 HIGH STREET
OAKLAND, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | FIGURE 2




TYPICAL
MONITORING WELL CONSTRUCTION
IN CROSS SECTION

Aqua Science Engineers | Figure 3

# APPENDIX A

Alameda County Health Care Services Agency
"Direction" Letter

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

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, #250
Alameda, CA 94502-6577
(510) 567-6700 FAX (510) 337-9335

September 17, 1996

**Mr. Mohammad Mashoon**
2951 High St,
Oakland, CA - 94619

STID 1038

RE: 2951 High Street, Oakland, CA

Dear Mr. Mashoon:

I am in receipt of the document titled "Report of Soil and Groundwater Assessment", dated July 17, 1996, prepared by Aqua Science Engineers for the above referenced property.

Five borings BHA to BHE were installed on the property to further delineate the extent of contamination from the former underground storage tanks. Both soil and groundwater samples were collected from each of the borings except BHD from which a groundwater sample could not be collected. Significant concentrations of gasoline and BTEX was identified in borings BHA and BHB, the downgradient borings from the tanks.

Based on a review of the document, this Department is requiring that the following additional work be conducted on the property:

- To complete groundwater characterization and define the extent of contamination, a monitoring well should be installed in the downgradient direction to borings, BHA and BHB. This well could serve as a target well to identify any potential contaminant migration to offsite receptors.

- Quarterly monitoring and gradient measurement should be conducted on all onsite monitoring wells at a quarterly frequency. For expedited closure, this Department recommends that more aggressive remediation options be considered to treat the contamination in the groundwater to acceptable standards. Also, in future, if the concentrations of petroleum hydrocarbons reduce significantly, either due to natural biodegradation or due to treatment, then a risk assessment can be conducted on site to evaluate any potential threats to onsite/offsite receptors. A site specific risk assessment conducted on the property can determine cleanup standards that are site specific and based on the assessment this Department could evaluate the site for closure.

Please submit a work plan to address the above listed concerns within 30 days from the receipt of this letter. If you have any questions, you can reach me at (510) 567-6764.

Sincerely,

Madhulla Logan

Madhulla Logan,
Hazardous Material Specialist

C: **Robert Kitay,** Aqua Science Engineers Inc, 2411 Old Crow Canyon Rd, #4, San Ramon, CA - 94583.