Mills College
5000 MacArthur Blvd.
Oakland, CA 94613
www.mills.edu

MILLS

Ms. Barbara Jacob
Alameda County Health Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

April 13, 2012

RE: **Work Plan**
Mills College
5000 MacArthur Blvd.
Oakland, California

Dear Ms. Jacob,

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

Sincerely,

Linda A. Zitzner
AVP Facilities, Auxiliaries, and Campus Planning
Off: 510-430-2024
Fax: 510-430-2306
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EquoLogic

Ms. Barbara Jacob
Alameda County Health Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

April 13, 2012
Project 411-01.01

RE: **Work Plan**
Mills College
5000 MacArthur Boulevard
Oakland, California

Dear Ms. Jacob,

EquoLogic, on behalf of Mills College, has prepared the following soil and groundwater investigation work plan (**Figure 1**). The work plan was requested by Alameda County Health Services Agency (ACHSA) in a letter to Mills College dated December 20, 2011.

BACKGROUND

Two underground fuel storage tanks (USTs) were formerly located at Mills College. In October 1988, a 1,000-gallon fuel UST was removed from the College corporation yard (**Figure 2**). Strong gasoline odors were reported present in excavated soil. In order to define the vertical extent of contamination, the tank pit was extended to a depth of approximately 21 feet below grade. The soil at 21 feet still was reported to have a strong gasoline odor. Soil samples were collected from within the excavation to a depth of 21 feet below grade. Total petroleum hydrocarbons (TPH) ranged from 16,327 milligrams per kilogram (mg/kg) at 9 feet below grade to less than 10 mg/kg at 21 feet at the western end of the excavation.

Subsequently, three groundwater monitoring wells (MW-1 through MW-3, **Figure 2**) were installed adjacent to the former tank pit. TPH as gasoline (TPH-G) was reported in soil samples only from the boring for well MW-1. TPH-G was detected at concentrations ranging from 520 mg/kg at 11 feet to 15

mg/kg at 21 feet. Two additional borings (EB-1 and EB-2, **Figure 2**) were drilled adjacent to the former tank pit. TPH-G was reported only in the soil samples from boring EB-2. TPH-G was detected in the 16-foot sample from EB-2 at 1,200 mg/kg with benzene reported at 21.0 mg/kg. A soil analytical summary table by Kaldveer Associates is provided in **Attachment A**.

Wells MW-1 through MW-3 were last sampled in January 2000. TPH-G were only detected in the water sample from well MW-1 at 11.0 parts per million (ppm). Benzene was reported in the water samples from the three wells at 0.17, 0.7, and 0.0031 ppm, respectively.

In 1989, a small capacity, fuel oil UST was removed from the parking lot of the former Mills kitchen building. This area is now developed as an open lawn and landscaped area referred to as Toyon Meadow (**Figure 3**). Soil samples from the base of the excavation (10 to 13 feet below grade) contained total petroleum hydrocarbons as diesel (TPH-D) at concentrations ranging from 260 mg/kg to 5,000 mg/kg. Soil samples were collected from eleven borings (B-1 through B-11, **Figure 3**) located west (downgradient) of the tank excavation. TPH-D was reported at a maximum concentration of 11,000 mg/kg at 14 feet below grade in boring B-8 (see table in **Attachment A**). Three groundwater monitoring wells were installed (MW-1 through MW-3, **Figure 3**). During the last monitoring event in 1995, wells contained a maximum concentration of 400 ppm TPH-D.

HYROGEOLOGIC CONDITIONS

Borings in the corporation yard encountered approximately 5 feet of sandy clay and silty sand overlying weathered granitic bedrock. Groundwater was first encountered in boring EB-2 at 25 feet below grade. Depth to groundwater in wells MW-1 through MW-3 in January 2000 was approximately 18 feet below top of casing. Groundwater flow was to the southwest.

Borings in Toyon Meadow encountered five to seven feet of fill material, underlain by clay to a depth of 10 to 13 feet below grade. Soil beneath the clay consisted of sand and gravel with lenses of clay to the maximum depth explored of 23.5 feet. Groundwater was encountered at a depth of 12 to 13 feet below grade and stabilized in monitoring wells at depths of 10 to 13 feet. Groundwater flow was to the west.

WORK PLAN

The following sections contain a work plan to meet the requirements of the ACHSA letter dated December 20, 2011.

Corporation Yard

Task 1 – A boring will be drill adjacent to former boring EB-2 (**Figure 2**) in order to define the vertical extent of petroleum hydrocarbons. All appropriate permits will be obtained prior to commencing field

work. An underground utility survey will be performed prior to field work in order to avoid damage to any subsurface lines during soil borings. Hollow-stem drilling equipment will be used to collect soil samples at depths of 15, 20, 25, and 30 feet below grade. Soil borings will be logged by a geologist using the Unified Soil Classification system. Soil samples will be monitored in the field for the presence of petroleum hydrocarbons with a photo-ionization detector (PID). The PID readings from boring EB-2 show a sharp drop from 1140 ppm at 21 feet to 70 ppm at 25 where saturated bedrock was encountered. Samples will be collected using a California modified split spoon sampler equipped with clean 6-inch brass liners. A limited amount of sample is anticipated. Blow count measurements from boring EB-2 indicate that 90 blow counts were required to collect a 6-inch sample at 21 feet. After sample collection, the liner containing the soil will be sealed with Teflon sheets and tight-fitting plastic caps.

A grab groundwater sample will be collected from the boring using a clean Teflon bailer. The water sample will be decanted into 40 milliliter glass vials with chemical preservative. Both soil and groundwater samples will be stored in an ice chest for shipment to a California certified laboratory. Soil and groundwater samples will be analyzed for TPH-G and BTEX compounds by EPA Methods 8015.

The boring will be backfilled with cement grout. Soil cuttings will be placed in a sealed 55-gallon drum for off-site disposal.

Task 2 –A groundwater sample will be collected from wells MW-1 through MW-3 located adjacent to the former UST excavation. The wells will be purged of three casing volumes prior to sampling with a clean Teflon bailer. The water samples will be decanted into 40 milliliter glass vials with chemical preservative. The groundwater samples will be stored in an ice chest for shipment to a California certified laboratory. Groundwater samples will be analyzed for TPHG and BTEX compounds by EPA Methods 8015.

Task 3 –A soil vapor intrusion evaluation will be performed in the area of the former UST.

To retrieve soil gas samples, EquoLogic proposes to install a dual-level well adjacent to former boring EB-2. The proposed sample location is within the area of soil and groundwater impact near the maintenance building. Soil gas sampling will be conducted in accordance with guidance from the California Department of Toxic Substances Control (DTSC) and California Environmental Protection Agency (Cal-EPA). The following tasks detail the scope of work proposed to complete the soil gas investigation.

PRE-FIELD ACTIVITIES

Prior to conducting field investigation activities, EquoLogic will obtain approval of this work plan and well permits from ACHSA. Site safety procedures will involve the preparation of a site-specific health and safety plan identifying potential chemical and physical hazards that may be encountered during the course of field activities. To identify underground utilities on public property, Underground Service Alert (USA) will be notified to clear all proposed well locations designated with white paint. For private property, a utility locator will be employed. Additionally, each of the well locations will be hand-cleared to a depth of at least 3 feet bgs to check for utilities. All personnel and subcontractors involved in conducting the field activities will have satisfied the requirements of the Federal Occupational Safety and Health Administration (OSHA) 40-Hour Hazardous Waste Operations and Emergency Response Training.

SOIL GAS SAMPLING WELL INSTALLATION

Soil gas sampling will be accomplished using permanent soil gas wells installed at the location adjacent to former boring EB-2. Two wells will be constructed. One well will be installed to approximately 5 feet bgs and the other will be installed to approximately 10 feet bgs. The wells will be installed using 2-inch diameter direct-push Geoprobe® drilling equipment. Each well will be constructed using a six-inch long well screen attached to 1/8-inch diameter Teflon® tubing. Sand pack will be placed in the annular space surrounding each well screen up to approximately six inches above each well screen. A bentonite seal will be installed between the lower and upper well screens and from the top of the sand pack for the upper well screen to approximately six inches below grade. Tube ends will be fitted with brass fittings and end caps, and encased in steel well box set flush with grade.

SOIL GAS SAMPLING AND ANALYSIS

Prior to soil gas sampling, depth to groundwater will be measured at all groundwater-monitoring wells. Following collection of depth to groundwater measurements, soil-gas sampling will begin. The sampling procedure will entail drawing soil gas from sample tubing exposed at the wellhead into a sample manifold. The sample manifold will be outfitted with stopcock valves, vacuum pressure gauges, a one-liter Summa™ sample canister, and six-liter Summa™ purge canister. The sampling flow rate will be maintained at a rate of 200 milliliters/minute using a flow regulator that is integral to the sampling manifold. Initially, the Summa™ canisters will be at a vacuum pressure of 15 inches of mercury (inHg).

Before the first samples are obtained, purge volumes for the 5-foot and 10-foot wells will be determined. The optimum purge volume will be identified via purging and sampling the soil gas well nearest to the known source area. Soil gas samples will be collected after removing three, five, and seven well volumes. The samples will be analyzed in the field using a photoionization detector (PID). The purge volume that generates the highest volatile organic compound (VOC) concentrations will be designated as the optimum purge volume. Purge times will be estimated using an estimated flow rate of 200 milliliter/minute and estimated purge volumes for 5-foot and 10-foot wells of 970 milliliters and 1,000 milliliters, respectively. If the sampling vacuum pressure remains above 10 inHg for longer than 20 minutes, the sampling point will be deemed unavailable due to flow conditions. During sampling, helium will be used as a tracer to test for leaks. This will be accomplished placing a shroud over the wellhead and sampling manifold, and filling the enclosed space with a mixture of helium and air. The concentration of helium will be measured during sampling using a field analyzer.

Along with soil gas samples, an equipment blank sample (ambient air) and one duplicate sample will be collected. The duplicate sample will be collected at one of the sampling wells immediately after the original sample is collected. All samples will be transported to the laboratory in an insulated container at ambient temperature, and samples will be analyzed within 72 hours of collection.

Air Toxics Ltd, a California State-certified laboratory, will analyze the soil gas samples for volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Modified Method TO-15, TPH-G and helium using EPA Method TO-3 (Modified), and oxygen, carbon dioxide, and methane using American Society for Testing and Materials (ASTM) Modified D-1946. Summa® canisters will be certified as clean by the laboratory in batches equivalent to 10 percent of the number of canisters processed during a single cleaning event.

DATA ANALYSIS

Data analysis will include a QA/QC evaluation, calculation of exposure point concentrations, and a preliminary screening evaluation of potential health risk. A two-stage process will be used to analyze potential health risk. First, health risk will be assessed using lookup tables published by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). In cases where lookup values are exceeded, potential risk will be further evaluated using the Johnson and Ettinger (1991) Model with California State-specified parameters (i.e, benzene slope factor).

Assessment of quality control data will include examination of equipment blank data, field duplicate data, surrogate recovery data, and relative percent difference data. Examination of equipment blank data will disclose whether contaminates occur in ambient air or the sampling manifold and the field duplicate data will be used to assess sampling and analysis repeatability. Surrogate recovery data will be used to assess analytical accuracy and duplicate sample data will be used to assess analytical precision. As part of the assessment, quality control data will be compared with method and lab control limits.

Task 4 – ACEHSA has requested information regarding a water supply well supposedly located near the corporation yard. EquoLogic contacted Mr. Mike McBride, chief facilities engineer for the College. Mr. McBride stated that there is no water supply well located on campus. He indicated that the location of a water storage tank may have been mistaken for a water supply well.

Toyon Meadow

Task 1 – Two soil borings will be drilled to define the vertical extent of petroleum hydrocarbons. One boring will be drilled adjacent to former boring B-8 where the highest concentrations of petroleum hydrocarbons were detected. A second boring will be drilled adjacent to the location of the former UST. Borings will be drilled to a depth of approximately 30 feet. Soil samples will be collected a 5-foot depth intervals using a split-spoon sampler equipped with 6-inch brass liners.

A grab groundwater sample will be collected from each boring using a clean Teflon bailer. The water sample will be decanted into 40 milliliter glass vials with chemical preservative and a 1-liter amber bottle. Both soil and groundwater samples will be stored in an ice chest for shipment to a California certified laboratory. Soil and groundwater samples will be analyzed for TPH-D, BTEX, and napthalene by EPA Methods 8015 or 8260B.

Task 2 – Mr. McBride of Mills College reports that the location two of the three wells located in the area of Toyon Meadow is known. Wells MW-1 and MW-3 appear to be intact. The location and status of well MW-2 is uncertain. A metal detector will be used to attempt to locate the metal vault cover of well MW-1. If located, the well will be unearthed and its status determined.

Task 3 - A groundwater sample will be collected from wells MW-1 through MW-3 located in the area of Toyon Meadow. The wells will be purged of three casing volumes prior to sampling with a clean Teflon bailer. The water samples will be decanted into 40 milliliter glass vials with chemical preservative. The groundwater samples will be stored in an ice chest for shipment to a California certified laboratory.

Groundwater samples will be analyzed for TPH-D, BTEX compounds, and napthalee by EPA Methods 8015/8260B.

Summary Report

A summary report containing a written description of field activities, boring logs stamped by a California professional geologist, boring location map, table containing laboratory results, and certified analytical laboratory report will be submitted to the ACHSA. The report will contain recommendations for any additional field work.

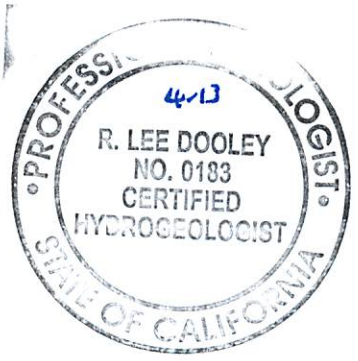
LIMITATIONS

The descriptions, conclusions, and recommendations contained in this report represent EquoLogic's professional opinions based upon the currently available information and are arrived at in accordance with currently acceptable professional standards. For any reports cited that were not generated by EquoLogic, the data from those reports is used "as is" and is assumed to be accurate. This report is based upon a specific scope of work requested by the client. The Contract between EquoLogic and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were conducted. This report is intended only for the use of EquoLogic's Client and anyone else specifically listed on this report. EquoLogic will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, EquoLogic makes no express or implied warranty as to the contents of this report.

You can contact me at (408) 656-2505 or by email at ldooley@equologicgroup.com.

Sincerely,

Lee Dooley
Senior Hydrogeologist
CHG 183



Attachments

Figure 1 – Site Location Map
Figure 2 – Site Plan of Corporation Yard
Figure 3 – Site Plan of Toyon Meadow

Attachment A – Soil Analytical Data

Cc: Linda Zitzner, Mills College, 5000 MacArthur Blvd., Oakland, CA 94613-1301

Ref. EquoLogic/4110101-SLM.DWG

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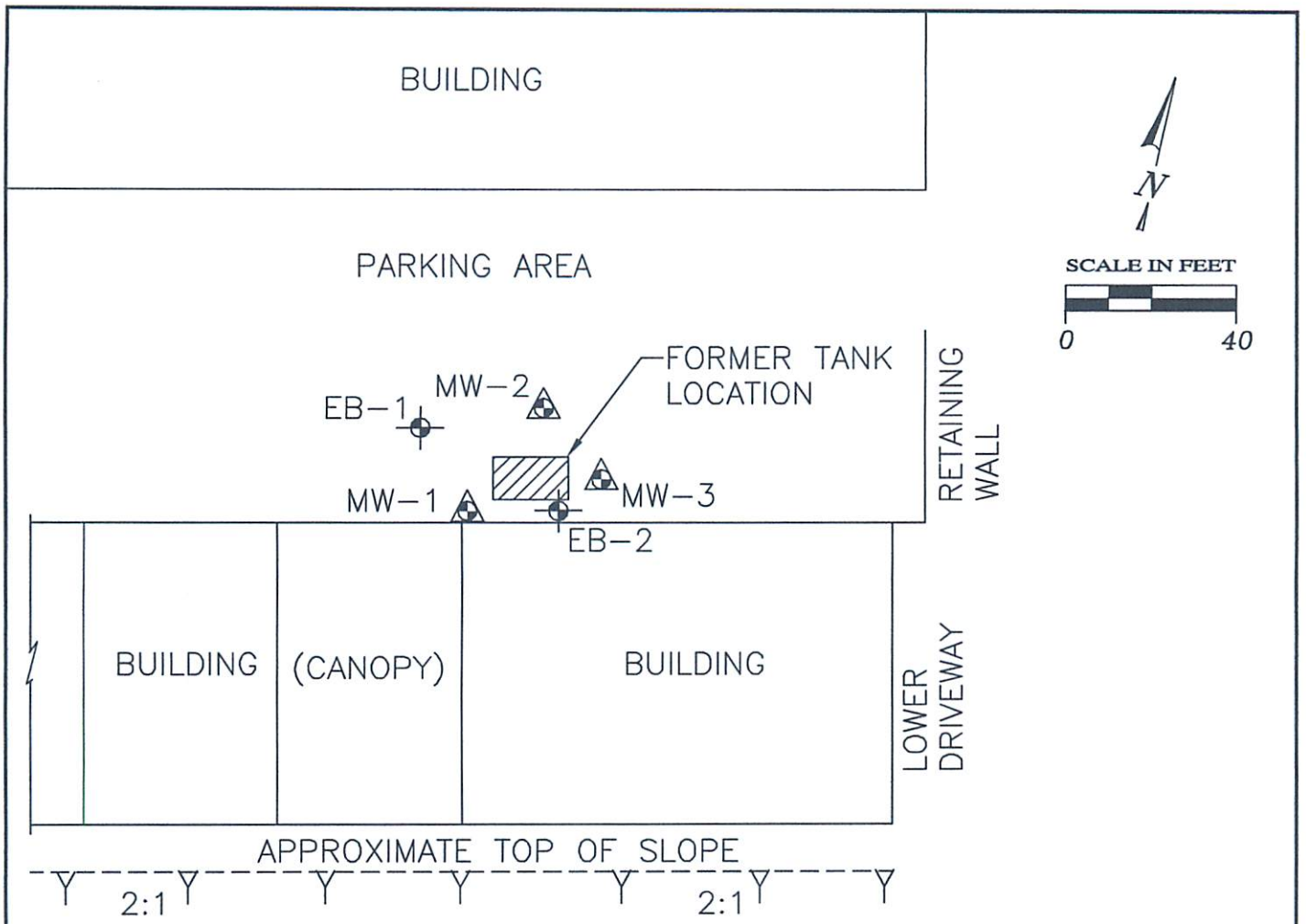
SITE LOCATION MAP

MILLS COLLEGE
5000 MacArthur Boulevard
Oakland, California

FIGURE:
1
PROJECT:
411.01.01



LEGEND

APPROXIMATE LOCATION OF SOIL BORING

APPROXIMATE LOCATION OF MONITORING WELL

Ref. EquoLogic/4110101-SITE.DWG

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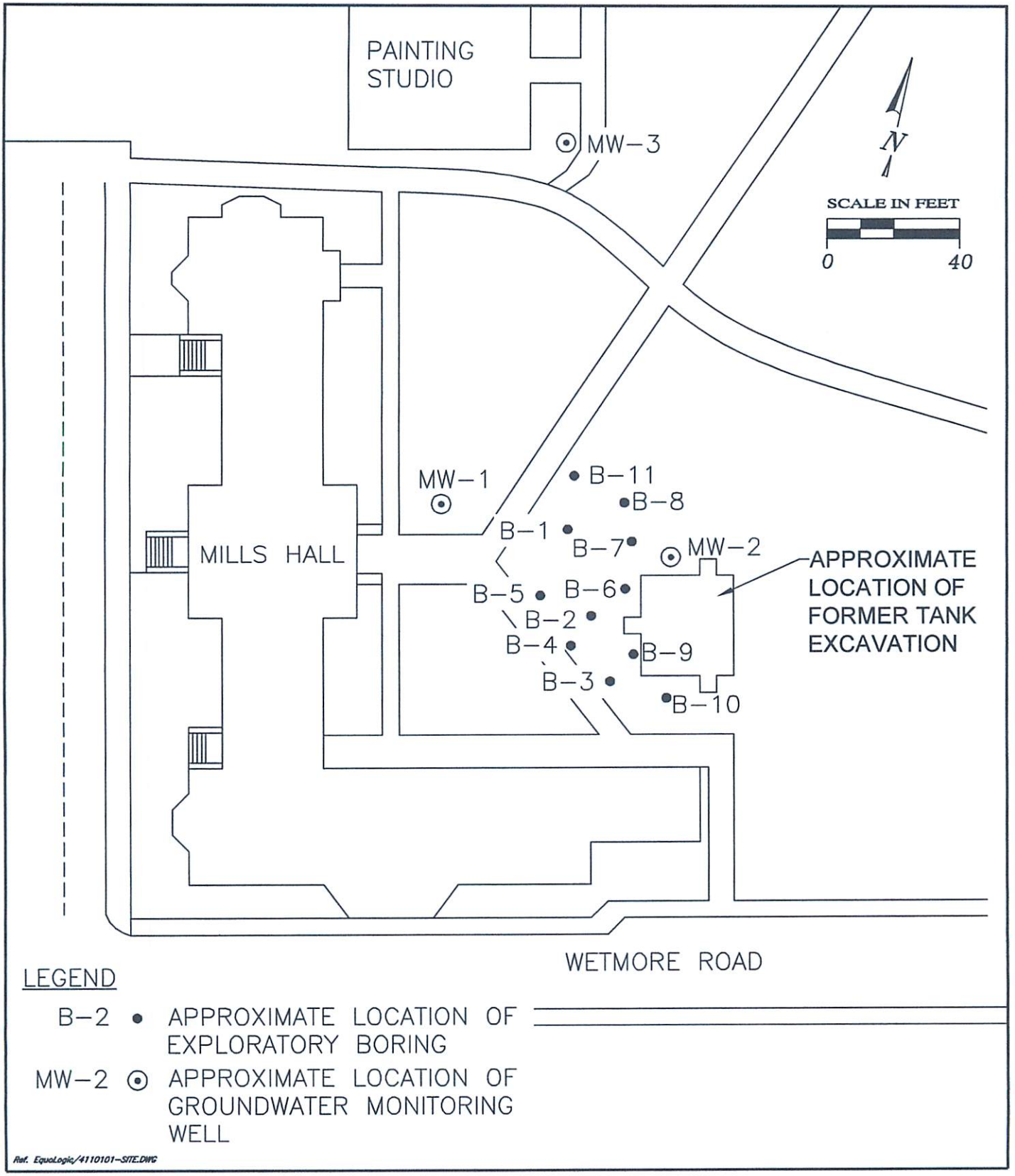
SITE PLAN CORPORATION YARD

MILLS COLLEGE
5000 MacArthur Boulevard
Oakland, California

FIGURE:
2
PROJECT:
411.01.01



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SITE PLAN TOYON MEADOWS

MILLS COLLEGE
5000 MacArthur Boulevard
Oakland, California

FIGURE:
3
PROJECT:
411.01.01

ATTACHMENT A

TABLE 1
ANALYTICAL RESULTS - SOIL
(reported in parts per million, mg/kg)

Sample Location Number, and Collection Date	Petroleum Hydrocarbons as Diesel
June 28, 1989 - Initial Excavation Limit Samples	
SS-1, SS-2	480
SS-3, SS-4	1,900
July 17, 1989 - Soil Boring Samples	
B1-10'	190
B1-14'	1,600
B2-10'	ND
B2-13.5'	1,800
B3-10'	ND
B3-14'	60
B4-14.5'	1,700
B5-13.5'	640
B6-14'	630
B7-10'	240
B7-14.5'	240
B8-14'	11,000
B9-13'	250
B10-14.5'	2,700
B11-14'	16
July 18, 19, 1989 - Additional Excavation Closure Samples	
CS1-10'	ND
CS2-13'	5,000
CS3-10'	ND
CS4-12'	260
CS5-10'	ND
CS6-13'	570
CS7-10'	ND
CS8-12'	1,600
August 4 - 7, 1989 - City Sewer Trench Samples, South of Mills Hall	
SS-1, 20'	ND
SS-2, 20'	ND
June 4, 1991 - Soil Samples Collected During Installation of MHW-2 and MHW-3	
MHW-2, 12.5'	620
MHW-3, 11'	ND

TABLE 2

ANALYTICAL RESULTS - SOIL
(reported in parts per million, mg/kg)

Sample Location & Depth(ft)	TPH Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
MW1-11	520.0	0.78	2.8	2.4	14.0
MW1-16	1.0	0.3	0.11	0.007	0.045
MW1-21	15.0	1.6	2.3	0.26	1.6
MW2-11	ND	0.002	0.002	ND	ND
MW2-16	ND	0.001	0.001	ND	ND
MW2-21	ND	ND	0.001	ND	ND
MW3-11	ND	0.015	0.001	ND	ND
MW3-16	ND	0.051	0.002	ND	0.005
MW3-21	ND	ND	ND	ND	ND
EB1-10.5	ND	0.005	0.002	ND	ND
EB1-15.5	ND	0.075	0.003	ND	ND
EB1-24	ND	0.003	0.002	ND	ND
EB2-11	580.0	7.6	50.0	13.0	72.0
EB2-16	1200.0	21.0	74.0	23.0	190.0
EB2-21	240.0	0.3	5.6	3.1	18.0

Notes:

TPH = Total Petroleum Hydrocarbons
ND = Not Detected; see laboratory reports for specific detection limits.