Is GW at 17 & 12' bgs?

GROUNDWATER MONITORING WELL INSTALLATION REPORT

AMERICAN BUILDING COMPONENTS CO.
6253 DOUGHERTY ROAD
DUBLIN, CA 94568

March 1996

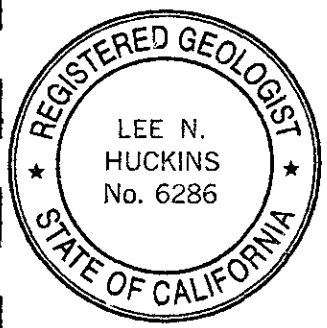
Prepared For:
MR. ED OMERNIK
AMERICAN BUILDING COMPONENTS CO.
6253 DOUGHERTY ROAD
DUBLIN, CA 94568

Submitted By:
TANK PROTECT ENGINEERING
Of Northern California, Inc.
2821 WHIPPLE ROAD
UNION CITY, CA 94587
(510) 429-8088

March 26, 1996

Project Number 176

Lee N. Huckins
Registered Geologist



Expiration Date 5/30/97

Jeff J. Farhoomand, M.S.
Principal Engineer

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This report has been prepared by the staff of **Tank Protect Engineering of Northern California, Inc.** under direction of an Engineer and/or Geologist whose seal(s) and/or signature(s) appear hereon.

The findings, recommendations, specifications or professional opinions are presented, within the limits prescribed by the client, after being prepared in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied.

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1.0 NTRODUCTION

The subject site is located at 6253 Dougherty Road in the City of Dublin in Alameda County, California and is occupied by the American Building Components Co. [(ABC) see Figure 1]. The contact person for ABC is Mr. Ed Omernik; telephone number (510) 828-0400.

Because soil contamination was documented as a result of the removal of 2 underground fuel tanks at the subject site, the Alameda County Health Care Services Agency (ACHCSA) required a groundwater investigation. ABC contracted with Tank Protect Engineering of Northern California, Inc. (TPE) to install a groundwater monitoring well in the verified downgradient direction (of groundwater flow) from the former tank complex as a preliminary groundwater investigation.

TPE submitted a May 4, 1994 WORKPLAN FOR GROUNDWATER MONITORING WELL INSTALLATION (WP) to ABC and the ACHCSA that proposed a scope of work for conducting the investigation. The ACHCSA approved the WP in a May 12, 1994 letter to ABC (see Appendix A).

This GROUNDWATER MONITORING WELL INSTALLATION REPORT (GMWIR) documents work conducted under the above WP and presents TPE's findings.

2.0 INSTALLATION OF A GROUNDWATER MONITORING WELL

As a preliminary investigation of groundwater contamination, TPE conducted the following scope of work:

- Obtained a well installation permit.
- Drilled a soil boring to the depth of about 22 feet for installation of a groundwater monitoring well.
- Continuously cored and samples the boring for construction of a lithologic log and for selection for chemical analysis as required by the ACHCSA.

- Analyzed 1 soil sample for total petroleum hydrocarbons as diesel and gasoline (TPHD and TPHG, respectively), and for benzene, toluene, ethylbenzene, and xylenes (BTEX).

- Converted the boring into a 2-inch diameter casing groundwater monitoring well.

- Developed, purged, and sampled the well.

- Analyzed the groundwater sample for TPHD, TPHG, and BTEX. Additionally, analyzed 1 trip blank sample for TPHG and BTEX.

- Prepared this GMWIR.

Details of the above scope of work are presented below.

2.1 Predrilling Activities

Before commencing drilling activities, TPE obtained a well installation permit from the Alameda County Flood Control and Water Conservation District, Water Resources Management Zone 7 and filed a Notice of Intent with the Department of Water Resources (see Appendix A).

2.2 Rationale for Monitoring Well Location

The proposed location of well MW-1 was changed at the direction of the client (see Figure 1). Well MW-1 was installed about 30 feet downgradient from the former underground tank complex (see Figure 1).

In TPE's WP, well MW-1, was proposed to be located within 10 feet and in the verified downgradient direction of the former underground tank complex according to recommendations in the California Regional Water Quality Control Board-San Francisco Bay Region's (CRWQCB) "Tri-Regional Board Staff Recommendations for Preliminary

Evaluation and Investigation of Underground Tank Sites", dated August 10, 1990. The verifiable downgradient direction was determined by the ACHCSA.

2.3 Soil Boring and Sampling Procedures

The exploratory boring for the groundwater monitoring well was drilled by State of California licensed water well driller PC Exploration, Inc. (C-57 license number 265556) using 8-inch diameter, hollow-stem, auger drilling equipment. The augers were steam-cleaned before drilling to prevent the introduction of offsite contamination to the boring. Soil samples were continuously collected, beginning at a depth of about 2 feet below the ground surface to the total depth explored, for construction of a lithologic log and for selection for chemical analysis. Soil samples in the vadose zone were collected by advancing a California split-spoon sampler, equipped with 2-inch diameter by 6-inch long brass tubes, into the undisturbed soil beyond the tip of the augers. Sampling in the saturated zone was conducted with California split-spoon and standard penetration samplers. The sampling equipment was cleaned before each sampling event by washing with an Alconox® solution and rinsing in tap water.

Drill cuttings were stored on site, contained in 55-gallon steel drums. The stored cuttings were labeled to show contents, date stored, suspected chemical contaminant, expected date of removal, company name, contact person, and telephone number.

A detailed boring log (see Appendix B) was prepared from auger return material and soil samples. The soil was logged according to the Unified Soil Classification System under the direction of a California Registered Geologist.

Appendices C and D document TPE's protocols relative to hollow-stem auger drilling and soil sampling procedures, and waste handling and decontamination procedures, respectively.

2.3.1 Soil Sample Selection for Chemical Analyses

Selected vadose zone soil samples were field-screened for the presence of apparent hydrocarbon soil contamination based on visible hydrocarbon stains, odors, and headspace analysis for volatile organic compounds using a Gastech, Inc., Trace-Techtor hydrocarbon vapor tester (HVT). Headspace analysis was conducted by partially filling a quart-size plastic bag with a soil sample, sealing the bag airtight, and warming the bag to promote volatilization of hydrocarbons, if any, into the headspace of the bag. The headspace of the bag was tested by the HVT and the response recorded in part per million (ppm).

Since no apparent hydrocarbon contamination was present, the sample nearest to groundwater was selected for chemical analysis.

The soil sample was preserved in a brass tube by quickly covering the open ends with Teflon sheeting and capping with plastic end-caps. The tube was labeled to show site name, project number, date and time collected, sample name and depth, and sampler name; sealed in a quart-size plastic bag; and placed in an iced-cooler for transport to California Department of Health Services (DHS) certified Trace Analysis Laboratory, Inc. (TAL) located in Hayward, California accompanied by chain-of-custody documentation.

Appendices E and F document TPE's protocols relative to sample handling and quality assurance and quality control procedures, respectively.

2.3.2 Results of Chemical Analyses

The above soil sample was analyzed for TPHD and TPHG by the DHS Method and for BTEX by the Modified United States Environmental Protection Agency (EPA) Method 8020.

All analytical results were nondetectable for well MW-1.

Analytical results are summarized in Table 1 and documented with a certified analytical report and a chain-of-custody in Appendix G.

2.4 Groundwater Monitoring Well Installation

The exploratory boring for groundwater monitoring well MW-1 was drilled to a depth of about 22 feet on December 14, 1994. Groundwater was encountered at a depth of about 17 feet. The boring was converted into a groundwater monitoring well by installing 2-inch diameter, flush-threaded schedule 40, polyvinyl chloride (PVC) casing and 0.010-inch slotted screen. The boring was plugged with bentonite from a total depth of about 22 feet to a depth of about 20 feet before constructing the screen interval from about 20 feet to a depth of about 10 feet below ground surface.

A sand pack of number 2/12 filter sand was placed in the annular space of the well from the bottom of the screen to about 2 feet above the top of the screened interval and about 1 foot of bentonite was placed above the sand pack followed by a neat cement slurry seal to ground surface. A traffic rated, bolt-locked, vault box was set in concrete to protect the well and a watertight locking well cap with lock was installed on the well casing.

Appendix H documents TPE's protocol relative to groundwater monitoring well construction procedures.

2.5 Groundwater Monitoring Well Development

Well MW-1 was developed on December 16, 1994. Before development, depth-to-groundwater was measured from the top-of-casing (TOC) to the nearest 0.01 foot using an electronic Solinst water level meter. A minimum of 3 repetitive measurements were made for each level determination to ensure accuracy. The well was checked for floating product using a dedicated polyethylene bailer. No floating product was present in the well.

The well was developed of about 70 gallons of water by using a 1.7-inch, positive displacement, PVC hand pump until no further improvement in water clarity was apparent (see Appendix I for Record of Well Development).

Development water was stored on site in 55-gallon steel drums labeled to show contents, date filled, suspected chemical contaminant, company name, contact person, and telephone number.

Appendix J documents TPE's protocol relative to groundwater monitoring well development procedures.

2.6 Groundwater Monitoring Well Sampling

Well MW-1 was sampled on December 20, 1994. Before sampling, depth to stabilized water was measured and recorded as discussed above under section 2.5 Groundwater Monitoring Well Development.

Depth-to-water was 8.95 feet below TOC on December 20, 1994.

On December 20, 1994, a groundwater sample was collected from well MW-1. Before sampling, the well was purged of about 20 liters of water with a dedicated disposable polyethylene bailer and until the temperature, pH, and electrical conductivity of the water in the well had stabilized (see Appendix I for Record of Water Sampling). After purging was completed, the water sample was collected in laboratory supplied, preserved, clean, sterilized, 40-milliliter glass vials and a 1-liter glass bottle having Teflon-lined screw caps; and labeled with project name, date and time collected, sample number, and sampler name. The sample was immediately stored in an iced-cooler for transport to DHS certified TAL located in Hayward, California accompanied by chain-of-custody documentation.

The well was checked for floating product using a dedicated, disposable polyethylene bailer. No odor, sheen, or floating product was detected in the well.

Appendix K documents TPE's protocol relative to groundwater monitoring well sampling procedures. Appendices D and F document TPE's protocols relative to waste handling and decontamination procedures, and quality assurance and quality control procedures.

Purge water was stored on site in a labeled 55-gallon drum.

2.6.1 Results of Chemical Analyses

The groundwater sample was analyzed for TPHD and TPHG by the DHS Method and for BTEX by Modified EPA Method 8020. A trip blank sample, MW-2, was analyzed for TPHG and BTEX.

All analytical results were nondetectable for well MW-1 and trip blank sample MW-2.

Analytical results are summarized in Table 2 and documented with a certified analytical report and chain-of-custody in Appendix G.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Chemical analyses of soil and groundwater samples for well MW-1 were nondetectable for TPHD, TPHG and BTEX chemicals.

Based on the above results, TPE recommends quarterly groundwater sampling of well MW-1 until 4 consecutive quarters of nondetectable analytical results for TPHD, TPHG, and BTEX chemicals are achieved. At that time, TPE will recommend that the client request site closure from the ACHCSA. The next sampling event is due on about March 20, 1995.

4.0 STUDY LIMITATIONS

This GMWIR is based on subsurface exploration and laboratory analyses of soil and groundwater samples. The chemical analytical results for the samples are considered applicable to that borehole or location from which they were collected. The soil encountered in the boring is believed to be representative of the site; however, the soil may vary in character between observation points. The conclusions contained herein are based on the field observations, analytical data, and professional judgement which is in accordance with current standards of professional practice. Representations made of soil and groundwater conditions between sample locations are extrapolations based on professional opinions and judgements and accepted industry practice. Therefore, TPE cannot and will not provide guarantees, certifications, or warranties that the subject property is or is not free of all contaminated soil or groundwater and such assessments are provided only in order that the client may make an informed decision.

The extent of testing and data collection directly affects the statistical confidence level of all work performed. As a practical matter, to reach or even approach a 100 percent statistical confidence level would be prohibitively expensive. Therefore, if a reassessment of the subject property becomes necessary in the future, TPE will not reassess the area at its own cost. No other warranty is expressed or implied.

The findings and conclusions of this report are valid as of the present time; however, the passing of time could change the conditions of the subsurface due to natural processes or the influence of man. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond TPE's control. Therefore, this report should not be relied upon after an extended period of time without being reviewed by a Civil Engineer or Registered Geologist.

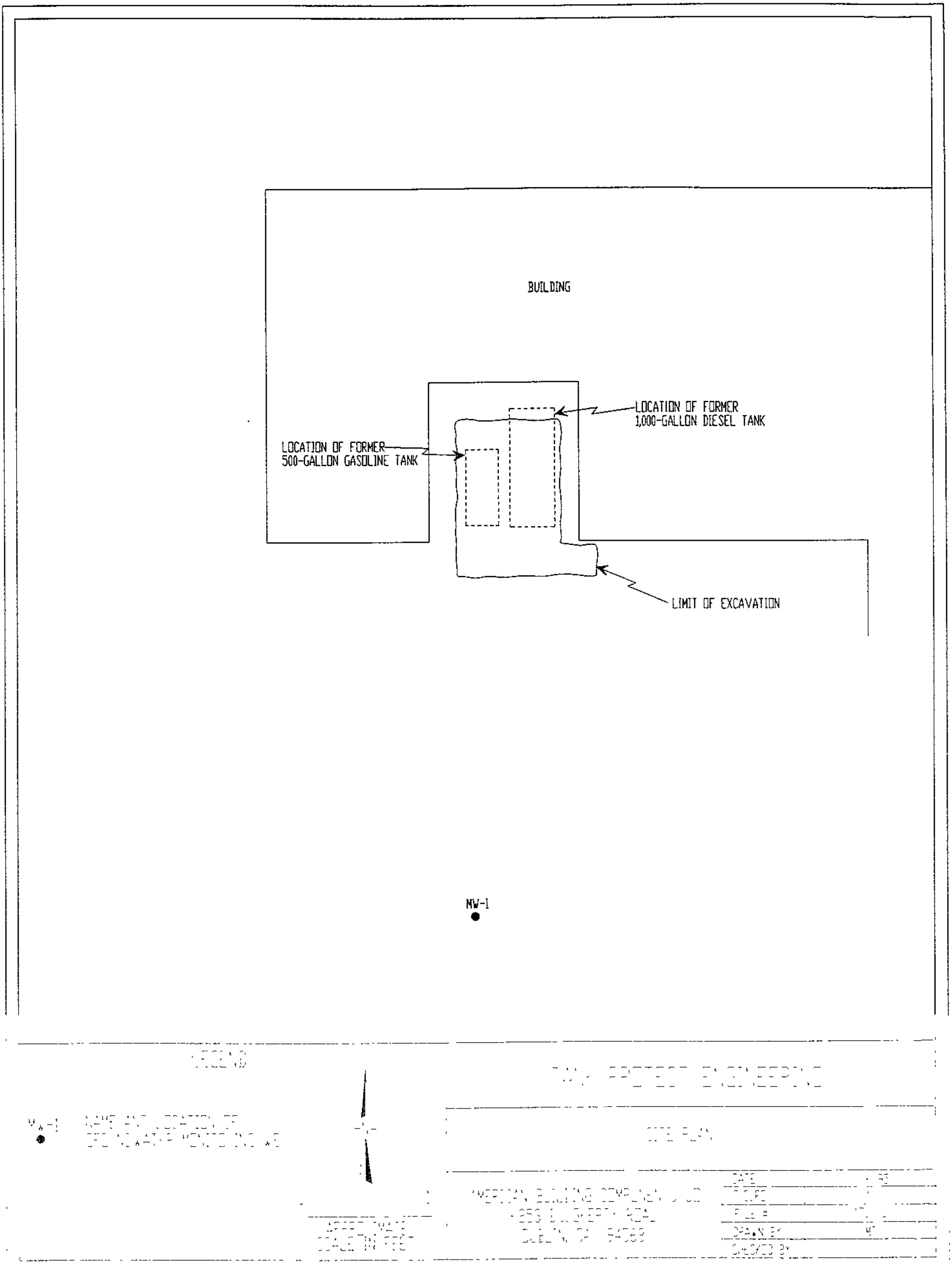

BUILDING
LOCATION OF FORMER
1,000-GALLON DIESEL TANK
LOCATION OF FORMER
500-GALLON GASOLINE TANK
LIMIT OF EXCAVATION
MW-1

TABLE 1
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS
(ppm[1])

Well Name	Date	Depth (Feet)	TPHD	TPHG	Benzene	Toluene	Ethyl-benzene	Xylenes
MW-1	12/14/94	16.5-17.0	<1.0	<.500	<0.0050	<0.0050	<0.0050	<.015

[1] PARTS PER MILLION

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS

(ppb[1])

Well Name	Date	TPHD	TPHG	Benzene	Toluene	Ethyl-benzene	Xylenes
MW-1	12/20/94	<50	<50	<0.50	<0.50	<0.50	<1.5
MW-2[2]	12/20/94	NA[3]	<50	<0.50	<0.50	<0.50	<1.5

[1] PARTS PER BILLION

[2] TRIP BLANK

[3] NOT ANALYZED

APPENDIX A

- ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY, MAY 12, 1994 LETTER
- ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, WATER RESOURCES MANAGEMENT ZONE 7, DRILLING PERMIT APPLICATION
- DEPARTMENT OF WATER RESOURCES, NOTICE OF INTENT

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

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
State Water Resources Control Board
Division of Clean Water Programs
UST Local Oversight Program
80 Swan Way, Rm 200
Oakland, CA 94621
(510) 271-4530

StID 1216

May 12, 1994

Mr. Ed Omernik
American Building Components
6253 Dougherty Rd
Dublin, CA 94568

Subject: Workplan Approval for 6253 Dougherty Rd, Dublin 94568

Dear Mr. Omernik:

I have completed review of Tank Protect Engineering's May 1994 Workplan for Groundwater Monitoring Well Installation for the above referenced site. The proposal to install one monitoring well in the downgradient direction of the former tank pit is acceptable. Field activities should commence **within 45 days of the date of this letter.** Please notify this office at least 72 hours prior to the start of field work.

If you have any questions, I can be reached at (510) 271-4530.

Sincerely,

eva chu
Hazardous Materials Specialist

cc: John Mrakovich, TPE, 2821 Whipple Rd, Union City 94587
Gil Jensen, Alameda County District Attorney's Office
files

omernik8

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT AMERICAN BUILDING COMPONENTS
6253 DOUGHERTY ROAD
DUBLIN, CA 94568

CLIENT
Name ED OMERNIK
Address AS ABOVE Voice 510 828-0400
City _____ Zip _____

APPLICANT
Name TANK PROTECT ENGINEERING
Fax 510 429 8089
Address 2821 WHIPPLE RD Voice 510 429 8088
City UNION CITY, CA Zip 94587

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	___
Monitoring	X	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE

Domestic	___	Industrial	___	Other	___
Municipal	___	Irrigation	___		

DRILLING METHOD:

Mud Rotary	___	Air Rotary	___	Auger	X
Cable	___	Other	___		

DRILLER'S LICENSE NO. C57 265556

WELL PROJECTS

Drill Hole Diameter	8	in.	Maximum		
Casing Diameter	2	in.	Depth	30	ft.
Surface Seal Depth	10	ft.	Number	1	

GEOTECHNICAL PROJECTS

Number of Borings	___		Maximum		
Hole Diameter	___	in.	Depth	___	ft.

ESTIMATED STARTING DATE 12/14/94
ESTIMATED COMPLETION DATE 12/14/94

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE John Mackenzie Date 12/6/94

FOR OFFICE USE

PERMIT NUMBER 94777
LOCATION NUMBER _____

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well Projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 9 Dec 94
Wyman Hong

91992

ORIGINAL
FILE WITH DEPARTMENT OF WATER RESOURCES

No. 261872

NOTICE OF INTENT

DEPARTMENT OF WATER RESOURCES: DEC 13, 19 94

On or about DEC 14, 19 94, I plan to commence drilling [X] deepening [ ], reconditioning [ ], or destruction of [ ] a cable [ ], rotary [ ], or other _____ type well, for GROUNDWATER MONITORING purposes. The work will be done for
(Proposed use of well)

AMERICAN BUILDING COMPONENTS, 6253 DOUGHERTY RD
(Name of client and address) DUBLIN, CA 94568

Approximate location of well is _____

AS ABOVE
(Legal subdivision or by reference to some landmark)

_____, in ALAMEDA County

PC EXPLORATION Lic. No. C57 265556
(Well driller)

42307 OSGOOD RD, FREMONT, CA 94539
(Address)

Need log forms [ ] Need notice cards [ ] DWR 2125

APPENDIX B

LOG OF EXPLORATORY BORING AND WELL COMPLETION DETAILS

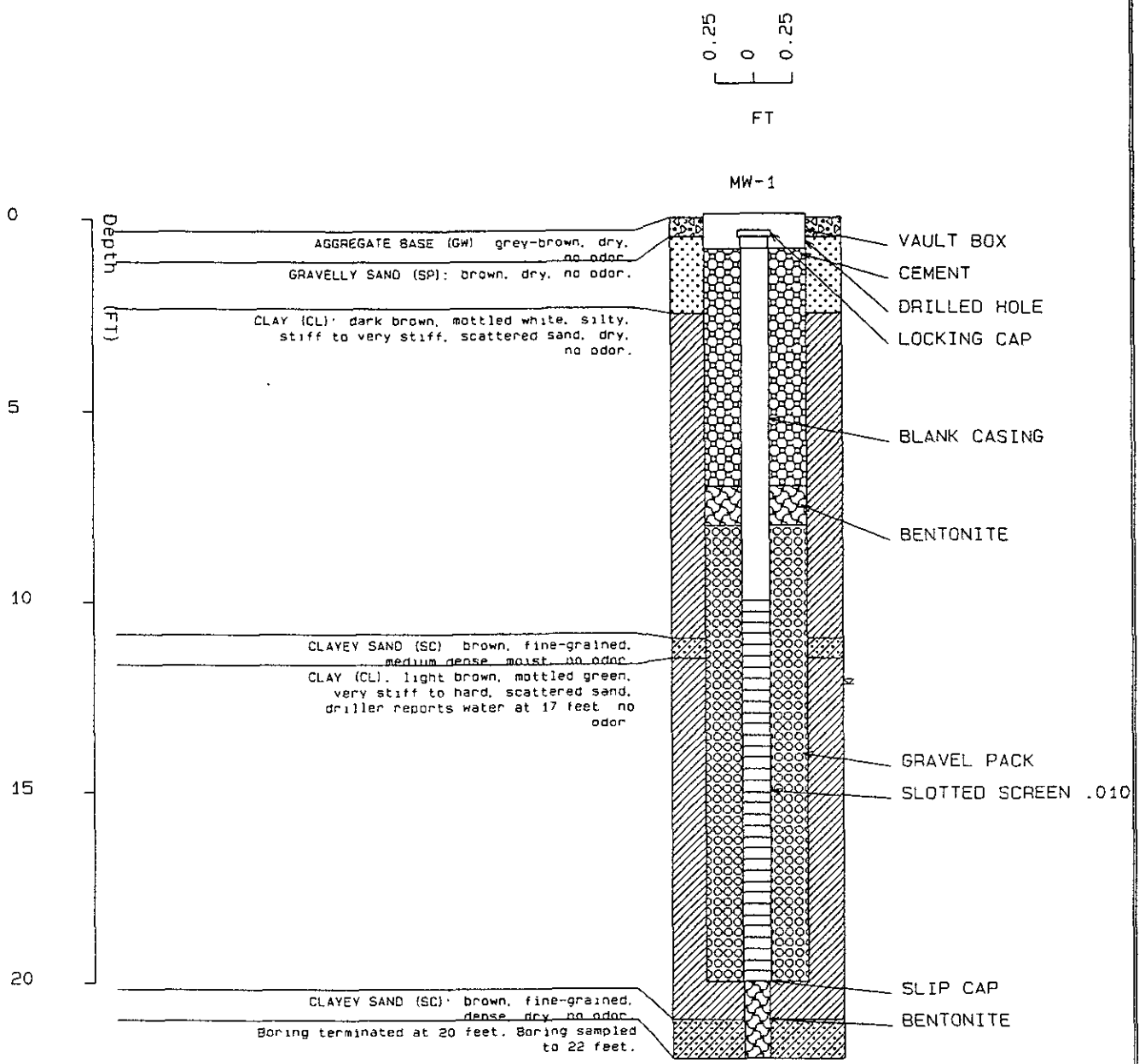
LOG OF EXPLORATORY BORING

PROJECT NUMBER 176 — BORING NO MW-1

PROJECT NAME 6253 Dougherty Road, Dublin, CA — PAGE

BY LNH — DATE 12/14/94 — SURFACE ELEV. 335 FT

RECOVERY (FT/FT)	OVA (PPM)	PENETRATION (BLOWS/FT)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOGRAPHIC COLUMN	DESCRIPTION
				1			AGGREGATE BASE (GW): grey-brown, dry, no odor.
				2			GRAVELLY SAND (SP): brown, dry, no odor
1 5/1 5	12	18		3			CLAY (CL): dark brown, mottled white, silty, stiff to very stiff, scattered sand, dry, no odor
1.0/1 5	-	20		4			
				5			
1.5/1.5	-	20		6			
1 5/1 5	40	17		7			
				8			
1 5/1 5	-	13		9			
1.5/1.5	30	15		10			
				11			CLAYEY SAND (SC). brown, fine-grained, medium dense, moist, no odor
1 5/1 5	22	17	▽	12			CLAY (CL): light brown, mottled green, very stiff to hard, scattered sand, driller reports water at 17 feet, no odor
1.2/1.5	-	32		13			
				14			
1 5/1 5	-	30		15			
1.5/1.5	10	25		16			
				17			CLAYEY SAND (SC) brown, fine-grained, dense, dry, no odor.
1.5/1 5	-	18		18			
				19			Boring terminated at 20 feet. Boring sampled to 22 feet.
1.5/1 5	-	37					



LEGEND

Figure

APPENDIX C

HOLLOW-STEM AUGER DRILLING AND SOIL SAMPLING PROCEDURES

APPENDIX C

HOLLOW-STEM AUGER DRILLING AND SOIL SAMPLING PROCEDURES

Undisturbed soil samples will be recovered from soil without introducing liquids into the borings. At a minimum, soil samples as core will be taken at 5-foot depth intervals, changes in lithology, and when encountering apparent soil contamination to termination depth, or through the aquifer zone of interest for lithologic logging.

Borings will be drilled with a hollow-stem auger and sampled with a California or modified California-type split-spoon sampler. Soil samples will be of sufficient volume to perform the analyses which may be required, including replicate analyses.

Soil from all borings will be described in detail using the Unified Soil Classification System and will be logged under the direction of a geologist, civil engineer, or engineering geologist who is registered or certified by the State of California and is experienced in the use of the Unified Soil Classification System.

All wet zones above the free water zone will be noted and accurately logged.

Soil samples will be collected in clean brass or stainless steel sampling tubes in the split-spoon. Sediment traps will be used when unconsolidated sands and gravels fall from the sampler during retrieval. The brass tubes will be cut apart using a clean knife. The ends of the tubes will be covered with Teflon sheets or aluminum foil beneath plastic end caps and sealed with electrical or duct tape and properly labeled. In lieu of electrical or duct tape, the tubes may be individually sealed in plastic bags. The samples will be stored in an iced-cooler at a temperature of 4 degrees Celsius. In the Alameda County Water District, the samples will be stored in an iced-cooler containing dry ice.

Drill cuttings will be stored on site in 55-gallon drums or covered with plastic sheeting. Analytical results will be submitted immediately to the site owner for determination of appropriate disposal procedures. The soil borings not completed as wells will be backfilled with a cement grout.

APPENDIX D

WASTE HANDLING AND DECONTAMINATION PROCEDURES

APPENDIX D

WASTE HANDLING AND DECONTAMINATION PROCEDURES

Decontamination: Any drilling, sampling or field measurement equipment that comes into contact with soil or groundwater will be properly decontaminated prior to its use at the site and after each incident of contact with the soil or groundwater being investigated. Proper decontamination is essential to obtain samples that are representative of environmental conditions and to accurately characterize the extent of soil and groundwater contamination. Hollow-stem auger flights and the drill bit will be steam-cleaned between the drilling of each well.

All sample equipment, including the split-tube sampler and brass tubes, will be cleaned by washing with trisodium phosphate or alconox detergent, followed by rinsing with tap water. Where required by specific regulatory guidelines, a nonphosphate detergent will be used.

Waste Handling: Waste materials generated during site characterization activities will be handled and stored as hazardous waste and will be stored on site in appropriately labeled containers. Waste materials anticipated include excavated soil, drill cuttings, development and purge water, water generated during aquifer testing, water generated during decontamination, and used personnel protection equipment such as gloves and Tyvek. The site owner will be responsible for providing the storage containers and will be responsible for the disposal of the waste materials. Drill cuttings from individual borings will be stored separately in drums or covered by plastic sheeting and the appropriate disposal procedure will be determined by the site owner or TPE following receipt of the soil sample analytical results. Drums will be labeled to show material stored, known or suggested contaminant, date stored, expected removal date, company name, contact, and telephone number.

APPENDIX E

SAMPLE HANDLING PROCEDURES

APPENDIX E

SAMPLE HANDLING PROCEDURES

Soil and groundwater samples will be packaged carefully to avoid breakage or contamination, and will be delivered to the laboratory in an iced-cooler. The following sample packaging requirements will be followed.

- Sample bottle/sleeve lids will not be mixed. All sample lids will stay with the original containers and have custody seals affixed to them.
- Samples will be secured in coolers to maintain custody, control temperature, and prevent breakage during transportation to the laboratory.
- A chain-of-custody form will be completed for all samples and accompany the sample cooler to the laboratory.
- Ice, blue ice, or dry ice (dry ice will be used for preserving soil samples collected for the Alameda County Water District) will be used to cool samples during transport to the laboratory.
- Each sample will be identified by affixing a pressure sensitive, gummed label, or standardized tag on the container(s). This label will contain the site identification, sample identification number, date and time of sample collection, and the collector's initials.
- Soil samples collected in brass tubes will be preserved by covering the ends with Teflon tape and capped with plastic end-caps. The tubes will be labeled, sealed in quart size bags, and placed in an iced-cooler for transport to the laboratory.

All groundwater sample containers will be precleaned and will be obtained from a State Department of Health Services certified analytical laboratory.

Sample Control/Chain-of-Custody: All field personnel will refer to this workplan to verify the methods to be employed during sample collection. All sample gathering activities will be recorded in the site file; all sample transfers will be documented in the chain-of-custody; samples are to be identified with labels and all sample bottles are to be custody-sealed. All information is to be recorded in waterproof ink. All TPE field personnel are personally responsible for sample collection and the care and custody of collected samples until the samples are transferred or properly dispatched.

The custody record will be completed by the field technician or professional who has been designated by the TPE project manager as being responsible for sample shipment to the appropriate laboratory. The custody record will include, among other things, the following information: site identification, name of person collecting the samples, date and time samples were collected, type of sampling conducted (composite/grab), location of sampling station, number and type of containers used, and signature of the TPE person relinquishing samples to a non-TPE person with the date and time of transfer noted. The relinquishing individual will also put all the specific shipping data on the custody record.

Records will be maintained by a designated TPE field employee for each sample, site identification, sampling locations, station numbers, dates, times, sampler's name, designation of the samples as a grab or composite, notation of the type of sample (e.g. groundwater, soil boring, etc.), preservatives used, on-site measurement data, and other observations or remarks.

APPENDIX F

QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

APPENDIX F

QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The overall objectives of the field sampling program include generation of reliable data that will support development of a remedial action plan. Sample quality will be checked by the use of proper sampling, handling, and testing methods. Additional sample quality control methods may include the use of background samples, equipment rinsate samples, and trip and field blanks. Chain-of-custody forms, use of a qualified laboratory, acceptable detection limits, and proper sample preservation and holding times also provide assurance of accurate analytical data.

TPE will follow a QA/QC program in the field to ensure that all samples collected and field measurements taken are representative of actual field and environmental conditions and that data obtained are accurate and reproducible. These activities and laboratory QA/QC procedures are described below.

Field Samples: Additional samples may be taken in the field to evaluate both sampling and analytical methods. Three basic categories of QA/QC samples that may be collected are trip samples, field blanks, and duplicate samples.

Trip blanks are a check for cross-contamination during sample collection, shipment, and in the laboratory. Analytically confirmed organic-free water shall be used for organic parameters and deionized water for metal parameters. Blanks will be prepared by the laboratory supplying the sample containers. The blank shall be numbered, packaged, and sealed in the same manner as the other samples. One trip blank will be used for each sample set of less than 20 samples. At least 5% blanks will be used for sets greater than 20 samples. The trip blank is a water sample that remains with the collected samples during transportation and is analyzed along with the field samples to check for residual contamination. The trip blank is not to be opened by either the sample collectors or the handlers.

The field blank is a water sample that is taken into the field and is opened and exposed at the sampling point to detect contamination from air exposure. The water sample is poured into appropriate containers to simulate actual sampling conditions. Contamination for air exposure can vary considerably from site to site.

The laboratory will not be informed about the presence of field and trip blanks and a false identifying number will be put on the label. Full documentation of these collection and decoy procedure will be made in the site log book.

Duplicate samples are identical sample pairs (collected in the same place and at the same time), placed in identical containers. For soils, adjacent sample liners will be analyzed. For the purpose of data reporting, one is arbitrarily designated the sample, and the other is designated as a duplicate sample. Both sets of results are reported to give an indication of the precision of sampling and analytical methods.

The laboratory's precision will be assessed without the laboratory's knowledge by labeling one of the duplicates with false identifying information. Data quality will be evaluated on the basis of the duplicate results.

Laboratory QA/QC: Execution of a strict QA/QC program is an essential ingredient in high-quality analytical results. By using accredited laboratory techniques and analytical procedures, estimates of the experimental values can be very close to the actual value of the environmental sample. The experimental value is monitored for its precision and accuracy by performing QC test designed to measure the amount of random and systematic errors and to signal when correction of these errors is needed.

The QA/QC program describes methods for performing QC tests. These methods involve analyzing method blanks, calibration standards, check standards (both independent and EPA-certified standards), duplicates, replicates, and sample spikes. Internal QC also requires adherence to written methods, procedural documentation, and record keeping, and the observance of good laboratory practices.

APPENDIX G

CERTIFIED ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

December 30, 1994

Mr. Jeff Farhoomand
Tank Protect Engineering
2821 Whipple Road
Union City, California 94587

Dear Mr. Farhoomand:

Trace Analysis Laboratory received one soil sample on December 15, 1994 for your Project No. 176-121494, American Building Components, 6253 Dougherty (our custody log number 5018).

This sample was analyzed for Total Petroleum Hydrocarbons as Diesel, Gasoline, Benzene, Toluene, Ethylbenzene, and Xylenes. Our analytical report and the completed chain of custody form are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

Scott T. Ferriman

Scott T. Ferriman
Project Specialist

Enclosures

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

LOG NUMBER: 5018
DATE SAMPLED: 12/14/94
DATE RECEIVED: 12/15/94
DATE EXTRACTED: 12/19/94
DATE ANALYZED: 12/28/94
DATE REPORTED: 12/30/94

CUSTOMER: Tank Protect Engineering

REQUESTER: Jeff Farhoomand

PROJECT: No. 176-121494, American Building Components, 6253 Dougherty

Sample Type: Soil

Method and Constituent:	Units	MW-1, 16.5-17.0 Concentration	MW-1, 16.5-17.0 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	ND	1,000

QC Summary:

% Recovery: 99
% RPD: 7.8

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 5018
DATE SAMPLED: 12/14/94
DATE RECEIVED: 12/15/94
DATE EXTRACTED: 12/19/94
DATE ANALYZED: 12/20/94
DATE REPORTED: 12/30/94
PAGE: Two

Sample Type: Soil

Method and Constituent:	Units	MW-1, 16.5-17.0 Concentration	MW-1, 16.5-17.0 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	ND	500
Modified EPA Method 8020 for:					
Benzene	ug/kg	ND	5.0	ND	5.0
Toluene	ug/kg	ND	5.0	ND	5.0
Ethylbenzene	ug/kg	ND	5.0	ND	5.0
Xylenes	ug/kg	ND	15	ND	15

QC Summary:

% Recovery: 70
% RPD: 3.9

Concentrations reported as ND were not detected at or above the reporting limit.

Louis W. DuPuis
Quality Assurance/Quality Control Manager

TANK PROTECT ENGINEERING

2821 WHIPPLE ROAD
UNION CITY, CA 94587
(415)429-8088
(800)523-8088
FAX(415)429-8089

5018

LAB: TAL

TURNAROUND: 15 day

P.O. #: 0984

CHAIN OF CUSTODY

PAGE 1 OF 1

PROJECT NO: 176.12.1494

SITE NAME & ADDRESS: American Building Components, 6253 Dougherty

SAMPLER NAME ADDRESS AND TELEPHONE NUMBER: Lee Huckins, 2821 WHIPPLE ROAD, UNION CITY, CA 94587 (415) 429-8088

ID NO	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	(1) TYPE OF CONTAINER	TOTAL LIGHT HC	AROMATIC HC (BTX)	TOTAL HEAVY HC	OIL & GREASE	VOC SCAN (624's)	OTHER	REMARKS
MW-1 165-17.0	12/14	10:10	X			Brass	X	X	X				

Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by : (Signature)
Lee Huckins	12/15/99 10:48	Lori Miller	Lori Miller	12/15/99 10:57	
Relinquished by (Signature)	Date / Time	Received by : (Signature)	Relinquished by (Signature)	Date / Time	Received by : (Signature)
Relinquished by (Signature)	Date / Time	Received for Laboratory by: (Signature) Scott Tuckness	Date / Time 12/15/99 10:50AM	Remarks Initiated From 12/14/99	

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

January 12, 1995

Mr. Jeff Farhoomand
Tank Protect Engineering
2821 Whipple Road
Union City, California 94587

Dear Mr. Farhoomand:

Trace Analysis Laboratory received two water samples on December 20, 1994 for your Project No. 176, ABC, 6253 Dougherty, Dublin (our custody log number 5029).

These samples were analyzed for Total Petroleum Hydrocarbons as Diesel, Gasoline, Benzene, Toluene, Ethylbenzene, and Xylenes. Our analytical report and the completed chain of custody form are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

Scott T. Ferriman

Scott T. Ferriman
Project Specialist

Enclosures

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

LOG NUMBER: 5029
DATE SAMPLED: 12/20/94
DATE RECEIVED: 12/20/94
DATE EXTRACTED: 01/03/95
DATE ANALYZED: 01/06/95
DATE REPORTED: 01/12/95

CUSTOMER: Tank Protect Engineering

REQUESTER: Jeff Farhoomand

PROJECT: No. 176, ABC, 6253 Dougherty, Dublin

Sample Type: Water

Method and Constituent:	Units	MW-1 Concentration	MW-1 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Diesel	ug/l	ND	50	ND	50

QC Summary:

% Recovery: 102
% RPD: 4.9

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 5029
DATE SAMPLED: 12/20/94
DATE RECEIVED: 12/20/94
DATE ANALYZED: 12/23/94
DATE REPORTED: 01/12/95
PAGE: Two

Sample Type: Water

Method and Constituent:	Units	MW-1 Concentration	MW-1 Reporting Limit	MW-2 Concentration	MW-2 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	ND	50	ND	50
Modified EPA Method 8020 for:							
Benzene	ug/l	ND	0.50	ND	0.50	ND	0.50
Toluene	ug/l	ND	0.50	ND	0.50	ND	0.50
Ethylbenzene	ug/l	ND	0.50	ND	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	ND	1.5	ND	1.5

QC Summary:

% Recovery: 98
% RPD: 1.4

Concentrations reported as ND were not detected at or above the reporting limit.

Louis W. DuPuis
Quality Assurance/Quality Control Manager

TANK PROTECT ENGINEERING
2821 WHIPPLE ROAD
UNION CITY, CA 94587
(415)429-8088
(800)523-8088
FAX(415)429-8089

5029

LAB: TRACE

TURNAROUND: 15 DAY

P.O. #: 000953

PAGE 1 OF 1

CHAIN OF CUSTODY

PROJECT NO	SITE NAME & ADDRESS
176	ABC 6253 DOUGHERTY DUBLIN

SAMPLER NAME, ADDRESS AND TELEPHONE NUMBER
MARK R. VARNEY
2821 WHIPPLE ROAD, UNION CITY, CA 94587 (415) 429-8088

ID NO	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	(1) TYPE OF CONTAINER	ANALYTES REQUESTED: TOTAL LIGHT HC	AROMATIC HC (BTX)	TOTAL HEAVY HC	OIL & GREASE	VOC SCAN (624's)	OTHER	REMARKS
MW-1	12/20	10:07		X			X	X	X				
MW-2	12/20	10:45		X			X	X					

Relinquished by (Signature)	Date / Time	Received by : (Signature)	Relinquished by : (Signature)	Date / Time	Received by : (Signature)
[signature]	12/20/91 2:45		[signature]		
Relinquished by (Signature)	Date / Time	Received by : (Signature)	Relinquished by : (Signature)	Date / Time	Received by : (Signature)
Relinquished by (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
		[signature]	12/20/91 2:45	Received at 4°C	

4 H2O, water, 1C, 2 voas HCl, white, Tray 1, Reg TAT

DATE: _____

APPENDIX H

GROUNDWATER MONITORING WELL CONSTRUCTION PROCEDURES

APPENDIX H

GROUNDWATER MONITORING WELL CONSTRUCTION PROCEDURES

BOREHOLE DESIGN

Casing Diameter: The minimum diameter of well casings will be 2 inches (nominal).

Borehole Diameter: The diameter of the borehole will be a minimum of 4 inches and a maximum of 12 inches greater than the diameter of the well casing. The minimum annular space will be 2.5 inches as measured from the outside diameter of the casing to the drill hole wall.

Shallow (Unconfined Zone) Wells: When unconfined groundwater is encountered the borehole will be advanced through the aquifer to an underlying clay layer or aquitard or to a maximum depth of 15 feet into the saturated zone, or the maximum depths required by regulatory guidelines. The screened interval will begin a minimum of 5 feet above the saturated zone or above the anticipated seasonal high level of groundwater. The screen will extend the full thickness of the aquifer or no more than 15 feet (or 20 feet if required by regulatory guidelines) into the saturated zone, whichever is reached first. The well screen will not extend into the aquitard, nor will the screened interval exceed 20 feet in length (or 30 feet if required by regulatory guidelines).

Deep (Confined Zone) Wells: Any monitoring well to be screened below the upper aquifer will be installed as a double-cased well. A steel conductor casing will be placed through the upper water-bearing zone to prevent aquifer cross-contamination.

The conductor casing will be installed in the following manner: a large diameter borehole (typically 18 inches) will be drilled until it is determined that the first competent aquitard has been reached. A low carbon steel conductor casing will be placed in the borehole to the depth drilled. Centralizers will be used to center the casing in the borehole. The annular space between the conductor casing and the

formation will be cement-grouted from bottom to top by tremie pipe method. The grout will be allowed to set for a minimum of 72 hours.

Drilling will continue inside the conductor casing, with a drill bit of smaller diameter than the conductor casing. If additional known aquifers are to be fully penetrated, the procedure will be repeated with successively smaller diameter conductor casings.

The bottom of the well screen in a confined aquifer will be determined by presence or lack of a clay layer or aquitard as described above. The screened interval in a confined zone shall extend across the entire saturated zone of the aquifer or up to a length of 20 feet, whichever is less. The screened zone and filter pack will not cross-connect to another aquifer.

CONSTRUCTION MATERIALS

Casing and Screen Materials: Well casing and screen will be constructed of clean materials that have the least potential for affecting the quality of the sample. The most suitable material for a particular installation will depend upon the parameters to be monitored. Acceptable materials include PVC, stainless steel, or low carbon steel.

Casing Joints: Joints will be connected by flush threaded couplers. Organic bonding compounds and solvents will not be used on joints.

Well Screen Slots: Well screen will be factory slotted. The size of the slots will be selected to allow sufficient groundwater flow to the well for sampling, minimize the passage of formation materials into the well, and ensure sufficient structural integrity to prevent the collapse of the intake structure.

Casing Bottom Plug: The bottom of the well casing will be permanently plugged, either by flush threaded screw-on or friction cap. Friction caps will be secured with stainless steel set screws. No organic solvents or cements will be applied.

Filter Pack Material: Filter envelope materials will be durable, water worn, and washed clean of silt, dirt, and foreign matter. Sand size particles will be screened silica sand.

Particles will be well rounded and graded to an appropriate size for retention of aquifer materials.

Bentonite Seal Material: Bentonite will be pure and free of additives that may affect groundwater quality. Bentonite will be hydrated with potable or tap water.

Grout Seal Material: Neat cement grout or sand-cement grout will consist of a proper mixture of Type 1/11 Portland cement, hydrated with potable or tap water. Up to 3% bentonite may be added to the mixture to control shrinkage.

CONSTRUCTION PROCEDURES

Decontamination: All downhole tools, well casings, casing fittings, screens, and all other components that are installed in the well shall be thoroughly cleaned immediately before starting each well installation. When available, each component shall be cleaned with a high temperature, high pressure washer for a minimum of 5 minutes. When a washer is not available, components shall be cleaned with water and detergent, rinsed in potable or tap water, then rinsed in distilled water.

Soil and water sampling equipment and material used to construct the wells shall not donate to, capture, mask, nor alter the chemical composition of the soil and groundwater.

Drilling Methods: Acceptable drilling methods include solid and hollow-stem auger, percussion, direct circulation mud and air rotary, and reverse rotary. The best alternative is that which minimizes the introduction of foreign materials or fluids. If drilling fluid is employed, drilling fluid additives shall be limited to inorganic and non-hazardous compounds. Compressed air introduced into the borehole shall be adequately filtered to remove oil and particulates.

Casing Installation: The casing will be set under tension, when necessary, to ensure straightness. Centralizers will be used where necessary to prevent curvature or stress to the casing.

Sand Pack Installation: The sand pack will be installed so as to avoid bridging and the creation of void spaces. The tremie pipe method will be used where installation conditions or local regulations require. Drilling mud, when used, will be thinned prior to pack placement. The sand pack shall cover the entire screened interval and rise a minimum of 2 feet above the highest perforation.

Bentonite Seal Placement: A bentonite seal will be placed above the sand pack by a method that prevents bridging. Bentonite pellets can be placed by free fall if proper sinking through annular water can be assured. Bentonite slurry will be placed by the tremie pipe method from the bottom upward. The bentonite seal will not be less than 1 to 3-feet in thickness, depending on regulatory guidelines.

Grout Seal Placement: The cement grout mixture will be hydrated with potable or tap water and thoroughly mixed prior to placement. If substantial groundwater exists in the bore hole, the grout shall be placed by tremie pipe method from the bottom upward. In a dry borehole, the grout may be surface poured to a depth of 30 feet. Below a depth of 30 feet grout will be placed by tremie pipe. Grout will be placed in 1 continuous lift and will extend to the surface or to the well vault if the well head is completed below grade. A minimum of 5 feet of grout seal will be installed, unless impractical due to the shallow nature of the well.

Surface Completion: The well head will be protected from fluid entry, accidental damage, unauthorized access, and vandalism. A watertight, locking cap will be installed on the well casing. Access to the casing will be controlled by a keyed lock.

Well heads completed below grade will be completed in a concrete and/or steel vault, installed to drain surface runoff away from the vault.

Well Identification: Each well will be labeled to show well number, depth, hole and casing diameter, and screened interval.

APPENDIX I

RECORD OF WELL DEVELOPMENT AND RECORD OF WATER SAMPLING

RECORD OF WELL DEVELOPMENT

PROJECT NO.: 176 DATE: 12-16-94 WELL NO.: mw-1

PROJECT NAME: American Building Components WELL DIAMETER: 2"

PROJECT LOCATION: 6253 Dougherty Rd TOC ELEV:

DEVELOPER: LNH LOCK NO.: None

WELL DEPTH (from construction detail):

WELL DEPTH (measured): 20.30 SOFT BOTTOM?: yes

DEPTH TO WATER: 10.17 TIME: 1345

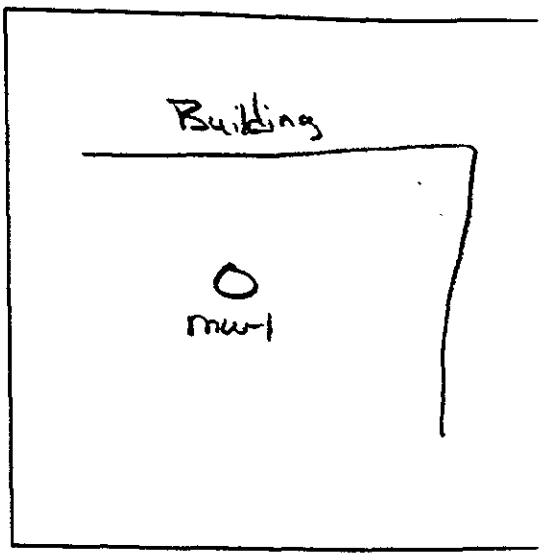
PRESSURE (circle one)?: YES OR (NO)

IF YES, WAS PRESSURE (circle one): POSITIVE OR NEGATIVE?

WATER VOLUME IN WELL: 1.62

[2-INCH CASING = 0.16 GAL/FT] [4-INCH CASING = 0.65 GAL/FT]

[6-INCH CASING = 1.47 GAL/FT] [1 GAL = 3.78L]



LOCATION MAP

DEVELOPMENT METHOD: Hand pump

FLOATING PRODUCT PRESENT: YES ☐ NO ~~☐~~

SHEEN PRESENT: YES ☐ NO ~~☐~~

ODOR PRESENT: YES ☐ NO ~~☐~~

FIELD MEASUREMENTS

Time	Depth to Water (FT)	Vol (Gal)	Clarity (NTU'S)	Remarks
1350		10	>200	No odor
1507		70	>200	No odor

TOTAL VOLUME DEVELOPED (GAL): 72 (L):

WATER VOL. IN DRUM: 100%

SIGNATURE:

NEED NEW DRUM?: yes

RECORD OF WATER SAMPLING

PROJECT NO.: 176 DATE: 12/20/94

PROJECT NAME: AMERICAN BLDG COMPONENTS

PROJECT LOCATION: 6253 DOUGHERTY BLVD, DUBLIN

SAMPLER: MRV

ANALYSES: TPH-D, TPH-G, BTEX

WELL DEPTH (from construction detail): _____

WELL DEPTH (measured): 19.97' SOFT BOTTOM?: NO

DEPTH TO WATER: 8.95' TIME: 9:40

PRESSURE (circle one)?: YES OR (NO)

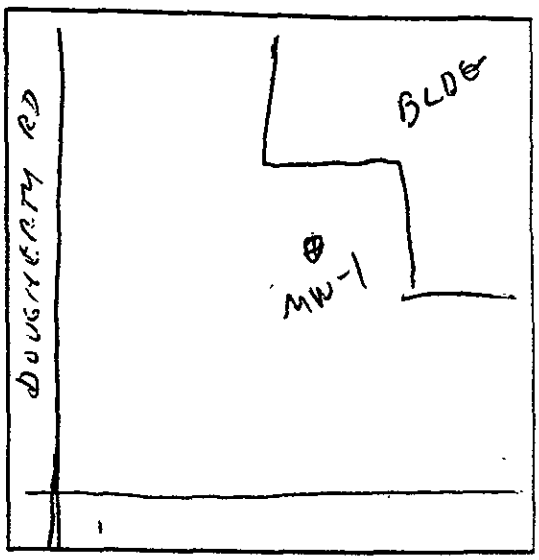
IF YES, WAS PRESSURE (circle one): POSITIVE OR NEGATIVE?

WELL NO.: MW-1

WELL DIAMETER: 2"

TOC ELEV: _____

LOCK NO.: P-605



LOCATION MAP

WATER VOLUME IN WELL: 1.76 GAL

[2-INCH CASING = 0.16 GAL/FT] [4-INCH CASING = 0.65 GAL/FT]

[6-INCH CASING = 1.47 GAL/FT] [1 GAL = 3.78 L]

CALCULATED PURGE VOL. (GAL): 5.3 (L): 20.03 ACTUAL PURGE VOL. (GAL): 5.3 (L): 29

PURGE METHOD: POLY BAILER SAMPLE METHOD: POLY BAILER

FIELD MEASUREMENTS

Time	Depth to Water (FT)	Vol (L)	Temp (Deg. F)	pH	EC x1000	Clarity	Turbidity (NTU)	Remarks
9:49		1	58.3	8.17	2.99	CLR		NO ODORS
9:57		14	59.3	7.43	2.30	"		
9:58		15	61.5	7.37	2.29	"		
9:59		16	62.6	7.31	2.30	"		
10:01		17	62.7	7.26	2.30	"		
10:02		18	62.8	7.23	2.32	"		
10:03		19	63.0	7.20	2.30	"		
10:04		20	62.6	7.19	2.30	"		
10:07		21	~~62.7~~			"		SAMPLE TAKEN

SIGNATURE: _____

WATER VOL. IN DRUM: 55 GAL

NEED NEW DRUM?: YES

APPENDIX J

GROUNDWATER MONITORING WELL DEVELOPMENT PROCEDURES

APPENDIX J

GROUNDWATER MONITORING WELL DEVELOPMENT PROCEDURES

INTRODUCTION

Newly installed groundwater monitoring wells will be developed to restore natural hydraulic conductivity of the formation, remove sediments from well casing and filter pack, stabilize the filter pack and aquifer material, and promote turbidity-free groundwater samples.

Wells may be developed by bailing, hand pumping, mechanical pumping, air lift pumping, surging, swabbing, or an effective combination of methods. Wells will be developed until the water is free of sand, silt, and minimum turbidity has stabilized.

In some cases where low permeability formations are involved or the drilling mud used fails to respond to cleanup, initial development pumping may immediately dewater the well casing and thereby inhibit development. When this occurs, clean, potable grade water may be introduced into the well, followed by surging of the introduced waters with a surge block. This operation will be followed by pumping or bailing. The procedure may be repeated as required to establish full development.

METHODOLOGY

Seal Stabilization: Cement and bentonite annular seals shall set and cure not less than 24 to 72 hours (according to local regulatory guidelines) prior to well development.

Decontamination: All well development tools and equipment shall be thoroughly cleaned immediately before starting each well installation. When available, each component shall be cleaned with a high temperature, high pressure washer for a minimum of 5 minutes. When a washer is not available, components shall be cleaned with potable or tap water, then rinsed with distilled water.

Development equipment shall not donate to, capture, mask, nor alter the chemical composition of the soil and groundwater.

Introduction of Water: Initial development of wells in low permeability formations may dewater the casing and filter pack. When this occurs, clean, potable or tap water will be introduced into the well to enhance development.

Bailing: Development will begin by bailing to remove heavy sediments from the well casing. Care will be taken to not damage the well bottom cap during lowering of the bailer.

Surging: Care will be exercised when using a surge block to avoid damaging the well screen and casing. When surging wells screened in coarse (sand/gravelly) aquifers, the rate of surge block lifting shall be slow and constant. When surging wells screened in fine (silty) aquifers, more vigorous lifting may be required. Between surging episodes, wells will be bailed to remove accumulated sediments.

Pumping: Development pumping rates shall be less than the recharge rate of the well in order to avoid dewatering.

Discharged Water Containment and Disposal: All water and sediment generated by well development shall be collected in labeled 55-gallon steel drums. Development water will be temporarily contained on site, pending sampling and laboratory analysis. No hazardous development water will be released to the environment. Disposal of development water will be the responsibility of the client

APPENDIX K

GROUNDWATER MONITORING WELL SAMPLING PROCEDURES

APPENDIX K

GROUNDWATER MONITORING WELL SAMPLING PROCEDURES

Groundwater monitoring wells will not be sampled until at least 24 to 72 hours (according to local regulatory guidelines) after well development. Groundwater samples will be obtained using either a bladder pump, clear Teflon bailer, or dedicated polyethylene bailer. Prior to collecting samples, the sampling equipment will be thoroughly decontaminated to prevent introduction of contaminants into the well and to avoid cross-contamination. Monitoring wells will be sampled after 3 to 10 wetted casing volumes of groundwater have been evacuated and pH, electrical conductivity, and temperature have stabilized as measured with a Hydac Digital Tester. If the well is emptied before 3 to 10 well volumes are removed, the sample will be taken when the water level in the well recovers to 80% of its initial water level or more.

When a water sample is collected, turbidity of the water will be measured and recorded with a digital turbidimeter. Degree of turbidity will be measured and recorded in nephelometric turbidity units (NTU).

TPE will also measure the thickness of any floating product in the monitoring wells using an interface or probe clear Teflon or polyethylene bailer. The floating product will be measured after well development but prior to the collection of groundwater samples. If floating product is present in the well, TPE will recommend to the client that product removal be commenced immediately and reported to the appropriate regulatory agency.

Unless specifically waived or changed by the local, prevailing regulatory agency, water samples shall be handled and preserved according to the latest EPA methods as described in the Federal Register (Volume 44, No. 233, Page 69544, Table II) for the type of analysis to be performed.

Development and/or purge water will be stored on site in labeled containers. The disposal of the containers and development and/or purge water is the responsibility of the client.

MEASUREMENTS

Purged Water Parameter: During purging, discharged water will be measured for the following parameters.

Parameter	Units of Measurement
pH	None
Electrical Conductivity	Micromhos
Temperature	Degrees F or C
Depth to Water	Feet/Hundredths
Volume of Water Discharged	Gallons
Turbidity	NTU

Documentation: All parameter measurements shall be documented in writing on TPE development logs.