Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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SITE CHARACTERIZATION REPORT DELINEATION OF HYDROCARBONS IN SOIL AND GROUND WATER

at

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

AGS Job No. 18034-7
4-5-90

Report prepared for

Exxon Company, U.S.A.
P.O. Box 4415
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by
Applied GeoSystems

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INTRODUCTION

This report summarizes the work that Applied GeoSystems (AGS) performed at Exxon Station No. 7-3399, at 2991 Hopyard Road in Pleasanton, California, to delineate the extent and magnitude of hydrocarbon compounds in soil and ground water. It includes a description of work performed and presents the results of soil vapor and ground-water recovery and treatment. Exxon Company, U.S.A. (Exxon) requested that this work be performed to satisfy the provisions of Cleanup and Abatement Order No. 89-132, issued by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) on August 11, 1989.

Delineation work included ground-water monitoring, drilling borings and installing ground-water monitoring wells, collecting soil and ground-water samples and analyzing them to

evaluate hydrocarbons in soil and ground water. Remediation work included extracting ground water and soil vapor, inspecting operation of the mechanical equipment, and sampling and analyzing effluent gases and water to evaluate trends in hydrocarbon concentrations. Installation of additional soil-vapor-extraction wells and performing two soil-vapor-extraction tests were also included in the scope of work.

Applied GeoSystems has submitted three progress reports (AGS, September 30, 1989; December 1, 1989; February 1, 1990) under Order No. 89-132. Those reports describe work performed between August 1, 1988, and approximately January 15, 1990. This report presents further documentation of the work conducted between September 1989 and March 1990.

Site Location and Description

Exxon Station No. 7-3399 is at the eastern corner of Hopyard Road and Valley Avenue in Pleasanton, as shown on the Site Vicinity Map (Plate P-1). The station property is bounded on the northwest by Valley Avenue; on the southwest by Hopyard Road; on the northeast by a shopping center parking lot owned by Lucky Stores, Inc., of Dublin, California (Lucky Stores property); and on the southeast by an access drive and Straw Hat pizza parlor owned by Mr. Ralph Henderlong of Alamo, California (Straw Hat property). Features at the station are shown on the Generalized Site Plan, Plate P-2, and include

three underground storage tanks (USTs) that store unleaded, premium unleaded, and regular leaded gasoline; a waste-oil UST; six service islands; and a station building with an automobile maintenance bay. The service station was demolished in September 1988 and new station facilities were constructed between September 1988 and February 1989. The USTs are near the northwest corner of the station property; the previous tanks were near the southeast edge of the property. Plate P-2 also shows the approximate location of the former gasoline UST pit.

Previous Environmental Work

Our progress report No. 18034-4, dated September 30, 1989, includes an overview of work performed between April and September 1988, and describes work performed from August 1988 through August 1989. The first three phases of work at the site were performed to evaluate the extent and magnitude of hydrocarbons in soil and ground water; to evaluate the potential for migration of hydrocarbons in ground water toward the City of Pleasanton Municipal Well No. 7 (Municipal Well 7); and to sample and analyze excavated and aerated soil from the removal of the former USTs. During these phases, activities included installing ground-water monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5d, MW-5s, MW-6, and recovery well MW-7; drilling boring B-4; performing a soil-vapor survey; sampling and analyzing soil and ground water for gasoline hydrocarbons; recovering floating product; conducting two pump tests; extracting and disposing of ground-water; and

sampling and analyzing in situ and excavated soil (AGS, April 22, 1988; July 15, 1988; August 17, 1988; August 22, 1988; and September 23, 1988).

FIELD WORK AND LABORATORY ANALYSES

The field work included drilling borings, installing ground-water and vapor-extraction wells, monitoring the ground water, pumping product and ground water, and performing two vapor extraction tests. A description of field procedures is presented in Appendix A. Laboratory work included analyses of samples of soil, ground water, and soil vapor for gasoline hydrocarbons.

Installation of Wells

During September and October 1989, five borings (B-8 through B-12) were drilled and ground-water monitoring wells (MW-8 through MW-11) were installed in four of the borings. Those borings were drilled and the wells were installed to delineate the extent of gasoline hydrocarbons in soil and ground water beneath and downgradient from the site. In November 1989, three more borings were drilled and vapor-recovery wells were installed.

Locations of Wells

Monitoring well MW-8 was drilled and installed on the northern portion of the property to monitor the water bearing zone observed at approximately 120 feet in depth in Municipal Well 7. Well MW-8 was located between the former gasoline UST pit and Municipal Well 7.

Wells MW-9 and MW-10 were installed onsite to evaluate the extent of hydrocarbons in ground water in the uppermost water bearing zone beneath the station property. Well MW-9 was drilled in the central portion of the property and MW-10 was drilled on the southwest corner of the property. Recovery well MW-7 was drilled out to its total depth and replaced with a larger diameter casing to allow measurement of the water level during pumping and for increased clearance for downhole equipment.

Mr. Ralph Henderlong of Alamo, California, provided permission for the installation of two monitoring wells on the Straw Hat property southeast of the station. Mr. Henderlong is owner of that property. Two wells were located to delineate and monitor ground water for hydrocarbons downgradient from the former tank pit. Monitoring well MW-11 was installed to a depth of approximately 60 feet to monitor the upper water bearing zone. Boring B-12 was drilled to a depth of 84 feet to install a monitoring well in the deeper

water bearing zone; however, only 1 foot of damp sand from depths of 70 to 71 feet was encountered and the borehole was backfilled.

Three boreholes were drilled near the center of the station property to install vapor-recovery wells VR-2 through VR-4. These wells were installed for delineating hydrocarbons in soil after higher concentrations of hydrocarbons in soil and ground water were found in well MW-9. The wells would also be planned to be used for vapor recovery. Wells VR-2 and VR-3 were installed adjacent to each other approximately 20 feet southeast of well MW-9; well VR-4 was installed 20 feet northwest of well MW-9.

Two wells were planned to be installed northeast and east of the site, but permission has not yet been obtained from the property owner. The approximate locations of wells MW-8 through MW-11, VR-2 through VR-4, and boring B-12 are shown on Plate P-2.

Drilling of Soil Borings

Before the environmental investigation began, permits were obtained for drilling and constructing the wells. Copies of the permits for construction of the monitoring wells are included in Appendix B. Underground Service Alert was contacted to notify various public utility companies. Field work was conducted in accordance with AGS Site Safety Plan No. 18034-4S, which is discussed in Appendix A.

Drilling of the borings took place from September through November 1989. During drilling, soil samples were collected and described using the Unified Soil Classification System. A copy of this classification system is shown on Plate P-3. Descriptions of the earth materials encountered in the borings are presented on the Logs of Borings, Plates P-4 through P-27.

Monitoring well MW-8 was drilled and installed on September 28 through September 30, 1989. The boring for this double-cased well was drilled with a mud rotary drilling rig by All Terrain Exploration Drilling of Roseville, California. A 14-inch-diameter borehole was drilled to a depth of approximately 91 feet and a 10-inch-diameter borehole was drill from 91 feet to the total depth of the boring at 140 feet.

The drilling and installation of onsite monitoring wells MW-9 and MW-10, and the drilling out and reinstallation of ground-water recovery well MW-7 were completed between October 4 and October 11, 1989. The borings for these wells were drilled by Kvilhaug Well Drilling and Pump Company, Inc., of Concord, California, using 10-inch-diameter, continuous-flight, hollow-stem augers. The boring for MW-9 was advanced to a total depth of approximately 57 1/2 feet, the boring for MW-10 was advanced to a total depth of approximately 60 1/2 feet, and MW-7 was drilled out to its total depth of 55 feet. Ground water was encountered during drilling at a depth of approximately 50 feet.

The boring for well MW-11 and boring B-12 were drilled on the Straw Hat property on November 2 and 3, 1989. These borings were drilled by Jcon Exploration of Yuba City, California. The boring for MW-11 was drilled using 8-inch-diameter augers, and was reamed with 10-inch-diameter augers to a total depth of approximately 55 1/2 feet. Ground water was encountered at approximately 50 feet below the ground surface. Boring B-12 was drilled using an 8-inch-diameter auger to approximately 84 feet in depth. The anticipated second aquifer was not encountered in boring B-12 and the borehole was backfilled with a slurry of sand and neat cement.

Jcon Exploration drilled the borings for vapor-recovery wells VR-2 through VR-4 on November 20 and 21, 1989. The boring for VR-2 was drilled to a depth of 45 feet into the unsaturated portion of the uppermost aquifer sand and gravel. The borings for VR-3 and VR-4 were terminated at depths of approximately 35 feet in the unsaturated silty clay.

Well Construction and Development

Monitoring well MW-8 was completed with 10-1/4-inch-diameter steel conductor casing set from 93 to 2 feet below grade, and 4-inch-diameter polyvinyl chloride (PVC) casing, which is slotted from the total depth of the well at 133 feet to 118 feet. Wells MW-9, MW-10, and MW-11 were completed with 4-inch-diameter PVC casing. The wells were completed with slotted casing from the wells' total depths to 35, 40, and 35 feet, respectively, and

unperforated casing from those depths to 1/2 foot below grade. Recovery well MW-7 was completed with 5-inch-diameter PVC casing, which is perforated from the 60- to 35-foot depths.

Wells VR-2 through VR-4 were constructed of 2-inch-diameter PVC casing. Perforated casing was placed from 35 to 45 feet in depth in well VR-2. Perforated casing in wells VR-3 and VR-4 were place between from 32 1/2 to 12 1/2 feet and 35 and 5 feet, respectively, to cover the zone of relatively higher concentrations found in soil in well MW-9.

The ground-water monitoring wells were developed by surging and pumping until the discharge water was relatively free of silt. The water purged from the wells during development was pumped into the sanitary sewer via the oil/water separator of the existing ground-water remediation system.

Sampling of Soil

Soil samples were collected from the borings at approximately 5-foot intervals from the ground surface to the total depths of the borings. Samples were collected in brass sleeves contained within a California modified split-spoon sampler. An organic vapor meter (OVM) was used in the field to evaluate concentrations of hydrocarbon vapors in the soil

samples. The OVM readings are shown on the Logs of Borings in the column labeled "P.I.D." (photoionization detector). When drilling the boring for MW-8, the depth intervals from 30 to 41 feet, and 50 to 140 feet were cored to provide a fairly comprehensive description of the sediments between the second and third aquifers.

Fifteen soil samples collected from the soil borings, from depths ranging from 6 to 84 feet below ground surface, were submitted for chemical analysis. Samples for testing were selected generally on the basis of the OVM readings, and were appropriately sealed and transported the state-certified Applied GeoSystems laboratory (Certificate No. 153) in Fremont, California, using chain-of-custody protocol.

One sample of silty clay was collected at the 106-foot depth in the boring drilled for well MW-8 and submitted to the laboratory of Woodward-Clyde Consultants in Pleasant Hill, California, for analysis for vertical head permeability. The procedure used to test the sample was EM-1110-2-1906 (USCE Manual, Appendix VII and X, 30 November 1970).

Monitoring and Sampling of Ground Water

The site was visited on September 13, November 28, December 20, 1989, and January 9, and 26, February 23, and March 26, 1990, to monitor the ground water. Monitoring included measuring water levels in wells and examining the water (subjective evaluation)

for evidence for floating product or sheen. Monitoring was performed on water from MW-1, MW-4, MW-5d, MW-5s, and MW-7 (recovery well) during the September and December visits, and from MW-8 through MW-11 following their installation and during the December visit. Monitoring was performed on all of the above-mentioned wells during site visits in 1990.

During September and December 1989, the wells were purged and sampled for laboratory analysis as part of a quarterly ground-water monitoring program. Wells MW-8 and MW-9 were also sampled in January and February 1990 because detected concentrations of hydrocarbons in these wells warranted more frequent sampling. The water samples were submitted to the Applied GeoSystems laboratory for testing.

Removal of Water and Floating Product from Well MW-9

On November 28, 1989, approximately 1 inch of floating gasoline product was found on the ground water in well MW-9. At the request of Exxon, weekly site visits were made during December 1989 and early January 1990 to bail or pump well MW-9 to remove free floating product. Approximately 200 gallons of fluid were removed from the well during four purging episodes on December 1, 7, and 20, 1989, and January 2, 1990. An estimated 1 to 2 gallons of the fluid was gasoline product. The floating product in well MW-9 was reduced to a slight sheen after the December 7, 1989, pumping episode.

Site visits also were made at Exxon's request on January 26, 31, and February 9, 14, and 30, 1990, to pump fluids from wells MW-9 and MW-1 as an interim measure to help reduce concentrations of hydrocarbons found in water in these wells. Approximately 900 gallons of water were removed from the wells during this time. The product and water were placed in drums and removed from the site by Armour Petroleum Service and Equipment Corporation of Fairfield, California.

Vapor-Extraction Tests

Wells VR-2 and VR-3 were planned to be used for vapor-extraction testing of both the silty clay zone and the underlying sand and gravel zone. Water, suspected from a perched zone, was found in VR-3 and VR-4 and those wells could be used for the test. Vapor extraction tests were performed on well VR-2 which was constructed in the unsaturated portion of the sand and gravel.

On December 14 and 15, 1989, two vapor-extraction tests were performed on well VR-2. A 100-cubic-feet/minute (cfm), 7.5 horsepower vacuum pump capable of developing 12 inches of mercury vacuum was used to pump the well for approximately 9 hours each day. Before being vented to the atmosphere, the extracted vapors were passed through two 150-pound carbon canisters placed in series. The effluent hydrocarbon concentration was monitored every half hour with an organic vapor analyzer (OVA) to confirm that the

effluent concentrations did not exceed the ambient TPHg concentration of 5 parts per million by volume (ppmv). The average vapor-extraction rate was approximately 103 cfm throughout the test. Pressure was monitored at the wellheads of MW-9 and VR-3. Well MW-9 is approximately 20 feet northwest of VR-2 and is screened in the sand and gravel zone; VR-3 is adjacent to VR-2 and is screened in the shallower silty clay. Field data collected during the test is tabulated in Appendix C.

Samples of the extracted vapors for laboratory analyses were collected every hour. The vapor samples transported to the Trace Analysis Laboratory, Inc., in Hayward, California, which is certified for gasoline hydrocarbon analyses.

Laboratory Analyses

Soil samples submitted to the laboratory were analyzed for total petroleum hydrocarbons as gasoline (TPHg) by modified Environmental Protection Agency (EPA) Method 8015, and for benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) by EPA Method 8020. Water samples were analyzed for TPHg and BTEX using EPA modified Method 8015 and EPA Method 602, respectively. Vapor samples were analyzed for TPHg and BTEX using modified method CA-ADDL004. Copies of the Chain of Custody Records that document handling of the samples and the laboratory analysis reports are included in Appendix D.

A vertical head permeability test was performed on a sample collected at the 106-foot depth in the boring for well MW-8. The laboratory report for this test is also included in Appendix D.

REMEDIATION SYSTEMS

Ground-Water Recovery and Treatment System

A discussion of the operation of the ground-water recovery system from June 1988 through August 1989 is presented in progress report 18034-4 (AGS, September 30, 1989). Recovery of ground water from well MW-7 continued until sometime between September 15 and 19, 1989, when the recovery pump broke down. An estimated 7.3 million gallons of water were recovered between July 1988 and September 1989. As stated earlier in this report, the 4-inch-diameter well casing of well MW-7 was replaced with 5-inch-diameter casing on October 11, 1989, and a new submersible pump was installed on October 26, 1989. Ground-water recovery resumed on October 30, 1989.

The initial pumping rate on October 30 was 9 gallons per minute (gpm); by November 2, 1989, the pumping rate had decreased to approximately 4-1/2 gallons per hour. The pumping rate varied during December and January from 0.3 gpm to 0.55 gpm. The average pumping rate between January and March 1990 was 0.6 gpm. Between October

30, 1989, and March 26, 1990, approximately 89,540 gallons of water were recovered from well MW-7. Ground water is currently being removed from the uppermost aquifer and discharged into the sanitary sewer under a permit from the Dublin-San Ramon Services District.

Monitoring of Effluent

Samples of ground-water effluent were collected quarterly in conjunction with the ground-water monitoring program for the site. The samples were analyzed for TPHg and BTEX as described under laboratory analyses.

Vapor-Extraction and Treatment System

As a result of various mechanical complications, the soil-vapor-extraction system operated intermittently between August 1989 and January 1990 . The system included a liquid-ring vacuum pump that uses water for cooling and sealing purposes. That water was being supplied by the ground-water recovery system via the oil-water separator tank. The reduction of ground-water recovery in late 1989 as a result of the decline in water level in the uppermost aquifer required that a supplemental water supply be connected to the system. That water supply also did not prove sufficient for cooling purposes. The

discovery of relatively higher hydrocarbons near well MW-9 altered the scope of the vapor extraction program, which will require some modification to the system.

Monitoring Operation of the System

Hydrocarbon vapors were extracted from well VR-1 located in the former gasoline storage-tank pit during operation in January 1990. As part of the monitoring program, the influent vapors were sampled daily for laboratory testing. These samples were submitted to Trace Analysis Laboratory, Inc. for TPHg and BTEX analysis.

RESULTS OF INVESTIGATION

A discussion of the results of work performed since September 1989 is presented in the following sections. Results are presented on the hydrogeology, ground water monitoring and sampling, vapor extraction tests, ground-water recovery, and hydrocarbon-vapor recovery.

Site Geology

Investigations to characterize the site included borings to depths between 40 and 140 feet. The subsurface strata consist of a silty clay from the ground surface generally to 40 feet, a

sand and gravel unit from approximately 40 to 58 feet, a silty clay unit from 55 to 65 feet, a sand unit between 65 and 80 feet, a silty clay from 80 to 120 feet, and a sand and gravel unit from 120 to 140 feet. Laboratory tests on a sample of silty clay from a depth of 106 feet in the boring from well MW-8 indicated an average permeability of 1.15×10^{-8} centimeters per second, representing a very low permeable material (See Appendix D for the report of laboratory results). A thin bed of silty sand and sand was found between the depths of 5 and 10 feet. This bed may be continuous across the site. Water from this sand layer is probably seeping into vapor wells VR-3 and VR-4.

The ground water in the coarse-grained sediments occurs under unconfined conditions in the shallower sand and gravel and under confined conditions in the two deeper sand and gravel zones. Data from drilling and pump tests indicated that the confining clay deposit separating the first and second aquifers is extensive beneath the study area. The second aquifer extends at least from the area of offsite well MW-5d and beneath the station property, but does not appear to extend to the south beyond the location of boring B-12. Except for 1 foot of sand at 70 to 71 feet deep, silty clay was encountered continuously between the depths of 52 and 84 feet in boring B-12. The thickness of the second aquifer appears to decrease substantially toward the south from approximately 12 feet near well MW-5d to 1 foot thick near boring B-12.

Results of Ground-Water Monitoring

Ground-water levels in wells have been measured at the site since April 1988. Subjective evaluations of fluids for floating product or sheen have also been performed since that time. Cumulative results of the water-level measurements and subjective evaluations of ground water since 1988 are presented in Table 1. The table shows that water levels in wells in March 1990 have declined more than 7 feet since March 1989, and more than 13 feet since early April 1988. The trend of water levels in wells at the site is presented on a hydrograph on Plate P-30.

Measurements of the depth to ground water were made on February 23, 1990, and March 26, 1990. Two measurements were made on each day; one while the recovery well MW-7 was operating, and the other when the recovery pump was not operating. The purpose of the two measurements was to evaluate the natural gradient and the radius of influence of pumping.

The water-level measurements were used with survey data on the relative elevations of the wells to estimate the elevation of the water surface (above mean sea level) of the uppermost aquifer. These data are shown in Table 2, and were used to evaluate the gradient and direction of ground-water flow in the uppermost aquifer. A copy of the survey performed by Ron Archer, Civil Engineer, of Pleasanton, California, is included in

Appendix B. Plates P-31 and P-32 were constructed to portray the estimated surface of the water table under static conditions and under pumping conditions on February 23, 1990. Plates P-33 and P-34 present an estimate of the ground water surface under the same conditions on March 26, 1990. The plates indicate that ground water flowed generally toward the southeast beneath most of the site, and the gradient was nearly flat.

Flow also is interpreted toward recovery well MW-7 on both days (Plates P-32 and P-34) as a result of pumping. Measured differences in the water level in wells MW-4, MW-9, MW-10, and MW-11 on both days and wells MW-1 and MW-5s on March 26, suggests that these wells are within the capture zone of recovery well MW-7 (Table 2).

Distribution of Hydrocarbons in Soil

The results of laboratory analyses of soil samples collected from the borings for wells MW-8, MW-10, and MW-11, and boring B-12, and the borings for VR-2 and VR-4 indicated nondetectable or very low (less than 1 ppm) concentrations of TPHg and BTEX. The results of laboratory analyses of soil samples collected from the boring for well MW-9 indicated TPHg concentrations ranging from 9.3 ppm to 6,200 ppm. Concentrations of 1,500 ppm and 3,000 ppm TPHg were found in the silty clay in this boring at the 5- and 20-foot depths, respectively. A concentration of 9.3 ppm was found at the 38-foot depth in silty clay, and 6,200 ppm and 900 ppm were found in the sand and gravel of the upper

aquifer sediments (38- and 41-foot depths). The TPHg were nondetectable in soil from well VR-2 at depths of 10, 20, and 45 feet; and the boring for well VR-4 at 10 and 20 feet in depth. Theses wells are approximately 20 feet from well MW-9. The results suggest that two relatively isolated areas of the higher concentrations of hydrocarbons are located in soil near MW-9. Laboratory results for soil from the borings are presented in Table 3. Copies of Chain of Custody records and laboratory analysis reports are included in Appendix D.

Previous investigations have indicated that hydrocarbon vapors are present in the vicinity of the former tank pit. Average concentrations and extent of hydrocarbons in the former tank-pit area and near well MW-9 were estimated by an approximate mass of hydrocarbons in the unsaturated soil. A total mass of approximately 1,800 kilograms (3,970 pounds) of hydrocarbons was calculated using available information. Assumptions and calculations to arrive at this estimate are presented in Appendix C.

Distribution of Hydrocarbons in Ground Water

Relatively low concentrations of TPHg and BTEX were found in water from offsite well MW-11 during November and December 1989 and in water from onsite well MW-1 during September and December 1989. The concentrations of the hydrocarbons remained roughly equivalent in both wells over that period of time. A trace concentration (0.00061 ppm) of total xylene isomers was detected in water from well MW-8. Results of analyses after

resampling of the well in January and February 1990, showed concentrations of 0.00087 ppm and 0.0011 ppm, respectively. Concentrations of TPHg and BTEX in water from recovery well MW-7 have been either slightly detectable or non-detectable since August 1989; no TPHg or BTEX were detected in the December 1989 sample analysis. The TPHg or BTEX were non-detectable in water from offsite wells MW-5d and MW-5s, north of the station, and onsite wells MW-4 and MW-10 (except for 0.0018 ppm total xylene isomers).

Monitoring well MW-9 contained floating product in November 1989, which has been reduced through periodic pumping to a very slight sheen in March 1990. No floating product or sheen have been found in water in the other wells since November 1989, when a very slight hydrocarbon sheen was reported on the water in MW-11. The cumulative results of analyses of water samples from the wells are presented in Table 4. Chain of Custody Records and laboratory reports for analyses performed between September 1989 and February 1990 are included in Appendix D.

The results of analyses of ground water from the uppermost aquifer show that dissolved hydrocarbons appear to be at relatively high concentrations in the area beneath the center of the site (MW-9). The concentrations detected in MW-11 suggest that hydrocarbons may not extend downgradient of the site much beyond that well. Only trace concentrations of total xylene isomers were found in water from MW-10, and this well may also be close to the extent of detectable hydrocarbons near the southwest corner of the station property.

The direction of ground-water flow since August 1988 (southeast to southwest) indicates that well MW-1 is upgradient of well MW-9. The concentrations of hydrocarbons found in water in MW-1 since September 1989 may be related to vapor-phase migration of the hydrocarbons in the presently unsaturated portion of the uppermost aquifer from the vicinity of well MW-9. The hydrocarbon levels in water in MW-1 have been decreasing with time. Hydrocarbons in the ground water may not extend to the north beyond the area of well MW-1. The extent of hydrocarbons to the east and northeast of the site was to be addressed by installing two wells on the Lucky Stores property. Access to that property has not been granted.

Analysis of Data from Vapor-Extraction Tests

The results of analyses of vapor samples indicated that concentrations of TPHg in vapor samples extracted from well VR-2 during the first day of testing ranged from 8,200 milligrams per cubic meter (mg/m^3) to 12,000 mg/m^3 (approximately 2,020 ppm to 2,955 ppm), and 7,300 mg/m^3 to 18,000 mg/m^3 (1,800 ppm to 4,430 ppm) during the second day. Within the observed ranges of TPHg, there were large fluctuations in concentrations during both tests. These fluctuations are typical responses during an initial phase of soil-vapor extraction. The average of soil-vapor concentrations during the two days of testing was 11,220 mg/m^3 (2,763 ppm). The analysis results of the vapor samples for TPHg and BTEX

are presented in Table 5 and the Chain of Custody Records and laboratory reports are included in Appendix D.

No measurable pressure response was detected at the wellhead of MW-9; a pressure response of less than 1 inch of water was measured at vapor-recovery well VR-3, which is 3 feet from well VR-2 and is screened in the silty clay to a depth that is 2 1/2 feet shallower than the top of the screen in well VR-2. Information to evaluate a larger radius of influence is not available; however, a flow rate of 103 cfm at the discharge point, a calculated flow rate of 96 cfm at the wellhead of VR-2, and relatively higher concentrations of TPHg in extracted vapors indicate that vapors were flowing relatively freely through the sand and gravel during the tests. The TPHg were non-detectable found in soil at the 45-foot depth in well VR-2 when this well was installed, which further suggests that hydrocarbon vapors were drawn toward well VR-2 from some distance.

The time to remove one pore volume of vapor within the distance between wells VR-2 and MW-9 (20 feet) was estimated to be approximately 1 hour. The value is based on a thickness of the extraction zone of 15 feet, a pore volume of 35 percent, and the flow rate of 103 cfm. Approximately 17 pore volumes within the sand and gravel zone and the between wells MW-9 and VR-2 are estimated to have been removed during the two tests.

During the two days of testing approximately 32 kilograms (72 pounds) of hydrocarbons were removed from the soil, which is an approximate rate of 1.8 kilograms per hour (4 pounds/hour). It is expected that during the life of the vapor-extraction project the concentrations of hydrocarbon in the extracted vapor will fall, and consequently recovery rates will gradually reduce, as a result of the reduction of volatile hydrocarbons in the soil. Calculations for the flow rate at well VR-2, estimated pore volumes removed, and mass of hydrocarbons removed during the tests are presented in Appendix C.

Ground-Water Recovery

Data from drilling and installing wells has indicated that the sand and gravel that contains the unconfined aquifer is between 15 and 20 feet thick beneath the site. A decline in water level of approximately 13 feet since 1988 has reduced the rate of ground water recovery substantially. Recovery rates of up to 25 gpm were attained in 1988 and the first 6 months of 1989. The recovery rate was approximately 0.5 gpm during the first quarter of 1990.

Some influence on the ground-water level was observed in MW-1, MW-4, MW-5s, MW-9, MW-10, and MW-11 when pumping from recovery well MW-7 was in progress during February and March 1990. These data indicate that the capture zone may extend beyond the locations of these wells.

Vapor Recovery

Vapor extraction from well VR-1 in the former gasoline tank pit took place for a period in January 1990. An effluent sample was collected at the start of vapor extraction and influent samples were collected daily for four days. The results of laboratory testing showed influent concentrations of 2,200 mg/m^3 (540 ppm) and 1,000 mg/m^3 (250 ppm) on the first day and concentrations of 970 mg/m^3 (240 ppm) and 920 mg/m^3 (225 ppm) on the third and fourth days. The results of the analyses of vapor samples in January 1990 and in 1989 are presented in Table 6. Copies of the Chain of Custody Records and the laboratory reports for the January analyses are included in Appendix D.

CONCLUSIONS

The following conclusions are drawn from data generated from the current and previous investigations at the site.

- The silty clay that separates the uppermost and second aquifers appears to be extensive beneath the area of investigation.
- A unit of silty clay that is approximately 50 feet thick appears to separate the second aquifer and the aquifer that occurs at the top of the perforations of City of Pleasanton Well 7, and this unit appears to be extensive beneath the site. Laboratory testing indicates that this silty clay is of low permeability.
- The second aquifer appears to pinch out approximately 50 to 75 feet south of the station property.
- The water level in the uppermost unconfined aquifer has declined approximately 13 feet since April 1988, which has reduced the rate of ground-water recovery substantially. Water-level measurements suggest, however, that the wells at the site may be within the capture zone of recovery well MW-7, which is at the south edge of the property.
- Hydrocarbons compounds in soil occur around the margins of the former gasoline tank pit in the interval from 15 and 25 feet, and have more recently been found between 5 and 25 feet and 40 and 45 feet in a relatively restricted area around well MW-9. A rough estimate of the mass of hydrocarbons detected in the silty clay and sand and gravel zones in these areas is approximately 4,000 pounds.
- Hydrocarbons in ground water from wells MW-4, MW-10, and MW-11 are very low to nondetectable. Hydrocarbons may not extend much beyond the wells, which are in the northeast, southwest, and southeast portions of the area investigated.
- Detectable hydrocarbons found in water from well MW-1, which is upgradient of the relatively high levels of hydrocarbons in well MW-9, may be related to vapor phase migration of hydrocarbons from the area of well MW-9.

- Relatively higher levels of hydrocarbons found in ground water from well MW-9 appear to be naturally migrating toward recovery well MW-7, but under a very low gradient. The southeast direction of ground water flow appears to enhance recovery of hydrocarbons.

REFERENCES

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TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 1 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-1	4/6/88	36.34	None	None
	4/8/88	36.29	None	None
	4/19/88	36.36	None	None
	6/6/88	38.16	None	None
	6/23/88	38.71	None	None
	6/28/88	39.16	--	--
	7/6/88	39.73	None	None
	7/13/88	40.22	None	None
	8/12/88	Well buried under excavated soil		
	8/26/88	41.90	--	--
	9/7/88	42.27	None	None
	12/7/88	43.94	None	None
	12/19/88	43.70	None	None
	2/9/89	42.53	--	--
	3/8/89	41.96	None	None
	4/3/89	41.59	--	--
	4/26/89	41.67	--	--
	6/30/89	43.79	None	None
	7/17/89	44.74	None	None
	7/18/89	44.76	--	--
	7/19/89	44.82	--	--
	7/20/89	44.85	None	None
	7/21/89	44.95	--	--
	7/26/89	45.42	None	None
	8/2/89	--	--	--
	8/3/89	46.18	--	--
	8/17/89	47.12	--	--
	9/13/89	49.08	None	None
	11/28/89	50.21	None	None
	1/9/90	49.31	None	None
	1/26/90	49.29	None	None
	2/23/90	49.02#	None	None
	2/23/90	49.02	None	None
	3/26/90	48.71#	None	None
	3/26/90	48.70	None	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 2 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-2	4/2/88	--	3.0	Heavy
	4/4/88	--	18.0	Heavy
	4/5/88	--	18.0	Heavy
	4/6/88	39.31	38.4	Heavy
	4/8/88	--*	--*	--*
	4/19/88	38.90	29.76**	Heavy
	6/6/88	38.78	3.12	Heavy
	6/23/88	39.23	1.50	Heavy
	6/28/88	39.72	--	--
	7/6/88	40.31	None	Slight
	7/12/88	Well destroyed due to excavation (old pit)		
MW-3	4/6/88	37.19	None	None
	4/8/88	37.14	None	None
	4/19/88	37.22	None	None
	6/6/88	39.02	None	None
	6/23/88	39.58	None	None
	6/28/88	40.04	--	--
	7/6/88	40.60	None	None
	7/13/88	41.09	None	None
	8/12/88	Well buried under excavated soil		
	8/26/88	42.77	--	--
	8/29/88	Well destroyed due to excavation (new pit)		
MW-4	4/8/88	36.41	None	None
	4/19/88	36.51	None	None
	6/6/88	38.26	None	None
	6/23/88	38.83	None	None
	6/28/88	39.28	--	--
	7/6/88	39.85	None	None
	7/13/88	40.31	None	None
	8/12/88	Well buried under excavated soil		

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 3 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-4	8/26/88	42.01	--	--
	9/7/88	Not accessible due to construction		
	12/7/88	Not accessible due to construction		
	12/19/88	43.83	None	None
	2/9/89	42.67	--	--
	3/8/89	42.11	None	None
	4/3/89	41.73	--	--
	4/26/89	41.79	--	--
	6/30/89	43.88	None	None
	7/17/89	44.85	None	None
	7/18/89	44.88	--	--
	7/19/89	44.92	--	--
	7/20/89	44.98	None	None
	7/21/89	45.04	--	--
	7/26/89	45.50	None	None
	8/2/89	--	--	--
	8/3/89	46.28	--	--
	8/17/89	47.22	--	--
	9/13/89	49.19	None	None
	11/28/89	50.34	None	None
	1/9/90	49.47	None	None
	1/26/90	49.36	None	None
	2/23/90	49.18#	None	None
	2/23/90	49.15	None	None
	3/26/90	48.84#	None	None
	3/26/90	48.83	None	None
B-4	4/2/88	--	None	None
MW-5d	5/25/88	38.55	None	None
	6/6/88	38.90	None	None
	6/23/88	39.56	None	None
	6/28/88	40.23	--	--

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 4 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-5d	7/6/88	40.69	None	None
	7/13/88	41.22	None	None
	8/12/88	42.34	--	--
	8/26/88	42.60	--	--
	9/7/88	42.99	--	--
	12/7/88	44.58	None	None
	2/9/89	Casing head damaged by construction		
	3/8/89	Casing head cut to lower elevation		
		42.49	None	None
	4/3/89	42.21	--	--
	4/26/89	42.36	--	--
	6/30/89	44.79	None	None
	7/17/89	45.73	None	None
	7/18/89	45.75	--	--
	7/19/89	44.89	--	--
	7/20/89	46.02	None	None
	7/21/89	46.18	--	--
	7/26/89	46.83	None	None
	8/2/89	--	--	--
	8/3/89	47.67	--	--
	8/17/89	48.27	--	--
	9/13/89	50.60	None	None
	11/28/89	51.16	None	None
	1/9/90	50.42	None	None
	1/26/90	50.10	None	None
	2/23/90	50.08	None	None
	3/26/90	49.80#	None	None
	3/26/90	49.77	None	None
MW-5s	5/25/88	38.46	None	None
	6/6/88	38.86	None	None
	6/23/88	39.52	None	None
	6/28/88	39.84	--	--
	7/6/88	40.45	None	None
	7/13/88	40.90	None	None
	7/22/88	41.30	None	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 5 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-5s	8/5/88	23.84▼	None	None
	8/12/88	42.21	--	--
	8/26/88	42.55	--	--
	9/7/88	42.94	None	None
	12/7/88	44.67	None	None
	2/9/89	43.19	--	--
	3/8/89	Casing head cut to lower elevation		
		42.11	None	None
	4/26/89	41.84	--	--
	6/30/89	43.95	None	None
	7/17/89	44.91	None	None
	7/18/89	44.93	--	--
	7/19/89	44.98	--	--
	7/20/89	45.02	None	None
	7/21/89	45.10	--	--
	7/26/89	45.57	None	None
	8/2/89	--	--	--
	8/3/89	46.31	--	--
	8/17/89	47.25	--	--
	9/13/89	49.22	None	None
	11/28/89	50.39	None	None
	1/9/90	49.51	None	None
	1/26/90	49.40	None	None
	2/23/90	49.20#	None	None
	2/23/90	49.20	None	None
	3/26/90	48.89#	None	None
	3/26/90	48.88	None	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 6 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-6	5/11/88	37.71	None	None
	6/6/88	38.70	None	None
	6/23/88	39.23	None	None
	6/28/88	39.74	None	None
	7/13/88	40.78	None	None
	8/5/88	41.72	None	None
	8/12/88	42.14	--	--
	8/17/88	Well buried under excavated soil		
	8/26/88	42.51	--	--
	9/7/88	42.85	None	None
	10/24/88	Well destroyed for station construction		
MW-7	7/13/88	40.50	None	None
	7/22/88	41.85#	None##	None##
	8/5/88	41.45#	None##	None##
	8/12/88	42.69	--	--
	9/7/88	42.60	--	--
	12/7/88	Not accessible		
	1/17/89	43.20	--	--
	2/9/89	Not accessible, pump equipment in well		
	10/12/89	49.93	None	None
	11/28/89	57.61#	--	--
	1/9/90	57.57#	--	--
	1/26/90	57.54#	None	None
	1/26/90	49.08	None	None
	2/23/90	55.26#	None	None
	2/23/90	48.93	None	None
	3/26/90	57.52#	None	None
	3/26/90	48.60	None	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 7 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-8	10/1/89	53.88	None	None
	11/28/89	53.74	None	None
	1/9/90	57.90	None	None
	1/26/90	53.57	None	None
	2/23/90	52.16	None	None
	3/26/90	52.80#	None	None
MW-9	10/12/89	50.24	None	None
	11/28/89	50.59	1.0	Heavy
	12/1/89	50.32	0.25	Heavy
	12/7/89	50.13	1.92	Heavy
	12/13/89	49.91	None	Slight
	12/20/89	49.78	None	Slight
	1/2/90	--	None	Slight
	1/9/90	49.39	None	Slight
	1/26/90	49.30	None	None
	2/23/90	49.06#	None	None
	2/23/90	49.05	None	None
	3/26/90	48.75#	None	None
	3/26/90	48.73	None	V. Slight
MW-10	10/12/89	51.93	None	None
	11/28/89	51.88	None	None
	12/20/89	51.47	None	None
	1/9/90	50.98	None	None
	1/26/90	50.87	None	None
	2/23/90	50.67#	None	None
	2/23/90	50.65	None	None
	3/26/90	50.36#	None	None
	3/26/90	50.35	None	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
(page 8 of 8)

Well/Boring	Date	Depth to Water	Floating Product	Sheen
MW-11	11/10/89	50.64	None	None
	11/28/89	50.51	None	V. Slight
	12/20/89	51.47	None	None
	1/9/90	49.68	None	None
	1/26/90	49.55	None	None
	2/23/90	49.37#	None	None
	2/23/90	49.35	None	None
	3/26/90	49.03#	None	None
	3/26/90	49.03	None	None

Depth to water is in feet below top of casing.
Thickness of floating product is in inches.
-- = Not measured
* = Not measured because of installed product-skimmer pump
** = Thickness of floating product after the well was allowed to recharge for approximately 3 hours.
▾ = Anomalous water level possibly due to recharge from a perched water zone.
= Pumping-water level.
= Water inspected in oil-water separator tank.

TABLE 2
GROUND-WATER ELEVATION DATA
UPPERMOST AQUIFER

Well No.	Casing Elevation	Depth to Ground Water	Ground-Water Elevation
February 23, 1990			
MW-1	321.44	49.02	272.42
MW-1	321.44	49.02*	272.42
MW-4	321.56	49.15	272.41
MW-4	321.56	49.18*	272.38
MW-5s	321.64	49.20	272.44
MW-5s	321.64	49.20*	272.44
MW-7	321.27	48.93	272.34
MW-7	321.27	55.26*	266.01
MW-9	321.44	49.05	272.39
MW-9	321.44	49.06*	272.38
MW-10	322.99	50.65	272.34
MW-10	322.99	50.67*	272.32
MW-11	321.71	49.35	272.36
MW-11	321.71	49.37*	272.34
March 26, 1990			
MW-1	321.44	48.70	272.74
MW-1	321.44	48.71*	272.73
MW-4	321.56	48.83	272.73
MW-4	321.56	48.84*	272.72
MW-5s	321.64	48.88	272.76
MW-5s	321.64	48.89*	272.75
MW-7	321.27	48.60	272.67
MW-7	321.27	57.52*	263.75
MW-9	321.44	48.73	272.71
MW-9	321.44	48.75*	272.69
MW-10	322.99	50.35	272.64
MW-10	322.99	50.36*	272.63
MW-11	321.71	49.03	272.68
MW-11	321.71	49.03*	272.68

Elevation is in feet above mean sea level.
Depth to ground water is in feet below the top of the casing.
* = water level during pumping of well MW-7

TABLE 3
RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
(page 1 of 2)

Date	Sample	B	T	E	X	TPHg
MW-8						
9/29/89	S-38.5-MW8	<0.050	<0.050	<0.050	<0.050	<2.0
	S-74-MW8	<0.050	<0.050	<0.050	<0.050	<2.0
MW-9						
10/4/89	S-6-MW9	4.9	40	26	150	1,500
	S-21-MW9	23	1,230	51	240	3,000
	S-36-MW9	0.89	0.37	0.16	0.40	9.3
	S-38-MW9	100	560	150	720	6,200
	S-41-MW9	3.6	42	18	90	900
MW-10						
10/6/89	S-20-MW10	<0.050	<0.050	<0.050	<0.050	<2.0
	S-35-MW10	<0.050	<0.050	<0.050	<0.050	<2.0
MW-11						
11/2/89	S-20-B11	<0.050	<0.050	<0.050	0.087	<2.0
	S-40-B11	<0.050	<0.050	<0.050	<0.050	<2.0
	S-45-B11	<0.050	0.059	<0.050	<0.050	<2.0

See notes on page 2 of 2.

TABLE 3
RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
Exxon Station No. 7-3399
(page 2 of 2)

Date	Sample	B	T	E	X	TPHg
B-12						
11/3/89	S-55-B12	<0.050	<0.050	<0.050	0.060	<2.0
	S-70-B12	<0.050	<0.050	<0.050	<0.050	<2.0
	S-84-B12	<0.050	<0.050	<0.050	0.051	<2.0
VR-2						
11/20/89	S-10-V2	0.13	0.059	<0.050	<0.050	<2.0
	S-20-V2	0.061	<0.050	<0.050	<0.050	<2.0
	S-45-V2	<0.050	0.091	<0.050	0.086	<2.0
VR-4						
11/21/89	S-10-V4	0.16	<0.050	0.093	0.082	<2.0
	S-20-V4	<0.050	0.079	<0.050	<0.050	<2.0

Results in milligrams per kilogram (mg/kg) = parts per million (ppm)
B = benzene
T = toluene
E = ethylbenzene
X = total xylene isomers
TPHg = total petroleum hydrocarbons as gasoline
< = less than the method detection limit of the laboratory
Sample designation: S-84-B12
- S = soil
- 84 = sample depth to nearest foot
- B12 = monitoring well (MW)/boring (B)

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 1 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-1								
4/2/88	W-38-MW1	<0.0005	0.0017	<0.0005	<0.0005	<0.02	--	--
7/6/88	W-40-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/13/88	W-42-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
9/7/88	W-43-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
3/8/89	W-43-MW1	0.0016	<0.0005	<0.0005	<0.0005	<0.02	--	--
6/30/89	W-44-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/17/89	W-45-MW1	<0.0005	<0.0005	<0.0005	<0.0005	0.023	--	--
7/20/89	W-45-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/26/89	W-46-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
8/2/89	W-46-MW1	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
9/13/89	W-50-MW1	0.039	0.00060	<0.00050	0.0051	0.22	--	--
12/20/89	W-50-MW1	0.056	0.00072	<0.00050	0.00071	0.22	--	--
1/25/90	W-50-MW1	0.018	0.0016	<0.00050	0.0018	0.057		
2/27/90	W-50-MW1	0.0032	0.0023	<0.00050	0.0032	0.055		
MW-2	(Well destroyed 7/12/88)							
7/6/88	W-41-MW2	5.7	18.5	2.9	21.4	62	--	--
MW-3	(Well destroyed 8/29/88)							
4/6/88	W-39-MW3	<0.0005	<0.0005	<0.0005	<0.0005	0.02		
7/6/88	W-41-MW3	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/13/88	W-43-MW3	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
8/26/88	W-44-MW3	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--

See notes on page 6 of 6.

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 2 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-4								
4/11/88	W-37-MW4	0.0018	0.0163	0.0006	0.0071	0.08	--	--
7/6/88	W-41-MW4	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/13/88	W-42-MW4	<0.0005	0.0009	<0.0005	<0.0005	<0.02	--	--
9/7/88		(Well not accessible)						
3/8/89	W-43-MW4	0.0038	0.0010	<0.0005	<0.0005	0.44	--	--
6/30/89	W-44-MW4	<0.0005	<0.0005	<0.0005	<0.0005	0.10	--	--
7/17/89	W-45-MW4	<0.0005	<0.0005	<0.0005	<0.0005	0.39	--	--
7/20/89	W-45-MW4	<0.0005	<0.0005	<0.0005	<0.0005	0.20	ND*	--
7/26/89	W-46-MW4	<0.0005	<0.0005	<0.0005	<0.0005	0.066	--	--
8/2/89	W-46-MW4	--	--	--	--	--	--	ND*
9/13/89	W-50-MW4	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
12/20/89	W-50-MW4	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
MW-5d								
5/25/88	W-39-MW5a	<0.0005	0.0031	<0.0005	<0.0005	<0.02	--	--
7/6/88	W-41-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/13/88	W-43-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	0.04	--	--
3/8/89	W-43-MW5d	<0.0005	<0.0005	<0.0005	<0.001	<0.02	--	--
6/30/89	W-45-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/17/89	W-46-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/20/89	W-47-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/26/89	W-47-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
8/2/89	W-48-MW5d	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--

See notes on page 6 of 6.

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 3 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-5d								
9/13/89	W-51-MW5d	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
12/20/89	W-51-MW5d	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
MW-5s								
5/25/88	W-41-MW5b	<0.0005	0.0009	<0.0005	<0.0005	<0.02	--	--
7/6/88	W-41-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/13/88	W-44-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/22/88	W-42-MW5s	0.0009	0.0041	0.0013	0.0087	0.05	--	--
8/5/88	W-25-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
9/7/88	W-43-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
3/8/89	W-43-MW5s	<0.0005	<0.0005	<0.0005	<0.001	<0.02	--	--
6/30/89	W-45-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/17/89	W-46-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/20/89	W-46-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
7/26/89	W-46-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
8/2/89	W-47-MW5s	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
9/13/89	W-50-MW5s	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
12/20/89	W-50-MW5s	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--

See notes on page 6 of 6.

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 4 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-6:	(Well destroyed 10/24/88)							
5/17/88	W-40-MW6	<0.0005	<0.0005	<0.0005	<0.0005	<0.02	--	--
6/28/88	W-38-MW6	0.0318	0.0075	0.0054	0.0067	0.44	--	--
7/13/88	W-42-MW6	0.1623	0.0077	0.0225	0.0141	0.29	--	--
8/5/88	W-42-MW6	0.2450	0.0052	0.0471	0.0237	1.18	--	--
9/7/88	W-43-MW6	0.474	0.016	0.262	0.136	2.92	--	--
MW-7 (recovery well)								
7/13/88	W-34-MW7	0.86	1.91	0.71	4.42	16.7	--	--
7/22/88	W-50-MW7	0.136	0.085	0.005	0.058	0.46	--	--
8/5/88	W-45-MW7	0.0733	0.0528	0.0023	0.0281	0.27	--	--
2/9/89	W-50-MW7	0.600	0.688	0.010	0.448	6.7	--	--
6/30/89	W-Pump-MW7	0.18	0.050	0.013	0.040	1.1	--	--
8/2/89	W-TAP-MW7	0.0016	<0.0005	<0.0005	0.00060	0.031	--	--
9/13/89	W-Influent	<0.00050	0.0026	<0.00050	0.012	0.087	--	--
12/20/89	W-TAP-MW7	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
Well No. 7								
7/20/89	Well 7	--	--	--	--	--	ND*	--
8/2/89	W-TAP-CW7	--	--	--	--	--	--	ND*

See notes on page 6 of 6.

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 5 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-8								
10/3/89	W-53-MW8	<0.00050	<0.00050	<0.00050	<0.00050	<0.020	--	--
12/20/89	W-52-MW8	<0.00050	<0.00050	<0.00050	0.00061	<0.020	--	--
1/31/90	W-55-MW8	<0.00050	<0.00050	<0.00050	0.00087	<0.020		
2/9/90	W-52-MW8	<0.00050	<0.00050	<0.00050	0.0011	<0.020		
	(Blank)	<0.00050	<0.00050	<0.00050	<0.00050	<0.020		
MW-9								
10/13/89	W-50-MW9	1.0	9.2	3.0	13	89	--	--
12/20/89	W-50-MW9	6.3	31	9.5	55	190	--	--
1/25/90	W-50-MW9	2.4	9.4	2.7	15	77		
2/27/90	W-50-MW9	1.2	7.1	2.3	14	97		
MW-10								
10/12/89	W-52-MW10	<0.00050	<0.00050	<0.00050	0.0015	0.020	--	--
12/20/89	W-52-MW10	<0.00050	<0.00050	<0.00050	0.0018	<0.020	--	--

See notes on page 6 of 6.

TABLE 4
RESULTS OF ANALYSES OF GROUND-WATER SAMPLES
(page 6 of 6)

Date	Sample No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	EPA 502.2	EPA 524.2
MW-11								
11/16/89	W-51-MW11	0.0041	0.0094	0.00074	0.020	0.15	--	--
12/20/89	W-50-MW11	0.0072	0.0075	0.0029	0.013	0.15	--	--

Results in milligrams per liter (mg/l) = parts per million (ppm)
TPH = total petroleum hydrocarbons by Environmental Protection Agency Method 8015
EPA 502.2 = Environmental Protection Agency Method 502.2 (volatile organic compounds)
EPA 524.2 = Environmental Protection Agency Method 524.2 (volatile organic compounds)
< = Less than the method detection limits of the laboratory
-- = Not analyzed or not applicable
ND = Nondetectable or below the method detection limit(s) of the laboratory
* = Nondetectable concentrations for 58 volatile organic compounds
Well No. 7 = City of Pleasanton Municipal Well No. 7
Sample designation: W-50-MW11
- W = water
- 50 = depth of sample to the nearest foot (for well MW-7, sample collected from a sample port at the surface)
- MW11 = monitoring well number

TABLE 5
RESULTS OF LABORATORY ANALYSIS OF INFLUENT VAPOR SAMPLES FROM VAPOR-EXTRACTION TESTS ON WELL VR-2

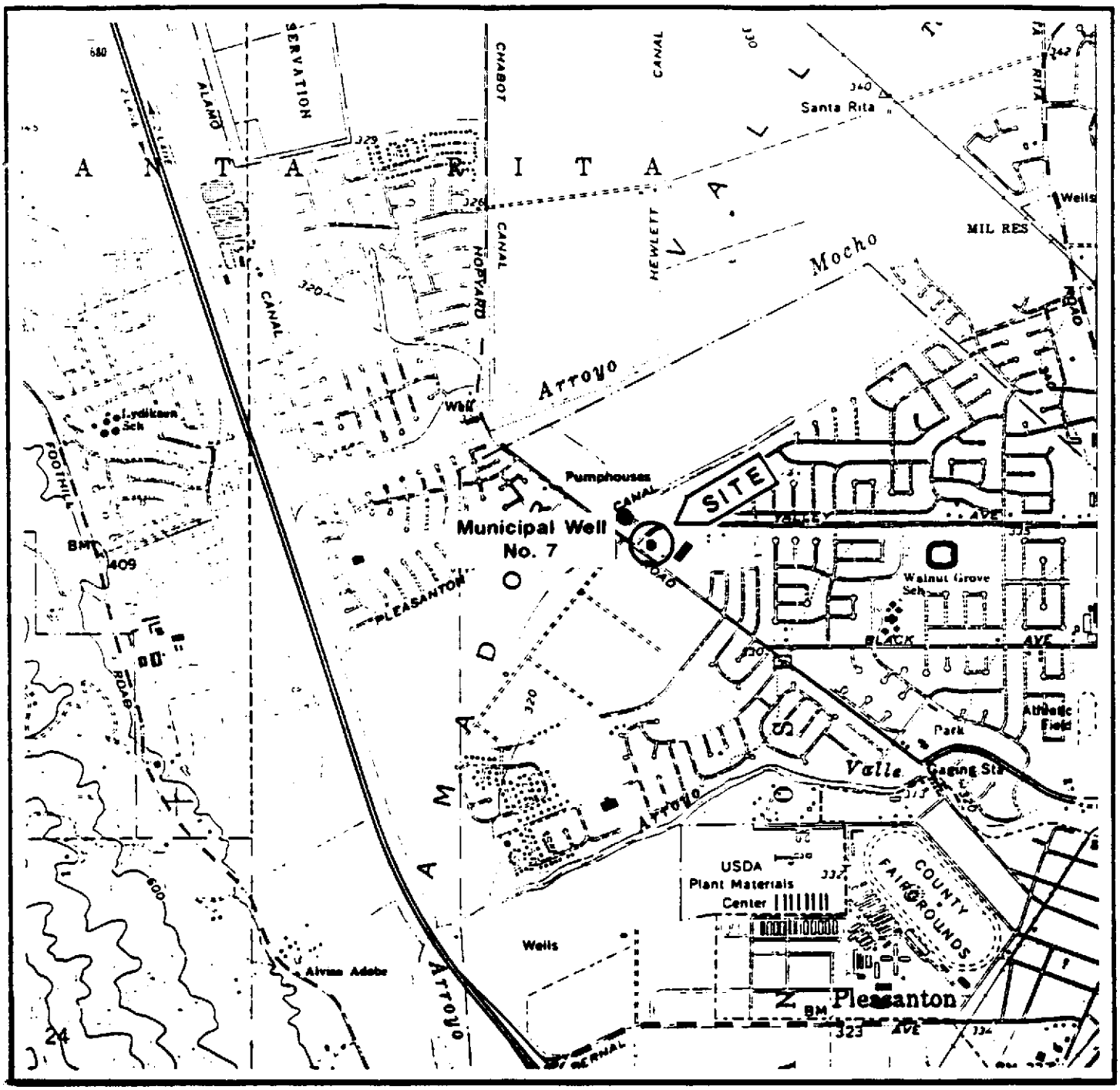
Sample No.	B	T	E	X	TPHg
December 14, 1989					
VR2-1-1214	88	64	21	75	11,000
VR2-2-1214	100	110	29	99	9,400
VR2-3-1214	150	140	36	120	9,200
VR2-4-1214	140	140	32	100	8,200
VR2-5-1214	200	230	54	200	12,000
VR2-6-1214	200	230	58	220	12,000
VR2-7-1214	200	270	69	270	13,000
VR2-8-1214	190	260	60	230	12,000
December 15, 1989					
VR2-2-1215	180	280	120	430	18,000
VR2-5-1215	84	200	43	150	9,000
VR2-6-1215	140	140	37	130	7,300
VR2-7-1215	120	250	55	200	15,000
VR2-8-1215	200	220	55	210	10,000

Results in milligrams per cubic meter (mg/m^3)
Influent = vapor sample collected before entering carbon filtration system

TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF VAPOR SAMPLES FROM WELL VR-1

Date	Sample No.	B	T	E	X	TPHg
Influent						
8/7/89	Inlet #1	25	7.1	<2	<7	9,300
8/7/89	Inlet #2*	18	<2	<2	<7	8,200
8/15/89	No. 5	6.3	2.1	<2	6.7	1,200
8/22/89	7 Inlet	6.0	6.5	1.8	20	1,200
9/11/89	9-Inlet	2.6	<1	<2	2.6	1,800
9/15/89	12-Inlet	3.8	2.7	<2	5.5	2,000
1/11/90	1-030-0111-Inlet	<40	<30	440	<90	2,200
1/11/90	1-0245-0111-Inlet	8.2	<3	<4	<9	1,000
1/15/90	1-1115-0115-Inlet@	<2	<2	<2	<2	180
1/16/90	1-1400-0116-Inlet@	<7	<7	<7	<20	970
1/17/90	3-1117-0117-Inlet@	2.1	<1	<1	<3	920
Effluent (from first carbon canister)						
9/11/89	10-Middle	<0.2	0.60	0.32	4.7	310
Effluent (from second carbon canister)						
8/7/89	Outlet #1	0.79	0.32	0.46	1.5	150
8/7/89	Outlet #2*	0.44	0.13	0.45	0.89	110
8/15/89	No. 6	3.5	<2	<3	<8	1,400
8/22/89	8 Outlet	4.3	<0.4	<0.5	1.7	1,300
9/11/89	11-Outlet	<0.03	<0.02	0.074	0.063	28
9/15/89	13-Outlet	0.58	<0.2	<0.3	<0.4	1,400
1/11/90	3-0245-0111-Outlet	<0.1	<0.1	<0.2	<0.4	8.9

Results in milligrams per cubic meter (mg/m^3)
Influent = vapor sample collected before entering carbon filtration system
Effluent = vapor sample collected after passing through either one or both carbon filtration units
* = duplicate sample
@ = sample collected immediately after system shut down
< = less than the method detection limit of the laboratory



Source: U.S. Geological Survey
7.5-Minute Quadrangle
Dublin, California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

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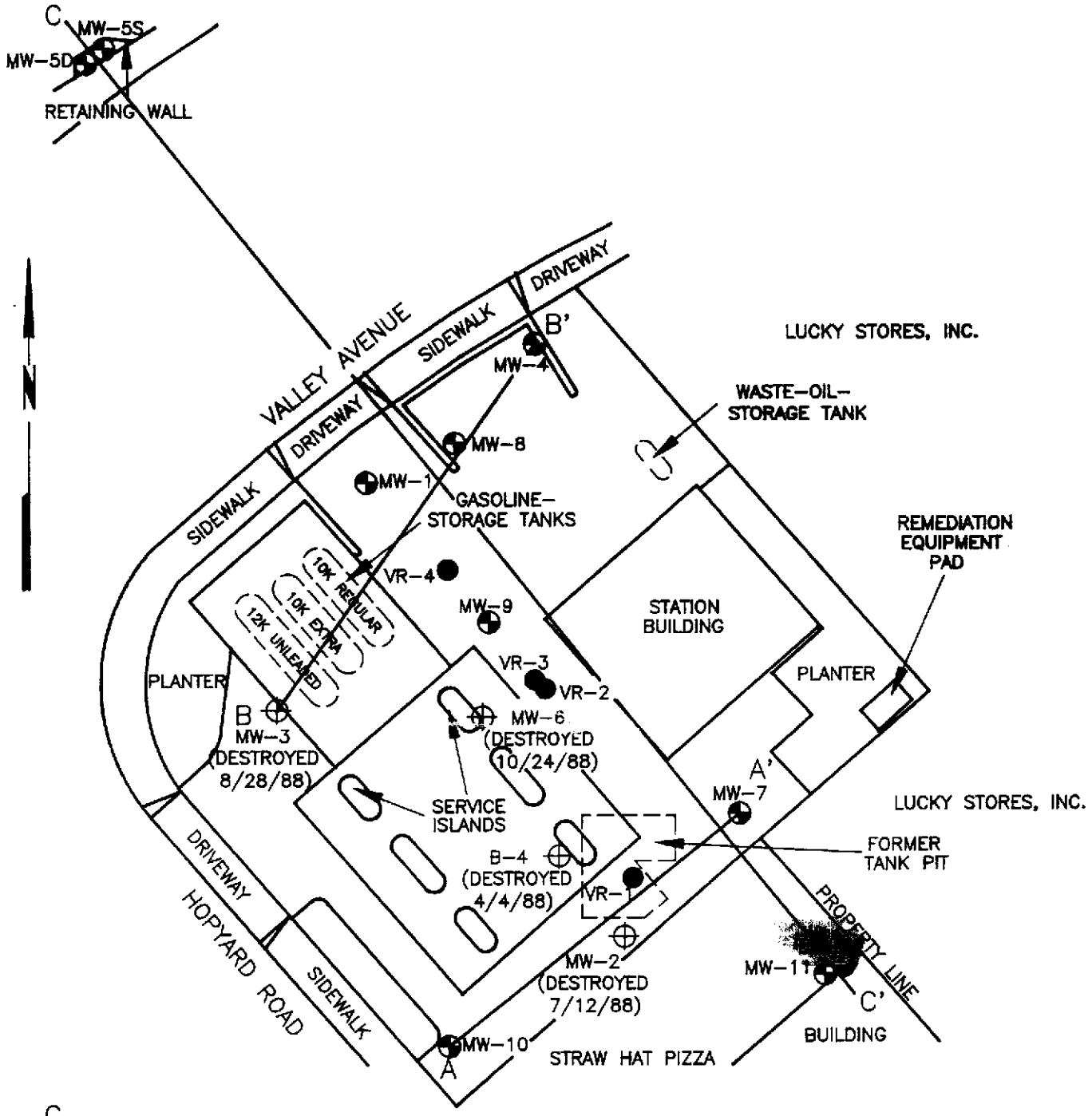
PROJECT NO. 18034-7	**SITE VICINITY MAP** **Exxon Station No. 7-3399** **2991 Hopyard Road** **Pleasanton, California**	PLATE **P - 1**



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PROJECT NO. 18034-7

GENERALIZED SITE PLAN
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE
P - 2

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	DESCRIPTION
Coarse-grained soils	Gravel and gravelly soils	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and sandy soils	SW	Well-graded sand or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures

MAJOR DIVISIONS		LTR	DESCRIPTION
Fine-grained soils	Silts and clays LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and clays LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils. Elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils		PT	Peat and other highly organic soils

Depth through which sampler is driven

Relatively undisturbed sample

No sample recovered

Static water level observed in well

Initial water level observed in boring

S-10 Sample number

Sand pack

Bentonite annular seal

Neat cement annular seal

Caved native soil

Blank PVC

Machine-slotted PVC

P.I.D. Photoionization detector

BLOWS REPRESENT THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH EACH 6 INCHES OF AN 18-INCH PENETRATION.

DASHED LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL. LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY.

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PROJECT NO. 18034-7

UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY

PLATE

P - 3

Total depth of boring: 140 feet **Diameter of boring:** 14 inches & 10 inches **Date drilled:** 9/28 – 9/30/89

Casing diameter: 4 inches **Length:** 133 feet **Slot size:** 0.020–inch

Screen diameter: 4 inches **Length:** 15 feet **Material type:** Sch 40 PVC

Drilling Company: All Terrain Exploration Drilling **Driller:** Ron, Bob and Lance

Method Used: Mud Rotary **Field Geologist:** Mark Armstrong

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Concrete.	
					First sample collected at 30 feet. See logs of borings of wells MW–1 and MW–4 (Applied GeoSystems, April 22, 1988) for description of sediments between the surface and 30 feet, and 40 and 50 feet.	
2						
4						
6						
8						
10					10–1/4–inch diameter, steel conductor casing	
12						
14					14–inch–diameter borehole to 91 feet below ground surface	
16						
18						
20						

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PROJECT NO. 16034-7

LOG OF BORING B-8/MW-8

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 4

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22						
24						
26						
28						
30				CH	Silty clay, gray–brown with red–brown staining, damp, high plasticity, trace rootlets.	
32					Grades slightly more silty and brown–gray, trace specks of black, carbonaceous material.	
34					Grades very dark brown; increase organic material at 34–1/2 feet.	
36					Trace fine sand, green–brown with red–brown and very dark brown stained streaks and inclusions (decomposed seeds and other plant material).	
				SC	Clayey fine sand, brown with red–brown staining, damp.	
38				SM	Silty very fine to fine sand, trace medium sand as stringers, gray–brown with red–brown staining, damp.	
40						
42				GW	Fine to coarse gravel, gray.	
44						
46						
48						
50						

(Section continues downward)

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PROJECT NO. 18034-7

LOG OF BORING B-8/MW-8

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 5

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GW	Fine to coarse gravel, gray.	
54						
56						
58				CH	Silty clay, dark brown with white patches of caliche, wet, high plasticity.	
60					Decreasing caliche, trace minute streaks of black carbonaceous material.	
62						
64				SP	Fine sand, brown, wet.	
				GP	Fine to coarse sandy gravel, with silt, brown, wet.	
66				SM	Silty very fine to fine sand, with trace medium sand and fine gravel, gray–brown, wet.	
				SW	Gravelly fine to coarse sand, with silt, gray–brown, wet.	
68						
70					Lens of fine sand with trace gravel at 70 feet.	
72					Red–brown staining.	
74				CH	Silty clay, light brown mottled with white caliche, black specks of carbonaceous material, damp, high plasticity.	
76				SM	Silty very fine sand, brown, wet.	
78				CL	Silty clay, trace fine to medium sand, light brown with red–brown staining, streaks and specks of black carbonaceous material, damp, medium plasticity. Trace white caliche appears at 78 feet and increases downward.	
80					Brown and light brown mottled.	

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PROJECT NO. 18034-7

LOG OF BORING B-8/MW-8

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 6

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
82				CH	Silty clay, brown with white mottling (caliche) and trace red–brown staining, specks of black carbonaceous material, damp, high plasticity.	
				CL	Silty clay, light brown with red–brown staining, trace black carbonaceous material, damp, medium plasticity.	
84				CH	Silty clay, trace fine gravel, brown with white mottling (caliche) and red–brown staining, damp, high plasticity.	
86						
88				CL	Silty clay, green–brown with patches and streaks of black carbonaceous material, damp, medium plasticity.	
90						
92				CH	Silty clay, green–gray with red–brown staining and trace white mottling (caliche), damp, high plasticity. Increase in caliche as patches, decreasing red–brown staining.	
94				CL	Very fine to fine sandy, silty clay, gray–brown with red–brown and white mottling (caliche) wet, low plasticity, trace plant material.	
96				CH	Silty clay, trace very fine to fine sand, gray–brown with red–brown mottling, trace stringers of white caliche, moist, high plasticity.	
98						
100					No sand, increasing caliche content to abundant at 101 feet, decrease in red–brown staining to trace.	
102					10–inch–diameter borehole from 91 to 140 feet	
104						
106					**Gray–green with red–brown and white (caliche) mottling.** Lens of very fine sand at 107 1/2 feet.	
108						
110						

Applied GeoSystems

PROJECT NO. 18034-7

LOG OF BORING B-8/MW-8

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 7

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
112				CL	Very silty clay, gray with red–brown mottling and trace white (caliche) mottling, moist, medium plasticity.	
				CH	Clay, gray–brown with red–brown and white (caliche) mottling, moist, high plasticity.	
114					Color change to brown, increasing caliche at 112–1/2 feet.	
					Color becomes brown and gray–brown mottled at 114 feet, caliche content decreases.	
116					Small patches and streaks of black carbonaceous material at 116 1/2 to 117 feet.	
				SM	Silty very fine sand, brown, wet.	
118				CH	Silty clay with interbeds of silty very fine sand, black with trace white caliche, wet, high plasticity.	
120						
				SM	Silty very fine to fine sand, gray–brown, wet.	
122				SW	Fine to coarse sand, with fine gravel, gray–brown, wet.	
					Lens of fine to medium sand at 124 feet.	
124				GW	Fine to coarse gravel, with fine to coarse sand, brown–gray, wet.	
126					Grades downward to fine to coarse gravel, blue–gray.	
128						
130					Lens of silty gravelly fine to coarse sand at 130 feet.	
132					Lens of silty gravelly, fine to coarse sand at 132 feet.	
134						
136						
138						
140					Total Depth = 140 feet.	

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PROJECT NO. 18034-7

LOG OF BORING B-8/MW-8

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 8

Total depth of boring: 57–1/2 feet **Diameter of boring:** 10 inches **Date drilled:** 10–4–89

Casing diameter: 4 inches **Length:** 54–1/2 feet **Slot size:** 0.020–inch

Screen diameter: 4 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: Kvilhaug Well Drilling, Inc. **Driller:** Criss and Paul

Method Used: Hollow–Stem Auger **Field Geologist:** Mark Armstrong

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Concrete (6 inches) underlain by sand (2 inches).	
2				SC	Fine to medium sandy clay, dark brown, damp, medium plasticity, very stiff.	
4		6				
6	S–6	7 14	270			
8				SP	Medium to coarse sand, gray–white and black, damp, loose.	
10		4		CL	Very silty clay, gray and red–brown mottled, damp, medium plasticity, stiff.	
12	S–11	6 4	201	CH	Silty clay, blue–gray and red–brown mottled, trace specks and thin streaks of black carbonaceous material, moist, high plasticity, stiff, trace filamentous rootlets.	
14		7				
16	S–16	10 12	124		Downward alternating blue–gray, green–gray, brown, and brown–black bands (1–inch–thick or greater) at 16 feet, reflecting downward increase in organic content, partially decayed rootlets, very stiff.	
18				ML	Clayey silt, gray to dark gray, damp, medium plasticity, very stiff, trace roots.	
20		6				
	S–21	9 13	250		(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B-9/MW-9

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 9

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
				ML	Clayey silt, gray to dark gray, damp, medium plasticity, very stiff, trace rootlets.	
22						
24				CH	Silty clay, green–gray with red–brown mottling, grades downward to dark gray, trace partially decayed rootlets and specks and thin streaks of black carbonaceous material, damp, high plasticity, very stiff.	
		6				
		8				
26	S–26	11	130			
				CL	Silty clay, green–gray with trace red–brown staining, damp, medium plasticity, very stiff.	
28				CH	Silty clay, dark gray with red–brown mottling, trace specks of organic material and partially decayed rootlets, damp, high plasticity, very stiff.	
30		10				
		10				
	S–31	13	22			
32						
34						
		6				
		12			Trace medium sand and gravel, hard.	
36	S–36	20	11		hard.	
		20		SM	Silty fine to medium sand (coarsens downward), gray–brown, damp, dense.	
		20				
38	S–38	25	340		Lens of silty sandy fine gravel at 38–1/2 feet.	
				SP	Fine to medium sand, gray–brown, damp, dense.	
40		20				
		25				
	S–41	25	110		Lens of silty sand at 41–1/2 feet.	
42						
				GW	Fine to coarse gravel, gray–brown, moist.	
44						
46						
48						
50						

(Section continues downward)

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PROJECT NO. 18034-7

LOG OF BORING B-9/MW-9

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 10

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GW	Fine to coarse gravel, gray–brown, moist.	
54				CH	Silty clay, green–brown, moist, high plasticity.	
56						
58					Total Depth = 57–1/2 feet.	
60						
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT NO. 18034-7

LOG OF BORING B-9/MW-9

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 11

Total depth of boring: 60–1/2 feet **Diameter of boring:** 10 inches **Date drilled:** 10–6–89

Casing diameter: 4 inches **Length:** 60 feet **Slot size:** 0.020–inch

Screen diameter: 4 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: Kvilhaug Well Drilling, Inc. **Driller:** Criss and Paul

Method Used: Hollow–Stem Auger **Field Geologist:** Mark Armstrong

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Concrete (6 inches) underlain by sand (2 inches).	
2				CL	Silty clay, with fine to coarse sand and fine gravel, dark brown with trace red–brown staining, damp, medium plasticity, hard.	
4						
6	S–6	12 16 18	0.6			
8				ML	Clayey silt, gray–brown with red–brown staining, moist, low plasticity, stiff, trace partially decayed plant roots.	
10	S–11	5 6 9	0.6		Lens of silty very fine to fine sand at 10 feet, gray–brown and red–brown mottled, wet, medium dense.	
12				CH	Silty clay, dark gray with abundant patches, specks and thin streaks of black carbonaceous material, moist, high plasticity, very stiff.	
14						
16	S–16	4 8 9	0.6			
18						
20	S–21	4 6 7	0		Green–gray with red brown staining, stiff. (Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B-10/MW-10

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 12

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
				CH	Silty clay, green–gray with red–brown staining, moist, high plasticity, stiff.	
22						
24		7 7				
	S–25	16	0.2		Very stiff, trace rootlets.	
26						
28						
		6 10				
30	S–30	17	0.2		Trace scattered specks and thin streaks of black carbonaceous material, trace rootlets.	
32						
				CL	Silty clay, trace medium to coarse sand, green–gray, moist, medium plasticity, very stiff.	
34		7 8			Silt grades to trace medium to coarse sand.	
	S–35	22	2.2			
36		7 8		CH	Silty clay, trace fine gravel, light green–brown with red–brown staining, damp, high plasticity, very stiff.	
38	S–37.5	14	0.2			
		16 25		ML	Clayey very fine sandy silt, brown with red–brown staining, wet, low plasticity, hard.	
40	S–40	30		SW	Gravelly fine to coarse sand, with clay, brown, wet, very dense.	
		30				
42	S–42	50+	8.1	GW	Fine to coarse sandy gravel, gray–brown, wet, very dense.	
44						
	S–45	50	0.2		Increase in gravel size and content, trace clay.	
46						
48						
50	S–50	50	0.2		Decrease in gravel size.	
					(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B-10/MW-10

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 13

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GW	Fine to coarse sandy gravel, gray–brown, wet, very dense.	
54		16 32				
	S–55	50	0.2		Lens of light brown, high plasticity, silty clay underlain by lens of dark blue–gray, low plasticity, clayey silt with very fine sand at 55 feet.	
56				SW	Fine gravelly sand, trace silt, dark brown, wet, very dense.	
		32				
58	S–57.5	50	1.2			
		20		CH	Silty clay, trace coarse sand, light brown with white (caliche) and red–brown mottling, damp, high plasticity, hard.	
60		20				
	S–60	25				
					Total Depth = 60–1/2 feet.	
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT NO. 18034-7

LOG OF BORING B-10/MW-10

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 14

Total depth of boring: 55-1/2 feet **Diameter of boring:** 10 inches **Date drilled:** 11-2-89

Casing diameter: 4 inches **Length:** 55 feet **Slot size:** 0.020-inch

Screen diameter: 4 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: Jcon Exploration **Driller:** Jim Condrey and Greg Taylor

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (3 inches) over gravel base (2 inches).	
2				ML	Fine to medium sandy silt, green-brown and black, slightly damp, low plasticity, very stiff.	
4		7 8				
6	S-5	12	1.6	SM	Silty fine sand, trace medium and coarse sand, trace fine gravel, brown, slightly damp, medium dense.	
8				CL	Silty clay, gray-brown with abundant red-brown and trace brown mottling, damp, medium plasticity, very stiff.	
10	S-10	6 8 10	0.1	CH	Silty clay, gray-brown with abundant red-brown and trace brown mottling, damp, high plasticity, very stiff.	
12						
14		6 7				
16	S-15	14	0.9		**Blue-gray and black mottled, grades downward at 15 feet to black reflecting increasing organic content, partially decayed rootlets.**	
18						
20		10 12				
	S-20	16	2.6		Green-gray with red-brown mottling.	
					(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B-11/MW-11

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 15

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CH	Silty clay, green–gray with red–brown mottling, damp, high plasticity, very stiff.	
24		9 10				
	S–25	10	0.9	ML	Clayey silt, green–gray with red–brown mottling, damp, low plasticity, very stiff.	
26				CH	Silty clay, green–gray with red–brown mottling, damp, high plasticity, very stiff.	
28						
		6 12				
30	S–30	22	0.1		Gray–brown with red–brown mottling, trace partially decayed rootlets, hard.	
32						
34		7 15			Trace coarse sand and fine gravel, green–brown with red–brown mottling and trace black mottling, (carbonaceous material), trace partially decayed rootlets.	
	S–35	18	0.1			
36		10 15		SC	Clayey gravelly fine to coarse sand, fine to coarse gravel, brown, very moist, dense.	
	S–37	24	1.6			
38						
		13 15		GW	Fine to coarse sandy gravel, trace silt and clay, brown–gray, moist, dense, trace carbonaceous material.	
40	S–40	30	16.7			
		10 16				
42	S–42	32	1.3			
44	S–44	120	1.3			
46						
48						
	S–49	55	0.1			
50					Medium to coarse sandy, slight increase in silt and clay, wet, very dense.	
					(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B-11/MW-11

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 16

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GW	Medium to coarse sandy, slight micaceous silt and clay brown–gray, wet, very dense.	
				GC	Clayey gravel with some medium to coarse sand, brown, wet, medium dense.	
54		9			Silty clay, brown with white–gray mottling, trace red–brown stains and trace specks and thin streaks of black caboncaeous material, damp, high plasticity, very stiff.	
	S–55	10 16	0.1	CH		
56					Total Depth = 55–1/2 feet.	
58						
60						
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT NO. 18034-7

LOG OF BORING B-11/MW-11

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 17

Total depth of boring: 84 feet **Diameter of boring:** 10 inches **Date drilled:** 11-3-89

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: Jcon Exploration **Driller:** Jim Condrey and Greg Taylor

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					See lithologic description from the surface to 55 feet of Log of Boring B-11/MW-11.	
2						
4						
6						
8						
10						
12						
14						
16						
18						
20						

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PROJECT NO. 18034-7

LOG OF BORING B - 12

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 18

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
					See lithologic description from the surface to 55 feet of Log of Boring B-11/MW-11.	
22						
24						
26						
28						
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						

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PROJECT NO. 18034-7

LOG OF BORING B - 12

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 19

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52						
				▽		
54		8 12		GC	Clayey gravel, with some medium to coarse sand, brown, wet, medium dense, trace organic material.	
	S-55	13	0.1			
56		9 18		CH	Silty clay, trace gravel, brown, wet, high plasticity, very stiff.	
		24				
58		8 9				
	S-58.5	17			Fine to coarse sandy, with trace gravel at 59 feet, damp, trace carbonaceous material.	
		10 16				
60	S-60	23	0.1		No sand or gravel, blue-gray with red-brown mottling, zones of increased silt content of medium plasticity, hard.	
62						
64		9 12				
	S-65	16	0.1		Green-gray with gray-white (caliche) mottling, very stiff.	
66		9 23			Gray and red-brown mottled, with trace gray-white mottling, trace partially decomposed rootlets, hard.	
	S-67	31		ML	Clayey silt, gray and red-brown mottled, damp, medium plasticity, hard.	
68						
		9 23				
70	S-70	32	0.1	SP	Fine to medium sand, brown, damp, very dense.	
		31		CH	Silty clay, trace coarse sand, gray-brown, damp, high plasticity, hard.	
72	S-71.5	100	0			
74		9 20				
	S-75	22	0		No sand, gray-brown with gray-white (caliche) mottling.	
76		9 23				
	S-77	32	0		Trace fine and coarse sand.	
78						
		9 23				
80	S-80	30				
					(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING B - 12

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 20

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
				CH	Silty clay, trace fine and coarse sand, gray–brown with gray–white (caliche) mottling, damp, high plasticity, hard.	
82		9				
		18				
84	S–83.5	20	0		Very fine to fine sand in occasional small lenses.	
					Total Depth = 84 feet.	
86						
88						
90						

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PROJECT NO. 18034-7

LOG OF BORING B - 12

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 21

Total depth of boring: 45-1/2 feet **Diameter of boring:** 8 inches **Date drilled:** 11-20-89

Casing diameter: 2 inches **Length:** 45 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 10 feet **Material type:** Sch 40 PVC

Drilling Company: Gregg Drilling and Testing, Inc. **Driller:** Jim and Richard

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Concrete (6 inches) underlain by sand (3 inches).	
				CL	Silty clay, trace stringers of medium to coarse sand, trace fine gravel, gray-brown to dark brown, damp, medium plasticity, stiff, trace rootlets and root holes.	
4		2				
		3				
	S-5	10	1.0			
8						
				SM	Silty fine to medium sand, dark brown, damp, loose.	
		2		ML	Clayey silt, blue-gray and gray-brown mottled, very moist, medium plasticity, medium stiff.	
10		4				
	S-10	4	2.8	CH	Silty clay, green-gray with yellow-brown staining, damp, high plasticity, medium stiff.	
14		2				
		4				
	S-15	8	1.2		Trace black carbonaceous material and partially decomposed plant material. Zone of more abundant organic material at 15 feet.	
18						
		3				
		5				
20	S-20	7	1.4		Trace stringers of medium sand, dark black to gray-black, some partially decomposed plant material.	
					(Section continues downward)	

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PROJECT NO. 18034-7

LOG OF BORING VR-2

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 22

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CH	Silty clay, trace stringers of medium sand, dark gray to gray–black, damp, high plasticity, medium stiff, some partially decomposed plant material.	
				ML	Clayey silt, gray with yellow–brown mottling, very moist, medium plasticity, medium stiff, trace rootlets partially decomposed.	
24		3 4				
	S–24.5	4	1.0	CL	Silty clay, gray with red–brown staining, moist, medium plasticity, medium stiff.	
26						
28						
		3 5		CH	Silty clay, brown with red–brown mottling and trace specks and thin streaks of black carbonaceous material, damp, high plasticity, stiff.	
30	S–30	10	1.6			
32						
34		5 7				
	S–35	17	.4		Gray–brown with red–brown mottling, trace specks and small patches of black carbonaceous material, including decomposed seeds, medium plasticity, very stiff.	
36						
38						
		10		GC	Clayey fine sandy gravel, trace medium and coarse sand, gray–brown, moist, dense.	
		24		SP	Very fine to fine sand, trace medium sand, brown, moist, dense.	
40	S–40	25	0.6			
42						
				GW	Coarse sandy gravel, gray–brown with red–brown staining, damp, very dense.	
44		34				
	S–45	62	6.4			
46					Total Depth = 45–1/2 feet.	
48						
50						

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PROJECT NO. 18034-7

LOG OF BORING VR-2

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 23

Total depth of boring: 35-1/2 feet. **Diameter of boring:** 8 inches **Date drilled:** 11-20-89

Casing diameter: 2 inches **Length:** 35 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 30 feet **Material type:** Sch 40 PVC

Drilling Company: Gregg Drilling and Testing, Inc. **Driller:** Jim and Richard

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					See lithologic description of Log of Boring VR-2.	
2						
4						
6						
8						
10						
12						
14						
16						
18						
20						

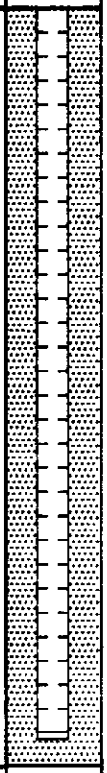
PROJECT NO. 18034-7

LOG OF BORING VR-3

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 24

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22					See lithologic description of Log of Boring VR-3.	
24						
26						
28						
30						
32						
34						
36					Total Depth = 35-1/2 feet.	
38						
40						
42						
44						
46						
48						
50						

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PROJECT NO. 18034-7

LOG OF BORING VR-3

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 25

Total depth of boring: 35-1/2 feet **Diameter of boring:** 8 inches **Date drilled:** 11-24-89

Casing diameter: 2 inches **Length:** 32-1/2 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: Gregg Drilling and Testing, Inc. **Driller:** Jim and Richard

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Concrete (6 inches) underlain by sand (3 inches).	
2				CL	Silty clay, trace medium to coarse sand, dark gray with red-brown and light gray mottling, damp, medium plasticity, stiff.	
4		3				
	S-5	5	5.4			
6		7				
8				SM	Silty very fine to medium sand, brown to gray, damp, loose.	
		3				
10		2		ML	Clayey silt, blue-gray and gray-brown mottled, damp, medium plasticity, medium stiff.	
	S-10	6	1			
12						
14		3		CH	Silty clay, green-gray to gray-black, damp, high plasticity, medium stiff, some partially decomposed rootlets and other plant material.	
		3				
	S-15	5	1			
16						
18						
		11				
20		5				
	S-20	6	1.4			

(Section continues downward)

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PROJECT NO. 18034-7

LOG OF BORING VR-4

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 26

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CH	Silty clay, dark gray, moist, high plasticity, stiff, some partially decomposed rootlets and other plant material.	
24		3				
		4			Green–gray with minute specks and thin streaks of carbonaceous material, trace plant fragments.	
	S–25	5	0.6	CL	Silty clay, blue–gray with red–brown mottling, damp, medium plasticity, stiff.	
26						
28						
		3		CH	Silty clay, gray–brown with red–brown mottling, damp, high plasticity, stiff.	
30		4				
	S–30	7	0.6			
32					Brown with red–brown staining and specks, streaks, and small patches of black carbonaceous material including decomposed seeds, trace rootlets.	
34		5				
		7				
	S–35	15	1.2		Brown with black and red–brown streaks.	
36					Total Depth = 35–1/2 feet.	
38						
40						
42						
44						
46						
48						
50						

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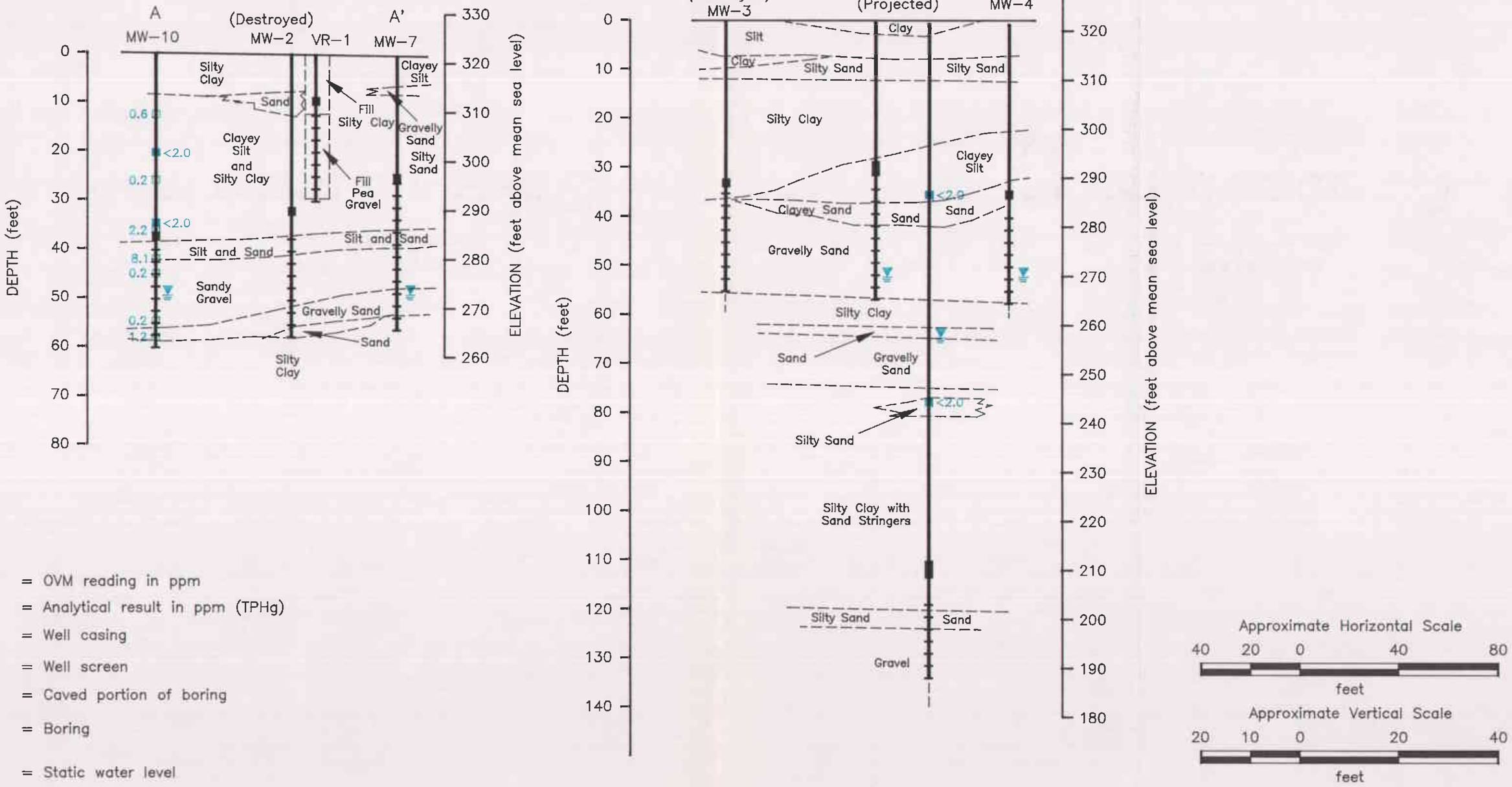
PROJECT NO. 18034-7

LOG OF BORING VR-4

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 27



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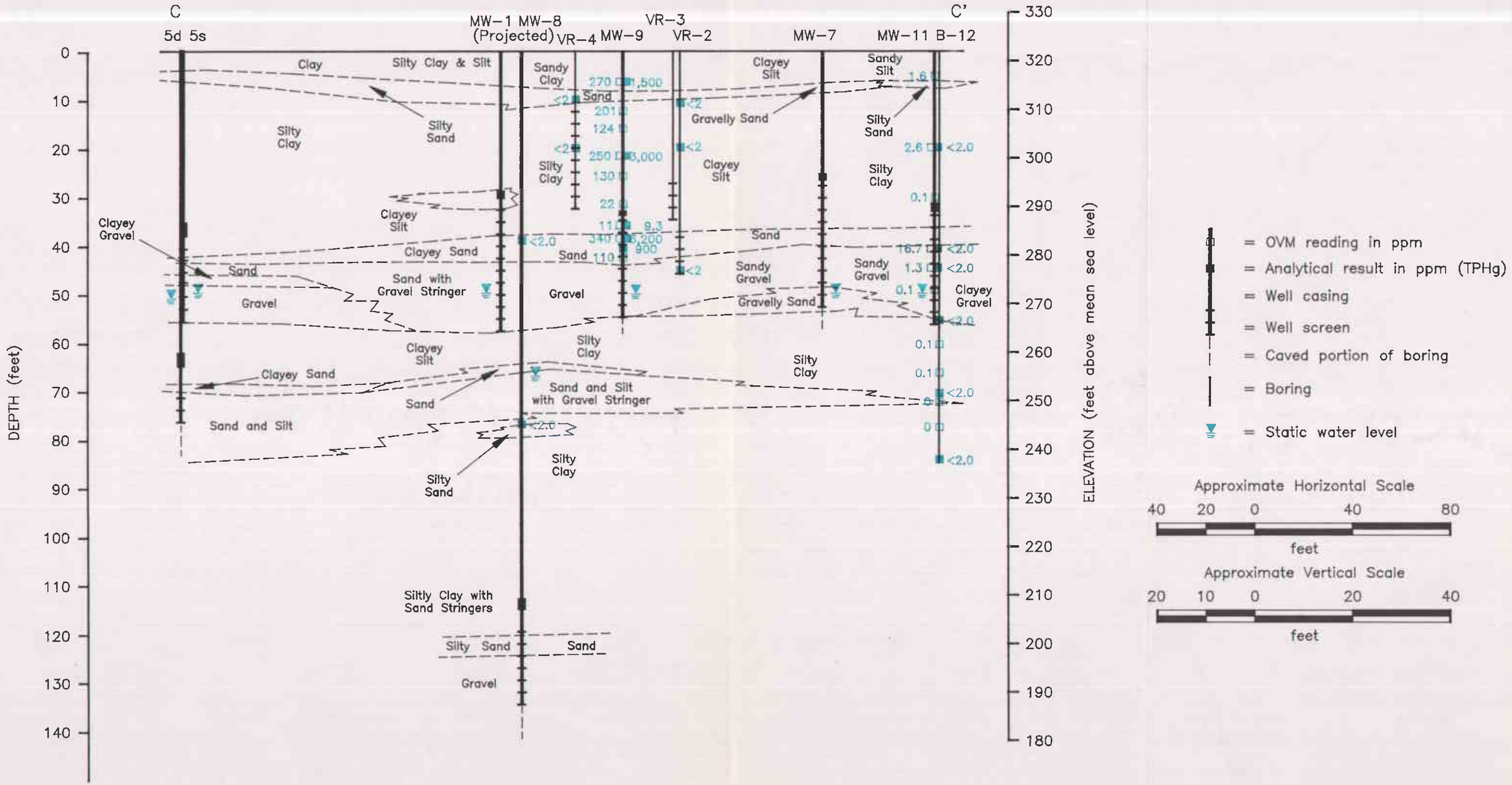
PROJECT NO. 18034-7

HYDROGEOLOGIC CROSS SECTIONS A-A' AND B-B'
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE
P - 28



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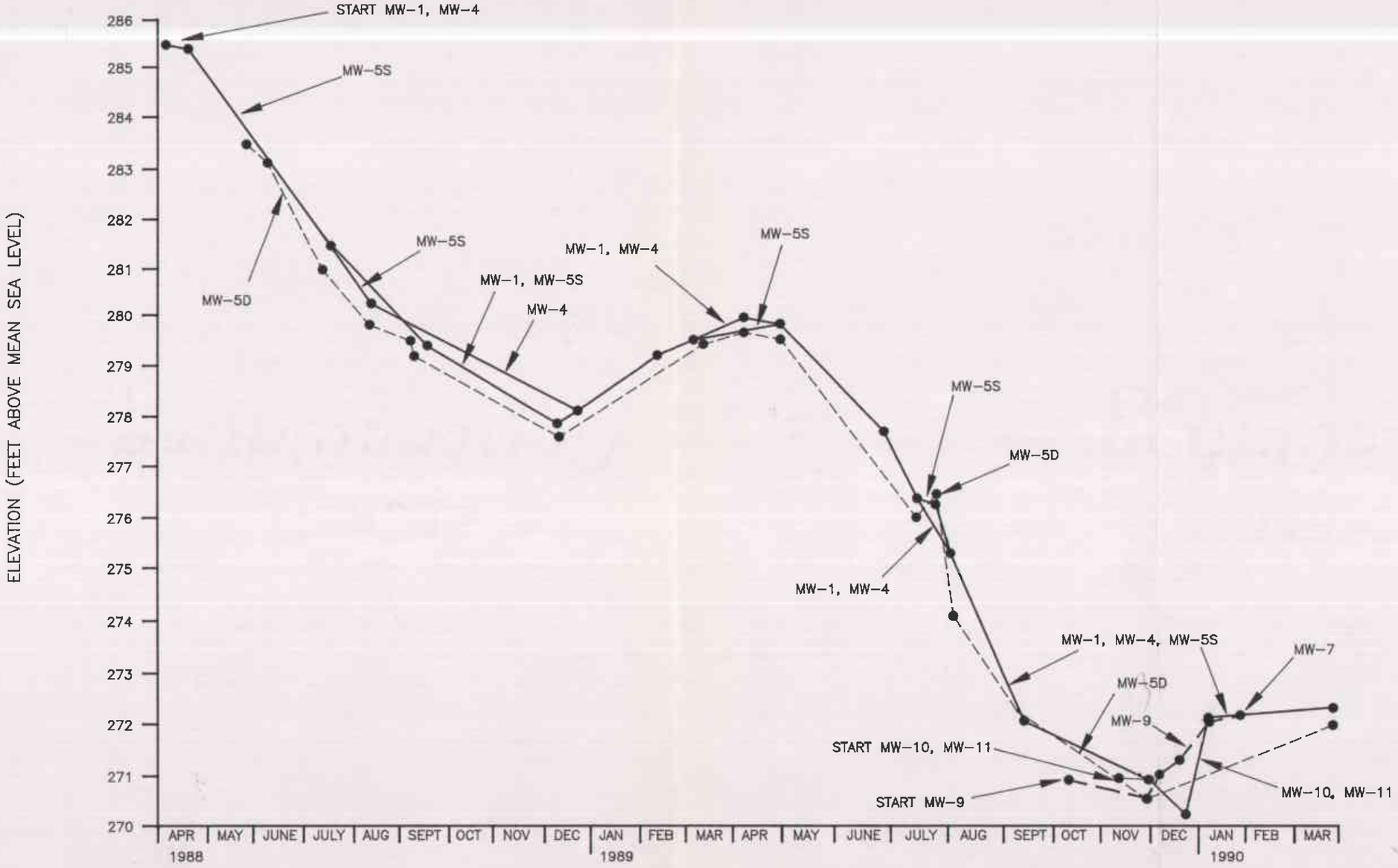
PROJECT NO. 18034-7

HYDROGEOLOGIC CROSS SECTION C-C'
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE
P - 29



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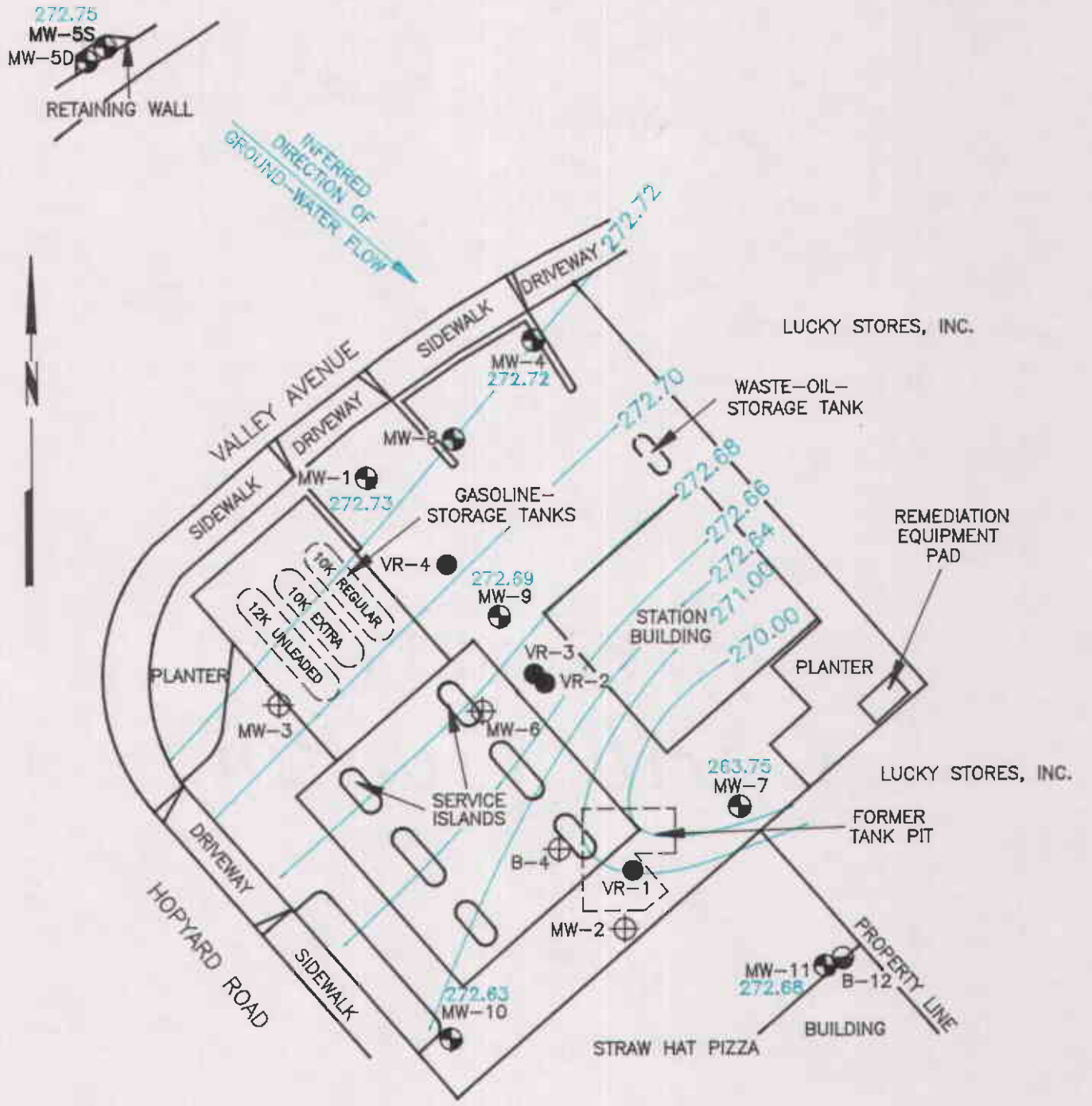
PROJECT NO. 18034-7

HYDROGRAPH OF WATER IN WELLS
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 30



272.72 = Line of equal elevation of ground water in feet above mean sea level

MW-7 = Monitoring well

VR-1 = Vapor recovery well

B-12 = Soil boring

MW-6 = Former well or boring

Approximate Scale

40 20 0 40 80

feet

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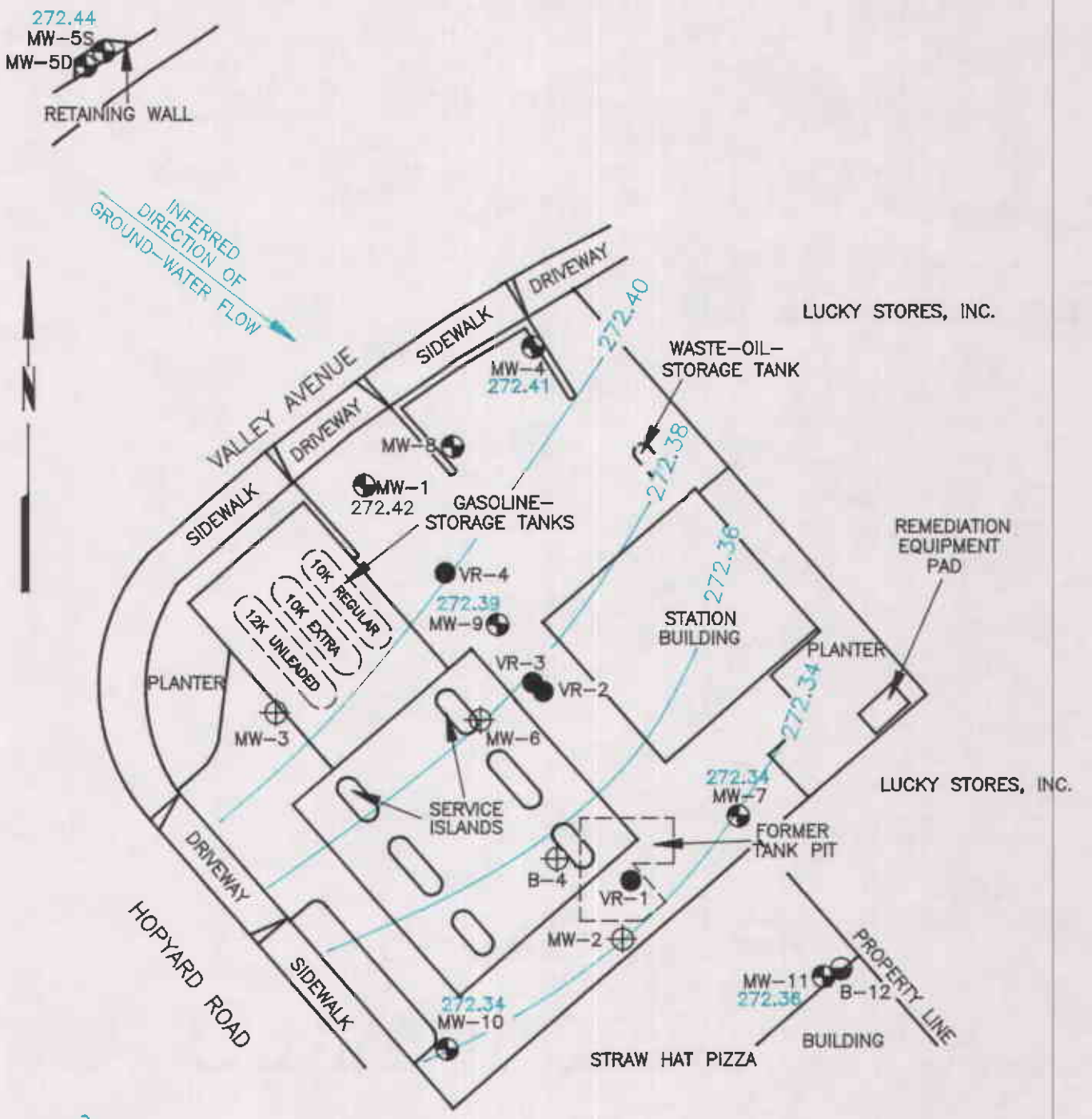
PROJECT NO. 18034-7

GROUND-WATER ELEVATION MAP DURING PUMPING (3-26-90)

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 34



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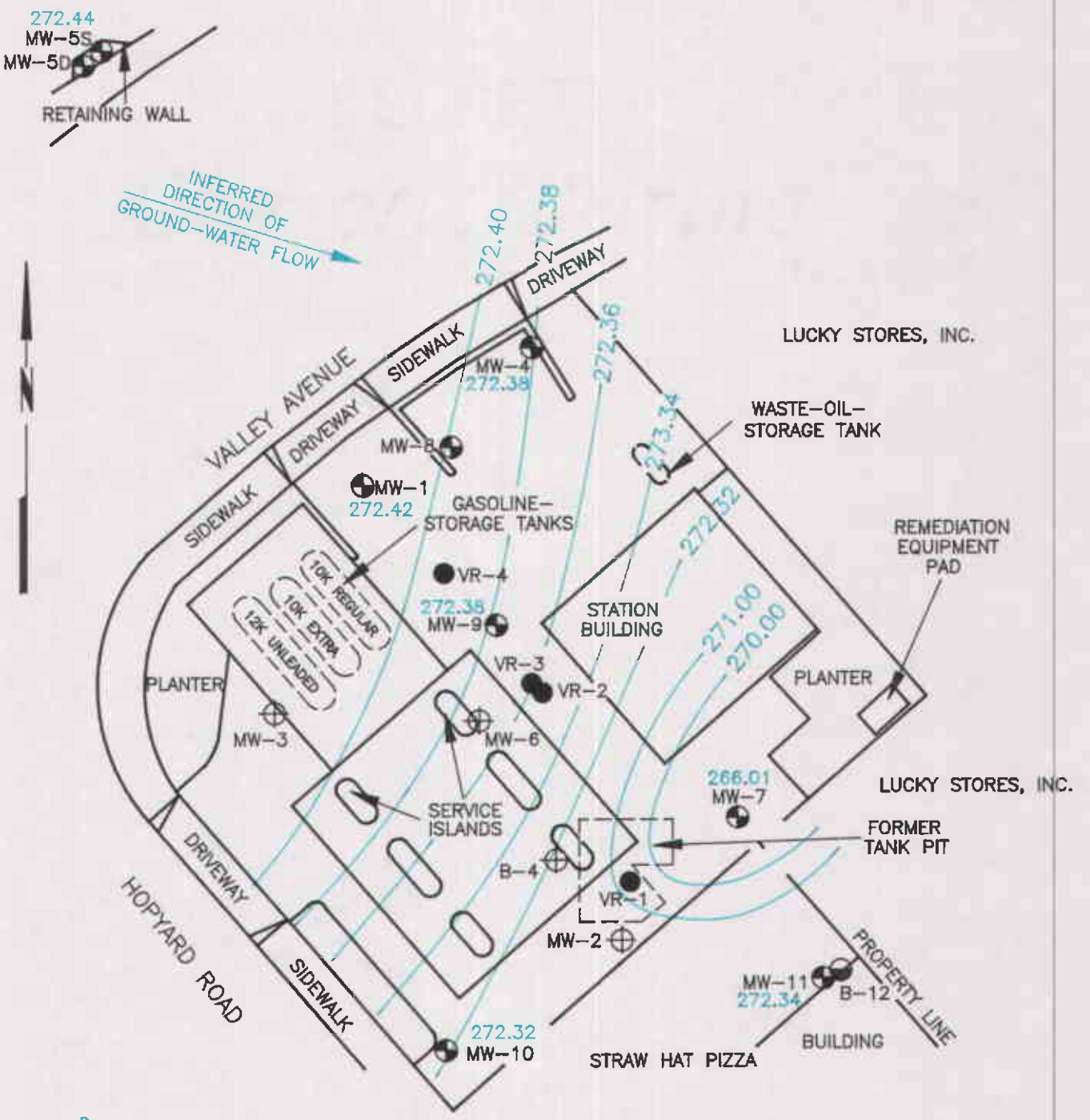
PROJECT NO. 18034-7

GROUND-WATER ELEVATION MAP
NO PUMPING (2-23-90)
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 31



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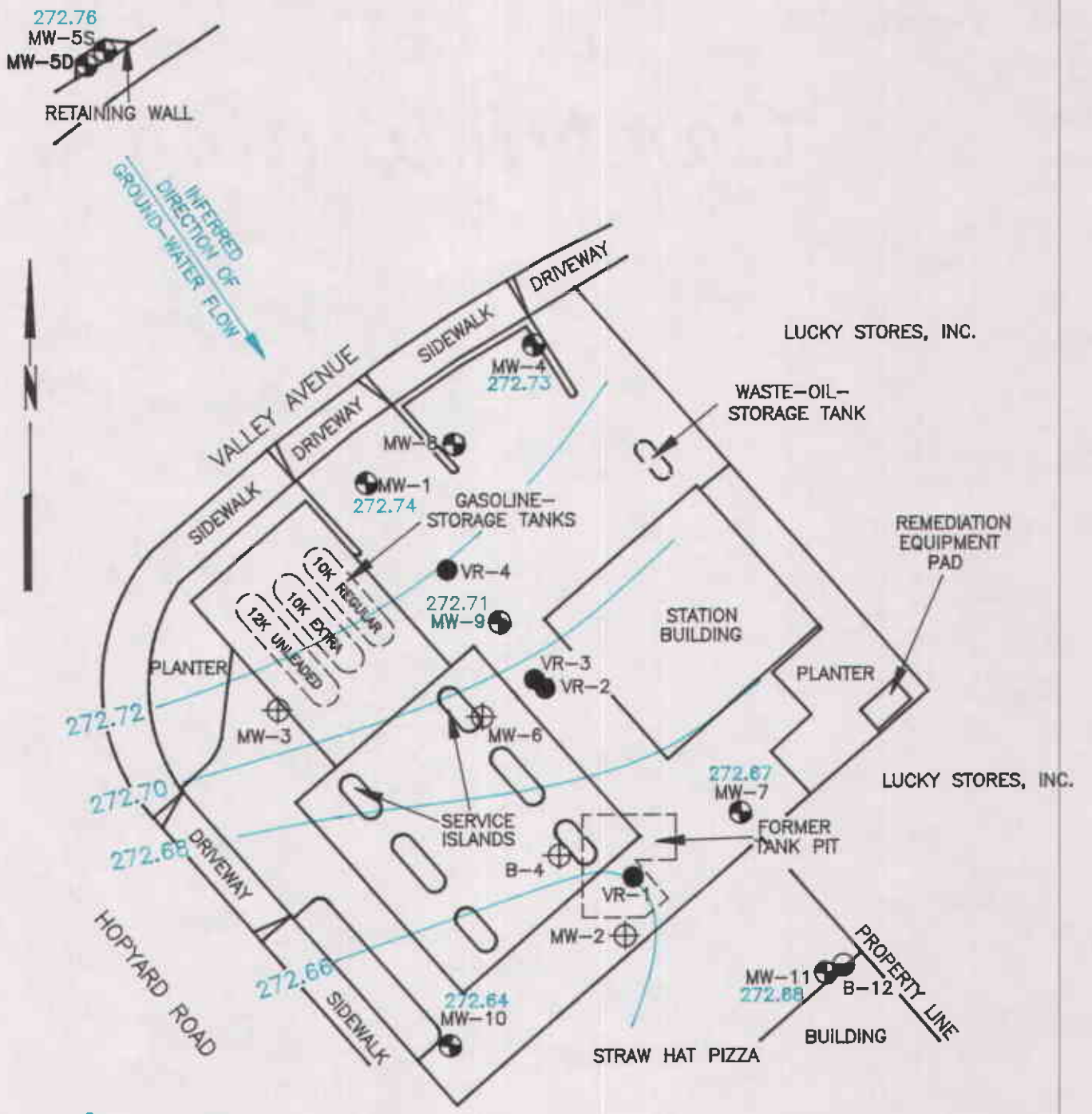
PROJECT NO. 18034-7

GROUND-WATER ELEVATION MAP DURING PUMPING (2-23-90)

Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 32



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PROJECT NO. 18034-7

GROUND-WATER ELEVATION MAP
NO PUMPING (3-26-90)
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

PLATE

P - 33

STANDARD FIELD PROCEDURES

Site Safety Plan

Field work performed by Applied GeoSystems (AGS) on behalf of Exxon Company, U.S.A. was conducted in accordance with AGS Site Safety Plan No. 18034-4S, September 10, 1989. This Plan describes the safety requirements for the subsurface environmental investigation at the site. The Site Safety Plan is applicable to personnel and subcontractors of Applied GeoSystems. Personnel and subcontractors of Applied GeoSystems scheduled to perform work at the site were briefed on the contents of the Site Safety Plan before work began. A copy of the Site Safety Plan was kept at the site, and was available for reference by appropriate parties during work at the site. The field Geologist of Applied GeoSystems was the Site Safety Officer.

Soil Sampling and Description

Soil samples were collected from each of the borings at a maximum of 5-foot intervals from the ground surface to total depth of the boring. Samples were collected with a California-modified, split-spoon sampler containing three 6-inch-long brass sleeves. Samples were collected by advancing the boring to a point just above the sampling depth and then driving the sampler through the hollow center of the auger and into the soil. The sampler was driven 18 inches with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows needed to drive the sampler each 6-inch increment was counted and recorded to evaluate the relative consistency of the soil.

After the sampler was recovered, the soil samples were removed. One sample from each sampling interval was sealed promptly in its brass sleeve with aluminum foil, plastic caps, and tape. Each sealed sample was labeled and placed in iced storage pending transport to a laboratory certified by the State of California to perform the required testing. Chain of Custody Records were initiated for samples selected for laboratory testing. A second sleeve was used to evaluate subjectively the soil sample from each sample interval for the presence of hydrocarbons. Any product discoloration was noted on the Log of Boring. An organic vapor meter (OVM) was used to evaluate the organic vapor concentrations in the soil samples. Readings were taken by by placing the rubber cup skirting the intake probe flush against the end of the soil sample when the sleeve was removed from the sampler. Measurements from instruments such as the OVM can be used to indicate relative organic vapor concentrations in soil but cannot be used to measure the level of hydrocarbon compounds with the precision of laboratory analytical methods.

The Unified Soil Classification System was used to identify the soil encountered in the borings. A copy of this classification system is shown on Plate P-3. Descriptions of the soil encountered in the boring are presented on the Logs of Borings (Plates P-4 through P-

P-27). The OVM readings are shown on the Logs of Borings in the column labeled "P.I.D."

Well Construction and Development

Monitoring well MW-8 was constructed with 10-1/4-inch steel conductor casing set to a depth of 91 feet and 4-inch-inside-diameter, Schedule 40, polyvinyl chloride (PVC) casing. The casing screen is factory perforated with 0.020-inch-wide slots. Monitoring wells MW-9 through MW-11 were constructed with 4-inch-inside-diameter PVC casing with 0.020-inch-wide perforations. Unperforated PVC casing was set from the top of the screened casing in wells MW-8 through MW-11 to within a few inches of the ground surface. All casing joints in the wells were flush threaded, and no glues, chemical cements, or solvents were used in the construction of the wells. The top of the casing is covered with a locking compression cap and the bottom has a threaded end-plug.

The annular space of each well was backfilled with No. 3 sorted sand from the total well depth to 1/2 foot above the screened casing. Bentonite plugs were placed above the sand as a seal to keep cement out of the sand pack. These plugs were approximately 4 feet thick in well MW-8 and from 1 to 2 feet thick in wells MW-9 through MW-11, and from 1/2 to 1 foot thick in wells VR-2 through VR-4. The remaining annulus was backfilled to within a few inches of grade with a slurry of neat cement. Graphic representation of the well constructions are shown in the right column of the corresponding Logs of Borings.

An aluminum utility box with a PVC apron was placed over the wellheads and set with concrete placed slightly above the ground surface. The utility box has a watertight seal to protect the ground-water well against surface-water infiltration. A special wrench must be used to open the utility boxes. This discourages vandalism and reduces the possibility of accidental disturbance of the wells.

The monitoring wells were developed by surging to remove accumulated sediment from the bottom and were purged of 3 to 5 well volumes of ground water. The purged water was pumped into the existing ground-water remediation system that is at the site.

Ground-Water Monitoring and Sampling

The depth to static water level in the wells were measured to the nearest 0.01 foot with a Solinst electronic water-level indicator. After this data was recorded, a measurement was performed on the well by gently lowering a clean Teflon bailer approximately half its length past the air-water interface. Samples were retrieved and examined for floating product and sheen.

The monitoring wells were purged of approximately 3 well volumes. Ground-water samples were collected after the ground water in each well had recovered to approximately its static water level as

measured with a Solinst electronic water-level indicator. The ground-water samples were collected with a Teflon bailer thoroughly cleaned with Alconox and water. The bailer was lowered gently past the air-water interface to collect each ground-water sample. The samples were transferred promptly to laboratory-cleaned, 40-milliliter sample vials. Hydrochloric acid was added to the samples as a preservative. The vials then were sealed with Teflon-lined caps, labeled, and placed in iced storage for transport for analytical testing to the Applied GeoSystems Laboratory in Fremont, California (Certificate No. 153). Chain of Custody Records were initiated in the field and accompanied the samples to the laboratory.

Effluent Ground-Water Sampling

Samples of effluent ground water were collected from a sampling port in the ground-water recovery line at the remediation equipment pad. The samples were collected in laboratory-cleaned, 40-milliliter sample vials. Hydrochloric acid was added to the samples as a preservative. The vials then were sealed with Teflon-lined caps, labeled, and placed in iced storage for transport for analytical testing to the Applied GeoSystems Laboratory in Fremont, California (Certificate No. 153). Chain of Custody Records were initiated in the field and accompanied the samples to the laboratory.

Vapor Sampling during Vapor Extraction Tests and Vapor Recovery

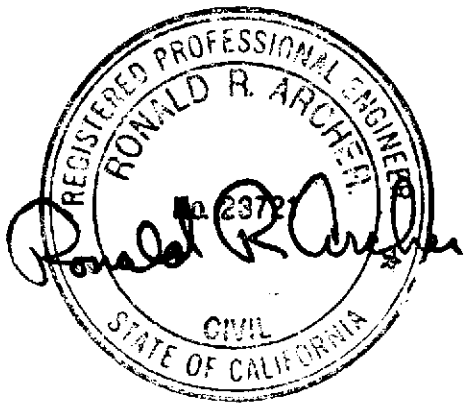
A 1-liter Tedlar air sample bag was placed inside a plastic sealable container that has two through fittings: the first fitting is used to create a vacuum inside the container by evacuating the air trapped after the container is sealed, and the other is used to connect the Tedlar bag inlet port to the sample port at the well head with a 3/16-inch food-grade teflon tubing.

For each sample collected, a fresh Tedlar bag was placed inside the container and was connected to the well-head sample port. The container was then sealed and a vacuum was applied to the sealed container with an offline vacuum pump. The vacuum generated by this pump counteracted the existing vacuum that was prevalent at the sample port thus creating a pressure gradient that enabled collection of soil vapor samples. For each sample collection, a fresh teflon tubing was used to eliminate the risk of cross contamination.

Sample containers were labeled in the field with the job number, sample location and depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record was initiated by the sampler, updated throughout handling of the samples, and accompanied the samples to a state-certified laboratory. Samples were transported to the laboratory promptly to help ensure that recommended sample holding times would not be exceeded.

RON ARCHER
CIVIL ENGINEER, INC.
CONSULTING • PLANNING • DESIGN • SURVEYING

4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(415) 462-9372



JULY 27, 1989 JOB NO. 1580.1
REVISED JANUARY 22, 1990

ELEVATIONS OF EXISTING MONITOR WELLS AT THE EXXON SERVICE STATION LOCATED AT 2991 HOPYARD ROAD AT VALLEY AVENUE, CITY OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA.

FOR: APPLIED GEOSYSTEMS.
PROJECT NO. 18034-7

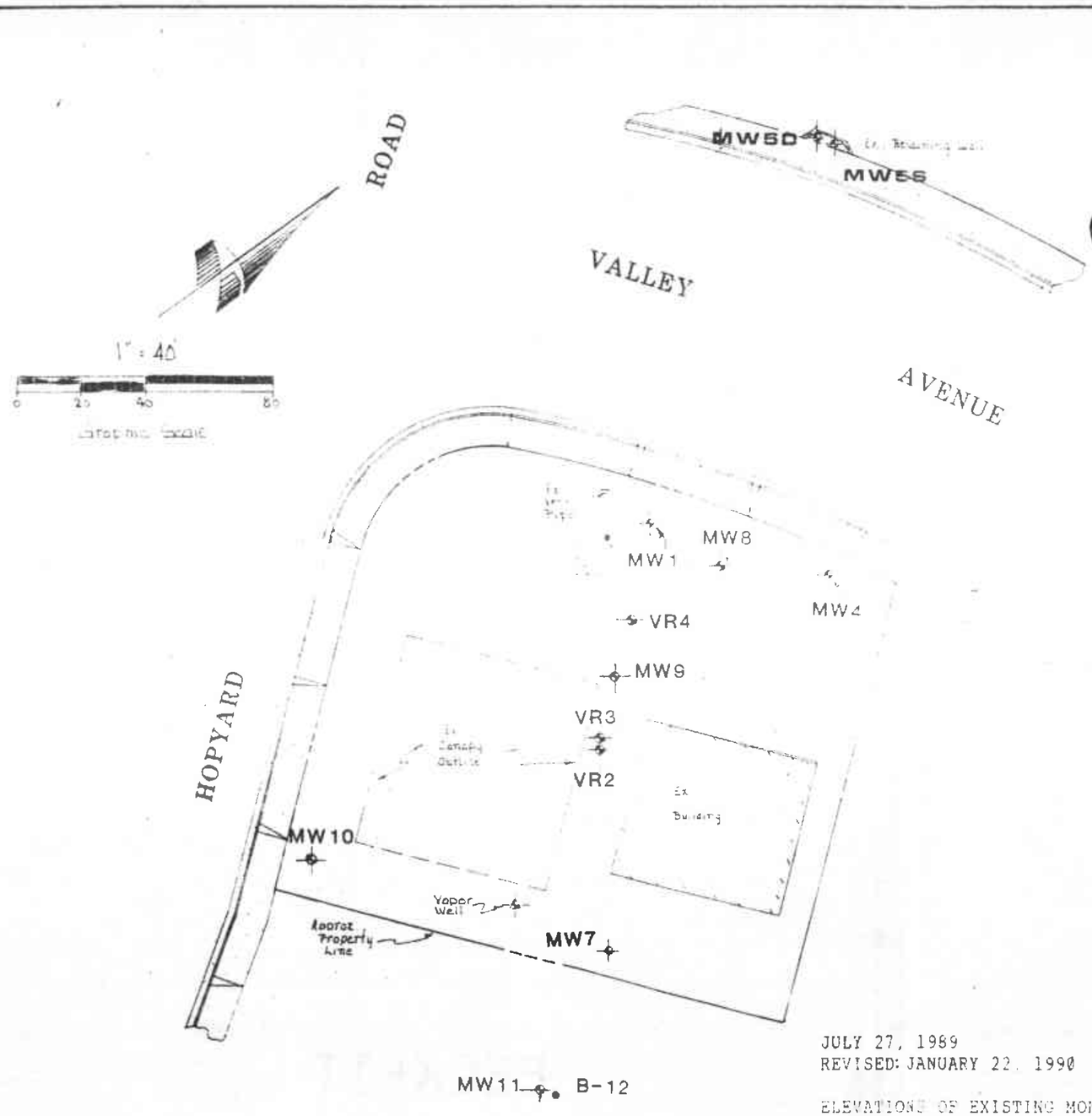
BENCHMARK: #C-972 (RESET IN 1967)
FOUND BRASS DISC SET IN CONCRETE ABUTMENT, 15' NORTH OF THE SOUTHEAST CORNER OF THE SOUTH BOUND CONCRETE BRIDGE OVER THE MOCHO CANAL. ELEVATION TAKEN AS 330.545 M.S.L. C & G.S. SURVEY, CITY OF PLEASANTON DATUM.

MONITOR WELL DATA TABLE

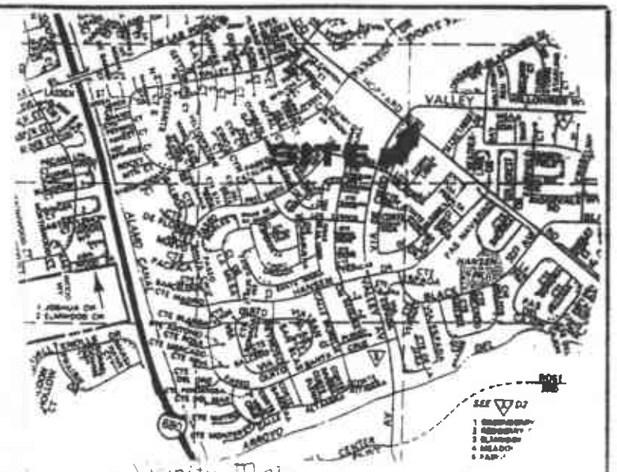
WELL DESIGNATION	ELEV	DESCRIPTION
MW1	321.43	TOP OF PVC CASING
	321.90	TOP OF BOX
MW4	321.56	TOP OF PVC CASING
	321.95	TOP OF BOX
MW5-D	321.79	TOP OF PVC CASING
	322.16	TOP OF BOX
MW5-S	321.64	TOP OF PVC CASING
	322.10	TOP OF BOX
MW7	321.27	TOP OF PVC CASING
	321.77	TOP OF BOX
VAPOR WELL	321.68	TOP OF PVC CASING
	321.97	TOP OF BOX

MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEV	DESCRIPTION
MW8	321.86	TOP OF PVC CASING
	322.Ø4	TOP OF BOX
MW9	321.44	TOP OF PVC CASING
	321.83	TOP OF BOX
MW1Ø	322.99	TOP OF PVC CASING
	323.27	TOP OF BOX
MW11	321.71	TOP OF PVC CASING
	322.19	TOP OF BOX
VR2	321.8Ø	TOP OF PVC CASING
	322.Ø7	TOP OF BOX
VR3	321.6Ø	TOP OF PVC CASING
	322.Ø5	TOP OF BOX
VR4	321.19	TOP OF PVC CASING
	321.38	TOP OF BOX



REGISTERED PROFESSIONAL ENGINEER
RONALD R. ARCHER
No. 2372
CIVIL
STATE OF CALIFORNIA



WELL DESIGNATION	ELEV.
MW1	321.40
MW4	321.96
MW5-D	321.79
MW9-3	321.44
MW7	321.47
VAPOR WELL	321.68
MW8	321.86
MW9	321.44
MW10	321.39
MW11	321.73
VR2	321.89
VR3	321.60
VR4	321.19

JULY 27, 1989
REVISED: JANUARY 22, 1990

JOB NO. 1580.1

ELEVATIONS OF EXISTING MONITOR WELLS AT THE EXXON SERVICE STATION LOCATED AT 2991 HOPYARD ROAD AT VALLEY AVENUE, CITY OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA.

FOR: APPLIED GEOSYSTEMS.
PROJECT NO. 18034-7

BENCHMARK: [illegible] (RESET IN 1987)
FOUND BRASS DISC SET IN CONCRETE ABUTMENT, 10' NORTH OF THE SOUTHEAST CORNER OF THE SOUTH BOUND CONCRETE BRIDGE OVER THE MOCHO CANAL. ELEVATION TAKEN AS 338.545 M.S.L.
C & G.S. SURVEY, CITY OF PLEASANTON DATUM.

RON ARCHER
CIVIL ENGINEER, INC.
CONSULTING • PLANNING • DESIGN • SURVEYING
4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(415) 462-8372

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

27 September 1989

Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 89564 for a monitoring well construction project at 2991 Hopyard Road in Pleasanton for Exxon Company USA.

Please note that permit condition A-3 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By J. Killingstad, Chief
Water Resources Engineering

WH:bkm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

(2) CLIENT
Name Exxon Company, U.S.A.
Address P.O. Box 4415 Phone (713) 656-7755
City Houston, Texas Zip 77210-4415

(3) APPLICANT
Name Applied GeoSystems
Address 43255 Mission Blvd. Phone (415) 651-1906
City Fremont, CA Zip 94539

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical ___
Cathodic Protection ___ Well Destruction ___

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring X Other ___

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary X Air Rotary ___ Auger ___
Cable ___ Other ___

WELL PROJECTS
Drill Hole Diameter 14 in. Depth(s) 130 ft.
Casing Diameter 10 and 4 in. Number
Surface Seal Depth 110 ft. of Wells 1 *
Driller's License No. 431604
Exploration Drilling Services

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

(7) ESTIMATED STARTING DATE October 11, 1989
ESTIMATED COMPLETION DATE October 13, 1989

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

APPLICANT'S SIGNATURE Rodger C. Wilson Date 9/22/89

FOR OFFICE USE

PERMIT NUMBER 89564
LOCATION NUMBER ___

Approved Wyman Hong Date 25 Sep 89
Wyman Hong

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. Notify this office (484-2600) at least one day prior to starting work on permitted work and before placing well seals.
3. 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 bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. 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, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

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

E. WELL DESTRUCTION. See attached.

* Two more wells at a depth of 60 feet to be drilled by Kvillhaug Drilling on 4 Oct 89.

MW-8

91987

ZONE 7 WATER RESOURCES MANAGEMENT

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

17 October 1989

Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Gentlemen:

MW-9, MW-10 MW-7 (reinstall)

Enclosed are Groundwater Protection Ordinance permits 89592 and 89593 for a monitoring well construction project and the destruction of well 3S/1E 18H12 at 2991 Hopyard Road in Pleasanton for Exxon Company, USA.

Please note that permit condition A-2 requires that a well construction and destruction report be submitted after completion of the work. The report should include drilling and completion logs, a description of methods and materials used to destroy the well, location sketch, date of destruction and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By Craig A. Mayfield
Craig A. Mayfield
Water Resources Engineer III

WH:bkm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

(2) CLIENT
Name Exxon Company, U.S.A.
Address P.O. Box 4415 Phone (713) 656-7755
City Houston, Texas Zip 77210-4415

(3) APPLICANT
Name Applied Geo Systems
Address 43255 Mission Blvd. Phone (415) 651-1906
City Fremont, CA Zip 94539

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical Investigation
Cathodic Protection General
Well Destruction * Contamination

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring Other Extraction of ground-water ★

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger X
Cable Other

DRILLER'S LICENSE NO. 482390
Kuilhewy Drilling

WELL PROJECTS
Drill Hole Diameter 12 In. Maximum
Casing Diameter 5 In. Depth 65 ft.
Surface Seal Depth 40 ft. Number 1

GEOTECHNICAL PROJECTS
Number of Borings Maximum
Hole Diameter In. Depth ft.

(7) ESTIMATED STARTING DATE October 6, 1989
ESTIMATED COMPLETION DATE October 6, 1989

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

APPLICANT'S SIGNATURE Rodger C. Wallace Date 9/22/89

FOR OFFICE USE

PERMIT NUMBER 89592 and 89593
LOCATION NUMBER 3S/1E 18H12

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, irrigation, and monitoring wells unless a lesser depth is specially approved.

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.

* 3S/1E 18H12 (MW-7)

MW-9, MW-10

Approved Wyman Hong Date 6 Oct 89
Wyman Hong

★ Intend to drill out existing ground-water recovery well MW-7 and reinstall a larger (5-inch-diameter) well.

21989

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 (415) 484-2600

FREMONT
OCT 20 1989
RECEIVED

20 October 1989

Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 89605 for a monitoring well construction project at 2991 Hopyard Road in Pleasanton for Exxon Company USA.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By Craig A. Mayfield
Craig A. Mayfield
Water Resources Engineer III

WH:bkm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

(2) CLIENT
Name Exxon Company, U.S.A.
Address P.O. Box 4415 Phone (713) 656 7755
City Houston, Texas Zip 77210-4415

(3) APPLICANT
Name Applied GeoSystems
Address 43255 Mission Blvd. Phone (415) 651-1906
City Fremont, CA Zip 94539

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical Investigation ___
Cathodic Protection ___ General ___
Well Destruction ___ Contamination X

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring X Other ___

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. C-57 563305
JCon Exploration

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 80 ft.
Surface Seal Depth 35 ft. Number 4

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

(7) ESTIMATED STARTING DATE October 18 — 23
ESTIMATED COMPLETION DATE October 24-30

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

APPLICANT'S SIGNATURE Rodger C. Witham Date 10/11/89

FOR OFFICE USE

PERMIT NUMBER 89605
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, irrigation, and monitoring wells unless a lesser depth is specially approved.

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 16 Oct 89
Wyman Hong

MW-11, B-12

21989

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

21 November 1989

Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 89672 for a monitoring well construction project at 2991 Hopyard Road in Pleasanton for Exxon Company.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By J. Killingstad, Chief
Water Resources Engineering

WH:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

3997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT Exxon Station No. 7-3399
3991 Hopyard Road
Pleasanton, California

(2) CLIENT
Name Exxon Company U.S.A.
Address P.O. Box 4415 Phone (713) 656-7735
City Houston Zip 77210-4415

(3) APPLICANT
Name Applied Geosystems
Address 43255 Mission Blvd. Phone (415) 651-1906
City Fremont Zip 94539

(4) DESCRIPTION OF PROJECT
Water Well Construction ✓ Geotechnical ___
Cathodic Protection ___ Well Destruction ___

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring ___ Other VAPOR EXTRACTION

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger ✓
Cable ___ Other ___

WELL PROJECTS
Drill Hole Diameter 8 in. Depth(s) 45 ft.
Casing Diameter 2 in. Number
Surface Seal Depth 5 ft. of Wells 3
Driller's License No. C57-485165

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

(7) ESTIMATED STARTING DATE 11-20-89
ESTIMATED COMPLETION DATE 11-21-89

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

APPLICANT'S SIGNATURE Rodger C. Nathan Date 11/15/89

FOR OFFICE USE

PERMIT NUMBER 89672
LOCATION NUMBER ___

Approved Wyman Hong Date 17 Nov 89
Wyman Hong

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. Notify this office (484-2600) at least one day prior to starting work on permitted work and before placing well seals.
3. 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 bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. 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, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

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

E. WELL DESTRUCTION. See attached.

VR-2, VR-3, VR-4

91987

PHYSICAL PROCESS DATA FROM VAPOR-EXTRATION TESTS
at
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

	Test 1	Test 2
Date:	12/14/89	12/15/89
Duration:	9 hours	9 hours
Flow rate at discharge from vacuum pump:	103 CFM	103 CFM
Vapor temperature at discharge from vacuum pump:	130 deg. F	130 deg. F
Vacuum at pump (inches of Mercury)	5	5
Vacuum at sampling point (inches of water)	26	26
Response at VR-3 (inches of water)	1	1
Response at MW-9	None	None

RESULTS OF VAPOR EXTRACTION TEST
OF VAPOR-EXTRACTION WELL VR-2
Exxon Station No. 7-3399
2991 Hopyard Road
Pleasanton, California

Date Time	Influent (mg/m^3)	Effluent (ppm)	Flow (cfm)	Vacuum VR-2 (in. Hg)	Vacuum MW-9 (in. H^2O)
12/14/89					
12:00 am	11,000	<5	103	2	0
1:00 pm	9,400	<5	103	2	0
2:00 pm	9,200	<5	103	2	0
3:00 pm	8,200	<5	103	2	0
4:00 pm	12,000	<5	103	2	0
5:00 pm	12,000	<5	103	2	0
6:00 pm	13,000	<5	103	2	0
12/15/89					
10:00 am	18,000	<5	103	2	0
1:00 pm	9,000	<5	103	2	0
2:00 pm	7,300	<5	103	2	0
3:00 pm	15,000	<5	103	2	0
4:00 pm	10,000	<5	103	2	0

< = less tnan detection limit indicated
ppm = parts per million
cfm = cubic feet per minute
in Hg = inches of mercury; in. H^2O = inches of water
Note: Influent vapor sampled and analyzed at Trace Analysis Laboratory in Hayward, California. Effluent vapor was monitored by a Foxboro Model 28 Organic Vapor Analyzer.

ASSUMPTIONS AND CALCULATIONS

Vapor Extraction Tests

I. Mass and volumetric flow rates

The mass and volume flow rates are calculated using the equation

$$PV=mRT$$

Where:

P= Absolute Pressure (lbs/in^2)
V= Volumetric flow rate (cfm)
m= Mass flow rate (lbs/min)
R= Specific Gas Constant
(for air 53.3 (lb-force ft./lb mass deg. Rankine)
T= Absolute Temperature (deg. Rankine)

A. At the outlet from vacuum pump

P = P1 = Atmospheric Pressure = 14.7 PSI = 2117 lbs/ft^3
V = V1 = 103 ft^3/min
R = 53.3 (lbf ft)/(lb m R)
T = T1 = 130 deg.F = 590 deg. R

Mass flow rate $m = \frac{P1 \times V1}{R \times T1}$ = 6.93 lbs/min of air

B. At the well head

P = P2 = 2 inches mercury = 13.8 lbs/in^2
m = m1 =m2 (conservation of mass)= 7.27 lbs/min of air
R = Same as A above
T= T2 = 55 deg.F = 515 deg.R

Volumetric flow rate at the well head is

$V2 = \frac{m \times R \times T2}{P1}$ = 95.72 ft^3/min.

II. Average soil vapor concentration

The average concentration of soil vapors recovered from vapor extraction well VR-2 on 12/14/89 was 10,850 mg/m^3 and on 12/15/89 was 11,860 mg/m^3. The average concentration of the vapors for the two days of testing was 11,220 mg/m^3.

III. Total mass of hydrocarbons removed

The total mass of hydrocarbons removed during the two days of testing was calculated as follows.

Mass hydrocarbons = 2 days X 9 hrs/day X 60 min/hr X 11,220 mg/m^3 X 95.72 ft^3/min X 0.0283 m^3/ft^3 X 1EE-6 Kg/mg

Mass hydrocarbons = 32.83 Kg.

IV. Time required for the extraction of one pore volume

T = Pore Volume / Volumetric flow rate

T = n X 3.142 X R X R X H/Q

n = Pore fraction = 0.35
R = Radius of influence = 20 feet
H = Thickness of the contaminated zone = 15 feet
Q = Volumetric flow rate = 103 CFM

T = 0.35 X 3.142 X 20 X 20 X 15/103 = 64 mins.
or T = 1.07 hrs.

Mass of Hydrocarbons in Soil

Near well MW-9

- 400 cubic yards of unsaturated sand and gravel that contains an average 1,500 ppm hydrocarbons. Total mass = 918 Kg.
- 139 cubic yards of silty clay that contains an average 2,000 ppm hydrocarbons. Total mass = 425 Kg.
- 361 cubic yards of silty clay with an overage 500 ppm hydrocarbons. Total mass = 276 Kg.
- 474 cubic yards of silty clay with an average 50 ppm hydrocarbons. Total mass = 36 Kg.

Near former underground storage tank

- 315 cubic yards of silty clay with an average 300 ppm soil hydrocarbons. Total mass = 145 Kg.

The total mass of gasoline hydrocarbons is estimated to be 1800 Kg. or 3969 Lbs.

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Armstrong
Phone: 651-1906

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 1 week

Project Leader: Rodger W. Thom
Phone No.

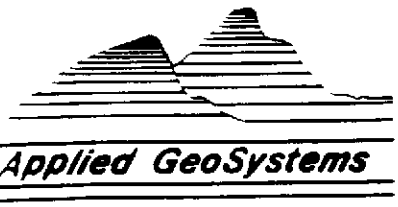
SHIPPING INFORMATION:
Shipper
Address
Date Shipped
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Armstrong			
	Received for laboratory by: M Wallace	10/2/89	17

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-38.5 MW-3	18034-7	RCW 9-29-89	TPHg (EPA 3015)	Iced
S-74 MW-3	18034-7	RCW 9-29-89	+ BTEX (EPA 8020)	Iced

CHAIN OF CUSTODY RECORD



Applied GeoSystems

43255 Mission Blvd Suite B Fremont CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Hamilton

Phone:

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 48 hours

Project Leader: Rodger Witham

Phone No.

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Hamilton	Rodger C. Witham	10/5/89	12:45 p.m.
Rodger C. Witham			
	Received for laboratory by:	10-5-89	1420

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-6-MW9	AGS 18034-7	10/4/89	TPHg + BTEX	Iced
S-21-MW9	AGS 18034-7	10/4/89	TPHg + BTEX	Iced
S-36-MW9	AGS 18034-7	10/4/89	TPHg + BTEX	Iced
S-38-MW9	AGS 18034-7	10/4/89	TPHg + BTEX	Iced

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont CA 94539 (415) 651-1906

SAMPLER (signature): M. Mark Hunter

Phone:

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 48 hours

Project Leader: Rodger Witham

Phone No.

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
S. Mark Hunter	Rodger C. Witham	10/10/89	3:45 p.m.
Rodger C. Witham			
	Received for laboratory by:	10-10-89	1545

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-41-MW9	AGS 18034-7	10/4/89	TPHg + BTEX	Iced

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Hamilton
Phone:

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 48 hours

Project Leader: Roger Witham
Phone No. 18034-7

SHIPPING INFORMATION:
Shipper
Address
Date Shipped
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Hamilton	Roger C. Witham	10/10/89	9:00 am
Roger C. Witham	Laura Kuk	10/10/89	9:00 AM

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-20-MW10	AGS 18034-7	10/6/89	TPHg + BTEX	Iced
S-35-MW10	AGS 18034-7	10/6/89	TPHg + BTEX	Iced

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont CA 94539 415/651-1906

SAMPLER (signature): Russell J Bake

Phone: 651-1906

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 2 week

Project Leader: Rodger Witham

Phone No. 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Russell Bake	Rodger C. Witham	11/7/89	4:45 pm
Rodger C. Witham	Received for laboratory by:	11-8-89	9:30 AM

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-20-B11	18034-7	11/2/89	TPHg + BTEX	Iced
S-40-B11	18034-7	11/2/89	TPHg + BTEX	Iced
S-45-B11	18034-7	11/2/89	TPHg + BTEX	Iced
S-55-B12	18034-7	11/3/89	TPHg + BTEX	Iced
S-70-B12	18034-7	11/3/89	TPHg + BTEX	Iced
S-84-B12	18034-7	11/3/89	TPHg + BTEX	Iced

CHAIN OF CUSTODY RECORD

* Top Frig on Bottom To the small brass Sleeves

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Russell Bake

Phone: (415) 651-1906

LABORATORY: Applied GeoSystems

RCW

TURNAROUND TIME: 1 & weeks

Project Leader: Rodger Witham

Phone No. (415) 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Russell Bake	Rodger C. Witham	11/28/89	2102 p.m.
	Received for laboratory by: Laura Luck	11/28/89	1400

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
S-10-V2	18034-7	11/20/89	TPHg + BTEX	Iced
S-20-V2 RCW	18034-7	11/20/89	TPHg + BTEX	Iced
S-45-V2	18034-7	11/20/89	TPHg + BTEX	Iced
S-10-V4	18034-7	11/21/89	TPHg + BTEX	Iced
S-20-V4	18034-7	11/21/89	TPHg + BTEX	Iced

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-02-89
Laboratory Number: 91003S01
Project #: 18034-7
Sample #: S-38.5-MW8
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		10-06-89	
TEH as Diesel						NR
Benzene	ND		0.050		10-06-89	
Toluene	ND		0.050		10-06-89	
Ethylbenzene	ND		0.050		10-06-89	
Total Xylenes	ND		0.050		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-02-89
Laboratory Number: 91003S02
Project #: 18034-7
Sample #: S-74-MW8
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		10-06-89	
TEH as Diesel						NR
Benzene	ND		0.050		10-06-89	
Toluene	ND		0.050		10-06-89	
Ethylbenzene	ND		0.050		10-06-89	
Total Xylenes	ND		0.050		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-05-89
Laboratory Number: 91012S01
Project #: 18034-7
Sample #: S-6-MW9
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	1500		50		10-06-89	
TEH as Diesel						NR
Benzene	4.9		1.0		10-06-89	
Toluene	40		1.0		10-06-89	
Ethylbenzene	26		1.0		10-06-89	
Total Xylenes	150		1.0		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-05-89
Laboratory Number: 91012S02
Project #: 18034-7
Sample #: S-21-MW9
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	3000		50		10-06-89	
TEH as Diesel						NR
Benzene	23		1.0		10-06-89	
Toluene	130		1.0		10-06-89	
Ethylbenzene	51		1.0		10-06-89	
Total Xylenes	240		1.0		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-05-89
Laboratory Number: 91012S03
Project #: 18034-7
Sample #: S-36-MW9
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	9.3		2.0		10-06-89	
TEH as Diesel						NR
Benzene	0.89		0.050		10-06-89	
Toluene	0.37		0.050		10-06-89	
Ethylbenzene	0.16		0.050		10-06-89	
Total Xylenes	0.40		0.050		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-05-89
Laboratory Number: 91012S04
Project #: 18034-7
Sample #: S-38-MW9
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	6200		100		10-06-89	
TEH as Diesel						NR
Benzene	100		2.5		10-06-89	
Toluene	560		2.5		10-06-89	
Ethylbenzene	150		2.5		10-06-89	
Total Xylenes	720		2.5		10-06-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-09-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-10-89
Laboratory Number: 91021S01
Project #: 18034-7
Sample #: S-41-MW9
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	900		2.0		10-11-89	
TEH as Diesel						NR
Benzene	3.6		1.0		10-11-89	
Toluene	42		1.0		10-11-89	
Ethylbenzene	18		1.0		10-11-89	
Total Xylenes	90		1.0		10-11-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-16-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-10-89
Laboratory Number: 91018S01
Project #: 18034-7
Sample #: S-20-MW10
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		10-11-89	
TEH as Diesel						NR
Benzene	ND		0.050		10-11-89	
Toluene	ND		0.050		10-11-89	
Ethylbenzene	ND		0.050		10-11-89	
Total Xylenes	ND		0.050		10-11-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-16-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-10-89
Laboratory Number: 91018S02
Project #: 18034-7
Sample #: S-35-MW10
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		10-11-89	
TEH as Diesel						NR
Benzene	ND		0.050		10-11-89	
Toluene	ND		0.050		10-11-89	
Ethylbenzene	ND		0.050		10-11-89	
Total Xylenes	ND		0.050		10-11-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-16-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 91108S01
Project #: 18034-7
Sample #: S-20-B11
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	ND		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	0.087		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

11-16-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 91108S02
Project #: 18034-7
Sample #: S-40-B11
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	ND		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	ND		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 91108S03
Project #: 18034-7
Sample #: S-45-B11
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	0.059		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	ND		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 91108S04
Project #: 18034-7
Sample #: S-55-B12
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	ND		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	0.060		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

11-16-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 9110805
Project #: 18034-7
Sample #: S-70-B12
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	ND		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	ND		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
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Attention: Rodger C. Witham

Date Received: 11-08-89
Laboratory Number: 91108S06
Project #: 18034-7
Sample #: S-84-B12
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		11-14-89	
TEH as Diesel						NR
Benzene	ND		0.050		11-14-89	
Toluene	ND		0.050		11-14-89	
Ethylbenzene	ND		0.050		11-14-89	
Total Xylenes	0.051		0.050		11-14-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

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Report Prepared for:
Applied GeoSystems
43255 Misson Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-28-89
Laboratory Number: 91134S01
Project #: 18034-7
Sample #: S-10-V2
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		12-04-89	
TEH as Diesel						NR
Benzene	0.13		0.050		12-04-89	
Toluene	0.059		0.050		12-04-89	
Ethylbenzene	ND		0.050		12-04-89	
Total Xylenes	ND		0.050		12-04-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-08-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Misson Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-28-89
Laboratory Number: 91134S02
Project #: 18034-7
Sample #: S-20-V2
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		12-04-89	
TEH as Diesel						NR
Benzene	0.061		0.050		12-04-89	
Toluene	ND		0.050		12-04-89	
Ethylbenzene	ND		0.050		12-04-89	
Total Xylenes	ND		0.050		12-04-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-08-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Misson Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-28-89
Laboratory Number: 91134S03
Project #: 18034-7
Sample #: S-45-V2
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		12-04-89	
TEH as Diesel						NR
Benzene	ND		0.050		12-04-89	
Toluene	0.091		0.050		12-04-89	
Ethylbenzene	ND		0.050		12-04-89	
Total Xylenes	0.086		0.050		12-04-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-08-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Misson Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-28-89
Laboratory Number: 91134S04
Project #: 18034-7
Sample #: S-10-V4
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		12-04-89	
TEH as Diesel						NR
Benzene	0.16		0.050		12-04-89	
Toluene	ND		0.050		12-04-89	
Ethylbenzene	0.093		0.050		12-04-89	
Total Xylenes	0.082		0.050		12-04-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-08-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Misson Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-28-89
Laboratory Number: 91134S05
Project #: 18034-7
Sample #: S-20-V4
Matrix: Soil

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline	ND		2.0		12-04-89	
TEH as Diesel						NR
Benzene	ND		0.050		12-04-89	
Toluene	0.079		0.050		12-04-89	
Ethylbenzene	ND		0.050		12-04-89	
Total Xylenes	ND		0.050		12-04-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-08-89
Date Reported

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Dan Kirkman
Phone: 651-1906

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 2 week

Project Leader: Rodger Witham
Phone No. 651-1906

SHIPPING INFORMATION:
Shipper
Address
Date Shipped
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Dan Kirkman			
	Received for laboratory by:	9-14-89	9:30 AM

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-51-MW5D	18034-6 DK	9-13-89 DK	TPH + BETX DK	Iced DK
W-50-MW5S				
W-50 MW1				
W-50-MW4				
W-Influent	DK	DK	DK	DK

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-

SAMPLER (signature): R. Mark Hamilton

Phone:

LABORATORY:
Applied GeoSystems
43255 Mission Blvd
Fremont CA.

TURNAROUND TIME: 2 weeks

Project Leader: Roger Witham

Phone No.

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	T
R. Mark Hamilton			
		(NT)	
	Received for laboratory by:	10/3/89	

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-53-MW8	18034-7	10-3-89	TPH_g - BTEX	ICED/HCL
W-Blank Pump-MW-8	18034-7	10-3-89	TPH_g - BTEX	ICED/HCL

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Stanley Thompson

Phone: (415) 651-1906

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 48 HR

Project Leader: Rodger Witham

Phone No. (415) 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Stanley Thompson			
	Received for laboratory by: [signature]	10/12/89	1800

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-52-MW10	18034-7	10/12/89	TPHg, BTEX	ICED, HCl

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Hamilton

Phone:

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 48 hours

Project Leader: Rodger Witham

Phone No.

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. **Cooler No.**

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Hamilton			
	Received for laboratory by: [signature]	10-16-89	8:00

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-50-MW4	18034-7 RW	10-13-89	TPHg + BTEX	ICED / HCL

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Russell Bth

Phone:

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 2 week

Project Leader: Rodger Witham

Phone No. (415) 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

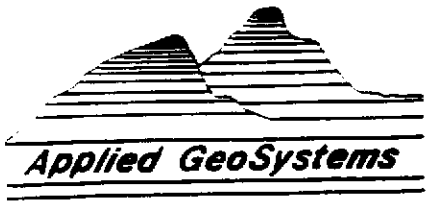
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Russell Bth	Rodger C. Witham	11/17/89	8:26 a.m
Rodger C. Witham	Received for laboratory by: Laura Kirk	11/17/89	10:40

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W51-MW11	18034-7	11-16-89	TPHg / BTEX	ice / HCL

CHAIN OF CUSTODY RECORD



43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Jon De Lon

Phone: 415 651 1906

LABORATORY:
Applied Geo Systems
43255 Mission Blvd
Fremont CA

TURNAROUND TIME: 2 weeks

Project Leader: Roger Witham

Phone No. 415 651 1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Jon De Lon			
	Received for laboratory by:	12-21-89	930

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-52-MW10				
W-50-MW11				
W-50-MW9	12	12-20-89	TPH-D BTEX	ICED 4°C
W-TAP-MW7	24			
W-50-MW5S	8			
W-51-MW5D				
W-52-MW8				
W-50-MW4				
W-50-MW1				

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Hamilton

Phone: 651-1906

LABORATORY: Applied Geo Systems

TURNAROUND TIME: 2 weeks

Project Leader: Rodger Witham

Phone No. 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Hamilton			
	Received for laboratory by:	1-26-90	830P

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-50-MW1	18034-8	1-25-90	BTEX TPHg	ICED HCL
W-50-MW9	18034-8	1-25-90	BTEX TPHg	ICED HCL
W-50-MW10				

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): R. Mark Armstrong
Phone: 415 - 651 - 1906

LABORATORY: Applied Geo System

TURNAROUND TIME: 2 weeks

Project Leader: Rodger Witham
Phone No. 415-651-1906

SHIPPING INFORMATION:
Shipper
Address
Date Shipped
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
R. Mark Armstrong			
	Received for laboratory by:	1/31/90	16[3]

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-55-MW-8	18034-8	1-31-90	TPHg BTEX	HCL ICED

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415)651-1906

SAMPLER (signature): E Mark Hamilton

Phone: 415-651-1906

LABORATORY: Applied Geo Systems

TURNAROUND TIME: 2 weeks

Project Leader: Rodger Whitmore

Phone No. 415-651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
E Mark Hamilton			
	Received for laboratory by:	2-12-90	1600

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-S2-MW8	1034-2	2-9-90	TPH, BTEX	ICED, HCL
W-S-FB1	1034-2	2-9-90	(TPH, BTEX) Hold	ICED, HCL

Note: Analyze W-S-FB1 only if detectable concentrations are found in W-S2-MW8

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
18034-8	Exxon Pleaston
P.O. NO.	SAMPLERS (Signature)
	K. Wind Jr. [illegible]

DATE MM/DD/YY	TIME		No. of Cont-ainers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)						Preserved?	REMARKS	LABORATORY I.D. NUMBER
				ANALYSIS										
02/12/90	3:00	W - 50 - MW1	4	✓	✓							HCl/ICE		
02/12/90	3:00	W - 50 - MW9	4	✓	✓							HCl/ICE		
					•									

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
R. Wind Jr.	3/1 11:30	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

Laboratory: Applied GeoSystems

Turn Around: 2 weeks

SEND RESULTS TO:

Applied GeoSystems
43255 Mission Boulevard
Fremont, California 95826

(415) 651-1906

Proj. Mgr.: Rodger

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

0212lab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 09-14-89
Laboratory Number: 90927W03
Project #: 18034-6
Sample #: W-50-MW1
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.22		0.020	09-26-89	
TEH as Diesel						NR
Benzene		0.039		0.00050	09-26-89	
Toluene		0.00060		0.00050	09-26-89	
Ethylbenzene		ND		0.00050	09-26-89	
Total Xylenes		0.0051		0.00050	09-26-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

09-27-89
Date Reported

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ANALYSIS REPORT

02121ab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 09-14-89
Laboratory Number: 90927W04
Project #: 18034-6
Sample #: W-50-MW4
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	09-26-89	
TEH as Diesel						NR
Benzene		ND		0.00050	09-26-89	
Toluene		ND		0.00050	09-26-89	
Ethylbenzene		ND		0.00050	09-26-89	
Total Xylenes		ND		0.00050	09-26-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

09-27-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 09-14-89
Laboratory Number: 90927W01
Project #: 18034-6
Sample #: W-51-5D
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	09-25-89	
TEH as Diesel						NR
Benzene		ND		0.00050	09-25-89	
Toluene		ND		0.00050	09-25-89	
Ethylbenzene		ND		0.00050	09-25-89	
Total Xylenes		ND		0.00050	09-25-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

09-27-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 09-14-89
Laboratory Number: 90927W02
Project #: 18034-6
Sample #: W-50-5S
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	09-25-89	
TEH as Diesel						NR
Benzene		ND		0.00050	09-25-89	
Toluene		ND		0.00050	09-25-89	
Ethylbenzene		ND		0.00050	09-25-89	
Total Xylenes		ND		0.00050	09-25-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

09-27-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 09-14-89
Laboratory Number: 90927W05
Project #: 18034-6
Sample #: W-influent
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.087		0.020	09-26-89	
TEH as Diesel						NR
Benzene		ND		0.00050	09-26-89	
Toluene		0.0026		0.00050	09-26-89	
Ethylbenzene		ND		0.00050	09-26-89	
Total Xylenes		0.012		0.00050	09-26-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

09-27-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-03-89
Laboratory Number: 91007W01
Project #: 18034-7
Sample #: W-53-MW8
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	10-10-89	
TEH as Diesel						NR
Benzene		ND		0.00050	10-10-89	
Toluene		ND		0.00050	10-10-89	
Ethylbenzene		ND		0.00050	10-10-89	
Total Xylenes		ND		0.00050	10-10-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-12-89
Date Reported

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-03-89
Laboratory Number: 91007W02
Project #: 18034-7
Sample #: W-Blank Pump-MW8
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.040		0.020	10-10-89	
TEH as Diesel						NR
Benzene		ND		0.00050	10-10-89	
Toluene		0.0019		0.00050	10-10-89	
Ethylbenzene		ND		0.00050	10-10-89	
Total Xylenes		0.00089		0.00050	10-10-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-12-89
Date Reported

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-12-89
Laboratory Number: 91022W01
Project #: 18034-7
Sample #: W-52-MW10
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.020		0.020	10-12-89	
TEH as Diesel						NR
Benzene		ND		0.00050	10-12-89	
Toluene		ND		0.00050	10-12-89	
Ethylbenzene		ND		0.00050	10-12-89	
Total Xylenes		0.0015		0.00050	10-12-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-16-89
Date Reported

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 10-16-89
Laboratory Number: 91026W01
Project #: 18034-7
Sample #: W-50-MW9
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		89		2.0	10-16-89	
TEH as Diesel						NR
Benzene		1.0		0.050	10-16-89	
Toluene		9.2		0.050	10-16-89	
Ethylbenzene		3.0		0.050	10-16-89	
Total Xylenes		13		0.050	10-16-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

10-18-89
Date Reported

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 11-17-89
Laboratory Number: 91120W01
Project #: 18034-7
Sample #: W-51-MW11
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.15		0.020	11-21-89	
TEH as Diesel						NR
Benzene		0.0041		0.00050	11-21-89	
Toluene		0.0094		0.00050	11-21-89	
Ethylbenzene		0.00074		0.00050	11-21-89	
Total Xylenes		0.020		0.00050	11-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

11-28-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W03
Project #: 18034-8
Sample #: W-50-MW1
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.22		0.020	12-21-89	
TPH as Diesel						NR
Benzene		0.056		0.00050	12-21-89	
Toluene		0.00072		0.00050	12-21-89	
Ethylbenzene		ND		0.00050	12-21-89	
Total Xylenes		0.00071		0.00050	12-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W04
Project #: 18034-8
Sample #: W-50-MW4
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-21-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-21-89	
Toluene		ND		0.00050	12-21-89	
Ethylbenzene		ND		0.00050	12-21-89	
Total Xylenes		ND		0.00050	12-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W02
Project #: 18034-8
Sample #: W-51-MW5D
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-21-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-21-89	
Toluene		ND		0.00050	12-21-89	
Ethylbenzene		ND		0.00050	12-21-89	
Total Xylenes		ND		0.00050	12-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W01
Project #: 18034-8
Sample #: W-50-MW5S
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-21-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-21-89	
Toluene		ND		0.00050	12-21-89	
Ethylbenzene		ND		0.00050	12-21-89	
Total Xylenes		ND		0.00050	12-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W05
Project #: 18034-8
Sample #: W-TAP-MW7
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-21-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-21-89	
Toluene		ND		0.00050	12-21-89	
Ethylbenzene		ND		0.00050	12-21-89	
Total Xylenes		ND		0.00050	12-21-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W06
Project #: 18034-8
Sample #: W-52-MW8
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-22-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-22-89	
Toluene		ND		0.00050	12-22-89	
Ethylbenzene		ND		0.00050	12-22-89	
Total Xylenes		0.00061		0.00050	12-22-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W07
Project #: 18034-8
Sample #: W-50-MW9
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		190		2.0	12-22-89	
TPH as Diesel						NR
Benzene		6.3		0.25	12-22-89	
Toluene		31		0.25	12-22-89	
Ethylbenzene		9.5		0.25	12-22-89	
Total Xylenes		55		0.25	12-22-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W08
Project #: 18034-8
Sample #: W-52-MW10
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.020	12-22-89	
TPH as Diesel						NR
Benzene		ND		0.00050	12-22-89	
Toluene		ND		0.00050	12-22-89	
Ethylbenzene		ND		0.00050	12-22-89	
Total Xylenes		0.0018		0.00050	12-22-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Rodger C. Witham

Date Received: 12-21-89
Laboratory Number: 91222W09
Project #: 18034-8
Sample #: W-50-MW11
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.15		0.020	12-22-89	
TPH as Diesel						NR
Benzene		0.0072		0.00050	12-22-89	
Toluene		0.0075		0.00050	12-22-89	
Ethylbenzene		0.0029		0.00050	12-22-89	
Total Xylenes		0.013		0.00050	12-22-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHg--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPHd--Total petroleum hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

12-29-89
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

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Attention:	Mr. Rodger Witham	Date Sampled:	01-25-90
	Applied GeoSystems	Date Received:	01-26-90
	43255 Mission Boulevard	BTEX Analyzed:	02-02-90
	Fremont, CA 94539	TPHg Analyzed:	02-02-90
Project:	AGS 18034-8	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-50-MW1 W1001172	18	1.6	ND	1.8	57	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

02-06-90
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

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Attention:	Mr. Rodger Witham	Date Sampled:	01-25-90
	Applied GeoSystems	Date Received:	01-26-90
	43255 Mission Boulevard	BTEX Analyzed:	02-02-90
	Fremont, CA 94539	TPHg Analyzed:	02-02-90
Project:	AGS 18034-8	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	100	100	100	100	5000	100
SAMPLE Laboratory Identification						
W-SU-MW9 W1001173	2400	9400	2700	15000	77000	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

02-06-90
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

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Attention: Mr. Rodger Witham
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 18034-8

Date Sampled: 01-31-90
Date Received: 01-31-90
BTEX Analyzed: 02-02-90
TPHg Analyzed: 02-02-90
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-55-MW8 W1001208	ND	ND	ND	0.87	ND	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

02-06-90
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Rodger Witham
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 18034-8

Date Sampled: 02-09-90
Date Received: 02-12-90
BTEX Analyzed: 02-20-90
TPHg Analyzed: 02-20-90
TPHd Analyzed: NR
Matrix: Water

	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHg ppb	TPHd ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-52-MW8 W1002094	ND	ND	ND	1.1	ND	NR
W-5-FB1 W1002095	ND	ND	ND	ND	ND	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

02-23-90
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Rodger Witham	Date Sampled:	02-27-90
	Applied GeoSystems	Date Received:	03-01-90
	43255 Mission Boulevard	BTEX Analyzed:	03-06-90
	Fremont, CA 94539	TPHg Analyzed:	03-06-90
Project:	AGS 18034-8	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-50-MW1 W1003005	3.2	2.3	ND	3.2	55	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

03-12-90
Date Reported

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Rodger Witham
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 18034-8

Date Sampled: 02-27-90
Date Received: 03-01-90
BTEX Analyzed: 03-06-90
TPHg Analyzed: 03-06-90
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	100	100	100	100	4000	100
SAMPLE Laboratory Identification						
W-50-MW9 W1003006	1200	7100	2300	14000	97000	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

03-12-90
Date Reported

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Behrooz Behranian
Phone: 415-651-1906.

LABORATORY: TRACE ANALYSIS LAB

TURNAROUND TIME: NORMAL (~$10 ONE DAY)

Project Leader: BEN TEHRANIAN. PROJ ENG.
Phone No. 415-651-1906. ROGER WITHAM PROJ MANAGER

SHIPPING INFORMATION:
Shipper Applied GeoSystems
Address 43255 MISSION Blvd
Date Shipped 9/12/89.
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Behrooz Behranian	[signature]	9/12	10:4
	Received for laboratory by:		

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
9-INLET	1834-4	9/11/89	TPH Gasoline, BTEX.	VAPOR PHASE.
10-MIDDLE	1834-4	9/11/89	TPH Gasoline, BTEX.	VAPOR PHASE.
11-OUTLET.	1834-4	9/11/89	TPH Gasoline, BTEX.	Vapor phase.

CHAIN OF CUSTODY RECORD

Applied GeoSystems
43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): Ben Teheranian B Teheranian.
Phone: 415-651-1906

LABORATORY: TRACE Analysis LABS.

TURNAROUND TIME: STANDARD

Project Leader: BEN TEHERANIAN (ROGER WITTEN, PROJ. ENG. / PROJ. MANAGER)
Phone No. 415-651-1906

SHIPPING INFORMATION:
Shipper APPLIED GEOSYSTEMS.
Address 43255 MISSION BLVD
Date Shipped 9/18/89.
Service Used Courier.
Airbill No. _____ Cooler No. _____

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
B Teheranian			
	Received for laboratory by:		

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
12-INLET.	18034-4	9/16/89	TPH Gasoline, BTEX.	VAPOR PHASE.
13-OUTLET	18034-4	9/16/89	TPH Gasoline, BTEX	Vapor phase.

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd Suite B Fremont, CA 94539 (415)651-1906

SAMPLER (signature): BEN TEHERANIAN.

Phone: 415-651-1906.

LABORATORY: TRACE ANALYSIS LABS.

TURNAROUND TIME: 2 DAYS.

Project Leader: ROGER WITHAM

Phone No. 415-651-1906.

SHIPPING INFORMATION:

Shipper APPLIED GEOSYSTEMS.

Address 43255 MISSION BLVD.

Date Shipped 1/15/90.

Service Used Cooler.

Airbill No. _____ Cooler No. _____

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
B Teheraniath.			
	Received for laboratory by: Janine Allen	1/15/90	2:1[illegible] P.M.

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
1-1030-0111-INLET	EXXON PLEASANTON	1/12/90	TPHg, BTEX	VAPOR PHASE.
2-0245-0111-INLET				
3-0245-0111-OUTLET AC1				

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd Suite B Fremont, CA 94539 (415)651-1906

SAMPLER (signature): BEN TEHERANIAN B Teheranian.

Phone: 415-651-1906.

LABORATORY: TRACE ANALYSIS LABS.

TURNAROUND TIME: 2 DAYS.

Project Leader: ROGER WITHAM.

Phone No. 415-651-1906.

SHIPPING INFORMATION:

Shipper APPLIED GEOSYSTEMS.

Address 43255 MISSION BLVD. FREMONT

Date Shipped 1/15/90.

Service Used Cooler.

Airbill No. _____ Cooler No. _____

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
K Teheranian.			
	Received for laboratory by: Corine Dulles	1/15/90	2:4 P.M.

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
1-1115-0115-INLET.	18034-8	1/15/90.	TPHg, BTEX.	VAPOR PHASE.

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 8/22/89

LOG NO.: 7694

DATE SAMPLED: 8/7/89

DATE RECEIVED: 8/7/89

CUSTOMER: Applied GeoSystems

REQUESTER: Ben Teheranian

PROJECT: No. 18034-4

Sample Type: Air

Method and Constituent	Units	Inlet #1 Concentration	Inlet #1 Detection Limit	Inlet #2 Concentration	Inlet #2 Detection Limit	Outlet #1 Concentration	Outlet #1 Detection Limit
Modified Method CA-ADDL004:							
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	9,300	30	8,200	30	150	3
Benzene	mg/m^3	25	2	18	2	0.79	0.2
Toluene	mg/m^3	7.1	2	< 2	2	0.32	0.2
Xylenes	mg/m^3	< 7	7	< 7	7	1.5	0.7
Ethyl Benzene	mg/m^3	< 2	2	< 2	2	0.46	0.2

DATE: 8/22/89
LOG NO.: 7694
DATE SAMPLED: 8/7/89
DATE RECEIVED: 8/7/89
PAGE: Two

Sample Type: Air

Method and Constituent	Units	Outlet #2 Concentration	Outlet #2 Detection Limit
Modified Method CA-ADDL004:			
Total Petroleum Hyfrocarbons as Gasoline	mg/m^3	110	0.6
Benzene	mg/m^3	0.44	0.04
Toluene	mg/m^3	0.13	0.04
Xylenes	mg/m^3	0.89	0.1
Ethyl Benzene	mg/m^3	0.45	0.05

Dan Farah

Dan Farah, Ph.D.
Supervisory Chemist

DF:slr

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 9/14/89

LOG NO.: 7826

DATE SAMPLED: 9/11/89

DATE RECEIVED: 9/12/89

CUSTOMER: Applied GeoSystems

REQUESTER: Ben Teheranian

PROJECT: No. 18034-4

Sample Type: Air

Method and Constituent	Units	10-Middle Concentration	Detection Limit
Modified Method CA-ADDL004:			
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	310	2
Benzene	mg/m^3	< 0.2	0.2
Toluene	mg/m^3	0.60	0.2
Xylenes	mg/m^3	4.7	0.7
Ethyl Benzene	mg/m^3	0.32	0.3

Stephen D Boyle

For Dan Farah, Ph.D.
Supervisory Chemist

DF:vs

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 (415) 783-6960

TAL

DATE: 9/27/89

LOG NO.: 7826A

DATE SAMPLED: 9/11/89

DATE RECEIVED: 9/12/89

CUSTOMER: Applied GeoSystems

REQUESTER: Ben Teheranian

PROJECT: No. 18034-4

Sample Type: Air

Method and Constituent	Units	9-Inlet Concentration	9-Inlet Detection Limit	11-Outlet Concentration	11-Outlet Detection Limit
Modified Method CA-ADDL004:					
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	1,800	20	28	0.5
Benzene	mg/m^3	2.6	1	< 0.03	0.03
Toluene	mg/m^3	< 1	1	< 0.02	0.02
Xylenes	mg/m^3	2.6	2	0.063	0.04
Ethyl Benzene	mg/m^3	< 2	2	0.074	0.03

Dan Farah

Dan Farah, Ph.D.
Supervisory Chemist

DF:sam

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 (415) 783-6960

TAL

DATE: 9/27/89

LOG NO.: 7851

DATE SAMPLED: 9/16/89

DATE RECEIVED: 9/18/89

CUSTOMER: Applied GeoSystems

REQUESTER: Ben Teheranian

PROJECT: NO. 18034-4

		Sample Type: Air			
		12-Inlet		13-Outlet	
Method and Constituent	Units	Concentration	Detection Limit	Concentration	Detection Limit
Modified Method CA-ADDL004:					
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	2,000	20	1,400	5
Benzene	mg/m^3	3.8	1	0.58	0.3
Toluene	mg/m^3	2.7	1	< 0.2	0.2
Xylenes	mg/m^3	5.5	2	< 0.4	0.4
Ethyl Benzene	mg/m^3	< 2	2	< 0.3	0.3

Dan Farah

Dan Farah, Ph.D.
Supervisory Chemist

DF:sam

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 12/20/89

LOG NO.: 8182

DATE SAMPLED: 12/14/89 and 12/15/89

DATE RECEIVED: 12/15/89

CUSTOMER: Appled GeoSystems

REQUESTER: Ben Teheranian

PROJECT: No. 18034-9

Sample Type: Air

Method and Constituent:	Units	VR2-1-1214 Concentration	VR2-1-1214 Detection Limit	VR2-2-1214 Concentration	VR2-2-1214 Detection Limit	VR2-3-1214 Concentration	VR2-3-1214 Detection Limit
Modified Method CA-ADDL004:							
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	11,000	100	9,400	100	9,200	100
Benzene	mg/m^3	88	10	100	10	150	10
Toluene	mg/m^3	64	10	110	10	140	10
Xylenes	mg/m^3	75	30	99	30	120	30
Ethylbenzene	mg/m^3	21	10	29	10	36	10

DATE: 12/20/89
LOG NO.: 8182
DATE SAMPLED: 12/14/89 and 12/15/89
DATE RECEIVED: 12/15/89
PAGE: Two

Sample Type: Air

Method and Constituent:	Units	VR2-4-1214 Concentration	VR2-4-1214 Detection Limit	VR2-5-1214 Concentration	VR2-5-1214 Detection Limit	VR2-6-1214 Concentration	VR2-6-1214 Detection Limit
Modified Method CA-ADDL004:							
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	8,200	100	12,000	100	12,000	100
Benzene	mg/m^3	140	10	200	10	200	10
Toluene	mg/m^3	140	10	230	10	230	10
Xylenes	mg/m^3	100	30	200	30	220	30
Ethylbenzene	mg/m^3	32	10	54	10	58	10

Method and Constituent:	Units	VR2-7-1214	VR2-8-1214	VR2-2-1215
Modified Method CA-ADDL004:				
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	13,000	12,000	18,000
Benzene	mg/m^3	200	190	180
Toluene	mg/m^3	270	260	280
Xylenes	mg/m^3	270	230	430
Ethylbenzene	mg/m^3	69	60	120

Method and Constituent:	Units	VR2-7-1214 Detection Limit	VR2-8-1214 Detection Limit	VR2-2-1215 Detection Limit
Modified Method CA-ADDL004:				
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	100	100	100
Benzene	mg/m^3	10	10	10
Toluene	mg/m^3	10	10	10
Xylenes	mg/m^3	30	30	30
Ethylbenzene	mg/m^3	10	10	10

DATE: 12/20/89
LOG NO.: 8182
DATE SAMPLED: 12/14/89 and 12/15/89
DATE RECEIVED: 12/15/89
PAGE: Three

Sample Type: Air

Method and Constituent:	Units	VR2-5-1215 Concentration	VR2-5-1215 Detection Limit	VR2-6-1215 Concentration	VR2-6-1215 Detection Limit	VR2-7-1215 Concentration	VR2-7-1215 Detection Limit
Modified Method CA-ADDL004:							
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	9,000	100	7,300	100	15,000	100
Benzene	mg/m^3	84	20	140	20	120	20
Toluene	mg/m^3	200	20	140	20	250	20
Xylenes	mg/m^3	150	40	130	40	200	40
Ethylbenzene	mg/m^3	43	20	37	20	55	20

Method and Constituent:	Units	VR2-8-1215 Concentration	VR2-8-1215 Detection Limit
Modified Method CA-ADDL004:			
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	10,000	100
Benzene	mg/m^3	200	20
Toluene	mg/m^3	220	20
Xylenes	mg/m^3	210	40
Ethylbenzene	mg/m^3	55	20

Louis W. DuPuis
Quality Assurance/Quality Control Manager

LWD:jon

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 1/19/90
LOG NO.: 8266
DATE SAMPLED: 1/12/90 and 1/15/90
DATE RECEIVED: 1/15/90

CUSTOMER: Applied GeoSystems
REQUESTER: Ben Teheranian
PROJECT: No. 18034-8, Exxon Pleasanton

Sample Type: Air

Method and Constituent:	Units	1-030-0111-Inlet Concentration	1-030-0111-Inlet Detection Limit	2-0245-0111-Inlet Concentration	2-0245-0111-Inlet Detection Limit
Modified Method CA-ADDL004:					
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	2,200	90	1,000	9
Benzene	mg/m^3	< 40	40	8.2	4
Toluene	mg/m^3	< 30	30	< 3	3
Xylenes	mg/m^3	< 90	90	< 9	9
Ethylbenzene	mg/m^3	440	40	< 4	4

	Units	3-0245-0111-Outlet, AC1		1-1115-01115-Inlet	
Modified Method CA-ADDL004:					
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	8.9	0.4	180	5
Benzene	mg/m^3	< 0.1	0.1	< 2	2
Toluene	mg/m^3	< 0.1	0.1	< 2	2
Xylenes	mg/m^3	< 0.4	0.4	< 5	5
Ethylbenzene	mg/m^3	< 0.2	0.2	< 2	2

Louis W. DuPuis
Quality Assurance/Quality Control Manager

LWD:lr

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 1/22/90
LOG NO.: 8275
DATE SAMPLED: 1/15/90
DATE RECEIVED: 1/17/90

CUSTOMER: Applied Geosystems
REQUESTER: Ben Teheranian
PROJECT: NO.18034-8

Sample Type: Air

Method and Constituent:	Units	1-1410-0116-Inlet Concentration	Detection Limit
Modified Method CA-ADDL004:			
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	970	20
Benzene	mg/m^3	< 7	7
Toluene	mg/m^3	< 7	7
Xylenes	mg/m^3	< 20	20
Ethylbenzene	mg/m^3	< 7	7

Louis W. DuPuis
Quality Assurance/Quality Control Manager

LWD:dmg

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 1/22/90

LOG NO.: 8277

DATE SAMPLED: 1/17/90

DATE RECEIVED: 1/18/90

CUSTOMER: Applied GeoSystems

REQUESTER: Ben Teheranian

PROJECT: NO.18034-8

Sample Type: Air

Method and Constituent:	Units	3-1117-0117-Inlet Concentration	Detection Limit
Modified Method CA-ADDL004:			
Total Petroleum Hydrocarbons as Gasoline	mg/m^3	920	3
Benzene	mg/m^3	2.1	1
Toluene	mg/m^3	< 1	1
Xylenes	mg/m^3	< 3	3
Ethylbenzene	mg/m^3	< 1	1

Louis W. DuPuis
Quality Assurance/Quality Control Manager

LWD:dmg

VARIABLE HEAD PERMEABILITY TEST

PROJECT NAME APPLIED GEOSYSTEMS PROJECT NO. 8910057A DATE 10-30-89

SAMPLE NO. S-106-MW9 #18034-7 DESCRIPTION GRAY CLAY CL-CH W/CALC. NODULES

TESTED BY C. Wason REDUCED BY C. Wason CHECKED BY S. Cappa

PERMEAMETER AREA (A') 0.180 cm^2 HEIGHT (B') 4.60 cm AREA (C') 19.07 cm^2

WET WEIGHT BEFORE TEST 175.64 gms. WATER CONTENT BEFORE TEST 28.80 %

WET WEIGHT AFTER TEST 174.33 gms. WATER CONTENT AFTER TEST 27.84 %

DRY WEIGHT 136.37 gms. DIAMETER 1.94 in. VOLUME 87.72 cm^3

INITIAL WET DENSITY 124.94 pcf INITIAL DRY DENSITY 97.00 pcf

$\bar{\sigma}$: 0.352 kg/cm^2 PERMEAMETER NO. 3

USCE Manual EM-1110-2-1906, Appendix VII and X, 30 November 1970

P-LEFT kg/cm^2	P-RIGHT kg/cm^2	$h_o = H_1 - H_2$ cm $h_f = H_1 - H_2$ cm	TIME min. sec.	k = cm/sec.
4.219	4.019	(A) (B) H_1 276.1 H_2 52.7 H_1 269.0 H_2 55.7 (C) (D)	INITIAL 0 FINAL 1451 SEC. (E) 87,060	
11	11	(A) (B) H_1 276.0 H_2 52.8 H_1 266.8 H_2 56.8 (C) (D)	INITIAL 0 FINAL 1925 SEC. (E) 115,500	1.15-08
11	11	(A) (B) H_1 276.0 H_2 52.8 H_1 257.8 H_2 62.7 (C) (D)	INITIAL 0 FINAL 4231 SEC. (E) 253,860	1.14-08 1.15-08

$$k = \frac{2.303 \times a \times L \times \log_{10} \frac{h_o}{h_f}}{2 \times A \times t}$$

AVERAGE 1.15-08

Woodward-Clyde Consultants