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TIRANSMITTAL

TO:

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DATE:

February 12, 2002

PROJECT NO.

140175.07

SUBJECT:

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Ms. Carol Mahoney - Zone 7 Water Agency 5997 Parkside Drive, Pleasanton, CA 94588



GROUNDWATER MONITORING WELL AND OZONE MICROSPARGE SYSTEM INSTALLATION REPORT

for
Tosco (76) Service Station No. 4186
1771 First Street
Livermore, California

Report No. 140175.07

Prepared for:

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Prepared by:

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February 6, 2002

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1.0 INTRODUCTION

At the request of Tosco Corporation (Tosco), a subsidiary of Phillips Petroleum Company, Gettler-Ryan Inc. (GR), has prepared this report documenting the installation of two groundwater monitoring wells and an ozone microsparge remedial measure to address impacted groundwater at the subject site. The scope of work included: obtaining the necessary well installation permits from the Zone 7 Water Agency; preparing a site specific health and safety plan; drilling ten soil borings and installing monitoring wells in two borings and ten ozone microsparge points in remaining eight borings; surveying the wellhead elevations; developing and sampling the wells; collecting and submitting selected soil and groundwater samples to a certified analytical laboratory for chemical analysis; coordinating Tosco's contractor to dispose of the soil cuttings; installation of an ozone microsparge system; and preparing a report which presents the findings of the investigation. This work was originally proposed in GR's Work Plan for Installation of Monitoring Wells and Ozone Microsparging System, dated November 27, 2001, and approved by Ms. Eva Chu of the Alameda County Environmental Health Services (ACEHS) on November 29, 2001.

2.0 SITE DESCRIPTION

The subject site is an operating service station located on the southwest corner of the intersection of First Street (State Highway 84) and N Street in Livermore, California (Figure 1). The site is bounded to the north by First Street, to the east by N Street, and to the south and west by commercial buildings. Properties in the immediate site vicinity are used for a mix of commercial purposes that include restaurants, automobile repair shops, and shopping facilities. The site is located at an approximate elevation of 480 feet above mean sea level (MSL).

Current aboveground site facilities consist of four dispenser islands, a canopy and a station building/convenience store. Two 10,000-gallon gasoline USTs are located in a common pit on the east side of the site. Prior to this investigation, five groundwater monitoring wells were present at and in the site vicinity. Pertinent site features are shown on Figure 2.

3.0 PREVIOUS ENVIRONMENTAL WORK

On June 6, 1996, GeoStrategies, Inc. (GSI) collected six soil samples from beneath the fuel dispensers and along the product delivery piping during dispenser and piping replacement activities. A total of 25 cubic yards of soils was excavated and transported to Forward Landfill located in Manteca, California. Analytical results were reported as not detected (ND) for Total Petroleum Hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene and xylenes (BTEX) for all samples collected beneath the dispenser islands and product delivery piping (GSI, 1996).

On September 10, 1997, Pacific Environmental Group (PEG) conducted a soil gas survey as part of a baseline site evaluation associated with the property transfer from Unocal Corporation to Tosco. Six soil gas probes were advanced and samples collected at 3 or 15 feet bgs in the vicinity of the UST complex, dispenser islands, and product lines. Analytical results ranged from 41 to 4,500 parts per billion by volume (ppbv) of TPHg, ND to 110 ppbv of benzene and ND to 8,000 ppbv of MtBE. Field data sheets indicate that no petroleum hydrocarbon odors were noted. The area of highest soil vapor concentration appeared to be localized around the UST complex (PEG, 1997).

On April 8, 1998, GR reviewed files at the Alameda County Zone 7 Water Agency to identify water supply wells located within a one half mile radius from the site. Two municipal wells were identified approximately 1,500 and 1,800 feet northwest of the site, and two domestic wells were located approximately 1,900 and 2,800 feet southwest and west of the site.

On June 16, 1998, GR installed three 2-inch diameter groundwater monitoring wells designated as U-1 through U-3. The wells were installed to a depth of approximately 34 feet bgs. Soil samples collected from the three wells were reported as ND for TPHg, benzene, and MtBE.

In May of 2000, GR submitted a site conceptual model (SCM) for the site. In the SCM, GR calculated a groundwater flow velocity in order to determine the plume travel time to the nearest receptor. Groundwater velocity was calculated at 46 feet per year. Based on this calculation, the MtBE plume would be expected to reach the vicinity of the nearest sensitive receptor (municipal well) in approximately 33 years. The SCM concluded that hydrocarbon impact to groundwater appears to fluctuate with the historical rise and fall of the groundwater surface beneath the site.

On February 21, 2001, GR installed two 2-inch diameter offsite groundwater monitoring wells (U-4 and U-5) at the locations shown on Figure 2. The wells were installed to a depth of approximately 47 feet bgs. TPHg, BTEX or MtBE were not detected in any of the soil samples analyzed. TPHg or benzene were nondetectable in the groundwater samples analyzed from wells U-4 and U-5. Other than MtBE, fuel oxygenates were also nondetectable. MtBE was detected in groundwater

samples from both wells U-4 and U-5 at concentrations of 38.2 and 55.4 ppb, respectively, as analyzed by EPA Method 8260.

Groundwater monitoring and sampling of the wells was initiated in July of 1998, and has continued on a quarterly basis to the present time. Historically, groundwater flow directions have varied from north to southwest. However, according to Eva Chu of the ACEHS, based on monitoring conducted at other sites in the area, predominant groundwater flow for the site vicinity is toward the northwest. Depth to groundwater has varied from approximately 23 to 46 feet below top of casing. During the groundwater monitoring and sampling event performed on October 8, 2001, groundwater was reported to flow toward the northwest at a gradient of approximately 0.2 ft/ft. Strepgraduck

4.0 FIELD WORK

Field work was conducted in accordance with GR's Field Methods and Procedures (Appendix A) and the Site Safety Plan dated November 29, 2001. A drilling permit was obtained from the Zone 7 Water Agency (permit No. 21201). Underground Service Alert was notified as required prior to drilling at the site (reference No. 370598). In addition, Cruz Brothers, Inc., a private utility locating service, visited the site prior to drilling to check and clear the proposed boring locations.

4.1 Drilling Activities

On December 5 to 7, 2001, a GR geologist observed Cascade Drilling (C-57 #717510) advance ten onsite soil borings (U-6, U-7 and SP-1 through SP-8) at the locations shown on Figure 2. The two monitoring wells and eight of the ozone microsparge points were drilled to a depth of 45 feet bgs, and two of the sparge points were drilled to a depth of 25 feet bgs, using 8-inch hollow-stem augers driven by a truck-mounted drill rig. Soil samples were collected every 5 feet from the well borings. The remainder of the borings were drilled with a wooden plug installed in the auger bit. The GR geologist prepared a log of each boring and field screened the soil samples for the presence of volatile organic compounds utilizing a photoionization detector (PID). Field screening data are presented on the boring logs (Appendix B).

Upon completion of soil sampling, the well borings were converted to groundwater monitoring ubout wells by the installation of 2-inch diameter poly-vinyl chloride (PVC) well casing through the hollow-stem augers. The well casing consisted of blank PVC casing from the ground surface to 35 feet bgs, and 0.020-inch machine slotted PVC well screen from 35 feet to 45 feet bgs. Lonestar # 3 sand was installed in the annular space from the bottom of the boring to two feet above the top of the screened interval (33 feet bgs). The well was then sealed with hydrated bentonite followed by neat cement containing approximately 5% bentonite to a depth of 1.5 feet bgs. The remainder of the annular space was filled with concrete and a steel, water-resistant, traffic-rated well box. An

expandable locking well cap was placed on the top of the PVC casing and secured with a lock. Well construction details are presented on the boring logs in Appendix B.

Borings SP-1 through SP-8 were completed as sparge points with the installation of 2-inch diameter KVA sparge points attached to ¾-inch blank schedule 80 PVC casing through the hollow-stem augers. The sparge points are composed of 30-inch long microporous plastic. Sparge points SP-1 through SP-4 were installed to a depth of 45 feet bgs. Sparge points SP-6S and SP-7S were installed to a depth of 25 feet bgs. The remaining two sparge locations contained nested sparge points SP-5, SP-5S SP-8 and SP-8S installed to 25 and 45 feet bgs in each boring, respectively. The nested sparge points were separated vertically by approximately 14 feet of bentonite. Lonestar # 2/16 sand was installed in the annular space from the bottom of the boring to one foot above the top of the sparge point. The remainder of the annular space in each boring was then sealed with hydrated bentonite followed by neat cement to a depth of approximately 1 foot bgs. A steel, waterproof, traffic-rated well box was set into the ground around each well head with concrete. Sparge point construction details are presented on the boring logs in Appendix B.

Drill cuttings were placed in a closed-top roll-off soil bin, and transported by Onyx Industrial Services Inc. (Onyx) to Allied Waste's Forward Landfill in Manteca, California, on December 8, 2001. The soil cuttings were accepted at the landfill under a previous profile number, obtained during the monitoring well installation performed in February of 2001.

4.2 Well Monitoring, Development, and Sampling

Monitoring, development, and sampling of the two newly installed wells was performed by GR personnel during the regularly scheduled quarterly monitoring and sampling event at the site. Copies of the well development and field monitoring data sheets are included in Appendix C. Monitoring data for the two new wells are summarized in Table 1.

Wells U-6 and U-7 were developed and sampled on January 3, 2002. Depth to groundwater in the wells were measured and each well checked for the presence of floating product prior to development. Floating product was not observed in the two wells. None of the wells dewatered during development and each yielded a minimum of 10 well volumes. Immediately after the wells were properly developed, groundwater samples were collected in appropriate containers supplied by the laboratory. Groundwater samples were submitted for chemical analysis under chain-of-custody documentation to Sequoia Analytical in Walnut Creek, California.

4.3 Wellhead Survey

Following installation of the wells, the well casing elevations were surveyed by Virgil Chavez Land Surveying of Vallejo, California (California Land Surveyor No. 6323). Top of casing and vault box elevations were measured relative to MSL, and the horizontal locations of the wells were measured by global positioning system (GPS). Well casing elevation data are presented in Table 1. A copy of the surveyor's report is included in Appendix D.

4.4 Interim Remedial Action

As an interim remedial action measure GR installed a K-V Associates, Inc. (KVA) "C-SpargeTM" ozone microsparging system. Ozone microsparging is a process where ozone in air is introduced into the groundwater at low flow rates (2-6 cubic feet per minute) through specially designed spargers to create small "microbubbles." As these microbubbles rise within the column of water, the VOCs are rapidly oxidized.

Ten KVA sparge points were installed at locations shown on Figure 2. Four sparge points were installed to a depth of 25 feet bgs, and six sparge points were installed to a depth of 45 feet bgs. Sparge point construction details are presented on the boring logs in Appendix B.

The C-SpargeTM panel was mounted on the trash enclosure. The panel includes an ozone generator, air compressor, and a programmable timer/controller. Sparge points are connected to the panel by 3/8" LDPE tubing. Each sparge point has a dedicated line. The tubing was run through schedule 80 PVC conveyance piping for added protection. The process flow diagram is presented as Figure 5.

4.5 Ozone Microsparge System Startup

The system was placed into operation in December of 2001. The system cycles ozone/air injection between the ten sparge points. The schedule is currently set to cycle through each point 16 times per day, for between 5 and 15 minutes per point per cycle. The schedule can be varied as part of the system evaluation process.

4.6 Ozone Microsparge System Operation and Maintenance and Reporting

System operation and maintenance (O&M) will be performed weekly for the first month, then twice monthly. A system status report will be issued after the first six months of operation, presenting the results of the sampling program. At that time, the effectiveness of the system will be evaluated. The routine groundwater monitoring and sampling data will be utilized to prepare the system evaluation.

5.0 RESULTS

5.1 Subsurface Conditions

Detailed descriptions of the subsurface materials encountered during drilling are presented on the boring logs in Appendix B. In general, the first 25 feet bgs were composed of gravel and sand, underlain by clay to a depth of approximately 35 feet bgs. The clay was underlain by sand and gravel to approximately 41 feet bgs, where clay was again encountered to the maximum explored depth of 46.5 feet bgs. Groundwater was first encountered at 20 feet bgs, and again at 31 feet bgs. The first encountered groundwater at 20 feet bgs was only observed in one boring (U-7), and may represent a localized perched zone.

5.2 Laboratory Analysis

The discrete soil samples collected from the two well borings and the groundwater samples collected from the developed wells were analyzed by Sequoia Analytical in Walnut Creek, (ELAP No. 1271) and San Carlos, California (ELAP No. 2360). The soil and groundwater samples were analyzed for: TPHg by EPA Method 8015 modified; BTEX and MtBE by EPA Method 8021; the fuel oxygenates tertiary butyl alcohol (TBA), ethyl tertiary-butyl ether (ETBE), tertiary-amyl methyl ether (TAME), di-isopropyl ether (DIPE), MtBE, and lead scavengers 1,2-dichloroethane (1,2-DCA) and 1,2-dibromoethane (EDB) by EPA Method 8260B. Copies of laboratory analytical reports and chain-of-custody records are included in Appendix E.

5.3 Groundwater Analytical Results

TPHg and benzene were detected in both of the groundwater samples analyzed from the two new wells, at concentrations of 5,000 ppb and 36 ppb (U-6) and 3,100 ppb and 93 ppb (U-7), respectively. The laboratory reported that the detected TPHg is weathered gasoline in the C6-C12 range. MtBE and the other fuel oxygenates were nondetectable in well U-6. MtBE and TBA were the only fuel oxygenates detected in the groundwater sample from well U-7 at concentrations of 130 and 30 ppb, respectively, as analyzed by EPA Method 8260. Groundwater chemical data are summarized in Table 1.

5.4 Soil Analytical Results

The laboratory reported that all analytes were below the laboratories reporting limits. Soil chemical data are summarized in Table 2.

5.5 Waste Disposal

Approximately 55 gallons of waste water generated by cleaning the drilling equipment and well development and sampling procedures were removed from the site by GR on January 3, 2002, and transported to the Tosco Refinery in Rodeo, California, for treatment and disposal. On December 8, 2001, Onyx Industrial Services of Benicia, California transported 9.87 tons of soil (drill cuttings) to the Allied Waste Inc. (Allied) Forward landfill facility in Manteca, California for disposal.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This work was performed to facilitate the installation of a petroleum hydrocarbon remediation system. The ozone microsparging system will be inspected on a twice monthly schedule to conduct operation and maintenance activities. The system operation will be enhanced and maintained as needed. The progress sampling will be coordinated with the regular scheduled quarterly monitoring and sampling program at the site. After the first six months of system operation (2nd quarter, 2002), a progress report will be issued, and future progress reports will be prepared on a semi-annual basis. The remedial system effectiveness will be evaluated after six months, and recommendations, if any, will be made at that time.

GR recommends that the two new monitoring wells be added to the quarterly monitoring and sampling program and sampled for the next four consecutive quarters. It is anticipated that the dissolved hydrocarbons detected in the two new wells will decrease with continued operation of the remediation system.

7.0 REFERENCES

- Gettler-Ryan Inc., 2001, Groundwater Monitoring and Sampling Report, Fourth Quarter Event of October 8, 2001, Tosco (Unocal) Service Station #4186, 1771 First St., Livermore, California, dated November 26, 2001.
- ..., 2001, Monitoring Well Installation Report, Tosco (Unocal) Service Station No. 4186, 1771 First Street, Livermore, California, dated June 4, 2001.
- ..., 2000, Site Conceptual Model for Tosco (76) Service Station No. 4186, located at 1771 First Street, Livermore, California, dated May 12, 2000.
- ..., 1998, Well Installation Report, Tosco (Unocal) Service Station No. 4186, 1771 First Street, Livermore, California, dated November 23, 1998.
- ..., 1998, Well Search Unocal Service Station No. 4186, 1771 1st Street, Livermore, California, dated April 8, 1998.
- Pacific Environmental Group, 1997, Soil Gas Survey Results Report, Unocal Service Station No. 4186, 1771 1st Street, Livermore, California, dated October 29, 1997.
- GeoStrategies, Inc., 1996, Product Line Replacement Report, Unocal Service Station No. 4186, 1771 First Street, Livermore, California, dated August 7, 1996.
- U.S. Geological Survey, 1961, Livermore Quadrangle, California, 7.5 Minute Series (Topographic): Scale 1:24,000, photorevised 1980.

TABLE 1 - GROUNDWATER MONITORING AND CHEMICAL ANALYTICAL DATA

Tosco (76) Service Station No. 4186

1771 First Street Livermore, California

Sample No.	Sample Date	Total Well Depth (ft.)	Well ¹ Elev. (ft. MSL)	Depth to Water (ft.)	Floating Product (ft.)	Ground Water Elevation (ft. MSL)	TPHg (ppb)	Benzene (pph)	Toluene (ppb)	Ethyl- benzene (ppb)	Total Xylenes (ppb)	MtBE ² (ppb)
U-6	1/3/02	44.65	478.38	33.99	0.0	444.39	5,000 4	36	<25	260	450	<250
U-7	1/3/02	44.45	478.74	32,43	0.0	446.31	3,100 4	93	<10	35	73	140
		MTBE ³ (ppb)	TBA (ppb)	DIPE (ppb)	ETBE (ppb)	TAME (ppb)	1,2-DCA (ppb)	1,2-DBA (ppb)	Ethanol (ppb)			
U-6 ⁵	1/3/02	<10	<200	<10	<10	<10	<10	<10	<5000			
U-7	1/3/02	130	30	<1.0	<1.0	<1.0	<1.0	<1.0	<500			

EXPLANATION:

ANALYTICAL LABORATORY:

ft. = feet

ft. MSL = feet relative to Mean Sea Level.

ppb = parts per billion

Sequoia Analytical San Carlos, CA (ELAP #2360)

¹ Well elevations reported as top of casing (TOC) surveyed by Virgil Chavez, Licensed California Land Surveyor No. 6323.

ANALYTICAL METHODS:

⁵ The reporting limits for this sample have been raised due to high levels of non-target interferents (sic)

TPHg = Total Petroleum Hydrocarbons as gasoline according to EPA Method 8015 Modified

Benzene, Toluene, Ethylbenzene, and Total Xylenes according to EPA Method 8021

MtBE = Methyl tertiary butyl ether according to EPA Method 8021/8260

TBA = tertiary butyl alcohol according to EPA Method 8260

DIPE = di-isopropyl ether according to EPA Method 8260

ETBE = ethyl tertiary butyl ether according to EPA Method 8260

TAME = tertiary amyl methyl ether according to EPA Method 8260

1,2-DCA = 1,2-Dichloroethane according to EPA Method 8260

1,2-DBA = 1,2-Dibromoethane according to EPA Method 8260

Ethanol according to EPA Method 8260

² MtBE by EPA Method 8021

³ MtBE by EPA Method 8260

⁴Chromatogram pattern: weathered gasoline C6-C12

TABLE 2 - SOIL CHEMICAL ANALYTICAL DATA

Tosco (76) Service Station No. 4186 1771 First Street Livermore, CA

Sample ID	Sample Depth (feet)	Date Collected	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl- benzene (ppm)	Total Xylenes (ppm)	MTBE by 8021 (ppm)	MTBE by 8260 (ppm)	TBA (ppb)	DIPE (ppb)	ETBE (ppb)	TAME (ppb)	1,2-DCA (ppb)	1,2-DBA (ppb)
U6-25	25	12/7/01	<1.00	<0.005	< 0.005	< 0.005	< 0.005	< 0.05	<0.20	<2.5	< 0.10	< 0.10	<0.10	<0.10	< 0.20
U6-30	30	12/7/01	<1.00	<0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.20	<2.5	<0.10	<0.10	<0.10	< 0.10	<0.20
U7-15	15	12/7/01	<1.00	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	<0.20	<2.5	< 0.10	<0.10	< 0.10	< 0.10	<0.20
U7-25	25	12/7/01	<1.00	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	<0.20	<2.5	< 0.10	<0.10	< 0.10	< 0.10	< 0.20

EXPLANATION:

ANALYTICAL LABORATORY

Seguoia Analytical Walnut Creek, CA (ELAP No. 1271)

feet = feet below ground surface

ppm = parts per million

<1.00 = not detected at or below laboratories reporting limit

ANALYTICAL METHODS:

TPHg = Total Petroleum Hydrocarbons as gasoline according to EPA Method 8015 Modified

Benzene, Toluene, Ethylbenzene, and Total Xylenes according to EPA Method 8021

MtBE = Methyl tertiary butyl ether according to EPA Method 8021/8260

TBA = tertiary butyl alcohol according to EPA Method 8260

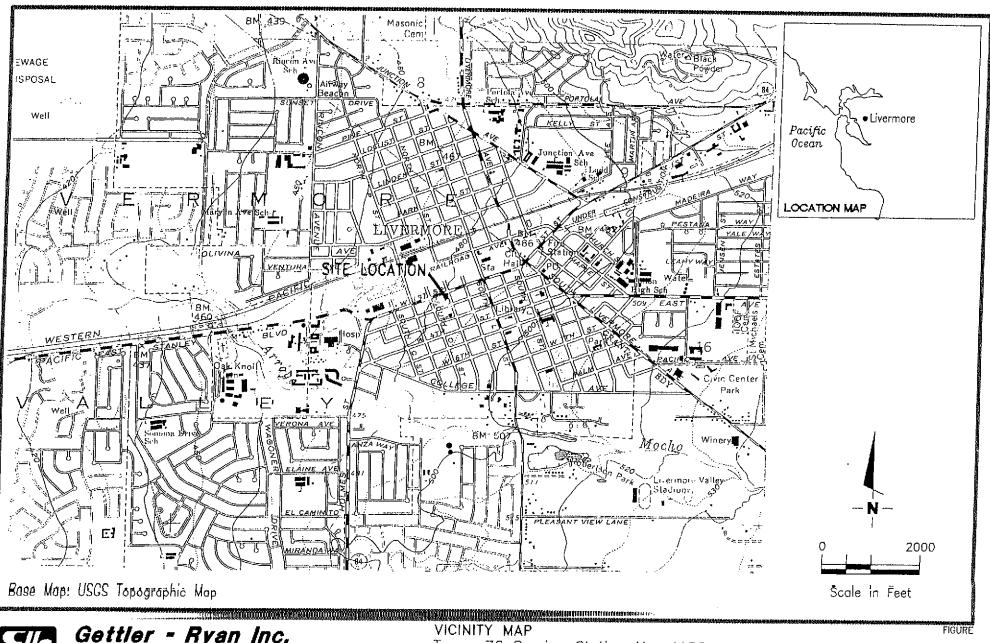
DIPE = di-isopropyl ether according to EPA Method 8260

ETBE = ethyl tertiary butyl ether according to EPA Method 8260

TAME = tertiary amyl methyl ether according to EPA Method 8260

1,2-DCA = 1,2-Dichloroethane according to EPA Method 8260

1,2-DBA = 1,2-Dibromoethane according to EPA Method 8260





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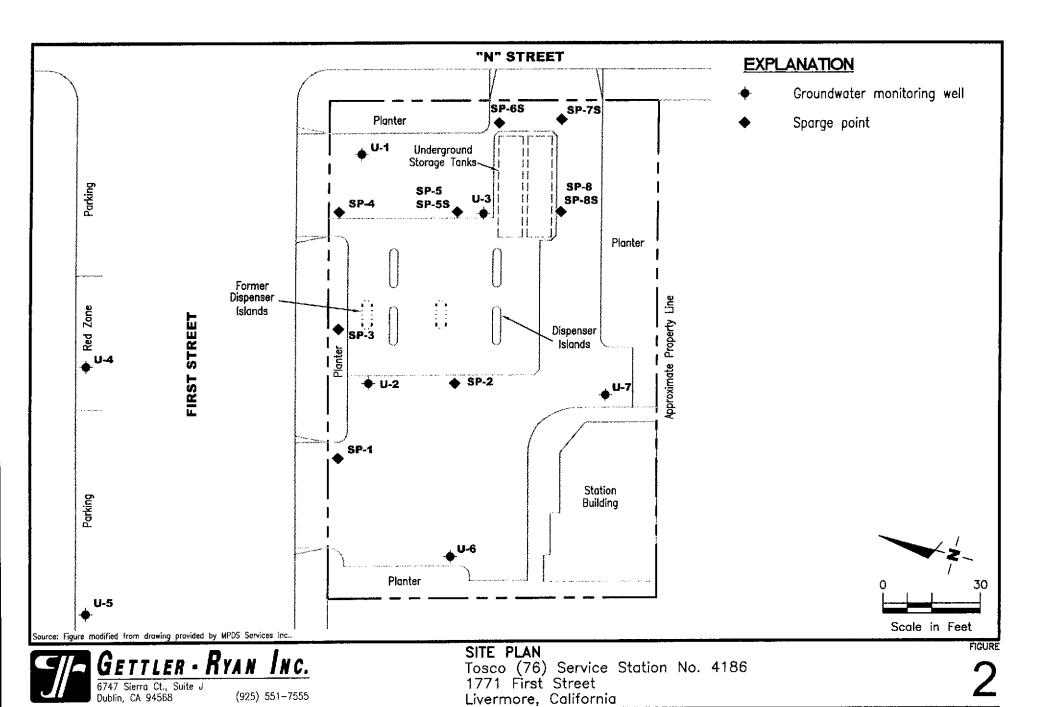
(925) 551-7555

Tosco 76 Service Station No. 4186 1771 First Street Livermore, California

DATE 4/00

REVISED DATE

JOB NUMBER 140175



DATE 12/01

REVISED DATE

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APPENDIX A GR FIELD METHODS AND PROCEDURES

GETTLER-RYANINC. FIELD METHODS AND PROCEDURES

Site Safety Plan

Field work performed by Gettler-Ryan Inc. (GR) is conducted in accordance with GR's Health and Safety Plan and the Site Safety Plan. GR personnel and subcontractors who perform work at the site are briefed on the of these plans contents prior to initiating site work. The GR geologist or engineer at the site when the work is performed acts as the Site Safety Officer. GR utilizes a photoionization detector (PID) to monitor ambient conditions as part of the Health and Safety Plan.

Collection of Soil Samples

Exploratory soil borings are drilled by a California-licensed well driller. A GR geologist is present to observe the drilling, collect soil samples for description, physical testing, and chemical analysis, and prepare a log of the exploratory soil boring. Soil samples are collected from the exploratory soil boring with a split-barrel sampler or other appropriate sampling device fitted with clean brass or stainless steel liners. The sampling device is driven approximately 18 inches with a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler each successive 6 inches is recorded on the boring log. The encountered soil is described using the Unified Soil Classification System (ASTM 2488-84) and the Munsell Soil Color Chart.

After removal from the sampling device, soil samples for chemical analysis are covered on both ends with Teflon sheeting or aluminum foil, capped, labeled, and placed in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Samples are selected for chemical analysis based on:

- a. depth relative to underground storage tanks and existing ground surface
- b. depth relative to known or suspected groundwater
- c. presence or absence of contaminant migration pathways
- d. presence or absence of discoloration or staining
- e. presence or absence of obvious gasoline hydrocarbon odors
- f. presence or absence of organic vapors detected by headspace analysis

Field Screening of Soil Samples

A PID is used to perform head-space analysis in the field for the presence of organic vapors from the soil sample. This test procedure involves removing some soil from one of the sample tubes not retained for chemical analysis and immediately covering the end of the tube with a plastic cap. The PID probe is inserted into the headspace inside the tube through a hole in the plastic cap. Head-space screening results are recorded on the boringlog. Head-space screening procedures are performed and results recorded as reconnaissance data. GR does not consider field screening techniques to be verification of the presence or absence of hydrocarbons.

Stockpile Sampling

Stockpile samples consist of four individual sample liners collected from each 100 cubic yards (yd³) of stockpiled soil material. Four arbitrary points on the stockpiled material are chosen, and discrete soil sample is collected at each of these points. Each discrete stockpile sample is collected by removing the upper 3 to 6 inches of soil, and then driving the stainless steel or brass tube into the stockpiled material with a wooden mallet or hand driven soil sampling device. The sample tubes are then covered on both ends with Teflon sheeting, capped, labeled, placed in the cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Stockpiled soils are covered with plastic sheeting after completion of sampling.

Construction of Monitoring Wells

Monitoring wells are constructed in the exploratory borings with Schedule 40 polyvinyl Chloride (PVC) casing. All joints are thread-joined; no glues, cements, or solvents are used in well construction. The screened interval is constructed of machine-slotted PVC well screen which generally extends from the total well depth to a point above the groundwater. An appropriately-sized sorted sand is placed in the annular space adjacent to the entire screened interval. A bentonite transition seal is placed in the annular space above the sand, and the remaining annular space is sealed with neat cement or cement grout.

Wellheads are protected with water-resistant traffic rated vault boxes placed flush with the ground surface. The top of the well casing is sealed with a locking cap. A lock is placed on the well cap to prevent vandalism and unintentional introduction of materials into the well.

Storing and Sampling of Drill Cuttings

Drill cuttings are stockpiled on plastic sheeting or stored in drums depending on site conditions and regulatory requirements. Stockpile samples are collected and analyzed on the basis of one composite sample per 50 cubic yards of soil. Stockpile samples are composed of four discrete soil samples, each collected from an arbitrary location on the stockpile. The four discrete samples are then composited in the laboratory prior to analysis.

Each discrete stockpile sample is collected by removing the upper 3 to 6 inches of soil, and then driving the stainless or brass sample tube into the stockpiled material with a hand, mallet, or drive sampler. The sample tubes are then covered on both ends with Teflon sheeting, capped, labeled, and placed in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Stockpiled soils are covered with plastic sheeting after completion of sampling.

Wellhead Survey

The top of the newly-installed well casing is surveyed by a California-licensed Land Surveyor to mean sea level (MSL).

Well Development

The purpose of well development is to improve hydraulic communication between the well and surrounding aquifer. Prior to development, each well is monitored for the presence of separate-phase hydrocarbons and the depth-to-water is recorded. Wells are then developed by alternately surging the well with the bailer, then purging the well with a pump to remove accumulated sediments and draw groundwater into the well. Development continues until the groundwater parameters (temperature, pH, and conductivity) have stabilized.

Groundwater Monitoring and Sampling

Decontamination Procedures

All physical parameter measuring and sampling equipment are decontaminated prior to sample collection using Alconox or equivalent detergent followed by steam cleaning with deionized water. During field sampling, equipment placed in a well are decontaminated before purging or sampling the next well by cleaning with Alconox or equivalent detergent followed by steam cleaning with deionized water.

Water-Level Measurements

Prior to sampling each well, the static water level is measured using an electric sounder and/or calibrated portable oil-water interface probe. Both static water-level and separate-phase product thickness are measured to the nearest ± 0.01 foot. The presence of separate-phase product is confirmed using a clean, acrylic or polyvinylchloride (PVC) bailer, measured to the nearest ± 0.01 foot with a decimal scale tape. The monofilament line used to lower the bailer is replaced between borings with new line to preclude the possibility of cross-contamination. Field observations (e.g. product color, turbidity, water color, odors, etc.) are noted. Water-levels are measured in wells with known or suspected lowest dissolved chemical concentrations to the highest dissolved concentrations.

Sample Collection and Labeling

A temporary PVC screen is installed in the boring to facilitate a grab groundwater sample collection. Samples of groundwater are collected from the surface of the water in each well or boring using the Teflon bailer or a pump. The water samples are then gently poured into laboratory-cleaned containers and sealed with Teflon-lined caps, and inspected for air bubbles to check for headspace. The samples are then labeled by an adhesive label, noted in permanent ink, and promptly placed in an ice storage. A Chain-of-Custody Record is initiated and updated throughout handling of the samples, and accompanies the samples to the laboratory certified by the State of California for analyses requested.

APPENDIX B PERMITS AND BORING LOGS



ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588-5127 VOICE (925) 484-2600 X235 FAX (925) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE	FOR OFFICE
LOCATION OF PROJECT TOSCO 76 STETION #4186	DEDUIT NUMBER 21201
Livernore CA	PERMIT NUMBER
	THE THOUSE IN THE PARTY OF THE
California Coordinates Source ft. Accuracy± ft. CCN ft. CCE ft. APN 77-60-6-7-7	PERMIT CONDITIONS
CLIENT TOSCO Corporation Name TOSCO Corporation Address 2000 Crow Canyon Pl. Phone 925-2772384 City San Remon Zip 94583	Circled Permit Requirements Apply A. GENERAL 1. A permit application should be submitted so as to arrive at the
APPLICANT GETTLER-RYON INC. Name Sed Dougles Fax 707 789.32/8 Address 1369 N. Melowell Birl Phone 707 789.3255 City Pet alune CA Zip 949.54 TYPE OF PROJECT	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.
Well Construction Geotechnical Investigation Cathodic Protection General Water Supply Contamination Monitoring Well Destruction	WATER SUPPLY WELLS Minimum surface seal thickness is two inches of cement grout placed by tremie. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth
PROPOSED WATER SUPPLY WELL USE New Domestic	is specially approved. 3. An access port at least 0.5 inches in diameter is required on the wellhead for water level measurements. 4. A sample port is required on the discharge pipe near the wellhead.
DRILLING METHOD: Mud Rotary	GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS Minimum surface seal thickness is two inches of cement grout placed by tremie.
DRILLER'S LICENSE NO. 717-510	2. Minimum seal depth for monitoring wells is the maximum depth
WELL PROJECTS Drill Hote Diameter 8 in. Maximum Casing Diameter 3/4 in. Depth 45 ft. Surface Seal Depth 70 ft. Number 70	practicable or 20 feet. D. 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. E. CATHODIC. Fill hole above anode zone with concrete placed by
GEOTECHNICAL PROJECTS Number of Borings Maximum Hole Diameter in. Depth ft.	tremie. F. WELL DESTRUCTION. See attached. G. SPECIAL CONDITIONS
ESTIMATED STARTING DATE 12-5-01 ESTIMATED COMPLETION DATE 12-7-01	W if
I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68. APPLICANT'S SIGNATURE Date 11-5-01	Approved Wyman Hong Date 11/14/01 8/6/99

	MAJOR DIV	ISIONS			TYPICAL NAMES
	GRAVELS	CLEAN GRAVELS		GW	Well graded gravels with or without sand, little or no fines
SIEVE	MORE THAN HALF	WITH LITTLE OR NO FINES		GP	Poorly graded gravels with or without sand, little or no fines
SOILS No. 200	COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	GRAVELS WITH		GM	Silty gravels, silty gravels with sand
		OVER 15% FINES		GC	Clayey gravels, clayey gravels with sand
COARSE—GRAINED AN HALF IS COARSER THAN		CLEAN SANDS		SW	Well graded sands with or without gravel, little or no fines
COARS	SANDS MORE THAN HALF	WITH LITTLE OR NO FINES		SP	Poorly graded sands with or without gravel, little or no fines
MORE TH	COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	Sands with		SM	Silty sands with or without gravel
		OVER 15% FINES		SC	Clayey sands with or without gravel
SIEVE	SEVE			ML	Inorganic silts and very fine sands, rock flour, silts with sands and gravels
SOILS NO. 200	SILTS AN			CL	Inorganic clays of low to medium plasticity, clays with sands and gravels, lean clays
-GRAINED SOI	UQUID UMIT J	UA UR LESS		OL	Organic silts or clays of low plasticity
<u>ο</u> ν	SILTS AN	D CLAYS	Щ	МН	Inorganic silts, micaceous or diatomaceous, fine sandy or silty soils, elastic silts
FINE-	LIQUID LIMIT GRE	ATER THAN 50%		СН	Inorganic clays of high plasticity, fat clays
MORE .				ОН	Organic silts or clays of medium to high plasticity
Н	C SOILS		PT	Peat and other highly organic soils	
	PID Volatile	vapors in ppm			Observed contact
(2.5YR 6/2) Soil color according to Soil Color Charts (199 BLOWS/FT. Sample drive hammer					— — — Inferred contact
				•	No soil sample recovered
BLC	140 pc	e drive hammer ounds falling 30	inches		"Undisturbed" sample
		required to drive are indicated o			
	1 1000	are maleuted 0		oyo.	▼ Static groundwater level
			_	Т	UNIFIED SOIL CLASSIFICATION



UNIFIED SOIL CLASSIFICATION
ASTM D 2488-85
AND
KEY TO SAMPLING DATA

RTED: ISHED METHI COMPA * 11/SM018	.: 14017. : 12/06/ :: 12/06/ OD: 8 in.	01	em Aug	Asphalt and ba	WL (ft. bgs): DATE: TOTAL DEPTH: 46.5 feet GEOLOGIST: Jed Douglas GEOLOGIC DESCRIPTION	
ISHED: ISHED METHU COMP/ * 1.1/SM0/18	: 12/06/ I: 12/06/ OD: 8 in. ANY: Ca. SYMBEE U-6-5	01 '01 Hollow St scade Drill	SOIL CLASS	Asphalt and ba	WL (ft. bgs): 31.5 DATE: 12/06/01 WL (ft. bgs): DATE: TOTAL DEPTH: 46.5 feet GEOLOGIST: Jed Douglas GEOLOGIC DESCRIPTION	TIME: 04:40
METHO COMPA * 1.14/SMO/18	1: 12/06/ OD: 8 in. ANY: Ca. U-6-5	'01 Hollow St scade Drill	SOIL CLASS	Asphalt and ba	WL (ft. bgs): DATE: TOTAL DEPTH: 46.5 feet GEOLOGIST: Jed Douglas GEOLOGIC DESCRIPTION	TIME.
METHO COMP/ * THO NETHO	OD: 8 in. ANY: Ca. SAMPLE NUMBER 0-6-5	Hollow St scade Drill	SOIL CLASS	Asphalt and ba	TOTAL DEPTH: 46.5 feet GEOLOGIST: Jed Douglas GEOLOGIC DESCRIPTION	
BLOWS/FT. *	SAMPLE NUMBER	scade Drill	SOIL CLASS	Asphalt and ba	GEOLOGIST: Jed Douglas GEOLOGIC DESCRIPTION	WELL DIAGRAM
V BLOWS/FT. *	SAMPLE NUMBER		SOIL CLASS	Asphalt and ba	GEOLOGIC DESCRIPTION	WELL DIAGRAM
V BLOWS/FT.	U-6-5	SAMPLE INT	SOIL	Asphalt and ba		WELL DIAGRAM
			GW	WELL-GRADED	se rock.	A CONTRACTOR OF THE PARTY OF TH
		•				12772
>100	U-6-10	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		subangular to r coarse sand.	GRAVEL WITH SAND (GW) - dark brown , very dense; 50% fine to coarse ounded gravel to 3 cm, 50% fine to	
				to coarse grav	to brown (10YR 4/3); becomes 70% fine el, 30% fine to coarse sand.	
>100	U-6-15	-	5W		SAND WITH GRAVEL (SW) – brown y, very dense; 70% fine to coarse sand, l.	biank schedule 40 PVC
48	U-6-20		CL	Color changes becomes moist, fine to coarse	to dark yellowish brown (10YR 4/4), dense, 70% fine to coarse sand, 30% gravel to 3 cm.	2 blank sc
39	U-6-25		55:	CLAY (CL) – d hard, low plasti sand.	ark yellowish brown (10YR 4/6), moist icity; 80% clay, 20% fine to coarse	
57	U-6-30					
54	U-6-35	- 1//				
50			SW-SC	(SW-SC) - oliv dense; 50% fin	ve gray (5Y 4/2), saturated, very e to coarse	2" machine slotted PVC (0.020 imch) - - - - - - - - - - - -
			CL			2. mach
50				Becomes satur	rated.	111111 X
				Bottom of bori	ing at 46.5 feet bgs.	deo
				(* = Converte blows/foot.)	ed to equivalent standard penetration	Ğ
	54	54 U-6-35	54 U-6-35 1 50	54 U-6-35 SW-SC 50 CL	SW-SC WELL-GRADED (SW-SC) - olin dense; 50% fin gravel, 10% classical dense; 50% fin gravel, 10% fin gravel, 10% classical dense; 50% fin gravel, 10% fin gra	SW-SC WELL-GRADED SAND WITH GRAVEL AND CLAY (SW-SC) - olive gray (5Y 4/2), saturated, very dense; 50% fine to coarse sand, 40% fine to coarse gravel, 10% clay. CL CLAY (CL) - olive brown (2.5Y 4/4), moist, hard, medium plasticity; 80% clay, 20% fine sand. Becomes saturated. Bottom of boring at 46.5 feet bgs. (* = Converted to equivalent standard penetration)

Gettler-Ryan, Inc.									Log of Boring U-7			
ROJE	CT:	Tosc	o (76) S	ervi	ce St	ation N	Vo. 41	186	LOCATION: 177	'1 First Street, Live	rmore, CA	
R PRO	OJECI	۲ NO.	: 14017:	5.07					CASING ELEVAT	ΓΙΟΝ: <i>478.74 Ft</i> .	(MSL)	
DATE	STAR	TED:	12/06/	01					WL (ft. bgs): 20	DATE: 12/06/01	TIME: /.	3:05
DATE	FINIS	SHED:	: 12/06/	'01					WL (ft. bgs):	DATE:	TIME:	
RILLI	ING M	ETHO	00: <i>8 in.</i>	Ho	llow S	tem Au	iger		TOTAL DEPTH:	46.5 feet		
RILLI	ING C	OMPA	NY: Ca	5080	de Dri	lling			GEOLOGIST: J	ed Douglas		
(feet)	PID (ppm)	BLOWS/FT, ₩	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS			GEOLOGIC DESCRIPT	ION	W	ELL DIAGRAM
8-		>100				GW		gravish brown	ie rock. GRAVEL WITH SAND 10YR 3/2), dry, very II, 50% fine to coarsi	dense; 50% fine	T C	
	0	>100	U-7-10	-					o brown (10YR 4/3).			
16	a	>100	U-7-15	-		SW		yellowish brown	SAND WITH GRAVEL (10YR 4/4), dry, ve , 30% fine to coarse	ry dense; 70% fine	blank schedule 40 PVC	IIII
	0	>100	U-7-20				Ā	coarse gravel t			2" blank so	
24-	0	51	U-7-25	J		CL		CLAY (CL) – da hard, low plasti	ark yellowish brown l city; 90% clay, 10% fi	(10YR 4/4), dry, ne sand.		
32-	0	52	U-7-30					Becomes wet, r	nedium plasticity; iro	n oxide staining.		
	0	47	U-7-35	2		SW		yellowish brown	SAND WITH GRAVEL (10YR 4/4), wet, ve i, 30% fine to coarse	ery dense; 70% fine	pe fu	Sand —
40-	349	49				GW		yellowish brown 60% fine to co- sand.		ted, very dense; 40% fine to coarse	machine slotted	
	558	52						medium plastici	ght olive brown (2.5° ty; 90% clay, 10% fin	e sand.	2 ma	174
48-	(555)				///			with very dark Boltom of bori	to light olive brown gray (N3). ng at 46.5 feet bgs. d to equivalent stan		сер	

Gett	der-Ryan, Inc.	Log of Boring SP-1	
ROJECT: Tosc	co (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermore, CA	
R PROJECT NO.	: 140175.07	CASING ELEVATION:	
ATE STARTED:	12/07/01	WL (ft. bgs): DATE: TIME:	
ATE FINISHED	: 12/07/01	WL (ft. bgs): DATE: TIME:	
RILLING METHO	DD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet	
RILLING COMPA	NY: Cascade Drilling	GEOLOGIST: Jed Douglas	
(feet) GRAPHIC LOG SOIL CLASS	GEOLOG1	C DESCRIPTION WELL DIA	AGRAM
GW 8	Asphalt and base rock. WELL-GRADED GRAVEL WITH SAND (I dense; 50% fine to coarse subangular coarse sand.	GW) - dark brown (10YR 3/2), dry, very to rounded gravel to 3 cm, 50% fine to	Trimerin .
sw	WELL-GRADED SAND WITH GRAVEL (70% fine to coarse sand, 30% fine gra	SW) - brown (10YR 4/3), dry, very dense; avel. 270 08 appropriate the strength of the strengt	neat cement
24- CL	CLAY (CL) — dark yellowish brown (10 20% fine to coarse sand.	IYR 4/4), moist hard, low plasticity; 80% clay,	
SW-S(WELL-GRADED SAND WITH GRAVEL A saturated, very dense; 50% fine to c clay.	ND CLAY (SW-SC) - brown (10YR 4/3), parse sand, 40% fine to coarse gravel, 10%	***
40	CLAY (CL) - olive brown (2.5Y 4/4), fine sand.	moist, hard, medium plasticity; 80% clay, 20%	*
48-	Bottom of boring at 45 feet bgs.		

Gettler-Ryan, Inc.	Log of Boring SP-2
ROJECT: Tosco (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermore, CA
R PROJECT NO.: 140175.07	CASING ELEVATION:
ATE STARTED: 12/07/01	WL (ft. bgs): DATE: TIME:
ATE FINISHED: 12/07/01	WL (ft. bgs); DATE: TIME:
RILLING METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet
RILLING COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas
SOIL CLASS SOIL CLASS	WELL DIAGRAM TO DESCRIPTION
Asphalt and base rock.	(GW) - dark brown (10YR 3/2), dry, very
coarse sand.	r to rounded gravel to 3 cm, 50% fine to
70% fine to coarse sand, 30% fine gra	(SW) - brown (10YR 4/3), dry, very dense; avel. OVR 4/4), moist hard, low plasticity; 80% clay.
CL CLAY (CL) – dark yellowish brown (10 20% fine to coarse sand.	IOYR 4/4), moist hard, low plasticity; 80% clay,
SW-SC WELL-GRADED SAND WITH GRAVEL A saturated, very dense; 50% fine to c clay.	AND CLAY (SW-SC) - brown (10YR 4/3), coarse sand, 40% fine to coarse gravel, 10%
	, moist, hard, medium plasticity; 80% clay, 20%
Bottom of boring at 45 feet bgs.	
56-	

Gettler-Ryan, Inc.	Log of Boring SP-3
OJECT: Tosco (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermore, CA
R PROJECT NO.: 140175.07	CASING ELEVATION:
ATE STARTED: 12/06/01	WL (ft. bgs): DATE: TIME:
ATE FINISHED: 12/06/01	WL (ft. bgs): DATE: TIME:
RILLING METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet
RILLING COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas
GRAPHIC LOG SOIL CLASS	OGIC DESCRIPTION
Topsoil.	3 (GW) - dark brown (10YR 3/2), dry, very
coarse sand.	ular to rounded gravel to 3 cm, 50% fine to L (SW) - brown (10YR 4/3), dry, very dense;
6 70% fine to coarse sand, 30% fine	Stanel 2V9 08 PVC
CL CLAY (CL) - dark yellowish brown 20% fine to coarse sand.	
SW-SC WELL-GRADED SAND WITH GRAVE saturated, very dense; 50% fine to clay.	EL AND CLAY (SW-SC) - brown (10YR 4/3), to coarse sand, 40% fine to coarse gravel, 10%
fine sand.	/4), moist, hard, medium plasticity; 80% clay, 20%
Bottom of boring at 45 feet bgs.	
56-	Page 1

Gettler-Ryan, Inc.	Log of Boring SP-4			
ROJECT: Tosco (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermore, CA			
R PROJECT NO.: 140175.07	CASING ELEVATION:			
ATE STARTED: 12/05/01	WL (ft. bgs): DATE: TIME:			
ATE FINISHED: 12/05/01	WL (ft. bgs): DATE: TIME:			
RILLING METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet			
RILLING COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas			
GRAPHIC LOG SOIL CLASS	C DESCRIPTION WELL DIAGRAM			
Asphalt and base rock. WELL-GRADED GRAVEL WITH SAND (6 dense; 50% fine to coarse subangular to coarse sand.	to rounded gravel to 3 cm, 50% fine to			
20% fine to coarse sand.				
WELL-GRADED GRAVEL WITH SAND (0 dense; 50% fine to coarse subangular coarse sand.	GW) - dark brown (10YR 3/2), dry, very to rounded gravel to 3 cm, 50% fine to			
CL CLAY (CL) - olive brown (2.5Y 4/4), fine sand. Bottom of boring at 45 feet bgs.	moist, hard, medium plasticity; 80% clay, 20%			
48-	27)			
56-1				

Gettier-Ryan, Inc.	Log of Boring SP-5	Log of Boring SP-5		
ROJECT: Tosco (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermore, CA	_		
R PROJECT NO.: 140175.07	CASING ELEVATION:			
DATE STARTED: 12/05/01	WL (ft. bgs): DATE: TIME;	_		
DATE FINISHED: 12/05/01	WL (ft. bgs): DATE: TIME:			
DRILLING METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet			
DRILLING COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas	_		
GEAPHIC LOG SOIL CLASS Asbhalt and pase Lock	WELL DIAGRAM SEOLOGIC DESCRIPTION	a .		
10% clay.	SAND AND CLAY (GW-GC) - dark grayIsh brown 30% fine to coarse gravel, 30% fine to coarse sand,	3 PVC		
20% fine to coarse sand.	I N N	- 3/4 blank schedule 40 PVC		
GW WELL-GRADED GRAVEL WITH dense; 50% fine to coarse subcoarse sand.	I SAND (GW) - dark brown (10YR 3/2), dry, very ubangular to rounded gravel to 3 cm, 50% fine to			
CL CLAY (CL) - olive brown (2.5 fine sand.	5Y 4/4), moist, hard, medium plasticity; 80% clay, 20%			
Bottom of boring at 45 feet I	bgs.			
56-	Page			

Gettler-Ryan, Inc.		Log of Boring SP-5/SP-5S			
ROJECT: Tosco (76) Service Station	No. 4186 LOCAT	LOCATION: 1771 First Street, Livermore, CA			
R PROJECT NO.: 140175.07		ELEVATION:			
ATE STARTED: 12/05/01	WL (ft.	ogs): DATE:	TIME:		
ATE FINISHED: 12/05/01	WL (ft.	ogs): DATE:	TIME:		
RILLING METHOD: 8 in. Hollow Stem	uger TOTAL	DEPTH: 45 feet			
RILLING COMPANY: Cascade Drilling	GEOLO	GIST: Jed Douglas			
GRAPHIC LOG SOIL CLASS	GEOLOGIC DESCRIPTION		WELL DIAGRAM		
(10YR 4/2), dry, ver 10% clay.	YEL WITH SAND AND CLAY (GW-Gy dense; 80% fine to coarse grave)	el, 30% fine to coarse sand,	Sparge point Starbushishi Filmminishishi Chank schedule 80 PVC		
dense; 50% fine to coarse sand.	VEL WITH SAND (GW) - dark bro coarse subangular to rounded gr brown (2.5Y 4/4), moist, hard, me	avel to 3 cm, 50% fine to	%		
Bottom of boring a	it 45 feet bgs.				

	Gettler-Ryan, Inc.	Log of Boring	Log of Boring SP-6S		
PROJECT:	Tosco (76) Service Station No. 4186	LOCATION: 1771 First Street, Liver	rmore, CA		
GR PROJE	CT NO.: 140175.07	CASING ELEVATION:			
DATE ST	ARTED: 12/07/01	WL (ft. bgs): DATE:	TIME:		
DATE FIN	NISHED: 12/07/01	WL (ft. bgs): DATE:	TIME:		
	METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 25 feet			
DRILLING	COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas			
DEPTH (feet) GRAPHIC LOG	SOIL CLASS	GIC DESCRIPTION	WELL DIAGRAM		
53.93	GW Asphalt and base rock.				
8-11	coarse sand.	(GW) - dark brown (10YR 3/2), dry, very ar to rounded gravel to 3 cm, 50% fine to (SW) - brown (10YR 4/3), dry, very dense; gravel.	3/4 blank schedule 80 PVC ———————————————————————————————————		
24-	Bottom of boring at 25 feet bgs.		#2/16 Lonestar sand————————————————————————————————————		
32-			0791/2#		
40-			25		
56-					

Gettler-Ryan, Inc.		ler-Ryan, Inc.	Log of Boring SP-7S		
PROJECT:	Tosc	o (76) Service Station No. 4186	LOCATION: 1771 First Street, Livermon	re, CA	
GR PROJECT NO.: 140175.07		: 140175.07	CASING ELEVATION:		
DATE STARTED: 12/06/01		12/06/01	WL (ft. bgs): DATE: T	IME:	
DATE FIN	VISHED:	: 12/06/01	WL (ft. bgs): DATE: T	IME:	
DRILLING	METHO	DD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 25 feet		
DRILLING	COMPA	NY: Cascade Drilling	GEOLOGIST: Jed Douglas		
DEPTH (feet) GRAPHIC LOG	SOIL CLASS	GEOLOGIC D	ESCRIPTION	WELL DIAGRAM	
8-16-11	SW	Asphalt and base rock. WELL-GRADED GRAVEL WITH SAND (GW) dense; 50% fine to coarse subangular to rocarse sand. WELL-GRADED SAND WITH GRAVEL (SW) 70% fine to coarse sand, 30% fine gravel. Bottom of boring at 25 feet bgs.	ounded gravel to 3 cm, 50% fine to - brown (10YR 4/3), dry, very dense:	Sparge point 3/4 blank schedule 80 PVC 3/4 b	
32-40-48-					

Gettler-Ryan, Inc.	Log of Boring SP-8/SP-8S LOCATION: 1771 First Street, Livermore, CA		
PROJECT: Tosco (76) Service Station No. 4186			
GR PROJECT NO.: 140175.07	CASING ELEVATION:		
DATE STARTED: 12/05/01	WL (ft. bgs): DATE: TIME;		
DATE FINISHED: 12/05/01	WL (ft. bgs): DATE: TIME;		
DRILLING METHOD: 8 in. Hollow Stem Auger	TOTAL DEPTH: 45 feet		
ORILLING COMPANY: Cascade Drilling	GEOLOGIST: Jed Douglas		
GRAPHIC LOG SOIL CLASS	WELL DIAGRAM SIC DESCRIPTION		
Asphalt and base rock. WELL-GRADED GRAVEL WITH SAND ((GW) - dark brown (10YR 3/2), dry, very r to rounded gravel to 3 cm, 50% fine to 3Ad 08 appears 100 A 08 ap		
WELL-GRADED SAND WITH GRAVEL (70% fine to coarse sand, 30% fine gr	(SW) - brown (10YR 4/3), dry, very dense; avel. OYR 4/4), moist hard, low plasticity; 80% clay,		
CL CLAY (CL) - dark yellowish brown (1 20% fine to coarse sand.	IOYR 4/4), moist hard, low plasticity; 80% clay,		
SW-SC WELL-GRADED SAND WITH GRAVEL	AND CLAY (SW-SC) - brown (10YR 4/3), coarse sand, 40% fine to coarse gravel, 10%		
CL CLAY (CL) - olive brown (2.5Y 4/4), fine sand.), moist, hard, medium plasticity; 80% clay, 20%		
Bottom of boring at 45 feet bgs.			
56-			

APPENDIX C

WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD DATA SHEETS

MONITORING WELL OBSERVATION SUMMARY SHEET

CLIENT/ # _	TOSCO 4186		G-R J08	180181	
OCATION:	1771 Firs	t st.	DATE _	1/3/02	
	Livermore		TIME: _		<u> </u>
Well	Total	Depth to Water	Product Thickness	TOB or TOC	Comments
<u>u-1</u>	94.05	27.67	0.00	10C	3.8
<u>u.2</u>	33.20	27.33			<u>3</u>
<u>u-3</u> <u>u-4</u>	33.40 45.30	23.73 36.15			5
u-5	47.20	<u>36.55</u> 33.99	-		
<u>u-6</u> u-7	44.65	32.43			
	· · · · · · · · · · · · · · · · · · ·				
			•		
				<u> </u>	
				<u> </u>	
Comments:		•			
-					
Sampler:	varteis		Assistan		and the second tree

WELL MONITORING/DEVELOPMENT

Client/ Tosc	O	FIELD DATA SHEET
		Job#: 130/8/
Address: 177	1 First st.	Date: <u>1/3/</u> 02
City: Liv	ermore, Ca	Sampler: Varthe,
Well ID	<u>u-6</u>	Well Condition:
Well Diameter		Hydrocarbon Amount Bailed
Total Depth	44.65 A.	
Depth to Water	33.99 ft.	Factor (VF) $6^{\circ} = 1.50$ $12^{\circ} = 5.80$
·	10-66 x VI	/F <u>0_ j → = 1. 81 </u>
Purge	Disposable Bailer	Sampling Dispersion Deliver
(Stack	Bailer
	Suction Grandfos	Pressure Bailer Grab Sample
		·
	Other:	Other:
Starting Time:	1205	
Address: 1771 First st. City: Livermore, Ca. Well ID Well ID Well Diameter Total Depth Opeth to Water Disposable Bailer Bailer Starting Time: Starting Time: Did well de-water? Time Volume Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well de-water? Time Volume (gal.) Purging Flow Rate: Did well conductivity Temperature Did GRP Amount Bailed Purging (roduct/water): Purging Flow Purging Volume: Purging Flow Rate: Disposable Bailer Bailer Grab Sampling Bailer		
Sampling Time:	1205	Weather Conditions: clear Water Color: bro Odor: mi/d
Sampling Time: Purging Flow Rate:	1205	Weather Conditions: clear Water Color: bro. Odor: mild gpm. Sediment Description: fine Silt (very till)
Sampling Time: Purging Flow Rate: Did well de-water? Time Vol	1205 1755 1	Weather Conditions: Water Color: Water Color: Water Color: Bro Odor: Mila gpm. Sediment Description: If yes; Time: 1214, 1229, 1745 Volume: Conductivity Temperature D.O. ORP Alkalin
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga	1205 1255 	Weather Conditions: Water Color: Water Color: Water Color: Sediment Description: If yes; Time: 1214, 1229, 1245 Volume: Conductivity Temperature D.O. ORP Alkalin µmhos/cm (mg/L) (mV) (ppn
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga	1205 1255 1 9 ume pH	Weather Conditions: Water Color: Water Color: Water Color: DO Odor: Mila Sediment Description: If yes; Time: Note Silt (very tills) Weather Conductivity Temperature DO ORP Alkalin pmhos/cm TRD 67.6 BO3 68.2 Clear after 229 9a.
Sampling Time: Purging Flow Rate: Did well de-water? Time Volume (ga // O 7 7 // Z 1/ C	1205 1255 1255 1 1 1 1 1 1 1 1 1 1 1 1 1	Weather Conditions: Water Color: bro: Odor: mila gpm. Sediment Description: fine silt (very tills If yes; Time: 1214, 1229, 1245 Volume: 8, 12 + 15 in Conductivity Temperature D.O. ORP Alkalin mhos/cm (mg/L) (mV) (ppn 780 67.6 803 68.2 Clear after 229 gas 809 68.0
Sampling Time: Purging Flow Rate: Did well de-water? Time Volo (ga /// - 2 //// - 2	1205 1255 1 9 1 9 1 9 1 10 1 7.77 2 7.63 7.60 7.54	Weather Conditions: Water Color: bro: Odor: mi/a gpm. Sediment Description: disesist (very tills If yes; Time: 1214, 1229, 1245 Volume: 8, 12 + 15 (c) Conductivity Temperature D.O. ORP Alkalin umhos/cm (mg/L) (mV) (ppm 780 67.6 803 68.2 Clear after 229 gas 809 68.0 816 68.2
Sampling Time: Purging Flow Rate: Did well de-water? Time Volume (ga //207 4 //207 6 //277 8	1205 1255 1 1 1 1 1 1 1 1 1 1 1 1 1	Weather Conditions: Water Color: bro: Odor: mila gpm. Sediment Description: fine silt (very tills If yes; Time: 1214, 1229, 174) Volume: 8, 12+15 (c Conductivity Temperature D.O. ORP Alkalin (mg/L) (mV) (ppn 780 67.6 803 68.2 Clear after 2nd ga. 809 68.0 816 68.2
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga // 0 7 2 // 20 7 4 // 20 7	1205 1255 19 19 19 10 10 10 10 10 10 10 10 10 10	Weather Conditions:
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga //207 / //	1205 1255 1 9 9 11.) 1255	Weather Conditions: Clear
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga //207 / //	1205 1255 1 9 9 11.) 1255	Weather Conditions: Clear
Sampling Time: Purging Flow Rate: Did well de-water? Time Vole (ga // 0 7 2 // 20 7 4 // 20 7 6 // 20 7 6 // 20 7 7 // 20 7 //	1205 1255 1 9 9 11.) 1255	Weather Conditions: Clear
Time Vole (ga 1207 4 1245 15	1205 1255 1 9 1 9 1 7.77 7.63 7.60 7.54 7.56 7.47 7.42	Weather Conditions: Clear Water Color: Bro: Odor: Mild gpm. Sediment Description: Size Silt (very tills If yes; Time: 1214, 1229, 1245 Volume: 8, 12415 (Conductivity Temperature D.O. ORP Alkalin µmhos/cm F (mg/L) (mV) (ppm 780 67.6 803 68.2 Clear after 2nd ga. 809 68.0 816 68.2 903 68.1 901 68.3 306 68.5 LABORATORY INFORMATION
Sampling Time: Purging Flow Rate: Did well de-water? Time Volo (ga //O + 2 //O / 4 //O / 6 //O / 6 //O / 7 //O / 6 //O / 7 //O / 6 //O / 7 //	1205 1255 1255 19 1000 10	Weather Conditions: Clear Water Color: bro: Odor: mild gom. Sediment Description: Sine Silt (very tills If yes; Time: 1214, 1229, 1245 Volume: 8, 12+15 (Conductivity Temperature D.O. ORP Alkalin µmhos/cm (mg/L) (mV) (ppn 780 67.6 803 68.2 Clear after 2nd ga. 809 68.0 816 68.2 907 68.1 901 68.3 306 68.5 2d 3 times. Slow recovery. LABORATORY INFORMATION EFRIG. PRESERV. TYPE LABORATORY ANALYSES

WELL MONITORING/DEVELOPMENT FIELD DATA SHEET

		FIELD DATA	OTILLI			
Client/ Tosco Facility <u># 4186</u>			Job#: _	180181		
Address: <u>1771</u>			Date: _	1/3/02		
	irmore, Ca	,	Sampler: _	Varther		
		,				
Well ID	<u>u-7</u>	Well Condition	: <u>0 k</u>			
Well Diameter		Hydrocarbon Thickness:	ව. <i>ප</i> ප ු	Amount Baile (product/water)	ed 🖈	(gal.)
Total Depth	44.45 ft.	Volume	$2^* = 0.17$	3" = 0.38	4	" = 0.66
Depth to Water	32.43 tt.	Factor (VF)	6" =	1.50 1:	2" = 5.80	
,	12,02 x VF	0.17 = 2.04 x	/心 (ず (case volume)	= Estimated Purge	Volume: _	20. s (gal.)
_	Disposable Bailer		npling			•
•	Bailer Stack	Equ	E	Disposable Baile Bailer	ţ.	
	Suction Grundfos			ressure Bailer Frab Sample		
	Other:	_	Other:			
Starting Time:	1310	_ Weather 0	Conditions: _	elear		
Sampling Time:	1400	Water Col	or: <i>C</i>	/2. 4. 5° 0	dor: <u> </u>	<u>ld</u>
sompring . mic.						
Purging Flow Rate:			Description: _			/3
Purging Flow Rate:			Description: _			/3 (gal.)
Purging Flow Rate: Did well de-water? Time Volu	ume pH		Description:			/3 (gal.) Alkalinity (ppm)
Purging Flow Rate: Did well de-water? Time Volume	ume pH al.)	If yes; To Conductivity μmhos/cm	Description:	33,/34 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 7	ume pH al.) 7.60	If yes; To Conductivity pmhos/cm	Description: _ ime:	33,/34 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Volume (gas 1310 2 4 4 4 6 6	y ume pH al.) 7.60 7.53 7.50	If yes; To Conductivity	Description:	33,/39 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Volume (gas) $\frac{1310}{1314} = \frac{7}{1316}$	y ume pH al.) 7.60 7.53 7.50 7.43	If yes; To Conductivity pmhos/cm	Description:	33,/39 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Vol. (ga 1310 7 7 1314 7 6 6 1318 7 10 10 10 10 10 10 10 10 10 10 10 10 10	pH al.) 7.60 7.53 7.50 7.43 7.38 7.38	Conductivity μmhos/cm 72 76 7 76 7 76 7 76 7	Description: _ ime:	33,/39 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Vol. (gs. 1310 7 7 7 1316 6 6 1318 7 10 10 10 10 10 10 10 10 10 10 10 10 10	y ume pH al.) 7.60 7.53 7.50 7.43	Conductivity μmhos/cm 721 767 767 767	Description:	33,/39 &Volume	ORP	Alkalinity
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 7 1314 7 1318 7 1318 7 1345 12	y ume pH al.) 7.60 7.53 7.53 7.35 7.35 7.35	Conductivity μmhos/cm 721 762 767 760 772 7760	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity
Purging Flow Rate: Did well de-water? Time Vol. (gs. 1310	pH al.) 7.60 7.53 7.50 7.43 7.38 7.38	Conductivity μmhos/cm 721 762 767 760 772 7760	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 7 1314 7 1318 7 1318 7 1345 12	y ume pH al.) 7.60 7.53 7.53 7.35 7.35 7.35	Conductivity μmhos/cm 721 762 767 760 772 7760	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity
Purging Flow Rate: Did well de-water? Time Vol. (gs	me pH al.) 7.60 7.53 7.50 7.43 7.35 7.35	Conductivity μmhos/cm 721 767 767 767 7770 3 times	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity (ppm)
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 2 1314 7 1318 7 1318 10 1345 10 1345 17 SAMPLE ID (me pH al.) 7.60 7.53 7.50 7.43 7.35 7.35	Conductivity	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity (ppm)
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 2 1314 4 1318 4 1325 10 1345 12 1346 17	1 y pH al.) 7.60 7.53 7.50 7.43 7.35 7.35 7.35 7.35 1 - 35 7.35 (#) - CONTAINER RE	Conductivity	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity (ppm)
Purging Flow Rate: Did well de-water? Time Volume (gate) 1310 2 1314 4 1318 4 1325 10 1345 12 1346 17	1 y pH al.) 7.60 7.53 7.50 7.43 7.35 7.35 7.35 7.35 1 - 35 7.35 (#) - CONTAINER RE	Conductivity	Description:	D.O. (mg/L)	ORP (mV)	Alkalinity (ppm)

Virgil Chavez Land Surveying

312 Georgia Street, Suite 225 Vallejo, California 94590-5907 (707) 553-2476 • Fax (707) 553-8698

January 17, 2002 Project No. 1604-19A

Jed Douglas Gettler-Ryan Inc. 1364 N. McDowell Blvd., Suite B2 Petaluma, CA 94954

Subject: Monitoring Well Survey

Former Tosco (76) Service Station No. 4186

1771 First Street Livermore, CA

SETTLER-HYAN, INC. GENERAL CONTRACTOR

Dear Jed:

This is to confirm that we have proceeded at your request to survey the ground water monitoring wells located at the above referenced location. The survey was completed on January 16, 2002. The benchmark for this survey was a City of Livermore survey monument at First & "Q" Streets. The latitude, longitude and coordinates are for top of casings and are based on the California State Coordinate System, Zone III (NAD83). Measurements taken at approximate top of box and top of casing. Benchmark Elev. = 469.246 feet, (NGVD 29).

<u>Latitude</u>	Longitude	Northing	Easting	Elev.	Desc.
				478.65	Rim U-6
37.6797775	121.7741765	2072494.83	6192941.69	478.38	TOC U-6
37.6797136	121 7730540	2072470.71	6193005 75	479.09 478 74	Rim U-7
37.0797130	121.//39340	20/24/0.71	0193003.73	4/0./4	100 0 1

Sincerely,

APPENDIX E

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY RECORDS



21 December, 2001

Jed Douglas Gettler Ryan, Inc. - Petaluma 1364 North McDowell Boulevard, Suite B2 Petaluma, CA 94954-1175

RE: Tosco

Sequoia Report: W112113

Enclosed are the results of analyses for samples received by the laboratory on 07-Dec-01 10:35. If you have any questions concerning this report, please feel free to contact me.

· Characa

Charlie Westwater Project Manager

CA ELAP Certificate #1271



Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2

Petaluma CA, 94954-1175

Project: Tosco

Project Number: Tosco # 4186 Project Manager: Jed Douglas Reported:

21-Dec-01 08:29

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
U6-25	W112113-01	Soil	06-Dec-01 09:35	07-Dec-01 10:35
U6-30	W112113-02	Soil	06-Dec-01 09:40	07-Dec-01 10:35
U7-15	W112113-03	Soil	06-Dec-01 12:55	07-Dec-01 10:35
U7-25	W112113-04	Soil	06-Dec-01 13:15	07-Dec-01 10:35



Gettler Ryan, Inc. - Petaluma

ic. - Petaluma

1364 North McDowell Boulevard, Suite B2

Petaluma CA, 94954-1175

Project: Tosco

Project Number: Tosco # 4186

Project Manager: Jed Douglas

Reported: 21-Dec-01 08:29

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
U6-25 (W112113-01) Soil Sampled: 00	6-Dec-01 09:35	Received: 0	7-Dec-01	10:35					
Purgeable Hydrocarbons (C6-C12)	ND	1.0	m g/kg	20	1L12003	12-Dec-01	12-Dec-01	EPA 8015/8021	
Велгепе	ND	0.0050	n	tı	u	ш	Ħ	lr .	
Toluene	ND	0.0050	п	†1	19	п	#	4	
Ethylbenzene	ND	0.0050	п	11	**	τŧ	Ð	н	
Xylenes (total)	ND	0.0050	u	11	ti .	"	II .	11	
Methyl tert-butyl ether (MTBE)	ND	0.050	п	n	u	**	U	41	
Surrogate: a,a,a-Trifluorotoluene		106 %	40-	140	"	'n	"	"	
U6-30 (W112113-02) Soil Sampled: 06	6-Dec-01 09:40	Received: 0	7-Dec-01	10:35					
Purgeable Hydrocarbons (C6-C12)	ND	1.0	mg/kg	20	1L12003	12-Dec-01	13-Dec-01	EPA 8015/8021	
Benzene	ND	0.0050	41	•	п	11	n	п	
Toluene	ND	0.0050	17	H	н	н	н	ti.	
Ethylbenzene	ND	0.0050	19	Ħ	u	ij	••	lŧ.	
Xylenes (total)	ND	0.0050	n	ti	"	II	11	н	
Methyl tert-butyl ether (MTBE)	ND	0.050	п	*1	**	it .	II	n	
Surrogate: a,a,a-Trifluorotoluene		104 %	40-	140	ıı	ır	"	н	
U7-15 (W112113-03) Soil Sampled: 0	6-Dec-01 12:55	Received: 0	7-Dec-01	10:35					
Purgeable Hydrocarbons (C6-C12)	ND	1.0	mg/kg	20	1L12003	12-Dec-01	12-Dec-01	EPA 8015/8021	
Benzene	ND	0.0050	17	ri .	11	**	Ħ	11	
Toluene	ND	0.0050	*	н	n	**	11	11	
Ethylbenzene	ND	0.0050	н	11	ш	п	**	ц	
Xylenes (total)	ND	0.0050	н	11	ш	11	**	n	
Methyl tert-butyl ether (MTBE)	ND	0.050	14	н	H	11	n	*	
Surrogate: a,a,a-Trifluorotoluene		89 %	40-	-140	н	n	"	п	



Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2

Project: Tosco

Project Number: Tosco # 4186

Reported: 21-Dec-01 08:29

Petaluma CA, 94954-1175 Project Manager: Jed Douglas

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
U7-25 (W112113-04) Soil Sampled: 06	Dec-01 13:15	Received: 0	7-Dec-01	10:35					
Purgeable Hydrocarbons (C6-C12)	ND	1.0	mg/kg	20	IL12003	12-Dec-01	12-Dec-01	EPA 8015/8021	
Benzene	ND	0.0050	U	e	U	U	÷I	tt	
Toluene	ND	0.0050	n	11	1)	u	II .	"	
Ethylbenzene	ND	0.0050		41	11	a	li .	**	
Xylenes (total)	ND	0.0050	п	n	11	u	μ	Hf.	
Methyl tert-butyl ether (MTBE)	ND	0.050	U	н	n	я	п	17	
Surrogate: a,a,a-Trifluorotoluene		93 %	40-	140	н	"	n	#	



Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2

Petaluma CA, 94954-1175

Project: Tosco

Project Number: Tosco # 4186 Project Manager: Jed Douglas Reported: 21-Dec-01 08:29

Volatile Organic Compounds by EPA Method 8260B Sequoia Analytical - Walnut Creek

	~-1	uvia Allai	J trour						
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Note
U6-25 (W112113-01) Soil S	Sampled: 06-Dec-01 09:35	Received: 0	7-Dec-01	10:35					
tert-Butyl alcohol	ND	2.5	mg/kg	100	1L10029	10-Dec-01	10-Dec-01	EPA 8260B	
Methyl tert-butyl ether (MTBI	E) ND	0.20	II .	11	n	**	u	**	
Di-isopropyl ether	ND	0.10	u	ч	Ħ	11	u	u	
Ethyl tert-butyl ether	ND	0.10	Ħ	31	**	17	Ħ	11	
tert-Amyl methyl ether	ND	0.10	**	17	**	**	**	11	
1,2-Dichloroethane	ND	0.10	**	11	и	**	***	11	
1,2-Dibromoethane	ND	0.20	11	n	n	11	**	н	
Surrogate: Dibromofluoromet	hane	95 %	50-	150	"	"	"	"	
Surrogate: 1,2-Dichloroethan		118 %		-150	"	"	"	н	
U6-30 (W112113-02) Soil S	Sampled: 06-Dec-01 09:40	Received: 0	7-Dec-01	10:35					
tert-Butyl alcohol	ND	2.5	mg/kg	100	1L10029	10-Dec-01	10-Dec-01	EPA 8260B	
Methyl tert-butyl ether (MTBI	E) ND	0.20	n	*1	**	11	11	41	
Di-isopropyl ether	ND	0.10	u	#1	**	"	п	1 1	
Ethyl tert-butyl ether	ND	0.10	11	r	n	**	II	**	
tert-Amyl methyl ether	ND	0.10	u	H	"	11	п	**	
1,2-Dichloroethane	ND	0.10	н	u	**	π	u	51	
1,2-Dibromoethane	ND	0.20	н	**	**	11	Ħ	11	
Surrogate: Dibromofluoromes	thane	100 %	50-	-150	n	"	"	"	
Surrogate: 1,2-Dichloroethan	e-d4	120 %	50	-150	"	"	n	"	
U7-15 (W112113-03) Soil S	Sampled: 06-Dec-01 12:55	Received: 0	7-Dec-01	10:35					
tert-Butyl alcohol	ND	2.5	mg/kg	100	1L10029	10-Dec-01	10-Dec-01	EPA 8260B	
Methyl tert-butyl ether (MTB)	E) ND	0.20	10	Ħ	tt	u	11	**	
Di-isopropyl ether	ND	0.10	11		**	n	11	11	
Ethyl tert-butyl ether	ND	0.10	u	11	**	**	11	11	
tert-Amyl methyl ether	ND	0.10	u	ŧI	n	**	II	Ħ	
1,2-Dichloroethane	ND	0.10	u	п	rt	*1	u	"	
1,2-Dibromoethane	ND	0.20	ŧŧ	•		Ħ	u	11	
Surrogate: Dibromofluorome	thane	97 %	50	-150	"	п	H	"	
Surrogate: 1,2-Dichloroethan	e-d4	123 %	50	-150	"	rr r	"	"	



Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2 Petaluma CA, 94954-1175 Project: Tosco

Project Number: Tosco # 4186 Project Manager: Jed Douglas

Reported: 21-Dec-01 08:29

Volatile Organic Compounds by EPA Method 8260B Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
U7-25 (W112113-04) Soil Sampled: 0	6-Dec-01 13:15	Received: 0	7-Dec-01	10:35				· · · · ·	
tert-Butyl alcohol	ND	2.5	mg/kg	100	1L10029	10-Dec-01	10-Dec-01	EPA 8260B	-
Methyl tert-butyl ether (MTBE)	ND	0.20	*1	**	tt	0	n	n	
Di-isopropyl ether	ND	0.10	11	Ħ	17	п	11	n	
Ethyl tert-butyl ether	ND	0.10	11	31	10	u	n	n	
tert-Amyl methyl ether	ND	0.10	"	31	**	и	11	1)	
1,2-Dichloroethane	ND	0.10	11	*1	**	u	п	II	
1,2-Dibromoethane	ND	0.20	n	n	17	ď)1	tt.	
Surrogate: Dibromofluoromethane		98 %	50-	150	**	"	"	rr	•
Surrogate: 1,2-Dichloroethane-d4		127 %	50-	150	"	If	"	"	

Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2

Petaluma CA, 94954-1175

Project: Tosco

Project Number: Tosco # 4186 Project Manager: Jed Douglas Reported: 21-Dec-01 08:29

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT - Quality Control Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1L12003 - EPA 5030B MeOH										
Blank (1L12003-BLK1)				Prepared	& Analyze	ed: 12-Dec	>-01			
Purgeable Hydrocarbons (C6-C12)	ND	1.0	mg/kg	•	-			-		
Benzene	ND	0.0050	11							
Toluene	ND	0.0050	II							
Ethylbenzene	ND	0.0050	ii							
Xylenes (total)	ND	0.0050	u							
Methyl tert-butyl ether (MTBE)	ND	0.050	11							
Surrogate: a.a.a-Trifluorotoluene	0.608		н	0.600		101	40-140			
LCS (1L12003-BS1)				Prepared	& Analyz	ed: 12-Dec	c- 0 1			
Benzene	0.874	0.0050	mg/kg	0.800		109	50-150			
Toluene	0.886	0.0050	11	0.800		111	50-150			
Ethylbenzene	0.852	0.0050	11	0.800		106	50-150			
Xylenes (total)	2.68	0.0050	17	2.40		112	50-150			
Surrogate: a,a,a-Trifluorotoluene	0.788		"	0.600		131	40-140			
Matrix Spike (1L12003-MS1)	Si	ource: W1121	13-01	Prepared:	12-Dec-0	l Analyze	d: 13-Dec-	-01		
Benzene	0.654	0.0050	mg/kg	0.800	ND	82	50-150			
Toluene	0.816	0.0050	11	0.800	ND	102	50-150			
Ethylbenzene	0.790	0.0050	н	0.800	ND	99	50-150			
Xylenes (total)	2.56	0.0050	п	2.40	ND	107	50-150			
Surrogate: a,a,a-Trifluorotoluene	0.522		11	0.600		87	40-140			
Matrix Spike Dup (1L12003-MSD1)	Se	ource: W1121	13-01	Prepared	: 12-Dec-0	I Analyze	d: 13-Dec-	-01		
Benzene	0.650	0.0050	mg/kg	0.800	ND	81	50-150	0.6	20	
Toluene	0.832	0.0050	**	0.800	ND	104	50-150	2	20	
Ethylbenzene	0.860	0.0050	11	0.800	ND	108	50-150	8	20	
Xylenes (total)	2.56	0.0050	11	2.40	ND	107	50-150	0	20	
Surrogate: a,a,a-Trifluorotoluene	0.532		"	0.600		89	40-140			•



Gettler Ryan, Inc. - Petaluma

1364 North McDowell Boulevard, Suite B2 Petaluma CA, 94954-1175 Project: Tosco

Project Number: Tosco # 4186 Project Manager: Jed Douglas Reported: 21-Dec-01 08:29

Volatile Organic Compounds by EPA Method 8260B - Quality Control Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1L10029 - EPA 5030B (MeOH)										
Blank (1L10029-BLK1)				Prepared	& Analyze	ed: 10-Dec	:-01			
Ethanol	ND	25	mg/kg							
tert-Butyl alcohol	ND	2.5	19							
Methyl tert-butyl ether (MTBE)	ND	0.20	17							
Di-isopropyl ether	ND	0.10	11							
Ethyl tert-butyl ether	ND	0.10	U							
tert-Amyl methyl ether	ND	0.10	u							
1,2-Dichloroethane	ND	0.10	н							
1,2-Dibromoethane	ND	0.20	a							
Surrogate: Dibromofluoromethane	2.47		"	2.50		99	50-150			*
Surrogate: 1,2-Dichloroethane-d4	2.89		"	2.50		116	50-150			
LCS (1L10029-BS1)				Prepared	& Analyz	ed: 10-Dec	c-01			
Methyl tert-butyl ether (MTBE)	2.00	0.20	mg/kg	2.50		80	70-130			
Surrogate: Dibromofluoromethane	2.40			2.50		96	50-150			
Surrogate: 1,2-Dichloroethane-d4	2.84		"	2.50		114	50-150			
Matrix Spike (1L10029-MS1)	So	ource: W1121	13-01	Prepared	& Analyz	ed: 10-Dec	c-01			
Methyl tert-butyl ether (MTBE)	2.14	0.20	mg/kg	2.50	ND	86	60-140			
Surrogate: Dibromofluoromethane	2,51		"	2.50		100	50-150			
Surrogate: 1,2-Dichloroethane-d4	3.26		"	2.50		130	50-150			
Matrix Spike Dup (1L10029-MSD1)	So	urce: W1121	13-01	Prepared	& Analyz	ed: 10-Dec	c -0 1			
Methyl tert-butyl ether (MTBE)	2.50	0.20	mg/kg	2.50	ND	100	60-140	16	25	
Surrogate: Dibromofluoromethane	2.49		"	2.50		100	50-150			
Surrogate: 1,2-Dichloroethane-d4	3.24		"	2.50		130	50-150			



Gettler Ryan, Inc. - Petaluma

Project: Tosco

1364 North McDowell Boulevard, Suite B2

Project Number: Tosco # 4186 Project Manager: Jed Douglas Reported: 21-Dec-01 08:29

Petaluma CA, 94954-1175

Notes and Definitions

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference





22 January, 2002

Deanna Harding Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J Dublin, CA 94568

RE: Tosco(1)

Sequoia Report: L201017

RECENTE

GETTERRY A PORTON.

Enclosed are the results of analyses for samples received by the laboratory on 01/03/02 19:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Latonya Pelt Project Manager

CA ELAP Certificate #2360

Sporya K. Pelt



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J Dublin CA, 94568

Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Reported: 01/22/02 12:10

Project Manager: Deanna Harding

ANALYTICAL REPORT FOR SAMPLES

Sample 1D	Laboratory ID	Matrix	Date Sampled	Date Received
TB-LB	L201017-01	Water	01/03/02 00:00	01/03/02 19:30
U-1	L201017-02	Water	01/03/02 10:30	01/03/02 19:30
U-2	L201017-03	Water	01/03/02 11:10	01/03/02 19:30
U-3	L201017-04	Water	01/03/02 11:50	01/03/02 19:30
U-4	L201017-05	Water	01/03/02 09:45	01/03/02 19:30
U-5	L201017-06	Water	01/03/02 09:05	01/03/02 19:30
U-6	L201017-07	Water	01/03/02 12:55	01/03/02 19:30
U-7	L201017-08	Water	01/03/02 14:00	01/03/02 19:30



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J

Dublin CA, 94568

Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
TB-LB (L201017-01) Water Sampled:	01/03/02 00:00	Received: 0	1/03/02 1	19:30					
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l]	2010043	01/14/02	01/14/02	EPA 8021B	
Benzene	ND	0.50	11	Ħ	11	II .	#	"	
Toluene	ND	0.50	ŧr	ц	11	II .	**	11	
Ethylbenzene	ND	0.50	tt	ш	#1	п	Ħ	11	
Xylenes (total)	ND	0.50	н	IJ	*1	n	*	"	
Methyl tert-butyl ether	ND	5.0	u	n	**	n	**	11	
Surrogate: a,a,a-Trifluorotoluene	-	90.2 %	70-	130	rr .	Ħ	"	n	
U-1 (L201017-02) Water Sampled: 01/0	03/02 10:30 Re	ceived: 01/0.	3/02 19:3	30				,	
Purgeable Hydrocarbons as	160	50	ug/l	1	2010044	01/14/02	01/14/02	EPA 8021B	P-03
Gasoline			Č					2711 00212	, 05
Вепzепе	ND	0.50	**	11	и	n	11	п	
Toluene	0.51	0.50	Ħ	#1	u	n	"	n	
Ethylbenzene	ND	0.50	11	ts	п	II	n	11	
Xylenes (total)	0.69	0.50	u	**	n	II	11	u	
Methyl tert-butyl ether	31	5.0	11	11	a	н	†1	ц	
Surrogate: a,a,a-Trifluorotoluene		86.8 %	70-	130	n	n	n	п	
U-2 (L201017-03) Water Sampled: 01/0	03/02 11:10 Re	<u>ceive</u> d: 01/0:	3/02 19:3	0					
Purgeable Hydrocarbons as	260	50	ug/I	1	2010043	01/14/02	01/14/02	EPA 8021B	P-01
Gasoline			2				0.0.2	217.002.12	1 -01
Benzene	7.7	0.50	u	ч	ш	п	II	п	
Toluene	11	0.50	п	11	п	п	11	и	
Ethylbenzene	1.7	0.50	11	н	U	п	11	u	
Xylenes (total)	15	0.50	n	u	n	n	11	u	
Methyl tert-butyl ether	42	5.0	**	u	n	D	II	н	
Surrogate: a,a,a-Trifluorotoluene		124 %	70-	130	"	11	"	ıı	,,_,,



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J Dublin CA, 94568

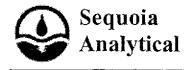
Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA Project Manager: Deanna Harding Reported:

01/22/02 12:10

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B Sequoia Analytical - San Carlos

		cquoia Aii	ary tien	· Dan C	41103				
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
U-3 (L201017-04) Water Sampled: 01/4	03/02 11:50 R	eceived: 01/0	3/02 <u>19:</u> 3	30					_
Purgeable Hydrocarbons as	9900	1200	ug/l	25	2010044	01/14/02	01/14/02	EPA 8021B	P-01
Gasoline			_						
Benzene	700	12	**	*1	μ	11	,,	**	
Toluene	130	12	11	#	u	Ħ	11	16	
Ethylbenzene	24	12	11	11	u	11	Ħ	ti	
Xylenes (total)	1000	12	11	17	n	n	H	n	
Methyl tert-butyl ether	14000	500	19	100	**	Ħ	n	17	M-04
Surrogate: a,a,a-Trifluorotoluene		84.0 %	70-	130	Ħ	11	11	н	
U-4 (L201017-05) Water Sampled: 01/0	03/02 09:45 R	eceived: 01/0	3/02 19:3	30					
Purgeable Hydrocarbons as	100	50	ug/l	1	2010044	01/14/02	01/15/02	EPA 8021B	P-03
Gasoline									
Benzene	ND	0.50	u	n	11	u	H	n	
Toluene	ND	0.50	ıı .	II.	11	"	**	10	
Ethylbenzene	ND	0.50	п	II	II	**	*1	19	
Xylenes (total)	ND	0.50	li .	ш	u	*1	11	n	
Methyl tert-butyl ether	10	5.0	u	u	п	u	11	11	
Surrogate: a,a,a-Trifluorotoluene		100 %	70-	-130	"	n	"	"	
U-5 (L201017-06) Water Sampled: 01/6	03/02 09:05 R	eceived: 01/0	3/02 19;3	30		· · · · · · · · · · · · · · · · ·			
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l	3	2010044	01/14/02	01/15/02	EPA 8021B	
Benzene	ND	0.50	**	11	11	u	TF	11	
Toluene	0.59	0.50	**	u	**	#	11	n	
Ethylbenzene	ND	0.50	31	u	11	31	11	п	
Xylenes (total)	0.91	0.50	17	11	п	11	u	н	
Methyl tert-butyl ether	51	5.0	п	11	п	τt	U)	н	
Surrogate: a,a,a-Trifluorotoluene		92.3 %	70	-130	u	"	"	"	



Gettler-Ryan/Geostrategies(1)

6747 Sierra Court, Suite J Dublin CA, 94568 Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B

Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
U-6 (L201017-07) Water	Sampled: 01/03/02 12:55	Received: 01/0	3/02 19:3	30					,
Purgeable Hydrocarbons a	s 5000	2500	ug/l	50	2010044	01/14/02	01/15/02	EPA 8021B	P-02
Gasoline			-						
Benzene	36	25	ш	If	II .	Ħ	n	н	
Toluene	ND	25	п	17	II .	•1	u	11	
Ethylbenzene	260	25	II	n	u	11	Ü	U	
Xylenes (totał)	450	25	п	b	"	ŧr	**	u .	
Methyl tert-butyl ether	ND.	250	u	n	*	Ħ	**	II .	
Surrogate: a,a,a-Trifluoroto	uene	76.8 %	70-	130	"	"	"	"	
U-7 (L201017-08) Water	Sampled: 01/03/02 14:00	Received: 01/0	3/02 19:3	30					
Purgeable Hydrocarbons a	s 3100	1000	ug/l	20	2010044	01/14/02	01/15/02	EPA 8021B	P-02
Gasoline			-						
Benzene	93	10	ш	u	**	n .	11	**	
Toluene	ND	10	tt.	u	et	п	ш	9	
Ethylbenzene	35	10	II .	ч	**	u	11	n	
Xylenes (total)	73	10	и	71	"	***	u	II	
Methyl tert-butyl ether	140	100	10	и	11	#1	u	u	
Surrogate: a,a,a-Trifluorotoi	uene	84.6 %	70-	130	n	n	"	и	



Gettler-Ryan/Geostrategies(1)

6747 Sierra Court, Suite J Dublin CA, 94568 Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Volatile Organic 8 Oxygenated Compounds by EPA Method 8260B

Sequoia Analytical - San Carlos

		equoia An	uiy iicai	Dan C				<u></u>	
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Note:
U-3 (L201017-04) Water	Sampled: 01/03/02 11:50 R	leceived: 01/0	3/02 19:3	0					
Ethanol	ND	50000	ug/l	1 00	2010020	01/07/02	01/07/02	EPA 8260B	
1,2-Dibromoethane	ND	100	ш	tı	tt	п	11	н	
1,2-Dichloroethane	ND	100	11	#1	#1	п	11	"	
Di-isopropyl ether	ND	100	n	\$1	**	**	n	n	
Ethyl tert-butyl ether	ND	100	IJ	η	11	11	11	11	
Methyl tert-butyl ether	12000	100	11	11	11	11	11	н	
Tert-amyl methyl ether	ND	100	li .	16	Ħ	h	п	19	
Tert-butyl alcohol	17000	2000		10	n		ц	11	
Surrogate: 1,2-Dichloroetha	ne-d4	93.5 %	70-	130	"	и	"	u	
Surrogate: Toluene-d8		99.8 %	70-	130	"	"	"	n	
U-4 (L201017-05) Water	Sampled: 01/03/02 09:45 R	leceived: 01/0	3/02 19:3	0					
Ethanol	ND	500	ug/l	1	2010014	01/07/02	01/07/02	EPA 8260B	
1,2-Dibromoethane	ND	1.0	μ	n	II .	н	#h	n	
1,2-Dichloroethane	ND	1.0	н	11	li .	**	11	11	
Di-isopropyl ether	ND	1.0	н	19	"	11	11	Ħ	
Ethyl tert-butyl ether	ND	1.0	ti	H	Ħ	п	ш	**	
Methyl tert-butyl ether	8.5	1.0	н	n	н	п	н	91	
Tert-amyl methyl ether	ND	1.0	Ħ	n	11	II.	•	11	
Tert-butyl alcohol	ND ND	20	н	"	†1	tr	47		
Surrogate: 1,2-Dichloroetha	ne-d4	98.2 %	70-	130	"	"	"	rr	***
Surrogate: Toluene-d8		101 %	70-	130	"	"	11	"	
U-5 (L201017-06) Water	Sampled: 01/03/02 09:05 R	leceived: 01/0	3/02 19:3	30					
Ethanol	ND	500	սց∕ി	1	2010014	01/07/02	01/07/02	EPA 8260B	
1,2-Dibromoethane	ND	1.0	**	rt .	u	н	н	11	
1,2-Dichloroethane	ND	1.0	n	11	ш	u	Ħ	μ	
Di-isopropyl ether	ND	1.0	··	"	11	"	ч	ıı .	
Ethyl tert-butyl ether	מא	1.0	i	11	11	11	11	u	
Methyl tert-butyl ether	53	1.0	**	11	11	1)	n	u	
Tert-amyl methyl ether	ND	1.0	*1	Ħ	11	п	11	**	
Tert-butyl alcohol	ND	20	11	#	Ħ	Ħ	n	11	
Surrogate: 1,2-Dichloroetha	ne-d4	97.8 %	70-	130	"	IJ	н	"	
Surrogate: Toluene-d8		101 %		130	,,	rr	n	n	



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J Dublin CA, 94568 Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Volatile Organic 8 Oxygenated Compounds by EPA Method 8260B

Sequoia Analytical - San Carlos

		ocquoia An	ary treat	D				<u></u>	
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<u>U-6 (L201017-07) Water</u>	Sampled: 01/03/02 12:55	Received: 01/0	3/02 19:30		·				R-05
Ethanol	ND	5000	ug/l	10	2010020	01/07/02	01/07/02	EPA 8260B	
1,2-Dibromoethane	ND	10	n	**	II .	10	и	u	
1,2-Dichloroethane	ND	10	11	н	II .	u	ij	tt	
Di-isopropyl ether	ND	10	11	91	11	ŧī	**	Ħ	
Ethyl tert-butyl ether	ND	10	II	**	u	**	11	11	
Methyl tert-butyl ether	ND	10	11	11	U	11	11	11	
Tert-amyl methyl ether	ND	10	tt	n	11	11	H	a	
Tert-butyl alcohol	ND	200	11	n	**	71	75	**	
Surrogate: 1,2-Dichloroeth	ane-d4	94.5 %	70-13	0	и	"	п	"	
Surrogate: Toluene-d8		99.7 %	70-13	0	"	n	п	0	
U-7 (L201017-08) Water	Sampled: 01/03/02 14:00	Received: 01/0	3/02 19:30						
Ethanol	ND	500	ug/l	1	2010014	01/07/02	01/07/02	EPA 8260B	
1,2-Dibromoethane	ND	1.0	11	и	11	II.	11	u	
1,2-Dichloroethane	ND	1.0	11	n	11	п	ŧ	71	
Di-isopropyl ether	ND	1.0	*)	**	**	Ħ	***	11	
Ethyl tert-butyl ether	ND	1.0	"	Ħ	Ħ	н	"	17	
Methyl tert-butyl ether	130	1.0	*1	н	†1	11	n	ш	
Tert-amyl methyl ether	ND	1.0	**	Ħ	11	**	17	**	
Tert-butyl alcohol	30	20	**	Ħ	11	ti	**	11	
Surrogate: 1,2-Dichloroeth	ane-d4	99.7 %	70-13	0	IJ	Ħ	n	n	
Surrogate: Toluene-d8		100 %	70-13	0	rr	n	"	n	



Gettler-Ryan/Geostrategies(1)

6747 Sierra Court, Suite J Dublin CA, 94568 Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010043 - EPA 5030B (P/T)										
Blank (2010043-BLK1)				Prepared .	& Analyze	ed: 01/14/0)2			
Purgeable Hydrocarbons as Gasoline	ND	50	uջ/ i			•				
Benzene	ND	0.50	**							
Toluene	ND	0.50	**							
Ethylbenzene	ND	0.50	**							
Xylenes (total)	ND	0.50	Ħ							
Methyl tert-butyl ether	ND	5.0	ŧI							
Surrogate: a,a,a-Trifluorotoluene	8.21		и	10.0		82.1	70-130			
LCS (2010043-BS1)				Prepared .	& Analyze	ed: 01/14/0	02			
Benzene	11.4	0.50	ug/l	10.0		114	70-130			*
Toluene	11.1	0.50	п	10.0		111	70-130			
Ethylbenzene	10.9	0.50	ш	10.0		109	70-130			
Xylenes (total)	33.2	0.50	н	30.0		111	70-130			
Surrogate: a,a,a-Trifluorotoluene	8.65		11	10.0		86.5	70-130		· ·	
LCS (2010043-BS2)				Prepared	& Analyz	ed: 01/14/0	02			
Purgeable Hydrocarbons as Gasoline	270	50	ug/l	250		108	70-130			•
Surrogate: a,a,a-Trifluorotoluene	9.16		н	10.0		91.6	70-130			
Matrix Spike (2010043-MS1)	So	urce: L20101	9-04	Prepared:	01/14/02	Analyzed	: 01/15/02			
Purgeable Hydrocarbons as Gasoline	264	50	ug/I	250	ND	106	60-140			
Surrogate: a,a,a-Trifluorotoluene	9.73		11	10.0		97.3	70-130			
Matrix Spike Dup (2010043-MSD1)	So	urce: L20101	9-04	Prepared:	01/14/02	Analyzed	: 01/15/02			
Purgeable Hydrocarbons as Gasoline	261	50	ug/l	250	ND	104	60-140	1.14	25	
Surrogate: a,a,a-Trifluorotoluene	9.23		n	10.0		92.3	70-130	_		



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J

Dublin CA, 94568

Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010044 - EPA 5030B (P/T)							···			· · · · · · · · · · · · · · · · · · ·
Blank (2010044-BLK1)				Prepared -	& Analyze	ed: 01/14/0	02		***	
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l					-	 · · · · · · · · · · · · · · · · · · 	
Benzene	ND	0.50	++							
Toluene	ND	0.50	11							
Ethylbenzene	ND	0.50	tt							
Xylenes (totał)	ND	0.50	11							
Methyl tert-butyl ether	ND	5.0	**							
Surrogate: a,a,a-Trifluorotoluene	7.63		rr	10.0		76.3	70-130			
LCS (2010044-BS1)				Prepared	& Analyze	ed: 01/14/0	02			
Benzene	8.17	0.50	ug/l	10.0		81.7	70-130			
Toluene	7.32	0.50	11	10.0		73.2	70-130			
Ethylbenzene	7.11	0.50	"	10.0		71.1	70-130			
Xylenes (total)	21.0	0.50	"	30.0		70.0	70-130			
Surrogate: a,a,a-Trifluorotoluene	7.83		п	10.0		78.3	70-130		·	
LCS (2010044-BS2)				Prepared	& Analyze	ed: 01/14/0	02			
Purgeable Hydrocarbons as Gasoline	275	50	ug/l	250		110	70-130			
Surrogate: a,a,a-Trifluorotoluene	7.89		п	10.0		78.9	70-130			-
Matrix Spike (2010044-MS1)	So	urce: L20101	6-06	Prepared:	01/14/02	Analyzed	: 01/15/02			
Purgeable Hydrocarbons as Gasoline	263	50	ug/l	250	ND	105	60-140			
Surrogate: a,a,a-Trifluorotoluene	9.81		п	10.0		98.1	70-130			
Matrix Spike Dup (2010044-MSD1)	So	urce: L20101	6-06	Prepared:	01/14/02	Analyzed	l: 01/15/02			
Purgeable Hydrocarbons as Gasoline	246	50	ug/l	250	ND	98.4	60-140	6.68	25	
Surrogate: a,a,a-Trifluorotoluene	9.17		"	10.0		91.7	70-130			

Gettler-Ryan/Geostrategies(1)

6747 Sierra Court, Suite J Dublin CA, 94568 Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA Project Manager: Deanna Harding Reported: 01/22/02 12:10

Volatile Organic 8 Oxygenated Compounds by EPA Method 8260B - Quality Control Sequoia Analytical - San Carlos

Aπalyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
	resur	Блін	Onns	Bever	resure	70KEC	Limits	КГД	Limit	Notes
Batch 2010014 - EPA 5030B [P/T]										
Blank (2010014-BLK1)				Prepared.	& Analyze	d: 01/04/0)2			
Ethanol	ND	500	ug/l							
1,2-Dibromoethane	ND	1.0	n							
1,2-Dichloroethane	ND	1.0	li							
Di-isopropyl ether	ND	1.0	II							
Ethyl tert-butyl ether	ND	1.0	п							
Methyl tert-butyl ether	ND	1.0	II							
Tert-amyl methyl ether	ND	1.0	"							
Tert-butyl alcohol	ND	20	и							
Surrogate: 1,2-Dichloroethane-d4	9.68		"	10.0		96.8	70-130			
Surrogate: Toluene-d8	9.91		n	10.0		99. I	70-130			
Blank (2010014-BLK2)				Prepared	& Analyze	ed: 01/07/	02			
Ethanol	ND	500	ug/l	- "	•					
1,2-Dibromoethane	ND	1.0	11							
1,2-Dichloroethane	ND	1.0	11							
Di-isopropyl ether	ND	1.0	**							
Ethyl tert-butyl ether	ND	1.0	11							
Methyl tert-butyl ether	ND	1.0	11							
Tert-amyl methyl ether	ND	1.0	11							
Tert-butyl alcohol	ND	20	II							
Surrogate: 1,2-Dichloroethane-d4	9.78		"	10.0		97.8	70-130			
Surrogate: Toluene-d8	10.1		"	10.0		101	70-130			
LCS (2010014-BS1)				Prepared	& Analyz	ed: 01/04/	02			
Methyl tert-butyl ether	45.5	1.0	ug/l	50.0		91.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	9. 6 7		н	10.0		96.7	70-130	_		
Surrogate: Toluene-d&	9.72		P	10.0		97.2	70-130			



Gettler-Ryan/Geostrategies(1) 6747 Sierra Court, Suite J

Dublin CA, 94568

Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Project Manager: Deanna Harding

Reported: 01/22/02 12:10

Volatile Organic 8 Oxygenated Compounds by EPA Method 8260B - Quality Control Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010014 - EPA 5030B [P/T]			Olino	Level	Resur	ZUKEC	Limins	KI D	Lillin	Notes
LCS (2010014-BS2)				Prepared	& Analyze	ed: 01/07/0	02		<u> </u>	
Methyl tert-butyl ether	44.3	1.0	ug/l	50.0	<u></u>	88.6	70-130			
Surrogate: 1,2-Dichloroethane-d4	9.42	···	"	10.0		94.2	70-130	-		
Surrogate: Toluene-d8	9.80		n	10.0		98.0	70-130 70-130			
Matrix Spike (2010014-MS1)	So	urce: L20101	4-04	Prepared	& Analyze	ed: 01/04/0	02			
Methyl tert-butyl ether	45.2	1.0	ug/l	50.0	3.6	83.2	60-140			
Surrogate: 1,2-Dichloroethane-d4	9.39		"	10.0		93.9	70-130			
Surrogate: Toluene-d8	9.60		и	10.0		96.0	70-130			
Matrix Spike Dup (2010014-MSD1)	So	urce: L20101	4-04	Prenared	& Analyze	ed: 01/04/6	07			
Methyl tert-butyl ether	47.9	1.0	ug/l	50.0	3.6	88.6	60-140	6.29	25	
Surrogate: 1,2-Dichloroethane-d4	9.53		п	10.0		95.3	70-130			
Surrogate: Toluene-d8	9.79		"	10.0		97.9	70-130			
Batch 2010020 - EPA 5030B [P/T]										
Blank (2010020-BLK1)				Prepared	& Analyze	ed: 01/07/6			 -	
Ethanol	ND	500	ug/l							
1,2-Dibromoethane	ND	1.0	10							
1,2-Dichloroethane	ND	1.0	ti							
Di-isopropyl ether	ND	1.0	*1							
Ethyl tert-butyl ether	ND	1.0	Ħ							
Methyl tert-butyl ether	ND	1.0	11							
Tert-amyl methyl ether	ND	1.0	1†							
Tert-butyl alcohol	ND	20	u							
Surrogate: 1,2-Dickloraethane-d4	9.78		11	10.0		97.8	70-130			
Surrogate: Toluene-d8	10.1		11	10.0		101	70-130			

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Project: Tosco(1)

Project Number: Unocal SS#4186, Livermore, CA

Reported: 01/22/02 12:10

Project Manager: Deanna Harding

Volatile Organic 8 Oxygenated Compounds by EPA Method 8260B - Quality Control Sequoia Analytical - San Carlos

	Reporting			Spike	Source		%REC		RPD		
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes	
Batch 2010020 - EPA 5030B [P/T]											
LCS (2010020-BS1)				Prepared	& Analyz	ed: 01/07/0	02				
Methyl tert-butyl ether	44.3	1.0	ug/l	50.0		88.6	70-130				
Surrogate: 1,2-Dichloroethane-d4	9.42		п	10.0		94.2	70-130				
Surrogate: Toluene-d8	9.80		п	10.0		98.0	70-130				
Matrix Spike (2010020-MS1)	Sou	rce: L20101	5-09	Prepared	& Analyze	ed: 01/07/0	02				
Methyl tert-butyl ether	42.3	1.0	ug/l	50.0	ND	84.6	60-140				
Surrogate: 1,2-Dichloroethane-d4	9.50		rr	10.0		95.0	70-130				
Surrogate: Toluene-d8	9.75		#	10.0		97.5	70-130				
Matrix Spike Dup (2010020-MSD1)	Sou	rce: L20101	5-09	Prepared	& Analyz	ed: 01/07/	02				
Methyl tert-butyl ether	41.0	1.0	ug/l	50.0	ND	82.0	60-140	3.12	25		
Surrogate: 1,2-Dichloroethane-d4	9.47		n	10.0		94.7	70-130				
Surrogate: Toluene-d8	9.77		n	10.0		97.7	70-130				



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Notes and Definitions

M-04 MTBE was reported from second analysis.

P-01 Chromatogram Pattern: Gasoline C6-C12

P-02 Chromatogram Pattern: Weathered Gasoline C6-C12

P-03 Chromatogram Pattern: Unidentified Hydrocarbons C6-C12

R-05 The reporting limit(s) for this sample have been raised due to high levels of non-target interferents.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference

Dot+/Time

Organization

elinguished By (Signature)