

TAC

# GETTLER-RYAN INC.

1364 North McDowell Blvd. Suite B2  
Petaluma, CA 94954  
Phone (707) 789-3255, Fax (707) 789-3218

## TRANSMITTAL

TO: Mr. David DeWitt  
ConocoPhillips  
76 Broadway  
Sacramento, CA 95818

DATE: August 28, 2003  
PROJECT NO. 140101.5  
SUBJECT: Station No. 6419, Dublin

FROM: Jeremy Smith

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# GETTLER-RYAN INC.

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## CORRECTIVE ACTION PLAN

for

ConocoPhillips (76) Service Station No. 6419  
6401 Dublin Boulevard  
Dublin, California


Report No. 140101.5

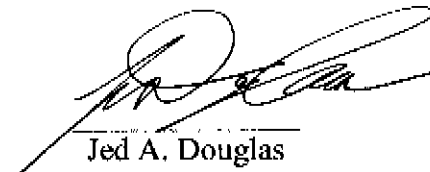
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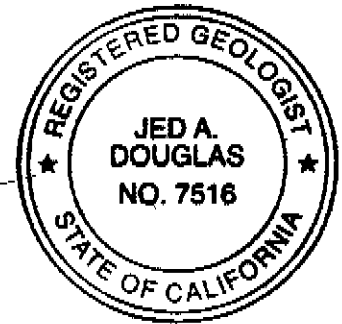
Mr. David DeWitt  
ConocoPhillips  
76 Broadway  
Sacramento, California 95818

Prepared by:

Gettler-Ryan Inc.  
1364 N. McDowell Blvd., Suite B2  
Petaluma, California 94954

  
Jeremy A. Smith  
Staff Geologist

  
Jed A. Douglas  
Senior Geologist  
R.G. 7516



August 28, 2003

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# CORRECTIVE ACTION PLAN

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Dublin, California

Report No. 140101.5

## 1.0 INTRODUCTION

At the request of ConocoPhillips, Gettler Ryan, Inc. (GR) has prepared this Corrective Action Plan (CAP) for the subject site. This CAP evaluates various remedial options and selects the most feasible and cost effective option to target the dissolved petroleum hydrocarbon plume.

This CAP has been prepared based on the guidelines presented in the California Code of Regulations, Title 23, Division 3, Chapter 16, Article II, Sections 2725(b), (d), and (e) through (g), and formatted per the requirements of this regulation.

## 2.0 SITE DESCRIPTION

### 2.1 General

The subject site is an active service station located on the western corner of Dublin Boulevard and Dougherty Road in Dublin, California (Figure 1). The site is bounded to the southeast by Dublin Boulevard, to the northeast by Dougherty Road, and to the northwest and southwest by a shopping center parking lot. Properties in the immediate site vicinity are used for a mixture of commercial purposes that include service stations and retail shopping facilities. The site is located at an approximate elevation of 330 feet above mean sea level.

Current aboveground site facilities consist of two dispenser islands under a canopy, a car wash, and a station building/convenience store. Two 12,000-gallon gasoline underground storage tanks (USTs) are located in the common pit immediately east of the station building. Eight monitoring wells and one conductor casing well exist at and in the site vicinity. Pertinent site features are shown on Figure 2

### 2.2 Previous Environmental Work

On September 7, 1993, two 10,000-gallon gasoline USTs, one 550-gallon waste oil UST, one 6,000-gallon underground septic tank, and the associated product piping were removed from the site under observation by Kaprealian Engineering Inc. (KEI). Groundwater was observed entering the UST excavation at a depth of approximately 14 feet below ground surface (bgs). Two 12,000-gallon and one 520-gallon double-wall glasteel USTs were installed in the same pit immediately northeast of the canopy and dispenser islands. Seven soil samples were collected from the sidewalls and bottom of the gasoline UST excavation at depths ranging from 13.5 to 17 feet bgs and analyzed for Total Petroleum

Hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, and xylenes (BTEX), and total lead. Petroleum hydrocarbon concentrations ranged from not detected to 2.6 parts per million (ppm) of TPHg and up to 0.11 ppm of benzene.

Eight soil samples were collected from beneath the dispenser islands at depths of 2.5 and 5.5 feet bgs. These samples were reported as not detected for TPHg and BTEX. Total lead concentrations in these samples ranged from 4.8 to 14 ppm. Seven soil samples were collected from beneath the product lines at depths ranging from 3 to 7 feet bgs and analyzed for TPHg, BTEX, and total lead. Petroleum hydrocarbon concentrations ranged from not detected to 9.7 ppm of TPHg and not detected to 0.15 ppm of benzene.

Two soil samples were collected from beneath the former septic tank at a depth of 10 feet bgs and were reported as not detected for TPHg and BTEX. One soil sample was collected from beneath the former waste oil UST at a depth of 8 feet bgs and analyzed for TPHg, BTEX, Total Petroleum Hydrocarbons as diesel (TPHd), Oil and Grease (O&G), volatile organic compounds (VOCs) and five metals. The sample contained 6.8 ppm of TPHg, 0.050 ppm of benzene, background concentrations of various metals, and was not detected for TPHd, O&G, and VOCs (KEI, 1993).

Approximately 7,000 gallons of groundwater were removed from the UST excavation on September 10, 1993. After purging, groundwater stabilized at approximately 15 feet bgs, at which time groundwater sample W1 was collected. The sample was reported to contain 2,600 parts per billion (ppb) of TPHg, 33 ppb of benzene, 530 ppb of TPHd, allowable concentrations of 5 metals, and was reported as not detected for O&G and VOCs. On September 13 and 14, 1993, approximately 12,000 additional gallons of groundwater was removed from the excavation. Groundwater sample W2 was collected from the excavation after groundwater had stabilized at approximately 12 feet bgs and was analyzed for TPHg and BTEX. The sample contained 740 ppb of TPHg and 14 ppb of benzene. A hydrocarbon sheen was observed on the surface of the groundwater in the southwest corner of the excavation (KEI, 1993a).

As part of the UST replacement activities, approximately 850 cubic yards of soil was excavated and stockpiled onsite. Approximately 750 cubic yards of soil was transported to The Browning Ferris Incorporated (BFI) Vasco Road Landfill in Livermore, California. In addition, approximately 100 cubic yards of soil was transported to Forward, Inc. Landfill in Stockton, California for disposal. The 19,000 gallons of purged groundwater were transported to, treated, and disposed of at the ConocoPhillips refinery located in Rodeo California (KEI, 1993b).

Three onsite 2-inch diameter groundwater monitoring wells (MW-1, MW-2, and MW-3) were installed in February 1994. Ten soil samples were collected during drilling at depths ranging from 5 to 17 feet bgs and analyzed for TPHg and BTEX.

In July 1998, Environmental Resolutions, Inc. (ERI) conducted a four day soil vapor extraction test at the site. Based on photoionization detector (PID) readings from each well, monitoring well MW-1 was selected as the extraction well. During the course of the test, MtBE concentrations in the vapor stream from MW-1 decreased from 1,700 to 47 ppb. ERI estimated that approximately 0.53 pounds of TPHg and 6.5 pounds of MtBE (approximately 1 gallon of gasoline/additive) were extracted

during the four day test. Vacuum measurements obtained from MW-2 and MW-3 during the test indicated that the effective radius of influence was likely to be less than 40 feet (ERI, 1998).

In June 1999, four onsite soil borings were drilled and completed as groundwater monitoring wells MW-4 through MW-7. The wells were each installed to a total depth of approximately 19 feet bgs. Selected soil samples from the well borings were analyzed for TPHg, BTEX, and MtBE. Petroleum hydrocarbons were not detected in the four soil samples collected from the soil borings except for 0.33 ppm of MtBE in a sample from well boring MW-6 at 12 feet bgs, and 0.010 ppm of benzene and 0.0080 ppm of xylenes detected in a sample from well boring MW-7 at 6 feet bgs (GR, 1999).

In November 1999, a four-inch diameter, slotted poly-vinyl chloride (PVC) Tank Pit Well was installed in the gasoline UST pit backfill to allow purging of MtBE-impacted groundwater. Purging of TPW-1 was initiated in December of 1999. From December 23, 1999 through December 24, 2002, approximately 649,600 gallons of groundwater were removed from well TPW-1 and an estimated total of 130.21 pounds of MtBE were removed from the site. On February 5, 2003, ConocoPhillips concurred with GR's recommendation to stop the groundwater purging, based on asymptotic levels of cumulative pounds of MtBE removed. A total of approximately 679,600-gallons of groundwater were removed during purging of TPW-1 from December 1999 to February 2003. The purged groundwater was transported to, treated, and disposed of at the ConocoPhillips refinery located in Rodeo, California.

In September 2001, two offsite monitoring wells (MW-8 and MW-9) were installed to a depth of 20 feet bgs. Two soil samples from each well boring at depths of 5.5 and 7.5 feet bgs were analyzed for TPHg, BTEX, and MtBE. The soil samples were all reported as non detected for the constituents analyzed.

Historically, dissolved hydrocarbon concentrations in groundwater have ranged from not detected to 9,200 ppb of TPHg, not detected to 130 ppb of benzene, and not detected to 140,000 ppb of MtBE, with well MW-1 showing the highest concentrations.

### 2.3 Geology and Hydrogeology

The subject site is located within the Dublin Sub-basin of the Livermore Valley Groundwater Basin and the site vicinity is underlain by Holocene age fine grained alluvium that is described as unconsolidated, plastic, moderately to poorly sorted carbonaceous silt and clay materials that are generally less than 10 feet thick. The site is situated less than 0.5 miles from two mapped geologic contacts separating the recent alluvium from Late Pleistocene alluvial deposits and Holocene medium-grained alluvium. The sequence consists of weakly consolidated slightly weathered, poorly sorted, irregularly interbedded clay, silt, sand, and gravel, with a thickness of at least 150 feet. The younger deposits consist of unconsolidated, moderately sorted, permeable fine sand, silt, and clayey silt with a few thin beds of coarse sand, with a maximum thickness of 12 feet in the vicinity of the site (United States Geological Survey, 1979). The site is also located approximately 0.6 miles west of the Pleasanton Fault and 1.4 miles east of the Calaveras Fault (California Division of Mines and Geology, 1990). The nearest surface water is an unnamed Canal, located approximately 1,000 feet

southwest of the site.

Boring logs from soil borings and monitoring wells indicate that the site is underlain by approximately 6 to 12 feet of artificial fill material consisting of clay, gravel, and sand which overlie the native soil at the site. The unsaturated (vadose) zone is comprised predominantly of clay and silt. The saturated zone is comprised of clay with lenses of sand and clayey or sandy gravel. Groundwater was initially encountered during drilling activities at depths ranging from approximately 12 to 18 feet bgs.

The static depth to groundwater in the existing monitoring wells ranged from 5.63 to 6.85 feet below TOC on February 17, 2003. Groundwater flow direction varied with a calculated gradient of 0.005 to 0.01 ft/ft. Historical depth to water has ranged from 5.09 to 9.64 feet below TOC. The historical groundwater flow direction has been reported as variable with more recent events reported as predominantly southwest.

### **3.0 CORRECTIVE ACTION PLAN COMPONENTS**

#### **3.1 Impact Assessment**

- 1. The physical and chemical characteristics of the hazardous substance or its constituents, including their toxicity, persistence, and potential for migration in water, soil, and air:**

Based on the analytical results for both soil and groundwater samples collected to date, the primary contaminant appears to be gasoline (BTEX constituents and MtBE). Material Safety Data Sheets (MSDS) for unleaded gasoline are attached in Appendix A. The MSDS describe the physical and chemical characteristics of gasoline and its components.

The analytical results of the groundwater samples collected from the monitoring wells at and in the vicinity of the site indicate that dissolved concentrations of petroleum hydrocarbons are present in the wells. Free product has never been detected at the site. It is GR's understanding that as of January 1, 2001, ConocoPhillips no longer delivers fuel containing MtBE to service stations in northern California. ConocoPhillips has replaced MtBE with ethanol to comply with the federal requirement for oxygenated fuels in California.

- 2. The hydrogeologic characteristics of the site and the surrounding area where the unauthorized release has migrated or might migrate:**

The most recent monitoring and sampling event at the site was conducted on February 17, 2003. On this date, the measured depth to groundwater in the monitoring wells ranged from 5.63 to 6.85 feet below TOC. The groundwater flow direction at the site varied, but was predominantly southwest, at a calculated gradient of 0.005 to 0.01 ft/ft. The historical groundwater flow direction generally has been southwest.

Boring logs from soil borings and monitoring wells indicate that the saturated zone is comprised of clay with lenses of sand and clayey or sandy gravel. Groundwater was initially encountered at depths ranging from approximately 12 to 18 feet bgs.

The MtBE plume beneath the site is generally defined in the downgradient direction. However, recent quarterly sampling appears to indicate that the hydrocarbon plume may have migrated offsite beneath Dublin Boulevard.

**3. The proximity and quality of nearby surface waters, wetlands, or groundwater, and the current and potential beneficial uses of these waters:**

**Surface Waters**

Based on the USGS Topographic Map for this area, the nearest surface water bodies are an unnamed canal located approximately 1,000 feet southwest of the site and Chabot Canal, located approximately 1,700 feet east of the site. The South San Ramon Creek is located approximately 2,400 feet west of the site and flows generally to the south. The unnamed canal flows generally towards the south into the South San Ramon Creek which empties into the Arroyo de la Laguna which flows southward along the eastern base of the Pleasanton Ridge. Eventually the Arroyo de la Laguna empties into Alameda Creek, which in turn flows westerly and ultimately drains to San Francisco Bay.

According to information contained in the Water Quality Control Plan for the Regional Water Quality Control Board (RWQCB), San Francisco Bay Basin (Basin Plan) dated June 21, 1995, the existing and potential beneficial uses for the San Francisco Bay are as follows:

- Ocean, Commercial, and Sport Fishing
- Estuarine Habitat
- Industrial Service Supply
- Fish Migration
- Navigation
- Preservation of Rare and Endangered Species
- Water Contact Recreation
- Non-Contact Water Recreation
- Shellfish Harvesting
- Fish Spawning (Potential)
- Wildlife Habitat

No discharges (past or present) to surface waters at the subject site are known to GR.

Wetlands

There are no wetlands in the vicinity of the site. Per the Basin Plan and topographic maps, the



nearest wetlands are located in Coyote Hills, west of the city of Fremont, approximately 12 miles southwest of the site. Additionally, the wetlands are separated from the site by the East Bay Hills.

#### Groundwater

Per the Basin Plan, the existing and potential beneficial uses applicable to groundwater in the San Francisco Basin include municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply.

#### **4. The potential effects of residual contamination on nearby surface water, wetlands, and groundwater:**

According to the Geotracker Website, there is one public water producing well located within 1 mile of the site, however Geotracker reported that this well was abandoned. Based on the information presented in subsections 2 and 3 above, the potential effects of residual contamination on nearby surface water and wetlands is considered to be minimal. However, based on the analytical results of the groundwater samples collected from the monitoring wells to date, the first aquifer beneath the site has been impacted by petroleum hydrocarbons. Because of the lack of potential receptors within 1 mile of the site, it is highly unlikely that impacted groundwater from beneath the site will adversely affect the public drinking water supply.

#### 3.2 Feasibility Study

**The responsible party shall conduct a feasibility study to evaluate the alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release. Each alternative shall be evaluated for cost effectiveness, and the responsible party shall propose to implement the most cost-effective corrective action:**

GR has reviewed various proven and recent remedial options that are available for use at the site. The following is a brief description and comparison of those options:

#### **OPTION #1 - NO REMEDIAL ACTION/LONG TERM MONITORING AND NATURAL ATTENUATION**

**COST:** \$25,000 to \$50,000

**TIME FRAME:** Long term

**ADVANTAGES:** 1) Low annual cost  
2) Minimal disruption of station operations

**DISADVANTAGES:** 1) Potential liability  
2) No defined project completion/closure

3) Potential migration of hydrocarbons

CONCLUSION: Not a suitable approach for this site at this time. However, groundwater monitoring and sampling will continue at the site.

**OPTION #2 - EXCAVATION OF IMPACTED SOIL**

COST: \$200,000 to \$400,000

TIME FRAME: Short term

ADVANTAGES: 1) Potential for quick and effective source removal if site conditions are favorable.

DISADVANTAGES: 1) Excavation would disrupt station activities and is not feasible due to onsite above and below ground structures.  
2) Excavation does not address hydrocarbon impacted groundwater, therefore, hydrocarbon impact in the capillary fringe zone would be expected to remain.

CONCLUSION: Not a suitable approach for this site; more appropriate methods are available.

**OPTION #3 - GROUND WATER PUMP AND TREAT**

During December 1999 through February 2003, weekly groundwater purging events were performed from the conductor casing well installed in the UST cavity. During the purging events, approximately 679,600-gallons of groundwater were removed from the site. Groundwater purging events were terminated in February 2003 based on asymptotic levels being reached.

COST: \$250,000 to \$550,000

TIME FRAME: Long term

ADVANTAGES: 1) Potential for hydraulic control.  
2) Removal of hydrocarbon impacted groundwater can reduce dissolved hydrocarbon concentrations.

DISADVANTAGES: 1) Lawrence Livermore National Laboratory report issued in 1995 found that pump and treat remediation is recognized as being ineffectual at reaching cleanup goals, since asymptotic levels are typically reached prior to achieving cleanup goals.  
2) Construction and operation costs for an extraction system would be high.

- 3) Disruption of station activities in order to install wells and piping.

**CONCLUSION:** Aquifer testing would be required to determine if this technology is feasible for this site. Based on groundwater purging events at the site reaching asymptotic levels, more appropriate methods are available.

#### **OPTION #4 - VAPOR EXTRACTION**

**COST:** \$200,000 to \$400,000

**TIME FRAME:** Medium to long term due to low hydrocarbon extraction rate

**ADVANTAGES:**

- 1) Can remediate capillary fringe soils.
- 2) Can reduce dissolved concentrations in ground water.

**DISADVANTAGES:**

- 1) Ineffective in fine grained soils such as silt and clay encountered at the site.
- 2) Disruption of station activities in order to install wells and piping.
- 3) Construction and operation costs for a extraction system would be high.

**CONCLUSION:** Based on the fine grained soils beneath the site, VE is not a suitable approach for this site; more appropriate methods are available.

#### **OPTION #5 – OZONE MICROSPARGING**

Ozone microsparging is a process where ozone in air is introduced into the groundwater through specially designed spargers to create small “microbubbles.” As these microbubbles rise within the column of water, the dissolved VOCs are rapidly oxidized. Low total flow rates (2-6 cfm) are used. Any ozone not consumed in the direct reaction with hydrocarbons rapidly decomposes to oxygen. This has an added benefit of stimulating the natural biological degradation.

**COST:** \$95,000 to \$225,000

**TIME FRAME:** Short term for impacts on and near the site, longer for offsite impacts.

**ADVANTAGES:**

- 1) Relatively low equipment and operating costs.
- 2) Because of low flow rates, vapor extraction to capture off gassing is not required.
- 3) Natural biodegradation rates may be enhanced by introduction of oxygen.
- 4) GR tests at other sites indicates the ability of an ozone air mixture to degrade MtBE, which is the main constituent of concern.

DISADVANTAGES: 1) Areas outside of the injection point radius of influence may take longer to treat.  
2) Might be difficult to treat large areas.

CONCLUSION: A feasible and cost effective approach for remediating impacted groundwater beneath the site.

### FEASIBILITY STUDY (Continued)

1. **For all sites, each recommended alternative shall be designed to mitigate nuisance conditions and risk of fire or explosion:**

A site-specific Health and Safety Plan (HSP) will be prepared for the approved scope of work. The HSP will be implemented during site activities in order to ensure site and community safety. The GR Company *Health and Safety Plan*, revised on February 11, 2002, covers construction and maintenance activities that may occur during installation and operation of an ozone microsparge system, and includes procedures to mitigate the potential for fire, explosion, or unauthorized release of ozone.

2. **For sites where unauthorized release affects or threatens water with current or potential beneficial uses designated in water quality control plans, the feasibility study shall also identify and evaluate at least two alternatives for restoring or protecting these beneficial uses:**

As previously stated in this CAP, the dissolved petroleum hydrocarbons that are present beneath the subject site do not appear to threaten any surface water or wetlands in the vicinity of the site that have a current or potential beneficial use. However, the groundwater in the vicinity of the site has been classified by the RWQCB as an area of current and/or potential beneficial use. Therefore, GR recommends installation of an ozone microsparge system to remediate the impacted groundwater beneath and in the vicinity of the site.

The existing groundwater monitoring wells are currently monitored and sampled semi-annually. This program will be continued and modified, as appropriate, to provide verification monitoring of corrective action effectiveness and progress towards cleanup levels.

### 3.3 Cleanup Levels

Cleanup levels for ground or surface waters, affected or threatened by the unauthorized release, shall meet the following requirements:

- (i) *For waters with current or potential beneficial uses for which numerical objectives*

*have been designated in water quality control plans, the responsible party shall propose at least two alternatives to achieve these numerical objectives.*

- (ii) *For waters with current or potential beneficial uses for which no numerical objectives have been designated in water quality control plans, the responsible party shall recommend target cleanup levels for long-term corrective actions to the regulatory agency for concurrence.*

Final cleanup level goals for MtBE and BTEX constituents will be the California Department of Health Services Maximum Contaminant Levels (MCLs), which are 13 ppb for MtBE, 1.0 ppb for benzene, 150 ppb for toluene, 300 ppb for ethylbenzene and 1,750 ppb for xylenes.

If the above MCL cleanup levels cannot be attained, then remediation will cease when asymptotic concentrations are reached. Concentrations will be declared to be asymptotic when no statistically significant changes are observed.

If it appears that the cleanup goals cannot be attained, an evaluation of risk to human health and environment (Risk-Based Corrective Action or RBCA) may be proposed. The RBCA would determine site specific Risk Based Screening Levels, which could then be implemented for the site.

### 3.4 Remedial Action Plan

Based on the information provided and the various remedial alternatives evaluated in this CAP, GR recommends the installation of an ozone sparge system, presented as Option #5 above. Proposed microsparge point locations are shown on Figure 2. The ozone sparge system will consist of 10 sparge points (SP-1 through SP-10) placed at depths of approximately 25 feet bgs to target the shallow impacted groundwater.

Once the remedial system is installed and operating for a period of six months, a system status report will be issued, which will include progress monitoring results. Further status reports will be prepared and submitted on a semi-annual basis.

## **4.0 Work Plan for Ozone Microsparge System Installation**

GR proposes to install ten microsparge points to initiate remediation of the known hydrocarbon plume beneath and in the vicinity of the site. The proposed sparge points will target the shallow impacted groundwater. The proposed locations of the sparge points are presented on Figure 2.

### 4.1 Pre-Field Activities

GR will update the site-specific safety plan and obtain the necessary drilling permits from the Alameda County Environmental Health Services. A private utility locator will be contracted to

locate any underground utilities near the proposed drilling locations and Underground Service Alert (USA) will be notified 48 hours prior to drilling.

#### 4.2 Drilling and Sampling

Drilling and sparge point construction activities will be performed by a California licensed driller. A GR geologist will observe the drilling, collect soil samples for possible chemical analyses, describe the encountered soil, and prepare a log of each boring, as detailed in GR's Field Methods and Procedures (Appendix B). The borings will be advanced using 8-inch-diameter hollow-stem augers driven by a truck-mounted drill rig.

Soil samples from each sampled interval will be screened in the field for the presence of volatile organic compounds using a photoionization detector (PID). Soil screening data will be collected for reconnaissance purposes only, and will not be used as verification of the presence or absence of petroleum hydrocarbons. Screening data will be recorded on each boring log.

#### 4.3 Sparge Point Installation

The sparge points will be constructed with 2-inch diameter sparge points attached to ¾-inch blank schedule 80 PVC casing installed through the hollow-stem augers. The sparge points are composed of 30-inch long sections of microporous plastic. It is anticipated that the sparge points will be installed to a depth of approximately 25 feet bgs. The actual installed depth of the sparge points will be depended upon field conditions. Proposed sparge point construction details are presented on Figure 3.

Select soil samples collected for description and possible chemical analysis will be obtained from select borings. The actual number of samples submitted for chemical analysis will depend on site conditions and field screening data.

Drill cuttings will be stockpiled at the site pending analysis and disposal. Stockpiled cuttings will be placed on and covered with plastic sheeting. Four soil samples from the drill cuttings will be collected for disposal characterization as described in Appendix B. Upon approval from the landfill, the drill cuttings will be transported by a ConocoPhillips-approved soil hauler to Forward Landfill, located in Manteca, California. Water generated during cleaning of the drilling equipment will be stored at the site in properly labeled drums, pending transportation to the ConocoPhillips Refinery in Rodeo, California, for disposal.

#### 4.4 Laboratory Analyses

All samples will be submitted to a California-certified Hazardous Materials Testing Laboratory. Selected soil samples will be analyzed for TPHg, BTEX, and the fuel oxygenates MtBE, tertiary butyl alcohol (TBA), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), and tertiary amyl methyl

ether (TAME) by EPA Method 8260. The disposal characterization sample from the soil stockpile will be analyzed for TPH<sub>g</sub>, BTEX, MtBE, and total lead as required by the disposal facility.

#### 4.5 Reporting

Following receipt and analysis of all data, and the installation and startup of the ozone microsparge system is complete, a report detailing the installation procedures, startup of the system, progress sampling, and status reporting will be prepared. In addition, select wells will be sampled on a monthly basis to monitor system progress. These reports will be submitted to ConocoPhillips for their use and distribution.

#### 4.6 Schedule

The proposed activities detailed in the Work Plan will commence upon regulatory approval of this CAP.

#### 4.7 Staff

Mr. Jed A. Douglas, a Registered Geologist in the State of California (R.G. No. 7516) will provide technical oversight and review of the work. Mr. David Vossler, Project Manager, will supervise implementation of the field and office operations. GR employs a staff of geologists, engineers, and technicians who will assist with the project.

### **5.0 REFERENCES**

Gettler-Ryan Inc., Remedial Status Report, Tosco (76) Facility No. 6419, 6401 Dublin Boulevard, Dublin, California, dated June 12, 2003.

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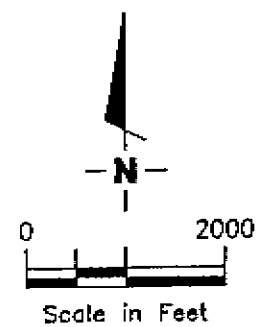
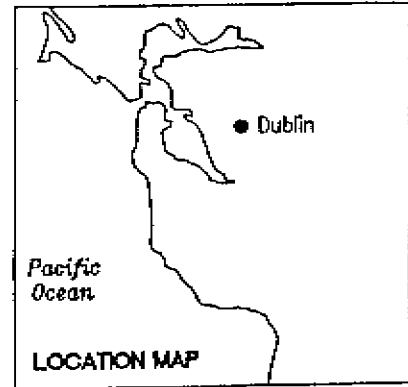
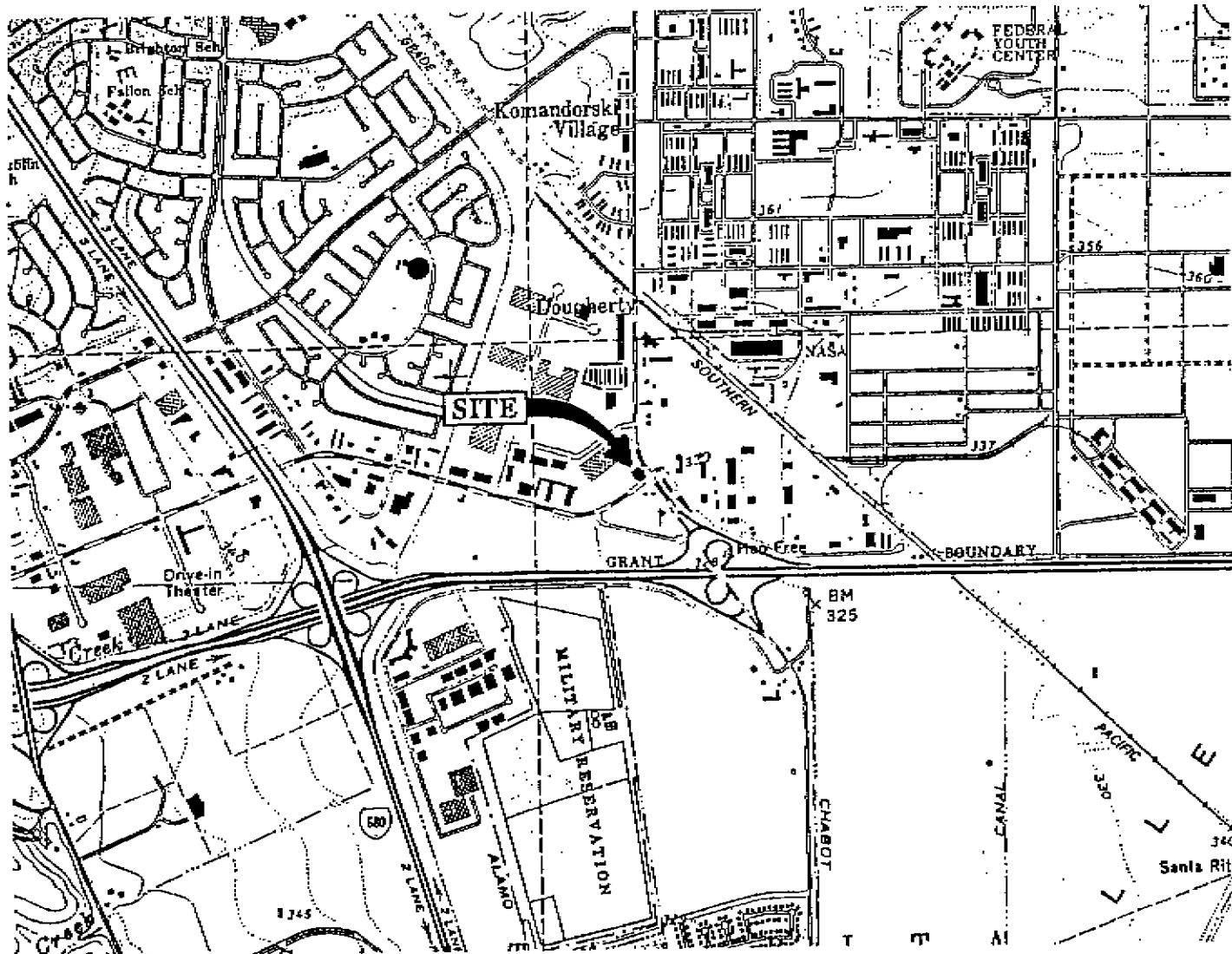
Gcotracker website - <http://www.geotracker.swrcb.ca.gov/>

United States Geologic Survey 7.5 minute Topographic Map, 1961, Dublin Quadrangle, photorevised 1980.

United States Geological Survey, 1979, Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties, and Their Importance to Comprehensive Planning, Professional Paper 943.



## FIGURES



Base Map: USGS Topographic Map



**Gettler - Ryan Inc.**

6747 Sierra Ct., Suite J (925) 551-7555  
Dublin, CA 94568

VICINITY MAP  
Tosco 76 Branded Facility #6419  
6401 Dublin Boulevard  
Dublin, California

FIGURE 1

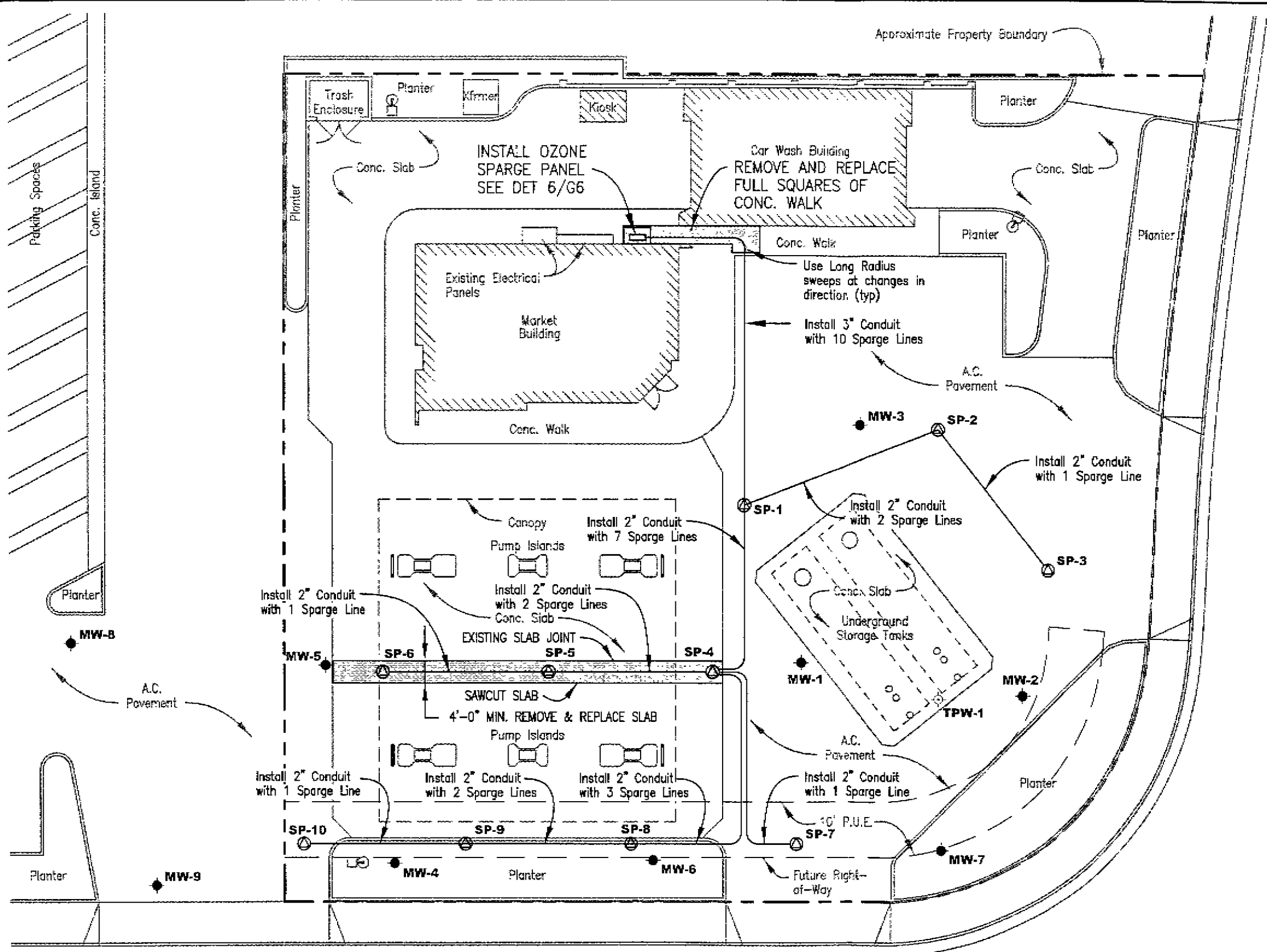
JOB NUMBER  
140101

REVIEWED BY

DATE  
November, 1998

REVISED DATE

FILE NAME: \\G:\p\w2\server\Remediation\Tosco\6419 Dublin\Drawings\6419 SPARC.dwg | Layout Tab: G2



**LEGEND**

- ◆ EXISTING GROUNDWATER MONITORING WELL
- ⊙ NEW OZONE SPARGE POINT

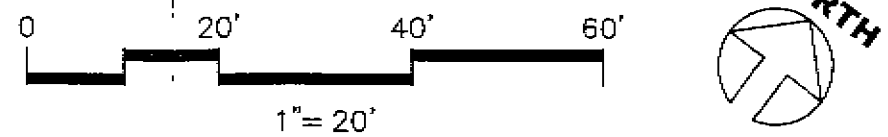
**SITE SPECIFIC NOTES**

1. EXISTING BURIED PIPE AND UTILITY LOCATIONS SHOWN ARE APPROXIMATE AS DETERMINED FROM EXISTING RECORDS. CONTRACTOR SHALL DETERMINE THE EXACT LOCATION AND DEPTH OF ALL BURIED PIPES AND UTILITIES, WHETHER SHOWN OR NOT SHOWN ON THESE PLANS, PRIOR TO THE START OF CONSTRUCTION. NOTIFY UNDERGROUND SERVICE ALERT, PHONE 1-800-642-2444, AT LEAST TWO WORKING DAYS PRIOR TO THE START OF WORK

**PRELIMINARY**  
NOT FOR CONSTRUCTION  
8-6-03

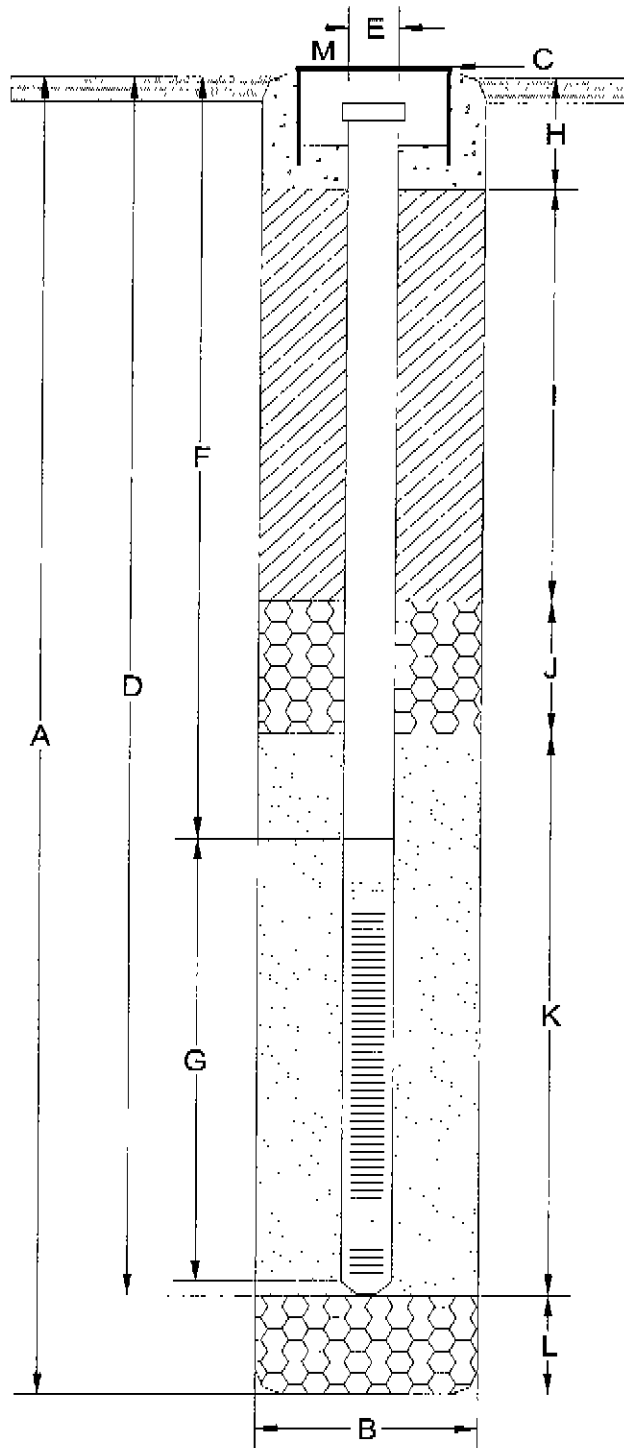
DUBLIN BOULEVARD

**SITE PLAN**



		<b>Gettler - Ryan Inc.</b> 1364 North McDowell Boulevard Suite B2 Petaluma, CA 94954 (707) 789-3255	<b>ConocoPhillips</b> 78 Broadway Sacramento, CA 95818	PROJECT: 140101.6	TITLE:		
				FACILITY: ConocoPhillips (76) Station No. 6419 6401 Dublin Boulevard Dublin, California 94568	<b>NEW CONSTRUCTION SITE PLAN</b>		
REV #	REVISION	BY	DATE	DATE: PREL'M	SHEET: 3 of 7	DRAWING No. <b>G2</b>	A

# WELL CONSTRUCTION DETAIL



- A Total Depth of Boring 25 ft.
- B Diameter of Boring 8 in.  
Drilling Method Hollow Stem Auger
- C Top of Casing Elevation \_\_\_\_\_ ft.  
 Referenced to Mean Sea Level  
 Referenced to Project-Datum
- D Casing Length 22.5 ft.  
Material Sch. 80 PVC
- E Casing Diameter 0.75 in.
- F Depth to Top Perforations 22.5 ft.
- G Perforated Length 2.5 ft.  
Perforated Interval from 22.5 to 25 ft.  
Perforation Size Microporous Plastic in.
- H Surface Seal from 0 to 1 ft.  
Seal Material Concrete
- I Backfill from 1 to 19.5 ft.  
Backfill Material Neat Cement
- J Seal from 19.5 to 21.5 ft.  
Seal Material Bentonite
- K Gravel Pack from 22.5 to 25 ft.  
Pack Material #2/16 Lonestar Sand
- L Bottom Seal NA ft.  
Seal Material \_\_\_\_\_
- M Traffic graded steel well cover

Note: Depths measured from initial ground surface.

FIGURE

**3**



**GETTLER - RYAN, INC.**

6747 Sierra Ct., Suite J (925) 651-7555  
Dublin, CA 94568

## Construction Details for Ozone Sparge Point

ConocoPhillips Station #6419  
6401 Dublin Boulevard  
Dublin, California

JOB NUMBER  
140101.5

REVIEWED BY  
JAS

DATE  
07/10/03

REVISED DATE

REVISED DATE

APPENDIX A

MATERIAL SAFETY DATA SHEETS FOR GASOLINE

**MATERIAL SAFETY DATA SHEET**

Product Name: Gasoline with Ethanol  
 Product Code: Multiple

Page 2 of 15

**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Name: Gasoline with Ethanol

Product Code: Multiple

Synonyms: Conventional Unleaded Gasolines - All Grades - Ethanol @ 5.7, 7.7, 8.0, 8.2, 10.0%  
 OPRG 87, 89, 90, 91, 92 Octane - Ethanol @ 6.0%  
 RFG - All Grades - 7.4, 8.3, 11.5, 13.5, 15.0 - Ethanol @ 5.7%

Generic Name: Unleaded Gasoline

Responsible Party: **Wosco Corporation**  
 72 Cummings Point Road  
 Stamford, CT  
 06901

For further information contact Help Desk  
 8am - 4pm Pacific Time, Mon-Fri: 1-800-762-0942

**EMERGENCY OVERVIEW**

**24 Hour Emergency Telephone Numbers:**

For Chemical Emergencies:  
 Spill, Leak, Fire or Accident  
 Call CHEMTREC  
 North America: (800)424-9300  
 Others: (703)527-3887 (collect)

For Health Emergencies:  
 California Poison  
 Control System  
 Cont. US: (800)356-3129  
 Outside US: (415)821-5338

**Health Hazards:** May be harmful or fatal if swallowed. Aspiration hazard. Possible cancer hazard based on animal data. Vapor harmful. Causes moderate to severe skin irritation. Causes eye irritation. A component is a birth defect hazard. Use ventilation adequate to keep exposure below recommended limits, if any. Avoid exposure during pregnancy. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

**Physical Hazards:** Extremely flammable liquid and vapor. Vapor can cause flash fire. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

► **Physical Form:** Liquid

Issue Date: 03/29/99

Status: Final Revised

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Product Name: Gasoline with Ethanol  
 Product Code: Multiple

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- ▶ Appearance: Clear to amber.
- ▶ Odor: Gasoline

NFPA HAZARD CLASS: Health: 1 (Slight)  
 Flammability: 3 (High)  
 Reactivity: 0 (Least)

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

HAZARDOUS COMPONENTS	% Weight	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Gasoline	90-100	300 ppm	ACGIH	TWA
CAS# None		500 ppm	ACGIH	STEL
Xylenes	1-14	100 ppm	ACGIH	TWA
CAS# 1330-20-7		150 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
		1000 ppm	NIOSH 1990	IDLH
Ethanol	<10	1000 ppm	ACGIH	TWA
CAS# 64-17-5		1000 ppm	OSHA	TWA
Toluene	1-9	50 ppm	ACGIH	TWA-SKIN
CAS# 108-88-3		200 ppm	OSHA	TWA
		500 mg/m3	OSHA	STEL
		300 ppm	OSHA	CEIL
		2000 ppm	NIOSH 1990	IDLH
1,2,4-Trimethyl Benzene	1-5	25 ppm	ACGIH	TWA
CAS# 95-63-6				
Ethyl Benzene	1-5	100 ppm	ACGIH	TWA
CAS# 100-41-4		125 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
		2000 ppm	NIOSH 1990	IDLH
n-Hexane	<4	50 ppm	ACGIH	TWA
CAS# 110-54-3		500 ppm	OSHA	TWA
		5000 ppm	NIOSH 1990	IDLH
Cyclohexane	<2	300 ppm	ACGIH	TWA
CAS# 110-82-7		400 ppm	OSHA	TWA
		10000 ppm	NIOSH 1990	IDLH
Benzene	<1.2	0.5 ppm	ACGIH	TWA-SKIN
CAS# 71-43-2		2.5 ppm	ACGIH	STEL-SKIN

Issue Date: 03/29/99

Status: Final Revised

Revised Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14

1 ppm	OSHA	TWA
5 ppm	OSHA	STEL
3000 ppm	NIOSH 1990	IDLH

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Contains benzene. If exposure concentrations exceed the 0.5 ppm action level, OSHA requirements for personal protective equipment, regulated areas and training may apply (29CFR1910.1028). Also see Section 4.

### 3. HAZARDS IDENTIFICATION

#### POTENTIAL HEALTH EFFECTS:

**Eye:** Eye irritant. Contact may cause stinging, watering, redness, and swelling.

**Skin:** Skin irritant. Contact may cause redness, itching, and burning of the skin. Prolonged or repeated contact may cause drying and cracking of the skin, burns, and severe skin damage. Contact may result in skin absorption but symptoms of toxicity are not anticipated by this route alone under normal conditions of use.

**Inhalation (Breathing):** Low to moderate degree of toxicity by inhalation.

**Ingestion (Swallowing):** Low degree of toxicity by ingestion.  
ASPIRATION HAZARD - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

**Signs and Symptoms:** Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, vomiting, flushing, transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, and fatigue), blurred vision, drunkenness, stupor, tremors, respiratory failure, unconsciousness, convulsions and death.

**Cancer:** A component is a known cancer hazard (see Section 11).

**Target Organs:** Overexposure may cause injury to the central nervous system, stomach, liver, male reproductive system and heart (see Section 11).



**Developmental:** A component is a potential hazard to the fetus (see Section 11).

**Other Comments:** Most adverse health effects associated with ethanol, a component of this material, are related to the chronic ingestion of alcoholic beverages. Alcoholism has been associated with liver, stomach, heart, and nervous system damage, cancer, adverse reproductive effects, and effects on the developing fetus. Many of these effects may be related to the profound metabolic changes that result from constantly high blood levels of alcohol. This exposure pattern is significantly different from that of persons handling industrial ethanol in the workplace or from refueling cars with gasoline containing ethanol.

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling this material may be harmful or fatal.

**Pre-Existing Medical Conditions:** Conditions aggravated by exposure may include skin disorders, respiratory (asthma-like) disorders and liver disorders.

Exposure to high concentrations of this material may increase the sensitivity of the heart to certain drugs. Persons with pre-existing heart disorders may be more susceptible to this effect (see Section 4 - Note to Physicians).

#### 4. FIRST AID MEASURES

**Eye:** Move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes with clean water and seek medical attention. For direct contact, hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes. Seek medical attention.

**Skin:** Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek medical attention.

**Inhalation (Breathing):** If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure

and into fresh air. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

**Ingestion (Swallowing):** Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

**Note To Physicians:** Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. Often these injuries require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

## 5. FIRE FIGHTING MEASURES

**Flammable Properties:** Flash Point: -49°F/-45°C  
OSHA Flammability Class: Flammable Liquid  
LEL%: 1.4 / UEL%: 7.6  
Autoignition Temperature: 833°F/444°C

**Unusual Fire & Explosion Hazards:** This material is extremely

Product Name: Gasoline with Ethanol  
Product Code: Multiple

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flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

**Extinguishing Media:** Dry chemical, carbon dioxide, or alcohol-resistant foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

**Fire Fighting Instructions:** For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

## 6. ACCIDENTAL RELEASE MEASURES

Extremely flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including

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Status: Final Revised

Revised Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14

respiratory protection as conditions warrant. (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Use water sparingly to reduce disposal requirements. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

## 7. HANDLING AND STORAGE

**Handling:** Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or APT RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practice.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty"

drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

**Storage:** Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

**Portable Containers:**

Static electricity may ignite gasoline vapors when filling portable containers. To avoid static buildup do not use a nozzle lock open device. Use only approved containers for the storage of gasoline. Place the container on the ground before filling. Keep the nozzle in contact with the container during filling.

Do not fill any portable container in or on a vehicle or marine craft.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

**Personal Protective Equipment (PPE):**

**Respiratory:** A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**Skin:** The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, absorption, and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

**Eye/Face:** Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

**Other Protective Equipment:** A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point: -49°F / -45°C

Flammable/Explosive Limits (%): LEL: 1.4 / UEL: 7.6

Autoignition Temperature: 833°F / 444°C

Appearance: Clear to amber

Physical State: Liquid

Odor: Gasoline

pH: Not applicable

Vapor Pressure (mm Hg): 350-760 @ 100°F

Vapor Density (air=1): >1

Boiling Point/Range: 80-450°F / 26-227°C

Freezing/Melting Point: No Data

Solubility in Water: Approx 10%

Specific Gravity: 0.72-0.75 @ 60°F

Percent Volatile: 100 vol. %

Product Name: Gasoline with Ethanol  
Product Code: Multiple

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Evaporation Rate (nBuAc=1): >1  
Bulk Density: 6.17 lbs/gal

## 10. STABILITY AND REACTIVITY

**Chemical Stability:** Stable under normal conditions of storage and handling. Extremely flammable liquid and vapor. Vapor can cause flash fire.

**Conditions To Avoid:** Avoid all possible sources of ignition (see Sections 5 and 7).

**Incompatible Materials:** Contact with strong oxidizing agents such as chlorine, dichromates, or permanganates can cause fire or explosion.

**Hazardous Decomposition Products:** The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. See Section 11 for additional information on hazards of engine exhaust, if any.

**Hazardous Polymerization:** Will not occur.

## 11. TOXICOLOGICAL INFORMATION

### Gasoline (CAS# None)

**Carcinogenicity:** Two year inhalation studies of wholly vaporized unleaded gasoline produced increased incidences of kidney tumors in male rats and liver tumors in female mice. Follow-up studies suggest that occurrence of the kidney tumors may be linked to alpha-2-u-globulin nephropathy, and most likely unique to the male rat. Epidemiology data collected from a study of more than 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer from gasoline exposure. Unleaded gasoline has been identified as a possible carcinogen by IARC.

Because solvent extracts of gasoline exhaust particulates caused skin cancer in laboratory animals, IARC has categorized gasoline engine exhaust as a possible human cancer hazard.

**Target Organ(s):** A two year inhalation study of wholly vaporized unleaded gasoline produced nephropathy in male rats.

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Revised Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14

characterized by the accumulation of alpha-2-u- globulin in epithelial cells of the proximal tubules, and necrosis and hyperplasia of surrounding cells. Follow up studies have demonstrated that these changes are unique to the male rat. Although prolonged exposure to n-hexane, a component of gasoline, has resulted in adverse male reproductive effects in experimental animal studies, no adverse male reproductive effects were found in studies conducted with gasoline.

**Developmental:** No evidence of developmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to up to 9,000 ppm vapor of unleaded gasoline via inhalation.

**Xylenes (CAS# 1330-20-7)**

**Target Organ(s):** A six week inhalation study with xylene produced hearing loss in rats.

**Developmental:** Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

**Ethanol (CAS# 64-17-5)**

**Carcinogenicity:** Ingestion of alcoholic beverages has been classified by IARC as "carcinogenic to humans" (Group 1). Occupational exposures to ethanol and exposures other than by ingestion (i.e., dermal and inhalation) have not been associated with cancer in humans.

**Target Organ(s):** Chronic alcoholism has been associated with damage to the liver in humans (e.g., cirrhosis of the liver). Excessive consumption of alcoholic beverages has also been associated with adverse effects on the central nervous system, digestive system, cardiovascular system, and the reproductive system including reduced sperm count and motility and loss of libido in men, abnormal menstrual function, and decreased plasma estradiol and progesterone levels in women.

**Developmental:** Excessive consumption of alcoholic beverages during pregnancy has been associated with effects on the developing fetus referred to collectively as the fetal alcohol syndrome. The effects most frequently manifested include psychomotor dysfunction, growth retardation and a characteristic cluster of facial anomalies.



**Mutagenicity:** Excessive consumption of alcoholic beverages has been associated with chromosomal aberrations in white blood cells. Depending on the animal species being tested, ethanol may produce chromosomal damage, DNA damage and mutation in both somatic and germ cells.

**Toluene (CAS# 108-88-3)**

**Target Organ(s):** Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

**Developmental:** Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

**Ethyl Benzene (CAS# 100-41-4)**

**Carcinogenicity:** Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has not been listed as a carcinogen by NTP, IARC, or OSHA.

**Target Organ(s):** In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), thyroid (hyperplasia) and pituitary (hyperplasia).

**n-Hexane (CAS# 110-54-3)**

**Target Organ(s):** Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.

Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

**Benzene (CAS# 71-43-2)**

**Carcinogenicity:** Benzene is an animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

**Target Organ(s):** Human exposure to benzene has been linked to bone marrow toxicity which can result in blood disorders such as leukopenia, thrombocytopenia, anemia, and aplastic anemia.

**Developmental:** Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body weight and increased skeletal variations in rodents. Alterations in hematopoiesis have been observed in the fetuses and offspring of pregnant mice.

**Mutagenicity:** Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells, and DNA damage in mammalian cells in vitro.

**12. DISPOSAL CONSIDERATIONS**

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

Product Name: Gasoline with Ethanol  
Product Code: Multiple

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### 13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Gasoline  
Hazard Class or Division: 3  
ID #: UN1203  
Packing Group: II

### 14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

COMPONENT	CAS NUMBER	WEIGHT %
Xylenes	1330-20-7	1-14
Toluene	108-88-3	1-9
1,2,4-Trimethyl Benzene	95-63-6	1-5
Ethyl Benzene	100-41-4	1-5
n-Hexane	110-54-3	<4
Cyclohexane	110-82-7	<2
Benzene	71-43-2	<1.2

**Warning:** This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

COMPONENT	EFFECT
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant
Unleaded Gasoline (wholly vaporized)	Cancer

Unleaded gasoline has been identified as a carcinogen by IARC. For carcinogenicity information on individual components, see Section 11.

EPA (CERCLA) Reportable Quantity: --None--

### 15. DOCUMENTARY INFORMATION

Issue Date: 03/29/99  
Previous Issue Date: 03/26/98  
Product Code: Multiple

Issue Date: 03/29/99 Status: Final Revised  
Revised Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14

Product Name: Gasoline with Ethanol

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Product Code: Multiple

Previous Product Code: Multiple

#### 16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Issue Date: 03/29/99

Status: Final Revised

Revised Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14

APPENDIX B

GR FIELD METHODS AND PROCEDURES

**GETTLER-RYAN INC.**  
**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 contents of these plans 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 boring log. 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 (yd<sup>3</sup>) of stockpiled soil material. Four arbitrary points on the stockpiled material are chosen, and discrete soil samples are 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 or aluminum foil, 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 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. 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  $\pm 0.01$  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.