*Prepared for:*

**Montrose Chemical Corporation of California**

# Revised Basis of Design Report

# Dual Site Groundwater Operable Unit Montrose Chemical and Del Amo Superfund Sites

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AQMD | Air Quality Management District |
| AOP | Advanced Oxidation Process |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| BFS | Bellflower Sand |
| cfm | Cubic feet per minute |
| CZ | Containment Zone |
| DDT | Dichlorodiphenyltrichloroethane |
| DCA | Dichloroethane |
| EPA | Environmental Protection Agency |
| EW | Extraction Well |
| FPS | feet per second |
| GAC | Granular activated carbon |
| gph | Gallons per hour |
| GFH | Granular ferric hydroxide |
| gph | Gallons per hour |
| gpm | Gallons per minute |
| GW | Groudwater |
| HDPE | High Density Polyethylene |
| ISGSs | In-Situ Groundwater Standards |
| IW | Injection Well |
| kVA | Kilovolt Ampere |
| LACSD | Los Angeles County Sanitation Districts |
| LADWP | Los Angeles Department of Water and Power |
| LBF | Lower Bellflower aquitard |
| LGAC | Liquid-phase granular activated carbon |
| MBFB | Middle Bellflower B Sand |
| MBFC | Middle Bellflower C Sand |
| MCL | Maximum Contaminant Level |
| mg/L | Milligrams per liter |
| NAPL | Non-Aqueous Phase Liquid |
| NPDES | National Pollution Discharge Elimination System |
| µg/L | Micrograms per liter |
| P&ID | Process and Instrumentation Diagram |
| pCBSA | Para-chlorobenzene sulfonic acid |
| PFD | Process Flow Diagram |
| PLC | Programmable logic controller |
| PVC | Polyvinyl Chloride |

## LIST OF ACRONYMS AND ABBREVATIONS (Cont.)

| | |
|---|---|
| psid | Pounds per square inch differential |
| psig | Pounds per square inch gage |
| RD | Remedial Design |
| ROD | Record of Decision |
| ROW | Right of Way |
| RWQCB | Regional Water Quality Control Board |
| SCAQMD | Southern California Air Quality Management District |
| SDR | Standard Dimension Ratio |
| SOW | Statement of Work |
| SVOC | Semi-volatile organic compounds |
| TCE | Trichloroethylene |
| TGRS | Torrance Groundwater Remediation System |
| UBA | Upper Bellflower Aquitard |
| USEPA | United States Environmental Protection Agency |
| VFD | Variable Frequency Drive |
| VGAC | Vapor-phase granular activated carbon |
| VOC | Volatile Organic Compound |
| WBS | Work Breakdown Structure |

# 1. INTRODUCTION

## 1.1 Terms of Reference

This *Revised Basis of Design Report* (Report) has been prepared for Montrose Chemical Corporation of California (Montrose). The Report presents the design basis of the groundwater remedy for the Dual Site Groundwater Operable Unit (Dual Site) set forth in the following documents:

- Record of Decision for Dual Site Groundwater Operable Unit; Montrose Chemical and Del Amo Superfund Sites (ROD) (USEPA, 1999); and

- Model Development and Remedial Wellfield Optimization Report; Dual Site Groundwater Remedial Operable Unit Remedial Design; Montrose Chemical and Del Amo Superfund Sites (RD Model Report) (CH2M Hill, 2008).

This Report was developed consistent with applicable EPA guidance documents including:

- Guidance for Scoping the Remedial Design (USEPA, 1995a);

- Remedial Design/Remedial Action Handbook (USEPA, 1995b); and

- Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties (USEPA, 1990).

The *Preliminary Basis of Design Report* was originally submitted in 2009 to fulfill the requirements of the Unilateral Administrative Order and was prepared in general accordance with Sections 4.1 and 4.2 of the SOW. This Report provides justification for the currently proposed groundwater remedy, considering the additional information and work that has been conducted since 2009.

## 1.2 Purpose

The *Preliminary Design Criteria Report* prepared by Geosyntec was submitted to the EPA on March 11, 2009 (Geosyntec, 2009b). The *Preliminary Basis of Design Report* prepared by Geosyntec was submitted to EPA on March 31, 2009 (Geosyntec, 2009c). Since these 2009 reports were submitted, studies have been conducted to gain additional information on several aspects of the remedial design, including groundwater concentrations of contaminants, the efficacy of treatment plant components, and injection well system design. Major studies and activities conducted after the *Preliminary Basis of Design Report* were submitted and are summarized below.

Additionally, documents that form this Basis of Design report are provided on the attached CD-ROM.

| Date | Action |
|---|---|
| April, 2009 | Hargis' Supplemental Groundwater Sampling and Analysis Results cause the projected groundwater influent concentrations to be revised |
| August 2009 | Testing indicates that HiPOx system can treat pCBSA concentrations without exceeding bromate standards |
| August-October, 2009 | Assessment and redevelopment of G-IW-2 |
| March 5, 2010 | Begin bench-scale testing of MPPE for groundwater treatment |
| May 5, 2010 | Advisory reports that chemical redevelopment of G-IW-2 resulted in additional clogging |
| June - July 2010 | Redevelopment work performed on G-IW-2 and BF-IW-2 |
| December 22, 2010 | Report that physical redevelopment of BF-IW-2 was effective, but redevelopment of G-IW-2 did not increase capacity |
| June 21, 2011 | Montrose decision to use air strippers and VGAC in the treatment system |
| August 4, 2011 | Intermediate Design Submittal |
| October 21, 2011 | Papadopulos study indicates that modified location of G-IW-4 and G-IW-2x (now G-IW-5) is acceptable |
| November 2, 2011 | Supplemental Information to the Intermediate Design submitted to EPA to support Intermediate Design |

In addition, adjustments to the design have been made based on access discussions and negotiations. The results of these studies and adjustments have changed the basis of the remedial design, and this Report describes the basis for the Final Design which is currently being completed and reviewed by EPA and CH2M Hill. Specifically, this Report:

- Summarizes the series of events that have occurred since the submittal of the previous reports identified above;
- Provides updated information to address the requirements of Sections 4.1 and 4.2 of the Amended Statement of Work (SOW) for Remedial Design Work (Administrative Order 2008-04A) Dual Site Groundwater Operable Unit (USEPA, 2008);
- Provides an update to the information presented in the Preliminary Analysis of Pipeline Corridors and Easement, Access and Permitting Requirements (Earth Tech AECOM, 2005), Preliminary Design Criteria Report (Geosyntec, 2009b) and Preliminary Basis of Design Report (Geosyntec, 2009c); and
- Provides background information to supplement the in-progress Final Design for the Dual Site.

### 1.3 Pending Design Decisions

The Final Design is rapidly progressing toward completion. There are remaining issues that will need to be finalized during the construction planning phase, including:

- Access – Although significant progress has been made on this issue, a final access agreement will need to be obtained for the Frito Lay property;
- Arsenic treatment – It is uncertain whether arsenic treatment will be needed, but the Final Design includes an arsenic treatment system that could later be removed if deemed unnecessary;
- Utility connections – Additional coordination with the City of Los Angeles will be required to confirm and permit the utility connections shown in the Final Design; and
- Injection wells –The Final Design maintains the plan for using injection wells and includes components to allow for routine injection well cleaning. Additional testing of G-IW-3 is ongoing to evaluate injection well design and implementation.

These issues have been advanced to the point where they are not holding up the design process, but instead can be resolved during construction and/or operation and maintenance.

### 1.4 Organization of This Document

The remainder of this Report is organized similarly to the *Preliminary Basis of Design Report* and is organized into the following sections:

- Section 2, Project Background, describes the scope, project setting, and remedial requirements. This section does not have significant deviations from the 2009 *Preliminary Basis of Design Report*;
- Section 3, Basis of Design Development, summarizes the progression of the design since the 2009 submittal of the *Preliminary Basis of Design Report.* This section was not included in the *Preliminary Basis of Design Report*;
- Section 4, Detailed Description and Design Basis of the Remedial System, provides a description of the major components of the remedial system. This section includes significant changes from the 2009 *Preliminary Basis of Design Report*, mostly related to the treatment train and access issues not included in the *Preliminary Basis of Design Report*;
- Section 5, Project Delivery Strategy, includes the strategy for project delivery and schedule. This section is updated from the 2009 *Preliminary Basis of Design Report*;
- Section 6, Specifications Outline and Drawing List, outlines the probable list of drawings and specifications that are being developed as part of the Final Design.

References, figures, tables, and appendices follow the body of this Report. As appropriate, drawings and specifications that are being included in the final report are also referenced in this report. The finalized drawings and specifications are being completed and will be submitted with the Final Design.

# 2. PROJECT BACKGROUND

This section includes a Site overview and design requirements.

## 2.1 Montrose Plant Site

From 1947 to 1982, Montrose manufactured dichlorodiphenyltrichloroethane (DDT) at a facility on a 13-acre property located at 20201 Normandie Avenue in the City of Los Angeles, CA (with a mailing address in Torrance, CA) (Figure 2-1).

The property, and the extent of contaminants associated with the property, are collectively referred to as the "Site." Remedial features associated with the Site lie within the City of Los Angeles and unincorporated Los Angeles County. Generally, the contaminant plume extends laterally over an area extending approximately 1.3 miles in length and about 1 mile wide, with Site-related chemicals present through the Gage Aquifer and the Bellflower Aquifer.

The property itself is accessible by city streets in the area and Interstates 405 and 110. The property is bounded by the Union Pacific Railroad right-of-way and Normandie Avenue to the east; Jones Chemical Company and a right-of-way owned by the Los Angeles Department of Water and Power to the south; GLJ property (former Boeing Property) to the north; and Frito-Lay to the west. Following plant closure in 1982, the property was cleared and capped with asphalt. Water service is available through a metered line located at the northeast corner of the property. Electrical and telephone services are not currently available at the property.

## 2.2 Scope of Remedial Design

As specified in the ROD (USEPA, 1999) and the RD Model Report (CH2M Hill, 2008), three areas of groundwater at the Dual Site are defined by convention as the chlorobenzene plume, benzene plume, and trichloroethylene (TCE) plume. These plumes are partially commingled and also contain concentrations of other constituents that will require remediation, including para-chlorobenzene sulfonic acid (pCBSA) which is an unwanted byproduct from DDT manufacturing. The design criteria discussed in this Report address the ROD requirements for the chlorobenzene plume, which include hydraulic extraction, treatment and injection of treated water extracted from the chlorobenzene plume. The benzene plume, as defined in the ROD, is being addressed largely by monitored natural attenuation, and the ROD requirements for the TCE plume will be addressed separately. Prevention of the adverse migration of TCE and benzene, however, has been considered in the design of the remedy for the chlorobenzene plume. Existing Injection Well G-IW-2 and planned Injection Wells G-IW-4 and G-IW-5 (Figure 2-1) are intended to reverse the downward gradient toward the Gage aquifer on the eastern flank of the chlorobenzene plume. RD modeling by CH2M Hill and additional modeling by SS Papadopulos & Associates indicate that injection of treated water at these wells will prevent the vertical migration of TCE and benzene into the Gage aquifer for containment within the Middle Bellflower C Sand (MBFC) containment zone (CH2M Hill, 2008; Papadopulos, 2011).

The design criteria discussed in this Report also address arsenic. Based on groundwater monitoring results obtained to date, the arsenic concentrations from two extraction wells (MBFB-EW-1 and UBA-EW-2) are expected to be elevated relative to arsenic concentrations in other extraction wells. Thus, the flow from these two extraction wells will be separately delivered to the treatment plant so that this flow could be treated for arsenic and then joined into the main process stream, if arsenic treatment is required.

Montrose continues to assess whether arsenic treatment will be required for the combined influent stream.

The ROD (USEPA, 1999) defines the chlorobenzene plume to include all areas of the Dual Site where chlorobenzene has been detected in the groundwater above in-situ groundwater standards (ISGSs). The chlorobenzene plume is present above ISGSs in the upper Bellflower aquitard (UBA), Middle Bellflower B Sand (MBFB Sand), the Middle Bellflower C Sand (MBFC Sand), the Lower Bellflower aquitard (LBF), and the Gage Aquifer. For the purposes of this report, the term “BF” refers to wells that are screened in the MBFC Sand or the merged B/C Sand. However, for discussion of the screened intervals in specific wells, the units are differentiated, as appropriate.

The ROD establishes an injection standard of 25,000 µg/L for pCBSA, and the ROD establishes sampling and institutional controls as part of the groundwater remedy. The ROD does not assign an ISGS for pCBSA, and the SOW does not explicitly discuss pCBSA treatment. However, the treatment of pCBSA to the injection standard is included in the remedial design and in the operational specifications that will be part of the remedial design.

## 2.3 Chlorobenzene Plume Remedial Action

The ROD specifies a remedial action that provides both contaminant containment and volume reduction of the chlorobenzene plume exceeding the ISGSs. The ROD also requires that adverse migration of contaminants be mitigated both laterally and vertically. As noted previously, pCBSA is not subject to these requirements.

Containment of dissolved-phase VOCs, including chlorobenzene, will be achieved by utilizing hydraulic extraction of groundwater from extraction wells to form a hydraulic barrier. The extracted groundwater will be treated and injected into the aquifers through injection wells. The wellfield and relative pumping rates of the wells will be optimized to limit the lateral and vertical migration of contaminants and to maximize containment during remedial action. This optimization will be conducted in accordance with the requirements and provisions of the ROD.

The detailed description and the design basis of the remedial system for chemicals of concern are discussed in Section 4 of this Report.

## 2.4 Remedial Requirements

The ROD included selection of a remedy for the dissolved-phase contamination. The selected remedy was further refined by the RD modeling conducted by EPA subsequent to issuance of the ROD (CH2M Hill, 2008). The RD Model Report lists some of the most critical ROD requirements pertaining to development of a remedial wellfield, including the following:

- A total pumping rate for the remedial wellfield that is not less than 700 gallons per minute (gpm);
- Indefinite containment of contaminants presently within a zone that the ROD refers to as the containment zone (CZ);
- Containment of the overall distribution of Dual Site contaminants;
- Reduction of the volume of water with concentrations of contaminants above drinking water standards to zero, progress toward which is required within certain timeframes;
- Achieving certain pore-volume flushing rates within the contaminant distributions;
- The limiting of adverse migration of significant contaminants, either as concentrations in the dissolved phase, or nonaqueous phase liquid (NAPL), especially to hydrostratigraphic layers lying below the present contamination; to this end, wells and pumping are designed to reverse or otherwise control downward gradients; and
- The redistribution of groundwater extraction as the contaminant plume shrinks, from clean areas to remaining contaminated areas, to expedite overall cleanup and make it more efficient.

The first four of the above requirements were considered “hard remediation targets” during the RD modeling process; these targets are required to be met by the remedial wellfield (CH2M Hill, 2008). The latter three of the above requirements were considered “soft remediation targets”; these targets must be met only to the extent they do not interfere with the hard remediation targets. The focus of the optimization process was to develop a wellfield that would fulfill the ROD requirements and design objectives with a sufficient degree of certainty, and in a manner sufficiently robust to succeed even if actual Dual Site conditions differ from those assumed, or if Dual Site conditions change in the future. Another goal of the optimization process was to achieve these requirements and objectives in the most cost-effective manner. The remedial design was based upon the results of the wellfield optimization process (CH2M Hill, 2008).

## 2.5 ARAR Requirements

Applicable or relevant and appropriate requirements (ARARs) are contained in Appendix A of the ROD. Of most significance to the groundwater remedy are the groundwater ARARs contained in Sec. 4.1 of Appendix A, under “State and Federal Maximum Contaminant Levels”. The remedial system is being designed with the intent of attaining ISGS levels in all groundwater areas of the Dual Site, outside of the containment zone. In addition to the ISGS requirements, there are several additional ARARs listed in Section 2 of Appendix A of the ROD. Table 2-1 contains a list of the additional ARARs and a description of how they will be met in the remedial design.

The ARARs listed in Table 2-1 are requirements that must be considered in the development of the groundwater remedy. These ARARs are general requirements that are applicable to, and will be satisfied through, the various submittals throughout the remedial design process.

## 2.6 Substantive Requirements for Permits

Several operational permits for the remedial design have been identified and are included in Table 2-2. The permitting process will utilize the subsequent design and construction documents to meet the application requirements. Construction documents, including the drawings, specifications and contracts, will require the contractor to comply with all applicable federal, state and local standards, codes and other restrictions in effect for construction activities.

## 2.7 Potential Environmental and Public Health Impacts

The SOW requires that this Report include a list of environmental and public health impacts and how they are being mitigated by the remedial design or will be mitigated by operational controls. A list of potential environmental and public impacts is set forth in Table 2-3. In general, potential impacts will be addressed in future design reports, subsequent construction documents, or the Preliminary Operations and Maintenance Manual to be developed for operation and maintenance of the remedial system.

# 3. BASIS OF DESIGN DEVELOPMENT

This section provides a framework for the development of the updated basis of design, an overview of actions that lead to design changes, and the status of previously submitted documents.

## 3.1 Overview and Recent Work

Several major changes have affected the basis of the remedial design since the *Preliminary Basis of Design Report* was submitted in March 2009. This section provides an overview of the developments that led to major design changes and the current status. The major actions and submittals of that re-design process associated with the treatment train are presented in Table 3-1.

Groundwater sampling and subsequent data analysis conducted in April 2009 changed the anticipated concentrations in the influent stream (Hargis + Associates, 2009b). The updated influent concentrations resulted in an extended evaluation of additional treatment trains because the former treatment train was no longer able to treat extracted groundwater to regulatory standards. The treatment train re-evaluation included literature reviews, bench-scale testing, and pilot-scale testing to arrive at the current treatment train. Over the same time period, the injection well design and installation techniques were re-evaluated. Well fouling was a significant issue in previous injection tests, and well rehabilitation was not successful at addressing the fouling issues. Thus, an improved design was developed, and dedicated return lines were designed into the groundwater remedy, to accommodate well backflushing and redevelopment.

## 3.2 Status of Previous Submittals

This section provides an overview of the previous design submittals and how subsequent design changes have changed the information presented in those documents.

### 3.2.1 Preliminary Design Criteria Report

The *Preliminary Design Criteria Report* was submitted on March 11, 2009 to present the technical parameters on which the design would be based. The *Preliminary Design Criteria Report* was prepared in accordance with Section 4.1 of the SOW. Changes made to the report are captured in this Report and on the forthcoming Final Design Drawings and Specifications.

### 3.2.2 Preliminary Basis of Design Report

The *Preliminary Basis of Design Report* is superseded by this Report to reflect changes to the basis of design and to reflect the increased definition of the remediation system. Per Section 4.2 of the SOW, this Report contains the conceptual design elements to achieve the Design Criteria listed in the *Preliminary Design Criteria Report.*

### 3.2.3 Preliminary Specifications Outline

The Preliminary Specifications Outline was originally submitted as part of *Preliminary Basis of Design Report* and is updated in Section 6 of this Report.

### 3.2.4 Preliminary Project Delivery Strategy and Construction Schedule

The Preliminary Project Delivery Strategy was originally submitted as part of *Preliminary Basis of Design Report*. It is updated in Section 5 of this Report.

### 3.2.5 Preliminary Drawings

The Preliminary Design Drawings were submitted first in April 2009 and then superseded by Intermediate Design Drawings submitted in August 2011. CH2M Hill commented on each set on behalf of EPA, as set forth in Appendix B to this Report.

### 3.2.6 Preliminary Cost Estimate

The *Preliminary Remedial Action Cost Estimate* was submitted in May 2009 to estimate the costs of the remedial action (Geosyntec, 2009d). The *Preliminary Remedial Action Cost Estimate* will be updated in the Final Design to reflect changes in remedial design and to more accurately estimate the costs of the remedial system.

### 3.2.7 Intermediate Design

The Intermediate Design package was submitted in August 2011 and incorporated the major changes to the remedial design (Geosyntec, 2011b). Subsequent to the Intermediate Design submittal, the Supplemental Information to the Intermediate Design Submittal was submitted November 2, 2011 (Geosyntec, 2011c). This supplement outlined the substantive changes to the design as follows:

- The expected influent concentrations of chemicals in the extracted groundwater increased based on the results of the sampling conducted in April 2009;

- In order to handle the updated anticipated influent process stream, the treatment train now includes air strippers and vapor-phase granular activated carbon (GAC) to treat the off-gases, as indicated in the Process Flow Diagrams, the Process and Instrumentation Diagrams, and the Equipment Layout;

- A grading plan to manage stormwater on the treatment pad is now included;

- In order to accommodate the injection well redevelopment water, the storage capacity of the treatment system was increased from 70,000 gallons to 180,000 gallons;

- The plan for powering pumps away from the treatment facility changed from individual power drops to a clustered satellite scheme to reduce the number of power drops;

- An additional 4-inch HDPE pipe from each injection well back to the treatment facility was added to convey flushing and redevelopment water;

- G-EW-6 was eliminated from the remedial design because RD modeling showed that it was not required for proper plume containment.

### 3.3 Amendment to Preliminary Analysis of Pipeline Corridors and Easement, Access, and Permitting Requirements

The Preliminary Pipeline Corridor Routing Options was submitted in June 2008 as Option 3A (Earth Tech AECOM, 2008b). A proposed final pipeline route was presented in a February 20, 2009 technical memorandum to EPA entitled "Pipeline Route Adjustments" (Geosyntec, 2009a). EPA responded to that February 20, 2009 memo with comments dated March 31, 2009, prepared by CH2M Hill (CH2M Hill, 2009).

Subsequent to the 2009 adjustments, access issues have caused additional changes to some of the pipeline routes. The current infrastructure plan is shown in Figure 2-1. A comprehensive potholing program was performed in March 2010 to identify the locations of the utilities along this route. The results of the potholing program were incorporated into the extraction and injection piping system. Although Montrose continues to negotiate with one private party for a portion of this route, significant progress has been made to the point where Montrose is confident that access to all parts of this route ultimately will be obtained.

# 4. DETAILED DESCRIPTION AND DESIGN BASIS OF THE REMEDIAL SYSTEM

## 4.1 Introduction

This section presents the design elements of the remedy to achieve the criteria set forth in the Statement of Work (EPA, 2008). The following sections are organized into three subsections:

- Section 4.2 describes the extraction system;
- Section 4.3 describes the treatment plant; and
- Section 4.4 describes the injection system.

These sections provide a comprehensive account of the revised basis of design. Where appropriate, the original text was retained from the *Preliminary Basis of Design Report.* Where changes have been made to the basis of design, the text has been revised accordingly.

## 4.2 Groundwater Extraction Well System

### 4.2.1 Extraction Well Locations

The general locations of the extraction wells are based upon the RD Model Report (CH2M Hill, 2008). Table 4-3 provides an updated description of the extraction well locations. The extraction well locations shown in Figure 2-1 and described in Table 4-3 include minor deviations from the modeled locations. These deviations were made to support adjustments of the pipeline route for the extraction and injection well systems. The adjustments to the pipeline route were provided in a memorandum titled "Montrose Superfund Site - Torrance Groundwater Remedial System Pipeline Route Adjustments" (Geosyntec, 2009a). The well locations are shown in Figure 2-1 and will be included in Drawing V-101. Due to the abundance of utilities in the ROW of Torrance Blvd and the difficulty in crossing them, it was decided to move well BF-EW-3 approximately 200 feet due south of its original location to the south side of Torrance Boulevard, thereby avoiding the need to cross Torrance Boulevard. Wells UBA-EW-2 and BF-EW-6 were originally going to be located in the parking lot of a commercial building. Due to access agreement issues they were moved approximately 50 feet from private property onto the LADWP right-of-way within Waste Management property to the south of their original location. Extraction well G-EW-6 was removed from the system design because it was determined that extraction from well G-EW-2 provided recovery at the toe of the plume due to low concentrations of chlorobenzene below the MCL in downgradient monitoring wells (Geosyntec, 2009i). EPA concurred with this position (EPA, 2009).

### 4.2.2 Groundwater Extraction Well Construction

The 14 extraction wells will be distributed between the water table (3 wells), MBFC (6 wells) and Gage (5 wells) aquifers. Six (6) of the fourteen (14) groundwater extraction wells have been installed. Well construction details are provided in the report titled "Pilot Extraction and Aquifer Response Test Completion Report, Montrose Site, Torrance, California" (Hargis + Associates, 2008). The eight (8) remaining extraction wells will be installed by a licensed drilling contractor to the targeted extraction interval by using the well design described in "Torrance Groundwater Remedial System, Basis of Design for Planned Extraction and Injection Wells" (Hargis + Associates 2009a). The extraction well installation will be conducted in compliance with the California Department of Water Resources and California Well Standards. Each extraction well will be constructed of stainless steel well screen and Schedule 80 PVC blank casing. Centralizers will be installed to center the well casing within the borehole, and the well bottoms will be fitted with threaded end caps. The design drawings and specifications will include requirements for the types, placement, and control scenarios for instrumentation at each well. Well construction details will be shown in the specifications as part of the final design.

### 4.2.3 Groundwater Extraction Pumping Rates

Groundwater extraction rates for each extraction well were specified in the RD Model Report for five time periods[1] (i.e., stress periods), with the maximum modeled extraction rate occurring during the first stress period (CH2M Hill, 2008). The groundwater pumping rates used for the design also were taken from the RD Model Report. The groundwater pumping rates for the individual wells are included in Table 4-4, which utilizes the extraction well rates calculated in the optimization modeling for each of the five stress periods and assumes that the system will operate continuously[2].

### 4.2.4 Groundwater Extraction Well Pumps

Each extraction well will contain an electric submersible pump that will extract and discharge groundwater into the pipeline system. This will overcome head losses in the piping without additional intermediate booster or lift pumps between the extraction

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[1]Cumulative influent flow was provided but individual wells flows may increase over time. For example, the initial flow rate at well BF-EW-2 is 67.6 gpm but at the end of remedy the flow at this well is 79.9 gpm.

[2] Two TCE extraction wells included in the RD Model Report (BF-EW-TCE and G-EW-TCE) are not included in the basis of design because the flow from these wills is to be handled by a separate treatment plant.

wells and the treatment plant. A hydraulic model of the groundwater extraction system was developed utilizing Bentley Water GEMS software. The extraction system pumps have been designed to overcome frictional losses in the pipeline and deliver the water to the treatment plant at 25 psig, including overcoming the height of the influent storage tank. The performance requirements for each of the extraction pumps will be presented in Specifications Section 43 06 21.

As part of the Remedial Design Modeling conducted by EPA, the pumping rates were adjusted over time as cleanup levels were reached in portions of the plume. While the total system flow rate of 700 gpm will decrease over time, the rate at individual wells will generally increase over time as the flow from wells that are shut off is redistributed to other, actively pumping wells. The extraction pumps are designed to meet these changes in flow rate. Well construction details will be shown in the specifications as part of the final design.

Each extraction pump will be constructed of stainless steel material and will require 480-volt, three-phase power. The pumps will be single-speed. Extraction rate flow control will be provided by an automated control valve located within the well vault. The control valve can be adjusted to maintain flow at any set point within the pump's range of operation. This arrangement gives flexibility to the output flow of the individual pumps. The pumps will be operated to maintain a pre-set extraction flow rate, with shutdown based on water levels in the extraction wells, to prevent running the pumps dry, as well as levels in the receiving tanks at the treatment plant to prevent overflows. Each pump will include interlocks that will shut down the pump based upon high pressure set points.

The final design of the pump installation will include provisions for pump cooling. Based on evaluation of anticipated pump motor sizes, pumping rates, and extraction well diameters, shrouds will be required in certain wells to maximize flow past the pump motor for cooling purposes. The extraction pumps will be located near the top of the screen, or alternatively, a pump could be located in the screened interval. Pump depth will be included in the Final Design Drawings.

### 4.2.5 Extraction Well Vaults

Pre-cast concrete vaults will be installed around each groundwater extraction well head. The wellhead casing will extend into the vault. As shown on the process and instrumentation diagrams (P&IDs) for the extraction wells, Drawings W-501 through W-510, each vault will include an H-20 traffic-rated water-tight cover for protection and for access to the components within the vaults. Waterproof frames and bolted lid manhole covers will provide access to the extraction wells. Vaults will have concrete bottoms to contain and detect leaks. Four aboveground power satellite stations will be located in non-traffic areas to service vaults not powered by the treatment plant power system. The power satellite stations have been located based on electrical power requirements, availability, ease of maintenance, and access. The vaults have been sized to provide ample room for equipment and personnel working in the vault.

### 4.2.6 Well and Vault Pipe Construction

Well pipe and vault piping will be stainless steel and will transition to double-walled high-density polyethylene (HDPE) as the piping exits the well vault. Well pipe sizes, flow velocities, and flow rates for the individual wells are shown. Stainless steel pipe will be used in the well vaults because it is rigid, so it can support valves and instrumentation without the addition of pipe supports, and it will resist corrosion. Well vault details will be included on Drawings W-501 through W-510.

### 4.2.7 Extraction Transfer Pipe Construction

Double-walled HDPE pipe will be utilized for underground extraction piping throughout the system in order to provide secondary containment during groundwater conveyance. HDPE pipe is easier to install than other traditional piping materials and is cost effective, flexible, durable, and corrosion resistant. The underground carrier piping shall be HDPE SDR 11 with a maximum recommended operating pressure of 160 psig at 73°F. The underground containment piping shall be HDPE SDR 17 with a maximum recommended operating pressure of 100 psig at 73°F. The pipe will originate from within each vault and will transfer the groundwater from each vault to the groundwater collection pipeline. These pipelines will be manifolded as described in Section 4.2.8 for transmission to the treatment plant.

The majority of the pipeline will be installed underground. In locations where the pipeline will be aboveground at bridge crossings, the double-walled HDPE will be encased inside a Schedule 40 carbon steel sleeve. At the connection point of the double-walled treatment plant, the double-walled HDPE will transition to single-wall Schedule 40 carbon steel and secondary containment will be achieved by way of the concrete containment curb on the treatment system pad. The pipe sizes and lengths for the entire extraction system will be shown in Specifications Section 40 06 21.

### 4.2.8 Extraction Transfer Pipeline Routes

The majority of the pipe routing will be located within public rights-of-way (ROWs) to minimize the impact on city residents and businesses by avoiding disturbance to private property. Three separate trunk pipelines will be used to reach the 14 extraction wells. The pipeline routes will be shown on Drawing V-101. The pipeline routes were addressed in the EPA *Montrose Superfund Site - Torrance Groundwater Remedial System Pipeline Route Adjustments* submittal (Geosyntec, 2009a). The aforementioned memo focused on adjusting six areas of the original route to eliminate difficult street or railway crossings and improve the design by reducing pipeline distances, when possible. The changes resulted in the elimination of one railway crossing at Francisco Street and Normandie Avenue.

In addition to the pipelines identified in the references above, a separate pipeline will be installed to service the two wells that may require treatment for arsenic (MBFB-EW-1 and UBA-EW-2). This pipeline will run from the treatment plant south along Normandie Avenue, with laterals south of West Jon Street.

## 4.3 Treatment System

The treatment system is designed to reduce the concentration of VOCs, pCBSA, and arsenic (if arsenic treatment is deemed necessary) in extracted groundwater to concentrations that meet ISGS discharge requirements. Compounds identified as requiring, or potentially requiring, treatment were summarized in the *Preliminary Design Criteria Report* (Geosyntec, 2009b). A flow-weighted concentration was presented in the influent compilation technical memorandum prepared by Hargis + Associates, Inc. (included in Geosyntec, 2009b). Based on the results of this information, the influent concentration summary was updated. The updated influent compilation summary changed the basis of design for the treatment system, as shown in Table 4-1. After a series of evaluations and testing, an updated treatment train was selected and documented in the *Treatment Train Advisory* (Geosyntec, 2011a).

The *Treatment Train Advisory* (Geosyntec, 2011a) and *Supplemental Information to the Intermediate Design Submittal - Dual Site Groundwater Operable Unit* (Geosyntec, 2011c) present assumptions used to develop the treatment train. As set forth in those documents, the treatment plant will include the following treatment processes, as depicted on the process flow diagrams (Drawing D-621 and D-622):

- pCBSA treatment using an advanced oxidation process (AOP). AOP testing by Montrose has indicated that HiPOx™, a technology supplied by Applied Process Technology, Inc. (APT) which oxidizes contaminants in water by using ozone and hydrogen peroxide, is the selected AOP treatment to be implemented at the Dual Site. The HiPOx™ system was demonstrated to effectively treat pCBSA in Site water during a field pilot study.

- Treatment of VOCs using air strippers and vapor-phase granular activated carbon (VGAC). The air strippers will include two active air strippers and one in reserve, for a total of three air strippers. The recommended VGAC configuration includes three 20,000-pound vessels filled with GAC operated in series, with a fourth vessel installed as a spare. The spent GAC will be disposed of at a permitted facility and not regenerated.

- Treatment of pesticides and residual VOCs using liquid-phase granular activated carbon (LGAC). The recommended LGAC configuration includes two 20,000-pound vessels filled with carbon operated in series. Carbon will be disposed of at a permitted facility and not regenerated.

- Treatment of arsenic (if deemed necessary) in groundwater from two extraction wells, MBFB-EW-1 and UBA-EW-2, using granular ferric hydroxide (GFH). It is assumed that there will be 3 vessels in series. Each of these will contain 12 cubic feet of total volume and 7 cubic feet of media.

The treatment system will be located near the eastern fence line of the Property (Drawing C-101).

### 4.3.1 Ancillary Treatment Processes

In addition to the primary treatment processes described in the Treatment Train Evaluation, filtration units will be used prior to treatment and, after treatment, before discharge into the injection well system. The treatment plant will also include systems to handle water generated during carbon change outs, carbon backwashing, groundwater monitoring purge water, and stormwater within the treatment plant compound.

### 4.3.2 Treatment Plant Location

In July 2003, the *Preliminary Layout of the Chlorobenzene Plume Treatment System* (Earth Tech, 2003) was submitted to EPA. This document included a treatment plant siting evaluation. Five candidate treatment plant locations were evaluated and, based on the criteria of that study, a preferred location was identified. An updated siting evaluation confirmed the location of the treatment plant and made recommendations for a geotechnical and soil investigation (Earth Tech AECOM, 2008a). Since that evaluation, the preferred location of the treatment plant has been shifted north to accommodate stormwater features that are anticipated to be part of the final soil remedy. The treatment plant is located on the northern portion of the eastern property boundary.

Based on the results of the updated siting evaluation, a geotechnical and soil investigation was performed at the former Montrose plant site to evaluate the geotechnical and soil conditions for the treatment plant location. This report, entitled *Geotechnical and Chemical Evaluation Groundwater Treatment Plant Soils* (Earth

Tech AECOM, 2008c) was submitted to EPA in October 2008. The report included a seismicity evaluation, a soil evaluation, and a liquefaction evaluation. Evaluation results will be used in grading and foundation design.

### 4.3.3 Treatment Plant Overview

An overview of the treatment plant is provided on the process flow diagrams (Drawings D-601 through D-602). The process flow diagrams present the mass flux of groundwater and of each chemical that is a candidate for treatment. Additional details of the treatment plant are provided on P&ID Drawings D-621 through D-627. The P&IDs depict the planned treatment system equipment and instrumentation.

The treatment plant will be designed with approximately 15 percent excess treatment capacity above the groundwater modeled design flow rate of 700 gpm for a total capacity of approximately 805 gpm. The additional capacity serves the following purposes:

- Accommodates potential variation between model projected flow rates and actual flow rates that will achieve ROD requirements for plume reduction; and

- Allows for the processing of intermittent side streams, such as carbon vessel backflush water or rainwater from the treatment system compound.

### 4.3.4 Influent Storage Tanks (3710 A/B)

The Influent Storage Tanks (3710 A/B) will receive unfiltered groundwater from the entire extraction system (i.e., the 14 extraction wells). The Influent Storage Tanks (3710 A/B) will be coated carbon steel. The tanks will be designed for atmospheric pressure operation.

There are two influent storage tanks to account for the additional storage of injection well re-development water. The storage capacity of each tank is 40,000 gallons for additional storage capacity of 80,000 gallons. The tanks will include level sensors that will be used in the control system to maintain a constant level in the tanks. Since the influent storage tank has the largest volume, it was evaluated in accordance with South Coast Air Quality Management District Rule 219. Based on the evaluation shown in Appendix A, this tank will be conditionally exempt from emission control requirements because the emissions are below thresholds.

### 4.3.5 Influent Filtration

The treatment plant will include two influent streams: 1) approximately 684 gpm of groundwater from 12 extraction wells that will not require arsenic pretreatment; and 2) approximately 16 gpm of groundwater from wells MBFB-EW-1 and UBA-EW-2 which may be processed through arsenic treatment equipment (if such treatment is deemed necessary) before being combined with the remainder of the well field flow for primary treatment. Each influent stream will be filtered by using a dedicated redundant filtration system as described below.

4.3.5.1 Extracted Groundwater Feed Filters (3410 A/B):

Extracted groundwater from 12 extraction wells will be pumped from the Influent Storage Tanks (3710 A/B) through Extracted Groundwater Feed Filters (3410 A/B) to the air stripper system (3300 A/B/C) at a design flow rate of approximately 684 gpm. The filters will be designed to remove particles 5 microns and larger. The filtration system will consist of redundant multi-bag filter with stainless steel housings that will have a hydraulic capacity of 805 gallons per minute and a pressure rating of 150 psig. One filter will be active and the other will serve as an in-place spare to eliminate downtime during filter bag changes. The filter systems would operate at a maximum recommended differential pressure of 20 psid (high pressure alarm setting) to prevent filter bag failure. Additional technical data concerning filters 3410 A/B can be found on Drawing D-621, and additional mechanical data on the filters can be found in the Drawing M-500 series.

4.3.5.2 Possible Arsenic Treatment Feed Filters (3400 A/B):

If arsenic treatment is needed, extracted groundwater from wells MBFB-EW-1 and UBA-EW-2 will be pumped through Arsenic Treatment Feed Filters (3400 A/B) at a design flow rate of approximately 16 gpm. The filters would be designed to remove particles 5 microns and larger at a maximum flow of 50 gpm and a maximum pressure of 150 psig. The filtration system would consist of redundant single-bag filter housings. One filter would be active and the other would serve as an in-place spare to eliminate downtime during filter bag changes. The filter systems would operate at a recommended maximum differential pressure of 20 psid to prevent filter bag failure. Additional technical information can be found in the specifications and on Drawing D-621. Mechanical detail will be included in the Drawing M-500 series.

### 4.3.6 Arsenic Treatment (3800)

Arsenic treatment is included in the treatment train design in the event that arsenic treatment is deemed necessary to decrease the expected influent concentration from 13 µg/L to below the maximum contaminant level (MCL) of 10 µg/L. Groundwater pumped from extraction wells MBFB-EW-1 and UBA-EW-2 will be in included as part of a side stream because of their anticipated arsenic concentrations of 200 µg/L and 260 µg/L, respectively. Anticipated arsenic concentrations in the process stream are included on the process flow diagrams (D-601 and D-602). The arsenic treatment included in the treatment train uses granular ferric hydroxide (GFH), which is an iron-based adsorptive media. GFH is an established technology that has been demonstrated effective at this Site during previous aquifer testing.

Particulate filtration would be provided prior to the potential arsenic treatment system to remove fines. The nominal design flow rate is 16 gpm, and the arsenic treatment system can accommodate up to 30 gpm to account for variability in design and actual flow rates. The arsenic treatment design is being completed and will be included in the Final Design drawings and specifications. Tentatively, the system is expected to include two vessels operated in series (12 cubic feet per vessel) that will be changed out when arsenic breakthrough occurs or the pressure drop across a vessel exceeds manufacturer's recommendations. One spare vessel will be manifolded with other two vessels to facilitate change out. It is estimated that the lead GFH vessel will be changed out on an approximately monthly basis.

If arsenic treatment is required, the treatment objective for the total treatment plant effluent will be the MCL, 10 µg/L of arsenic. The side stream from MBFB-EW-1 and UBA-EW-2 will produce only 16 gpm of the approximately 700 gpm flow, with the remaining 684 gpm expected to contain a combined arsenic concentration of approximately 8 µg/L. Thus, the side stream treatment would need to achieve an arsenic concentration of less than 95 µg/L in the 16 gpm flow to result in a combined 700 gpm effluent with an arsenic concentration less than 10 µg/L. The arsenic treatment system would be monitored and operated so that the spare vessel could be brought on-line before the 16 gpm effluent reaches the 95 µg/L threshold.

#### 4.3.7 Advanced Oxidation Process, AOP (3810)

Extensive treatability testing was conducted to select the advanced oxidation process for use in the treatment train. The selected technology includes dosing the water with ozone and hydrogen peroxide, which proved successful during Site-specific bench and pilot-scale testing.

The AOP system will be designed to treat influent pCBSA concentrations to 25,000 µg/L, which is the ROD-mandated ISGS. The primary purpose of the AOP system is to treat pCBSA, although some VOC/SVOC destruction will occur as well (a preliminary estimate indicates that the AOP system would reduce the concentrations of chlorobenzene and benzene by approximately 35 percent). The process design assumes that compounds identified in the influent stream that are not readily degraded by AOP, such as chlorinated alkanes (1,2-DCA, chloroform, carbon tetrachloride, and methylene chloride) and pesticides[3] will pass through the AOP to be treated by the air stripper. Anticipated mass flow through the AOP is included in Drawing D-601.

The AOP consists of an ozone generation system, hydrogen peroxide feed system, and a contact chamber, where the reaction will occur. Water from the Influent Storage Tank will be pumped into the injection modules using the Feed Pump (3610 A/B). The water feed will be dependent on the level in the Influent Storage Tanks (3710 A/B). The AOP system will include a programmable logic controller (PLC) to maintain proper flow and reagent ratios. Hydrogen peroxide and ozone will be injected at 20 to 45 psig in a series of injection modules.

After reagents are injected, the dosed fluid will flow immediately through the module’s mixing section, followed by a reaction zone specifically designed to allow sufficient residence time for contaminant destruction. The residence time in each individual reactor will be between 3 and 10 seconds. Hydrogen peroxide will be stored in a tank and transferred to the injection modules using a metering pump that will be controlled by the AOP system PLC. In addition, oxygen from an oxygen generator will be fed into a solid state ozone generator. The ozone will then be metered into the injection modules.

Preliminary process design indicates that the 700 gpm AOP system will require an ozone dose of 23.7 mg/L and a hydrogen peroxide dose of 28.5 mg/L. These vendor-developed process estimates were calculated using data derived from AOP bench testing (Earth Tech, 2004). The AOP will have an estimated electrical consumption of approximately 270 amperes of 460-volt three-phase power and 23 amperes of 120 V power. Preliminary sizing for the hydrogen peroxide tank indicates that a 1,000-gallon tank will provide a minimum of 30 days of operation.

### 4.3.8 Air Stripper Influent Storage Tank

The Air Stripper Influent Storage Tank (3730) will be downstream from the AOP. The tank will be internally coated carbon steel and will be designed for atmospheric pressure operation. The total volume of the tank is 20,000 gallons. The tank was sized to provide a sufficient working volume to allow for system recovery in the event of minor process disturbances, such as treatment of backwash water.

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[3] The poor degradation of chlorinated alkanes and pesticides through AOP was observed during AOP bench testing (Earth Tech, 2004).

### 4.3.9 Air Strippers (3300 A/B/C)

In order to meet the ISGS, the air strippers will remove the following VOCs in the waste stream: 1,2-dichloroethane, 1,4-dichlorobenzene, benzene, carbon tetrachloride, chlorobenzene, chloroform, methylene chloride, PCE, and TCE. Mass flow rates and estimated reduction rates are included on the process flow diagram (Drawings D-621 through D-622). QED Model 48.6 was selected by Montrose to use as the basis of design for the air stripper system because of its proven effectiveness at treating groundwater at the Montrose Site in Henderson, Nevada (similar contaminants) and the model's easy-access side loading tray design. Treatment removal efficiencies are based on vendor-provided modeling and are included in Appendix A.

The air strippers consist of a feed water system, three low profile tray style air strippers, a sequestering agent feed system, a duct heater, and a pH control system. Two air strippers will be operated in parallel, with a third in reserve to be operated when one of the other air strippers requires tray cleaning or maintenance. Each of the active air strippers will take half of the groundwater flow, up to 402.5 gpm if the treatment train is operating at 805 gpm. This is well within the capabilities for each air stripper, which is rated for up to 500 gpm (67 cfm). Water from the Air Stripper Influent Storage Tank (3730) will be pumped through filters (3420 A/B) and into the air strippers by the air stripper feed pump (3630 A/B). The air stripper PLC will be used to maintain proper flow and reagent ratios. Between the air stripper feed pump and the sequestrating filter, a sequestering agent will be added. The air strippers will be followed by a pH control system as discussed in Section 4.3.10.

### 4.3.10 Chemical Adjustment Systems

#### 4.3.10.1 Sequestering Agent

To prevent scaling in the air strippers, a polyphosphate type sequestering agent will be added to the water stream before it reaches the air strippers. The sequestering feed system will consist of a 264-gallon chemical storage tank (Tank 3740), a sequestering agent feed pump (3640 A/B), and injection piping. Based on a flow rate of 805 gpm, the sequestering agent flow rate will be approximately 0.5 gallons per hour (gph). The feed pumps will have a turndown ration of approximately 1000:1 to accommodate a range of potential flows and doses. Based on a review of the groundwater inorganic chemistry, a sequestering agent is recommended to control mineral fouling of the air stripper trays during operation. The influent is projected to have an alkalinity of 270 mg/L as calcium carbonate, a pH of 7.7, and an iron content of 0.48 mg/L.

4.3.10.2 Defoaming Agent

Based on an estimated 936 µg/L of surfactants in the influent, a defoaming agent is recommended to control foaming in the air strippers during operation, but its use may be scaled back over time if surfactants cease to be present. The defoaming agent will likely be a silicone-based compound. The defoaming agent feed system will consist of a 264-gallon chemical storage tank (Tank 3940), a feed pump (3840 A/B), and injection piping. Based on a flow rate of 805 gpm, the defoaming agent flow rate will be added at a rate of 0.5 to 5 gallons per hour. The feed pumps will have a turndown ratio of approximately 1000:1 to accommodate a range of potential flows and doses.

4.3.10.3 pH Control

During the air stripping, carbon dioxide will be removed from the process stream. Alkalinity will also be removed over time in the form of mineral scaling. Preliminary design calculations indicate that there is a potential for the pH to increase in the air stripper effluent process stream. Based on an anticipated influent carbon dioxide concentration of 40 mg/L and bicarbonate alkalinity concentration of 333 mg/L, the air stripper effluent pH is expected to range between 7 and 9, depending on the amount of carbon dioxide and the amount of alkalinity removed from the process stream.

The pH control system will consist of a pH Control Feed (3690 A/B) and pH Control Storage Tank (3790) controlled by a pH feedback loop. The tank capacity will be 264 gallons. Hydrochloric acid will be added to the water after air stripper treatment to decrease the pH to below 8.5. Approximately 0.10 gph of 35% hydrochloric acid is required, and an approximately 1000:1 pump turndown ratio (0.007 to 0.66 gph) will accommodate fluctuations.

### 4.3.11 Vapor-Phase Granular Activated Carbon (VGAC) Vessels (3430 A/B/C)

The VGAC vessels (3430 A/B/C) are provided to remove VOCs that will be present in air stripper vapor effluent. The TGRS will include three vessels operated in series; each will contain 20,000 pounds of coconut-shell-based GAC. The back-up calculations that demonstrate this approach for the configuration of the VGAC vessels (i.e., three vessels in series with a fourth spare) and specified carbon is provided in Appendix A.

The vessel design is being completed; either the Siemens FRP-12 fiberglass vessel or an equivalent internally coated carbon steel vessel will be used. VGAC vessel internals will be finalized during final equipment selection and specification. Additional technical information regarding the VGAC vessels is included in Drawing D-623 and Specifications Section 43 31 13.13.

#### 4.3.12 Air Stripper Off-Gas Conveyance Systems

The blowers from the air strippers will convey vapors from the system via steel pipe (12-inch diameter Schedule 40) through the humidity control system and then to the VGAC vessels. The humidity in the air stripper vapor effluent will be near 100 percent and should be reduced to less than 50 percent prior to entering the VGAC vessels. Humidity in excess of 50 percent is not recommended for carbon adsorption. The humidity control (Heater 3500) will consist of an electric in-line duct air heater. The vapor effluent will be discharged into the atmosphere through a stack which will be approximately 25 feet above the surrounding ground surface to provide adequate diffusion of the treated air. The calculations in Appendix A demonstrate that the predicted air emission meets AQMD requirements, and in fact, there is a significant degree of conservatism in the estimates.

#### 4.3.13 LGAC Influent Storage Tank

The LGAC Influent Storage Tank (3760) will be downstream of the arsenic treatment system (if deemed necessary), the AOP system, and the Air Strippers. This tank will receive partially treated water and balance flows for pumping through the LGAC polishing vessels. The tank will be internally coated carbon steel and will be designed for atmospheric pressure operation. The total volume of the tank is 20,000 gallons. It was sized for sufficient working volume to allow for system recovery in the event of minor process disturbances, such as treatment of backwash water. Additional details of the tank are included in Drawings D-600 Series, D-620 series, Q-101, and M Series. Technical and performance data are included in Specifications Section 43 41 16.

#### 4.3.14 LGAC Vessels (3440 A/B)

The LGAC Vessels (3440 A/B) are provided to remove residual VOCs in extracted groundwater and treat dissolved pesticides not otherwise removed by the AOP or air stripping systems to meet discharge requirements. It is expected that the LGAC vessels will receive treated water, and therefore a small amount of carbon consumption is anticipated, as shown in Appendix A.

The TGRS will include two vessels operated in series, each filled with 20,000 pounds of GAC equivalent to Siemens AC1230C. The rationale for the configuration of the LGAC vessels (i.e., two vessels in series) and specified carbon is provided in the *Treatment Train Re-Evaluation* (Geosyntec, 2011a). The 20,000-lb size and specified carbon are based on bench testing of LGAC for Site groundwater (Earth Tech AECOM, 2008c) and subsequent calculations for the currently known list of contaminants.

The hydraulic parameters for the vessels are based on the vendor's recommendations for the equipment (Earth Tech AECOM, 2008c), except that a larger vessel diameter was selected to decrease the velocity of the water through the vessels. The vessels will be constructed of internally coated carbon steel in accordance with American Society of Mechanical Engineers Boiler and Pressure Vessel Code. LGAC vessel internals will be finalized during final equipment selection and specification. Additional technical and mechanical details will be found in the Drawing D-625, M-600 Series, and the Specifications Section 43 31 13.15.

### 4.3.15 Injection Holding Tank (3770)

The Injection Holding Tank (3770) will be downstream from the LGAC vessels. This tank will receive treated water and balance flows for pumping through effluent filtration to the injection wells. The Injection Holding Tank (3770) is internally coated carbon steel. It is designed for atmospheric pressure operation. The total volume of the tank will be 20,000 gallons. It was sized for sufficient working volume to allow for system recovery in the event of minor process disturbances, such as treatment of backwash water. Additional details of the tank will be included in Drawings D-600 Series, D-620 series, M-500 Series, and Specifications Section 43 41 16.

### 4.3.16 Effluent Filtration

Treated groundwater from Injection Holding Tank (3770) will be pumped through the Treated Water Filters (Roughing Filter 3460 A/B, Finishing Filter 3470 A/B, Auxiliary Filter 3480 A/B). The filters will be set up with progressively smaller micron rating bag filters to increase the efficiency of the operation. The filters will be designed to remove particles that can negatively impact injection well performance. The effluent filtration will be designed to filer particles larger than 1 micron. Each filter pair will consist of redundant multi-bag stainless steel filter housings that will have a hydraulic capacity of 805 gpm and a pressure rating of 150 psig. One filter pair will be operated and the other will serve as a ready spare to minimize downtime during filter bag changes. The filters will operate at a maximum recommended differential pressure of 20 psid to prevent filter bag failure.

### 4.3.17 Utility Tank (3750)

The Utility Tank (3750) will receive carbon backwash water, groundwater sampling development water, injection well development water, stormwater, and sump water. The Utility Tank (3750) will be internally coated carbon steel and will be designed for atmospheric pressure operation. The tank will have a conical bottom to facilitate removal of accumulated solids.

The utility tank water can be pumped either to the Influent Storage Tank (3710 A/B) or LGAC Influent Storage Tank (3760), depending on the composition of the water in the Utility Tank. Water will first be filtered by Utility Tank Filters (3450 A/B). Water requiring VOC or pCBSA treatment will be pumped to Tank 3710 A/B, and water requiring only solids treatment, back flush water, or rainwater will be pumped to Tank 3760. A PLC will be used to adjust the speed of the utility tank transfer pump (3650 A/B) VFD, so as not to exceed the hydraulic capacity of the treatment units downstream of the Tanks 3710 A/B and 3760.

The total volume of the utility tank is 30,000 gallons. The tank was sized to accommodate one carbon backwash cycle.

#### 4.3.18 Utility Tank Water Filters

Water from Utility Tank 3750 will be pumped through Utility Tank Filters (3450 A/B) at a maximum flow rate of approximately 150 gpm to Influent Storage Tank 3710 A/B or LGAC Influent Storage Tank 3760. The filters will be designed to remove particles 5 microns and larger. The filters will consist of redundant multi-bag stainless steel filter housings that will have a hydraulic capacity of 200 gpm and a pressure rating of 150 psig. One filter unit will be operated, and the other will serve as an in-place spare to eliminate downtime during filter bag changes. The filter will operate at a maximum recommended differential pressure of 20 psid to prevent filter bag failure.

#### 4.3.19 Treatment System Pumps

Submersible pumps installed in the extraction wells will be used to deliver extracted groundwater directly to the treatment system. Because they are not needed to overcome head losses of the pipeline network, no boost or lift pumps will be used in the pipeline system between the wells and the treatment plant. If arsenic treatment is deemed necessary, the submersible extraction pumps from the arsenic-affected wells will be sized to pump to the Arsenic Pre-treatment Storage Tank (3700). For the main process stream, the submersible extraction pumps will be sized to pump water into the Influent Storage Tanks (3710 A/B).

##### 4.3.19.1 Process Stream Pumps

Transfer pumps will be used at several points in the treatment system as follows:

- Feed Pump (3610 A/B);
- Air Stripper Feed Pump (3630 A/B) ;
- LGAC Feed Pumps (3660 A/B);
- Injection Booster Pumps (3670 A/B); and

- Utility Tank Transfer Pump (3650 A/B).

The process stream transfer pumps listed above will have a similar configuration and control set up throughout the system. The system is designed with two pumps at each pumping station; one pump is capable of handling the entire flow and a second in-place identical spare pump will be provided for redundancy. The pump is sized to handle the 805 gpm process stream flow. The pumps will be controlled using a VFD to match the treatment system flow rate to that being produced by the extraction wellfield. The design inlet flow range will be 700 gpm average with an instantaneous maximum of 805 gpm. Technical information for the process stream pumps will be found in Specification Section 43 06 23.

4.3.19.2 Utility Tank Transfer Pump (3650 A/B)

The Utility Tank Transfer Pumps will pump water from Utility Tank 3750 through Utility Tank Filters 3450 A/B, and to either the Influent Storage Tank (3710 A/B) or to the LGAC Influent Tank (3760), depending on the composition of the water in the Utility Tank. Each pump is sized with a capacity of up to 150 gpm and will be controlled using a VFD to balance the flow rate to 3710 A/B or 3760. At its maximum flow rate (with both pumps operating), the pumps will allow processing of utility tank water in approximately 2 hours.

4.3.19.3 Sump Pump (3680 A/B)

The Sump Pump (3680 A/B) is provided to remove rain water, AOP condensate water, and minor spills from the containment dike and transfer such flows to Utility Tank (3750). The pump will convey water at a design rate of 50 gpm and will be provided with inlet screens to prevent large debris from entering the Utility Tank. The 25-year, 24-hour design storm would produce approximately 6 inches of rain and could be completely contained within the existing treatment pad containment of 9 inches. If this storm were to occur, the 50 gpm sump pump would process the accumulated water in approximately 20 hours. Additional technical details for the pumps will be included on Drawings D-620 Series and Specifications Section 43 00 00.

### 4.3.20 Treatment Plant Control Summary

The treatment plant control system will be designed to allow unattended operation and reduce limit the need for operator interaction. The system will allow off-site monitoring of the treatment plant and of the well site operations, and will also provide for response to notifications and alarms. The system is described below and summarized on the P&ID (Drawings D-621 thru D-627). The system will communicate and control the well sites and will allow the safe and orderly operation of the extraction and injection wells. A preliminary evaluation of communication between the treatment plant and well sites was presented in *Groundwater Remedy Well Sites Control System Evaluation,* which was submitted to EPA on June 25, 2008 (H+A, June 25, 2008). This preliminary evaluation recommended hardwired communication between the treatment plant and the well sites, which will be incorporated into the design of the system.

Electrical submersible pumps will extract groundwater from 14 extraction wells. Individual pump controllers located in each well vault will control the flow rate. The influent filtration systems (and potentially, an arsenic treatment system, if required) will be provided with differential pressure transmitters that will provide warning and shutdown alarms at indicated set points. This will notify an operator that the filters require replacement or, in the case of the LGAC and potential arsenic treatment equipment, that backwashing is necessary.

The filtered water in the Influent Storage Tank (3710 A/B) will be pumped by the AOP Feed Pump (3610 A/B) through the AOP based on level control in the influent storage tank. A level transmitter installed in the tank will maintain a constant level in the tank by balancing inflow and outflow. The level signal will be transmitted to a PLC that will be used to adjust the speed of the AOP transfer pump VFD. A PLC will manage the AOP system and control the operation of the hydrogen peroxide metering pump and ozone generator. The hydrogen peroxide and ozone systems will also be programmed with a user-defined dosage rate that will be reviewed and refined over time as dissolved pCBSA and VOC concentrations decrease. The AOP system will be provided with automated valves for startup, recycle, and shutdown operations. The AOP system will be integrated into the rest of the TGRS control system to operate only the extraction wells when the AOP system is operating properly. The AOP system will be provided with diagnostic and status alarms to report system status.

The AOP effluent water in the Air Stripper Storage Tank will be pumped by the Air Stripper Feed Pump 3630 A/B through the Air Strippers based on level control in the influent storage tank. A level transmitter installed in the tank will maintain a constant level in the tank by balancing inflow and outflow. In addition, the tanks will be equipped with low and high level alarms and shutdowns. The level signal will be transmitted to a PLC that will be used to adjust the speed of the feed pump VFD.

After the water leaves the Air Stripper Feed Pump, a sequestering agent and a defoaming agent will be injected into the water stream. Chemical metering pumps (3460A/B and 3430A/B) will be used to transfer the agents from storage tanks based on calibrated VFD setpoints prior to entering the Air Stripper system.

Next, the water passes through a filtration system that precedes the air stripper equipped with differential pressure transmitters that will provide warning and shutdown alarms at indicated set points, notifying an operator that filters require replacement. The air stripper feed pumps will be controlled based on the liquid level in the air stripper feed tank; the air stripper blowers will operate when the air strippers are receiving water; and the air stripper sump pumps will operate based on level control in the sumps and receiving tank. The air stripper systems will shut down if low-low or high-high level alarms go off, pressure buildup occurs in the vapor stream, , low airflow is detected, or high temperatures are detected.

A differential pressure transmitter will be installed on the VGAC vessels to provide warning. Shutdown alarms at indicated set points will notify an operator if the carbon media in one of the filters needs replacement. Temperature sensors will also be included on the VGAC vessels to trigger alarms and shutdown at high temperatures.

The pH of groundwater transferred from the Air Stripper system to the LGAC influent storage tank will be continuously monitored via a pH sensor. A pH control agent will be fed into the groundwater at this location. The pH control agent is dosed via chemical metering pumps controlled by a feedback loop based on a user defined set point at the pH sensor.

A level transmitter will be installed in the LGAC Influent Storage Tank (3760) to maintain a constant level by balancing inflow and outflow. The level signal will be transmitted to a PLC that will be used to adjust the speed of the injection pumps VFD. Differential pressure transmitters will be installed on each carbon vessel to monitor vessel pressure drop and assess whether it is time for carbon backwash.

Pre-injection filters will be provided with differential pressure transmitters that will provide warning and shutdown alarms at indicated set points, notifying an operator that filters require replacement.

A level transmitter will be installed in the Utility Tank to provide level information, but the tank will be operated in a semi-automated configuration by the plant operator to batch treat water in the tank. Batch operation is a more cost-effective approach to processing backwash water, since backwashing is anticipated to be an infrequent operation.

The treatment system will be provided with a series of ancillary shutdowns and alarms depicted on the P&ID drawings (D-621 through D-627). These alarms include, but are not limited to, containment dike alarms and power failure alarms. In addition, each storage tank will be equipped with low and high level alarms and shutdowns to prevent overflow and/or running the system dry.

#### 4.3.21 Treatment Plant Materials of Construction

The groundwater remedy is expected to be operated continuously for over 30 years. Pressure vessels, tanks, and pipelines will be designed and specified to have a minimum design life of 30 years, typical for remediation systems. With continuing maintenance and scheduled component replacement, the treatment plant is anticipated to perform as long as is necessary to meet requirements for the groundwater remedy. Mechanical equipment utilized (i.e., pumps, valve, controllers, etc.) is not expected to last the entire period of operation and so will be designed and specified in a manner that replacement can be readily performed as this equipment reaches the end of its useful life.

Montrose prepared a preliminary evaluation of treatment system construction materials (Earth Tech, 2003). Materials were selected during that evaluation for safety, reliability, and cost-effectiveness for the projected treatment system design life. The selected materials are summarized below.

Two important factors that impact material longevity are water quality and climatic conditions. Water quality conditions were summarized in the *Preliminary Design Criteria Report* (Geosyntec, 2009b), and the climatic conditions were summarized in the *Preliminary Layout of Chlorobenzene Plume Treatment System* (Earth Tech, 2003).

Tanks and vessels will be constructed of coated carbon steel (Earth Tech, 2003). Pump casings will be ductile iron with stainless steel impellers and other pump wetted parts. Viton was recommended for flexible seals and gaskets (Earth Tech, 2003).

The preliminary construction materials evaluation of aboveground pipe resulted in the selection of coated carbon steel for both untreated and treated water, based on effectiveness and cost (Earth Tech, 2003). This evaluation was based on guidance from ASME B31.3 and resulted in the selection of Schedule 40 carbon steel. With continuing maintenance and scheduled component replacement, the system is anticipated to perform as long as is necessary to meet system requirements.

Recommendations for construction materials provided in this document are based on known site conditions. Material selections may change during the remedial design process, which includes evaluation of cost and commercial availability.

#### 4.3.22 Energy Requirements

The electrical design is progressing and will be included in the Final Design Drawings and Specifications. Energy requirements are being revised to include the current equipment layout, well configuration, and number of power drops.

#### 4.3.23 Utilities Requirements

The electrical service requirements for the treatment system will be provided by the Los Angeles Department of Water and Power (LADWP). The requested electrical service is still being designed. The feeder, transformer, and meter locations will be based on the technical requirements of the LADWP and the City of Los Angeles Building Department. The treatment system does not incorporate a redundant power supply (e.g., generators), since a power failure at the treatment plant would likely be regional in nature and the control system would shut down the extraction well pumps, thus eliminating the need for plant operation. Battery backups are planned for critical control system components, such as alarm call outs, PLCs, computers, and emergency lighting.

Potable water is available from an existing 6-inch LADWP connection located at the northeastern corner of the Property. Preliminary contacts with LADWP indicate that the existing connection could provide up to 1,400 gpm, but a flow evaluation during the construction planning phase would be required to verify flow performance. Potable water would be used for sanitary purposes, emergency eyewashes, and used in the treatment process for carbon backwashes.

A sanitary sewer connection will be required for sanitary facilities provided in the control room only. Sewer connections will be determined during the construction planning phase. No process water would be discharged into the sanitary sewer. The sanitary sewer is operated by Los Angeles County Sanitation Districts (LACSD). The sanitary sewer connection will be sized in accordance with the technical requirements of the City of Los Angeles and the LACSD.

Preliminary telecommunication requirements for the treatment system will include up to two voice lines and a data communication line. Two phone lines were selected to allow simultaneous operator communication with auto dialer alarm callout. Telecommunications services are available from Verizon and other major telecommunications service providers in the City of Los Angeles.

## 4.4 <u>Effluent Injection</u>

### 4.4.1 Overview

In this section, injection well locations and injection pipelines are discussed. Injection well locations are based on the groundwater flow model prepared for the RD Model Report. The RD modeling projected the need for a total of six injection well locations, three in the BFS and three in the Gage Aquifer. The maximum operational injection rates compared to the EPA design injection rates for the wells are shown in Table 4-2.

Prior to 2012, Montrose has conducted testing on four injection wells (G-IW-1, BF-IW-1, G-IW-2 and BF-IW-2). This testing has shown significant difficulty in attaining the design injection rates. Therefore, to provide additional injection capacity in the Gage Aquifer in the vicinity of Gage injection well G-IW-1 and BFS injection wells BF-IW-1 and BF-IW-3, an additional Gage injection well, referred to as G-IW-3, was located adjacent to planned injection well BF-IW-3. G-IW-3 was installed in December 2011. An additional injection well, G-IW-5, has been sited south of G-IW-2 to provide capacity not expected to be available at G-IW-2, since the integrity of injection well G-IW-2 has been shown to be compromised, as discussed below.

Based on the foregoing, the TGRS will include at least eight injection wells that will recharge the treated groundwater from the treatment system (Figure 2-1). The actual number of required injection wells may be adjusted based on additional testing yet to be performed.

### 4.4.2 Injection Well Locations

Five of the eight injection wells have been installed (BF-IW-1, BF-IW-2, G-IW-1, G-IW-2, and G-IW-3). The locations of two of the planned wells (BF-IW-3 and G-IW-4) were also based on the RD Model Report. However, since the RD Model Report was issued, Montrose has performed extensive work to secure access for the pipeline system. As a result of this work, changes to some well locations identified in the RD Model Report were necessary due to access agreement issues (Geosyntec, 2009a).

During injection testing, it was discovered that the well casing of G-IW-2 was compromised due to a crack in the PVC blank above the screened interval and a break in the seal at the bottom of the well. As a result, the well is unlikely to be able to achieve the design injection rate. Although Montrose will perform additional assessment on G-IW-2, a new well (G-IW-5) was planned a short distance from G-IW-2 to replace the capacity of G-IW-2. However, continuing difficulty with access negotiations for the proposed new location of G-IW-4 caused Montrose to re-evaluate the locations of both G-IW-4 and G-IW-5 (the replacement well for G-IW-2). Groundwater modeling performed by S.S. Papadopoulos & Associates showed that G-IW-4 could be further moved approximately 400 feet to the southeast of the previously proposed location (Papadopulos, 2011) and G-IW-5 could be moved approximately 175 feet south of G-IW-2. With these adjustments, Papapdopulos suggested that the wells could achieve their design injection rates without causing unacceptable groundwater mounding. Papadopulos noted, however, that during the 2005 injection test at well G-IW-2 – at which time injection occurred only at well G-IW-2, at a rate of 119 gallons minute – actual mounding in well G-IW-2 exceeded

60 feet and during the latter part of the test period, the rate of buildup increased significantly. Thus, as noted previously, modeling results for G-IW-2, and for each injection well tested thus far, have not been borne out through actual field testing.

The modeling performed by S.S. Papadopoulos & Associates has been reviewed by EPA. Although during subsequent conversations EPA requested that the Papadopulos memo be updated after pending water level data are obtained by Montrose, EPA generally was in agreement with the memo. As a result, the planned locations of G-IW-4 and G-IW-5 were moved approximately 200 feet and 150 feet south of the locations proposed in 2009, respectively. Table 4-3 provides a description of the planned injection well locations and deviations from the modeled locations. The planned injection rates for the individual wells are presented in Table 4-4. The injection well locations are shown on Drawing V-102.

### 4.4.3 Groundwater Injection Transfer/Backflush Pipelines

Underground single-walled HDPE pipe will be used to transfer the treated groundwater from the treatment plant to each of the eight injection wellheads. Separate underground single-walled HDPE pipe will be used to transfer groundwater generated during backflushing of each of the injection wells back to the treatment plant. The HDPE piping throughout the system will be SDR 11 with a maximum recommended operating pressure of 160 psig at 73°F. The piping system will contain cleanouts at certain low points and bends for removal of solids/sediment. The single-walled HDPE pipe sizes and lengths for the entire injection system are shown in the Drawing Series W-136 though W-163. The pipeline was designed to maintain pipe velocity of 2 – 7 feet per second (fps).

### 4.4.4 Treated Groundwater Transfer Pipeline Routes

Pipe routing will be located within public ROWs where possible to minimize the impact on city residents and businesses. Two separate trunk pipelines will be installed to reach the eight injection wells. The pipeline routes are shown in Figure 2-1. Pipeline routes were addressed in documents submitted to the EPA (Earth Tech, 2005; Geosyntec, 2009a). As discussed above, the changes to the locations of G-IW-4 and G-IW-5 resulted in changes to the injection pipeline transporting treated groundwater to these wells. The majority of the pipeline that was formerly sited in Vermont Avenue north of Del Amo Boulevard is now located on private property west of Vermont Avenue. Additionally, the injection pipeline from the treatment system running east to Vermont Avenue was moved south from Del Amo Boulevard to 204th Street, and continuing east to New Hampshire; south to Baron Street and finally to Vermont Avenue.

### 4.4.5 Injection Well Head Vaults

As shown on the P&IDs for the injection wells, Drawing Numbers D-631 and D-632, each vault will include an H-20 traffic-rated water-tight cover for protection of the vaults and for access to the components within the vaults. Vaults will have concrete bottoms to detect and contain leaks. The injection wells will include automated valves to control flow and which can be operated from the treatment plant PLC or the wellhead. The automated valves reduce the need to physically access the wells. In addition, the water level in the injection wells will be monitored with pressure transmitters to prevent excessive water mounding and shut the control valves if the mounding exceeds setpoints.

### 4.4.6 Injection Well Construction and Operation

Each remaining injection well will be constructed with stainless steel screen and Schedule 80 PVC blank casing. Centralizers will be installed to center the well casing within the borehole. For the purposes of sizing the injection wells, it was assumed that the injection wells may need to be backflushed on a regular basis to maintain capacity. To minimize disruption to injection operations, injection wells will accommodate permanent installation of a submersible pump to allow backflushing for short periods. Injection well pumps were sized based on the estimated maximum short-term extraction rate of the wells.

A stainless steel drop pipe will be used to convey water within the injection wells. The treated groundwater will be reintroduced into the aquifers via two-foot long perforated pipe sections located five feet above the well screen of each injection well. This is anticipated to provide less turbulent flow through the screens and, therefore, reduce disturbance to the filter pack. This perforated section will be located below the static water level for each well to reduce the introduction of entrained air into the system. The perforated pipe will be capped at its base and will be designed to provide equal distribution and adequate recharge to the surrounding groundwater aquifer. Table 4-5 shows the injection interval for each well.

### 4.4.7 Injection Well Maintenance Components

Each injection well will have a dedicated backflush pump. Backflushing will be performed periodically to clear the injection wells of any fouling that typically occurs in injection wells. This system of backflush pumps will be an automated permanent system. During backflushing, each backflush pump will operate at the short-term extraction rate specified for each well in Table 4-6. The short-term extraction rates represent the maximum allowable extraction rate of the well and are based on the hydraulic conditions at each well. The backflush rates will exceed the injection flow rate for improved fouling reduction and fine particle removal.

Backflush water will return to the influent storage tanks (3710 A/B) in the treatment plant via a dedicated return pipe line system. The backflush water will then be treated in the treatment plant and re-injected.

# 5. PROJECT DELIVERY STRATEGY

## 5.1 Introduction

A preliminary project delivery strategy and construction schedule is presented in this section. The delivery strategy and construction schedule will be refined as the project proceeds through Final Design and towards construction. A baseline construction schedule will be developed upon execution of contracts with contractors for construction of the remedy.

Contracts will be prepared with appropriately qualified construction contractors for performance of the work and the procurement of materials and most equipment. Some engineered and fabricated equipment may be procured in advance of mobilization of a construction contractor.

## 5.2 Work Breakdown

A work breakdown structure (WBS) will be developed to identify manageable elements of the remedy construction. The WBS will form the basis for construction cost estimating, scheduling, and management of the work.

## 5.3 Preliminary Project Delivery Strategy

Bid documents will be produced and qualified contractors will be selected or requested to competitively bid on the work. A contractor will be selected and a contract will be negotiated.

## 5.4 Overall Schedule

Montrose continues to develop an overall schedule for construction, which will be completed after the acceptance of the Final Design.

## 6. SPECIFICATIONS OUTLINE AND DRAWINGS LIST

The basis of design as discussed herein will be reflected in design drawings and specifications. A list of the design drawings is being finalized and a general list is provided in Table 6-1, and a general list of the specifications is included in Table 6-2.

## 7. REFERENCES

CH2M Hill, 2008. *Model Development and Remedial Wellfield Optimization Report; Dual Site Groundwater Remedial Operable Unit Remedial Design*; Montrose Chemical and Del Amo Superfund Sites (RD Model Report).

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# FIGURE

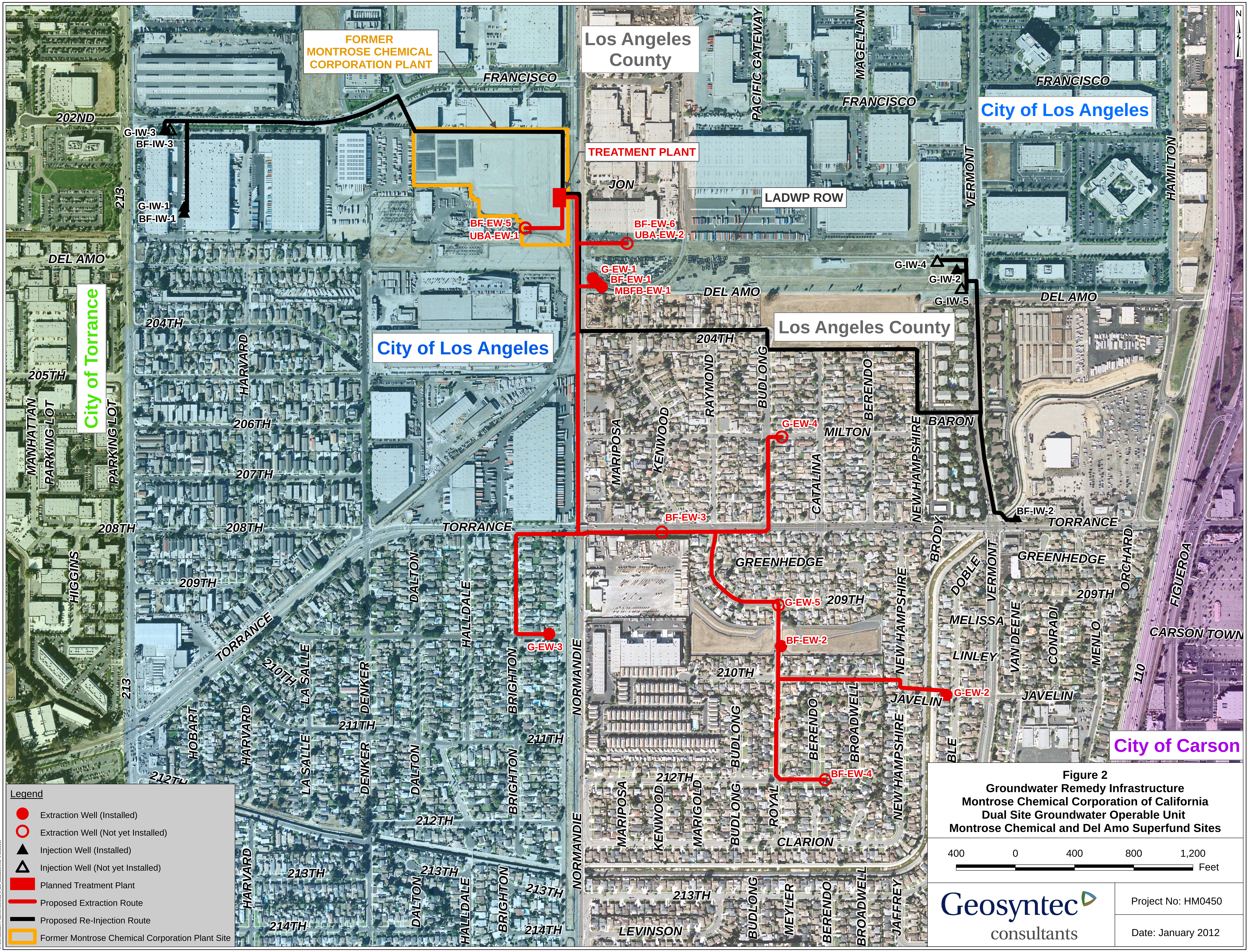


Figure 2
Groundwater Remedy Infrastructure
Montrose Chemical Corporation of California
Dual Site Groundwater Operable Unit
Montrose Chemical and Del Amo Superfund Sites

# TABLES

**TABLE 2-1**

**ARAR REQUIREMENTS**

**REVISED BASIS OF DESIGN REPORT**

**DUAL SITE GROUNDWATER OPERABLE UNIT**

| ARAR Requirement | How ARAR is Being Addressed |
|---|---|
| 22 C.C.R. Section 66261.10 Criteria for Identifying the Characteristic of Hazardous Waste. | Preliminary O&M Manual |
| 22 C.C.R. Section 66262.11 Hazardous Waste Determination by Generators. | Preliminary O&M Manual |
| 22 C.C.R. Section 66262.34 Accumulation Time. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.13(a)(1), (b) General Waste Analysis. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.14(a), (b) Hazardous Waste Facility General Security Requirements. | Preliminary O&M Manual |
| 22 C.C.R. Section. 66264.15 General Facility Inspection Requirements. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.17 Hazardous Waste Facility General Requirements for Ignitable Reactive or Incompatible Wastes. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.18 Location Standards. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.25 Hazardous Waste Facility Seismic and Precipitation Standards. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.31 Preparedness & Prevention-Design and Operation of Facility. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.32 Preparedness & Prevention-Required Equipment. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.33 Preparedness & Prevention-Testing and Maintenance. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.34 Preparedness & Prevention-Access to Communications or Alarm System. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.35 Preparedness & Prevention-Required Aisle Space. | Preliminary O&M Manual |
| 22 C.C.R Section 66264.37 Preparedness & Prevention-Arrangements With Local Authorities. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.51 Contingency Plan-Purpose and Implementation. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.52 Contingency Plan-Content. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.53(a) Contingency Plan-Copies of Plan. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.54 Contingency Plan-Amendment. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.55 Contingency Plan-Emergency Coordinator. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.56 Contingency Plan-Emergency Procedures. | Preliminary O&M Manual |
| 22 C.C.R. Section 66264.111 Hazardous Waste Facility Closure Performance Standard. | Facility Closure Plan |
| 22 C.C.R. Section 66264.112 (a)(1), (b) Closure Plan. | Facility Closure Plan |
| 22 C.C.R. Section 66264.114 Hazardous Waste Facility Closure-Disposal and Decontamination of Equipment, Structures and Soils. | Facility Closure Plan |
| 22 C.C.R. Section 66264.117(a)(b)(1) and (d) Hazardous Waste Facility Postclosure Care and Use of Property. | Facility Closure Plan |
| 22 C.C.R. Section 66264.119(a) (regarding notice to the local zoning authority) and (b)(1) Hazardous Waste Facility Post Closure Notices. | Facility Closure Plan |

| ARAR Requirement | How ARAR is Being Addressed |
|---|---|
| 22 C.C.R. Sections 66264.171-178 Use and Management of Containers. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.192 New Tanks. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.193(b),(c), (d), (e) and (f) Containment and Detection of Releases. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.194 General Operating Requirements. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.195 Inspections. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.196 Response to Leaks or Spills and Disposition of Leaking Or Unfit-for Use Tank Systems. | General requirement for system operation: O&M Plan element. |
| 22 C.C.R. Section 66264.197 Closure and Post Closure Care. | Facility Closure Plan |
| 22 C.C.R. Section 66264.1052 Standards-Pumps in Light Liquid Service. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1053 Compressors. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1057 Standards-Valves in Gas Vapor Service or Light Liquid Service. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1058 Standards-Pumps and Valves in Heavy Liquid Service. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Sections 66264.1061 and 66264.1062 Alternate Standards. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1063 Test Methods and Procedures. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1101 Containment Buildings-Design and Operating Standards. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| 22 C.C.R. Section 66264.1102 Closure and Post Closure Care. | Facility Closure Plan |
| 22 C.C.R. Section 66268.3 Hazardous Waste Dilution Prohibition as a Substitute for Treatment. | General requirement for system operation: O&M Plan element. |
| Regulation XIII New Source Review (including but not limited to Rule 1303). | Rule 1303 Permit to Construct |
| **Regulation IV, Prohibitions** | |
| i. Rule 401 Visible Emissions, | General requirement for system operation: O&M Plan element. |
| ii. Rule 402 Nuisance, | General requirement for system operation: O&M Plan element. |
| iii. Rule 403 Fugitive Dust, and | General requirement for system operation: O&M Plan element. |
| iv. Rule 473 Disposal of Solid and Liquid Waste. | General requirement for system operation: O&M Plan element. |
| Regulation X NESHAP (Benzene). | General requirement for system operation: O&M Plan element. |
| Rule 1401 New Source Review of Carcinogenic Air Contaminants. | General requirement for system operation: O&M Plan element. |
| State and Federal Maximum Contaminant Levels | Preliminary Design Criteria Report and Preliminary Basis of Design Report |

| ARAR Requirement | How ARAR is Being Addressed |
|---|---|
| **Regulation IV, Prohibitions (continued)** | |
| S.W.R.C.B. Resolution 68-16. | Preliminary Design Criteria Report and Preliminary Basis of Design Report |
| S.W.R.C.B. Regulation, 22 C.C.R. Chapter 15, Article 5, Section 2550.7(b)(5) General Water Quality Monitoring and System Requirements. | General requirement for system operation: O&M Plan element. |
| S.W.R.C.B. Resolution 92-49 Section III. (H). | TI Waiver Zone establishes waiver. |
| CERCLA Section 121 (d)(3),42 U.S.C. Section 9621(d)(3) requirements regarding offsite disposal of material contaminated with hazardous substances. | General requirement for system operation: O&M Plan element. |
| CERCLA Section 103, 42 U.S.C. Section 9603 notification requirements and comparable provisions of California law. | General requirement for system operation: O&M Plan element. |
| Provisions of Title 22 of the California Code of Regulations and parallel provisions of federal RCRA regulations relating to offsite shipments of hazardous waste, including but not limited to manifest requirements, pretransport requirements, transportation requirements, and offsite disposal, treatment and land ban prohibitions and requirements. | General requirement for system operation: O&M Plan element. |
| Provisions of the California Porter Cologne Act (implementing both state law and the federal Clean Water Act NPDES program) concerning the issuance of waste discharge requirements for point source discharges of treated groundwater water to offsite storm sewer conveyances. | NPDES permit application |
| Federal and State Occupation Health and Safety Act requirements. | General requirement for system operation: O&M Plan element. |
| Los Angeles County Sanitation District Wastewater Ordinance, as amended, concerning offsite discharges of treated groundwater to the LACSD sanitary sewer system. | NPDES permit application |

**TABLE 2-2**
**SUBSTANTIVE PERMIT REQUIREMENTS**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Agency | Division, if applicable | Permit Type | Use | Substantive Permit Requirement(s) |
|---|---|---|---|---|
| City of Los Angeles | Public Works (Bureau of Engineering) | E-Permit (Construction/ Encroachment) & R-Permit (to allow long-term installation in public ROW for life of system) | Well / Pipeline installations; also likely for potholing work | **With permit application:**<br>(1) Design drawings<br>(2) Traffic control plan & work hours<br>(3) Contractor insurance COIs<br>(4) Application fee(s)<br><br>****** Long-term agreement - through BOE - is issued following approval of the Engineering Board. |
| | Fire Department | CUPA – Certified Unified Program Agency | Storage of hazardous materials for HiPOx system | **With permit application:**<br>(1) List of chemicals, along with quantities, to be stored onsite;<br>(2) Schematic drawing showing all entry points to GWTS enclosure, electrical boxes - on/off panels, and general system components<br>(3) Application fees<br>**For Annual Compliance:**<br>(1) Update to system and chemical information to be submitted annually along with permit renewal fees<br>(2) Annual inspection by Fire Department<br><br>* HiPOx system - may need periodic demonstration that ozone is not accumulating in GWTS area |
| | Public Works (Building & Safety) | Building | Treatment plant building | Submittal of general project and design information for pre-development meeting with Building and Safety and other Public Works departments.<br>**With permit application:**<br>(1) Design drawings (full-size set) showing entry points to site and general structure of GWTS pad and O&M building, including spedifications<br>(2) Contractor insurance COIs<br>(3) Application fees<br>* Final inspections and approval by City Inspector(s) |
| LA County | Public Works, Road | Construction/ Encroachment | Pipeline/ well installations | **With permit application:**<br>(1) Design drawings (4 sets)<br>(2) Contractor Information (License No. & COIs)<br>(3) Associated fees<br>**For long-term installation** - Franchise agreement through County Real Estate Division; annual fees may be required. |

| Agency | Division, if applicable | Permit Type | Use | Substantive Permit Requirement(s) |
|---|---|---|---|---|
| LA County (continued) | Public Works, Flood | Encroachment/ Access | Access to channel for pipeline installations and excavations in vicinity of channel | **With permit application:**<br>(1) Design drawings & calculations (4 sets), showing required clearances from channels where necessary<br>(2) Contractor Information (License No. & COIs)<br>(3) Associated fees |
| | Public Works, Industrial Waste | Industrial Waste Discharge Permit | For temporary discharge of aquifer testing water during construction and start-up of GWTS operation | **With permit application**:<br>(1) Water quality data for GWTS influent, and information on treatment prior to dischage to meet NPDES requirements<br>(2) Drawings showing applicable outfalls along with current NPDES permit for outfalls identified *and* LACFCD permit for access to outfall connecting to the storm drain<br>(3) Permit fees, renewed annually<br>**For general compliance:**<br>(1) Prior to discharge, notifications to departments specified in permit<br>(2) Within 3 days of starting discharge, report GW quality data, total anticipated volume, and number of days over which discharge will take place. |
| | Public Works, Flood | Access for IWD | Access to outfall for discharge of water through IWD permit | **With permit application:**<br>(1) Design drawings showing applicable outfalls, work area, and equipment that will be used to transport water (temporary piping, etc.) from work site to outfall<br>(2) Copy or confirmation of IWD & NPDES permits allowing discharge |
| | Public Health | Well Permit | Well Installation | Application includes:<br>(1) General well detail information;<br>(2) Possible well inspection before final approval;<br>(3) Submittal of final well details and boring logs. |
| Regional Water Quality Control Board | Los Angeles Region | Temporary Discharge | To discharge aquifer testing water, backwash construction and start-up of treatment system | **Letter of Intent to Discharge and Discharge Feasibility Study, which should include:**<br>(1) Description of the water source;<br>(2) Tables presenting average VOC concentrations at each well, estimated flow rates, total discharge anticipated during well installation and aquifer testing, and the number of temporary storage tanks needed at each location;<br>(3) Maps of well locations that also show temporary storage tank areas.<br>(4) Monitoring plan for discharging development water |
| | | Waste Discharge Requirement (WDR) | Injection of treated water | Meet RWQCB's Basin Plan Objectives |

| Agency | Division, if applicable | Permit Type | Use | Substantive Permit Requirement(s) |
|---|---|---|---|---|
| Regional Water Quality Control Board (continued) | Los Angeles Region | NPDES | Discharge of treated water that is not injected | **With permit application:**<br>(1) Water quality data for GWTS influent, and source water information likely<br>(2) Design drawings for GWTS components<br>(3) Permit fees<br>**For annual compliance:**<br>(1) GW quality monitoring<br>(2) Quarterly and Annual Compliance Reporting<br>(3) Annual permit renewal, including fees |
| AQMD – Air Quality Management District | South Coast (SCAQMD) | 1166 Permit | Excavations (pipe-jacking, if contamination encountered) | **With permit application:**<br>(1) map of potential receptor areas;<br>(2) GWTS design drawings, including all components of treatment train *- if needed for GWTS operation*<br>**For general compliance (GWTS Operation):**<br>(1) Updated system information, including VOCs (lbs. mass) discharged to atmosphere, submitted with annual permit renewal<br>(2) Periodica system inspections to be conducted by SCAQMD every 1-3 years |
| California Department of Water Resources | Water Master, West Basin Adjudication | Extraction permits, Non-consumptive Water | Non-consumptive extraction of groundwater | **With application for all extraction and injection wells:**<br>(1) General project information<br>(2) Table with anticipated extraction and injection rates, including total projected volume<br>(3) Submittal of final well details and boring logs<br>(4) Compliance with Basin requirements of ownership or lease agreement of adjudicated water rights<br>** May require well inspection before final approval.<br>Quarterly and annual reporting of extraction and injection volumes is required and submitted throught the WRD. |
| | Water Replenishment Distrit (WRD) | Replenishment exemption | Approves fee exemption for non-consumptive use of groundwater | **Application for exemption includes:**<br>(1) Project background, including agency oversight and applicable site documents<br>(2) Maps showing extraction well locations<br>(3) Historical water quality data and site<br>(4) Anticipated extraction rates and total volumes per year and over the lifetime of the project<br>** Must be renewed every 5 years and approved by the WRD Board.<br>** Issued in conjunction with Water Master's Non-Consumptive Use Permit. |

**TABLE 2-3**
**POTENTIAL ENVIRONMENTAL AND PUBLIC IMPACTS**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Potential Environmental/Public Impact[1] | How Potential Impact is Being Addressed |
|---|---|
| Aesthetics | No impacts expected |
| Agriculture Resources | No impacts expected |
| Air Quality | While not expected, monitoring will occur during construction activities to document any temporary impacts. Subsequent design documents and construction documents will discuss any monitoring at the treatment system after operation begins. |
| Biological Resources | No impacts expected |
| Cultural Resources | No impacts expected |
| Geology / Soils | Various reports already produced and submitted to EPA |
| Hazards & Hazardous Materials | Subsequent design documents, construction documents, Preliminary O&M Manual |
| Hydrology / Water Quality | Various reports already produced and submitted to EPA |
| Land Use / Planning | No impacts expected |
| Mineral Resources | No impacts expected |
| Noise | Temporary impacts anticipated during construction; subsequent design documents, construction documents, Preliminary O&M Manual |
| Population / Housing | No impacts expected |
| Public Services | Subsequent design documents, construction documents, Preliminary O&M Manual |
| Recreation | No impacts expected |
| Transportation / Traffic | Temporary impacts anticipated during construction; Subsequent design documents, construction documents, Preliminary O&M Manual |
| Utilities / Service Systems | Subsequent design documents, construction documents, Preliminary O&M Manual |

[1] Note: List of potential impacts is taken from California Environmental Quality Act (CEQA) Initial Study checklist

**TABLE 3-1**

**CHRONOLOGY OF CHANGES**

**REVISED BASIS OF DESIGN REPORT**

**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Date | Action | Reference Document | Narrative |
|---|---|---|---|
| March 11, 2009 | Preliminary Design Criteria Report Submitted | Preliminary Design Criteria Report | |
| March 31, 2009 | Preliminary Basis of Design Report Submitted | Preliminary Basis of Design Report | |
| April 1, 2009 | Hargis' Supplemental Groundwater Sampling and Analysis Results indicate that some non-aromatic VOCs in the groundwater exceed ISGSs | Supplemental Groundwater Sampling and Analysis Results | In 2009, Hargis + Associates (H+A) sampled groundwater from wells surrounding the Montrose site, as documented in "Supplemental Groundwater Sampling and Analysis Results." The results were generally consistent with previous findings regarding the locations of the chlorobenzene and pCBSA plumes. H+A found a historical high concentration of chlorobenzene near the southeast corner of the Montrose Property in the UBA, which indicates that this contaminant is continuing to dissolve in the DNAPL. They also found significant concentrations of 1,2-dichloroethane, chloroform, and methylene chloride (Hargis + Associates, 2009).<br><br>The arsenic concentrations in the water extracted from wells UBA-EW-2 and MBFB-EW-1 exceed the maximum contaminant level (MCL) for arsenic of 10 ppb (Geosyntec, 2009g). In 2011, a workplan was proposed for bench-scale testing to assess the capacity of LGAC to treat arsenic (Geosyntec, 2011e). |
| April 30, 2009 | Preliminary Design Submitted | Preliminary Design Drawings and Specifications | Preliminary Design Drawings were submitted using the Influent Compilation Table provided in the Preliminary Basis of Design Report. |
| August-October 2009 | Assessment and redevelopment of G-IW-2 | Advisory: Evaluation of Injection Wells and Future Program | A series of tests were done on the injection wells to assess how to maintain high well capacities. Between 2005 and 2007, injection well tests indicated a significant reduction in well capacity at the existing wells. In 2009, Geosyntec prepared a plan to evaluate whether well redevelopment would be a sustainable solution to the low well capacities. Geosyntec redeveloped and tested G-IW-2 (Geosyntec, 2009f). An assessment of well conditions indicated that the decrease in well capacity was caused by sediment clogging, not biofouling. Chemical redevelopment resulted in an additional reduction in well capacity. Further physical well development was recommended for improving the capacity, with the potential addition of a well conditioning step (Geosyntec, 2010b). Physical well redevelopment increased the capacity of BF-IW-2 by 60-70%, but did not have a significant effect on the specific capacity of G-IW-2. A final injection test of G-IW-2 was recommended to learn if G-IW-2 would be able to meet design injection rate criteria. Upcoming work includes the installation of three injection wells with a design modified to account for the small particle size of the aquifer material (Geosyntec, 2010d). |
| October 30, 2009 | U.S. EPA comments on Dual Site Groundwater Operable Unit | Comments Received from CH2MHill October 30, 2009 | CH2MHill provided comments on the April 30, 2009 Preliminary Design Drawings and Specifications. |
| September 1, 2009 | Intermediate Design Submittal | Intermediate Design Drawings | Design drawings submitted assuming LGAC treatment using influent compilation that was included in the Preliminary Basis of Design. |
| November 3, 2009 | Testing indicates that HiPOx system can reduce pCBSA concentrations without exceeding bromate standards | Summary of the Additional Bench-Scale Testing of APT's HiPOx Process | The 2009 sampling was the first indication of high bromide concentrations in the extracted well water. Advanced oxidation using a HiPOx system was intended for treatment of para-chlorobenzene sulfonic acid (pCBSA). While bromide itself is not a concern, it may be oxidized to bromate, a human carcinogen, in the HiPOx system. Bench-scale tests were planned in order to assess whether modification of the HiPOx system would allow it to treat pCBSA without producing over 10 µg/L of bromate (Geosyntec, 2009e). The bench-scale tests indicated that the pCBSA concentration could be reduced to the regulatory limit of 25,000 µg/L with a maximum bromate concentration of 6.1 µg/L (Geosyntec, 2009h). |
| March 5, 2010 | Bench-scale testing of MPPE treatment of non-aromatic, "secondary," VOCs is planned | Re-Evaluation of Volatile Organic Compound Treatment | |

| Date | Action | Reference Document | Narrative |
|---|---|---|---|
| May 5, 2010 | Pipeline route and well siting adjustments. | Advisory: Evaluation of Injection Wells and Future Program | The proposed location of some of the well infrastructure has changed due to access restrictions. The planned pipeline route to G-EW-3 was modified to go down S. Brighton Avenue instead of Normandie Avenue. This design modification occurred in July 2010 after concluding that the access discussions with Lator Star were fruitless. The proposed solution to the siting issues of G-IW-4 and the new G-IW-2 is to install both wells on Waste Management Property. A study by Papadopoulos & Associates suggests that the interference caused by placing the wells so close together will be less than 20% of the total build-up within each of the injection wells. Moreover, they predict that the requirements for ROD compliance will continue to be met (Papadopoulos, 2011).<br><br>Well G-EW-6 has been removed from the design because it was found to be unnecessary to meet the conditions of the ROD. EPA indicated their agreement that this well is unnecessary (Geosyntec, 2009d). |
| June - July 2010 | Redevelopment work performed on G-IW-2 and BF-IW-2 | Advisory: Injection Wells Redevelopment and Evaluation | |
| December 22, 2010 | Report that physical redevelopment of BF-IW-2 was effective, and redevelopment of G-IW-2 did not increase capacity | Advisory: Injection Wells Redevelopment and Evaluation | |
| June 21, 2011 | Finalize Treatment Train | Treatment Train Advisory | The treatment train outlined in the 2009 BOD would use liquid-phase granular activated carbon (LGAC) to treat benzene and chlorobenzene. The high concentrations of non-aromatic VOCs found by Hargis + Associates would consume significantly more LGAC. Bench-scale tests were conducted with groundwater extracted from the Site to aid in selection of treatment train components that could treat the secondary VOCs more economically (Geosyntec, 2010a). Macro porous polymer extraction (MPPE) was found to be effective at removing VOCs to the level specified by the in-situ groundwater standards (ISGS) (Geosyntec, 2010c). However, the practical considerations associated with a sole-source technology manufactured in Europe resulted in the decision to use a different technology. The revised treatment train includes advanced oxidation (HiPOxTM), air stripping, treatment of the off-gas with vapor-phase granular activated carbon (VGAC) and treatment of the water with liquid-phase granular activated carbon (LGAC) prior to the final filtration step (Geosyntec, 2011a). |
| August 4, 2011 | Intermediate Design Submittal | Intermediate Design Drawings | |
| October 1, 2011 | EPA Comments | | |
| October 21, 2011 | Papadopoulos study indicates that modified location of G-IW-4 and G-IW-2x will not affect injection | Evaluation of Proposed G-IW-2x and G-IW-4 Injection Well Locations | |
| November 2, 2011 | Supplemental Information to the Intermediate Design Submittal submitted | Supplemental Information to the Intermediate Design Submittal | |
| November 29, 2011 | EPA Requests Revised Basis of Design | | Discussion with EPA and CH2MHill provides requirement for Revised Basis of Design Report. |

**TABLE 4-1**
**SUBSTANTIVE TREATMENT SYSTEM DESIGN CHANGES**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| No. | Item | Substantive Changes | Change From |
|---|---|---|---|
| ***Groundwater Treatment System*** | | | |
| 1 | Anticipated Influent Concentration | The groundwater extraction flow rates have not changed in the Intermediate Design Submittal. The expected concentrations of chemicals in the extracted groundwater have changed based on groundwater sampling conducted in 2009. The most current anticipated concentrations are included on the Process Flow Diagram (Sheet D-601). These changes were also documented in the letter report sent to USEPA on March 5, 2010 titled *Re-evaluation of Volatile Organic Compound Treatment, Dual Site Groundwater Operable Unit, Torrance, California.* The flow rates of auxiliary water sources that will enter the treatment system (i.e. redevelopment water, backwash water, stormwater) will be accommodated by the treatment system. | *Preliminary Design Criteria Report, Section 3.1.7* |
| 2 | Treatment Scheme | Based on the changes in groundwater concentrations, the treatment train was re-evaluated and adjusted to reflect a more efficient arrangement that will meet the treatment criteria. The new treatment train is shown on sheets D-601 and D-602 and is generally as follows: advanced oxidation -> air stripper -> liquid-phase granular activated carbon (LGAC). The air-stripper off-gases will be treated by vapor-phase GAC (VGAC). The evaluation process was documented in the following submittals to EPA: *"Re-evaluation of Volatile Organic Compound Treatment, Dual Site Groundwater Operable Unit, Torrance, California; 5 March 2010" and "Treatment Train Advisory, Torrance Groundwater Remedial System, Los Angeles, California, 21 June 2011.* The design for each system was updated to reflect the updated mass loading. Details of each treatment system are included in Attachment 1 of this Supplement. | *Preliminary Design Criteria Report, Section 2* |
| 3 | Site Grading Plan | Previous submittals did not include a grading plan or topographic information. Sheet C-102 includes a grading plan to manage stormwater and allow for incorporation of excavation spoils into the grading plan. The general stormwater management strategy is to capture and manage water within the treatment pad containment berm based on California Title 22 and Title 23 regulations. Stormwater that falls outside the treatment pad containment berm will not be treated through the treatment system. | N/A |
| 4 | Process Flow Diagram | The process flow diagram (PFD) has been altered to reflect the updated treatment train and updated anticipated influent groundwater concentrations. The mass flows at each stage of the treatment process have also been updated. The updated PFDs are on Sheets D-601 and D-602. Assumptions concerning the operation of each treatment system are included in Attachment 1. | *Intermediate Design Submittal, October 9, 2009* |
| 5 | Process and Instrumentation Diagram (P&ID) | The groundwater treatment system P&IDs have been updated to reflect the updated treatment system and provide more detail about the proposed control system. The P&IDs for the groundwater treatment system are included on sheets D-621 through D-627. The new equipment has been included, the control loops have been adjusted, and interlocks have been altered. In general, the flowrates at each treatment system will be controlled by the levels in the storage tanks. Accordingly, interlocks have been added to the control systems. | *Intermediate Design Submittal, October 9, 2009* |
| 6 | Equipment Layout | The equipment configuration has been reorganized to accommodate the additional equipment that will be included on the treatment pad. The equipment configuration was chosen to facilitate efficient construction, operation, and maintenance. To the extent possible, the treatment train was laid out sequentially. The updated equipment layout is provided on drawing Q-101. Process piping is placed on a centralized pipe support structure that provides equipment access through a central aisle (details on drawing S-102). The equipment has been arranged to be accessible from outside the treatment plant for maintenance and repairs. | *Intermediate Design Submittal, October 9, 2009* |

| No. | Item | Substantive Changes | Change From |
|---|---|---|---|
| 7 | Storage Tanks | Previous design submittals have included two process tanks and one utility tank with an approximate total storage capacity of 70,000 gallons. The current proposed design includes six process tanks and one utility tank with an approximate total storage capacity of 180,000 gallons. The additional storage capacity was included to provide additional operational flexibility, accommodate the updated treatment train, and accommodate auxiliary flows that will be treated in the system (i.e., redevelopment water, backwash water, stormwater).<br><br>In addition, chemical tanks have been included to provide bulk chemical storage for chemicals that are included in a unit process (e.g., sequestering agent, pH control, etc.). | *Intermediate Design Submittal, October 9, 2009* |

**TABLE 4-2**
**COMPARISON OF OPERATIONAL INJECTION RATES TO DESIGN RATES**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Well Identifier | Maximum Operational Injection Rate (gpm) | EPA Design Injection Rate (gpm) | Comparison to Design Rate (percent excess) |
|---|---|---|---|
| ***Existing Injection Wells*** | | | |
| BF-IW-1 | 60 | 40 | 50 |
| BF-IW-2 | 70 | 40 | 75 |
| G-IW-1 | 145 | 156.5 | -7 |
| G-IW-2[1] | Limited | 125 | N/A(36) |
| G-IW-3[2] | 145 | 156.5 | N/A |
| ***Planned Injection Wells*** | | | |
| BF-IW-3 | 60 | 57 | 5 |
| G-IW-4 | 180 | 125 | 44 |
| G-IW-5[1] | 170 | [125] | 36 |
| **TOTAL** | **830** | **700** | **18** |

gpm = Gallons per minute

[1]Injection testing of G-IW-2 revealed that the integrity of the well casing had been compromised and the well could not achieve the EPA design injection rate. The values reported in parenthesis are those reported by Hargis + Associates (2008a) and have been reassigned to a planned replacement injection well (G-IW-5) located a short distance south of G-IW-2.

[2]G-IW-3, an installed injection well, is included in this table for completeness but was not included in this comparison because it was not part of the RD Model. G-IW-1 and G-IW-3 together accomplish the original EPA Design Injection Rate for G-IW-1 (313 gpm).

**TABLE 4-3**
**EXTRACTION AND INJECTION WELL LOCATIONS**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Well Number | Aquifer | Address | Jurisdiction | Location Description | Comments |
|---|---|---|---|---|---|
| UBA-EW-1 | Water Table | 20201 South Normandie Ave. (nearest) | City of Los Angeles | On southwest corner of southernmost protrusion of Montrose Property. Near existing Montrose monitoring well MW-06. | Proposed Well - To be constructed approximately 175 ft. north of Modeled Location. Moves well onto Montrose Property |
| UBA-EW-2 | Water Table | 20200 South Normandie Ave. (nearest) | City of Los Angeles | On Waste Management (or LADWP) property southeast of Montrose Property. Near existing Montrose monitoring wells G-05, BF-06, MW-13 and LW-02. | Proposed Well |
| MBFB-EW-1 | Water Table | 20201 South Normandie Ave. (nearest) | City of Los Angeles | Located on Waste Management owned property, on northeast corner of South Normandie Ave. and West Del Amo Blvd. | Existing Well |
| BF-EW-1 | MBFC | 20201 South Normandie Ave. (nearest) | City of Los Angeles | Located on Waste Management owned property, on northeast corner of South Normandie Ave. and West Del Amo Blvd. | Existing Well |
| BF-EW-2 | Merged MBFB/MBFC | 1065 W. 210th Street (nearest) | Los Angeles County | Located on east side of Royal Blvd., south of West 209th St. and north of West 210th St. | Existing Well |
| BF-EW-3 | Merged MBFB/MBFC | 20736 Kenwood Ave. (nearest) | Los Angeles County | On south side of Torrance Blvd., across from 20736 Kenwood Ave. | Proposed Well |

| Well Number | Aquifer | Address | Jurisdiction | Location Description | Comments |
|---|---|---|---|---|---|
| BF-EW-4 | Merged MBFB/MBFC | 1026 West 212th St. (nearest) | Los Angeles County | On north side of West 212th St., across from 1026 West 212th St. | Proposed Well |
| BF-EW-5 | MBFC | 20201 South Normandie Ave. (nearest) | City of Los Angeles | On southwest corner of southernmost protrusion of Montrose Property. Near existing Montrose monitoring well MW-06. | Proposed Well - To be constructed approximately 175 ft. north of Modeled Location. Moves well onto Montrose Property |
| BF-EW-6 | MBFC | 20200 South Normandie Ave. (nearest) | City of Los Angeles | On Waste Management (or LADWP) property southeast of Montrose Property. Near existing Montrose monitoring wells G-05, BF-06, MW-13 and LW-02. | Proposed Well |
| G-EW-1 | Gage | 20201 South Normandie Ave. (nearest) | City of Los Angeles | Located on Waste Management owned property, on northeast corner of South Normandie Ave. and West Del Amo Blvd. | Existing Well |
| G-EW-2 | Gage | 926 Javelin St. (nearest) | Los Angeles County | Located at the end of Javelin St., near the Torrance Lateral, in front of 926 Javelin St. | Existing Well |
| G-EW-3 | Gage | 20857 Normandie Ave. (nearest) | City of Los Angeles | Located on the north side of West 209th St., west of Normandie Ave. | Existing Well |
| G-EW-4 | Gage | 20600 Budlong Ave (nearest) | Los Angeles County | On south side of Milton St., north of 20600 Budlong | Proposed Well |
| G-EW-5 | Gage | 1070 West 209th St. (nearest) | Los Angeles County | On south side of 209th St. in front of 1070 West 209th St. | Proposed Well |
| BF-IW-1 | MBFC | 1540 Francisco St. (actual) | City of Los Angeles | Well is located in the southern portion of Wesco Inc. owned property. | Existing Well |

| Well Number | Aquifer | Address | Jurisdiction | Location Description | Comments |
|---|---|---|---|---|---|
| BF-IW-2 | Merged MBFB/MBFC | 833 Torrance Blvd. (actual) | Los Angeles County | Well is located on property owned by Alpine Village, on the northeast corner of South Vermont Ave. and Torrance Blvd. | Existing Well |
| BF-IW-3 | MBFC | 2001 Western Way (nearest) | City of Los Angeles | On south side of Francisco St. east of intersection of Francisco St. and Western Ave. on parcel owned by Cornerstone Realty. | Proposed Well - To be constructed east of modeled location and east of Western Ave. This moves the well out of City of Torrance jurisdiction. |
| G-IW-1 | Gage | 1540 Francisco St. (actual) | City of Los Angeles | Well is located in the southern portion of Wesco Inc. owned property. | Existing Well |
| G-IW-2 | Gage | 20300 South Vermont Ave. (actual) | City of Los Angeles | Well is located on Waste Management owned property on northwest corner of South Vermont Ave. and West Del Amo Blvd. | Existing Well |
| G-IW-3 | Gage | 2001 Western Way (nearest) | City of Los Angeles | On south side of Francisco St. east of intersection of Francisco St. and Western Ave. on parcel owned by Cornerstone Realty. | Existing well constructed east of modeled location and east of Western Ave out of City of Torrance jurisdiction. |
| G-IW-4 | Gage | 20300 South Vermont Ave. (nearest) | City of Los Angeles | Located on Waste Management owned property on northwest corner of South Vermont Ave. and West Del Amo Blvd. | Proposed Well - To be constructed approximately 1,200 ft. south of Modeled Location. |
| G-IW-5 | Gage | 20300 South Vermont Ave. (nearest) | City of Los Angeles | Located on Waste Management owned property on northwest corner of South Vermont Ave. and West Del Amo Blvd. | Proposed G-IW-2 replacement well - To be constructed approximately 200 ft. south of G-IW-2. |

**TABLE 4-4**
**GROUNDWATER EXTRACTION AND INJECTION RATES**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Aquifer | Well Identification | Design Flow Rate (gpm) | Depth of Well |
|---|---|---|---|
| ***Extraction Well Information*** | | | |
| Water Table | UBA-EW-1 | 6 | 78 |
| | UBA-EW-2 | 12 | 78 |
| | MBFB-EW-1 | 4 | 79 |
| BFS[(1)] | BF-EW-1 | 35 | 130 |
| | BF-EW-2 | 79.9 | 130 |
| | BF-EW-3 | 75.6 | 138 |
| | BF-EW-4 | 134.2 | 130 |
| | BF-EW-5 | 35 | 125 |
| | BF-EW-6 | 35 | 138 |
| Gage Aquifer | G-EW-1 | 120 | 199.5 |
| | G-EW-2 | 33.6 | 181 |
| | G-EW-3 | 27.7 | 181 |
| | G-EW-4 | 67.6 | 200 |
| | G-EW-5 | 56.8 | 184 |
| ***Injection Well Information*** | | | |
| BFS[(1)] | BF-IW-1 | 39.9 | 130 |
| | BF-IW-2 | 39.9 | 146 |
| | BF-IW-3 | 56.8 | 125 |
| Gage Aquifer | G-IW-1 | 156.25 | 166.5 |
| | G-IW-2[(2)] | - | - |
| | G-IW-3 | 156.25 | 163 |
| | G-IW-4 | 125.4 | 205 |
| | G-IW-5 | 125.4 | 219 |

[(1)] See Table 4-1 for details regarding the lithology in the screened interval.

[(2)] G-IW-2 will be replaced by G-IW-5 because G-IW-2 could not achieve the design injection rate.

**TABLE 4-5**
**INDIVIDUAL WELL INJECTION INTERVALS**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Well Identifier | Depth to Static (ft bgs) | Well Screen Interval (ft bgs) | Injection Interval (ft bgs) |
|---|---|---|---|
| BF-IW-1 | 67 | 107-125 | 100-102 |
| BF-IW-2 | 38 | 61.5-144 | 54.5-56.5 |
| BF-IW-3 | 68 | 107-125 | 100-102 |
| G-IW-1 | 37 | 138-163.5 | 131-133 |
| G-IW-2[(1)] | - | - | - |
| G-IW-3 | 67 | 138-163 | 131-133 |
| G-IW-4 | 50 | 175-205 | 168-170 |
| *G-IW-5* | *49* | *173-214* | *166-168* |

[(1)] Injection testing of G-IW-2 indicated that it could not achieve the EPA design injection rate. It will be replaced by G-IW-5.

**TABLE 4-6**
**INJECTION WELL BACKFLUSH EXTRACTION RATES**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Well ID | Estimated Specific Capacity Without Plugging (gpm/ft) | Available Drawdown (feet bls) | Short-Term Extraction Rate (gpm) | Design Injection Rate (gpm) |
|---|---|---|---|---|
| BF-IW-1 | 1.3 | 46 | 60 | 40 |
| BF-IW-2 | 2.4 | 51 | 122 | 40 |
| BF-IW-3 | 1.3 | 46 | 60 | 57 |
| G-IW-1 | 4.3 | 71 | 305 | 157 |
| G-IW-2[(1)] | - | - | - | - |
| G-IW-3 | 4.3 | 71 | 305 | 157 |
| G-IW-4 | 2.2 | 121 | 266 | 125 |
| G-IW-5 | 2.2 | 124 | 273 | 125 |

[(1)] Injection testing of G-IW-2 indicated that it could not achieve the EPA design injection rate. It will be replaced by G-IW-5.

Geosyntec consultants

**TABLE 6-1**
**LIST OF DRAWINGS**
**REVISED BASIS OF DESIGN REPORT**
**DUAL SITE GROUNDWATER OPERABLE UNIT**

| Drawing Number or Series | Drawing |
|---|---|
| G-001 | Title Sheet and Drawing Index |
| G-101 | General Notes and Symbols |
| V-101 | Extraction Infrastructure Index Sheet |
| V-102 | Injection Infrastructure Index Sheet |
| W-100 - EXT Series | Extraction Piping Plan and Profile |
| W-100 INJ Series | Injection Piping Plan and Profile |
| W-300 Series | Pipeline Trench Sections |
| W-400 Series | Well and Satellite Layout Site Plans |
| W-500 Series | Well Vault Details and Standard Details |
| C-101 | Treatment Plant Site Plan |
| C-102 | Existing Topography/Demolition Plan |
| C-103 | Treatment Plant Grading Plan |
| C-104 | Utility Plan |
| C-501 | Drainage Details |
| S-101 | Treatment System Foundation Plan |
| S-102 | Treatment System Pipe Supports |
| S-500 Series | Treatment System Foundation Details |
| Q-101 | Treatment Plant Equipment Plan |
| D-001 | Process & Instrumentation Diagram General Notes & Symbols |
| D-601 - D-602 | Process Flow Diagrams |
| D-611 - D-618 | Extraction System Process & Instrumentation Diagrams |
| D-619 | Extraction System Valve Schedule |
| D-621 - D-627 | Treatment System Process & Instrumentation Diagrams |
| D-631 - D-632 | Injection System Process & Instrumentation Diagrams |
| D-633 | Injection System Valve Schedule |
| M-101 | Treatment Plant Piping Diagram - Plan View |
| M-300 Series | Treatment Plant Piping Sections |
| M-500 Series | Treatment Plant Piping Details |
| M-600 Series | Mechanical Schedule |
| E-001 | Electrical & Grounding Symbology |
| E-101 | Treatment System Conduit and Wiring Diagram |
| E-500 Series | Electrical Single Line Diagrams |
| T-101 | Controls Schematic |

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**TABLE 6-2**

**LIST OF SPECIFICATIONS**

**REVISED BASIS OF DESIGN REPORT**

**DUAL SITE GROUNDWATER OPERABLE UNIT**

| | Section No. | Revision | Description |
|---|---|---|---|
| ***Division 01 - General Requirements*** | | | |
| 1 | 01 00 00 | 1 | General Requirements |
| 2 | 01 10 00 | 0 | Summary |
| 3 | 01 11 00 | 0 | Summary of Work |
| 4 | 01 11 13 | 1 | Work Covered by Contract Documents |
| 5 | 01 14 13 | 1 | Access to Site |
| 6 | 01 14 16 | 1 | Coordination With Occupants |
| 7 | 01 14 19 | 0 | Use of Site |
| 8 | 01 20 00 | 0 | Price and Payment Procedures |
| 9 | 01 30 00 | 0 | Administrative Requirements |
| 10 | 01 32 16 | 1 | Construction Progress Schedule |
| 11 | 01 32 19 | 1 | Submittals Schedule |
| 12 | 01 33 00 | 0 | Submittal Procedures |
| 13 | 01 33 23 | 0 | Shop Drawings, Product Data, and Samples |
| 14 | 01 33 26 | 1 | Source Quality Control Reporting |
| 15 | 01 35 13 | 1 | Special Project Procedures (for Railroad Crossings) |
| 16 | 01 40 00 | 0 | Quality Requirements |
| 17 | 01 42 19 | 0 | Reference Standards |
| 18 | 01 45 16 | 1 | Field Quality Control Procedures |
| 19 | 01 45 16.13 | 0 | Contractor Quality Control |
| 20 | 01 50 00 | 0 | Temporary Facilities and Controls |
| 21 | 01 51 00 | 1 | Temporary Utilities |
| 22 | 01 51 13 | 1 | Temporary Electricity |
| 23 | 01 51 16 | 0 | Fire Protection |
| 24 | 01 51 23 | 0 | Temporary Heating, Cooling, and Ventilating |
| 25 | 01 51 33 | 1 | Temporary Telecommunications |
| 26 | 01 51 36 | 1 | Temporary Water |
| 27 | 01 52 00 | 0 | Construction Facilities |
| 28 | 01 52 19 | 0 | Sanitary Facilities |
| 29 | 01 57 00 | 0 | Temporary Controls |
| 30 | 01 57 19 | 1 | Temporary Environmental Controls |
| 31 | 01 60 00 | 0 | Product Requirements |
| 32 | 01 66 00 | 0 | Product Storage and Handling Requirements |
| 33 | 01 70 00 | 0 | Execution and Closeout Requirements |
| 34 | 01 75 13 | 0 | Checkout Procedures |
| ***Division 01 - General Requirements (continued)*** | | | |

| | Section No. | Revision | Description |
|---|---|---|---|
| 35 | 01 77 00 | 0 | Closeout Procedures |
| 36 | 01 78 23 | 1 | Operation and Maintenance Data |
| 37 | 01 78 39 | 0 | Project Record Documents |
| ***Division 02 - Existing Conditions*** | | | |
| 1 | 02 00 00 | 0 | Existing Conditions |
| 2 | 02 05 00 | 0 | Common Work Results for Existing Conditions |
| 3 | 02 20 00 | 0 | Assessment |
| 4 | 02 22 00 | 1 | Existing Conditions Assessment |
| 5 | 02 24 00 | 1 | Environmental Assessment |
| 6 | 02 25 00 | 1 | Existing Material Assessment |
| ***Division 03 - Concrete*** | | | |
| 1 | 03 00 00 | 0 | Concrete |
| 2 | 03 05 00 | 0 | Common Work Results for Concrete |
| 3 | 03 05 01 | 0 | Watertightness Test for Concrete Structures |
| 4 | 03 06 30 | 0 | Schedules for Cast-in-Place Concrete |
| 5 | 03 06 40 | 0 | Schedules for Precast Concrete (Extraction Well Vaults) |
| 6 | 03 06 41 | 0 | Schedules for Precast Concrete (Injection Well Vaults) |
| 7 | 03 06 42 | 1 | Schedules for Precast Concrete (Other) |
| 8 | 03 10 00 | 0 | Concrete Forming and Accessories |
| 9 | 03 11 00 | 0 | Concrete Forming |
| 10 | 03 15 00 | 0 | Concrete Accessories |
| 11 | 03 15 13 | 0 | Waterstops |
| 12 | 03 15 13.13 | 0 | Waterproof Seals (Link-Seal) |
| 13 | 03 15 13.14 | 0 | Waterproof Seals for Vaults (Z•Lok Connectors) |
| 14 | 03 20 00 | 0 | Concrete Reinforcing |
| 15 | 03 21 00 | 0 | Reinforcing Steel |
| 16 | 03 30 00 | 0 | Cast-in-Place Concrete |
| 17 | 03 30 53 | 0 | Miscellaneous Cast-in Place Concrete |
| 18 | 03 35 00 | 0 | Concrete Finishing |
| 19 | 03 39 00 | 0 | Concrete Curing |
| 20 | 03 40 00 | 0 | Precast Concrete |
| 21 | 03 41 10 | 1 | Precast Vaults and Pull Boxes |
| 22 | 03 60 00 | 0 | Grouting |
| 23 | 03 62 00 | 0 | Non-Shrink Grouting |

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| | Section No. | Revision | Description |
|---|---|---|---|
| ***Division 26 - Electrical*** | | | |
| 1 | 26 00 00 | 0 | Electrical |
| 2 | 26 05 00 | 0 | Common Work Results for Electrical |
| 3 | 26 05 12 | 1 | Tracer Wire and Marking Tape for Underground Conduit |
| 4 | 26 05 19 | 1 | Low-Voltage Electrical Power Conductors and Cables |
| 5 | 26 05 24 | 1 | Electric Power Conductor and Cable Fittings |
| 6 | 26 05 30 | 1 | Wiring Devices |
| 7 | 26 05 33 | 0 | Raceway and Boxes for Electrical Systems |
| 8 | 26 05 33.13 | 0 | Conduit for Electrical Systems (Schedule 80 PVC Conduit) |
| 9 | 26 05 53 | 1 | Identification for Electrical Systems |
| 10 | 26 05 83 | 1 | Service Entrance |
| 11 | 26 06 00 | 1 | Schedules for Electrical |
| 12 | 20 06 20.25 | 1 | Conduit Schedule |
| 13 | 20 06 20.26 | 1 | Wiring Device Schedule |
| 14 | 26 20 00 | 0 | Low-Voltage Electrical Transmission |
| 15 | 26 22 16 | 0 | Dry Type Transformers |
| 16 | 26 50 00 | 0 | Lighting |
| 17 | 26 52 00 | 1 | Emergency Lighting |
| ***Division 31 - Earthwork*** | | | |
| 1 | 31 00 00 | 0 | Earthwork |
| 2 | 31 05 00 | 1 | Common Work Results for Earthwork |
| 3 | 31 10 00 | 0 | Site Clearing |
| 4 | 31 11 00 | 1 | Clearing and Grubbing |
| 5 | 31 20 00 | 1 | Earth Moving |
| 6 | 31 22 00 | 1 | Grading |
| 7 | 31 22 19 | 1 | Finish Grading |
| 8 | 31 23 16 | 1 | Excavation |
| 9 | 31 23 19 | 0 | Dewatering |
| 10 | 31 23 23.23 | 0 | Compaction |
| 11 | 31 23 33 | 1 | Trenching and Backfilling |
| 12 | 31 40 00 | 0 | Shoring and Underpinning |
| 13 | 31 41 33 | 0 | Trench Shielding |
| ***Division 32 - Exterior Improvements*** | | | |
| 1 | 32 00 00 | 1 | Exterior Improvements |
| 2 | 32 05 00 | 1 | Common Work Results for Exterior Improvements |
| 3 | 32 06 00 | 1 | Schedules for Exterior Improvements |
| 4 | 32 06 30.12 | 1 | Schedule for Asphalt Paving |
| 5 | 32 10 00 | 1 | Bases, Ballasts, and Paving |

| | Section No. | Revision | Description |
|---|---|---|---|
| 6 | 32 12 16 | 1 | Asphalt Paving |
| ***Division 33 - Utilities*** | | | |
| 1 | 33 00 00 | 0 | Utilities |
| 2 | 33 05 00 | 0 | Common Work Results for Utilities |
| 3 | 33 05 13 | 1 | Manholes (for Well Vaults) |
| ***Division 40 - Process Integration*** | | | |
| 1 | 40 00 00 | 0 | Process Integration |
| 2 | 40 05 00 | 0 | Common Work Results for Process Integration |
| 3 | 40 05 13.09 | 0 | Flushing and Testing |
| 4 | 40 05 13.11 | 0 | Leak Testing of Piping |
| 5 | 40 05 13.12 | 0 | Tracer Wire and Marking Tape for Buried Piping |
| 6 | 40 05 13.13 | 0 | Steel Process Piping |
| 7 | 40 05 13.19 | 0 | Stainless Steel Process Piping |
| 8 | 40 05 13.73 | 1 | Plastic Process Piping (Sch. 80 PVC) |
| 9 | 40 05 13.74 | 1 | HDPE Process Piping |
| 10 | 40 05 23 | 1 | Common Work Results for Process Valves |
| 11 | 40 05 23.19 | 1 | Stainless Steel Process Valves |
| 12 | 40 05 23.33 | 1 | Brass and Iron Process Valves |
| 13 | 40 05 23.83 | 0 | Air Relief Valves (Air Release With Vacuum Check) |
| 14 | 40 05 23.84 | 0 | Air Relief Valves (Combination Air Valves) |
| 15 | 40 06 00 | 1 | Schedules for Process Integration |
| 16 | 40 06 21 | 1 | Schedules for Extraction Well Process Piping |
| 17 | 40 06 22 | 1 | Schedules for Injection Well Process Piping |
| 18 | 40 06 23 | 1 | Schedules for Process Piping Within Vaults |
| 19 | 40 06 24 | 1 | Schedule for Steel Casing Pipe |
| 20 | 40 06 50 | 1 | Schedule for Extraction Well Vault Process Valves |
| 21 | 40 06 51 | 1 | Schedule for Injection Well Vault Process Valves |
| 22 | 40 50 00 | 0 | Process Piping and Railroad Crossings |
| 23 | 40 50 13 | 1 | Process Piping Procedures for Railroad Crossings |
| 24 | 40 90 00 | 0 | Instrumentation and Controls |
| ***Division 43 Process Gas & Liquid Handling Equipment*** | | | |
| 1 | 43 00 00 | 0 | Process Gas & Liquid Handling Equipment |
| 2 | 43 05 00 | 0 | Common Work Results for Gas & Liquid Handling Equipment |
| 3 | 43 06 00 | 0 | Schedules for Process Gas & Liquid Handling Equipment |
| 4 | 43 06 21 | 0 | Schedules for Extraction Well Pumps |
| 5 | 43 06 22 | 0 | Schedules for Injection Well Redevelopment Pumps |
| 6 | 43 06 23 | 1 | Schedules for Treatment System Sump and Transfer Pumps |
| 7 | 43 06 30 | 1 | Schedules for Gas and Liquid Hi-Purification Equipment |
| 8 | 43 06 31 | 1 | Schedule for Chemical Feed Pump Systems |
| 9 | 43 06 30 | 1 | Schedules for Gas and Liquid Storage (Tanks) |

| | Section No. | Revision | Description |
|---|---|---|---|
| 10 | 43 20 00 | 0 | Liquid Handling Equipment |
| ***Division 43 Process Gas & Liquid Handling Equipment (continued)*** | | | |
| 11 | 43 21 13 | 1 | Centrifugal Liquid Transfer Pumps |
| 12 | 43 21 39 | 1 | Submersible Liquid Pumps |
| 13 | 43 21 43 | 1 | Sump Liquid Pumps |
| 14 | 43 21 50 | 1 | Booster Pumps |
| 15 | 43 27 00 | 1 | Process Liquid Filters |
| 16 | 43 27 23 | 1 | Liquid Bag Filters |
| 17 | 43 30 00 | 1 | Gas and Liquid Purification Equipment |
| 18 | 43 31 10 | 1 | Air Strippers |
| 19 | 43 31 13.13 | 1 | Activated Carbon Gas Purification Filters |
| 20 | 43 31 13.14 | 1 | Activated Carbon Liquid Purification Filters |
| 21 | 43 31 13.26 | 1 | Multimedia Gas and Liquid Purification Filters |
| 22 | 43 32 69 | 1 | Chemical Feed Systems |
| 23 | 43 32 79 | 1 | Advanced Oxidation Equipment |
| 24 | 43 40 00 | 1 | Gas and Liquid Storage |
| 25 | 43 41 11 | 1 | Bolted Steel Tanks |
| 26 | 43 41 16 | 1 | Atmospheric Tanks and Vessels |

# APPENDIX A

# TREATMENT SYSTEM CALCULATIONS

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# Summary of Treatment System Operations Envelope

Several calculations, model runs, and treatability tests have been conducted to evaluate the performance of the treatment system. Several cases have been evaluated to confirm that the treatment system will be capable of treating the groundwater under the expected operational envelope as well as under non-ideal conditions.

## 1. GENERAL CONSIDERATIONS

Each piece of treatment equipment contains a factor of safety in the design, with the overall operational parameters as follows:

- Average flowrate is 700 gpm;
- Maximum flowrate is 805 gpm, accounting for instantaneous flow spikes and processing of stormwater, injection well backflushing/redevelopment water, and cleaning water;
- Contaminant concentrations at start-up represent the upper end of the range, and concentrations are expected to decrease over time; and
- The air emissions from the stack are well below the AQMD Rule 1401 risk assessment limits, which provides a buffer in the event that contaminant concentrations increase with time.

## 2. ADVANCED OXIDATION PROCESS

The advanced oxidation process (AOP) is included in the treatment system to treat pCBSA but will also treat some VOCs. The AOP system design is based on bench-scale testing. AOP operational parameters include:

- Manufacturer has a factor of safety built into their process of about 25% above the expected contaminant and flow loads at startup.
- AOP system will destroy some VOCs incidentally from approximately 38% to 68%. VOC destruction of 35% for alkenes is included in the calculations, which is conservative by being at the low end of the range.
- Alkanes present in the influent process stream that will pass through the AOP system relatively unaffected include 1,2-Dichloroethane, carbon tetrachloride, chloroform, and methylene chloride.
- Pesticides will also pass through the AOP System relatively unaffected.

## 3. AIR STRIPPER

The air stripper system transfers dissolved-phase VOCs to the vapor-phase where they will be treated through VGAC. The air stripper is included downstream of the AOP unit to address remaining VOCs that pass through the AOP unit, including poorly adsorbing VOCs such as methylene chloride, which would otherwise experience rapid breakthrough at the LGAC vessels. In addition, placement of the air stripper downstream of the AOP unit takes advantage of the destructive ability of the AOP unit (i.e., the ability to reduce VGAC consumption and cost). The general set up of the air stripper system is:

- There will be two air strippers in operation, connected in parallel, and one additional spare unit. The spare unit is included to accommodate potential downtime due to scaling or mechanical failure.
- The air strippers have been sized based on the 805 gpm flow and accounting for a 35% decrease in VOCs through the AOP.
- Manufacturer stated that AOP unit has a built in factor of safety of approximately 25%, which increases the conservativeness of the system.
- Process stream pH will be affected by alkalinity levels and carbon dioxide concentrations. An acid injection system has been included on the effluent of the sir stripper to adjust pH if needed.
- Initial MBAS (surfactant) concentrations in the waste stream may cause foaming in the air stripper; a defoaming agent will be included as part of the air stripper system.

## 4. LIQUID-PHASE GRANULAR ACTIVATED CARBON

The liquid-phase granular activated carbon (LGAC) is designed as a “polish” step to treat non-volatile pesticides that will be present in the liquid phase effluent of the air stripper. The treatment parameters are as follows:

- The LGAC will include two 20,000 lbs. vessels connected in series that will be manifolded such that either vessel can run in the lead position, and the related piping will be configured to include a backflush system.
- Vessel size was governed more by flow capacity than adsorption capacity.
- More a polishing step, expect the carbon units to be changed out infrequently.
- The calculations included a scenario where the air stripper is not in operation, in which case an approximately three-day change-out of a 20,000-pound vessel will be expected. However, please note that the treatment system would not continue to operate if the air strippers fail.

## 5. VAPOR-PHASE GRANULAR ACTIVATED CARBON

The vapor-phase granular activated carbon (VGAC) is designed to treat the vapor phase effluent of the air stripper. The ROD does not include treatment criteria for vapor phase emissions, so the Air Quality Management District (AQMD) Rule 1401 and 212 was used to estimate emission limits based on estimated mass loading included above.

- There will be three 20,000-lbs VGAC vessels connected in series, with one spare.
- Carbon usage is less than 1,000 pounds per day at startup, when the AQMD risk assessment "treatment efficiencies" are considered.
- The following assumptions were used in the AQMD Rule 1401 and 212 model:
    - Air Stripper modeling output was used to estimate the approximate mass loading
    - Continuous operation 24 hours each day, 365 days per year.
    - The system would include Toxic Best Available Control Technology (TBACT), and per Rule 1401, the minimum individual cancer risk (MICR) of ten in one million applies.
    - The vapor exhaust stack will be 25 feet high.
    - The nearest commercial receptor is greater than 200 feet away and the nearest residential receptor is greater than 890 feet away.

## 6. ARSENIC TREATMENT

If needed, Granular Ferric Hydroxide (GFH) will be included to treat arsenic present in a side stream flow.

- Side stream design flow is approximately 16 gpm.
- If needed, the arsenic treatment system will have a change-out frequency of approximately one vessel per month.
- GFH has been used successfully at the site during previous groundwater pump testing.

* * * *

# A-1

# AIR STRIPPER

| QED Air Stripper Model ver. 2.0 | 2/10/2012 |
|---|---|

## Site Data

**Name:** Geosyntec
**e-mail:** mthomas@geosyntec.com
**Project:** TGRS Air Stripper
**Units:** English
**Altitude:** 100 ft
**Air Temp:** 72 F
**Flow:** 402.5 gpm
**Water Temp:** 72 F
**Stripper:** EZ-Tray 48.x - Click for details
**Stripper Air Flow:** 2600 cfm
**Stripper Max Flow:** 500 gpm

## Water Results

| Contaminant | Influent (ppb) | Target (ppb) | 4-Tray Results (ppb) | 4-Tray % Removal | 6-Tray Results (ppb) | 6-Tray % Removal |
|---|---|---|---|---|---|---|
| 1,2-dichloroethane | 8.7 | 0.5 | < 1 | 100.000 | < 1 | 100.000 |
| 1,4-dichlorobenzene | 11.3 | 5 | < 1 | 100.000 | < 1 | 100.000 |
| benzene | 161.5 | 1 | < 1 | 100.000 | < 1 | 100.000 |
| carbon tetrachloride | 1 | 0.5 | < 1 | 100.000 | < 1 | 100.000 |
| chlorobenzene | 9035.0 | 70 | 61.5 | 99.319 | 5.4 | 99.940 |
| chloroform (trichloromethane) | 336 | 100 | 2.8 | 99.167 | < 1 | 100.000 |
| methylene chloride | 16 | 5 | < 1 | 100.000 | < 1 | 100.000 |
| tetrachloroethylene (PERC,PCE) | 109.2 | 5 | < 1 | 100.000 | < 1 | 100.000 |
| trichloroethylene (TCE) | 24.7 | 5 | < 1 | 100.000 | < 1 | 100.000 |

## Air Results

| Contaminant | 4-Tray (ppmV) | 4-Tray (lb/hr) | 6-Tray (ppmV) | 6-Tray (lb/hr) |
|---|---|---|---|---|
| 1,2-dichloroethane | 0.0397 | 0.00158 | 0.0423 | 0.00168 |
| 1,4-dichlorobenzene | 0.0382 | 0.00225 | 0.0385 | 0.00227 |
| benzene | 1.0326 | 0.03241 | 1.0367 | 0.03254 |
| carbon tetrachloride | 0.0033 | 0.00020 | 0.0033 | 0.00020 |
| chlorobenzene | 39.9867 | 1.80852 | 40.2367 | 1.81983 |
| chloroform (trichloromethane) | 1.3998 | 0.06715 | 1.4105 | 0.06766 |
| methylene chloride | 0.0916 | 0.00313 | 0.0939 | 0.00320 |
| tetrachloroethylene (PERC,PCE) | 0.3302 | 0.02201 | 0.3303 | 0.02201 |
| trichloroethylene (TCE) | 0.0942 | 0.00497 | 0.0943 | 0.00498 |

Note: The lb/hr mass loading under air results is per air stripper. Because there are two air strippers in parallel, the mass loading is doubled when input to the Tier 2 Screening Risk Assessment calculations.

# A-2

# AQMD EMISSIONS

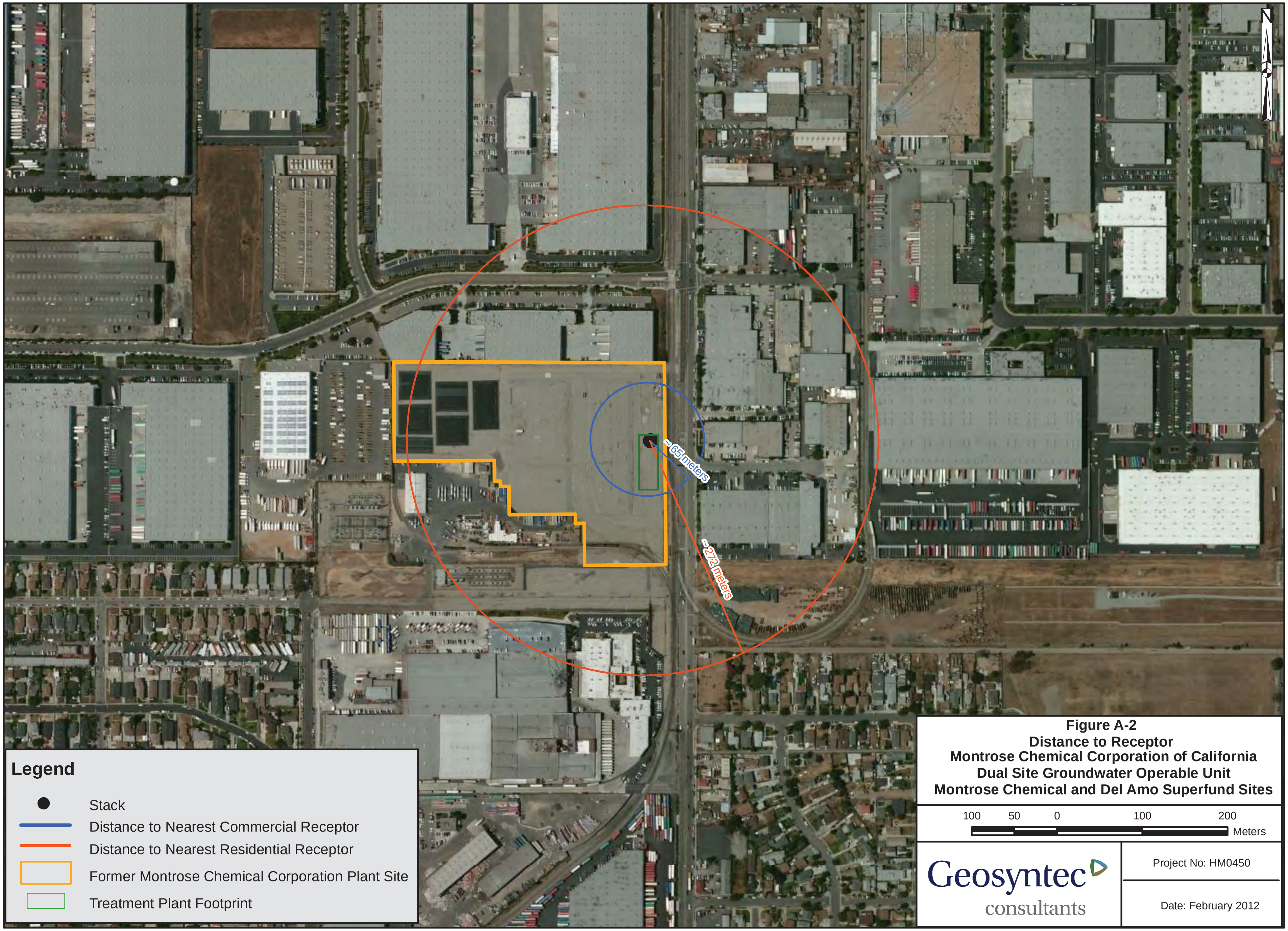


**Figure A-2**
**Distance to Receptor**
**Montrose Chemical Corporation of California**
**Dual Site Groundwater Operable Unit**
**Montrose Chemical and Del Amo Superfund Sites**

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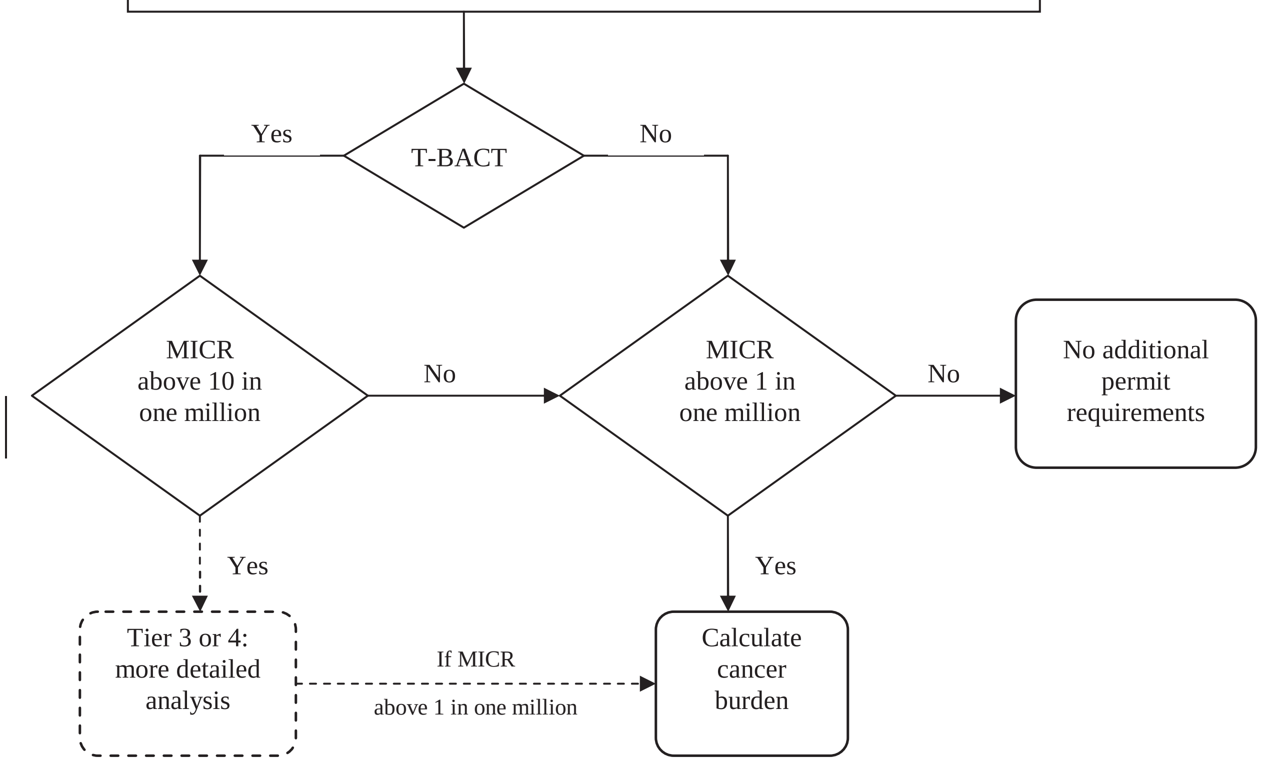
**Figure 3C**
**Tier 2 - Maximum Individual Cancer Risk (MICR) Equation**

**$MICR = CP \times Q_{tons} \times X/Q \times AF_{ann} \times MET \times DBR \times EVF \times 10^{-6} \times MP$**

***CP = Cancer Potency [(mg/kg-day)$^{-1}$]***
***$Q_{tons}$ = Maximum Emission Rate [tons/yr]***
***X/Q = Dispersion Factor [(µg/m$^3$) / (tons/yr)]***
***$AF_{ann}$ = Annual Concentration Adjustment Factor (unitless)***
***MET = Meteorological Correction Factor (unitless)***
***DBR = Daily Breathing Rate [liter/kg body weight-day]***
***EVF = Exposure Value Factor (unitless)***
***$10^{-6}$ = Conversion Factor (Micrograms to Milligrams, Liters to Cubic Meter)***
***MP = Multipathway Factor***



## TIER 1 / TIER 2 SCREENING RISK ASSESSMENT DATA INPUT

| | |
|---|---|
| **Application deemed complete date:** | 12/07/11 |
| **A/N:** | |
| **Fac:** | |

**Stack Data**

| | | Units |
|---|---|---|
| Hour/Day | 24 | hr/day |
| Day/Week | 7 | day/wk |
| Week/Year | 52 | wk/yr |
| Emission Units | lb/hr | |
| | | 0 |
| Control Efficiency | | fraction range 0-1 |
| Does source have TBACT? | YES | |
| Point or Volume Source ? | P | P or V |
| Stack Height or Building Height | 25 | feet |
| Area (For Volume Source Only) | | $ft^2$ |
| Distance-Residential | 250 | meters |
| Distance-Commercial | 60 | meters |
| Meteorological Station | Long Beach | |

| | | |
|---|---|---|
| Source Type: | O - Other | |
| Screening Mode (**NO** = Tier 1 or Tier 2; **YES** = Tier 3) | NO | |

| | | |
|---|---|---|
| Emission Units | lb/hr | |
| Source output capacity | n/a | n/a |

Distances were conservatively chosen (see Fig A-2).

Key Site Assumptions:
- Continuous treatment plant operation (24 hr/d, 365 d/yr)
- Includes Toxic Best Available Technology (i.e., VGAC)
- Stack height is 25 feet
- Commercial receptors at ~65 m (see Fig A-2)
- Residential receptors at ~272 m (see Fig A-2)

**FOR USER-DEFINED CHEMICALS AND EMISSIONS, FILL IN THE TABLE BELOW**

| USER DEFINED CHEMICALS AND EMISSIONS | | | | R1 - Uncontrolled | Efficiency Factor | R2 - Controlled |
|---|---|---|---|---|---|---|
| Cmpound Code | Compound | lb/hr | Molecular Weight | lbs/hr | Fraction range 0-1 | lbs/hr |
| D4 | Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 4.54E-03 | 147.01 | 0.00454 | 0.99000 | 0.0000454 |
| B1 | Benzene (including benzene from gasoline) | 6.51E-02 | 78.11 | 0.06508 | 0.99000 | 0.0006508 |
| C3 | Carbon tetrachloride (Tetrachloromethane) | 4.00E-04 | 153.24 | 0.0004 | 0.99000 | 0.000004 |
| C7 | Chlorobenzene | 3.64E+00 | 112.56 | 3.63966 | 0.99990 | 0.000363966 |
| C14 | Chloroform(trichloromethane) | 1.35E-01 | 119.38 | 0.13532 | 0.90000 | 0.013532 |
| M13 | Methylene chloride(Dichloromethane) | 6.40E-03 | 84.94 | 0.0064 | 0.00000 | 0.0064 |
| T8 | Trichloroethylene | 9.96E-03 | 130.4 | 0.00996 | 0.99000 | 9.96E-05 |
| P2 | Perchloroethylene (or tetrachloroethylene) | 4.40E-02 | 165.83 | 0.04402 | 0.99000 | 0.0004402 |
| E8 | Ethylene dichloride (or 1,2-dichloroethane) | 3.36E-03 | 98.96 | 0.00336 | 0.00000 | 0.00336 |
| | | | | 0 | | |
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Efficiency factors were chosen based on professional judgment. Conservatively assumed 0% efficiency for removal of poorly sorbing constituents (e.g., 1,2-dichloroethane and dichloromethane) and a lower removal efficiency for chloroform (90%) than other VOCs (99%).

Mass loading rates are the calculated effluent from the QED 6-tray air stripper model (see A-1) and are based on flow-weighted average initial influent VOC concentrations. Because there are two air strippers in parallel, the lb/hr mass loading from the QED air stripper model is doubled.

## TIER 2 SCREENING RISK ASSESSMENT REPORT

**A/N:**
**Fac:**

**Application deemed complete date:** 12/07/11

### 2. Tier 2 Data

| | |
|---|---|
| MET Factor | 1.00 |
| | |
| 4 hr | 0.89 |
| 6 or 7 hrs | 0.73 |

Dispersion Factors tables

| | |
|---|---|
| 3 | For Chronic X/Q |
| 6 | For Acute X/Q |

Dilution Factors (ug/m3)/(tons/yr)

| Receptor | X/Q | X/Qmax |
|---|---|---|
| Residential | 1.445 | 83.35 |
| Commercial | 9.404 | 491.26 |

Adjustment and Intake Factors

| | AFann | DBR | EVF |
|---|---|---|---|
| Residential | 1 | 302 | 0.96 |
| Worker | 1 | 149 | 0.38 |

Note: These factors are the same for each compound

**3. Rule 1401 Compound Data**

| Compound | R1 - uncontrolled (lbs/hr) | R2 - controlled (lbs/hr) | CP | MP MICR Resident | MP MICR Worker | MP Chronic Resident | MP Chronic Worker | REL Chronic | REL Acute |
|---|---|---|---|---|---|---|---|---|---|
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 4.54E-03 | 4.54E-05 | 4.00E-02 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 800 | |
| Benzene (including benzene from gasoline) | 6.51E-02 | 6.51E-04 | 1.00E-01 | 1 | 1 | 1 | 1 | 60 | 1300 |
| Carbon tetrachloride (Tetrachloromethane) | 4.00E-04 | 4.00E-06 | 1.50E-01 | 1 | 1 | 1 | 1.0000 | 40 | 1900 |
| Chlorobenzene | 3.64E+00 | 3.64E-04 | | 1 | 1 | 1 | 1 | 1000 | |
| Chloroform(trichloromethane) | 1.35E-01 | 1.35E-02 | 1.90E-02 | 1.0000 | 1.0000 | 1 | 1 | 300 | 150 |
| Methylene chloride(Dichloromethane) | 6.40E-03 | 6.40E-03 | 3.50E-03 | 1.0000 | 1.0000 | 1 | 1 | 400 | 14000 |
| Trichloroethylene | 9.96E-03 | 9.96E-05 | 7.00E-03 | 1 | 1 | 1 | 1 | 600 | |
| Perchloroethylene (or tetrachloroethylene) | 4.40E-02 | 4.40E-04 | 2.10E-02 | 1 | 1 | 1 | 1 | 35 | 20000 |
| Ethylene dichloride (or 1,2-dichloroethane) | 3.36E-03 | 3.36E-03 | 7.20E-02 | 1.0000 | 1.0000 | 1 | 1 | 400 | |

CP, R2, and MP values are used to calculate MICR in Table 5a. Note that the MP values are the same for each compound so only CP and R2 drive the differences in MICR.

Of the compounds evaluated, benzene and carbon tetrachloride have highest CP values.

Chlorobenzene is not carcinogenic and does not contribute to the cumulative cancer risk.

Methylene chloride has second lowest CP value.

CP = Cancer Potency
MICR = Maximum Individual Cancer Risk
MP = Multipathway Factor
REL = Reference Exposure Level
R(1 and 2) = Mass Loading Rate

## 4. Emission Calculations

| Compound | R1 (lb/hr) uncontrolled | R2 (lb/hr) controlled | R2 (lb/yr) | R2 (ton/yr) |
|---|---|---|---|---|
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 4.54E-03 | 4.54E-05 | 0.3966144 | 0.000198307 |
| Benzene (including benzene from gasoline) | 6.51E-02 | 6.51E-04 | 5.6853888 | 0.002842694 |
| Carbon tetrachloride (Tetrachloromethane) | 4.00E-04 | 4.00E-06 | 0.034944 | 0.000017472 |
| Chlorobenzene | 3.64E+00 | 3.64E-04 | 3.17960698 | 0.001589803 |
| Chloroform(trichloromethane) | 1.35E-01 | 1.35E-02 | 118.215552 | 0.059107776 |
| Methylene chloride(Dichloromethane) | 6.40E-03 | 6.40E-03 | 55.9104 | 0.0279552 |
| Trichloroethylene | 9.96E-03 | 9.96E-05 | 0.8701056 | 0.000435053 |
| Perchloroethylene (or tetrachloroethylene) | 4.40E-02 | 4.40E-04 | 3.8455872 | 0.001922794 |
| Ethylene dichloride (or 1,2-dichloroethane) | 3.36E-03 | 3.36E-03 | 29.35296 | 0.01467648 |
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| | | | | |
| **Total** | 3.91E+00 | 2.49E-02 | 2.17E+02 | 1.09E-01 |

A/N: | Application deemed complete date: 12/07/11

TIER 2 RESULTS

5a. MICR

MICR = CP (mg/(kg-day))^-1 * Q (ton/yr) * (X/Q) * AFann * MET * DBR * EVF * 1E-6* MP

| Compound | Residential | Commercial |
|---|---|---|
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 3.32E-09 | 4.22E-09 |
| Benzene (including benzene from gasoline) | 1.19E-07 | 1.51E-07 |
| Carbon tetrachloride (Tetrachloromethane) | 1.10E-09 | 1.40E-09 |
| Chlorobenzene | | |
| Chloroform(trichloromethane) | 4.70E-07 | 5.98E-07 |
| Methylene chloride(Dichloromethane) | 4.10E-08 | 5.21E-08 |
| Trichloroethylene | 1.28E-09 | 1.62E-09 |
| Perchloroethylene (or tetrachloroethylene) | 1.69E-08 | 2.15E-08 |
| Ethylene dichloride (or 1,2-dichloroethane) | 4.43E-07 | 5.63E-07 |
| **Total** | **1.10E-06** | **1.39E-06** |
| | **PASS** | **PASS** |

These factors are the same for each compound as pointed out in Tables 2 and 3. Therefore CP (cancer potential) and Q (mass loading; R2 elsewhere) drive the differences in MICR between each compound.

Chlorobenzene is not carcinogenic and does not contribute to MICR.

Benzene, chloroform, and 1,2-DCA comprise 94% of the cumulative MICR and have the greatest impact on emission levels. The cumulative MICR would still pass the emission evaluation following individual increases of:
- Benzene = 58 fold increase, or
- Chloroform = 15 fold increase, or
- 1,2-DCA = 16 fold increase.

| **5b. Cancer Burden** | **YES** |
|---|---|
| X/Q for one-in-a-million: | 6.75 |
| Distance (meter) | 83.27 |
| Area (km2): | 2.18E-02 |
| Population: | 152 |
| **Cancer Burden:** | **2.12E-04** |

11% to 14% of the SCAQMD allowable risk limit (1.0E-05). A 7 fold increase in the total VOC emissions would still pass the cumulative MICR evaluation.

**6. Hazard Index**

HIA = [Q(lb/hr) * (X/Q)max] * AF / Acute REL

HIC = [Q(ton/yr) * (X/Q) * MET * MP] / Chronic REL

| Target Organs | Acute | Chronic | Acute Pass/Fail | Chronic Pass/Fail |
|---|---|---|---|---|
| Alimentary system (liver) - AL | 7.55E-07 | 2.74E-03 | Pass | Pass |
| Bones and teeth - BN | | | Pass | Pass |
| Cardiovascular system - CV | | 6.57E-04 | Pass | Pass |
| Developmental - DEV | 3.25E-02 | 2.30E-03 | Pass | Pass |
| Endocrine system - END | | | Pass | Pass |
| Eye | 1.08E-05 | 6.82E-06 | Pass | Pass |
| Hematopoietic system - HEM | 1.80E-04 | 4.46E-04 | Pass | Pass |
| Immune system - IMM | 1.80E-04 | 6.82E-06 | Pass | Pass |
| Kidney - KID | | 2.39E-03 | Pass | Pass |
| Nervous system - NS | 3.26E-02 | 1.11E-03 | Pass | Pass |
| Reproductive system - REP | 3.25E-02 | 1.50E-05 | Pass | Pass |
| Respiratory system - RES | 1.08E-05 | 9.15E-06 | Pass | Pass |
| Skin | | | Pass | Pass |

A/N: | Application deemed complete date: 12/07/11

**6a. Hazard Index Acute**

HIA = [Q(lb/hr) * (X/Q)max] *AF/ Acute REL

| | HIA - Residential | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Compound | AL | CV | DEV | EYE | HEM | IMM | NS | REP | RESP | SKIN |
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | | | | | | | | | | |
| Benzene (including benzene from gasoline) | | | 3.05E-05 | | 3.05E-05 | 3.05E-05 | | 3.05E-05 | | |
| Carbon tetrachloride (Tetrachloromethane) | 1.28E-07 | | 1.28E-07 | | | | 1.28E-07 | 1.28E-07 | | |
| Chlorobenzene | | | | | | | | | | |
| Chloroform(trichloromethane) | | | 5.49E-03 | | | | 5.49E-03 | 5.49E-03 | | |
| Methylene chloride(Dichloromethane) | | | | | | | 3.81E-05 | | | |
| Trichloroethylene | | | | | | | | | | |
| Perchloroethylene (or tetrachloroethylene) | | | | 1.83E-06 | | | 1.83E-06 | | 1.83E-06 | |
| Ethylene dichloride (or 1,2-dichloroethane) | | | | | | | | | | |
| **Total** | 1.28E-07 | | 5.52E-03 | 1.83E-06 | 3.05E-05 | 3.05E-05 | 5.53E-03 | 5.52E-03 | 1.83E-06 | |

| | HIA - Commercial | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Compound | AL | CV | DEV | EYE | HEM | IMM | NS | REP | RESP | SKIN |
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | | | | | | | | | | |
| Benzene (including benzene from gasoline) | | | 1.80E-04 | | 1.80E-04 | 1.80E-04 | | 1.80E-04 | | |
| Carbon tetrachloride (Tetrachloromethane) | 7.55E-07 | | 7.55E-07 | | | | 7.55E-07 | 7.55E-07 | | |
| Chlorobenzene | | | | | | | | | | |
| Chloroform(trichloromethane) | | | 3.24E-02 | | | | 3.24E-02 | 3.24E-02 | | |
| Methylene chloride(Dichloromethane) | | | | | | | 2.25E-04 | | | |
| Trichloroethylene | | | | | | | | | | |
| Perchloroethylene (or tetrachloroethylene) | | | | 1.08E-05 | | | 1.08E-05 | | 1.08E-05 | |
| Ethylene dichloride (or 1,2-dichloroethane) | | | | | | | | | | |
| **Total** | 7.55E-07 | | 3.25E-02 | 1.08E-05 | 1.80E-04 | 1.80E-04 | 3.26E-02 | 3.25E-02 | 1.08E-05 | |

## 6b. Hazard Index Chronic

HIC = [Q(ton/yr) * (X/Q) * MET * MP] / Chronic REL

| | HIC - Residential | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Compound | AL | BN | CV | DEV | END | EYE | HEM | IMM | KID | NS | REP | RESP | SKIN |
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 3.58E-07 | | | | | | | | 3.58E-07 | 3.58E-07 | | 3.58E-07 | |
| Benzene (including benzene from gasoline) | | | | 6.85E-05 | | | 6.85E-05 | | | 6.85E-05 | | | |
| Carbon tetrachloride (Tetrachloromethane) | 6.31E-07 | | | 6.31E-07 | | | | | | 6.31E-07 | | | |
| Chlorobenzene | 2.30E-06 | | | | | | | | 2.30E-06 | | 2.30E-06 | | |
| Chloroform(trichloromethane) | 2.85E-04 | | | 2.85E-04 | | | | | 2.85E-04 | | | | |
| Methylene chloride(Dichloromethane) | | | 1.01E-04 | | | | | | | 1.01E-04 | | | |
| Trichloroethylene | | | | | | 1.05E-06 | | 1.05E-06 | | | | 1.05E-06 | |
| Perchloroethylene (or tetrachloroethylene) | 7.94E-05 | | | | | | | | 7.94E-05 | | | | |
| Ethylene dichloride (or 1,2-dichloroethane) | 5.30E-05 | | | | | | | | | | | | |
| **Total** | 4.20E-04 | | 1.01E-04 | 3.54E-04 | | 1.05E-06 | 6.85E-05 | 1.05E-06 | 3.67E-04 | 1.70E-04 | 2.30E-06 | 1.41E-06 | |

A/N: | Application deemed complete date: 12/07/11

### 6b. Hazard Index Chronic (cont.)

| | HIC - Commercial | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Compound | AL | BN | CV | DEV | END | EYE | HEM | IMM | KID | NS | REP | RESP | SKIN |
| Dichlorobenzene, p- (or 1,4-dichlorobenzene) | 2.33E-06 | | | | | | | | 2.33E-06 | 2.33E-06 | | 2.33E-06 | |
| Benzene (including benzene from gasoline) | | | | 4.46E-04 | | | 4.46E-04 | | | 4.46E-04 | | | |
| Carbon tetrachloride (Tetrachloromethane) | 4.11E-06 | | | 4.11E-06 | | | | | | 4.11E-06 | | | |
| Chlorobenzene | 1.50E-05 | | | | | | | | 1.50E-05 | | 1.50E-05 | | |
| Chloroform(trichloromethane) | 1.85E-03 | | | 1.85E-03 | | | | | 1.85E-03 | | | | |
| Methylene chloride(Dichloromethane) | | | 6.57E-04 | | | | | | | 6.57E-04 | | | |
| Trichloroethylene | | | | | | 6.82E-06 | | 6.82E-06 | | | | 6.82E-06 | |
| Perchloroethylene (or tetrachloroethylene) | 5.17E-04 | | | | | | | | 5.17E-04 | | | | |
| Ethylene dichloride (or 1,2-dichloroethane) | 3.45E-04 | | | | | | | | | | | | |
| **Total** | 2.74E-03 | | 6.57E-04 | 2.30E-03 | | 6.82E-06 | 4.46E-04 | 6.82E-06 | 2.39E-03 | 1.11E-03 | 1.50E-05 | 9.15E-06 | |

# A-3

# LIQUID PHASE GAC

Geosyntec consultants

# Table 1
## LGAC System Carbon Consumption (Two 20,000-lb Vessels in Series)
## Normal Operating Conditions

**Description:** This scenario contains calculations for normal operating conditions under max flowrate at start-up, which assumes that the advanced oxidation system will treat the pCBSA to a concentration below 25,000 µg/L and the air strippers remove VOCs to below the ISGSs. Predictive modeling software was used to estimate LGAC consumption rates, and the modeling results are adjusted by a correlation factor that was determined during rapid small-scale column testing (RSSCT) performed with site groundwater. The correlation factor adjusts for non-ideal conditions, primarily due to the presence of pCBSA. These calculations demonstrate that the predicted LGAC consumption rates will be manageable under normal conditions.

| **Parameters** | |
|---|---|
| System Max Flow (gpm) | 805 |
| Vessel Diameter (ft) | 12 |
| Bed Flux (gpm/$ft^2$) | 7.1 |
| Coconut Shell Based Carbon | |

| **Constituent** | **LGAC Influent Concentration**[(1)] | **Estimated Carbon Usage**[(2)] | **RSSCT Correlation Factor**[(3)] | **LGAC Consumption** | **LGAC Consumption** |
|---|---|---|---|---|---|
| ***Units*** | **µg/L** | **#GAC/kgal** | **Unitless** | **#GAC/kgal** | **#GAC/day** |
| Chlorobenzene | 5.4 | 0.003 | 0.489 | 0.006 | 7 |
| Total BHC Isomers | 1 | 0.019 | 0.489 | 0.04 | 44 |
| | | | Totals | 0.04 | 50 |

Notes

(1) Chlorobenzene concentration based on predicted effluent from air stripper, which will still affect carbon usage while being below the discharge limit; BHC is assumed to be untreated by advanced oxidation and air stripping.

(2) Values for VOCs based on Liquid Phase Isotherm Report - Siemens, 27 February 2012. Values for BHC compounds based on modeling results.

(3) RSSCT correlation factor based on three-vessel arrangement for the LGAC Bench-Scale Testing and Cost Projection (AECOM, 11 November 2008) focused on chlorobenzene. This correlation factor was chosen for the planned 2-vessel arrangement because advanced oxidation will decrease pCBSA concentrations and associated interference thereby increasing the efficiency of carbon. In addition, it is more conservative than the 0.57 typically used by Siemens (Note: 1/1.75 = 0.57) so it was used for each constituent (i.e., not just chlorobenzene).

Liquid Isotherm report created on 02/27/12 at 07:27.

## *LIQUID PHASE ISOTHERM DESIGN PARAMETERS*

| | |
|---|---|
| Water Flow Rate | 805.00000 gpm |

## *LIQUID PHASE DESIGN*

| ***Component Name*** | ***Concentration*** | ***#GAC/1000 gallons of water*** |
|---|---|---|
| BENZENE,CHLORO- | 5.4000 ppbw | 0.0048 |

***Total Carbon Usage Estimated at Breakthrough***

5.5950 #GAC/day
0.0048 #GAC/1000 gallons of water

*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

Liquid Isotherm report created on 02/27/12 at 07:27.

## *LIQUID PHASE ISOTHERM DESIGN PARAMETERS*

Water Flow Rate 805.00000 gpm

## *LIQUID PHASE DESIGN*

| Component Name | Concentration | Q [Wt %] | #GAC/1000 gallons of water | Suitability |
|---|---|---|---|---|
| BENZENE,CHLORO- | 5.4000 ppbw | 1.6323 | 0.0028 | Conc. Too Low |

***Total Carbon Usage Estimated at Breakthrough***

5.5950 #GAC/day

0.0048 #GAC/1000 gallons of water

***(Both totals have been multiplied by a factor of 1.75)***

*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

Geosyntec consultants

# Table 2
# LGAC System Carbon Consumption (Two 20,000-lb Vessels in Series)
# Air Stripper Failure

**Description:** This scenario contains calculations for a conservative worst-case where of air stripper failure at max flowrate at start-up, which assumes that the advanced oxidation system will treat the pCBSA to a concentration below 25,000 µg/L and decrease most VOCs by 35%. Predictive modeling software was used to estimate LGAC consumption rates, and the modeling results are adjusted by a correlation factor that was determined during rapid small-scale column testing (RSSCT) performed with site groundwater. The correlation factor adjusts for non-ideal conditions, primarily due to the presence of pCBSA. These calculations demonstrate that 40,000 pounds of LGAC (2x20,000 pound vessels in series) would prevent exceedances in the discharge if an air stripper failure occurs.

| **Parameters** | |
|---|---|
| System Max Flow (gpm) | 805 |
| Vessel Diameter (ft) | 12 |
| Bed Flux (gpm/ft$^2$) | 7.1 |
| Coconut Shell Based Carbon | |

| **Constituent** | **LGAC Influent Concentration[(1)]** | **Estimated Carbon Usage[(2)]** | **RSSCT Correlation Factor[(3)]** | **LGAC Consumption** | **LGAC Consumption** |
|---|---|---|---|---|---|
| ***Units*** | **µg/L** | **#GAC/kgal** | **Unitless** | **#GAC/kgal** | **#GAC/day** |
| Chlorobenzene | 9,035 | 0.395 | 0.489 | 0.81 | 937 |
| Chloroform | 336 | 0.545 | 0.489 | 1.11 | 1291 |
| Benzene | 162 | 0.071 | 0.489 | 0.14 | 168 |
| Tetrachloroethene | 109 | 0.020 | 0.489 | 0.041 | 48 |
| Trichloroethylene | 25 | 0.022 | 0.489 | 0.045 | 52 |
| Methylene Chloride | 16 | 2.308 | 0.489 | 4.72 | 5471 |
| 1,4 - Dichlorobenzene | 11 | 0.004 | 0.489 | 0.007 | 8 |
| 1,2 - Dichloroethane | 9 | 0.175 | 0.489 | 0.36 | 415 |
| Carbon Tetrachloride | 1 | 0.021 | 0.489 | 0.043 | 50 |
| Total BHC Isomers | 1 | 0.019 | 0.489 | 0.038 | 44 |
| | | | Totals | 7.3 | 8483 |

Notes

(1) Alkenes and aromatics assumed to be decreased by 35% via advanced oxidation. BHC assumed to be untreated by advanced oxidation and air stripping.

(2) Values for VOCs based on Liquid Phase Isotherm Design Parameters - Siemens Proposal dated 16 June 2011. Values for BHC compounds based on modeling results.

(3) RSSCT correlation factor based on three-vessel arrangement for the LGAC Bench-Scale Testing and Cost Projection (AECOM, 11 November 2008) focused on chlorobenzene. This correlation factor was chosen for the planned 2-vessel arrangement because advanced oxidation will decrease pCBSA concentrations and associated interference thereby increasing the efficiency of carbon. In addition, it is more conservative than the 0.57 typically used by Siemens (Note: 1/1.75 = 0.57) so it was used for each constituent (i.e., not just chlorobenzene).

## LIQUID PHASE ISOTHERM DESIGN PARAMETERS

| | |
|---|---|
| Water Flow Rate | 805.00000 gpm |

## LIQUID PHASE DESIGN

| Component Name | Concentration | #GAC/1000 gallons of water |
|---|---|---|
| BENZENE,CHLORO- | 9035.0000 ppbw | 0.6919 |
| CHLOROFORM | 336.0000 ppbw | 0.9529 |
| BENZENE | 161.5000 ppbw | 0.1239 |
| TETRACHLOROETHENE | 109.2000 ppbw | 0.0352 |
| TRICHLOROETHYLENE | 24.7000 ppbw | 0.0381 |
| METHYLENE CHLORIDE | 16.0000 ppbw | 4.0385 |
| BENZENE,1,4-DICHLORO- | 11.3000 ppbw | 0.0062 |
| ETHANE,1,2-DICHLORO- | 8.7000 ppbw | 0.3064 |
| CARBON TETRACHLORIDE | 1.0000 ppbw | 0.0367 |

***Total Carbon Usage Estimated at Breakthrough***

7221.6813 #GAC/day
6.2299 #GAC/1000 gallons of water

*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

## LIQUID PHASE ISOTHERM DESIGN PARAMETERS

Water Flow Rate 805.00000 gpm

## LIQUID PHASE DESIGN

| Component Name | Concentration | Q [Wt %] | #GAC/1000 gallons of water | Suitability |
|---|---|---|---|---|
| BENZENE,CHLORO- | 9035.0000 ppbw | 19.0505 | 0.3954 | In Range |
| CHLOROFORM | 336.0000 ppbw | 0.5144 | 0.5445 | In Range |
| BENZENE | 161.5000 ppbw | 1.9024 | 0.0708 | In Range |
| TETRACHLOROETHENE | 109.2000 ppbw | 4.5208 | 0.0201 | In Range |
| TRICHLOROETHYLENE | 24.7000 ppbw | 0.9452 | 0.0218 | In Range |
| METHYLENE CHLORIDE | 16.0000 ppbw | 0.0058 | 2.3077 | In Range |
| BENZENE,1,4-DICHLORO- | 11.3000 ppbw | 2.6669 | 0.0035 | In Range |
| ETHANE,1,2-DICHLORO- | 8.7000 ppbw | 0.0414 | 0.1751 | In Range |
| CARBON TETRACHLORIDE | 1.0000 ppbw | 0.0397 | 0.0210 | Conc. Too Low |

***Total Carbon Usage Estimated at Breakthrough***

7221.6813 #GAC/day

6.2299 #GAC/1000 gallons of water

***(Both totals have been multiplied by a factor of 1.75)***

*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

# A-4

# VAPOR PHASE GAC

# Table 1
## VGAC System Carbon Consumption (Three 20,000-lb Vessels in Series)
## Normal Operating Conditions

**Description:** This scenario contains calculations for normal operating conditions under max flowrate at start-up, which assumes that the advanced oxidation system will destroy some VOCs (conservatively 35%) and influent concentrations to the VGAC system are equal to the vapor phase effluent from the air strippers. Predictive modeling software was used to estimate VGAC consumption rates, which are further estimated based on acceptable removal efficiencies. These calculations demonstrate that the predicted VGAC consumption rates will be manageable under normal conditions.

| **Parameters** | |
|---|---|
| System Max Flow (scfm) | 5200 |
| Vessel Diameter (ft) | 12 |
| Bed Flux ($scfm/ft^2$) | 46.0 |
| Coconut Shell Based Carbon | |

| **Constituent** | **VGAC Influent Concentration**(1) | **Estimated Carbon Usage for Full Treatment**(2) | **Percent Treatment** | **VGAC Consumption** |
|---|---|---|---|---|
| ***Units*** | **ppmv** | **#GAC/day** | **%** | **#GAC/day** |
| Chlorobenzene | 40.2 | 515 | 99.99% | 515 |
| Chloroform | 1.41 | 291 | 90% | 262 |
| Benzene | 1.04 | 84 | 99% | 83 |
| Tetrachloroethylene | 0.33 | 17 | 99% | 17 |
| Trichloroethylene | 0.094 | 21 | 99% | 21 |
| Methylene Chloride | 0.094 | 1,122 | 0% | 0 |
| 1,2-Dichloroethane | 0.042 | 30 | 0% | 0 |
| 1,4-Dichlorobenzene | 0.039 | 1.13 | 99% | 1.11 |
| Carbon Tetrachloride | 0.003 | 4.4 | 99% | 4.3 |
| | | | Totals | 903 |

Notes
(1) VOC concentration based on predicted effluent from air stripper.
(2) Values for VOCs based on Vapor Phase Isotherm Report - Siemens, 27 February 2012.

Vapor Isotherm report created on 02/27/12 at 09:39.

## *VAPOR PHASE ISOTHERM DESIGN PARAMETERS*

| | |
|---|---|
| System Temperature | 72.00000 °F |
| Air Flow Rate | 5200.00000 SCFM |
| System Pressure | 14.70000 psi |
| Relative Humidity | 60.0000 % |

## *VAPOR PHASE DESIGN*

| *Component Name* | *Concentration* | *#GAC/day at Breakthrough* |
|---|---|---|
| ETHANE,1,2-DICHLORO- | 0.0423 ppmv | 30.3088 |
| BENZENE,1,2-DICHLORO- [1] | 0.0385 ppmv | 1.1261 |
| BENZENE | 1.0367 ppmv | 84.1821 |
| CARBON TETRACHLORIDE | 0.0033 ppmv | 4.3730 |
| BENZENE,CHLORO- | 40.2367 ppmv | 515.1025 |
| CHLOROFORM | 1.4105 ppmv | 290.7506 |
| METHYLENE CHLORIDE | 0.0939 ppmv | 1122.4892 |
| TETRACHLOROETHENE | 0.3303 ppmv | 16.9431 |
| TRICHLOROETHYLENE | 0.0943 ppmv | 21.0405 |

***Total Carbon Usage Estimated at Breakthrough***
2086.3159 #GAC/day

[1] Note: Siemens substituted 1,2-Dichlorobenzene (1,2-DCB) for 1,4-Dichlorobenzene (1,4-DCB) because 1,4-DCB was not in their isocalc program. Siemens expects there to be very little difference in carbon consumption between the two due to their similar boiling point (~4 degrees difference).

* indicates that Relative Humidity was calculated
~ indicates that Relative Humidity was approximated
*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

Vapor Isotherm report created on 02/27/12 at 09:39.

## *VAPOR PHASE ISOTHERM DESIGN PARAMETERS*

| | | |
|---|---|---|
| System Temperature | 72.00000 | °F |
| Air Flow Rate | 5200.00000 | SCFM |
| System Pressure | 14.70000 | psi |
| Relative Humidity | 60.0000 | % |

## *VAPOR PHASE DESIGN*

| *Component Name* | *Concentration* | *Q [Wt %]* | *#GAC/day at Saturation* |
|---|---|---|---|
| ETHANE,1,2-DICHLORO- | 0.0423 ppmv | 0.4658 | 17.3193 |
| BENZENE,1,2-DICHLORO- | 0.0385 ppmv | 16.9509 | 0.6435 |
| BENZENE | 1.0367 ppmv | 3.2444 | 48.1040 |
| CARBON TETRACHLORIDE | 0.0033 ppmv | 0.3915 | 2.4989 |
| BENZENE,CHLORO- | 40.2367 ppmv | 41.3661 | 294.3443 |
| CHLOROFORM | 1.4105 ppmv | 1.9533 | 166.1432 |
| METHYLENE CHLORIDE | 0.0939 ppmv | 0.0240 | 641.4224 |
| TETRACHLOROETHENE | 0.3303 ppmv | 10.9035 | 9.6818 |
| TRICHLOROETHYLENE | 0.0943 ppmv | 1.9861 | 12.0231 |

***Total Carbon Usage Estimated at Breakthrough***
2086.3159 #GAC/day

***(Total has been multiplied by a factor of 1.75)***

* indicates that Relative Humidity was calculated
~ indicates that Relative Humidity was approximated
*The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.*

# A-5

# ADVANCED OXIDATION

# HiPOx® Technology Laboratory Test Report

**Report:**

**P1190**

**Rev: A**

**Site:**

**pCBSA Reduction and Bromate Control for Groundwater Remediation**

**Torrance, CA**

**Prepared for:**

**Hargis + Associates, Inc.**

**Mission City Corporate Center.**

**2365 Northside Drive, Suite C-100**

**San Diego, CA 92108**

**Report Author(s): B. Srikanth, C. Loll, K. Robinson**

**Original Report Date: September 1, 2009**

**Revision Report Date: January 21, 2010**

**APPLIED PROCESS TECHNOLOGY, INC.**
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**Pleasant Hill, CA 94523**
**Phone: (925) 977-1811; Fax: (925) 977-1818**
**www.aptwater.com**

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## 1.0 BACKGROUND INFORMATION

### *1.1 HiPOx Technology*

The HiPOx process developed by Applied Process Technology, Inc. (Applied) is an ozone-based plug flow reactor technology that can be used as either an advanced oxidation reactor or a highly efficient ozone dissolution/contacting system. In the advanced oxidation mode, HiPOx maximizes the production of hydroxyl radicals (the most powerful oxidant available for water treatment) with highly efficient injection and mixing of ozone and hydrogen peroxide while minimizing bromate formation. In the ozone only mode, HiPOx maximizes the benefits of ozone with high mass transfer efficiency to ensure ozone is not wasted and reacts completely with the water. HiPOx can be operated in either advanced oxidation or ozone only modes as needed.

HiPOx has many water treatment applications. HiPOx has proven to be a very effective process for destroying organic micropollutants for groundwater remediation, drinking water wellhead treatment, and industrial wastewater treatment. It is well-known that ozone is very beneficial for taste and odor, color, enhanced clarification, disinfection byproduct precursor removal, and disinfection for drinking water surface water treatment. Ozone is also an emerging technology for wastewater treatment and water reuse with respect to micropollutants, endocrine disrupting compounds (EDCs), and personal and pharmaceutical care products. HiPOx has received conditional acceptance for disinfection of tertiary filtered wastewater for unrestricted water reuse under the requirements of Title 22 in the state of California.

HiPOx may also be integrated with other treatment technologies such as air stripping, metals removal, filtration, activated carbon, UV, and chlorine to provide a multiple treatment barrier and low cost water treatment solution.

### *1.2 Project Specific Information*

The following is background information regarding this project:

- The proposed treatment system includes solid filtration (bag filters), arsenic removal, HiPOx system, and carbon beds prior to reinjection;
- The treatment objectives for the HiPOx system are to reduce pCBSA from 40,000 ug/l to less than 25,000 ug/l while maintaining bromate formation below 10 ug/l (Federal MCL).
- Previous site testing with HiPOx projected that an ozone dose of approximately 22 mg/l was needed to reduce pCBSA from 40,000 ug/l to less than 25,000 ug/l.
- Bromate control has not been previously evaluated.

### *1.3 Objective of Evaluation*

The primary goals of this evaluation were to determine the following information:

- Feasibility of bromate control for the sample water matrix;
- Dose-response curve for pCBSA destruction and bromate formation as a function of hydrogen peroxide:ozone mole ratio and number of injection points;
- Dose-response curve for pCBSA destruction and bromate formation as a function of ozone dose;
- Projected full-scale conditions for satisfying the treatment objectives.

### *1.4 Process Water Information*

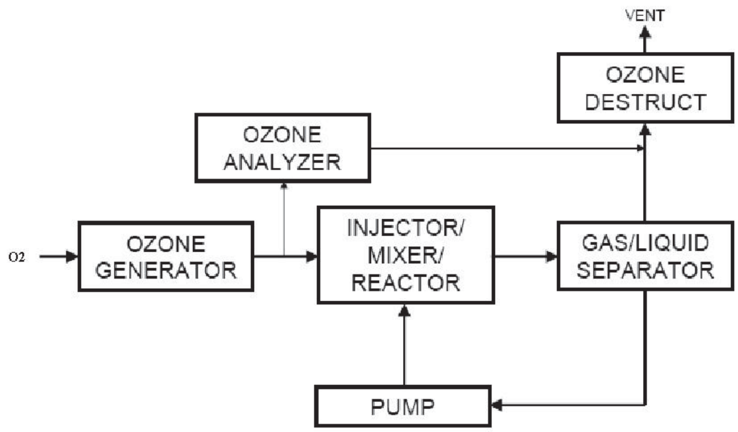
Untreated water collected from the Site was collected by Hargis/Geosyntec, blended by Test America, and shipped to Applied's Pleasant Hill facility on the morning of August 7, 2009. The bench test was conducted on August 7, 2009.

## 2.0 TEST EQUIPMENT AND PROCEDURES

### *2.1 Test Equipment Description*

The HiPOx lab-test reactor arrangement is shown in Figure 1.

Figure 1: HiPOx Lab-Test Reactor




Applied's semi-continuous bench-scale test unit includes an ozone generator, ozone analyzer, ozone injector, static mixer, tubular reactor, recirculation pump, gas-liquid separator and thermo-catalytic ozone destruct unit. Reactor and piping materials of construction are Schedule-40 clear PVC. Oxygen or ozone tubing/piping is 316L stainless steel or PFA (Teflon™[1]). The ozone generator is an ASTeX Model 8200. The ozone analyzer is an INUSA Model H1-X. The ozone destruct unit is an INUSA part number 810-0062-01. The mixer is a ½", four-element, Kenics KMA static mixer insert.

### *2.2 Test Procedures*

Experimental and equipment settings are calculated and listed in the attached table of Lab-Test Conditions (**ATTACHMENT 1**).

**Pre-Test Preparation:** Prior to conducting the test, the ozone destruct unit is turned on and preheated for ten (10) minutes. The flow of oxygen through the ozone generator is adjusted using the oxygen rotameter and the generator pressure is adjusted using the backpressure regulator. The ozone analyzer is zeroed using pure oxygen prior to turning on the ozone generator. The lab-test unit (hereinafter referred to as "reactor") is charged with 1.8 liters of distilled water prior to the first run. The ozone generator and the reactor are then operated at maximum dosing conditions for 15-20 minutes to both clean the reactor and to set/adjust equipment parameters. Following completion of the pre-test operation, the reactor is drained and rinsed with an additional 2.0 liters of distilled water.

The selected test ozone doses were 16.5, 22, 27.5 mg/l as shown in **ATTACHMENT 1.** Hydrogen peroxide: ozone mole ratios (MR) of 0.7, 1.7, and 3.1 were used.

**Sample Preparation:** The water was spiked with bromide with the intention of attaining concentrations of 500 and 550 ug/l. For each run, a graduated cylinder is filled to 1.8 liters with untreated sample. The entire contents of the graduated cylinder are charged to the reactor. Hydrogen peroxide is added to the contents of the reactor before ozone injection.

**Test Operation:** For each run, the pump is started, and air is purged from the reactor as the water is re-circulated and mixed for a brief period. The water rotameter is set to 3 gallons/minute. With the ozone generator venting to the ozone destruct unit, the generator power dial is set to achieve the ozone concentration listed in the Lab-Test Conditions table as measured by the ozone analyzer. When the ozone concentration has stabilized, the generator output is directed to the reactor. After the appropriate amount of ozone (dose) has been added to the reactor, the generator output is re-directed to the ozone destruct and samples were collected for dissolved ozone residual and/or hydrogen peroxide residual and the reactor subsequently drained.

**Sample Collection:** A sample of water was collected at Applied's testing facility upon receipt and prior to treatment. pH, Alkalinity, Turbidity, and Temperature were measured and recorded for the untreated water. Samples of the untreated water were collected for COD, TOC, General Minerals, pCBSA, chlorobenzene, VOCs, bromide, and bromate. After each test run, samples were immediately measured and recorded by Applied for dissolved ozone residual, dissolved hydrogen peroxide residual, pH, Alkalinity, Turbidity, and Temperature. After each test run, samples were collected for pCBSA, chlorobenzene, VOCs, bromide, and bromate. The samples were packaged properly in coolers preserved with blue ice and including chain-of-custody forms. Coolers were shipped to analytical laboratories designated by the customer.

**Analyses:** All analyses (except for bromide and bromate) were performed by Test America located at 17461 Derian Avenue, Suite 100, Irvine, CA 92614. Bromide and bromate analyses were performed by MWH Labs located at 750 Royal Oak Drive, Suite 100, Monrovia, CA 91016. Analytical results for both treated and untreated samples were provided to Applied.

Applied's laboratory measurements were performed with the following equipment: The turbidity meter used was an Orbeco-Hellige Model 965-10 Serial # 2222. The pH was measured with an Oakton Model Ph Tester 3+. Alkalinity was measured using a Hach Model 5-EP test kit. Ozone residual was measured using a Hach Model Ozone AccuVac test kit. Hydrogen Peroxide residual was measured using a Hach Model HYP-1 test kit.

[1] Trademark of the Dupont Company.

## 3.0 RESULTS

Analytical results of the test are summarized in **ATTACHMENT 2**. Dose response figures for 1,4-Dioxane removal are presented in **ATTACHMENT 3.** All supporting third party analytical data reporting is provided in **ATTACHMENT 4**.

## 4.0 DISCUSSION

### *4.1 Raw Water Quality*

A summary of the analytical results for the untreated water are presented in **ATTACHMENT 2.** The historical site average concentration, the projected blended sample influent concentration, and the actual sample concentration are shown in the table below:

| Analyte | Unit | Historical Site Average[1] | Projected Blended Sample Influent[2] | Actual Sample Influent[3] |
|---|---|---|---|---|
| pH | | 7.7 | NS | 7.1 |
| Alkalinity | mg/l as CaCO3 | 270 | 245 | 260 |
| Hardness | mg/l as CaCO3 | 495 | NS | 420 |
| COD | mg/l | 92.8 | 77 | 67 |
| TOC | mg/l | 21.9 | 24 | 20 |
| TDS | mg/l | 909 | 880 | 850 |
| Bromide | ug/l | 431 | 468 | 430/490 |
| pCBSA | ug/l | 39628 | 49667 | 50000 |
| Chlorobenzene | ug/l | 13900 | 12300 | 3100 |

Notes:
1. Information supplied by Hargis: TGRS Influent Concentrations as of 7/16/09 (flow weighted influent concentrations)
2. Information supplied by Hargis: Projected blend from 50/50 mix of diluted BF-OW-03 and undiluted BF-11
3. Water collected by Applied and samped prior to HiPOx bench testing.

The COD and chlorobenzene concentration were slightly lower than anticipated for the blended sample, and lower than the historical site average concentration. The pCBSA concentration was higher than the historical site average concentration. Bromide levels were similar to the historical site average concentration. Note: the reported bromide values for the actual sample were taken after spiking. While the goal was to spike to values of 500 and 550 ug/l, the actual values were slightly lower. This may be due to the projected blended sample influent bromide concentration being lower than anticipated.

### *4.2 Testing Results*

**ATTACHMENT 2** summarizes the analytical results for all samples and test runs. **ATTACHMENT 3** displays a graphical depiction of bromate formation in the form of a dose-response figure. **ATTACHMENT 4** displays a graphical depiction of bromate formation and pCBSA destruction in the form of a dose-response figure. **ATTACHMENT 5** includes the third-party laboratory reports for all analytical data.

HiPOx was effective at maintaining bromate formation below 10 ug/l for ALL test runs. As shown in **ATTACHMENT 3,** bromate control improved with increasing MR, but the effect was subtle. Also, increasing the number of ozone injectors from 10 to 20 also improved bromate control in a subtle manner. When the bromide concentration increased from 430 ug/l to 490 ug/l, the bromate formation increased by approximately 20% but remained below the MCL.

The projected ozone dose of 22 mg/l was effective at providing pCBSA effluent concentrations near or below the treatment target of 25,000 ug/l for most test runs. However, the influent level of 50,000 ug/l during the test was much higher than the anticipated full-scale design conditions of 40,000 ug/l. Therefore, HiPOx exceeded the projected removal efficiency of pCBSA at the ozone dose of 22 mg/l.

### *4.3 HiPOx Dosing Projections for Full-Scale System*

A destruction model was generated within the limitations of the data to project ozone and hydrogen peroxide dosing levels to meet the treatment objectives for full-scale design.

| Analyte | Bench-Scale Model | Full-Scale Model |
|---|---|---|
| COD (mg/l) | 67 | 92 |
| pCBSA, influent (ug/l) | 40000 | 40000 |
| pCBSA, effluent (ug/l) | 25000 | 25000 |
| % pCBSA reduction | 38% | 38% |
| bromide, influent (ug/l) | 430-490 | 430-490 |
| bromate, effluent (ug/l) | <10 | <10 |
| projected ozone dose (mg/l) | 14.1 | 21.5 |
| projected hydrogen peroxide:ozone mole ratio | 0.7 | 0.7 |
| projected hydrogen peroxide dose (mg/l) | 7.0 | 10.7 |
| number of injectors | 10 | 10 |

Note: Projected ozone dose for full-scale model corrected for higher COD.

### *4.4 Recommendations*

The lab testing results demonstrate that HiPOx operated in the AOP mode is successful at reducing pCBSA to the treatment target while maintaining bromate concentrations below the MCL. Based on modeled projections using interpolation to the influent design criteria, corrections for the differences in COD levels, and allowances for a design factor, the full-scale HiPOx system should be designed to meet the performance objectives with a design ozone dose of 22 mg/l, a MR of 0.7, and 10 injector reactor configuration. The full-scale HiPOx system should have the capability to use higher MRs (up to 1.4) for additional bromate control, if needed. However, it is anticipated that this will not require any significant changes to equipment sizing.

End of Report

## 5.0 ATTACHMENTS

| | |
|---|---|
| ATTACHMENT 1 | Test Conditions |
| ATTACHMENT 2 | Results |
| ATTACHMENT 3 | Bromate Formation Figure |
| ATTACHMENT 4 | Ozone-Dose Response Figure |
| ATTACHMENT 5 | Third Party Analytical Data |

## ATTACHMENT 1
## HIPOX BENCH TEST CONDITIONS

**Lab Analytical Run Sheet**

| Sample ID # | Run # | Ozone Dose (ppm) | H2O2:O3 Mole Ratio | pH | Alk | Turb | Temp | O3 Residual | H2O2 Residual | H2O2 Residual | TOC | COD | General Minerals | Hardness | pCBSA | VOCs | Bromide | Bromate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Applied | Applied | Applied | Applied | Applied | Applied | Applied | Test America | Test America | Test America | Test America | Test America | Test America | MWH Labs | MWH Labs |
| | | | | Oakton Model pH Tester 3+ | Hach Model 5-EP Test Kit | Orbeco-Hellige Model 965-10 | Therm | Hach Model Ozone AccuVac Test Kit | Hach Test Kit | Test Strips | SM5310B | SM5220D | | SM2340C | EPA 314.0 M | EPA 8260B | EPA 300.0 | EPA 317 |
| | | | | | | | | | | | (1) x 250 ml amber w/HCl | (1) x 500 ml poly w/H2SO4 | (1) x 1000 ml poly plus (1) x 500 ml poly | (1) x 500 ml poly w/HNO3 | (1) x 500 ml poly | (3) x 40 ml VOA w/HCL | (1) x 60 ml poly w/EDA | |
| P1190-SP-0A-500 | --- | --- | --- | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| P1190-SP-0B-550 | --- | --- | --- | 1 | 1 | 1 | 1 | | | | | | | | | | 1 | 0 |
| P1190-SP-1-500 | 1 | 22.0 | 0.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-2-500 | 2 | 22.0 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-3-500 | 3 | 22.0 | 3.10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-4-500 | 4 | 22.0 | 0.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-5-500 | 5 | 22.0 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-6-500 | 6 | 22.0 | 3.10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-7-500 | 7 | 16.5 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-8-500 | 8 | 27.5 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-9-550 | 9 | 22.0 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-10-550 | 10 | 22.0 | 3.10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-11-550 | 11 | 22.0 | 1.70 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |
| P1190-SP-12-550 | 12 | 22.0 | 3.10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 1 | 1 |

## ATTACHMENT 2
## HIPOX BENCH TEST RESULTS

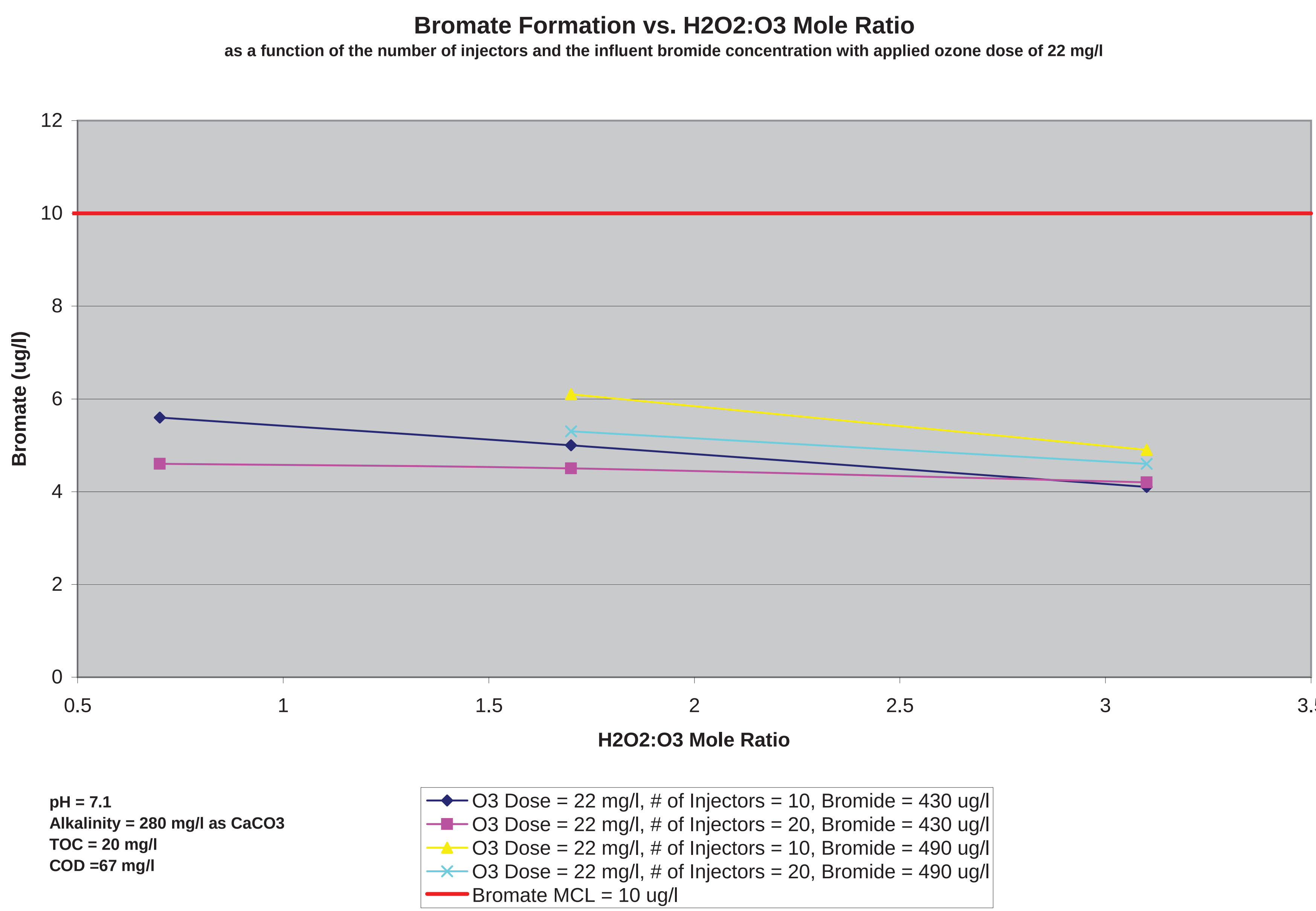
**Lab Analytical Run Sheet**

| Sample ID # | Run # | Ozone Dose (ppm) | H2O2:O3 Mole Ratio | pH | Alk | Turb | Temp | O3 Residual | H2O2 Residual | H2O2 Residual | TOC | COD | General Minerals | Hardness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Applied | Applied | Applied | Applied | Applied | Applied | Applied | Test America | Test America | Test America | Test America |
| | | | | Model pH | Model 5-EP Test | Hellige Model | Therm | Hach Model Ozone AccuVac Test Kit | Hach Test Kit | Test Strips | SM5310B | SM5220D | | SM2340C |
| | | | | | mg/l as CaCO3 | NTU | deg C | mg/l | mg/l | mg/l | mg/l | mg/l | see below | see below |
| P1190-SP-0A-500 | --- | --- | --- | 7.1 | 280 | 4.5 | | | | | 20 | 67 | see below | see below |
| P1190-SP-0B-550 | --- | --- | --- | 7.0 | 260 | 5.9 | | | | | | | | |
| P1190-SP-1-500 | 1 | 22.0 | 0.70 | 6.7 | 260 | 4.5 | 20.9 | 0.3 | 10 | 10 | | | | |
| P1190-SP-2-500 | 2 | 22.0 | 1.70 | 6.9 | 280 | 4.4 | 19.8 | 0.0 | 27 | 25 | | | | |
| P1190-SP-3-500 | 3 | 22.0 | 3.10 | 6.9 | 260 | 4.3 | 20.2 | 0.4 | 49 | 30 | | | | |
| P1190-SP-4-500 | 4 | 22.0 | 0.70 | 6.7 | 260 | 4.2 | 21.4 | 0.4 | 10 | 7 | | | | |
| P1190-SP-5-500 | 5 | 22.0 | 1.70 | 7.0 | 240 | 4.2 | 21.8 | 0.0 | 27 | 20 | | | | |
| P1190-SP-6-500 | 6 | 22.0 | 3.10 | 6.9 | 260 | 4.9 | 22.1 | 0.5 | 46 | 30 | | | | |
| P1190-SP-7-500 | 7 | 16.5 | 1.70 | 6.9 | 260 | 5.0 | 21.5 | 0.0 | 18 | 20 | | | | |
| P1190-SP-8-500 | 8 | 27.5 | 1.70 | 6.9 | 260 | 5.8 | 21.9 | 0.2 | 27 | 20 | | | | |
| P1190-SP-9-550 | 9 | 22.0 | 1.70 | 6.9 | 280 | 5.4 | 22.2 | 0.4 | 25 | 20 | | | | |
| P1190-SP-10-550 | 10 | 22.0 | 3.10 | 6.7 | 280 | 5.1 | 22.0 | 0.0 | 48 | 30 | | | | |
| P1190-SP-11-550 | 11 | 22.0 | 1.70 | 6.9 | 260 | 5.3 | 22.9 | 0.0 | 26 | 20 | | | | |
| P1190-SP-12-550 | 12 | 22.0 | 3.10 | 6.8 | 260 | 6.4 | 23.3 | 0.3 | 49 | 30 | | | | |

| Sample ID # | pCBSA | Chlorobenzene | Bromide | Bromate | Benzene | Acetone | 1,2-DCA | Methylene Chloride | 1,4-Dichlorobenzene | Chloroform |
|---|---|---|---|---|---|---|---|---|---|---|
| | Test America | Test America | MWH Labs | MWH Labs | Test America | Test America | Test America | Test America | Test America | Test America |
| | EPA 314.0 M | EPA 8260B | EPA 300.0 | EPA 317 | EPA 8260B | EPA 8260B | EPA 8260B | EPA 8260B | EPA 8260B | EPA 8260B |
| | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l |
| P1190-SP-0A-500 | 50000 | 3100 | 430 | NS | 8.0 J | ND (MDL = 45) | ND (MDL = 2.8) | ND (MDL = 9.5) | ND (MDL = 3.7) | ND (MDL = 3.3) |
| P1190-SP-0B-550 | NS | NS | 490 | NS | NS | NS | NS | NS | NS | NS |
| P1190-SP-1-500 | 24000 | 390 | 420 | 5.6 | 0.92 J | 9.3 J | 1.6 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-2-500 | 24000 | 300 | 400 | 5.0 | 0.74 J | 6.6 J | 1.4 | 1.1 J | ND (MDL = 0.37) | ND (MDL = 0.33) |
| P1190-SP-3-500 | 23000 | 770 | 430 | 4.1 | 1.4 J | ND (MDL = 9.0) | 2.0 | ND (MDL = 1.9) | 0.84 J | ND (MDL = 0.66) |
| P1190-SP-4-500 | 26000 | 710 | 420 | 4.6 | 2.1 J | ND (MDL = 9.0) | 2.4 | ND (MDL = 1.9) | 0.88 J | ND (MDL = 0.66) |
| P1190-SP-5-500 | 26000 | 650 | 420 | 4.5 | 1.2 J | ND (MDL = 9.0) | 1.8 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-6-500 | 26000 | 530 | 420 | 4.2 | 1.3 J | ND (MDL = 9.0) | 1.8 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-7-500 | 29000 | 640 | 440 | 5.4 | 1.4 J | ND (MDL = 9.0) | 1.7 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-8-500 | 20000 | 320 | 410 | 6.0 | 0.69 J | 6.8 J | 1.9 | ND (MDL = 0.95) | ND (MDL = 0.37) | 0.44 J |
| P1190-SP-9-550 | 24000 | 500 | 520 | 6.1 | 1.0 J | ND (MDL = 9.0) | 1.9 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-10-550 | 23000 | 570 | 470 | 4.9 | 1.2 J | ND (MDL = 9.0) | 1.8 | 2.2 J | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-11-550 | 26000 | 650 | 480 | 5.3 | 1.4 J | ND (MDL = 9.0) | 1.8 | 2.3 J | ND (MDL = 0.74) | ND (MDL = 0.66) |
| P1190-SP-12-550 | 26000 | 600 | 470 | 4.6 | 1.4 J | ND (MDL = 9.0) | 2.0 | ND (MDL = 1.9) | ND (MDL = 0.74) | ND (MDL = 0.66) |

| | | | | |
|---|---|---|---|---|
| General Minerals | **Iron** | ND (0.040) | mg/l | EPA 6010B-Diss |
| | **Magnesium** | 39 | mg/l | EPA 6010B-Diss |
| | **Manganese** | 0.15 | mg/l | EPA 6010B-Diss |
| | **Calcium** | 110 | mg/l | EPA 6010B-Diss |
| | **TDS** | 850 | mg/l | SM2540C |
| | **Alkalinity** | 260 | mg/l as CaCO3 | SM2320B |
| | **Sulfate** | 160 | mg/l | EPA 300.0 |
| | **Hardness** | 420 | mg/l as CaCO3 | SM2340C |

## ATTACHMENT 3



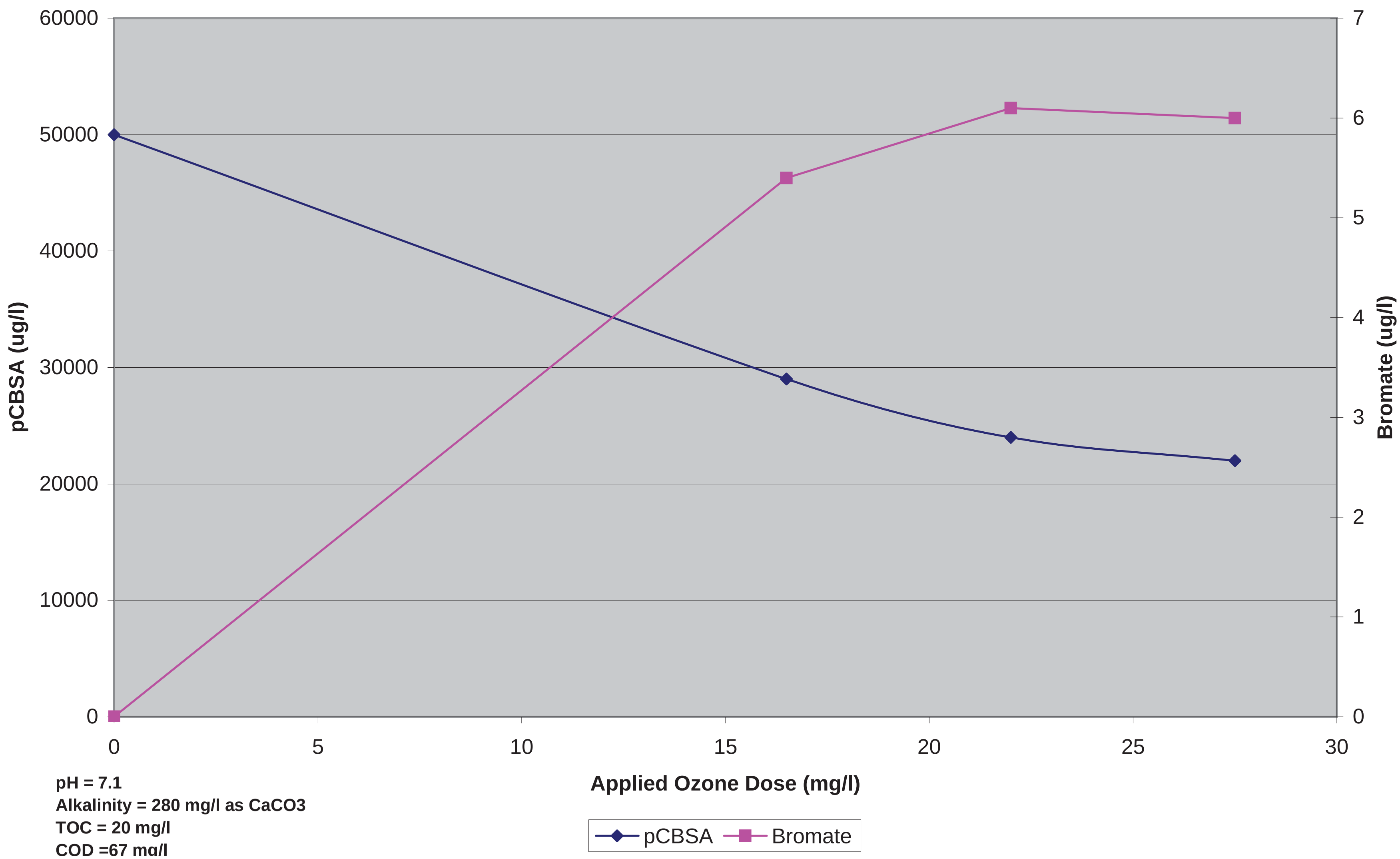

**pH = 7.1**
**Alkalinity = 280 mg/l as $CaCO_3$**
**TOC = 20 mg/l**
**COD =67 mg/l**

*Applied Process Technology, Inc.*
*Confidential Information*

## ATTACHMENT 4

### Ozone Dose Response

**$H_2O_2$:$O_3$ MR = 1.7, # of Injectors = 10, Bromide = 430 ug/l**




**pH = 7.1**
**Alkalinity = 280 mg/l as $CaCO_3$**
**TOC = 20 mg/l**
**COD =67 mg/l**

*Applied Process Technology, Inc.*
*Confidential Information*

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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# LABORATORY REPORT

Prepared For: Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project: Montrose-Torrance Bench Study
P1190

Sampled: 08/07/09
Received: 08/08/09
Issued: 08/19/09 14:17

NELAP #01108CA California ELAP#2706 CSDLAC #10256 AZ #AZ0671 NV #CA01531

*The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain of Custody, 1 page, is included and is an integral part of this report.*
*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

| LABORATORY ID | CLIENT ID | MATRIX |
|---|---|---|
| ISH0701-01 | P1190-SP-OA-500 | Water |
| ISH0701-02 | P1190-SP-1-500 | Water |
| ISH0701-03 | P1190-SP-2-500 | Water |
| ISH0701-04 | P1190-SP-3-500 | Water |
| ISH0701-05 | P1190-SP-4-500 | Water |
| ISH0701-06 | P1190-SP-5-500 | Water |
| ISH0701-07 | P1190-SP-6-500 | Water |
| ISH0701-08 | P1190-SP-7-500 | Water |
| ISH0701-09 | P1190-SP-8-550 | Water |
| ISH0701-10 | P1190-SP-9-550 | Water |
| ISH0701-11 | P1190-SP-10-550 | Water |
| ISH0701-12 | P1190-SP-11-550 | Water |
| ISH0701-13 | P1190-SP-12-550 | Water |

Reviewed By:

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-01 (P1190-SP-OA-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12030 | 18 | 100 | **3100** | 50 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *94 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *106 %* | | | | |
| **Sample ID: ISH0701-01RE1 (P1190-SP-OA-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H12030 | 45 | 100 | ND | 10 | 08/12/09 | 08/12/09 | |
| **Benzene** | EPA 8260B | 9H12030 | 2.8 | 20 | **8.0** | 10 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12030 | 2.7 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12030 | 4.0 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12030 | 3.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12030 | 4.0 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12030 | 4.2 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12030 | 47 | 100 | ND | 10 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12030 | 3.7 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12030 | 2.5 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12030 | 2.2 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12030 | 4.8 | 10 | ND | 10 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12030 | 2.8 | 5.0 | ND | 10 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12030 | 4.0 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12030 | 3.3 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12030 | 4.0 | 15 | ND | 10 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12030 | 2.8 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12030 | 2.9 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12030 | 9.7 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12030 | 4.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12030 | 4.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12030 | 3.6 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12030 | 3.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12030 | 3.5 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12030 | 3.7 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12030 | 2.6 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12030 | 4.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloroethane | EPA 8260B | 9H12030 | 2.8 | 5.0 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12030 | 4.2 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12030 | 3.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12030 | 3.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12030 | 3.5 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12030 | 3.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12030 | 3.4 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-01RE1 (P1190-SP-OA-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12030 | 2.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12030 | 3.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12030 | 2.8 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12030 | 11 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12030 | 2.5 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12030 | 3.8 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12030 | 26 | 100 | ND | 10 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12030 | 2.5 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12030 | 2.8 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12030 | 35 | 100 | ND | 10 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12030 | 9.5 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12030 | 4.1 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12030 | 2.7 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12030 | 2.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12030 | 2.7 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12030 | 3.0 | 10 | ND | 10 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12030 | 3.2 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12030 | 3.6 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12030 | 3.0 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12030 | 4.8 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12030 | 3.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12030 | 3.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12030 | 2.6 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12030 | 3.4 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12030 | 4.0 | 100 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12030 | 2.3 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12030 | 2.6 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12030 | 10 | 50 | ND | 10 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12030 | 4.0 | 5.0 | ND | 10 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12030 | 6.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12030 | 3.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12030 | 9.0 | 20 | ND | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *100 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *100 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-02 (P1190-SP-1-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12030 | 3.6 | 20 | **390** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *94 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |
| **Sample ID: ISH0701-02RE1 (P1190-SP-1-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Acetone** | EPA 8260B | 9H12030 | 9.0 | 20 | **9.3** | 2 | 08/12/09 | 08/12/09 | J |
| **Benzene** | EPA 8260B | 9H12030 | 0.56 | 4.0 | **0.92** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12030 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12030 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12030 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12030 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12030 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12030 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12030 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12030 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12030 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12030 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12030 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12030 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12030 | 0.56 | 1.0 | **1.6** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12030 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-02RE1 (P1190-SP-1-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12030 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12030 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12030 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12030 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12030 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12030 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12030 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12030 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12030 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12030 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12030 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12030 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12030 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12030 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12030 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12030 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *95 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *107 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *105 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-03 (P1190-SP-2-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12030 | 1.8 | 10 | **300** | 5 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *98 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *110 %* | | | | |
| **Sample ID: ISH0701-03RE1 (P1190-SP-2-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Acetone** | EPA 8260B | 9H12036 | 4.5 | 10 | **6.6** | 1 | 08/12/09 | 08/13/09 | J |
| **Benzene** | EPA 8260B | 9H12036 | 0.28 | 2.0 | **0.74** | 1 | 08/12/09 | 08/13/09 | J |
| Bromobenzene | EPA 8260B | 9H12036 | 0.27 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Bromochloromethane | EPA 8260B | 9H12036 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Bromodichloromethane | EPA 8260B | 9H12036 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Bromoform | EPA 8260B | 9H12036 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Bromomethane | EPA 8260B | 9H12036 | 0.42 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12036 | 4.7 | 10 | ND | 1 | 08/12/09 | 08/13/09 | |
| n-Butylbenzene | EPA 8260B | 9H12036 | 0.37 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12036 | 0.25 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12036 | 0.22 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Carbon Disulfide | EPA 8260B | 9H12036 | 0.48 | 1.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12036 | 0.28 | 0.50 | ND | 1 | 08/12/09 | 08/13/09 | |
| Chloroethane | EPA 8260B | 9H12036 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Chloroform | EPA 8260B | 9H12036 | 0.33 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Chloromethane | EPA 8260B | 9H12036 | 0.40 | 1.5 | ND | 1 | 08/12/09 | 08/13/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12036 | 0.28 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12036 | 0.29 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12036 | 0.97 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Dibromochloromethane | EPA 8260B | 9H12036 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12036 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Dibromomethane | EPA 8260B | 9H12036 | 0.36 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12036 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12036 | 0.35 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12036 | 0.37 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12036 | 0.26 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12036 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12036 | 0.28 | 0.50 | **1.4** | 1 | 08/12/09 | 08/13/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12036 | 0.42 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12036 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12036 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12036 | 0.35 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12036 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12036 | 0.34 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |

**TestAmerica Irvine**

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Sample ID: ISH0701-03RE1 (P1190-SP-2-500 - Water) - cont.** **Sampled: 08/07/09**

**Reporting Units: ug/l**

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| cis-1,3-Dichloropropene | EPA 8260B | 9H12036 | 0.22 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12036 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12036 | 0.28 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12036 | 1.1 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Ethylbenzene | EPA 8260B | 9H12036 | 0.25 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12036 | 0.38 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 2-Hexanone | EPA 8260B | 9H12036 | 2.6 | 10 | ND | 1 | 08/12/09 | 08/13/09 | |
| Isopropylbenzene | EPA 8260B | 9H12036 | 0.25 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12036 | 0.28 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12036 | 3.5 | 10 | ND | 1 | 08/12/09 | 08/13/09 | |
| **Methylene chloride** | EPA 8260B | 9H12036 | 0.95 | 5.0 | **1.1** | 1 | 08/12/09 | 08/13/09 | J |
| Naphthalene | EPA 8260B | 9H12036 | 0.41 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| n-Propylbenzene | EPA 8260B | 9H12036 | 0.27 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Styrene | EPA 8260B | 9H12036 | 0.20 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12036 | 0.27 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12036 | 0.30 | 1.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Tetrachloroethene | EPA 8260B | 9H12036 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Toluene | EPA 8260B | 9H12036 | 0.36 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12036 | 0.30 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12036 | 0.48 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12036 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12036 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Trichloroethene | EPA 8260B | 9H12036 | 0.26 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12036 | 0.34 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12036 | 0.40 | 10 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12036 | 0.23 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12036 | 0.26 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Vinyl acetate | EPA 8260B | 9H12036 | 1.0 | 5.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Vinyl chloride | EPA 8260B | 9H12036 | 0.40 | 0.50 | ND | 1 | 08/12/09 | 08/13/09 | |
| m,p-Xylenes | EPA 8260B | 9H12036 | 0.60 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| o-Xylene | EPA 8260B | 9H12036 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| Xylenes, Total | EPA 8260B | 9H12036 | 0.90 | 2.0 | ND | 1 | 08/12/09 | 08/13/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *103 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |

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| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | <br>Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-04 (P1190-SP-3-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12030 | 3.6 | 20 | **770** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *98 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *103 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *105 %* | | | | |
| **Sample ID: ISH0701-04RE1 (P1190-SP-3-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H12030 | 9.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| **Benzene** | EPA 8260B | 9H12030 | 0.56 | 4.0 | **1.4** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12030 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12030 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12030 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12030 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12030 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12030 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12030 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12030 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12030 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12030 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,4-Dichlorobenzene** | EPA 8260B | 9H12030 | 0.74 | 4.0 | **0.84** | 2 | 08/12/09 | 08/12/09 | J |
| Dichlorodifluoromethane | EPA 8260B | 9H12030 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12030 | 0.56 | 1.0 | **2.0** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12030 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | <br>Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-04RE1 (P1190-SP-3-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12030 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12030 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12030 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12030 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12030 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12030 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12030 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12030 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12030 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12030 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12030 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12030 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12030 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12030 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12030 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12030 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *93 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *109 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |

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Project Manager

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-05 (P1190-SP-4-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12030 | 3.6 | 20 | **710** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *93 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *106 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *111 %* | | | | |
| **Sample ID: ISH0701-05RE1 (P1190-SP-4-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H12030 | 9.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| **Benzene** | EPA 8260B | 9H12030 | 0.56 | 4.0 | **2.1** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12030 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12030 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12030 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12030 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12030 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12030 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12030 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12030 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12030 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12030 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12030 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,4-Dichlorobenzene** | EPA 8260B | 9H12030 | 0.74 | 4.0 | **0.88** | 2 | 08/12/09 | 08/12/09 | J |
| Dichlorodifluoromethane | EPA 8260B | 9H12030 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12030 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12030 | 0.56 | 1.0 | **2.4** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12030 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12030 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12030 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-05RE1 (P1190-SP-4-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12030 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12030 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12030 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12030 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12030 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12030 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12030 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12030 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12030 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12030 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12030 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12030 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12030 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12030 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12030 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12030 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12030 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12030 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12030 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12030 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12030 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12030 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12030 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12030 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *98 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-06 (P1190-SP-5-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **650** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *103 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *103 %* | | | | |
| **Sample ID: ISH0701-06RE1 (P1190-SP-5-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.2** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.8** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-06RE1 (P1190-SP-5-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *102 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-06RE2 (P1190-SP-5-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H14051 | 9.0 | 20 | ND | 2 | 08/14/09 | 08/14/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *100 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *97 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |

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Applied Process Technology
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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-07 (P1190-SP-6-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **530** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *106 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |
| **Sample ID: ISH0701-07RE1 (P1190-SP-6-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.3** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.8** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-07RE1 (P1190-SP-6-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *106 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *109 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *103 %* | | | | |

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-07RE2 (P1190-SP-6-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H14051 | 9.0 | 20 | ND | 2 | 08/14/09 | 08/14/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *99 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *94 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | | Sampled: 08/07/09<br>Received: 08/08/09 |

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-08 (P1190-SP-7-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **640** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *110 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *105 %* | | | | |
| **Sample ID: ISH0701-08RE1 (P1190-SP-7-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.4** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.7** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-08RE1 (P1190-SP-7-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *106 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *109 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *102 %* | | | | |

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| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-08RE2 (P1190-SP-7-500 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H14051 | 9.0 | 20 | ND | 2 | 08/14/09 | 08/14/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *101 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *95 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |

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| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-09 (P1190-SP-8-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 1.8 | 10 | **320** | 5 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *102 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *109 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *103 %* | | | | |
| **Sample ID: ISH0701-09RE1 (P1190-SP-8-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.28 | 2.0 | **0.69** | 1 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.27 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.42 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 4.7 | 10 | ND | 1 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.37 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.25 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.22 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.48 | 1.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.28 | 0.50 | ND | 1 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.40 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| **Chloroform** | EPA 8260B | 9H12029 | 0.33 | 2.0 | **0.44** | 1 | 08/12/09 | 08/12/09 | J |
| Chloromethane | EPA 8260B | 9H12029 | 0.40 | 1.5 | ND | 1 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.28 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.29 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 0.97 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.36 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.35 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.37 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.26 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.40 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.28 | 0.50 | **1.9** | 1 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.42 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.35 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.34 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.22 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-09RE1 (P1190-SP-8-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.28 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 1.1 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.25 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.38 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 2.6 | 10 | ND | 1 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.25 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.28 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 3.5 | 10 | ND | 1 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12029 | 0.95 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12029 | 0.41 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.27 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.20 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.27 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.30 | 1.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.32 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.36 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.30 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.48 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.26 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.34 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.40 | 10 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.23 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.26 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 1.0 | 5.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.40 | 0.50 | ND | 1 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.30 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 0.90 | 2.0 | ND | 1 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *107 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *114 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *102 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-09RE2 (P1190-SP-8-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Acetone** | EPA 8260B | 9H15008 | 4.5 | 10 | **6.8** | 1 | 08/15/09 | 08/15/09 | J |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *97 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *95 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *107 %* | | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-10 (P1190-SP-9-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **500** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *110 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |
| **Sample ID: ISH0701-10RE1 (P1190-SP-9-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.0** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.9** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-10RE1 (P1190-SP-9-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *114 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *103 %* | | | | |

**TestAmerica Irvine**

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Project Manager

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| | | | |
|---|---|---|---|
| Applied Process Technology | Project ID: | Montrose-Torrance Bench Study | |
| 3333 Vincent Road, Suite 222 | | P1190 | Sampled: 08/07/09 |
| Pleasant Hill, CA 94523 | Report Number: | ISH0701 | Received: 08/08/09 |
| Attention: Keel Robinson | | | |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-10RE2 (P1190-SP-9-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H15008 | 9.0 | 20 | ND | 2 | 08/15/09 | 08/15/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *100 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *98 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *106 %* | | | | |

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-11 (P1190-SP-10-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **570** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *111 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *105 %* | | | | |
| **Sample ID: ISH0701-11RE1 (P1190-SP-10-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.2** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.8** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-11RE1 (P1190-SP-10-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| **Methylene chloride** | EPA 8260B | 9H12029 | 1.9 | 10 | **2.2** | 2 | 08/12/09 | 08/12/09 | J |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *114 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |

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| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-11RE2 (P1190-SP-10-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H15008 | 9.0 | 20 | ND | 2 | 08/15/09 | 08/15/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *99 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *99 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *112 %* | | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-12 (P1190-SP-11-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12029 | 3.6 | 20 | **650** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *103 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *114 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *103 %* | | | | |
| **Sample ID: ISH0701-12RE1 (P1190-SP-11-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Benzene** | EPA 8260B | 9H12029 | 0.56 | 4.0 | **1.4** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12029 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12029 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12029 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12029 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12029 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12029 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12029 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12029 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12029 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12029 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12029 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12029 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12029 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12029 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12029 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12029 | 0.56 | 1.0 | **1.8** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12029 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12029 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12029 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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|---|---|---|---|
| Applied Process Technology | Project ID: | Montrose-Torrance Bench Study | |
| 3333 Vincent Road, Suite 222 | | P1190 | Sampled: 08/07/09 |
| Pleasant Hill, CA 94523 | Report Number: | ISH0701 | Received: 08/08/09 |
| Attention: Keel Robinson | | | |

# VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-12RE1 (P1190-SP-11-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12029 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12029 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12029 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12029 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12029 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12029 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| **Methylene chloride** | EPA 8260B | 9H12029 | 1.9 | 10 | **2.3** | 2 | 08/12/09 | 08/12/09 | J |
| Naphthalene | EPA 8260B | 9H12029 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12029 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12029 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12029 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12029 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12029 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12029 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12029 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12029 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12029 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12029 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12029 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12029 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12029 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12029 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12029 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12029 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *105 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *113 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *102 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-12RE2 (P1190-SP-11-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H15008 | 9.0 | 20 | ND | 2 | 08/15/09 | 08/15/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *97 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *98 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *105 %* | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | <br>Sampled: 08/07/09<br>Received: 08/08/09 |

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-13 (P1190-SP-12-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **Chlorobenzene** | EPA 8260B | 9H12034 | 3.6 | 20 | **600** | 10 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *110 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *106 %* | | | | |
| **Sample ID: ISH0701-13RE1 (P1190-SP-12-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| Acetone | EPA 8260B | 9H12034 | 9.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | C |
| **Benzene** | EPA 8260B | 9H12034 | 0.56 | 4.0 | **1.4** | 2 | 08/12/09 | 08/12/09 | J |
| Bromobenzene | EPA 8260B | 9H12034 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromochloromethane | EPA 8260B | 9H12034 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromodichloromethane | EPA 8260B | 9H12034 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromoform | EPA 8260B | 9H12034 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Bromomethane | EPA 8260B | 9H12034 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Butanone (MEK) | EPA 8260B | 9H12034 | 9.4 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Butylbenzene | EPA 8260B | 9H12034 | 0.74 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| sec-Butylbenzene | EPA 8260B | 9H12034 | 0.50 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| tert-Butylbenzene | EPA 8260B | 9H12034 | 0.44 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon Disulfide | EPA 8260B | 9H12034 | 0.96 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Carbon tetrachloride | EPA 8260B | 9H12034 | 0.56 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroethane | EPA 8260B | 9H12034 | 0.80 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloroform | EPA 8260B | 9H12034 | 0.66 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Chloromethane | EPA 8260B | 9H12034 | 0.80 | 3.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Chlorotoluene | EPA 8260B | 9H12034 | 0.56 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Chlorotoluene | EPA 8260B | 9H12034 | 0.58 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 9H12034 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromochloromethane | EPA 8260B | 9H12034 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 9H12034 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dibromomethane | EPA 8260B | 9H12034 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichlorobenzene | EPA 8260B | 9H12034 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichlorobenzene | EPA 8260B | 9H12034 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,4-Dichlorobenzene | EPA 8260B | 9H12034 | 0.74 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Dichlorodifluoromethane | EPA 8260B | 9H12034 | 0.52 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethane | EPA 8260B | 9H12034 | 0.80 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| **1,2-Dichloroethane** | EPA 8260B | 9H12034 | 0.56 | 1.0 | **2.0** | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloroethene | EPA 8260B | 9H12034 | 0.84 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| cis-1,2-Dichloroethene | EPA 8260B | 9H12034 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,2-Dichloroethene | EPA 8260B | 9H12034 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloropropane | EPA 8260B | 9H12034 | 0.70 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3-Dichloropropane | EPA 8260B | 9H12034 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2,2-Dichloropropane | EPA 8260B | 9H12034 | 0.68 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |

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Applied Process Technology
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Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-13RE1 (P1190-SP-12-550 - Water) - cont.** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| cis-1,3-Dichloropropene | EPA 8260B | 9H12034 | 0.44 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| trans-1,3-Dichloropropene | EPA 8260B | 9H12034 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1-Dichloropropene | EPA 8260B | 9H12034 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2-Dichloro-1,1,2-trifluoroethane | EPA 8260B | 9H12034 | 2.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Ethylbenzene | EPA 8260B | 9H12034 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Hexachlorobutadiene | EPA 8260B | 9H12034 | 0.76 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 2-Hexanone | EPA 8260B | 9H12034 | 5.2 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Isopropylbenzene | EPA 8260B | 9H12034 | 0.50 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| p-Isopropyltoluene | EPA 8260B | 9H12034 | 0.56 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 9H12034 | 7.0 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| Methylene chloride | EPA 8260B | 9H12034 | 1.9 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Naphthalene | EPA 8260B | 9H12034 | 0.82 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| n-Propylbenzene | EPA 8260B | 9H12034 | 0.54 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Styrene | EPA 8260B | 9H12034 | 0.40 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 9H12034 | 0.54 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 9H12034 | 0.60 | 2.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Tetrachloroethene | EPA 8260B | 9H12034 | 0.64 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Toluene | EPA 8260B | 9H12034 | 0.72 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 9H12034 | 0.60 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 9H12034 | 0.96 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,1-Trichloroethane | EPA 8260B | 9H12034 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,1,2-Trichloroethane | EPA 8260B | 9H12034 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichloroethene | EPA 8260B | 9H12034 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Trichlorofluoromethane | EPA 8260B | 9H12034 | 0.68 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,3-Trichloropropane | EPA 8260B | 9H12034 | 0.80 | 20 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 9H12034 | 0.46 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 9H12034 | 0.52 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl acetate | EPA 8260B | 9H12034 | 2.0 | 10 | ND | 2 | 08/12/09 | 08/12/09 | |
| Vinyl chloride | EPA 8260B | 9H12034 | 0.80 | 1.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| m,p-Xylenes | EPA 8260B | 9H12034 | 1.2 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| o-Xylene | EPA 8260B | 9H12034 | 0.60 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| Xylenes, Total | EPA 8260B | 9H12034 | 1.8 | 4.0 | ND | 2 | 08/12/09 | 08/12/09 | |
| *Surrogate: 4-Bromofluorobenzene (80-120%)* | | | | | *104 %* | | | | |
| *Surrogate: Dibromofluoromethane (80-120%)* | | | | | *111 %* | | | | |
| *Surrogate: Toluene-d8 (80-120%)* | | | | | *104 %* | | | | |

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Applied Process Technology
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Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## DISSOLVED METALS

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-01 (P1190-SP-OA-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: mg/l** | | | | | | | | | |
| **Calcium** | EPA 6010B-Diss | 9H10101 | N/A | 0.10 | **110** | 1 | 08/10/09 | 08/12/09 | |
| Iron | EPA 6010B-Diss | 9H10101 | N/A | 0.040 | ND | 1 | 08/10/09 | 08/12/09 | |
| **Magnesium** | EPA 6010B-Diss | 9H10101 | N/A | 0.020 | **39** | 1 | 08/10/09 | 08/12/09 | |
| **Manganese** | EPA 6010B-Diss | 9H10101 | N/A | 0.020 | **0.15** | 1 | 08/10/09 | 08/12/09 | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## INORGANICS

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-01 (P1190-SP-OA-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: mg/l** | | | | | | | | | |
| **Alkalinity as CaCO3** | SM2320B | 9H10057 | N/A | 2.0 | **260** | 1 | 08/10/09 | 08/10/09 | |
| **Bicarbonate** | SM2320B | 9H10057 | N/A | 2.4 | **320** | 1 | 08/10/09 | 08/10/09 | |
| Carbonate | SM2320B | 9H10057 | N/A | 1.2 | ND | 1 | 08/10/09 | 08/10/09 | |
| Hydroxide | SM2320B | 9H10057 | N/A | 0.70 | ND | 1 | 08/10/09 | 08/10/09 | |
| **Chemical Oxygen Demand** | SM5220D | 9H10077 | N/A | 20 | **67** | 1 | 08/10/09 | 08/10/09 | |
| **Hardness (as CaCO3)** | SM2340C | 9H11102 | N/A | 4.0 | **420** | 1 | 08/11/09 | 08/11/09 | |
| **Sulfate** | EPA 300.0 | 9H10045 | N/A | 2.5 | **160** | 5 | 08/10/09 | 08/10/09 | |
| **Total Dissolved Solids** | SM2540C | 9H11007 | N/A | 10 | **850** | 1 | 08/11/09 | 08/11/09 | |
| **Total Organic Carbon** | SM5310B | 9H10001 | N/A | 1.0 | **20** | 1 | 08/10/09 | 08/10/09 | |
| **Sample ID: ISH0701-01 (P1190-SP-OA-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 5000 | **50000** | 500 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-02 (P1190-SP-1-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **24000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-03 (P1190-SP-2-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **24000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-04 (P1190-SP-3-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **23000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-05 (P1190-SP-4-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **26000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-06 (P1190-SP-5-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **26000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-07 (P1190-SP-6-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **26000** | 100 | 08/18/09 | 08/18/09 | |

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| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## INORGANICS

| Analyte | Method | Batch | MDL Limit | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ID: ISH0701-08 (P1190-SP-7-500 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **29000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-09 (P1190-SP-8-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **20000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-10 (P1190-SP-9-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **24000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-11 (P1190-SP-10-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **23000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-12 (P1190-SP-11-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **26000** | 100 | 08/18/09 | 08/18/09 | |
| **Sample ID: ISH0701-13 (P1190-SP-12-550 - Water)** | | | | | **Sampled: 08/07/09** | | | | |
| **Reporting Units: ug/l** | | | | | | | | | |
| **4-Chlorobenzenesulfonic acid** | EPA 314.0 MOD. | 9H18058 | N/A | 1000 | **26000** | 100 | 08/18/09 | 08/18/09 | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12029-BLK1)** | | | | | | | | | | | |
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| Benzene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| Bromobenzene | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| Bromochloromethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromodichloromethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Bromoform | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromomethane | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| 2-Butanone (MEK) | ND | 10 | 4.7 | ug/l | | | | | | | |
| n-Butylbenzene | ND | 5.0 | 0.37 | ug/l | | | | | | | |
| sec-Butylbenzene | ND | 5.0 | 0.25 | ug/l | | | | | | | |
| tert-Butylbenzene | ND | 5.0 | 0.22 | ug/l | | | | | | | |
| Carbon Disulfide | ND | 1.0 | 0.48 | ug/l | | | | | | | |
| Carbon tetrachloride | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| Chlorobenzene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| Chloroethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Chloroform | ND | 2.0 | 0.33 | ug/l | | | | | | | |
| Chloromethane | ND | 1.5 | 0.40 | ug/l | | | | | | | |
| 2-Chlorotoluene | ND | 5.0 | 0.28 | ug/l | | | | | | | |
| 4-Chlorotoluene | ND | 5.0 | 0.29 | ug/l | | | | | | | |
| 1,2-Dibromo-3-chloropropane | ND | 5.0 | 0.97 | ug/l | | | | | | | |
| Dibromochloromethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dibromoethane (EDB) | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| Dibromomethane | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2-Dichlorobenzene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,3-Dichlorobenzene | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,4-Dichlorobenzene | ND | 2.0 | 0.37 | ug/l | | | | | | | |
| Dichlorodifluoromethane | ND | 5.0 | 0.26 | ug/l | | | | | | | |
| 1,1-Dichloroethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dichloroethane | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| 1,1-Dichloroethene | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| cis-1,2-Dichloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| trans-1,2-Dichloroethene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,2-Dichloropropane | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,3-Dichloropropane | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 2,2-Dichloropropane | ND | 2.0 | 0.34 | ug/l | | | | | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12029-BLK1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | ND | 2.0 | 0.22 | ug/l | | | | | | | |
| trans-1,3-Dichloropropene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,1-Dichloropropene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 1,2-Dichloro-1,1,2-trifluoroethane | ND | 2.0 | 1.1 | ug/l | | | | | | | |
| Ethylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| Hexachlorobutadiene | ND | 5.0 | 0.38 | ug/l | | | | | | | |
| 2-Hexanone | ND | 10 | 2.6 | ug/l | | | | | | | |
| Isopropylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| p-Isopropyltoluene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 4-Methyl-2-pentanone (MIBK) | ND | 10 | 3.5 | ug/l | | | | | | | |
| Methylene chloride | ND | 5.0 | 0.95 | ug/l | | | | | | | |
| Naphthalene | ND | 5.0 | 0.41 | ug/l | | | | | | | |
| n-Propylbenzene | ND | 2.0 | 0.27 | ug/l | | | | | | | |
| Styrene | ND | 2.0 | 0.20 | ug/l | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | | | | | | | |
| Tetrachloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| Toluene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2,3-Trichlorobenzene | ND | 5.0 | 0.30 | ug/l | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 5.0 | 0.48 | ug/l | | | | | | | |
| 1,1,1-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,1,2-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Trichloroethene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Trichlorofluoromethane | ND | 5.0 | 0.34 | ug/l | | | | | | | |
| 1,2,3-Trichloropropane | ND | 10 | 0.40 | ug/l | | | | | | | |
| 1,2,4-Trimethylbenzene | ND | 2.0 | 0.23 | ug/l | | | | | | | |
| 1,3,5-Trimethylbenzene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Vinyl acetate | ND | 5.0 | 1.0 | ug/l | | | | | | | |
| Vinyl chloride | ND | 0.50 | 0.40 | ug/l | | | | | | | |
| m,p-Xylenes | ND | 2.0 | 0.60 | ug/l | | | | | | | |
| o-Xylene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Xylenes, Total | ND | 2.0 | 0.90 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.5* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.2* | | | *ug/l* | *25.0* | | *105* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *25.7* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12029-BS1)** | | | | | | | | | | | |
| Acetone | 28.3 | 10 | 4.5 | ug/l | 25.0 | | 113 | 30-140 | | | |
| Benzene | 25.4 | 2.0 | 0.28 | ug/l | 25.0 | | 102 | 70-120 | | | |
| Bromobenzene | 24.5 | 5.0 | 0.27 | ug/l | 25.0 | | 98 | 75-120 | | | |
| Bromochloromethane | 25.8 | 5.0 | 0.40 | ug/l | 25.0 | | 103 | 70-130 | | | |
| Bromodichloromethane | 27.5 | 2.0 | 0.30 | ug/l | 25.0 | | 110 | 70-135 | | | |
| Bromoform | 21.8 | 5.0 | 0.40 | ug/l | 25.0 | | 87 | 55-130 | | | |
| Bromomethane | 29.5 | 5.0 | 0.42 | ug/l | 25.0 | | 118 | 65-140 | | | |
| 2-Butanone (MEK) | 28.4 | 10 | 4.7 | ug/l | 25.0 | | 114 | 40-140 | | | |
| n-Butylbenzene | 26.5 | 5.0 | 0.37 | ug/l | 25.0 | | 106 | 70-130 | | | |
| sec-Butylbenzene | 26.3 | 5.0 | 0.25 | ug/l | 25.0 | | 105 | 70-125 | | | |
| tert-Butylbenzene | 26.3 | 5.0 | 0.22 | ug/l | 25.0 | | 105 | 70-125 | | | |
| Carbon Disulfide | 28.2 | 1.0 | 0.48 | ug/l | 25.0 | | 113 | 50-130 | | | |
| Carbon tetrachloride | 28.5 | 0.50 | 0.28 | ug/l | 25.0 | | 114 | 65-140 | | | |
| Chlorobenzene | 25.3 | 2.0 | 0.36 | ug/l | 25.0 | | 101 | 75-120 | | | |
| Chloroethane | 27.9 | 5.0 | 0.40 | ug/l | 25.0 | | 112 | 60-140 | | | |
| Chloroform | 27.6 | 2.0 | 0.33 | ug/l | 25.0 | | 110 | 70-130 | | | |
| Chloromethane | 28.1 | 1.5 | 0.40 | ug/l | 25.0 | | 113 | 50-140 | | | |
| 2-Chlorotoluene | 26.8 | 5.0 | 0.28 | ug/l | 25.0 | | 107 | 70-125 | | | |
| 4-Chlorotoluene | 26.6 | 5.0 | 0.29 | ug/l | 25.0 | | 106 | 75-125 | | | |
| 1,2-Dibromo-3-chloropropane | 29.3 | 5.0 | 0.97 | ug/l | 25.0 | | 117 | 50-135 | | | |
| Dibromochloromethane | 27.7 | 2.0 | 0.40 | ug/l | 25.0 | | 111 | 70-140 | | | |
| 1,2-Dibromoethane (EDB) | 25.8 | 2.0 | 0.40 | ug/l | 25.0 | | 103 | 75-125 | | | |
| Dibromomethane | 27.1 | 2.0 | 0.36 | ug/l | 25.0 | | 108 | 70-125 | | | |
| 1,2-Dichlorobenzene | 24.8 | 2.0 | 0.32 | ug/l | 25.0 | | 99 | 75-120 | | | |
| 1,3-Dichlorobenzene | 25.3 | 2.0 | 0.35 | ug/l | 25.0 | | 101 | 75-120 | | | |
| 1,4-Dichlorobenzene | 25.1 | 2.0 | 0.37 | ug/l | 25.0 | | 101 | 75-120 | | | |
| Dichlorodifluoromethane | 28.1 | 5.0 | 0.26 | ug/l | 25.0 | | 112 | 35-155 | | | |
| 1,1-Dichloroethane | 26.2 | 2.0 | 0.40 | ug/l | 25.0 | | 105 | 70-125 | | | |
| 1,2-Dichloroethane | 27.0 | 0.50 | 0.28 | ug/l | 25.0 | | 108 | 60-140 | | | |
| 1,1-Dichloroethene | 30.8 | 5.0 | 0.42 | ug/l | 25.0 | | 123 | 70-125 | | | |
| cis-1,2-Dichloroethene | 26.8 | 2.0 | 0.32 | ug/l | 25.0 | | 107 | 70-125 | | | |
| trans-1,2-Dichloroethene | 27.6 | 2.0 | 0.30 | ug/l | 25.0 | | 110 | 70-125 | | | |
| 1,2-Dichloropropane | 25.6 | 2.0 | 0.35 | ug/l | 25.0 | | 102 | 70-125 | | | |
| 1,3-Dichloropropane | 26.4 | 2.0 | 0.32 | ug/l | 25.0 | | 106 | 70-120 | | | |
| 2,2-Dichloropropane | 31.3 | 2.0 | 0.34 | ug/l | 25.0 | | 125 | 65-140 | | | |

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| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12029-BS1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | 25.1 | 2.0 | 0.22 | ug/l | 25.0 | | 101 | 75-125 | | | |
| trans-1,3-Dichloropropene | 25.2 | 2.0 | 0.32 | ug/l | 25.0 | | 101 | 70-125 | | | |
| 1,1-Dichloropropene | 27.4 | 2.0 | 0.28 | ug/l | 25.0 | | 109 | 75-130 | | | |
| Ethylbenzene | 27.1 | 2.0 | 0.25 | ug/l | 25.0 | | 108 | 75-125 | | | |
| Hexachlorobutadiene | 24.1 | 5.0 | 0.38 | ug/l | 25.0 | | 96 | 65-135 | | | |
| 2-Hexanone | 30.6 | 10 | 2.6 | ug/l | 25.0 | | 122 | 45-140 | | | |
| Isopropylbenzene | 27.0 | 2.0 | 0.25 | ug/l | 25.0 | | 108 | 75-130 | | | |
| p-Isopropyltoluene | 25.5 | 2.0 | 0.28 | ug/l | 25.0 | | 102 | 75-125 | | | |
| 4-Methyl-2-pentanone (MIBK) | 29.9 | 10 | 3.5 | ug/l | 25.0 | | 119 | 45-140 | | | |
| Methylene chloride | 27.6 | 5.0 | 0.95 | ug/l | 25.0 | | 110 | 55-130 | | | |
| Naphthalene | 26.3 | 5.0 | 0.41 | ug/l | 25.0 | | 105 | 55-135 | | | |
| n-Propylbenzene | 26.8 | 2.0 | 0.27 | ug/l | 25.0 | | 107 | 75-130 | | | |
| Styrene | 25.3 | 2.0 | 0.20 | ug/l | 25.0 | | 101 | 75-130 | | | |
| 1,1,1,2-Tetrachloroethane | 25.2 | 5.0 | 0.27 | ug/l | 25.0 | | 101 | 70-130 | | | |
| 1,1,2,2-Tetrachloroethane | 27.5 | 1.0 | 0.30 | ug/l | 25.0 | | 110 | 55-130 | | | |
| Tetrachloroethene | 25.7 | 2.0 | 0.32 | ug/l | 25.0 | | 103 | 70-125 | | | |
| Toluene | 25.7 | 2.0 | 0.36 | ug/l | 25.0 | | 103 | 70-120 | | | |
| 1,2,3-Trichlorobenzene | 24.6 | 5.0 | 0.30 | ug/l | 25.0 | | 98 | 65-125 | | | |
| 1,2,4-Trichlorobenzene | 24.8 | 5.0 | 0.48 | ug/l | 25.0 | | 99 | 70-135 | | | |
| 1,1,1-Trichloroethane | 28.9 | 2.0 | 0.30 | ug/l | 25.0 | | 116 | 65-135 | | | |
| 1,1,2-Trichloroethane | 26.9 | 2.0 | 0.30 | ug/l | 25.0 | | 107 | 70-125 | | | |
| Trichloroethene | 25.7 | 2.0 | 0.26 | ug/l | 25.0 | | 103 | 70-125 | | | |
| Trichlorofluoromethane | 29.4 | 5.0 | 0.34 | ug/l | 25.0 | | 118 | 65-145 | | | |
| 1,2,3-Trichloropropane | 26.7 | 10 | 0.40 | ug/l | 25.0 | | 107 | 60-130 | | | |
| 1,2,4-Trimethylbenzene | 26.0 | 2.0 | 0.23 | ug/l | 25.0 | | 104 | 75-125 | | | |
| 1,3,5-Trimethylbenzene | 26.3 | 2.0 | 0.26 | ug/l | 25.0 | | 105 | 75-125 | | | |
| Vinyl acetate | 33.2 | 5.0 | 1.0 | ug/l | 25.0 | | 133 | 45-145 | | | |
| Vinyl chloride | 30.4 | 0.50 | 0.40 | ug/l | 25.0 | | 122 | 55-135 | | | |
| m,p-Xylenes | 51.3 | 2.0 | 0.60 | ug/l | 50.0 | | 103 | 75-125 | | | |
| o-Xylene | 25.7 | 2.0 | 0.30 | ug/l | 25.0 | | 103 | 75-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *26.8* | | | *ug/l* | *25.0* | | *107* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.4* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *25.8* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12029-MS1)** | | | | | | **Source: ISH0701-06** | | | | | |
| Acetone | 271 | 100 | 45 | ug/l | 250 | ND | 108 | 20-150 | | | |
| Benzene | 262 | 20 | 2.8 | ug/l | 250 | ND | 105 | 65-125 | | | |
| Bromobenzene | 251 | 50 | 2.7 | ug/l | 250 | ND | 101 | 70-125 | | | |
| Bromochloromethane | 279 | 50 | 4.0 | ug/l | 250 | ND | 111 | 65-135 | | | |
| Bromodichloromethane | 295 | 20 | 3.0 | ug/l | 250 | ND | 118 | 70-135 | | | |
| Bromoform | 214 | 50 | 4.0 | ug/l | 250 | ND | 86 | 55-135 | | | |
| Bromomethane | 280 | 50 | 4.2 | ug/l | 250 | ND | 112 | 55-145 | | | |
| 2-Butanone (MEK) | 271 | 100 | 47 | ug/l | 250 | ND | 108 | 30-145 | | | |
| n-Butylbenzene | 271 | 50 | 3.7 | ug/l | 250 | ND | 108 | 65-135 | | | |
| sec-Butylbenzene | 268 | 50 | 2.5 | ug/l | 250 | ND | 107 | 70-125 | | | |
| tert-Butylbenzene | 266 | 50 | 2.2 | ug/l | 250 | ND | 106 | 65-130 | | | |
| Carbon Disulfide | 278 | 10 | 4.8 | ug/l | 250 | ND | 111 | 40-140 | | | |
| Carbon tetrachloride | 286 | 5.0 | 2.8 | ug/l | 250 | ND | 114 | 65-140 | | | |
| Chlorobenzene | 849 | 20 | 3.6 | ug/l | 250 | 651 | 79 | 75-125 | | | |
| Chloroethane | 267 | 50 | 4.0 | ug/l | 250 | ND | 107 | 55-140 | | | |
| Chloroform | 289 | 20 | 3.3 | ug/l | 250 | ND | 115 | 65-135 | | | |
| Chloromethane | 260 | 15 | 4.0 | ug/l | 250 | ND | 104 | 45-145 | | | |
| 2-Chlorotoluene | 274 | 50 | 2.8 | ug/l | 250 | ND | 110 | 65-135 | | | |
| 4-Chlorotoluene | 274 | 50 | 2.9 | ug/l | 250 | ND | 110 | 70-135 | | | |
| 1,2-Dibromo-3-chloropropane | 278 | 50 | 9.7 | ug/l | 250 | ND | 111 | 45-145 | | | |
| Dibromochloromethane | 287 | 20 | 4.0 | ug/l | 250 | ND | 115 | 65-140 | | | |
| 1,2-Dibromoethane (EDB) | 263 | 20 | 4.0 | ug/l | 250 | ND | 105 | 70-130 | | | |
| Dibromomethane | 285 | 20 | 3.6 | ug/l | 250 | ND | 114 | 65-135 | | | |
| 1,2-Dichlorobenzene | 258 | 20 | 3.2 | ug/l | 250 | ND | 103 | 75-125 | | | |
| 1,3-Dichlorobenzene | 261 | 20 | 3.5 | ug/l | 250 | ND | 104 | 75-125 | | | |
| 1,4-Dichlorobenzene | 261 | 20 | 3.7 | ug/l | 250 | ND | 105 | 75-125 | | | |
| Dichlorodifluoromethane | 238 | 50 | 2.6 | ug/l | 250 | ND | 95 | 25-155 | | | |
| 1,1-Dichloroethane | 270 | 20 | 4.0 | ug/l | 250 | ND | 108 | 65-130 | | | |
| 1,2-Dichloroethane | 291 | 5.0 | 2.8 | ug/l | 250 | ND | 116 | 60-140 | | | |
| 1,1-Dichloroethene | 314 | 50 | 4.2 | ug/l | 250 | ND | 126 | 60-130 | | | |
| cis-1,2-Dichloroethene | 275 | 20 | 3.2 | ug/l | 250 | ND | 110 | 65-130 | | | |
| trans-1,2-Dichloroethene | 279 | 20 | 3.0 | ug/l | 250 | ND | 112 | 65-130 | | | |
| 1,2-Dichloropropane | 269 | 20 | 3.5 | ug/l | 250 | ND | 108 | 65-130 | | | |
| 1,3-Dichloropropane | 270 | 20 | 3.2 | ug/l | 250 | ND | 108 | 65-135 | | | |
| 2,2-Dichloropropane | 291 | 20 | 3.4 | ug/l | 250 | ND | 117 | 60-145 | | | |

**TestAmerica Irvine**

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12029-MS1)** | | | | | **Source: ISH0701-06** | | | | | | |
| cis-1,3-Dichloropropene | 268 | 20 | 2.2 | ug/l | 250 | ND | 107 | 70-130 | | | |
| trans-1,3-Dichloropropene | 264 | 20 | 3.2 | ug/l | 250 | ND | 105 | 65-135 | | | |
| 1,1-Dichloropropene | 277 | 20 | 2.8 | ug/l | 250 | ND | 111 | 70-135 | | | |
| Ethylbenzene | 273 | 20 | 2.5 | ug/l | 250 | ND | 109 | 65-130 | | | |
| Hexachlorobutadiene | 248 | 50 | 3.8 | ug/l | 250 | ND | 99 | 60-135 | | | |
| 2-Hexanone | 286 | 100 | 26 | ug/l | 250 | ND | 115 | 25-140 | | | |
| Isopropylbenzene | 270 | 20 | 2.5 | ug/l | 250 | ND | 108 | 70-135 | | | |
| p-Isopropyltoluene | 256 | 20 | 2.8 | ug/l | 250 | ND | 103 | 65-130 | | | |
| 4-Methyl-2-pentanone (MIBK) | 296 | 100 | 35 | ug/l | 250 | ND | 118 | 40-140 | | | |
| Methylene chloride | 297 | 50 | 9.5 | ug/l | 250 | ND | 119 | 50-135 | | | |
| Naphthalene | 272 | 50 | 4.1 | ug/l | 250 | ND | 109 | 50-140 | | | |
| n-Propylbenzene | 270 | 20 | 2.7 | ug/l | 250 | ND | 108 | 70-135 | | | |
| Styrene | 258 | 20 | 2.0 | ug/l | 250 | ND | 103 | 50-145 | | | |
| 1,1,1,2-Tetrachloroethane | 262 | 50 | 2.7 | ug/l | 250 | ND | 105 | 65-140 | | | |
| 1,1,2,2-Tetrachloroethane | 279 | 10 | 3.0 | ug/l | 250 | ND | 112 | 55-135 | | | |
| Tetrachloroethene | 254 | 20 | 3.2 | ug/l | 250 | ND | 101 | 65-130 | | | |
| Toluene | 263 | 20 | 3.6 | ug/l | 250 | ND | 105 | 70-125 | | | |
| 1,2,3-Trichlorobenzene | 262 | 50 | 3.0 | ug/l | 250 | ND | 105 | 60-135 | | | |
| 1,2,4-Trichlorobenzene | 262 | 50 | 4.8 | ug/l | 250 | ND | 105 | 65-135 | | | |
| 1,1,1-Trichloroethane | 288 | 20 | 3.0 | ug/l | 250 | ND | 115 | 65-140 | | | |
| 1,1,2-Trichloroethane | 278 | 20 | 3.0 | ug/l | 250 | ND | 111 | 65-130 | | | |
| Trichloroethene | 260 | 20 | 2.6 | ug/l | 250 | ND | 104 | 65-125 | | | |
| Trichlorofluoromethane | 284 | 50 | 3.4 | ug/l | 250 | ND | 113 | 60-145 | | | |
| 1,2,3-Trichloropropane | 270 | 100 | 4.0 | ug/l | 250 | ND | 108 | 55-135 | | | |
| 1,2,4-Trimethylbenzene | 267 | 20 | 2.3 | ug/l | 250 | ND | 107 | 55-135 | | | |
| 1,3,5-Trimethylbenzene | 268 | 20 | 2.6 | ug/l | 250 | ND | 107 | 70-130 | | | |
| Vinyl acetate | 326 | 50 | 10 | ug/l | 250 | ND | 130 | 40-150 | | | |
| Vinyl chloride | 287 | 5.0 | 4.0 | ug/l | 250 | ND | 115 | 45-140 | | | |
| m,p-Xylenes | 517 | 20 | 6.0 | ug/l | 500 | ND | 103 | 65-130 | | | |
| o-Xylene | 264 | 20 | 3.0 | ug/l | 250 | ND | 106 | 65-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *275* | | | *ug/l* | *250* | | *110* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *272* | | | *ug/l* | *250* | | *109* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *260* | | | *ug/l* | *250* | | *104* | *80-120* | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/12/2009 (9H12029-MSD1)** | | | | | | **Source: ISH0701-06** | | | | | |
| Acetone | 265 | 100 | 45 | ug/l | 250 | ND | 106 | 20-150 | 2 | 35 | |
| Benzene | 252 | 20 | 2.8 | ug/l | 250 | ND | 101 | 65-125 | 4 | 20 | |
| Bromobenzene | 240 | 50 | 2.7 | ug/l | 250 | ND | 96 | 70-125 | 5 | 20 | |
| Bromochloromethane | 260 | 50 | 4.0 | ug/l | 250 | ND | 104 | 65-135 | 7 | 25 | |
| Bromodichloromethane | 277 | 20 | 3.0 | ug/l | 250 | ND | 111 | 70-135 | 6 | 20 | |
| Bromoform | 210 | 50 | 4.0 | ug/l | 250 | ND | 84 | 55-135 | 2 | 25 | |
| Bromomethane | 284 | 50 | 4.2 | ug/l | 250 | ND | 114 | 55-145 | 1 | 25 | |
| 2-Butanone (MEK) | 260 | 100 | 47 | ug/l | 250 | ND | 104 | 30-145 | 4 | 40 | |
| n-Butylbenzene | 262 | 50 | 3.7 | ug/l | 250 | ND | 105 | 65-135 | 3 | 20 | |
| sec-Butylbenzene | 259 | 50 | 2.5 | ug/l | 250 | ND | 103 | 70-125 | 3 | 20 | |
| tert-Butylbenzene | 257 | 50 | 2.2 | ug/l | 250 | ND | 103 | 65-130 | 4 | 20 | |
| Carbon Disulfide | 270 | 10 | 4.8 | ug/l | 250 | ND | 108 | 40-140 | 3 | 20 | |
| Carbon tetrachloride | 285 | 5.0 | 2.8 | ug/l | 250 | ND | 114 | 65-140 | 1 | 25 | |
| Chlorobenzene | 883 | 20 | 3.6 | ug/l | 250 | 651 | 93 | 75-125 | 4 | 20 | |
| Chloroethane | 264 | 50 | 4.0 | ug/l | 250 | ND | 106 | 55-140 | 1 | 25 | |
| Chloroform | 279 | 20 | 3.3 | ug/l | 250 | ND | 112 | 65-135 | 3 | 20 | |
| Chloromethane | 257 | 15 | 4.0 | ug/l | 250 | ND | 103 | 45-145 | 1 | 25 | |
| 2-Chlorotoluene | 267 | 50 | 2.8 | ug/l | 250 | ND | 107 | 65-135 | 3 | 20 | |
| 4-Chlorotoluene | 263 | 50 | 2.9 | ug/l | 250 | ND | 105 | 70-135 | 4 | 20 | |
| 1,2-Dibromo-3-chloropropane | 268 | 50 | 9.7 | ug/l | 250 | ND | 107 | 45-145 | 4 | 30 | |
| Dibromochloromethane | 276 | 20 | 4.0 | ug/l | 250 | ND | 110 | 65-140 | 4 | 25 | |
| 1,2-Dibromoethane (EDB) | 252 | 20 | 4.0 | ug/l | 250 | ND | 101 | 70-130 | 4 | 25 | |
| Dibromomethane | 276 | 20 | 3.6 | ug/l | 250 | ND | 110 | 65-135 | 3 | 25 | |
| 1,2-Dichlorobenzene | 246 | 20 | 3.2 | ug/l | 250 | ND | 98 | 75-125 | 5 | 20 | |
| 1,3-Dichlorobenzene | 251 | 20 | 3.5 | ug/l | 250 | ND | 101 | 75-125 | 4 | 20 | |
| 1,4-Dichlorobenzene | 249 | 20 | 3.7 | ug/l | 250 | ND | 100 | 75-125 | 5 | 20 | |
| Dichlorodifluoromethane | 233 | 50 | 2.6 | ug/l | 250 | ND | 93 | 25-155 | 2 | 30 | |
| 1,1-Dichloroethane | 262 | 20 | 4.0 | ug/l | 250 | ND | 105 | 65-130 | 3 | 20 | |
| 1,2-Dichloroethane | 277 | 5.0 | 2.8 | ug/l | 250 | ND | 111 | 60-140 | 5 | 20 | |
| 1,1-Dichloroethene | 304 | 50 | 4.2 | ug/l | 250 | ND | 121 | 60-130 | 3 | 20 | |
| cis-1,2-Dichloroethene | 269 | 20 | 3.2 | ug/l | 250 | ND | 108 | 65-130 | 2 | 20 | |
| trans-1,2-Dichloroethene | 274 | 20 | 3.0 | ug/l | 250 | ND | 110 | 65-130 | 2 | 20 | |
| 1,2-Dichloropropane | 257 | 20 | 3.5 | ug/l | 250 | ND | 103 | 65-130 | 5 | 20 | |
| 1,3-Dichloropropane | 261 | 20 | 3.2 | ug/l | 250 | ND | 104 | 65-135 | 4 | 25 | |
| 2,2-Dichloropropane | 281 | 20 | 3.4 | ug/l | 250 | ND | 113 | 60-145 | 4 | 25 | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12029 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/12/2009 (9H12029-MSD1)** | | | | | **Source: ISH0701-06** | | | | | | |
| cis-1,3-Dichloropropene | 254 | 20 | 2.2 | ug/l | 250 | ND | 102 | 70-130 | 6 | 20 | |
| trans-1,3-Dichloropropene | 256 | 20 | 3.2 | ug/l | 250 | ND | 102 | 65-135 | 3 | 25 | |
| 1,1-Dichloropropene | 266 | 20 | 2.8 | ug/l | 250 | ND | 107 | 70-135 | 4 | 20 | |
| Ethylbenzene | 266 | 20 | 2.5 | ug/l | 250 | ND | 106 | 65-130 | 3 | 20 | |
| Hexachlorobutadiene | 237 | 50 | 3.8 | ug/l | 250 | ND | 95 | 60-135 | 5 | 20 | |
| 2-Hexanone | 279 | 100 | 26 | ug/l | 250 | ND | 111 | 25-140 | 3 | 35 | |
| Isopropylbenzene | 260 | 20 | 2.5 | ug/l | 250 | ND | 104 | 70-135 | 4 | 20 | |
| p-Isopropyltoluene | 248 | 20 | 2.8 | ug/l | 250 | ND | 99 | 65-130 | 3 | 20 | |
| 4-Methyl-2-pentanone (MIBK) | 277 | 100 | 35 | ug/l | 250 | ND | 111 | 40-140 | 6 | 35 | |
| Methylene chloride | 288 | 50 | 9.5 | ug/l | 250 | ND | 115 | 50-135 | 3 | 20 | |
| Naphthalene | 253 | 50 | 4.1 | ug/l | 250 | ND | 101 | 50-140 | 7 | 30 | |
| n-Propylbenzene | 263 | 20 | 2.7 | ug/l | 250 | ND | 105 | 70-135 | 3 | 20 | |
| Styrene | 253 | 20 | 2.0 | ug/l | 250 | ND | 101 | 50-145 | 2 | 30 | |
| 1,1,1,2-Tetrachloroethane | 254 | 50 | 2.7 | ug/l | 250 | ND | 102 | 65-140 | 3 | 20 | |
| 1,1,2,2-Tetrachloroethane | 264 | 10 | 3.0 | ug/l | 250 | ND | 106 | 55-135 | 5 | 30 | |
| Tetrachloroethene | 252 | 20 | 3.2 | ug/l | 250 | ND | 101 | 65-130 | 1 | 20 | |
| Toluene | 256 | 20 | 3.6 | ug/l | 250 | ND | 102 | 70-125 | 3 | 20 | |
| 1,2,3-Trichlorobenzene | 247 | 50 | 3.0 | ug/l | 250 | ND | 99 | 60-135 | 6 | 20 | |
| 1,2,4-Trichlorobenzene | 248 | 50 | 4.8 | ug/l | 250 | ND | 99 | 65-135 | 5 | 20 | |
| 1,1,1-Trichloroethane | 284 | 20 | 3.0 | ug/l | 250 | ND | 114 | 65-140 | 1 | 20 | |
| 1,1,2-Trichloroethane | 266 | 20 | 3.0 | ug/l | 250 | ND | 106 | 65-130 | 5 | 25 | |
| Trichloroethene | 250 | 20 | 2.6 | ug/l | 250 | ND | 100 | 65-125 | 4 | 20 | |
| Trichlorofluoromethane | 281 | 50 | 3.4 | ug/l | 250 | ND | 112 | 60-145 | 1 | 25 | |
| 1,2,3-Trichloropropane | 248 | 100 | 4.0 | ug/l | 250 | ND | 99 | 55-135 | 8 | 30 | |
| 1,2,4-Trimethylbenzene | 257 | 20 | 2.3 | ug/l | 250 | ND | 103 | 55-135 | 4 | 25 | |
| 1,3,5-Trimethylbenzene | 258 | 20 | 2.6 | ug/l | 250 | ND | 103 | 70-130 | 4 | 20 | |
| Vinyl acetate | 315 | 50 | 10 | ug/l | 250 | ND | 126 | 40-150 | 4 | 30 | |
| Vinyl chloride | 286 | 5.0 | 4.0 | ug/l | 250 | ND | 114 | 45-140 | 0 | 30 | |
| m,p-Xylenes | 512 | 20 | 6.0 | ug/l | 500 | ND | 102 | 65-130 | 1 | 25 | |
| o-Xylene | 252 | 20 | 3.0 | ug/l | 250 | ND | 101 | 65-125 | 5 | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *270* | | | *ug/l* | *250* | | *108* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *273* | | | *ug/l* | *250* | | *109* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *258* | | | *ug/l* | *250* | | *103* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Batch: 9H12030 Extracted: 08/12/09**

**Blank Analyzed: 08/12/2009 (9H12030-BLK1)**

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| Benzene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| Bromobenzene | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| Bromochloromethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromodichloromethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Bromoform | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromomethane | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| 2-Butanone (MEK) | ND | 10 | 4.7 | ug/l | | | | | | | |
| n-Butylbenzene | ND | 5.0 | 0.37 | ug/l | | | | | | | |
| sec-Butylbenzene | ND | 5.0 | 0.25 | ug/l | | | | | | | |
| tert-Butylbenzene | ND | 5.0 | 0.22 | ug/l | | | | | | | |
| Carbon Disulfide | ND | 1.0 | 0.48 | ug/l | | | | | | | |
| Carbon tetrachloride | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| Chlorobenzene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| Chloroethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Chloroform | ND | 2.0 | 0.33 | ug/l | | | | | | | |
| Chloromethane | ND | 1.5 | 0.40 | ug/l | | | | | | | |
| 2-Chlorotoluene | ND | 5.0 | 0.28 | ug/l | | | | | | | |
| 4-Chlorotoluene | ND | 5.0 | 0.29 | ug/l | | | | | | | |
| 1,2-Dibromo-3-chloropropane | ND | 5.0 | 0.97 | ug/l | | | | | | | |
| Dibromochloromethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dibromoethane (EDB) | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| Dibromomethane | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2-Dichlorobenzene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,3-Dichlorobenzene | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,4-Dichlorobenzene | ND | 2.0 | 0.37 | ug/l | | | | | | | |
| Dichlorodifluoromethane | ND | 5.0 | 0.26 | ug/l | | | | | | | |
| 1,1-Dichloroethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dichloroethane | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| 1,1-Dichloroethene | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| cis-1,2-Dichloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| trans-1,2-Dichloroethene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,2-Dichloropropane | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,3-Dichloropropane | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 2,2-Dichloropropane | ND | 2.0 | 0.34 | ug/l | | | | | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12030-BLK1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | ND | 2.0 | 0.22 | ug/l | | | | | | | |
| trans-1,3-Dichloropropene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,1-Dichloropropene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 1,2-Dichloro-1,1,2-trifluoroethane | ND | 2.0 | 1.1 | ug/l | | | | | | | |
| Ethylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| Hexachlorobutadiene | ND | 5.0 | 0.38 | ug/l | | | | | | | |
| 2-Hexanone | ND | 10 | 2.6 | ug/l | | | | | | | |
| Isopropylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| p-Isopropyltoluene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 4-Methyl-2-pentanone (MIBK) | ND | 10 | 3.5 | ug/l | | | | | | | |
| Methylene chloride | ND | 5.0 | 0.95 | ug/l | | | | | | | |
| Naphthalene | ND | 5.0 | 0.41 | ug/l | | | | | | | |
| n-Propylbenzene | ND | 2.0 | 0.27 | ug/l | | | | | | | |
| Styrene | ND | 2.0 | 0.20 | ug/l | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | | | | | | | |
| Tetrachloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| Toluene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2,3-Trichlorobenzene | ND | 5.0 | 0.30 | ug/l | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 5.0 | 0.48 | ug/l | | | | | | | |
| 1,1,1-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,1,2-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Trichloroethene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Trichlorofluoromethane | ND | 5.0 | 0.34 | ug/l | | | | | | | |
| 1,2,3-Trichloropropane | ND | 10 | 0.40 | ug/l | | | | | | | |
| 1,2,4-Trimethylbenzene | ND | 2.0 | 0.23 | ug/l | | | | | | | |
| 1,3,5-Trimethylbenzene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Vinyl acetate | ND | 5.0 | 1.0 | ug/l | | | | | | | |
| Vinyl chloride | ND | 0.50 | 0.40 | ug/l | | | | | | | |
| m,p-Xylenes | ND | 2.0 | 0.60 | ug/l | | | | | | | |
| o-Xylene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Xylenes, Total | ND | 2.0 | 0.90 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.0* | | | *ug/l* | *25.0* | | *100* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *25.6* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.9* | | | *ug/l* | *25.0* | | *108* | *80-120* | | | |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12030-BS1)** | | | | | | | | | | | |
| Acetone | 23.6 | 10 | 4.5 | ug/l | 25.0 | | 95 | 30-140 | | | |
| Benzene | 25.7 | 2.0 | 0.28 | ug/l | 25.0 | | 103 | 70-120 | | | |
| Bromobenzene | 26.6 | 5.0 | 0.27 | ug/l | 25.0 | | 106 | 75-120 | | | |
| Bromochloromethane | 26.7 | 5.0 | 0.40 | ug/l | 25.0 | | 107 | 70-130 | | | |
| Bromodichloromethane | 27.7 | 2.0 | 0.30 | ug/l | 25.0 | | 111 | 70-135 | | | |
| Bromoform | 21.1 | 5.0 | 0.40 | ug/l | 25.0 | | 84 | 55-130 | | | |
| Bromomethane | 26.1 | 5.0 | 0.42 | ug/l | 25.0 | | 105 | 65-140 | | | |
| 2-Butanone (MEK) | 28.7 | 10 | 4.7 | ug/l | 25.0 | | 115 | 40-140 | | | |
| n-Butylbenzene | 27.0 | 5.0 | 0.37 | ug/l | 25.0 | | 108 | 70-130 | | | |
| sec-Butylbenzene | 26.5 | 5.0 | 0.25 | ug/l | 25.0 | | 106 | 70-125 | | | |
| tert-Butylbenzene | 26.5 | 5.0 | 0.22 | ug/l | 25.0 | | 106 | 70-125 | | | |
| Carbon Disulfide | 26.5 | 1.0 | 0.48 | ug/l | 25.0 | | 106 | 50-130 | | | |
| Carbon tetrachloride | 27.0 | 0.50 | 0.28 | ug/l | 25.0 | | 108 | 65-140 | | | |
| Chlorobenzene | 26.1 | 2.0 | 0.36 | ug/l | 25.0 | | 104 | 75-120 | | | |
| Chloroethane | 26.2 | 5.0 | 0.40 | ug/l | 25.0 | | 105 | 60-140 | | | |
| Chloroform | 27.1 | 2.0 | 0.33 | ug/l | 25.0 | | 108 | 70-130 | | | |
| Chloromethane | 23.4 | 1.5 | 0.40 | ug/l | 25.0 | | 94 | 50-140 | | | |
| 2-Chlorotoluene | 27.8 | 5.0 | 0.28 | ug/l | 25.0 | | 111 | 70-125 | | | |
| 4-Chlorotoluene | 27.7 | 5.0 | 0.29 | ug/l | 25.0 | | 111 | 75-125 | | | |
| 1,2-Dibromo-3-chloropropane | 27.8 | 5.0 | 0.97 | ug/l | 25.0 | | 111 | 50-135 | | | |
| Dibromochloromethane | 28.2 | 2.0 | 0.40 | ug/l | 25.0 | | 113 | 70-140 | | | |
| 1,2-Dibromoethane (EDB) | 26.6 | 2.0 | 0.40 | ug/l | 25.0 | | 106 | 75-125 | | | |
| Dibromomethane | 27.7 | 2.0 | 0.36 | ug/l | 25.0 | | 111 | 70-125 | | | |
| 1,2-Dichlorobenzene | 26.2 | 2.0 | 0.32 | ug/l | 25.0 | | 105 | 75-120 | | | |
| 1,3-Dichlorobenzene | 27.0 | 2.0 | 0.35 | ug/l | 25.0 | | 108 | 75-120 | | | |
| 1,4-Dichlorobenzene | 26.0 | 2.0 | 0.37 | ug/l | 25.0 | | 104 | 75-120 | | | |
| Dichlorodifluoromethane | 26.5 | 5.0 | 0.26 | ug/l | 25.0 | | 106 | 35-155 | | | |
| 1,1-Dichloroethane | 26.5 | 2.0 | 0.40 | ug/l | 25.0 | | 106 | 70-125 | | | |
| 1,2-Dichloroethane | 24.9 | 0.50 | 0.28 | ug/l | 25.0 | | 100 | 60-140 | | | |
| 1,1-Dichloroethene | 29.6 | 5.0 | 0.42 | ug/l | 25.0 | | 118 | 70-125 | | | |
| cis-1,2-Dichloroethene | 29.1 | 2.0 | 0.32 | ug/l | 25.0 | | 117 | 70-125 | | | |
| trans-1,2-Dichloroethene | 29.2 | 2.0 | 0.30 | ug/l | 25.0 | | 117 | 70-125 | | | |
| 1,2-Dichloropropane | 24.3 | 2.0 | 0.35 | ug/l | 25.0 | | 97 | 70-125 | | | |
| 1,3-Dichloropropane | 29.1 | 2.0 | 0.32 | ug/l | 25.0 | | 116 | 70-120 | | | |
| 2,2-Dichloropropane | 28.1 | 2.0 | 0.34 | ug/l | 25.0 | | 112 | 65-140 | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12030-BS1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | 30.7 | 2.0 | 0.22 | ug/l | 25.0 | | 123 | 75-125 | | | |
| trans-1,3-Dichloropropene | 25.2 | 2.0 | 0.32 | ug/l | 25.0 | | 101 | 70-125 | | | |
| 1,1-Dichloropropene | 26.6 | 2.0 | 0.28 | ug/l | 25.0 | | 106 | 75-130 | | | |
| Ethylbenzene | 26.8 | 2.0 | 0.25 | ug/l | 25.0 | | 107 | 75-125 | | | |
| Hexachlorobutadiene | 23.9 | 5.0 | 0.38 | ug/l | 25.0 | | 95 | 65-135 | | | |
| 2-Hexanone | 24.5 | 10 | 2.6 | ug/l | 25.0 | | 98 | 45-140 | | | |
| Isopropylbenzene | 25.1 | 2.0 | 0.25 | ug/l | 25.0 | | 100 | 75-130 | | | |
| p-Isopropyltoluene | 26.1 | 2.0 | 0.28 | ug/l | 25.0 | | 104 | 75-125 | | | |
| 4-Methyl-2-pentanone (MIBK) | 23.6 | 10 | 3.5 | ug/l | 25.0 | | 95 | 45-140 | | | |
| Methylene chloride | 31.1 | 5.0 | 0.95 | ug/l | 25.0 | | 125 | 55-130 | | | |
| Naphthalene | 28.2 | 5.0 | 0.41 | ug/l | 25.0 | | 113 | 55-135 | | | |
| n-Propylbenzene | 27.5 | 2.0 | 0.27 | ug/l | 25.0 | | 110 | 75-130 | | | |
| Styrene | 26.7 | 2.0 | 0.20 | ug/l | 25.0 | | 107 | 75-130 | | | |
| 1,1,1,2-Tetrachloroethane | 26.2 | 5.0 | 0.27 | ug/l | 25.0 | | 105 | 70-130 | | | |
| 1,1,2,2-Tetrachloroethane | 29.7 | 1.0 | 0.30 | ug/l | 25.0 | | 119 | 55-130 | | | |
| Tetrachloroethene | 24.6 | 2.0 | 0.32 | ug/l | 25.0 | | 98 | 70-125 | | | |
| Toluene | 27.4 | 2.0 | 0.36 | ug/l | 25.0 | | 110 | 70-120 | | | |
| 1,2,3-Trichlorobenzene | 26.3 | 5.0 | 0.30 | ug/l | 25.0 | | 105 | 65-125 | | | |
| 1,2,4-Trichlorobenzene | 26.6 | 5.0 | 0.48 | ug/l | 25.0 | | 106 | 70-135 | | | |
| 1,1,1-Trichloroethane | 25.8 | 2.0 | 0.30 | ug/l | 25.0 | | 103 | 65-135 | | | |
| 1,1,2-Trichloroethane | 27.5 | 2.0 | 0.30 | ug/l | 25.0 | | 110 | 70-125 | | | |
| Trichloroethene | 24.8 | 2.0 | 0.26 | ug/l | 25.0 | | 99 | 70-125 | | | |
| Trichlorofluoromethane | 26.8 | 5.0 | 0.34 | ug/l | 25.0 | | 107 | 65-145 | | | |
| 1,2,3-Trichloropropane | 29.0 | 10 | 0.40 | ug/l | 25.0 | | 116 | 60-130 | | | |
| 1,2,4-Trimethylbenzene | 26.1 | 2.0 | 0.23 | ug/l | 25.0 | | 104 | 75-125 | | | |
| 1,3,5-Trimethylbenzene | 26.5 | 2.0 | 0.26 | ug/l | 25.0 | | 106 | 75-125 | | | |
| Vinyl acetate | 33.1 | 5.0 | 1.0 | ug/l | 25.0 | | 133 | 45-145 | | | |
| Vinyl chloride | 25.9 | 0.50 | 0.40 | ug/l | 25.0 | | 104 | 55-135 | | | |
| m,p-Xylenes | 53.1 | 2.0 | 0.60 | ug/l | 50.0 | | 106 | 75-125 | | | |
| o-Xylene | 26.6 | 2.0 | 0.30 | ug/l | 25.0 | | 106 | 75-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *26.3* | | | *ug/l* | *25.0* | | *105* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.7* | | | *ug/l* | *25.0* | | *107* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.0* | | | *ug/l* | *25.0* | | *108* | *80-120* | | | |

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|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12030-MS1)** | | | | | | **Source: ISH0743-02** | | | | | |
| Acetone | 23.7 | 10 | 4.5 | ug/l | 25.0 | ND | 95 | 20-150 | | | |
| Benzene | 29.0 | 2.0 | 0.28 | ug/l | 25.0 | ND | 116 | 65-125 | | | |
| Bromobenzene | 27.1 | 5.0 | 0.27 | ug/l | 25.0 | ND | 108 | 70-125 | | | |
| Bromochloromethane | 29.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 116 | 65-135 | | | |
| Bromodichloromethane | 31.2 | 2.0 | 0.30 | ug/l | 25.0 | ND | 125 | 70-135 | | | |
| Bromoform | 22.3 | 5.0 | 0.40 | ug/l | 25.0 | ND | 89 | 55-135 | | | |
| Bromomethane | 28.2 | 5.0 | 0.42 | ug/l | 25.0 | ND | 113 | 55-145 | | | |
| 2-Butanone (MEK) | 27.4 | 10 | 4.7 | ug/l | 25.0 | ND | 110 | 30-145 | | | |
| n-Butylbenzene | 29.2 | 5.0 | 0.37 | ug/l | 25.0 | ND | 117 | 65-135 | | | |
| sec-Butylbenzene | 29.5 | 5.0 | 0.25 | ug/l | 25.0 | ND | 118 | 70-125 | | | |
| tert-Butylbenzene | 28.0 | 5.0 | 0.22 | ug/l | 25.0 | ND | 112 | 65-130 | | | |
| Carbon Disulfide | 29.0 | 1.0 | 0.48 | ug/l | 25.0 | ND | 116 | 40-140 | | | |
| Carbon tetrachloride | 31.8 | 0.50 | 0.28 | ug/l | 25.0 | ND | 127 | 65-140 | | | |
| Chlorobenzene | 27.8 | 2.0 | 0.36 | ug/l | 25.0 | ND | 111 | 75-125 | | | |
| Chloroethane | 29.4 | 5.0 | 0.40 | ug/l | 25.0 | ND | 117 | 55-140 | | | |
| Chloroform | 30.9 | 2.0 | 0.33 | ug/l | 25.0 | 1.94 | 116 | 65-135 | | | |
| Chloromethane | 24.9 | 1.5 | 0.40 | ug/l | 25.0 | ND | 100 | 45-145 | | | |
| 2-Chlorotoluene | 28.2 | 5.0 | 0.28 | ug/l | 25.0 | ND | 113 | 65-135 | | | |
| 4-Chlorotoluene | 29.2 | 5.0 | 0.29 | ug/l | 25.0 | ND | 117 | 70-135 | | | |
| 1,2-Dibromo-3-chloropropane | 27.8 | 5.0 | 0.97 | ug/l | 25.0 | ND | 111 | 45-145 | | | |
| Dibromochloromethane | 29.0 | 2.0 | 0.40 | ug/l | 25.0 | ND | 116 | 65-140 | | | |
| 1,2-Dibromoethane (EDB) | 27.0 | 2.0 | 0.40 | ug/l | 25.0 | ND | 108 | 70-130 | | | |
| Dibromomethane | 29.6 | 2.0 | 0.36 | ug/l | 25.0 | ND | 119 | 65-135 | | | |
| 1,2-Dichlorobenzene | 27.1 | 2.0 | 0.32 | ug/l | 25.0 | ND | 108 | 75-125 | | | |
| 1,3-Dichlorobenzene | 27.6 | 2.0 | 0.35 | ug/l | 25.0 | ND | 110 | 75-125 | | | |
| 1,4-Dichlorobenzene | 27.0 | 2.0 | 0.37 | ug/l | 25.0 | ND | 108 | 75-125 | | | |
| Dichlorodifluoromethane | 29.9 | 5.0 | 0.26 | ug/l | 25.0 | ND | 120 | 25-155 | | | |
| 1,1-Dichloroethane | 28.0 | 2.0 | 0.40 | ug/l | 25.0 | ND | 112 | 65-130 | | | |
| 1,2-Dichloroethane | 26.6 | 0.50 | 0.28 | ug/l | 25.0 | ND | 107 | 60-140 | | | |
| 1,1-Dichloroethene | 30.4 | 5.0 | 0.42 | ug/l | 25.0 | ND | 122 | 60-130 | | | |
| cis-1,2-Dichloroethene | 30.8 | 2.0 | 0.32 | ug/l | 25.0 | ND | 123 | 65-130 | | | |
| trans-1,2-Dichloroethene | 30.5 | 2.0 | 0.30 | ug/l | 25.0 | ND | 122 | 65-130 | | | |
| 1,2-Dichloropropane | 27.2 | 2.0 | 0.35 | ug/l | 25.0 | ND | 109 | 65-130 | | | |
| 1,3-Dichloropropane | 29.7 | 2.0 | 0.32 | ug/l | 25.0 | ND | 119 | 65-135 | | | |
| 2,2-Dichloropropane | 31.3 | 2.0 | 0.34 | ug/l | 25.0 | ND | 125 | 60-145 | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12030-MS1)** | | | | | **Source: ISH0743-02** | | | | | | |
| cis-1,3-Dichloropropene | 35.7 | 2.0 | 0.22 | ug/l | 25.0 | ND | 143 | 70-130 | | | *M1* |
| trans-1,3-Dichloropropene | 26.6 | 2.0 | 0.32 | ug/l | 25.0 | ND | 106 | 65-135 | | | |
| 1,1-Dichloropropene | 30.2 | 2.0 | 0.28 | ug/l | 25.0 | ND | 121 | 70-135 | | | |
| Ethylbenzene | 29.1 | 2.0 | 0.25 | ug/l | 25.0 | ND | 116 | 65-130 | | | |
| Hexachlorobutadiene | 26.2 | 5.0 | 0.38 | ug/l | 25.0 | ND | 105 | 60-135 | | | |
| 2-Hexanone | 25.1 | 10 | 2.6 | ug/l | 25.0 | ND | 100 | 25-140 | | | |
| Isopropylbenzene | 28.2 | 2.0 | 0.25 | ug/l | 25.0 | ND | 113 | 70-135 | | | |
| p-Isopropyltoluene | 28.0 | 2.0 | 0.28 | ug/l | 25.0 | ND | 112 | 65-130 | | | |
| 4-Methyl-2-pentanone (MIBK) | 25.2 | 10 | 3.5 | ug/l | 25.0 | ND | 101 | 40-140 | | | |
| Methylene chloride | 31.7 | 5.0 | 0.95 | ug/l | 25.0 | ND | 127 | 50-135 | | | |
| Naphthalene | 28.9 | 5.0 | 0.41 | ug/l | 25.0 | ND | 115 | 50-140 | | | |
| n-Propylbenzene | 28.9 | 2.0 | 0.27 | ug/l | 25.0 | ND | 116 | 70-135 | | | |
| Styrene | 28.2 | 2.0 | 0.20 | ug/l | 25.0 | ND | 113 | 50-145 | | | |
| 1,1,1,2-Tetrachloroethane | 27.6 | 5.0 | 0.27 | ug/l | 25.0 | ND | 110 | 65-140 | | | |
| 1,1,2,2-Tetrachloroethane | 29.6 | 1.0 | 0.30 | ug/l | 25.0 | ND | 118 | 55-135 | | | |
| Tetrachloroethene | 27.6 | 2.0 | 0.32 | ug/l | 25.0 | ND | 111 | 65-130 | | | |
| Toluene | 30.6 | 2.0 | 0.36 | ug/l | 25.0 | ND | 122 | 70-125 | | | |
| 1,2,3-Trichlorobenzene | 27.6 | 5.0 | 0.30 | ug/l | 25.0 | ND | 111 | 60-135 | | | |
| 1,2,4-Trichlorobenzene | 28.4 | 5.0 | 0.48 | ug/l | 25.0 | ND | 114 | 65-135 | | | |
| 1,1,1-Trichloroethane | 29.6 | 2.0 | 0.30 | ug/l | 25.0 | ND | 118 | 65-140 | | | |
| 1,1,2-Trichloroethane | 30.0 | 2.0 | 0.30 | ug/l | 25.0 | ND | 120 | 65-130 | | | |
| Trichloroethene | 27.9 | 2.0 | 0.26 | ug/l | 25.0 | ND | 111 | 65-125 | | | |
| Trichlorofluoromethane | 29.5 | 5.0 | 0.34 | ug/l | 25.0 | ND | 118 | 60-145 | | | |
| 1,2,3-Trichloropropane | 27.8 | 10 | 0.40 | ug/l | 25.0 | ND | 111 | 55-135 | | | |
| 1,2,4-Trimethylbenzene | 28.6 | 2.0 | 0.23 | ug/l | 25.0 | ND | 114 | 55-135 | | | |
| 1,3,5-Trimethylbenzene | 27.4 | 2.0 | 0.26 | ug/l | 25.0 | ND | 110 | 70-130 | | | |
| Vinyl acetate | 32.2 | 5.0 | 1.0 | ug/l | 25.0 | ND | 129 | 40-150 | | | |
| Vinyl chloride | 27.7 | 0.50 | 0.40 | ug/l | 25.0 | ND | 111 | 45-140 | | | |
| m,p-Xylenes | 56.6 | 2.0 | 0.60 | ug/l | 50.0 | ND | 113 | 65-130 | | | |
| o-Xylene | 29.0 | 2.0 | 0.30 | ug/l | 25.0 | ND | 116 | 65-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *26.1* | | | *ug/l* | *25.0* | | *104* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.5* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *28.1* | | | *ug/l* | *25.0* | | *112* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/12/2009 (9H12030-MSD1)** | | | | | | **Source: ISH0743-02** | | | | | |
| Acetone | 23.2 | 10 | 4.5 | ug/l | 25.0 | ND | 93 | 20-150 | 2 | 35 | |
| Benzene | 29.4 | 2.0 | 0.28 | ug/l | 25.0 | ND | 117 | 65-125 | 1 | 20 | |
| Bromobenzene | 29.4 | 5.0 | 0.27 | ug/l | 25.0 | ND | 118 | 70-125 | 8 | 20 | |
| Bromochloromethane | 28.2 | 5.0 | 0.40 | ug/l | 25.0 | ND | 113 | 65-135 | 3 | 25 | |
| Bromodichloromethane | 31.4 | 2.0 | 0.30 | ug/l | 25.0 | ND | 126 | 70-135 | 1 | 20 | |
| Bromoform | 24.1 | 5.0 | 0.40 | ug/l | 25.0 | ND | 96 | 55-135 | 8 | 25 | |
| Bromomethane | 27.6 | 5.0 | 0.42 | ug/l | 25.0 | ND | 110 | 55-145 | 2 | 25 | |
| 2-Butanone (MEK) | 29.2 | 10 | 4.7 | ug/l | 25.0 | ND | 117 | 30-145 | 6 | 40 | |
| n-Butylbenzene | 33.0 | 5.0 | 0.37 | ug/l | 25.0 | ND | 132 | 65-135 | 12 | 20 | |
| sec-Butylbenzene | 32.2 | 5.0 | 0.25 | ug/l | 25.0 | ND | 129 | 70-125 | 9 | 20 | *M1* |
| tert-Butylbenzene | 31.1 | 5.0 | 0.22 | ug/l | 25.0 | ND | 124 | 65-130 | 10 | 20 | |
| Carbon Disulfide | 29.1 | 1.0 | 0.48 | ug/l | 25.0 | ND | 116 | 40-140 | 1 | 20 | |
| Carbon tetrachloride | 31.8 | 0.50 | 0.28 | ug/l | 25.0 | ND | 127 | 65-140 | 0 | 25 | |
| Chlorobenzene | 29.0 | 2.0 | 0.36 | ug/l | 25.0 | ND | 116 | 75-125 | 4 | 20 | |
| Chloroethane | 28.2 | 5.0 | 0.40 | ug/l | 25.0 | ND | 113 | 55-140 | 4 | 25 | |
| Chloroform | 30.8 | 2.0 | 0.33 | ug/l | 25.0 | 1.94 | 115 | 65-135 | 0 | 20 | |
| Chloromethane | 24.5 | 1.5 | 0.40 | ug/l | 25.0 | ND | 98 | 45-145 | 2 | 25 | |
| 2-Chlorotoluene | 31.0 | 5.0 | 0.28 | ug/l | 25.0 | ND | 124 | 65-135 | 9 | 20 | |
| 4-Chlorotoluene | 31.5 | 5.0 | 0.29 | ug/l | 25.0 | ND | 126 | 70-135 | 8 | 20 | |
| 1,2-Dibromo-3-chloropropane | 30.7 | 5.0 | 0.97 | ug/l | 25.0 | ND | 123 | 45-145 | 10 | 30 | |
| Dibromochloromethane | 31.0 | 2.0 | 0.40 | ug/l | 25.0 | ND | 124 | 65-140 | 7 | 25 | |
| 1,2-Dibromoethane (EDB) | 29.9 | 2.0 | 0.40 | ug/l | 25.0 | ND | 120 | 70-130 | 10 | 25 | |
| Dibromomethane | 30.1 | 2.0 | 0.36 | ug/l | 25.0 | ND | 120 | 65-135 | 2 | 25 | |
| 1,2-Dichlorobenzene | 29.2 | 2.0 | 0.32 | ug/l | 25.0 | ND | 117 | 75-125 | 8 | 20 | |
| 1,3-Dichlorobenzene | 30.2 | 2.0 | 0.35 | ug/l | 25.0 | ND | 121 | 75-125 | 9 | 20 | |
| 1,4-Dichlorobenzene | 30.0 | 2.0 | 0.37 | ug/l | 25.0 | ND | 120 | 75-125 | 10 | 20 | |
| Dichlorodifluoromethane | 29.5 | 5.0 | 0.26 | ug/l | 25.0 | ND | 118 | 25-155 | 1 | 30 | |
| 1,1-Dichloroethane | 28.4 | 2.0 | 0.40 | ug/l | 25.0 | ND | 114 | 65-130 | 2 | 20 | |
| 1,2-Dichloroethane | 27.0 | 0.50 | 0.28 | ug/l | 25.0 | ND | 108 | 60-140 | 1 | 20 | |
| 1,1-Dichloroethene | 30.1 | 5.0 | 0.42 | ug/l | 25.0 | ND | 120 | 60-130 | 1 | 20 | |
| cis-1,2-Dichloroethene | 30.0 | 2.0 | 0.32 | ug/l | 25.0 | ND | 120 | 65-130 | 3 | 20 | |
| trans-1,2-Dichloroethene | 30.3 | 2.0 | 0.30 | ug/l | 25.0 | ND | 121 | 65-130 | 1 | 20 | |
| 1,2-Dichloropropane | 28.5 | 2.0 | 0.35 | ug/l | 25.0 | ND | 114 | 65-130 | 5 | 20 | |
| 1,3-Dichloropropane | 31.3 | 2.0 | 0.32 | ug/l | 25.0 | ND | 125 | 65-135 | 5 | 25 | |
| 2,2-Dichloropropane | 31.5 | 2.0 | 0.34 | ug/l | 25.0 | ND | 126 | 60-145 | 1 | 25 | |

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12030 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/12/2009 (9H12030-MSD1)** | | | | | **Source: ISH0743-02** | | | | | | |
| cis-1,3-Dichloropropene | 35.0 | 2.0 | 0.22 | ug/l | 25.0 | ND | 140 | 70-130 | 2 | 20 | *M1* |
| trans-1,3-Dichloropropene | 27.4 | 2.0 | 0.32 | ug/l | 25.0 | ND | 110 | 65-135 | 3 | 25 | |
| 1,1-Dichloropropene | 31.0 | 2.0 | 0.28 | ug/l | 25.0 | ND | 124 | 70-135 | 3 | 20 | |
| Ethylbenzene | 31.0 | 2.0 | 0.25 | ug/l | 25.0 | ND | 124 | 65-130 | 6 | 20 | |
| Hexachlorobutadiene | 28.1 | 5.0 | 0.38 | ug/l | 25.0 | ND | 112 | 60-135 | 7 | 20 | |
| 2-Hexanone | 27.7 | 10 | 2.6 | ug/l | 25.0 | ND | 111 | 25-140 | 10 | 35 | |
| Isopropylbenzene | 30.8 | 2.0 | 0.25 | ug/l | 25.0 | ND | 123 | 70-135 | 9 | 20 | |
| p-Isopropyltoluene | 30.1 | 2.0 | 0.28 | ug/l | 25.0 | ND | 120 | 65-130 | 7 | 20 | |
| 4-Methyl-2-pentanone (MIBK) | 25.4 | 10 | 3.5 | ug/l | 25.0 | ND | 102 | 40-140 | 1 | 35 | |
| Methylene chloride | 31.6 | 5.0 | 0.95 | ug/l | 25.0 | ND | 126 | 50-135 | 0 | 20 | |
| Naphthalene | 31.6 | 5.0 | 0.41 | ug/l | 25.0 | ND | 126 | 50-140 | 9 | 30 | |
| n-Propylbenzene | 32.6 | 2.0 | 0.27 | ug/l | 25.0 | ND | 130 | 70-135 | 12 | 20 | |
| Styrene | 30.9 | 2.0 | 0.20 | ug/l | 25.0 | ND | 123 | 50-145 | 9 | 30 | |
| 1,1,1,2-Tetrachloroethane | 29.6 | 5.0 | 0.27 | ug/l | 25.0 | ND | 118 | 65-140 | 7 | 20 | |
| 1,1,2,2-Tetrachloroethane | 32.2 | 1.0 | 0.30 | ug/l | 25.0 | ND | 129 | 55-135 | 9 | 30 | |
| Tetrachloroethene | 29.5 | 2.0 | 0.32 | ug/l | 25.0 | ND | 118 | 65-130 | 7 | 20 | |
| Toluene | 29.2 | 2.0 | 0.36 | ug/l | 25.0 | ND | 117 | 70-125 | 5 | 20 | |
| 1,2,3-Trichlorobenzene | 30.2 | 5.0 | 0.30 | ug/l | 25.0 | ND | 121 | 60-135 | 9 | 20 | |
| 1,2,4-Trichlorobenzene | 31.6 | 5.0 | 0.48 | ug/l | 25.0 | ND | 126 | 65-135 | 11 | 20 | |
| 1,1,1-Trichloroethane | 29.2 | 2.0 | 0.30 | ug/l | 25.0 | ND | 117 | 65-140 | 1 | 20 | |
| 1,1,2-Trichloroethane | 30.5 | 2.0 | 0.30 | ug/l | 25.0 | ND | 122 | 65-130 | 2 | 25 | |
| Trichloroethene | 28.2 | 2.0 | 0.26 | ug/l | 25.0 | ND | 113 | 65-125 | 1 | 20 | |
| Trichlorofluoromethane | 29.8 | 5.0 | 0.34 | ug/l | 25.0 | ND | 119 | 60-145 | 1 | 25 | |
| 1,2,3-Trichloropropane | 30.6 | 10 | 0.40 | ug/l | 25.0 | ND | 122 | 55-135 | 9 | 30 | |
| 1,2,4-Trimethylbenzene | 30.2 | 2.0 | 0.23 | ug/l | 25.0 | ND | 121 | 55-135 | 5 | 25 | |
| 1,3,5-Trimethylbenzene | 30.2 | 2.0 | 0.26 | ug/l | 25.0 | ND | 121 | 70-130 | 10 | 20 | |
| Vinyl acetate | 32.2 | 5.0 | 1.0 | ug/l | 25.0 | ND | 129 | 40-150 | 0 | 30 | |
| Vinyl chloride | 27.8 | 0.50 | 0.40 | ug/l | 25.0 | ND | 111 | 45-140 | 0 | 30 | |
| m,p-Xylenes | 60.5 | 2.0 | 0.60 | ug/l | 50.0 | ND | 121 | 65-130 | 7 | 25 | |
| o-Xylene | 31.6 | 2.0 | 0.30 | ug/l | 25.0 | ND | 126 | 65-125 | 9 | 20 | *M1* |
| *Surrogate: 4-Bromofluorobenzene* | *26.3* | | | *ug/l* | *25.0* | | *105* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *25.2* | | | *ug/l* | *25.0* | | *101* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.6* | | | *ug/l* | *25.0* | | *111* | *80-120* | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12034-BLK1)** | | | | | | | | | | | |
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| Benzene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| Bromobenzene | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| Bromochloromethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromodichloromethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Bromoform | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromomethane | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| 2-Butanone (MEK) | ND | 10 | 4.7 | ug/l | | | | | | | |
| n-Butylbenzene | ND | 5.0 | 0.37 | ug/l | | | | | | | |
| sec-Butylbenzene | ND | 5.0 | 0.25 | ug/l | | | | | | | |
| tert-Butylbenzene | ND | 5.0 | 0.22 | ug/l | | | | | | | |
| Carbon Disulfide | ND | 1.0 | 0.48 | ug/l | | | | | | | |
| Carbon tetrachloride | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| Chlorobenzene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| Chloroethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Chloroform | ND | 2.0 | 0.33 | ug/l | | | | | | | |
| Chloromethane | ND | 1.5 | 0.40 | ug/l | | | | | | | |
| 2-Chlorotoluene | ND | 5.0 | 0.28 | ug/l | | | | | | | |
| 4-Chlorotoluene | ND | 5.0 | 0.29 | ug/l | | | | | | | |
| 1,2-Dibromo-3-chloropropane | ND | 5.0 | 0.97 | ug/l | | | | | | | |
| Dibromochloromethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dibromoethane (EDB) | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| Dibromomethane | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2-Dichlorobenzene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,3-Dichlorobenzene | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,4-Dichlorobenzene | ND | 2.0 | 0.37 | ug/l | | | | | | | |
| Dichlorodifluoromethane | ND | 5.0 | 0.26 | ug/l | | | | | | | |
| 1,1-Dichloroethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dichloroethane | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| 1,1-Dichloroethene | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| cis-1,2-Dichloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| trans-1,2-Dichloroethene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,2-Dichloropropane | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,3-Dichloropropane | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 2,2-Dichloropropane | ND | 2.0 | 0.34 | ug/l | | | | | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12034-BLK1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | ND | 2.0 | 0.22 | ug/l | | | | | | | |
| trans-1,3-Dichloropropene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,1-Dichloropropene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 1,2-Dichloro-1,1,2-trifluoroethane | ND | 2.0 | 1.1 | ug/l | | | | | | | |
| Ethylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| Hexachlorobutadiene | ND | 5.0 | 0.38 | ug/l | | | | | | | |
| 2-Hexanone | ND | 10 | 2.6 | ug/l | | | | | | | |
| Isopropylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| p-Isopropyltoluene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 4-Methyl-2-pentanone (MIBK) | ND | 10 | 3.5 | ug/l | | | | | | | |
| Methylene chloride | ND | 5.0 | 0.95 | ug/l | | | | | | | |
| Naphthalene | ND | 5.0 | 0.41 | ug/l | | | | | | | |
| n-Propylbenzene | ND | 2.0 | 0.27 | ug/l | | | | | | | |
| Styrene | ND | 2.0 | 0.20 | ug/l | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | | | | | | | |
| Tetrachloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| Toluene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2,3-Trichlorobenzene | ND | 5.0 | 0.30 | ug/l | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 5.0 | 0.48 | ug/l | | | | | | | |
| 1,1,1-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,1,2-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Trichloroethene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Trichlorofluoromethane | ND | 5.0 | 0.34 | ug/l | | | | | | | |
| 1,2,3-Trichloropropane | ND | 10 | 0.40 | ug/l | | | | | | | |
| 1,2,4-Trimethylbenzene | ND | 2.0 | 0.23 | ug/l | | | | | | | |
| 1,3,5-Trimethylbenzene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Vinyl acetate | ND | 5.0 | 1.0 | ug/l | | | | | | | |
| Vinyl chloride | ND | 0.50 | 0.40 | ug/l | | | | | | | |
| m,p-Xylenes | ND | 2.0 | 0.60 | ug/l | | | | | | | |
| o-Xylene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Xylenes, Total | ND | 2.0 | 0.90 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.5* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *27.8* | | | *ug/l* | *25.0* | | *111* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.6* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12034-BS1)** | | | | | | | | | | | |
| Acetone | 28.7 | 10 | 4.5 | ug/l | 25.0 | | 115 | 30-140 | | | |
| Benzene | 24.8 | 2.0 | 0.28 | ug/l | 25.0 | | 99 | 70-120 | | | |
| Bromobenzene | 23.0 | 5.0 | 0.27 | ug/l | 25.0 | | 92 | 75-120 | | | |
| Bromochloromethane | 25.8 | 5.0 | 0.40 | ug/l | 25.0 | | 103 | 70-130 | | | |
| Bromodichloromethane | 28.4 | 2.0 | 0.30 | ug/l | 25.0 | | 114 | 70-135 | | | |
| Bromoform | 20.6 | 5.0 | 0.40 | ug/l | 25.0 | | 82 | 55-130 | | | |
| Bromomethane | 27.9 | 5.0 | 0.42 | ug/l | 25.0 | | 112 | 65-140 | | | |
| 2-Butanone (MEK) | 27.4 | 10 | 4.7 | ug/l | 25.0 | | 110 | 40-140 | | | |
| n-Butylbenzene | 26.7 | 5.0 | 0.37 | ug/l | 25.0 | | 107 | 70-130 | | | |
| sec-Butylbenzene | 25.9 | 5.0 | 0.25 | ug/l | 25.0 | | 104 | 70-125 | | | |
| tert-Butylbenzene | 25.5 | 5.0 | 0.22 | ug/l | 25.0 | | 102 | 70-125 | | | |
| Carbon Disulfide | 27.7 | 1.0 | 0.48 | ug/l | 25.0 | | 111 | 50-130 | | | |
| Carbon tetrachloride | 28.9 | 0.50 | 0.28 | ug/l | 25.0 | | 116 | 65-140 | | | |
| Chlorobenzene | 24.5 | 2.0 | 0.36 | ug/l | 25.0 | | 98 | 75-120 | | | |
| Chloroethane | 26.3 | 5.0 | 0.40 | ug/l | 25.0 | | 105 | 60-140 | | | |
| Chloroform | 29.0 | 2.0 | 0.33 | ug/l | 25.0 | | 116 | 70-130 | | | |
| Chloromethane | 25.2 | 1.5 | 0.40 | ug/l | 25.0 | | 101 | 50-140 | | | |
| 2-Chlorotoluene | 26.5 | 5.0 | 0.28 | ug/l | 25.0 | | 106 | 70-125 | | | |
| 4-Chlorotoluene | 26.4 | 5.0 | 0.29 | ug/l | 25.0 | | 105 | 75-125 | | | |
| 1,2-Dibromo-3-chloropropane | 27.1 | 5.0 | 0.97 | ug/l | 25.0 | | 108 | 50-135 | | | |
| Dibromochloromethane | 27.5 | 2.0 | 0.40 | ug/l | 25.0 | | 110 | 70-140 | | | |
| 1,2-Dibromoethane (EDB) | 24.4 | 2.0 | 0.40 | ug/l | 25.0 | | 98 | 75-125 | | | |
| Dibromomethane | 27.5 | 2.0 | 0.36 | ug/l | 25.0 | | 110 | 70-125 | | | |
| 1,2-Dichlorobenzene | 24.4 | 2.0 | 0.32 | ug/l | 25.0 | | 98 | 75-120 | | | |
| 1,3-Dichlorobenzene | 24.6 | 2.0 | 0.35 | ug/l | 25.0 | | 98 | 75-120 | | | |
| 1,4-Dichlorobenzene | 24.4 | 2.0 | 0.37 | ug/l | 25.0 | | 98 | 75-120 | | | |
| Dichlorodifluoromethane | 25.0 | 5.0 | 0.26 | ug/l | 25.0 | | 100 | 35-155 | | | |
| 1,1-Dichloroethane | 27.2 | 2.0 | 0.40 | ug/l | 25.0 | | 109 | 70-125 | | | |
| 1,2-Dichloroethane | 28.0 | 0.50 | 0.28 | ug/l | 25.0 | | 112 | 60-140 | | | |
| 1,1-Dichloroethene | 30.5 | 5.0 | 0.42 | ug/l | 25.0 | | 122 | 70-125 | | | |
| cis-1,2-Dichloroethene | 26.7 | 2.0 | 0.32 | ug/l | 25.0 | | 107 | 70-125 | | | |
| trans-1,2-Dichloroethene | 27.2 | 2.0 | 0.30 | ug/l | 25.0 | | 109 | 70-125 | | | |
| 1,2-Dichloropropane | 25.6 | 2.0 | 0.35 | ug/l | 25.0 | | 103 | 70-125 | | | |
| 1,3-Dichloropropane | 25.9 | 2.0 | 0.32 | ug/l | 25.0 | | 104 | 70-120 | | | |
| 2,2-Dichloropropane | 30.1 | 2.0 | 0.34 | ug/l | 25.0 | | 120 | 65-140 | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12034-BS1)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | 24.9 | 2.0 | 0.22 | ug/l | 25.0 | | 100 | 75-125 | | | |
| trans-1,3-Dichloropropene | 25.1 | 2.0 | 0.32 | ug/l | 25.0 | | 100 | 70-125 | | | |
| 1,1-Dichloropropene | 27.0 | 2.0 | 0.28 | ug/l | 25.0 | | 108 | 75-130 | | | |
| Ethylbenzene | 26.4 | 2.0 | 0.25 | ug/l | 25.0 | | 105 | 75-125 | | | |
| Hexachlorobutadiene | 24.0 | 5.0 | 0.38 | ug/l | 25.0 | | 96 | 65-135 | | | |
| 2-Hexanone | 28.3 | 10 | 2.6 | ug/l | 25.0 | | 113 | 45-140 | | | |
| Isopropylbenzene | 26.1 | 2.0 | 0.25 | ug/l | 25.0 | | 105 | 75-130 | | | |
| p-Isopropyltoluene | 24.8 | 2.0 | 0.28 | ug/l | 25.0 | | 99 | 75-125 | | | |
| 4-Methyl-2-pentanone (MIBK) | 28.0 | 10 | 3.5 | ug/l | 25.0 | | 112 | 45-140 | | | |
| Methylene chloride | 29.5 | 5.0 | 0.95 | ug/l | 25.0 | | 118 | 55-130 | | | |
| Naphthalene | 24.8 | 5.0 | 0.41 | ug/l | 25.0 | | 99 | 55-135 | | | |
| n-Propylbenzene | 26.3 | 2.0 | 0.27 | ug/l | 25.0 | | 105 | 75-130 | | | |
| Styrene | 24.8 | 2.0 | 0.20 | ug/l | 25.0 | | 99 | 75-130 | | | |
| 1,1,1,2-Tetrachloroethane | 25.0 | 5.0 | 0.27 | ug/l | 25.0 | | 100 | 70-130 | | | |
| 1,1,2,2-Tetrachloroethane | 26.6 | 1.0 | 0.30 | ug/l | 25.0 | | 106 | 55-130 | | | |
| Tetrachloroethene | 24.7 | 2.0 | 0.32 | ug/l | 25.0 | | 99 | 70-125 | | | |
| Toluene | 25.5 | 2.0 | 0.36 | ug/l | 25.0 | | 102 | 70-120 | | | |
| 1,2,3-Trichlorobenzene | 24.3 | 5.0 | 0.30 | ug/l | 25.0 | | 97 | 65-125 | | | |
| 1,2,4-Trichlorobenzene | 24.4 | 5.0 | 0.48 | ug/l | 25.0 | | 98 | 70-135 | | | |
| 1,1,1-Trichloroethane | 30.4 | 2.0 | 0.30 | ug/l | 25.0 | | 122 | 65-135 | | | |
| 1,1,2-Trichloroethane | 26.6 | 2.0 | 0.30 | ug/l | 25.0 | | 107 | 70-125 | | | |
| Trichloroethene | 25.2 | 2.0 | 0.26 | ug/l | 25.0 | | 101 | 70-125 | | | |
| Trichlorofluoromethane | 29.9 | 5.0 | 0.34 | ug/l | 25.0 | | 120 | 65-145 | | | |
| 1,2,3-Trichloropropane | 25.4 | 10 | 0.40 | ug/l | 25.0 | | 102 | 60-130 | | | |
| 1,2,4-Trimethylbenzene | 25.5 | 2.0 | 0.23 | ug/l | 25.0 | | 102 | 75-125 | | | |
| 1,3,5-Trimethylbenzene | 25.7 | 2.0 | 0.26 | ug/l | 25.0 | | 103 | 75-125 | | | |
| Vinyl acetate | 30.4 | 5.0 | 1.0 | ug/l | 25.0 | | 121 | 45-145 | | | |
| Vinyl chloride | 28.8 | 0.50 | 0.40 | ug/l | 25.0 | | 115 | 55-135 | | | |
| m,p-Xylenes | 50.4 | 2.0 | 0.60 | ug/l | 50.0 | | 101 | 75-125 | | | |
| o-Xylene | 25.3 | 2.0 | 0.30 | ug/l | 25.0 | | 101 | 75-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *27.2* | | | *ug/l* | *25.0* | | *109* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *27.9* | | | *ug/l* | *25.0* | | *112* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.1* | | | *ug/l* | *25.0* | | *104* | *80-120* | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12034-MS1)** | | | | | | **Source: ISH0728-10** | | | | | |
| Acetone | 26.1 | 10 | 4.5 | ug/l | 25.0 | ND | 104 | 20-150 | | | |
| Benzene | 25.6 | 2.0 | 0.28 | ug/l | 25.0 | ND | 103 | 65-125 | | | |
| Bromobenzene | 23.5 | 5.0 | 0.27 | ug/l | 25.0 | ND | 94 | 70-125 | | | |
| Bromochloromethane | 26.6 | 5.0 | 0.40 | ug/l | 25.0 | ND | 107 | 65-135 | | | |
| Bromodichloromethane | 28.7 | 2.0 | 0.30 | ug/l | 25.0 | ND | 115 | 70-135 | | | |
| Bromoform | 20.9 | 5.0 | 0.40 | ug/l | 25.0 | ND | 83 | 55-135 | | | |
| Bromomethane | 29.0 | 5.0 | 0.42 | ug/l | 25.0 | ND | 116 | 55-145 | | | |
| 2-Butanone (MEK) | 26.5 | 10 | 4.7 | ug/l | 25.0 | ND | 106 | 30-145 | | | |
| n-Butylbenzene | 27.5 | 5.0 | 0.37 | ug/l | 25.0 | ND | 110 | 65-135 | | | |
| sec-Butylbenzene | 26.6 | 5.0 | 0.25 | ug/l | 25.0 | ND | 106 | 70-125 | | | |
| tert-Butylbenzene | 26.3 | 5.0 | 0.22 | ug/l | 25.0 | ND | 105 | 65-130 | | | |
| Carbon Disulfide | 28.9 | 1.0 | 0.48 | ug/l | 25.0 | ND | 116 | 40-140 | | | |
| Carbon tetrachloride | 29.9 | 0.50 | 0.28 | ug/l | 25.0 | ND | 120 | 65-140 | | | |
| Chlorobenzene | 25.5 | 2.0 | 0.36 | ug/l | 25.0 | ND | 102 | 75-125 | | | |
| Chloroethane | 28.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 112 | 55-140 | | | |
| Chloroform | 29.9 | 2.0 | 0.33 | ug/l | 25.0 | ND | 120 | 65-135 | | | |
| Chloromethane | 26.4 | 1.5 | 0.40 | ug/l | 25.0 | ND | 105 | 45-145 | | | |
| 2-Chlorotoluene | 27.2 | 5.0 | 0.28 | ug/l | 25.0 | ND | 109 | 65-135 | | | |
| 4-Chlorotoluene | 26.9 | 5.0 | 0.29 | ug/l | 25.0 | ND | 108 | 70-135 | | | |
| 1,2-Dibromo-3-chloropropane | 25.9 | 5.0 | 0.97 | ug/l | 25.0 | ND | 104 | 45-145 | | | |
| Dibromochloromethane | 27.7 | 2.0 | 0.40 | ug/l | 25.0 | ND | 111 | 65-140 | | | |
| 1,2-Dibromoethane (EDB) | 25.3 | 2.0 | 0.40 | ug/l | 25.0 | ND | 101 | 70-130 | | | |
| Dibromomethane | 27.6 | 2.0 | 0.36 | ug/l | 25.0 | ND | 110 | 65-135 | | | |
| 1,2-Dichlorobenzene | 24.8 | 2.0 | 0.32 | ug/l | 25.0 | ND | 99 | 75-125 | | | |
| 1,3-Dichlorobenzene | 25.5 | 2.0 | 0.35 | ug/l | 25.0 | ND | 102 | 75-125 | | | |
| 1,4-Dichlorobenzene | 25.2 | 2.0 | 0.37 | ug/l | 25.0 | ND | 101 | 75-125 | | | |
| Dichlorodifluoromethane | 26.3 | 5.0 | 0.26 | ug/l | 25.0 | ND | 105 | 25-155 | | | |
| 1,1-Dichloroethane | 27.9 | 2.0 | 0.40 | ug/l | 25.0 | ND | 112 | 65-130 | | | |
| 1,2-Dichloroethane | 28.4 | 0.50 | 0.28 | ug/l | 25.0 | ND | 114 | 60-140 | | | |
| 1,1-Dichloroethene | 31.4 | 5.0 | 0.42 | ug/l | 25.0 | ND | 125 | 60-130 | | | |
| cis-1,2-Dichloroethene | 27.7 | 2.0 | 0.32 | ug/l | 25.0 | ND | 111 | 65-130 | | | |
| trans-1,2-Dichloroethene | 28.9 | 2.0 | 0.30 | ug/l | 25.0 | ND | 116 | 65-130 | | | |
| 1,2-Dichloropropane | 26.0 | 2.0 | 0.35 | ug/l | 25.0 | ND | 104 | 65-130 | | | |
| 1,3-Dichloropropane | 26.7 | 2.0 | 0.32 | ug/l | 25.0 | ND | 107 | 65-135 | | | |
| 2,2-Dichloropropane | 33.1 | 2.0 | 0.34 | ug/l | 25.0 | ND | 132 | 60-145 | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12034-MS1)** | | | | | **Source: ISH0728-10** | | | | | | |
| cis-1,3-Dichloropropene | 25.2 | 2.0 | 0.22 | ug/l | 25.0 | ND | 101 | 70-130 | | | |
| trans-1,3-Dichloropropene | 25.5 | 2.0 | 0.32 | ug/l | 25.0 | ND | 102 | 65-135 | | | |
| 1,1-Dichloropropene | 28.4 | 2.0 | 0.28 | ug/l | 25.0 | ND | 113 | 70-135 | | | |
| Ethylbenzene | 27.6 | 2.0 | 0.25 | ug/l | 25.0 | ND | 110 | 65-130 | | | |
| Hexachlorobutadiene | 24.4 | 5.0 | 0.38 | ug/l | 25.0 | ND | 98 | 60-135 | | | |
| 2-Hexanone | 27.4 | 10 | 2.6 | ug/l | 25.0 | ND | 110 | 25-140 | | | |
| Isopropylbenzene | 26.9 | 2.0 | 0.25 | ug/l | 25.0 | ND | 107 | 70-135 | | | |
| p-Isopropyltoluene | 25.6 | 2.0 | 0.28 | ug/l | 25.0 | ND | 102 | 65-130 | | | |
| 4-Methyl-2-pentanone (MIBK) | 27.7 | 10 | 3.5 | ug/l | 25.0 | ND | 111 | 40-140 | | | |
| Methylene chloride | 29.3 | 5.0 | 0.95 | ug/l | 25.0 | ND | 117 | 50-135 | | | |
| Naphthalene | 24.9 | 5.0 | 0.41 | ug/l | 25.0 | ND | 99 | 50-140 | | | |
| n-Propylbenzene | 27.2 | 2.0 | 0.27 | ug/l | 25.0 | ND | 109 | 70-135 | | | |
| Styrene | 25.4 | 2.0 | 0.20 | ug/l | 25.0 | ND | 102 | 50-145 | | | |
| 1,1,1,2-Tetrachloroethane | 25.5 | 5.0 | 0.27 | ug/l | 25.0 | ND | 102 | 65-140 | | | |
| 1,1,2,2-Tetrachloroethane | 26.1 | 1.0 | 0.30 | ug/l | 25.0 | ND | 104 | 55-135 | | | |
| Tetrachloroethene | 25.8 | 2.0 | 0.32 | ug/l | 25.0 | ND | 103 | 65-130 | | | |
| Toluene | 26.2 | 2.0 | 0.36 | ug/l | 25.0 | ND | 105 | 70-125 | | | |
| 1,2,3-Trichlorobenzene | 24.6 | 5.0 | 0.30 | ug/l | 25.0 | ND | 98 | 60-135 | | | |
| 1,2,4-Trichlorobenzene | 24.9 | 5.0 | 0.48 | ug/l | 25.0 | ND | 100 | 65-135 | | | |
| 1,1,1-Trichloroethane | 31.7 | 2.0 | 0.30 | ug/l | 25.0 | ND | 127 | 65-140 | | | |
| 1,1,2-Trichloroethane | 26.9 | 2.0 | 0.30 | ug/l | 25.0 | ND | 108 | 65-130 | | | |
| Trichloroethene | 25.8 | 2.0 | 0.26 | ug/l | 25.0 | ND | 103 | 65-125 | | | |
| Trichlorofluoromethane | 31.2 | 5.0 | 0.34 | ug/l | 25.0 | ND | 125 | 60-145 | | | |
| 1,2,3-Trichloropropane | 25.1 | 10 | 0.40 | ug/l | 25.0 | ND | 100 | 55-135 | | | |
| 1,2,4-Trimethylbenzene | 26.1 | 2.0 | 0.23 | ug/l | 25.0 | ND | 104 | 55-135 | | | |
| 1,3,5-Trimethylbenzene | 26.4 | 2.0 | 0.26 | ug/l | 25.0 | ND | 105 | 70-130 | | | |
| Vinyl acetate | 31.2 | 5.0 | 1.0 | ug/l | 25.0 | ND | 125 | 40-150 | | | |
| Vinyl chloride | 30.3 | 0.50 | 0.40 | ug/l | 25.0 | ND | 121 | 45-140 | | | |
| m,p-Xylenes | 52.3 | 2.0 | 0.60 | ug/l | 50.0 | ND | 105 | 65-130 | | | |
| o-Xylene | 26.5 | 2.0 | 0.30 | ug/l | 25.0 | ND | 106 | 65-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *27.9* | | | *ug/l* | *25.0* | | *112* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *28.4* | | | *ug/l* | *25.0* | | *113* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *25.9* | | | *ug/l* | *25.0* | | *104* | *80-120* | | | |

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| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12034 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/12/2009 (9H12034-MSD1)** | | | | | | **Source: ISH0728-10** | | | | | |
| Acetone | 27.3 | 10 | 4.5 | ug/l | 25.0 | ND | 109 | 20-150 | 5 | 35 | |
| Benzene | 27.8 | 2.0 | 0.28 | ug/l | 25.0 | ND | 111 | 65-125 | 8 | 20 | |
| Bromobenzene | 25.7 | 5.0 | 0.27 | ug/l | 25.0 | ND | 103 | 70-125 | 9 | 20 | |
| Bromochloromethane | 29.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 116 | 65-135 | 8 | 25 | |
| Bromodichloromethane | 31.7 | 2.0 | 0.30 | ug/l | 25.0 | ND | 127 | 70-135 | 10 | 20 | |
| Bromoform | 23.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 92 | 55-135 | 10 | 25 | |
| Bromomethane | 30.2 | 5.0 | 0.42 | ug/l | 25.0 | ND | 121 | 55-145 | 4 | 25 | |
| 2-Butanone (MEK) | 30.6 | 10 | 4.7 | ug/l | 25.0 | ND | 123 | 30-145 | 15 | 40 | |
| n-Butylbenzene | 29.1 | 5.0 | 0.37 | ug/l | 25.0 | ND | 116 | 65-135 | 5 | 20 | |
| sec-Butylbenzene | 28.2 | 5.0 | 0.25 | ug/l | 25.0 | ND | 113 | 70-125 | 6 | 20 | |
| tert-Butylbenzene | 27.9 | 5.0 | 0.22 | ug/l | 25.0 | ND | 112 | 65-130 | 6 | 20 | |
| Carbon Disulfide | 30.4 | 1.0 | 0.48 | ug/l | 25.0 | ND | 121 | 40-140 | 5 | 20 | |
| Carbon tetrachloride | 32.0 | 0.50 | 0.28 | ug/l | 25.0 | ND | 128 | 65-140 | 7 | 25 | |
| Chlorobenzene | 27.5 | 2.0 | 0.36 | ug/l | 25.0 | ND | 110 | 75-125 | 8 | 20 | |
| Chloroethane | 29.6 | 5.0 | 0.40 | ug/l | 25.0 | ND | 118 | 55-140 | 5 | 25 | |
| Chloroform | 31.6 | 2.0 | 0.33 | ug/l | 25.0 | ND | 127 | 65-135 | 6 | 20 | |
| Chloromethane | 28.7 | 1.5 | 0.40 | ug/l | 25.0 | ND | 115 | 45-145 | 9 | 25 | |
| 2-Chlorotoluene | 29.0 | 5.0 | 0.28 | ug/l | 25.0 | ND | 116 | 65-135 | 6 | 20 | |
| 4-Chlorotoluene | 28.7 | 5.0 | 0.29 | ug/l | 25.0 | ND | 115 | 70-135 | 6 | 20 | |
| 1,2-Dibromo-3-chloropropane | 31.0 | 5.0 | 0.97 | ug/l | 25.0 | ND | 124 | 45-145 | 18 | 30 | |
| Dibromochloromethane | 31.0 | 2.0 | 0.40 | ug/l | 25.0 | ND | 124 | 65-140 | 11 | 25 | |
| 1,2-Dibromoethane (EDB) | 27.8 | 2.0 | 0.40 | ug/l | 25.0 | ND | 111 | 70-130 | 9 | 25 | |
| Dibromomethane | 30.8 | 2.0 | 0.36 | ug/l | 25.0 | ND | 123 | 65-135 | 11 | 25 | |
| 1,2-Dichlorobenzene | 27.1 | 2.0 | 0.32 | ug/l | 25.0 | ND | 108 | 75-125 | 9 | 20 | |
| 1,3-Dichlorobenzene | 27.5 | 2.0 | 0.35 | ug/l | 25.0 | ND | 110 | 75-125 | 8 | 20 | |
| 1,4-Dichlorobenzene | 27.0 | 2.0 | 0.37 | ug/l | 25.0 | ND | 108 | 75-125 | 7 | 20 | |
| Dichlorodifluoromethane | 27.8 | 5.0 | 0.26 | ug/l | 25.0 | ND | 111 | 25-155 | 5 | 30 | |
| 1,1-Dichloroethane | 29.5 | 2.0 | 0.40 | ug/l | 25.0 | ND | 118 | 65-130 | 5 | 20 | |
| 1,2-Dichloroethane | 31.3 | 0.50 | 0.28 | ug/l | 25.0 | ND | 125 | 60-140 | 10 | 20 | |
| 1,1-Dichloroethene | 33.1 | 5.0 | 0.42 | ug/l | 25.0 | ND | 132 | 60-130 | 5 | 20 | *M1* |
| cis-1,2-Dichloroethene | 30.2 | 2.0 | 0.32 | ug/l | 25.0 | ND | 121 | 65-130 | 9 | 20 | |
| trans-1,2-Dichloroethene | 30.4 | 2.0 | 0.30 | ug/l | 25.0 | ND | 121 | 65-130 | 5 | 20 | |
| 1,2-Dichloropropane | 28.3 | 2.0 | 0.35 | ug/l | 25.0 | ND | 113 | 65-130 | 8 | 20 | |
| 1,3-Dichloropropane | 29.4 | 2.0 | 0.32 | ug/l | 25.0 | ND | 118 | 65-135 | 10 | 25 | |
| 2,2-Dichloropropane | 33.6 | 2.0 | 0.34 | ug/l | 25.0 | ND | 134 | 60-145 | 2 | 25 | |

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Applied Process Technology
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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Batch: 9H12034 Extracted: 08/12/09**

**Matrix Spike Dup Analyzed: 08/12/2009 (9H12034-MSD1)** **Source: ISH0728-10**

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| cis-1,3-Dichloropropene | 28.4 | 2.0 | 0.22 | ug/l | 25.0 | ND | 114 | 70-130 | 12 | 20 | |
| trans-1,3-Dichloropropene | 28.5 | 2.0 | 0.32 | ug/l | 25.0 | ND | 114 | 65-135 | 11 | 25 | |
| 1,1-Dichloropropene | 30.8 | 2.0 | 0.28 | ug/l | 25.0 | ND | 123 | 70-135 | 8 | 20 | |
| Ethylbenzene | 29.5 | 2.0 | 0.25 | ug/l | 25.0 | ND | 118 | 65-130 | 7 | 20 | |
| Hexachlorobutadiene | 26.4 | 5.0 | 0.38 | ug/l | 25.0 | ND | 105 | 60-135 | 7 | 20 | |
| 2-Hexanone | 30.9 | 10 | 2.6 | ug/l | 25.0 | ND | 124 | 25-140 | 12 | 35 | |
| Isopropylbenzene | 28.5 | 2.0 | 0.25 | ug/l | 25.0 | ND | 114 | 70-135 | 6 | 20 | |
| p-Isopropyltoluene | 27.3 | 2.0 | 0.28 | ug/l | 25.0 | ND | 109 | 65-130 | 6 | 20 | |
| 4-Methyl-2-pentanone (MIBK) | 30.8 | 10 | 3.5 | ug/l | 25.0 | ND | 123 | 40-140 | 11 | 35 | |
| Methylene chloride | 31.7 | 5.0 | 0.95 | ug/l | 25.0 | ND | 127 | 50-135 | 8 | 20 | |
| Naphthalene | 28.0 | 5.0 | 0.41 | ug/l | 25.0 | ND | 112 | 50-140 | 12 | 30 | |
| n-Propylbenzene | 28.6 | 2.0 | 0.27 | ug/l | 25.0 | ND | 114 | 70-135 | 5 | 20 | |
| Styrene | 27.7 | 2.0 | 0.20 | ug/l | 25.0 | ND | 111 | 50-145 | 8 | 30 | |
| 1,1,1,2-Tetrachloroethane | 28.4 | 5.0 | 0.27 | ug/l | 25.0 | ND | 113 | 65-140 | 11 | 20 | |
| 1,1,2,2-Tetrachloroethane | 28.9 | 1.0 | 0.30 | ug/l | 25.0 | ND | 116 | 55-135 | 10 | 30 | |
| Tetrachloroethene | 27.6 | 2.0 | 0.32 | ug/l | 25.0 | ND | 111 | 65-130 | 7 | 20 | |
| Toluene | 28.0 | 2.0 | 0.36 | ug/l | 25.0 | ND | 112 | 70-125 | 6 | 20 | |
| 1,2,3-Trichlorobenzene | 27.1 | 5.0 | 0.30 | ug/l | 25.0 | ND | 109 | 60-135 | 10 | 20 | |
| 1,2,4-Trichlorobenzene | 27.6 | 5.0 | 0.48 | ug/l | 25.0 | ND | 110 | 65-135 | 10 | 20 | |
| 1,1,1-Trichloroethane | 32.8 | 2.0 | 0.30 | ug/l | 25.0 | ND | 131 | 65-140 | 4 | 20 | |
| 1,1,2-Trichloroethane | 29.3 | 2.0 | 0.30 | ug/l | 25.0 | ND | 117 | 65-130 | 8 | 25 | |
| Trichloroethene | 27.8 | 2.0 | 0.26 | ug/l | 25.0 | ND | 111 | 65-125 | 8 | 20 | |
| Trichlorofluoromethane | 31.5 | 5.0 | 0.34 | ug/l | 25.0 | ND | 126 | 60-145 | 1 | 25 | |
| 1,2,3-Trichloropropane | 28.2 | 10 | 0.40 | ug/l | 25.0 | ND | 113 | 55-135 | 12 | 30 | |
| 1,2,4-Trimethylbenzene | 28.1 | 2.0 | 0.23 | ug/l | 25.0 | ND | 112 | 55-135 | 7 | 25 | |
| 1,3,5-Trimethylbenzene | 27.9 | 2.0 | 0.26 | ug/l | 25.0 | ND | 112 | 70-130 | 6 | 20 | |
| Vinyl acetate | 34.3 | 5.0 | 1.0 | ug/l | 25.0 | ND | 137 | 40-150 | 9 | 30 | |
| Vinyl chloride | 33.4 | 0.50 | 0.40 | ug/l | 25.0 | ND | 134 | 45-140 | 10 | 30 | |
| m,p-Xylenes | 56.3 | 2.0 | 0.60 | ug/l | 50.0 | ND | 113 | 65-130 | 7 | 25 | |
| o-Xylene | 28.2 | 2.0 | 0.30 | ug/l | 25.0 | ND | 113 | 65-125 | 6 | 20 | |
| *Surrogate: 4-Bromofluorobenzene* | *27.7* | | | *ug/l* | *25.0* | | *111* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *27.0* | | | *ug/l* | *25.0* | | *108* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *25.8* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |

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|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12036 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12036-BLK1)** | | | | | | | | | | | |
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| Benzene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| Bromobenzene | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| Bromochloromethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromodichloromethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Bromoform | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Bromomethane | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| 2-Butanone (MEK) | ND | 10 | 4.7 | ug/l | | | | | | | |
| n-Butylbenzene | ND | 5.0 | 0.37 | ug/l | | | | | | | |
| sec-Butylbenzene | ND | 5.0 | 0.25 | ug/l | | | | | | | |
| tert-Butylbenzene | ND | 5.0 | 0.22 | ug/l | | | | | | | |
| Carbon Disulfide | ND | 1.0 | 0.48 | ug/l | | | | | | | |
| Carbon tetrachloride | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| Chloroethane | ND | 5.0 | 0.40 | ug/l | | | | | | | |
| Chloroform | ND | 2.0 | 0.33 | ug/l | | | | | | | |
| Chloromethane | ND | 1.5 | 0.40 | ug/l | | | | | | | |
| 2-Chlorotoluene | ND | 5.0 | 0.28 | ug/l | | | | | | | |
| 4-Chlorotoluene | ND | 5.0 | 0.29 | ug/l | | | | | | | |
| 1,2-Dibromo-3-chloropropane | ND | 5.0 | 0.97 | ug/l | | | | | | | |
| Dibromochloromethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dibromoethane (EDB) | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| Dibromomethane | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2-Dichlorobenzene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,3-Dichlorobenzene | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,4-Dichlorobenzene | ND | 2.0 | 0.37 | ug/l | | | | | | | |
| Dichlorodifluoromethane | ND | 5.0 | 0.26 | ug/l | | | | | | | |
| 1,1-Dichloroethane | ND | 2.0 | 0.40 | ug/l | | | | | | | |
| 1,2-Dichloroethane | ND | 0.50 | 0.28 | ug/l | | | | | | | |
| 1,1-Dichloroethene | ND | 5.0 | 0.42 | ug/l | | | | | | | |
| cis-1,2-Dichloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| trans-1,2-Dichloroethene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,2-Dichloropropane | ND | 2.0 | 0.35 | ug/l | | | | | | | |
| 1,3-Dichloropropane | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 2,2-Dichloropropane | ND | 2.0 | 0.34 | ug/l | | | | | | | |
| cis-1,3-Dichloropropene | ND | 2.0 | 0.22 | ug/l | | | | | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12036 Extracted: 08/12/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/12/2009 (9H12036-BLK1)** | | | | | | | | | | | |
| trans-1,3-Dichloropropene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| 1,1-Dichloropropene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 1,2-Dichloro-1,1,2-trifluoroethane | ND | 2.0 | 1.1 | ug/l | | | | | | | |
| Ethylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| Hexachlorobutadiene | ND | 5.0 | 0.38 | ug/l | | | | | | | |
| 2-Hexanone | ND | 10 | 2.6 | ug/l | | | | | | | |
| Isopropylbenzene | ND | 2.0 | 0.25 | ug/l | | | | | | | |
| p-Isopropyltoluene | ND | 2.0 | 0.28 | ug/l | | | | | | | |
| 4-Methyl-2-pentanone (MIBK) | ND | 10 | 3.5 | ug/l | | | | | | | |
| Methylene chloride | ND | 5.0 | 0.95 | ug/l | | | | | | | |
| Naphthalene | ND | 5.0 | 0.41 | ug/l | | | | | | | |
| n-Propylbenzene | ND | 2.0 | 0.27 | ug/l | | | | | | | |
| Styrene | ND | 2.0 | 0.20 | ug/l | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | 5.0 | 0.27 | ug/l | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | | | | | | | |
| Tetrachloroethene | ND | 2.0 | 0.32 | ug/l | | | | | | | |
| Toluene | ND | 2.0 | 0.36 | ug/l | | | | | | | |
| 1,2,3-Trichlorobenzene | ND | 5.0 | 0.30 | ug/l | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 5.0 | 0.48 | ug/l | | | | | | | |
| 1,1,1-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| 1,1,2-Trichloroethane | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Trichloroethene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Trichlorofluoromethane | ND | 5.0 | 0.34 | ug/l | | | | | | | |
| 1,2,3-Trichloropropane | ND | 10 | 0.40 | ug/l | | | | | | | |
| 1,2,4-Trimethylbenzene | ND | 2.0 | 0.23 | ug/l | | | | | | | |
| 1,3,5-Trimethylbenzene | ND | 2.0 | 0.26 | ug/l | | | | | | | |
| Vinyl acetate | ND | 5.0 | 1.0 | ug/l | | | | | | | |
| Vinyl chloride | ND | 0.50 | 0.40 | ug/l | | | | | | | |
| m,p-Xylenes | ND | 2.0 | 0.60 | ug/l | | | | | | | |
| o-Xylene | ND | 2.0 | 0.30 | ug/l | | | | | | | |
| Xylenes, Total | ND | 2.0 | 0.90 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *23.9* | | | *ug/l* | *25.0* | | *96* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *25.6* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.1* | | | *ug/l* | *25.0* | | *109* | *80-120* | | | |

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|---|---|---|
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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12036 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12036-BS1)** | | | | | | | | | | | |
| Acetone | 21.3 | 10 | 4.5 | ug/l | 25.0 | | 85 | 30-140 | | | |
| Benzene | 26.6 | 2.0 | 0.28 | ug/l | 25.0 | | 106 | 70-120 | | | |
| Bromobenzene | 25.4 | 5.0 | 0.27 | ug/l | 25.0 | | 101 | 75-120 | | | |
| Bromochloromethane | 27.0 | 5.0 | 0.40 | ug/l | 25.0 | | 108 | 70-130 | | | |
| Bromodichloromethane | 27.7 | 2.0 | 0.30 | ug/l | 25.0 | | 111 | 70-135 | | | |
| Bromoform | 20.4 | 5.0 | 0.40 | ug/l | 25.0 | | 82 | 55-130 | | | |
| Bromomethane | 25.1 | 5.0 | 0.42 | ug/l | 25.0 | | 100 | 65-140 | | | |
| 2-Butanone (MEK) | 25.8 | 10 | 4.7 | ug/l | 25.0 | | 103 | 40-140 | | | |
| n-Butylbenzene | 27.2 | 5.0 | 0.37 | ug/l | 25.0 | | 109 | 70-130 | | | |
| sec-Butylbenzene | 27.2 | 5.0 | 0.25 | ug/l | 25.0 | | 109 | 70-125 | | | |
| tert-Butylbenzene | 26.6 | 5.0 | 0.22 | ug/l | 25.0 | | 106 | 70-125 | | | |
| Carbon Disulfide | 24.9 | 1.0 | 0.48 | ug/l | 25.0 | | 100 | 50-130 | | | |
| Carbon tetrachloride | 28.1 | 0.50 | 0.28 | ug/l | 25.0 | | 112 | 65-140 | | | |
| Chloroethane | 26.6 | 5.0 | 0.40 | ug/l | 25.0 | | 106 | 60-140 | | | |
| Chloroform | 26.4 | 2.0 | 0.33 | ug/l | 25.0 | | 106 | 70-130 | | | |
| Chloromethane | 20.2 | 1.5 | 0.40 | ug/l | 25.0 | | 81 | 50-140 | | | |
| 2-Chlorotoluene | 27.0 | 5.0 | 0.28 | ug/l | 25.0 | | 108 | 70-125 | | | |
| 4-Chlorotoluene | 27.5 | 5.0 | 0.29 | ug/l | 25.0 | | 110 | 75-125 | | | |
| 1,2-Dibromo-3-chloropropane | 25.6 | 5.0 | 0.97 | ug/l | 25.0 | | 103 | 50-135 | | | |
| Dibromochloromethane | 27.0 | 2.0 | 0.40 | ug/l | 25.0 | | 108 | 70-140 | | | |
| 1,2-Dibromoethane (EDB) | 25.7 | 2.0 | 0.40 | ug/l | 25.0 | | 103 | 75-125 | | | |
| Dibromomethane | 28.3 | 2.0 | 0.36 | ug/l | 25.0 | | 113 | 70-125 | | | |
| 1,2-Dichlorobenzene | 25.0 | 2.0 | 0.32 | ug/l | 25.0 | | 100 | 75-120 | | | |
| 1,3-Dichlorobenzene | 26.8 | 2.0 | 0.35 | ug/l | 25.0 | | 107 | 75-120 | | | |
| 1,4-Dichlorobenzene | 25.8 | 2.0 | 0.37 | ug/l | 25.0 | | 103 | 75-120 | | | |
| Dichlorodifluoromethane | 25.0 | 5.0 | 0.26 | ug/l | 25.0 | | 100 | 35-155 | | | |
| 1,1-Dichloroethane | 26.1 | 2.0 | 0.40 | ug/l | 25.0 | | 104 | 70-125 | | | |
| 1,2-Dichloroethane | 25.4 | 0.50 | 0.28 | ug/l | 25.0 | | 101 | 60-140 | | | |
| 1,1-Dichloroethene | 29.0 | 5.0 | 0.42 | ug/l | 25.0 | | 116 | 70-125 | | | |
| cis-1,2-Dichloroethene | 29.4 | 2.0 | 0.32 | ug/l | 25.0 | | 118 | 70-125 | | | |
| trans-1,2-Dichloroethene | 27.9 | 2.0 | 0.30 | ug/l | 25.0 | | 111 | 70-125 | | | |
| 1,2-Dichloropropane | 25.6 | 2.0 | 0.35 | ug/l | 25.0 | | 102 | 70-125 | | | |
| 1,3-Dichloropropane | 27.3 | 2.0 | 0.32 | ug/l | 25.0 | | 109 | 70-120 | | | |
| 2,2-Dichloropropane | 26.9 | 2.0 | 0.34 | ug/l | 25.0 | | 108 | 65-140 | | | |
| cis-1,3-Dichloropropene | 31.3 | 2.0 | 0.22 | ug/l | 25.0 | | 125 | 75-125 | | | |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12036 Extracted: 08/12/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/12/2009 (9H12036-BS1)** | | | | | | | | | | | |
| trans-1,3-Dichloropropene | 24.1 | 2.0 | 0.32 | ug/l | 25.0 | | 96 | 70-125 | | | |
| 1,1-Dichloropropene | 27.6 | 2.0 | 0.28 | ug/l | 25.0 | | 110 | 75-130 | | | |
| Ethylbenzene | 27.2 | 2.0 | 0.25 | ug/l | 25.0 | | 109 | 75-125 | | | |
| Hexachlorobutadiene | 23.8 | 5.0 | 0.38 | ug/l | 25.0 | | 95 | 65-135 | | | |
| 2-Hexanone | 23.0 | 10 | 2.6 | ug/l | 25.0 | | 92 | 45-140 | | | |
| Isopropylbenzene | 25.9 | 2.0 | 0.25 | ug/l | 25.0 | | 104 | 75-130 | | | |
| p-Isopropyltoluene | 26.6 | 2.0 | 0.28 | ug/l | 25.0 | | 107 | 75-125 | | | |
| 4-Methyl-2-pentanone (MIBK) | 23.2 | 10 | 3.5 | ug/l | 25.0 | | 93 | 45-140 | | | |
| Methylene chloride | 30.0 | 5.0 | 0.95 | ug/l | 25.0 | | 120 | 55-130 | | | |
| Naphthalene | 26.2 | 5.0 | 0.41 | ug/l | 25.0 | | 105 | 55-135 | | | |
| n-Propylbenzene | 26.9 | 2.0 | 0.27 | ug/l | 25.0 | | 108 | 75-130 | | | |
| Styrene | 26.6 | 2.0 | 0.20 | ug/l | 25.0 | | 106 | 75-130 | | | |
| 1,1,1,2-Tetrachloroethane | 25.6 | 5.0 | 0.27 | ug/l | 25.0 | | 102 | 70-130 | | | |
| 1,1,2,2-Tetrachloroethane | 28.1 | 1.0 | 0.30 | ug/l | 25.0 | | 112 | 55-130 | | | |
| Tetrachloroethene | 25.3 | 2.0 | 0.32 | ug/l | 25.0 | | 101 | 70-125 | | | |
| Toluene | 28.0 | 2.0 | 0.36 | ug/l | 25.0 | | 112 | 70-120 | | | |
| 1,2,3-Trichlorobenzene | 24.6 | 5.0 | 0.30 | ug/l | 25.0 | | 98 | 65-125 | | | |
| 1,2,4-Trichlorobenzene | 26.0 | 5.0 | 0.48 | ug/l | 25.0 | | 104 | 70-135 | | | |
| 1,1,1-Trichloroethane | 26.3 | 2.0 | 0.30 | ug/l | 25.0 | | 105 | 65-135 | | | |
| 1,1,2-Trichloroethane | 27.0 | 2.0 | 0.30 | ug/l | 25.0 | | 108 | 70-125 | | | |
| Trichloroethene | 25.7 | 2.0 | 0.26 | ug/l | 25.0 | | 103 | 70-125 | | | |
| Trichlorofluoromethane | 26.2 | 5.0 | 0.34 | ug/l | 25.0 | | 105 | 65-145 | | | |
| 1,2,3-Trichloropropane | 26.5 | 10 | 0.40 | ug/l | 25.0 | | 106 | 60-130 | | | |
| 1,2,4-Trimethylbenzene | 27.1 | 2.0 | 0.23 | ug/l | 25.0 | | 108 | 75-125 | | | |
| 1,3,5-Trimethylbenzene | 26.7 | 2.0 | 0.26 | ug/l | 25.0 | | 107 | 75-125 | | | |
| Vinyl acetate | 25.8 | 5.0 | 1.0 | ug/l | 25.0 | | 103 | 45-145 | | | |
| Vinyl chloride | 22.5 | 0.50 | 0.40 | ug/l | 25.0 | | 90 | 55-135 | | | |
| m,p-Xylenes | 54.5 | 2.0 | 0.60 | ug/l | 50.0 | | 109 | 75-125 | | | |
| o-Xylene | 27.5 | 2.0 | 0.30 | ug/l | 25.0 | | 110 | 75-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.7* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.6* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.1* | | | *ug/l* | *25.0* | | *109* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Batch: 9H12036 Extracted: 08/12/09**

**Matrix Spike Analyzed: 08/12/2009 (9H12036-MS1)** **Source: ISH0911-03**

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 23.2 | 10 | 4.5 | ug/l | 25.0 | ND | 93 | 20-150 | | | |
| Benzene | 30.0 | 2.0 | 0.28 | ug/l | 25.0 | ND | 120 | 65-125 | | | |
| Bromobenzene | 29.0 | 5.0 | 0.27 | ug/l | 25.0 | ND | 116 | 70-125 | | | |
| Bromochloromethane | 29.1 | 5.0 | 0.40 | ug/l | 25.0 | ND | 116 | 65-135 | | | |
| Bromodichloromethane | 32.5 | 2.0 | 0.30 | ug/l | 25.0 | ND | 130 | 70-135 | | | |
| Bromoform | 22.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 88 | 55-135 | | | |
| Bromomethane | 26.4 | 5.0 | 0.42 | ug/l | 25.0 | ND | 106 | 55-145 | | | |
| 2-Butanone (MEK) | 29.0 | 10 | 4.7 | ug/l | 25.0 | ND | 116 | 30-145 | | | |
| n-Butylbenzene | 30.4 | 5.0 | 0.37 | ug/l | 25.0 | ND | 122 | 65-135 | | | |
| sec-Butylbenzene | 31.7 | 5.0 | 0.25 | ug/l | 25.0 | ND | 127 | 70-125 | | | *M1* |
| tert-Butylbenzene | 30.0 | 5.0 | 0.22 | ug/l | 25.0 | ND | 120 | 65-130 | | | |
| Carbon Disulfide | 28.2 | 1.0 | 0.48 | ug/l | 25.0 | ND | 113 | 40-140 | | | |
| Carbon tetrachloride | 32.0 | 0.50 | 0.28 | ug/l | 25.0 | ND | 128 | 65-140 | | | |
| Chloroethane | 30.2 | 5.0 | 0.40 | ug/l | 25.0 | ND | 121 | 55-140 | | | |
| Chloroform | 29.7 | 2.0 | 0.33 | ug/l | 25.0 | ND | 119 | 65-135 | | | |
| Chloromethane | 21.5 | 1.5 | 0.40 | ug/l | 25.0 | ND | 86 | 45-145 | | | |
| 2-Chlorotoluene | 29.8 | 5.0 | 0.28 | ug/l | 25.0 | ND | 119 | 65-135 | | | |
| 4-Chlorotoluene | 30.1 | 5.0 | 0.29 | ug/l | 25.0 | ND | 120 | 70-135 | | | |
| 1,2-Dibromo-3-chloropropane | 27.7 | 5.0 | 0.97 | ug/l | 25.0 | ND | 111 | 45-145 | | | |
| Dibromochloromethane | 30.4 | 2.0 | 0.40 | ug/l | 25.0 | ND | 121 | 65-140 | | | |
| 1,2-Dibromoethane (EDB) | 28.4 | 2.0 | 0.40 | ug/l | 25.0 | ND | 114 | 70-130 | | | |
| Dibromomethane | 32.5 | 2.0 | 0.36 | ug/l | 25.0 | ND | 130 | 65-135 | | | |
| 1,2-Dichlorobenzene | 27.9 | 2.0 | 0.32 | ug/l | 25.0 | ND | 112 | 75-125 | | | |
| 1,3-Dichlorobenzene | 30.2 | 2.0 | 0.35 | ug/l | 25.0 | ND | 121 | 75-125 | | | |
| 1,4-Dichlorobenzene | 28.4 | 2.0 | 0.37 | ug/l | 25.0 | ND | 114 | 75-125 | | | |
| Dichlorodifluoromethane | 27.1 | 5.0 | 0.26 | ug/l | 25.0 | ND | 109 | 25-155 | | | |
| 1,1-Dichloroethane | 28.4 | 2.0 | 0.40 | ug/l | 25.0 | ND | 113 | 65-130 | | | |
| 1,2-Dichloroethane | 28.5 | 0.50 | 0.28 | ug/l | 25.0 | ND | 114 | 60-140 | | | |
| 1,1-Dichloroethene | 32.3 | 5.0 | 0.42 | ug/l | 25.0 | ND | 129 | 60-130 | | | |
| cis-1,2-Dichloroethene | 32.5 | 2.0 | 0.32 | ug/l | 25.0 | 0.430 | 128 | 65-130 | | | |
| trans-1,2-Dichloroethene | 30.6 | 2.0 | 0.30 | ug/l | 25.0 | ND | 122 | 65-130 | | | |
| 1,2-Dichloropropane | 29.5 | 2.0 | 0.35 | ug/l | 25.0 | ND | 118 | 65-130 | | | |
| 1,3-Dichloropropane | 31.4 | 2.0 | 0.32 | ug/l | 25.0 | ND | 126 | 65-135 | | | |
| 2,2-Dichloropropane | 31.4 | 2.0 | 0.34 | ug/l | 25.0 | ND | 126 | 60-145 | | | |
| cis-1,3-Dichloropropene | 35.5 | 2.0 | 0.22 | ug/l | 25.0 | ND | 142 | 70-130 | | | *M1* |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H12036 Extracted: 08/12/09** | | | | | | | | | | | |
| **Matrix Spike Analyzed: 08/12/2009 (9H12036-MS1)** | | | | | | **Source: ISH0911-03** | | | | | |
| trans-1,3-Dichloropropene | 27.4 | 2.0 | 0.32 | ug/l | 25.0 | ND | 110 | 65-135 | | | |
| 1,1-Dichloropropene | 31.5 | 2.0 | 0.28 | ug/l | 25.0 | ND | 126 | 70-135 | | | |
| Ethylbenzene | 29.6 | 2.0 | 0.25 | ug/l | 25.0 | ND | 118 | 65-130 | | | |
| Hexachlorobutadiene | 26.1 | 5.0 | 0.38 | ug/l | 25.0 | ND | 104 | 60-135 | | | |
| 2-Hexanone | 25.8 | 10 | 2.6 | ug/l | 25.0 | ND | 103 | 25-140 | | | |
| Isopropylbenzene | 28.0 | 2.0 | 0.25 | ug/l | 25.0 | ND | 112 | 70-135 | | | |
| p-Isopropyltoluene | 29.4 | 2.0 | 0.28 | ug/l | 25.0 | ND | 117 | 65-130 | | | |
| 4-Methyl-2-pentanone (MIBK) | 26.1 | 10 | 3.5 | ug/l | 25.0 | ND | 104 | 40-140 | | | |
| Methylene chloride | 33.0 | 5.0 | 0.95 | ug/l | 25.0 | ND | 132 | 50-135 | | | |
| Naphthalene | 29.5 | 5.0 | 0.41 | ug/l | 25.0 | ND | 118 | 50-140 | | | |
| n-Propylbenzene | 30.7 | 2.0 | 0.27 | ug/l | 25.0 | ND | 123 | 70-135 | | | |
| Styrene | 30.0 | 2.0 | 0.20 | ug/l | 25.0 | ND | 120 | 50-145 | | | |
| 1,1,1,2-Tetrachloroethane | 28.6 | 5.0 | 0.27 | ug/l | 25.0 | ND | 114 | 65-140 | | | |
| 1,1,2,2-Tetrachloroethane | 31.6 | 1.0 | 0.30 | ug/l | 25.0 | ND | 126 | 55-135 | | | |
| Tetrachloroethene | 28.4 | 2.0 | 0.32 | ug/l | 25.0 | 0.340 | 112 | 65-130 | | | |
| Toluene | 31.9 | 2.0 | 0.36 | ug/l | 25.0 | ND | 128 | 70-125 | | | *M1* |
| 1,2,3-Trichlorobenzene | 28.2 | 5.0 | 0.30 | ug/l | 25.0 | ND | 113 | 60-135 | | | |
| 1,2,4-Trichlorobenzene | 28.6 | 5.0 | 0.48 | ug/l | 25.0 | ND | 114 | 65-135 | | | |
| 1,1,1-Trichloroethane | 29.2 | 2.0 | 0.30 | ug/l | 25.0 | ND | 117 | 65-140 | | | |
| 1,1,2-Trichloroethane | 31.8 | 2.0 | 0.30 | ug/l | 25.0 | ND | 127 | 65-130 | | | |
| Trichloroethene | 31.3 | 2.0 | 0.26 | ug/l | 25.0 | 0.930 | 121 | 65-125 | | | |
| Trichlorofluoromethane | 29.1 | 5.0 | 0.34 | ug/l | 25.0 | ND | 116 | 60-145 | | | |
| 1,2,3-Trichloropropane | 28.9 | 10 | 0.40 | ug/l | 25.0 | ND | 116 | 55-135 | | | |
| 1,2,4-Trimethylbenzene | 29.4 | 2.0 | 0.23 | ug/l | 25.0 | ND | 118 | 55-135 | | | |
| 1,3,5-Trimethylbenzene | 28.2 | 2.0 | 0.26 | ug/l | 25.0 | ND | 113 | 70-130 | | | |
| Vinyl acetate | 27.2 | 5.0 | 1.0 | ug/l | 25.0 | ND | 109 | 40-150 | | | |
| Vinyl chloride | 25.1 | 0.50 | 0.40 | ug/l | 25.0 | ND | 100 | 45-140 | | | |
| m,p-Xylenes | 59.4 | 2.0 | 0.60 | ug/l | 50.0 | ND | 119 | 65-130 | | | |
| o-Xylene | 30.7 | 2.0 | 0.30 | ug/l | 25.0 | ND | 123 | 65-125 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.5* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *26.5* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *28.2* | | | *ug/l* | *25.0* | | *113* | *80-120* | | | |

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Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Batch: 9H12036 Extracted: 08/12/09**

**Matrix Spike Dup Analyzed: 08/12/2009 (9H12036-MSD1)** **Source: ISH0911-03**

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 25.0 | 10 | 4.5 | ug/l | 25.0 | ND | 100 | 20-150 | 8 | 35 | |
| Benzene | 30.0 | 2.0 | 0.28 | ug/l | 25.0 | ND | 120 | 65-125 | 0 | 20 | |
| Bromobenzene | 31.2 | 5.0 | 0.27 | ug/l | 25.0 | ND | 125 | 70-125 | 7 | 20 | |
| Bromochloromethane | 31.8 | 5.0 | 0.40 | ug/l | 25.0 | ND | 127 | 65-135 | 9 | 25 | |
| Bromodichloromethane | 33.7 | 2.0 | 0.30 | ug/l | 25.0 | ND | 135 | 70-135 | 4 | 20 | |
| Bromoform | 25.0 | 5.0 | 0.40 | ug/l | 25.0 | ND | 100 | 55-135 | 13 | 25 | |
| Bromomethane | 28.7 | 5.0 | 0.42 | ug/l | 25.0 | ND | 115 | 55-145 | 8 | 25 | |
| 2-Butanone (MEK) | 31.6 | 10 | 4.7 | ug/l | 25.0 | ND | 126 | 30-145 | 9 | 40 | |
| n-Butylbenzene | 32.8 | 5.0 | 0.37 | ug/l | 25.0 | ND | 131 | 65-135 | 7 | 20 | |
| sec-Butylbenzene | 32.9 | 5.0 | 0.25 | ug/l | 25.0 | ND | 132 | 70-125 | 4 | 20 | *M1* |
| tert-Butylbenzene | 33.8 | 5.0 | 0.22 | ug/l | 25.0 | ND | 135 | 65-130 | 12 | 20 | *M1* |
| Carbon Disulfide | 30.1 | 1.0 | 0.48 | ug/l | 25.0 | ND | 120 | 40-140 | 7 | 20 | |
| Carbon tetrachloride | 33.6 | 0.50 | 0.28 | ug/l | 25.0 | ND | 135 | 65-140 | 5 | 25 | |
| Chloroethane | 30.4 | 5.0 | 0.40 | ug/l | 25.0 | ND | 122 | 55-140 | 1 | 25 | |
| Chloroform | 31.0 | 2.0 | 0.33 | ug/l | 25.0 | ND | 124 | 65-135 | 4 | 20 | |
| Chloromethane | 23.3 | 1.5 | 0.40 | ug/l | 25.0 | ND | 93 | 45-145 | 8 | 25 | |
| 2-Chlorotoluene | 32.3 | 5.0 | 0.28 | ug/l | 25.0 | ND | 129 | 65-135 | 8 | 20 | |
| 4-Chlorotoluene | 33.9 | 5.0 | 0.29 | ug/l | 25.0 | ND | 136 | 70-135 | 12 | 20 | *M1* |
| 1,2-Dibromo-3-chloropropane | 29.8 | 5.0 | 0.97 | ug/l | 25.0 | ND | 119 | 45-145 | 7 | 30 | |
| Dibromochloromethane | 33.3 | 2.0 | 0.40 | ug/l | 25.0 | ND | 133 | 65-140 | 9 | 25 | |
| 1,2-Dibromoethane (EDB) | 30.8 | 2.0 | 0.40 | ug/l | 25.0 | ND | 123 | 70-130 | 8 | 25 | |
| Dibromomethane | 34.2 | 2.0 | 0.36 | ug/l | 25.0 | ND | 137 | 65-135 | 5 | 25 | *M1* |
| 1,2-Dichlorobenzene | 30.4 | 2.0 | 0.32 | ug/l | 25.0 | ND | 122 | 75-125 | 9 | 20 | |
| 1,3-Dichlorobenzene | 31.5 | 2.0 | 0.35 | ug/l | 25.0 | ND | 126 | 75-125 | 4 | 20 | *M1* |
| 1,4-Dichlorobenzene | 32.0 | 2.0 | 0.37 | ug/l | 25.0 | ND | 128 | 75-125 | 12 | 20 | *M1* |
| Dichlorodifluoromethane | 28.1 | 5.0 | 0.26 | ug/l | 25.0 | ND | 112 | 25-155 | 3 | 30 | |
| 1,1-Dichloroethane | 30.6 | 2.0 | 0.40 | ug/l | 25.0 | ND | 123 | 65-130 | 8 | 20 | |
| 1,2-Dichloroethane | 30.0 | 0.50 | 0.28 | ug/l | 25.0 | ND | 120 | 60-140 | 5 | 20 | |
| 1,1-Dichloroethene | 33.4 | 5.0 | 0.42 | ug/l | 25.0 | ND | 133 | 60-130 | 3 | 20 | *M1* |
| cis-1,2-Dichloroethene | 34.6 | 2.0 | 0.32 | ug/l | 25.0 | 0.430 | 137 | 65-130 | 6 | 20 | *M1* |
| trans-1,2-Dichloroethene | 32.8 | 2.0 | 0.30 | ug/l | 25.0 | ND | 131 | 65-130 | 7 | 20 | *M1* |
| 1,2-Dichloropropane | 29.9 | 2.0 | 0.35 | ug/l | 25.0 | ND | 120 | 65-130 | 1 | 20 | |
| 1,3-Dichloropropane | 32.7 | 2.0 | 0.32 | ug/l | 25.0 | ND | 131 | 65-135 | 4 | 25 | |
| 2,2-Dichloropropane | 33.7 | 2.0 | 0.34 | ug/l | 25.0 | ND | 135 | 60-145 | 7 | 25 | |
| cis-1,3-Dichloropropene | 37.9 | 2.0 | 0.22 | ug/l | 25.0 | ND | 151 | 70-130 | 6 | 20 | *M1* |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

**Batch: 9H12036 Extracted: 08/12/09**

**Matrix Spike Dup Analyzed: 08/12/2009 (9H12036-MSD1)** **Source: ISH0911-03**

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,3-Dichloropropene | 28.9 | 2.0 | 0.32 | ug/l | 25.0 | ND | 116 | 65-135 | 5 | 25 | |
| 1,1-Dichloropropene | 31.9 | 2.0 | 0.28 | ug/l | 25.0 | ND | 128 | 70-135 | 1 | 20 | |
| Ethylbenzene | 32.7 | 2.0 | 0.25 | ug/l | 25.0 | ND | 131 | 65-130 | 10 | 20 | *M1* |
| Hexachlorobutadiene | 28.4 | 5.0 | 0.38 | ug/l | 25.0 | ND | 113 | 60-135 | 8 | 20 | |
| 2-Hexanone | 27.1 | 10 | 2.6 | ug/l | 25.0 | ND | 108 | 25-140 | 5 | 35 | |
| Isopropylbenzene | 31.6 | 2.0 | 0.25 | ug/l | 25.0 | ND | 126 | 70-135 | 12 | 20 | |
| p-Isopropyltoluene | 30.9 | 2.0 | 0.28 | ug/l | 25.0 | ND | 123 | 65-130 | 5 | 20 | |
| 4-Methyl-2-pentanone (MIBK) | 26.2 | 10 | 3.5 | ug/l | 25.0 | ND | 105 | 40-140 | 1 | 35 | |
| Methylene chloride | 34.3 | 5.0 | 0.95 | ug/l | 25.0 | ND | 137 | 50-135 | 4 | 20 | *M1* |
| Naphthalene | 31.4 | 5.0 | 0.41 | ug/l | 25.0 | ND | 126 | 50-140 | 6 | 30 | |
| n-Propylbenzene | 33.0 | 2.0 | 0.27 | ug/l | 25.0 | ND | 132 | 70-135 | 7 | 20 | |
| Styrene | 33.3 | 2.0 | 0.20 | ug/l | 25.0 | ND | 133 | 50-145 | 10 | 30 | |
| 1,1,1,2-Tetrachloroethane | 31.6 | 5.0 | 0.27 | ug/l | 25.0 | ND | 127 | 65-140 | 10 | 20 | |
| 1,1,2,2-Tetrachloroethane | 32.4 | 1.0 | 0.30 | ug/l | 25.0 | ND | 130 | 55-135 | 3 | 30 | |
| Tetrachloroethene | 30.9 | 2.0 | 0.32 | ug/l | 25.0 | 0.340 | 122 | 65-130 | 8 | 20 | |
| Toluene | 32.2 | 2.0 | 0.36 | ug/l | 25.0 | ND | 129 | 70-125 | 1 | 20 | *M1* |
| 1,2,3-Trichlorobenzene | 30.0 | 5.0 | 0.30 | ug/l | 25.0 | ND | 120 | 60-135 | 6 | 20 | |
| 1,2,4-Trichlorobenzene | 31.2 | 5.0 | 0.48 | ug/l | 25.0 | ND | 125 | 65-135 | 9 | 20 | |
| 1,1,1-Trichloroethane | 30.9 | 2.0 | 0.30 | ug/l | 25.0 | ND | 124 | 65-140 | 6 | 20 | |
| 1,1,2-Trichloroethane | 33.1 | 2.0 | 0.30 | ug/l | 25.0 | ND | 132 | 65-130 | 4 | 25 | *M1* |
| Trichloroethene | 30.6 | 2.0 | 0.26 | ug/l | 25.0 | 0.930 | 119 | 65-125 | 2 | 20 | |
| Trichlorofluoromethane | 30.1 | 5.0 | 0.34 | ug/l | 25.0 | ND | 121 | 60-145 | 4 | 25 | |
| 1,2,3-Trichloropropane | 30.9 | 10 | 0.40 | ug/l | 25.0 | ND | 124 | 55-135 | 7 | 30 | |
| 1,2,4-Trimethylbenzene | 32.2 | 2.0 | 0.23 | ug/l | 25.0 | ND | 129 | 55-135 | 9 | 25 | |
| 1,3,5-Trimethylbenzene | 31.3 | 2.0 | 0.26 | ug/l | 25.0 | ND | 125 | 70-130 | 11 | 20 | |
| Vinyl acetate | 28.8 | 5.0 | 1.0 | ug/l | 25.0 | ND | 115 | 40-150 | 6 | 30 | |
| Vinyl chloride | 27.1 | 0.50 | 0.40 | ug/l | 25.0 | ND | 108 | 45-140 | 8 | 30 | |
| m,p-Xylenes | 65.5 | 2.0 | 0.60 | ug/l | 50.0 | ND | 131 | 65-130 | 10 | 25 | *M1* |
| o-Xylene | 32.4 | 2.0 | 0.30 | ug/l | 25.0 | ND | 130 | 65-125 | 5 | 20 | *M1* |
| *Surrogate: 4-Bromofluorobenzene* | *25.8* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *25.7* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.4* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H14051 Extracted: 08/14/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/14/2009 (9H14051-BLK1)** | | | | | | | | | | | |
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.4* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.4* | | | *ug/l* | *25.0* | | *94* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.6* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| **LCS Analyzed: 08/14/2009 (9H14051-BS1)** | | | | | | | | | | | |
| Acetone | 21.1 | 10 | 4.5 | ug/l | 25.0 | | 84 | 30-140 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.6* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *24.1* | | | *ug/l* | *25.0* | | *96* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *25.7* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| **Matrix Spike Analyzed: 08/14/2009 (9H14051-MS1)** | | | | | **Source: ISH0974-03** | | | | | | |
| Acetone | 17.7 | 10 | 4.5 | ug/l | 25.0 | ND | 71 | 20-150 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *27.6* | | | *ug/l* | *25.0* | | *110* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.1* | | | *ug/l* | *25.0* | | *92* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.3* | | | *ug/l* | *25.0* | | *105* | *80-120* | | | |
| **Matrix Spike Dup Analyzed: 08/14/2009 (9H14051-MSD1)** | | | | | **Source: ISH0974-03** | | | | | | |
| Acetone | 18.2 | 10 | 4.5 | ug/l | 25.0 | ND | 73 | 20-150 | 3 | 35 | |
| *Surrogate: 4-Bromofluorobenzene* | *25.4* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *22.7* | | | *ug/l* | *25.0* | | *91* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.5* | | | *ug/l* | *25.0* | | *110* | *80-120* | | | |
| **Batch: 9H15008 Extracted: 08/15/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/15/2009 (9H15008-BLK1)** | | | | | | | | | | | |
| Acetone | ND | 10 | 4.5 | ug/l | | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.5* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.6* | | | *ug/l* | *25.0* | | *94* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.5* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |

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## METHOD BLANK/QC DATA

## VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H15008 Extracted: 08/15/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/15/2009 (9H15008-BS1)** | | | | | | | | | | | |
| Acetone | 19.0 | 10 | 4.5 | ug/l | 25.0 | | 76 | 30-140 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.1* | | | *ug/l* | *25.0* | | *100* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.8* | | | *ug/l* | *25.0* | | *95* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.6* | | | *ug/l* | *25.0* | | *107* | *80-120* | | | |
| **LCS Dup Analyzed: 08/15/2009 (9H15008-BSD1)** | | | | | | | | | | | |
| Acetone | 19.6 | 10 | 4.5 | ug/l | 25.0 | | 78 | 30-140 | 3 | 30 | |
| *Surrogate: 4-Bromofluorobenzene* | *26.9* | | | *ug/l* | *25.0* | | *108* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.9* | | | *ug/l* | *25.0* | | *96* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.4* | | | *ug/l* | *25.0* | | *106* | *80-120* | | | |
| **Matrix Spike Analyzed: 08/15/2009 (9H15008-MS1)** | | | | | **Source: ISH1208-03** | | | | | | |
| Acetone | 22.9 | 10 | 4.5 | ug/l | 25.0 | ND | 92 | 20-150 | | | |
| *Surrogate: 4-Bromofluorobenzene* | *25.6* | | | *ug/l* | *25.0* | | *102* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *23.0* | | | *ug/l* | *25.0* | | *92* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *26.2* | | | *ug/l* | *25.0* | | *105* | *80-120* | | | |
| **Matrix Spike Dup Analyzed: 08/15/2009 (9H15008-MSD1)** | | | | | **Source: ISH1208-03** | | | | | | |
| Acetone | 24.4 | 10 | 4.5 | ug/l | 25.0 | ND | 98 | 20-150 | 6 | 35 | |
| *Surrogate: 4-Bromofluorobenzene* | *25.8* | | | *ug/l* | *25.0* | | *103* | *80-120* | | | |
| *Surrogate: Dibromofluoromethane* | *22.7* | | | *ug/l* | *25.0* | | *91* | *80-120* | | | |
| *Surrogate: Toluene-d8* | *27.4* | | | *ug/l* | *25.0* | | *110* | *80-120* | | | |

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Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## DISSOLVED METALS

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H10101 Extracted: 08/10/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/11/2009 (9H10101-BLK1)** | | | | | | | | | | | |
| Calcium | ND | 0.10 | N/A | mg/l | | | | | | | |
| Iron | ND | 0.040 | N/A | mg/l | | | | | | | |
| Magnesium | ND | 0.020 | N/A | mg/l | | | | | | | |
| Manganese | ND | 0.020 | N/A | mg/l | | | | | | | |
| **LCS Analyzed: 08/11/2009 (9H10101-BS1)** | | | | | | | | | | | |
| Calcium | 0.984 | 0.10 | N/A | mg/l | 1.00 | | 98 | 80-120 | | | |
| Iron | 0.983 | 0.040 | N/A | mg/l | 1.00 | | 98 | 80-120 | | | |
| Magnesium | 1.00 | 0.020 | N/A | mg/l | 1.00 | | 100 | 80-120 | | | |
| Manganese | 0.985 | 0.020 | N/A | mg/l | 1.00 | | 99 | 80-120 | | | |
| **Matrix Spike Analyzed: 08/11/2009 (9H10101-MS1)** | | | | | | **Source: ISH0576-01** | | | | | |
| Calcium | 307 | 0.10 | N/A | mg/l | 1.00 | 313 | -634 | 75-125 | | | *MHA* |
| Iron | 0.928 | 0.040 | N/A | mg/l | 1.00 | ND | 93 | 75-125 | | | |
| Magnesium | 104 | 0.020 | N/A | mg/l | 1.00 | 109 | -501 | 75-125 | | | *MHA* |
| Manganese | 1.44 | 0.020 | N/A | mg/l | 1.00 | 0.544 | 90 | 75-125 | | | |
| **Matrix Spike Dup Analyzed: 08/11/2009 (9H10101-MSD1)** | | | | | | **Source: ISH0576-01** | | | | | |
| Calcium | 309 | 0.10 | N/A | mg/l | 1.00 | 313 | -348 | 75-125 | 1 | 20 | *MHA* |
| Iron | 0.973 | 0.040 | N/A | mg/l | 1.00 | ND | 97 | 75-125 | 5 | 20 | |
| Magnesium | 110 | 0.020 | N/A | mg/l | 1.00 | 109 | 119 | 75-125 | 6 | 20 | *MHA* |
| Manganese | 1.51 | 0.020 | N/A | mg/l | 1.00 | 0.544 | 96 | 75-125 | 5 | 20 | |

**TestAmerica Irvine**

Joseph Doak
Project Manager

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H10001 Extracted: 08/10/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/10/2009 (9H10001-BLK1)** | | | | | | | | | | | |
| Total Organic Carbon | ND | 1.0 | N/A | mg/l | | | | | | | |
| **LCS Analyzed: 08/10/2009 (9H10001-BS1)** | | | | | | | | | | | |
| Total Organic Carbon | 10.4 | 1.0 | N/A | mg/l | 10.0 | | 104 | 90-110 | | | |
| **Matrix Spike Analyzed: 08/10/2009 (9H10001-MS1)** | | | | | **Source: ISH0577-01** | | | | | | |
| Total Organic Carbon | 5.37 | 1.0 | N/A | mg/l | 5.00 | ND | 107 | 80-120 | | | |
| **Matrix Spike Dup Analyzed: 08/10/2009 (9H10001-MSD1)** | | | | | **Source: ISH0577-01** | | | | | | |
| Total Organic Carbon | 5.26 | 1.0 | N/A | mg/l | 5.00 | ND | 105 | 80-120 | 2 | 20 | |
| **Batch: 9H10045 Extracted: 08/10/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/10/2009 (9H10045-BLK1)** | | | | | | | | | | | |
| Sulfate | ND | 0.50 | N/A | mg/l | | | | | | | |
| **LCS Analyzed: 08/10/2009 (9H10045-BS1)** | | | | | | | | | | | |
| Sulfate | 9.62 | 0.50 | N/A | mg/l | 10.0 | | 96 | 90-110 | | | |
| **Matrix Spike Analyzed: 08/10/2009 (9H10045-MS1)** | | | | | **Source: ISH0705-01** | | | | | | |
| Sulfate | 1410 | 25 | N/A | mg/l | 100 | 1380 | 32 | 80-120 | | | *MHA* |
| **Matrix Spike Dup Analyzed: 08/10/2009 (9H10045-MSD1)** | | | | | **Source: ISH0705-01** | | | | | | |
| Sulfate | 1470 | 25 | N/A | mg/l | 100 | 1380 | 88 | 80-120 | 4 | 20 | *MHA* |
| **Batch: 9H10057 Extracted: 08/10/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/10/2009 (9H10057-BLK1)** | | | | | | | | | | | |
| Alkalinity as CaCO3 | ND | 2.0 | N/A | mg/l | | | | | | | |
| Bicarbonate | ND | 2.4 | N/A | mg/l | | | | | | | |
| Carbonate | ND | 1.2 | N/A | mg/l | | | | | | | |
| Hydroxide | ND | 0.70 | N/A | mg/l | | | | | | | |

**TestAmerica Irvine**

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Project Manager

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Applied Process Technology
3333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson

Project ID: Montrose-Torrance Bench Study
P1190
Report Number: ISH0701

Sampled: 08/07/09
Received: 08/08/09

## METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H10057 Extracted: 08/10/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/10/2009 (9H10057-BS1)** | | | | | | | | | | | |
| Alkalinity as CaCO3 | 180 | 2.0 | N/A | mg/l | 186 | | 97 | 90-110 | | | |
| **Duplicate Analyzed: 08/10/2009 (9H10057-DUP1)** | | | | | **Source: ISH0576-01** | | | | | | |
| Alkalinity as CaCO3 | 120 | 2.0 | N/A | mg/l | | 120 | | | 0 | 20 | |
| Bicarbonate | 146 | 2.4 | N/A | mg/l | | 146 | | | 0 | 20 | |
| Carbonate | ND | 1.2 | N/A | mg/l | | ND | | | | 20 | |
| Hydroxide | ND | 0.70 | N/A | mg/l | | ND | | | | 20 | |
| **Batch: 9H10077 Extracted: 08/10/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/10/2009 (9H10077-BLK1)** | | | | | | | | | | | |
| Chemical Oxygen Demand | ND | 20 | N/A | mg/l | | | | | | | |
| **LCS Analyzed: 08/10/2009 (9H10077-BS1)** | | | | | | | | | | | |
| Chemical Oxygen Demand | 202 | 20 | N/A | mg/l | 200 | | 101 | 90-110 | | | |
| **Matrix Spike Analyzed: 08/10/2009 (9H10077-MS1)** | | | | | **Source: ISH0566-03** | | | | | | |
| Chemical Oxygen Demand | 216 | 20 | N/A | mg/l | 200 | 16.5 | 100 | 70-120 | | | |
| **Matrix Spike Dup Analyzed: 08/10/2009 (9H10077-MSD1)** | | | | | **Source: ISH0566-03** | | | | | | |
| Chemical Oxygen Demand | 207 | 20 | N/A | mg/l | 200 | 16.5 | 95 | 70-120 | 4 | 15 | |
| **Batch: 9H11007 Extracted: 08/11/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/11/2009 (9H11007-BLK1)** | | | | | | | | | | | |
| Total Dissolved Solids | ND | 10 | N/A | mg/l | | | | | | | |

**TestAmerica Irvine**

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H11007 Extracted: 08/11/09** | | | | | | | | | | | |
| **LCS Analyzed: 08/11/2009 (9H11007-BS1)** | | | | | | | | | | | |
| Total Dissolved Solids | 998 | 10 | N/A | mg/l | 1000 | | 100 | 90-110 | | | |
| **Duplicate Analyzed: 08/11/2009 (9H11007-DUP1)** | | | | | **Source: ISH0672-02** | | | | | | |
| Total Dissolved Solids | 1330 | 10 | N/A | mg/l | | 1350 | | | 1 | 10 | |
| **Batch: 9H11102 Extracted: 08/11/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/11/2009 (9H11102-BLK1)** | | | | | | | | | | | |
| Hardness (as CaCO3) | ND | 4.0 | N/A | mg/l | | | | | | | |
| **LCS Analyzed: 08/11/2009 (9H11102-BS1)** | | | | | | | | | | | |
| Hardness (as CaCO3) | 120 | 4.0 | N/A | mg/l | 123 | | 98 | 90-110 | | | |
| **Duplicate Analyzed: 08/11/2009 (9H11102-DUP1)** | | | | | **Source: ISH0435-02** | | | | | | |
| Hardness (as CaCO3) | 224 | 4.0 | N/A | mg/l | | 226 | | | 1 | 20 | |
| **Batch: 9H18058 Extracted: 08/18/09** | | | | | | | | | | | |
| **Blank Analyzed: 08/18/2009 (9H18058-BLK1)** | | | | | | | | | | | |
| 4-Chlorobenzenesulfonic acid | ND | 10 | N/A | ug/l | | | | | | | |
| **LCS Analyzed: 08/18/2009 (9H18058-BS1)** | | | | | | | | | | | |
| 4-Chlorobenzenesulfonic acid | 94.9 | 10 | N/A | ug/l | 100 | | 95 | 85-115 | | | |
| **Matrix Spike Analyzed: 08/18/2009 (9H18058-MS1)** | | | | | **Source: ISH0701-02** | | | | | | |
| 4-Chlorobenzenesulfonic acid | 34500 | 1000 | N/A | ug/l | 10000 | 24400 | 101 | 80-120 | | | |

**TestAmerica Irvine**

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Project Manager

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| | | |
|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID: Montrose-Torrance Bench Study<br>P1190<br>Report Number: ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 9H18058 Extracted: 08/18/09** | | | | | | | | | | | |
| **Matrix Spike Dup Analyzed: 08/18/2009 (9H18058-MSD1)** | | | | | | **Source: ISH0701-02** | | | | | |
| 4-Chlorobenzenesulfonic acid | 34600 | 1000 | N/A | ug/l | 10000 | 24400 | 102 | 80-120 | 0 | 20 | |

**TestAmerica Irvine**

Joseph Doak
Project Manager

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17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

## DATA QUALIFIERS AND DEFINITIONS

**C** Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.

**J** Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of limited reliability.

**M1** The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

**MHA** Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

**RPD** Relative Percent Difference

## ADDITIONAL COMMENTS

**For 8260 analyses:**

Due to the high water solubility of alcohols and ketones, the calibration criteria for these compounds is <30% RSD. The average % RSD of all compounds in the calibration is 15%, in accordance with EPA methods.

**TestAmerica Irvine**

Joseph Doak
Project Manager

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| | | | |
|---|---|---|---|
| Applied Process Technology<br>3333 Vincent Road, Suite 222<br>Pleasant Hill, CA 94523<br>Attention: Keel Robinson | Project ID:<br><br>Report Number: | Montrose-Torrance Bench Study<br>P1190<br>ISH0701 | Sampled: 08/07/09<br>Received: 08/08/09 |

# Certification Summary

## TestAmerica Irvine

| Method | Matrix | Nelac | California |
|---|---|---|---|
| EPA 300.0 | Water | X | X |
| EPA 314.0 MOD. | Water | | |
| EPA 6010B-Diss | Water | X | X |
| EPA 8260B | Water | X | X |
| Filtration | Water | N/A | N/A |
| SM2320B | Water | X | X |
| SM2340C | Water | X | X |
| SM2540C | Water | X | |
| SM5220D | Water | X | X |
| SM5310B | Water | X | X |

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at www.testamericainc.com*

**TestAmerica Irvine**

Joseph Doak
Project Manager

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

TAL-0013(1007)

18H0707



Client Name / Address: Applied Process Technology, Inc 3329 Vincent Rd Pleasant Hill, CA 94523

Project/PO Number: P1190

Project Manager: Keel Robinson Krobinson@aptwater.com

Phone Number: 925-977-1811

Fax Number: 925-977-1818

Sampler: Diane West

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | TOC SM5310B | COD SM5220D | General Minerals + TDS | Hardness SM2340C | PCB5A EPA 314.0 | VOC: 8260B | | | | Special Instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1190-SP-0A-500 | | | 8 | 080709 | 1045 | | X | X | X | X | X | X | | | | |
| -1-500 | | | 4 | ↓ | 1120 | | | | | | X | X | | | | |
| -2-500 | | | 4 | ↓ | 1150 | | | | | | X | X | | | | |
| -3-500 | | | 4 | ↓ | 1220 | | | | | | X | X | | | | |
| -4-500 | | | 4 | ↓ | 1300 | | | | | | X | X | | | | |
| -5-500 | | | 4 | ↓ | 1320 | | | | | | X | X | | | | |
| -6-500 | | | 4 | ↓ | 1345 | | | | | | X | X | | | | |
| -7-500 | | | 4 | ↓ | 1405 | | | | | | X | X | | | | |
| -8-500 | | | 4 | ↓ | 1415 | | | | | | X | X | | | | |
| -9-550 | | | 4 | ↓ | 1500 | | | | | | X | X | | | | dn 1300 8/8/09 |
| -10-550 | | | 4 | ↓ | 1515 | | | | | | X | X | | | | |
| -11-550 | | | 4 | ↓ | 1530 | | | | | | X | X | | | | |
| P1190-SP-12-550 | | | 4 | 080709 | 1545 | | | | | | X | X | | | | |

CMK 8/7/09

| | | | | |
|---|---|---|---|---|
| Relinquished By: Craig M Koll | Date/Time: 8/7/09 / 1700 | Received By: | Date/Time: 8/8/09 4.1 1046 | Turnaround Time: (Check) same day ___ 72 hours ___ |
| Relinquished By: | Date/Time: | Received By: | Date/Time: | 24 hours ___ 5 days ___ 48 hours ___ normal X |
| Relinquished By: | Date/Time: | Received in Lab By: | Date/Time: | Sample Integrity: (Check) intact X on ice X |

**Note:** By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

4.1 C

MWH Laboratories
A Division of MWH Americas, Inc.

750 Royal Oak Dr., Suite 100
Monrovia, California, 91016-3629
Tel: 626 386 1100
Fax: 626 386 1101
1 800 566 LABS (1 800 566 5227)

# Laboratory Report

for

Applied Process Technologies
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attention: Keel Robinson
Fax: 925-977-1818

Date of Issue
08/23/2009
MWH LABORATORIES

ACCREDITED IN ACCORDANCE WITH nelac 01114CA

Report#: 311742
Project: P1190
Group: Bromate

RCZ: Rick Zimmer

Project Manager

Laboratory certifies that the test results meet all **NELAC** requirements unless noted in the Comments section or the Case Narrative. Following the cover page are Hits Reports, Comments, QC Summary, QC Report and Regulatory Forms. This report shall not be reproduced except in full, without the written approval of the laboratory.

MWH Laboratories

750 Royal Oaks Drive Suite 100, Monrovia, Ca 91016
Phone 626-386-1100/Fax: 626-386-1101

## Acknowledgement of Samples Received

**Applied Process Technologies**
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attn: Keel Robinson
Phone: 925-977-1811

Customer Code: APT
Group #: 311742
Project #: P1190
Sample Group: Bromate
Project Manager: Rick Zimmer
Phone: 626-386-1157

The following samples were received from you on **August 11, 2009**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using MWH Laboratories.

| Sample # | Sample Id | | Sample Date |
|---|---|---|---|
| 200908110229 | P1190-SP-0A-500 | | 07-Aug-2009 1045 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110230 | P1190-SP-0B-550 | | 07-Aug-2009 1450 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110231 | P1190-SP-1-500 | | 07-Aug-2009 1120 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110232 | P1190-SP-2-500 | | 07-Aug-2009 1150 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110233 | P1190-SP-3-500 | | 07-Aug-2009 1220 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110234 | P1190-SP-4-500 | | 07-Aug-2009 1310 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110235 | P1190-SP-5-500 | | 07-Aug-2009 1330 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110236 | P1190-SP-6-500 | | 07-Aug-2009 1350 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110237 | P1190-SP-7-500 | | 07-Aug-2009 1410 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110238 | P1190-SP-8-500 | | 07-Aug-2009 1430 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110239 | P1190-SP-9-550 | | 07-Aug-2009 1505 |
| | Bromate by UV/VIS | Bromide by 300.0 | |
| 200908110240 | P1190-SP-10-550 | | 07-Aug-2009 1520 |
| | Bromate by UV/VIS | Bromide by 300.0 | |

MWH Laboratories

750 Royal Oaks Drive Suite 100, Monrovia, Ca 91016
Phone 626-386-1100/Fax: 626-386-1101

# Acknowledgement of Samples Received

**Applied Process Technologies**
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523
Attn: Keel Robinson
Phone: 925-977-1811

Customer Code: APT
Group #: 311742
Project #: P1190
Sample Group: Bromate
Project Manager: Rick Zimmer
Phone: 626-386-1157

The following samples were received from you on **August 11, 2009**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using MWH Laboratories.

| Sample # | Sample Id | Sample Date |
|---|---|---|
| 200908110241 | P1190-SP-11-550 | 07-Aug-2009 1530 |
| | Bromate by UV/VIS; Bromide by 300.0 | |
| 200908110242 | P1190-SP-12-550 | 07-Aug-2009 1555 |
| | Bromate by UV/VIS; Bromide by 300.0 | |

**Test Description**



Reported: 08/24/09

# MWH Laboratories
A Division of MWH Americas, Inc.

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
Tel: 626 386 1100
Fax: 626 386 1101
1 800 566 LABS (1 800 566 5227)

# CHAIN OF CUSTODY RECORD

311742

*MWH LABS USE ONLY:*

LOGIN COMMENTS:

SAMPLES CHECKED AGAINST COC BY: JT

SAMPLES LOGGED IN BY: MW

SAMPLE TEMP WHEN REC'D AT LAB: 4° (Compliance: 4 +/- 2°C)

SAMPLES REC'D DAY OF COLLECTION? [ ] (check for yes)

CONDITION OF BLUE ICE: FROZEN ___ PARTIALLY FROZEN ___ THAWED ___

*TO BE COMPLETED BY SAMPLER:*

COMPANY/AGENCY NAME: Applied Process Technology

PROJECT CODE: P1190

COMPLIANCE SAMPLES (check for yes) [ ] - Requires state forms [ ]

NON-COMPLIANCE SAMPLES (check for yes) [ ]

REGULATION INVOLVED: (eg. SDWA, Phase V, NPDES, FDA,...)

Type of samples (circle one): ROUTINE SPECIAL CONFIRMATION

MWH LABS CLIENT CODE:

COC ID: Montrose Torrance

SAMPLE GROUP: EarthTech - mixed well water

SEE ATTACHED BOTTLE ORDER FOR ANALYSES [ ] (check for yes), OR list ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)

SAMPLER PRINTED NAME AND SIGNATURE: Ricardo Villalobos [signature]

TAT requested: rush by adv notice only
STANDARD TURNAROUND

| SAMPLE DATE | SAMPLE TIME | SAMPLE ID | CLIENT LAB ID | MATRIX * | Field Data | Field Data | Bromide EPA 300.0A | Bromate UV-Vis EPA 317 | SAMPLER COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| 8/7/09 | 10:45 | P1190-SP-0A-500 | | RGW | | | X | X | |
| 8/7/09 | 14:50 | P1190-SP-0B-550 | | RGW | | | X | X | |
| 8/7/09 | 11:20 | P1190-SP-1-500 | | WW | | | X | X | |
| 8/7/09 | 14:50 4/12 | P1190-SP-2-500 | | WW | | | X | X | |
| 8/7/09 | 12:20 | P1190-SP-3-500 | | WW | | | X | X | |
| 8/7/09 | 13:10 | P1190-SP-4-500 | | WW | | | X | X | |
| 8/7/09 | 13:30 | P1190-SP-5-500 | | WW | | | X | X | |
| 8/7/09 | 13:50 | P1190-SP-6-500 | | WW | | | X | X | |
| 8/7/09 | 14:10 | P1190-SP-7-500 | | WW | | | X | X | |
| 8/7/09 | 14:30 | P1190-SP-8-500 | | WW | | | X | X | |
| 8/7/09 | 15:05 | P1190-SP-9-550 | | WW | | | X | X | |
| 8/7/09 | 15:20 | P1190-SP-10-550 | | WW | | | X | X | |
| 8/7/09 | 15:30 | P1190-SP-11-550 | | WW | | | X | X | |
| 8/7/09 | 15:55 | P1190-SP-12-550 | | WW | | | X | X | |

*** MATRIX TYPES:** RSW = Raw Surface Water; RGW = Raw Ground Water; CFW = Chlor(am)inated Finished Water; FW = Other Finished Water; SEAW = Sea Water; WW = Waste Water; BW = Bottled Water; SW = Storm Water; SO = Soil; SL = Sludge; O = Other - Please Identify

| | SIGNATURE | PRINT NAME | COMPANY/TITLE | DATE | TIME |
|---|---|---|---|---|---|
| RELINQUISHED BY: | [signature] | Ricardo Villalobos | Applied Process Technology | 8/10/09 | 12:00 |
| RECEIVED BY: | [signature] | JT[illegible] | MWH | 8-11 | 10:11 |
| RELINQUISHED BY: | | | | | |
| RECEIVED BY: | | | | | |

C-O-C# ______

From: Origin ID: CCRA (925) 977-1811
Diana West
Applied Process Technology, Inc
3330 Vincent Road
Suite A
Pleasant Hill, CA 94523

FedEx Express

E

J09200906152023

SHIP TO: (626) 386-1157 BILL SENDER
**Rick Zimmer**
**MWH Laboratory - Monrovia**
**750 ROYAL OAKS DR STE 100**
**STE.100**
**MONROVIA, CA 91016**

Ship Date: 10AUG09
ActWgt: 9.0 LB
CAD: 4553525/INET9060
Account#: S *********
Dims: 13 X 11 X 10 IN

Delivery Address Bar Code

Ref # P-1390 - Lab Samples NB
Invoice #
PO #
Dept #

TRK# 0201 7978 3665 2557

**TUE - 11AUG A1**
**PRIORITY OVERNIGHT**

**91016**
**CA-US**
**BUR**

**91 WHPA**

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1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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Tel: 626 386 1100
Fax: 626 386 1101
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**Laboratory**
**Hits Report: 311742**

**Applied Process Technologies**
Keel Robinson
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523

Samples Received on:
08/11/2009

| Analyzed | | Analyte | Sample ID | Result | Federal MCL | Units | MRL |
|---|---|---|---|---|---|---|---|
| | | **200908110229** | **P1190-SP-0A-500** | | | | |
| 08/14/2009 | 06:28 | Bromide | | 430 | | ug/L | 25 |
| | | **200908110230** | **P1190-SP-0B-550** | | | | |
| 08/15/2009 | 16:48 | Bromide | | 490 | | ug/L | 25 |
| | | **200908110231** | **P1190-SP-1-500** | | | | |
| 08/20/2009 | 20:37 | Bromate by UV/VIS | | 5.6 | 10 | ug/L | 1 |
| 08/14/2009 | 07:23 | Bromide | | 420 | | ug/L | 25 |
| | | **200908110232** | **P1190-SP-2-500** | | | | |
| 08/20/2009 | 21:05 | Bromate by UV/VIS | | 5.0 | 10 | ug/L | 1 |
| 08/14/2009 | 07:51 | Bromide | | 400 | | ug/L | 25 |
| | | **200908110233** | **P1190-SP-3-500** | | | | |
| 08/20/2009 | 22:27 | Bromate by UV/VIS | | 4.1 | 10 | ug/L | 1 |
| 08/14/2009 | 08:18 | Bromide | | 430 | | ug/L | 25 |
| | | **200908110234** | **P1190-SP-4-500** | | | | |
| 08/20/2009 | 22:55 | Bromate by UV/VIS | | 4.6 | 10 | ug/L | 1 |
| 08/15/2009 | 17:15 | Bromide | | 420 | | ug/L | 25 |
| | | **200908110235** | **P1190-SP-5-500** | | | | |
| 08/21/2009 | 00:17 | Bromate by UV/VIS | | 4.5 | 10 | ug/L | 1 |
| 08/14/2009 | 09:13 | Bromide | | 420 | | ug/L | 25 |
| | | **200908110236** | **P1190-SP-6-500** | | | | |
| 08/21/2009 | 00:44 | Bromate by UV/VIS | | 4.2 | 10 | ug/L | 1 |
| 08/14/2009 | 12:38 | Bromide | | 420 | | ug/L | 25 |
| | | **200908110237** | **P1190-SP-7-500** | | | | |
| 08/21/2009 | 03:56 | Bromate by UV/VIS | | 5.4 | 10 | ug/L | 1 |
| 08/14/2009 | 13:05 | Bromide | | 440 | | ug/L | 25 |
| | | **200908110238** | **P1190-SP-8-500** | | | | |
| 08/21/2009 | 04:23 | Bromate by UV/VIS | | 6.0 | 10 | ug/L | 1 |
| 08/14/2009 | 13:32 | Bromide | | 410 | | ug/L | 25 |
| | | **200908110239** | **P1190-SP-9-550** | | | | |
| 08/21/2009 | 05:46 | Bromate by UV/VIS | | 6.1 | 10 | ug/L | 1 |
| 08/14/2009 | 14:00 | Bromide | | 520 | | ug/L | 25 |
| | | **200908110240** | **P1190-SP-10-550** | | | | |
| 08/21/2009 | 06:13 | Bromate by UV/VIS | | 4.9 | 10 | ug/L | 1 |
| 08/14/2009 | 14:27 | Bromide | | 470 | | ug/L | 25 |



**SUMMARY OF POSITIVE DATA ONLY**

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**Laboratory**
**Hits Report: 311742**

**Applied Process Technologies**
Keel Robinson
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523

Samples Received on:
08/11/2009

| Analyzed | Analyte | Sample ID | Result | Federal MCL | Units | MRL |
|---|---|---|---|---|---|---|
| | **200908110241** | **P1190-SP-11-550** | | | | |
| 08/21/2009 07:35 | Bromate by UV/VIS | | 5.3 | 10 | ug/L | 1 |
| 08/14/2009 14:55 | Bromide | | 480 | | ug/L | 25 |
| | **200908110242** | **P1190-SP-12-550** | | | | |
| 08/21/2009 08:03 | Bromate by UV/VIS | | 4.6 | 10 | ug/L | 1 |
| 08/14/2009 15:22 | Bromide | | 470 | | ug/L | 25 |



**SUMMARY OF POSITIVE DATA ONLY**

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**Laboratory Data**
**Report: 311742**

**Applied Process Technologies**
Keel Robinson
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523

Samples Received on:
08/11/2009

| Prepared | Analyzed | QC Ref # | Method | Analyte | Result | Units | MRL | Dilution |
|---|---|---|---|---|---|---|---|---|
| **P1190-SP-0A-500 (200908110229)** | | | | | | **Sampled on** | **08/07/2009 1045** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 18:47 | 521246 | (EPA 317) | Bromate by UV/VIS | ND | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 06:28 | 520090 | (EPA 300.0) | Bromide | 430 | ug/L | 25 | 5 |
| **P1190-SP-0B-550 (200908110230)** | | | | | | **Sampled on** | **08/07/2009 1450** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 19:15 | 521246 | (EPA 317) | Bromate by UV/VIS | ND | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/15/2009 | 16:48 | 520559 | (EPA 300.0) | Bromide | 490 | ug/L | 25 | 5 |
| **P1190-SP-1-500 (200908110231)** | | | | | | **Sampled on** | **08/07/2009 1120** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 20:37 | 521246 | (EPA 317) | Bromate by UV/VIS | 5.6 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 07:23 | 520090 | (EPA 300.0) | Bromide | 420 | ug/L | 25 | 5 |
| **P1190-SP-2-500 (200908110232)** | | | | | | **Sampled on** | **08/07/2009 1150** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 21:05 | 521246 | (EPA 317) | Bromate by UV/VIS | 5.0 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 07:51 | 520090 | (EPA 300.0) | Bromide | 400 | ug/L | 25 | 5 |
| **P1190-SP-3-500 (200908110233)** | | | | | | **Sampled on** | **08/07/2009 1220** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 22:27 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.1 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 08:18 | 520090 | (EPA 300.0) | Bromide | 430 | ug/L | 25 | 5 |
| **P1190-SP-4-500 (200908110234)** | | | | | | **Sampled on** | **08/07/2009 1310** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/20/2009 | 22:55 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.6 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/15/2009 | 17:15 | 520559 | (EPA 300.0) | Bromide | 420 | ug/L | 25 | 5 |
| **P1190-SP-5-500 (200908110235)** | | | | | | **Sampled on** | **08/07/2009 1330** | |



Rounding on totals after summation.
(c) - indicates calculated results

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**Laboratory Data**
**Report: 311742**

**Applied Process Technologies**
Keel Robinson
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523

Samples Received on:
08/11/2009

| Prepared | Analyzed | QC Ref # | Method | Analyte | Result | Units | MRL | Dilution |
|---|---|---|---|---|---|---|---|---|
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 00:17 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.5 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 09:13 | 520090 | (EPA 300.0) | Bromide | 420 | ug/L | 25 | 5 |
| **P1190-SP-6-500 (200908110236)** | | | | | | **Sampled on** | **08/07/2009 1350** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 00:44 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.2 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 12:38 | 520090 | (EPA 300.0) | Bromide | 420 | ug/L | 25 | 5 |
| **P1190-SP-7-500 (200908110237)** | | | | | | **Sampled on** | **08/07/2009 1410** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 03:56 | 521246 | (EPA 317) | Bromate by UV/VIS | 5.4 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 13:05 | 520090 | (EPA 300.0) | Bromide | 440 | ug/L | 25 | 5 |
| **P1190-SP-8-500 (200908110238)** | | | | | | **Sampled on** | **08/07/2009 1430** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 04:23 | 521246 | (EPA 317) | Bromate by UV/VIS | 6.0 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 13:32 | 520090 | (EPA 300.0) | Bromide | 410 | ug/L | 25 | 5 |
| **P1190-SP-9-550 (200908110239)** | | | | | | **Sampled on** | **08/07/2009 1505** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 05:46 | 521246 | (EPA 317) | Bromate by UV/VIS | 6.1 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 14:00 | 520090 | (EPA 300.0) | Bromide | 520 | ug/L | 25 | 5 |
| **P1190-SP-10-550 (200908110240)** | | | | | | **Sampled on** | **08/07/2009 1520** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 06:13 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.9 | ug/L | 1 | 1 |
| | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | | | |
| 08/14/2009 | 14:27 | 520090 | (EPA 300.0) | Bromide | 470 | ug/L | 25 | 5 |
| **P1190-SP-11-550 (200908110241)** | | | | | | **Sampled on** | **08/07/2009 1530** | |
| | **EPA 317 - Bromate by UV/VIS 317** | | | | | | | |
| 08/21/2009 | 07:35 | 521246 | (EPA 317) | Bromate by UV/VIS | 5.3 | ug/L | 1 | 1 |



Rounding on totals after summation.
(c) - indicates calculated results

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**Laboratory Data**
**Report: 311742**

**Applied Process Technologies**
Keel Robinson
333 Vincent Road, Suite 222
Pleasant Hill, CA 94523

Samples Received on:
08/11/2009

| Prepared | Analyzed | QC Ref # | Method | Analyte | Result | Units | MRL | Dilution |
|---|---|---|---|---|---|---|---|---|
| | | | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | |
| | 08/14/2009 14:55 | 520090 | (EPA 300.0) | Bromide | 480 | ug/L | 25 | 5 |
| **P1190-SP-12-550 (200908110242)** | | | | | | **Sampled on** | **08/07/2009 1555** | |
| | | | **EPA 317 - Bromate by UV/VIS 317** | | | | | |
| | 08/21/2009 08:03 | 521246 | (EPA 317) | Bromate by UV/VIS | 4.6 | ug/L | 1 | 1 |
| | | | **EPA 300.0 - Disinfection ByProducts by 300.0** | | | | | |
| | 08/14/2009 15:22 | 520090 | (EPA 300.0) | Bromide | 470 | ug/L | 25 | 5 |



Rounding on totals after summation.
(c) - indicates calculated results

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**Laboratory**
**QC Summary: 311742**

Applied Process Technologies

**QC Ref # 520090 - Disinfection ByProducts by 300.0** **Analysis Date: 08/14/2009**

| | | |
|---|---|---|
| 200908110229 | P1190-SP-0A-500 | Analyzed by: SER |
| 200908110231 | P1190-SP-1-500 | Analyzed by: SER |
| 200908110232 | P1190-SP-2-500 | Analyzed by: SER |
| 200908110233 | P1190-SP-3-500 | Analyzed by: SER |
| 200908110235 | P1190-SP-5-500 | Analyzed by: SER |
| 200908110236 | P1190-SP-6-500 | Analyzed by: SER |
| 200908110237 | P1190-SP-7-500 | Analyzed by: SER |
| 200908110238 | P1190-SP-8-500 | Analyzed by: SER |
| 200908110239 | P1190-SP-9-550 | Analyzed by: SER |
| 200908110240 | P1190-SP-10-550 | Analyzed by: SER |
| 200908110241 | P1190-SP-11-550 | Analyzed by: SER |
| 200908110242 | P1190-SP-12-550 | Analyzed by: SER |

**QC Ref # 520559 - Disinfection ByProducts by 300.0** **Analysis Date: 08/15/2009**

| | | |
|---|---|---|
| 200908110230 | P1190-SP-0B-550 | Analyzed by: SER |
| 200908110234 | P1190-SP-4-500 | Analyzed by: SER |

**QC Ref # 521246 - Bromate by UV/VIS 317** **Analysis Date: 08/20/2009**

| | | |
|---|---|---|
| 200908110229 | P1190-SP-0A-500 | Analyzed by: TLH |
| 200908110230 | P1190-SP-0B-550 | Analyzed by: TLH |
| 200908110231 | P1190-SP-1-500 | Analyzed by: TLH |
| 200908110232 | P1190-SP-2-500 | Analyzed by: TLH |
| 200908110233 | P1190-SP-3-500 | Analyzed by: TLH |
| 200908110234 | P1190-SP-4-500 | Analyzed by: TLH |
| 200908110235 | P1190-SP-5-500 | Analyzed by: TLH |
| 200908110236 | P1190-SP-6-500 | Analyzed by: TLH |
| 200908110237 | P1190-SP-7-500 | Analyzed by: TLH |
| 200908110238 | P1190-SP-8-500 | Analyzed by: TLH |
| 200908110239 | P1190-SP-9-550 | Analyzed by: TLH |
| 200908110240 | P1190-SP-10-550 | Analyzed by: TLH |
| 200908110241 | P1190-SP-11-550 | Analyzed by: TLH |
| 200908110242 | P1190-SP-12-550 | Analyzed by: TLH |

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**Laboratory**
**QC Report: 311742**

Applied Process Technologies

| QC Type | Analyte | Native | Spiked | Recovered | Units | Yield (%) | Limits (%) | RPDLimit (%) | RPD% |
|---|---|---|---|---|---|---|---|---|---|
| **QC Ref# 520090 - Disinfection ByProducts by 300.0 by EPA 300.0** | | | | | | **Analysis Date: 08/14/2009** | | | |
| LCS1 | Bromide | | 100 | 101 | ug/L | 101 | (90-110) | | |
| LCS2 | Bromide | | 100 | 99.9 | ug/L | 100 | (90-110) | 10 | 1.1 |
| MBLK | Bromide | | | <5.0 | ug/L | | | | |
| MRL_CHK | Bromide | | 5.0 | 4.85 | ug/L | 97 | (50-150) | | |
| MS_200908040010 | Bromide | 8.7 | 50 | 59.7 | ug/L | 102 | (80-120) | | |
| MS2_200908110536 | Bromide | 23 | 50 | 82.1 | ug/L | 118 | (80-120) | | |
| MSD_200908040010 | Bromide | 8.7 | 50 | 57.2 | ug/L | 97 | (80-120) | 15 | 5.1 |
| MSD2_200908110536 | Bromide | 23 | 50 | 74.3 | ug/L | 103 | (80-120) | 15 | 14 |
| **QC Ref# 520559 - Disinfection ByProducts by 300.0 by EPA 300.0** | | | | | | **Analysis Date: 08/15/2009** | | | |
| LCS1 | Bromide | | 100 | 97.5 | ug/L | 98 | (90-110) | | |
| LCS2 | Bromide | | 100 | 99.4 | ug/L | 99 | (90-110) | 10 | 1.9 |
| MBLK | Bromide | | | <5.0 | ug/L | | | | |
| MRL_CHK | Bromide | | 5.0 | 5.52 | ug/L | 110 | (50-150) | | |
| MS_200908110253 | Bromide | ND | 50 | 50.1 | ug/L | 100 | (80-120) | | |
| MSD_200908110253 | Bromide | ND | 50 | 51.4 | ug/L | 103 | (80-120) | 15 | 3.0 |
| **QC Ref# 521246 - Bromate by UV/VIS 317 by EPA 317** | | | | | | **Analysis Date: 08/20/2009** | | | |
| LCS1 | Bromate by UV/VIS | | 10 | 9.34 | ug/L | 93 | (90-110) | | |
| LCS2 | Bromate by UV/VIS | | 10 | 9.63 | ug/L | 96 | (90-110) | 20 | 3.1 |
| MBLK | Bromate by UV/VIS | | | <1 | ug/L | | | | |
| MRL_CHK | Bromate by UV/VIS | | 1.0 | 0.824 | ug/L | 82 | (75-125) | | |
| MS_200908190353 | Bromate by UV/VIS | ND | 5.0 | 5.39 | ug/L | 108 | (75-125) | | |
| MS2_200908110258 | Bromate by UV/VIS | ND | 5.0 | 5.93 | ug/L | 104 | (75-125) | | |
| MSD_200908190353 | Bromate by UV/VIS | ND | 5.0 | 5.31 | ug/L | 106 | (75-125) | 15 | 1.9 |
| MSD2_200908110258 | Bromate by UV/VIS | ND | 5.0 | 5.72 | ug/L | 99 | (75-125) | 15 | 4.6 |

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
(S) Indicates surrogate compound.
(I) Indicates internal standard compound.
RPD not calculated for LCS2 when different a concentration than LCS1 is used
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level)

# A-6

# TANK VENTING PLAN

Geosyntec consultants

# Table A-6
# T-700 Influent Storage Tank
# South Coast Air Quality Management District (SCAQMD) Rule 219
# Organic Vapor Pressure Calculation

| Chemical | Concentration (µg/L) | Vapor Pressure[1] (mmHg) | Henry's Law Constant (atm-m$^3$/mol) | Molecular Weight (g/mol) |
|---|---|---|---|---|
| Benzene | 250 | 1.35E-02 | 5.54E-03 | 7.81E+01 |
| Chlorobenzene | 13,900 | 3.45E-01 | 3.69E-03 | 1.13E+02 |
| 1,2-Dichloroethane | 9.0 | 6.75E-05 | 9.77E-04 | 9.90E+01 |
| Tetrachloroethylene | 170 | 1.43E-02 | 1.84E-02 | 1.66E+02 |
| Trichloroethylene | 38 | 2.27E-03 | 1.03E-02 | 1.31E+02 |
| 1,4-Dichlorobenzene | 17 | 2.10E-04 | 2.39E-03 | 1.47E+02 |
| Chloroform | 340 | 7.95E-03 | 3.66E-03 | 1.19E+02 |
| Carbon Tetrachloride | 1.5 | 2.24E-04 | 3.03E-02 | 1.54E+02 |
| 1,2,4-Trimethyl Benzene | 11 | 4.28E-04 | 6.14E-03 | 1.20E+02 |
| Methylene Chloride | 16 | 3.12E-04 | 2.18E-03 | 8.49E+01 |
| alpha-BHC | 0.42 | 1.16E-08 | 1.06E-05 | 2.91E+02 |
| beta-BHC[2] | 0.31 | 0.00E+00 | - | 2.91E+02 |
| gamma-BHC | 0.59 | 2.16E-08 | 1.40E-05 | 2.91E+02 |
| pCBSA[2] | 39,600 | 0.00E+00 | - | 2.15E+02 |

Total Vapor Pressure (mmHg)[3] 0.3842

Notes:

(1) Vapor pressure calculated using Henry's Law:

y = Hx

where,

y = vapor phase concentration (partial pressure in atmospheres converted to mmHg)

H = Henry's law constants for each species at 21.1 degrees Celsius (°C) from *Users Guide for the Johnson and Ettinger (1991) Model (Revised)* , USEPA, 2004

(2) Compounds are not volatile

(3) As shown, the total organic vapor pressure is less than 5 mm Hg and thereby complies with the exemptions contained in SCAQMD Rule 219

Conversions:

760 mmHg @ 0°C = 1 atm

1,000 liters/m$^3$

1,000,000 µg/g

Footnotes:

µg/L = Micrograms per liter

mmHg = Millimeters mercury

atm-m$^3$/mol = Atmospheres meters cubed per mole

g/mol = Grams per mol

µg/g = Micrograms per gram

USEPA = U.S. Environmental Protection Agency

pCBSA = para-Clorobenzene sulfonic acid

BHC = Benzene hexachloride

# APPENDIX B

# RESPONSE TO COMMENTS TABLE

**Summary of Response to Comments on Previous Comments**
**Received from U.S. EPA October 20, 2011**
**Dual Site Groundwater Operable Unit**
**Intermediate Design Drawings**

**Response Date:** February 3, 2012
**Comment Date:** October 20, 2011
**Document Title:**
Intermediate Design Drawings
Montrose Chemical and Del Amo Superfund Sites
Dual Site Groundwater Operable Unit
Torrance, CA
**Reviewer**: U.S. EPA

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Review Comments on Geosyntec Responses to Previous Comments from EPA/CH2M HILL** | | | |
| 1 | 51 | Please review the applicable Laws and Regulations governing engineering in the State of California and comply with applicable sealing and signing requirements for plans and specifications. The regulations are applicable to intermediate designs as well as final designs. | Per the *Professional Engineers Act* of California, Section **6735. Preparation, signing, and sealing of civil engineering documents** states in paragraph (a): All civil (including structural and geotechnical) engineering plans, calculations, specifications, and reports (hereinafter referred to as "documents") shall be prepared by, or under the responsible charge of, a licensed civil engineer and **shall include his or her name and license number**. Interim documents shall include a notation as to the intended purpose of the document, such as "preliminary," "not for construction," "for plan check only," or "for review only."<br><br>**Response:** These plans are not final, therefore do not need to be stamped per the requirement. The plans are labeled intermediate design, which satisfies the requirement stated above. We will add the name and license number of the P.E. in responsible charge to the draft documents, and the final documents will be stamped and signed. |
| 2 | 6, 7, 69, 72, 73, 78 | Discussion of these electrical design items cannot be deferred to the Pre-Final Design, as these are critical elements that should be addressed in the intermediate design. | Critical comment will be discussed in Final Design discussions with EPA. |

## Summary of Response to Comments on Previous Comments
## Received from U.S. EPA October 20, 2011
## Dual Site Groundwater Operable Unit
## Intermediate Design Drawings

**Response Date:** February 3, 2012

**Comment Date:** October 20, 2011

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| Comment No. | Location/Section | Comment | Response |
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| 3 | 54 | The removal of the signal line-type from the Piping and Instrumentation Diagrams (P&IDs) seems to be an inappropriate response because the variable frequency drives (VFDs) are now shown on Drawing No. T-101-Control Schematic as being connected to the Local Area Network, which implies virtual inputs and outputs will be utilized along with some hardwired inputs and outputs to the programmable logic controller (PLC) and Operator HMI (human-machine interface). In addition, the line-type in question was added to the P&IDs legend as "Software Link," but is not used where it is applicable on the P&IDs. Please coordinate information between drawings and utilize the defined line-types where applicable. | Non-Critical comment will be discussed in Final Design discussions with EPA. |
| 4 | 56 | There are still numerous symbols and abbreviations used on the P&IDs that are not defined in the legend. Please review the symbols and abbreviations used and define them in the legend. | Non-Critical comment will be discussed in Final Design discussions with EPA. |
| 5 | 59 | The inclusion of the running status should be considered as a necessary component for operation and remote control of the submersible well pumps. The addition of a local indicating light showing the submersible well pump is in operation provides valuable information for system operation, maintenance, and troubleshooting for the operational staff. | Non-Critical comment will be discussed in Final Design discussions with EPA. |
| 6 | 66 | The response indicates the comment was addressed without providing the resolution, and the text "Rain Water" still exists in the flow stream description. Please provide information as to what was corrected. | Non-Critical comment will be discussed in Final Design discussions with EPA. |
| 7 | 44 | Please note that flanges allow disconnecting the components, but a coupling is typically needed to actually remove the components for piping larger than 6 inches in diameter. Please provide couplings as necessary. | Our feeling is with the spool pieces of pipe that are present between the individual components, that couplings are not needed for removal.<br><br>Non-Critical comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 8 | 16 | On the profile, please provide defined high point locations for air release valves and low points for draining pipe, if needed. Disposal of extracted water may be an issue that requires tanker truck containment. Please determine requirements for draining injection water pipelines. We recommend minimizing locations for blow-offs, which are not at extractions well vaults, and providing an outlet for easy connection for those at vaults. | Profiles are being prepared to be inclusion into the pre-final design due to access issues. It is agreed that high and low points should be minimized.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 9 | 20 | Schematically, it appears that the shaded area on the profile of Drawing W-1 03 may be the approximate location of the 42-inch casing described in the plan view. Casings are normally jacked from low elevation to high, so schematically the large pit may be at the south end and the smaller pit at the north end. | The jacking and receiving pits will be reversed on the plan and profile on Drawing W-103.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 10 | 22 | Please address this comment for all locations with horizontal deflections (Le., for consideration of whether to allow Contractor to use minimum bend radius for HOPE in lieu of fabricated bends). | A note will be added to all plan and profile sheets requiring contractors to use minimum bend radius in lieu of fabricated bends if possible.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 11 | 23 | This is a typical comment for pipeline low points regarding whether to provide intermediate blow-off locations or only to allow blow-offs for draining at vaults, in which case provisions to drain at the vaults are needed. Our previous comment on W-121 applies to W-122. | The intent is to provide intermediate blow off locations based on low points created in the design of the profile which are not complete at this time due to access issues. Access issues should be resolved by 13 March 2012 Submittal<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 12 | 24 | Please consider a drain point at the pipeline low point now on Sheet W-122. | Drain points will be determined as part of the pre-final profile design, at this time due to access issues the vertical alignment is not complete. Access issues should be resolved before 13 March 2012 submittal.<br><br>Critical comment will be discussed in Final Design discussions with EPA |
| 13 | 26 | Sheet W-130 (previous Sheet W-129) has a reference to pipe hangers in Detail 1 on W-524. However, it is not specific as to which one to use or where to attach it to the bridge. Please provide a bridge cross-section showing where to use the hanger and which hanger to use. | The detail callout was inadvertently referenced to the wrong detail sheet. The detail call out should be referenced to Detail 1 on W-527.<br><br>Critical comment will be reviewed in over the shoulder meeting in February to discuss pre-final design progress. |
| 14 | 27 | On Sheets W-134 and W-135 (previous Sheets W-133 and W-134), please consider showing and calling out at least the closest parallel pipe, which is a 20-inch water main. Please also consider if a casing pipe is needed for these crossings of up to 13 utilities, including a 63-inch storm drain and a number of fuel lines. Please clarify if micro tunneling has been considered. | Critical Comment will be addressed in Pre-Final Design, discuss in over the shoulder review meeting with EPA after 16 March 2012 submittal |
| 15 | 30 | Please consider a standard note for minimum bend radius in lieu of fabricated bends for piping (Sheet W-145). | A note will be added to all plan and profile sheets requiring contractors to use minimum bend radius in lieu of fabricated bends.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

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| 16 | 38 | It does not appear that horizontal directional drilling (HOD) is contemplated for this project because of the significant number of "multiple pipes, control conduits, power conduits, etc." However, it was noted that there is a new detail for the arrangement of pipes at casing locations under railroad tracks (Detail 5 on Sheet W-521). In addition, there are three trench details on Sheet W-301 , which can apparently be regarded as "typical" conduit placement arrangements. Based on the above observations, it seems that Detail 3 on Sheet W-519 should refer the Contractor to Sheet W-301, which includes the trenching provisions for power and control conduits as significant standard portions of the trench detail. Alternatively, or in addition, the details on Sheet W-301 could include the depiction of the "pipe zone" to include the control and electrical conduits. | The pipe zone detail reference is noted on in the notes on drawing W-301. The trench detail reference will be added to the pipe zone detail on W-519. The conduit arrangement is designed and shown to be in the pipe zone bedding and backfill area above or at equal depth of the environmental piping.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

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### 3.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Civil Comments** | | | |
| 17 | 33 00 00 | Please add missing pipe schedule and water, sewer, and telecom conduit specifications. | Will include.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 18 | 31 22 00 | Please include missing overexcavation section. | Will include.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Electrical Comments** | | | |
| 19 | Div 26 00 00 | Several sections such as Panel Boards, Circuit Breakers, Disconnect Switches, Motor Control Centers, Motor Starters, and Electrical Acceptance Testing are missing and need to be included. | Critical comment will be discussed in Final Design discussions with EPA. |
| 20 | 26 05 12, 2.02 A | Marker tape for Electrical is RED per OSHA, not YELLOW as indicated. Please make correction. | The correction will be made and YELLOW was changed to RED.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 21 | 26 05 33.13 | This specification is for Schedule 80 PVC water pipe that has been improperly converted to UL PVC conduit specification. Please delete and use the proper specification. | Critical comment will be discussed in Final Design discussions with EPA. |
| 22 | 40 90 00 | No specifications have been provided for review. Please provide draft specifications as part of the revised Intermediate Design submittal. | Critical comment will be discussed in Final Design discussions with EPA. |
| | | | |
| **Mechanical Comments** | | | |
| 23 | 40 05 23.19 | Paragraph 2.01.A - Please specify the correct material for the application (Viton is specified for valves, but Teflon for piping). | Change made to indicate valves may have viton or Teflon seals as both are compatible with process water to be received.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

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### 3.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 26 | 40 06 21 and 40 06 22 | Extraction Piping Schedule and Injection Piping Schedule - Please clarify if the pipe material should be Schedule 40 SST instead of Schedule 40 STL. | Notes included to differentiate, STL indicates steel piping, SS indicates stainless steel.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 25 | 40 06 21, 43 06 22 and 43 06 23 | Please add pump pressures to the tables for the following schedules: (1) Schedule for Extraction Well Pumps, (2) Schedule for Injection Well Pumps, and (3) Schedule for Treatment System Sump/Transfer Pumps. | Pump pressures included in tables.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 26 | 43 06 30 | Schedule for Gas and Liquid Hi-Purification Equipment - Please add the pressure drop information to the table (pressure drop should be for the flow in the table). | Note made on Spec Sheet.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

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### 3.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Process Comments** | | | |
| 27 | 43 30 00 | Deferring the treatment process equipment specifications to the Pre-Final Design submittal is not acceptable and is too late in the design process. Preliminary specifications for key treatment equipment items are required at the Intermediate Design stage. Please submit these draft specifications with the revised Intermediate Design submittal.<br>Because the treatment process was recently changed (as documented in a report titled Treatment Train Advisory, Torrance Groundwater Remedial System, Los Angeles CA, prepared on behalf of Montrose by Geosyntec, dated June 21,2011), EPA requested that an updated basis of design for each key treatment process step, including design/process parameters and performance criteria, be submitted to EPA for review. This information is important to confirm that the appropriate type, size, and operational flexibility of each treatment process are provided by the design.<br>Based on the above, a revised Basis of Design report based on the latest treatment process configuration should be submitted as part Of the revised Intermediate Design submittal. This submittal should also provide a determination/conclusion of whether treatment for arsenic is required as part of the treatment train. | Critical comment will be discussed in Final Design discussions with EPA. |

### 3.2 Noncritical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Civil Comments** | | | |
| 28 | 01 57 00 | Please provide Best Management Practices (BMPs) specifications for stormwater management. | Critical comment will be discussed in Final Design discussions with EPA. |
| 29 | 31 05 01.03 A.1 | Please identify the specific Caltrans Standard Specification for earthworks. | Critical comment will be discussed in Final Design discussions with EPA. |

**Electrical Comments**

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### 3.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 30 | 26 05 19, 2.04 A. | Please consider changing to 600V insulation. Putting 300V cables in a common location with 600V cables and conductors (as in vaults, control panels, pull boxes) is a violation of the National Electrical Code (NEC). To avoid this violation, the 300V cables would have to be isolated by some type of conduit or raceway to preserve isolation. Alternatively, insulating all cables and conductors at 600V may be an easier way to deal with this problem. | Change made in this section to indicate cables shall be rated at 600V. |
| 31 | 26 05 19, 3.01 B. | Please consider adding a new subsection titled "3.01 B. Conductor and Cable Pulling Calculations," that states, "All conductors and cables installed using other than hand pull methods, hall require prior Owner-approved pulling calculations." | Section has been included stating:<br><br>"1. All conductors and cables installed using other than hand pull methods shall require prior OWNER's REPRESENTATIVE approved pulling calculations." |
| 32 | 26 05 33, 1.03 B. | Please change reference from 40 05 12 to 26 05 12, which is already in the specifications. | Change has been made. |
| 33 | 26 05 33, 1.04 A and 3.02 A. | Please consider adding references to NEIS standards - the NECA installation standards. | Reference of NEIS Standards has been included in both sections. |
| 34 | 26 05 33, 1.05 A and 2.01 B. | Please consider adding "Type DB" and "Type EB" to the list. | Reference to both Type DB and Type EB have been included in this section. |
| 35 | 26 05 53, Part 1 | Please complete mass of Part 1 and cite the proper standards, etc. | Section has been bolstered and includes referenced standards |
| 36 | 26 20 00, 1.06 A and C | Please cite the proper specification sections using the correct format (CSI 2004) and not the previous 5-digit specification section. | Proper sections have been referenced |
| | | | |
| **Mechanical Comments** | | | |
| 37 | 40 00 00 | Paragraph 1.04.A - Please consider adding the phrase "and appurtenances" after "All mechanical equipment. .. " | corrected, phrase "and appurtenances" has been included. |
| 38 | 40 05 13.11 | Paragraph 3.02.A - The reference that is cited is not correct. Please correct the reference or do not include it | reference removed, text corrected |
| 39 | 40 05 13.73 | Paragraphs 2.01.0.5 - Please consider deleting the table because it is in ASTM 01785. If table is to be retained, please double-check the information to make sure it matches ASTM 01785 for PVC Schedule 80 pipe. | Table retained, has been checked with ASTM 01785. |

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### 3.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 40 | 40 05 13.74 | Paragraph 2.01.G - Please check if the color PURPLE is the correct color to use. Typically, purple color is used for Reclaimed/Recycled water. | *in process of being addressed to provide clarity |

| Structural Comments | | | |
|---|---|---|---|
| 41 | 03 05 01 | Art 1.03 A 1-5 - Please delete these five (5) references to pre-stressed concrete tanks, as none are included in this project | addressed, references were deleted |
| 42 | 03 06 30 | There are no notes on Drawing S-101 as stated. Please verify (or delete and state "see drawings for details" as done on other items) the exact dimensions of the three dimensioned Project components listed. | to be addressed in accordance with new drawings |
| 43 | 03 06 40 | Please make the following corrections: BF-EW-1 is on Drawing W-507 and not on 501; G-EW-3 is on Drawing W-501 and not on 507. | corrections have been made |
| 44 | 03 06 40 | Please clarify if Jensen is the only manufacturer to be considered. If there are other manufacturers, please consider revising the Manufacturer and Model Number table heading to Jensen "or equal" if approved by the engineer of record. | Note has been included to state: "an alternative manufacturer may be used if approved by the OWNER's REPRESENTATIVE." |
| 45 | 03 15 00 | Art 2.05 Band C - Please clarify if there are any "or equal" products approved. | clarification provided to include "or OWNER's REPRESENTATIVE approved equal" |
| 46 | 03 15 00 | Art 3.02 - For contractor's clarity, this waterstop installation information and requirements should be included in specification section 03 15 13; Waterstops, and should not be split between these two sections so that nothing is overlooked. | All text regarding waterstops has been moved to section 03 15 13 |
| 47 | 03 15 13 | Art 2.03 - Please include a list of approved manufacturers of adhesive waterstops similar to what was done for PVC types. | Now states:<br><br>A. Preformed Plastic Adhesive Waterstops shall be manufactured by:<br>1. Greenstreak Plastic Products Division of Western Textile Products Company,<br>2. Burke Concrete Accessories Inc.;<br>3. Kirkhill Rubber Company; Williams Products Inc.; or equal. |
| 48 | 01 21 00 | Art 1.02 A 1 - Please add section 03 30 00, Cast-in-Place Concrete, as a related section. | Section added |

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**3.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 49 | 03 21 00 | Art 1.03 A -Include ASTM A615 for typical rebar. Also, coordinate with section 03 40 00, article 1.03 A 1, noting ASTM A706 rebar. If this type of bar is to be used in the precast components, it needs to be included in this steel reinforcement specification. | both comments in this section have been addressed. |
| 50 | 03 21 00 | Art 3.02 E 1 -It appears that the wording "... not less than every fourth intersection... " implies something different than intended. Please clarify this statement. | Now states, "Wall bars and slab bar intersections other than around the periphery shall be at no greater than the following maximum spacings (directed to table) |
| 51 | 03 30 00 | Art 2:03 - Please verify with geotechnical report that no specific types of aggregates are required due to soils. | Do we need to provide geotechnical report or is there one I need to reference? |
| 52 | 03 35 00 | Art 2.01 A - Please clarify if any "or equal" products are allowed. | Section now states: "Where specified, the sealer shall be Conspec #1, Thomson's Water Seal 201, or an OWNER's REPRESENTATIVE approved eqaul applied at a rate of 300 sq ft. / gallon for each coat." |
| 53 | 03 40 00 | Art 1.02 A 1 -Include sections 03 06 41 and 03 06 42 as related sections. | comment addressed |
| 54 | 03 40 00 | Art 1.03 A 1 - Please note that A615 rebar and not A706 is typically used. Please clarify if there a specific reason this is to be used in these precast products. | There is not specific reason, however A706 rebar has been been successfully used on a variety of precast concrete structural projects. A note including that use of A615 is also permitted for use as an alterative to A706 steel bars has been included. |
| 55 | 03 40 00 | Art 2.01 A 1 - Please include a 30 percent impact to the HS-20 loading criteria. Please clarify what the end of the last sentence is referring to as "calculations #31663." | comment addressed |
| 56 | 03 40 00 | Art 2.02 and other references to ASTM C-478 - Please clarify if the fabricator is to use A706 or A615 type rebar. | Now state "and reinforcing steel in accordance with ASTM A706 and ASTM C-478" |
| 57 | 03 40 00 | Art 2.06 A - Please note that H-20 wheel load is 16,000 pounds, not 8,000. Please clarify what is the referenced reinforcing steel type. Please make it clear to fabricators which components require A706. | Wheel load corrected, comment addressed to state, "The concrete shall have compressive strength of 5,500psi at 28 days and ASTM A615 reinforcing steel of minimum 60,000 psi." |

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**4.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Civil Comments** | | | |
| 58 | General | Please provide survey control. | Agree, we will include survey control on 17 February 2012 submittal<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 59 | General | Please provide drainage plan. | Will provide drainage plan using grading plan as a base.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 60 | C-101 | Please identify the project limits. | Provide dashed line on C-101, include in legend.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 61 | C-501 | Please define limits of overexcavation. | Include overexcavation on S-101 section C and provide pavement section as detail.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |

| | | | |
|---|---|---|---|
| **Electrical Comments** | | | |
| 62 | E-501 through E-505 | For each electrical service from the utility, please include the following on the Single Line Drawings: Load Calculation Table, Short Circuit Calculation, and Voltage Drop Calculation Table as these will be required for submission to Building Department Plan Check. | It was our intent to include these tables and calculations in the final submittal upon completion of access requirements.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| | | | |
| **Instrumentation and Controls Comments** | | | |

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**4.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 63 | W-521 | For UPRR Crossing No.2 shown (Detail 5), the detailed drawing cross section shows a single 4-inch PVC conduit while the description of pipes to be installed indicates three 4-inch rigid metal control conduits. If rigid metal conduit is required, please utilize PVC coated rigid metal conduits since this is a wet underground installation that also may be corrosive. In addition, the cross sections seem to show that the conduits will be used as supports for other steel casings, which may damage or deform the conduits. Typical conduit installations in a bore utilize bore spacers for ease of installation, support, and for securing the conduits. Please revise the detail to minimize the possibility of deforming or damaging conduits or consider a separate bore casing for conduits, and coordinate the descriptions with what is shown on the cross section. | This is an typographic error in Crossing No. 2 and should be a single 4-inch PVC conduit. The conduits will be installed within steel casing pipes as shown. The main casing pipe will be fitted with steel plates welded into the ends of each pipe section to serve as spacers as shown, and individual smaller steel casing pipes will be installed on these plates for carrying pipes and conduits.<br><br>We have worked with jack and bore contractors to develop this arrangement in order to minimize the number of bores that will be required.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 64 | W-522 | Details 4, 5, and 6 seem to be related information, and should be coordinated and combined into a single detail. Detail 5 refers to some Examples, A through D, which are not referenced. Detail 4 has Examples A through C, but no D. Detail 6 seems to contradict straight pipe lengths in Detail 4, and it uses different flow meter type names from Details 4 and 5. Please resolve the inconsistencies and combine into a single coordinated detail. | We will address the comment.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 65 | D-621 | Please provide a failsafe shutoff means to stop the groundwater flow to the treatment system to minimize the possibilities of overflows and subsequent spills from the containment area. In addition, the Influent Storage Tanks LAHH interlocks should be shown on the Extraction Well Pumps P&IDs. | We agree and will be adding a failsafe shut-off.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 66 | D-621 | Indicating lights, not defined on the legend, are shown connected to or associated with the Shared Display information for Influent Storage Tanks level alarms LAL and LAH, which should be the START and STOP for the Extraction Well Pumps and maybe their associated Feed Pumps; it is difficult to tell what the intent is. The actual alarms appear to be LAHH and LALL, yet they do not have an associated indicating light. Please confirm and provide the control strategy and revise the drawing as needed. | Critical comment will be discussed in Final Design discussions with EPA. |

**Mechanical Comments**

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**4.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 67 | W-501 through W-518 | Please make sure to provide insulation/isolation between the steel and stainless steel components at each wellhead. Welding of stainless steel to steel must not be allowed (see Detail 1 on W-511). | Critical comment will be discussed in Final Design discussions with EPA. |
| 68 | W-511 through W-517 (only odd numbers) | Please coordinate the size of the hole at the bottom of each vault with the corresponding size of the well steel casing and Detail 2 on Drawing W-524. | Will add hole and link seal dimensions to table on sheets.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 69 | All M Drawings | It is standard and common practice to add the name of the equipment along with its corresponding tag to each piece of equipment on the mechanical and P&ID drawings, thereby making it easier to review and coordinate. Please consider following this standard practice. | As discussed recently with EPA, only he major equipment will be labeled on the Mechanical Plan (Q-101) and the individual ID names and numbers will be saved for the detail sheets. |
| 70 | All W and M Drawings | Please fix all the callouts on the drawings that show the sections and details to be the drawing number(s) of the drawing where the section was cut or the detail was called out. | As discussed recently with EPA, callout boxes with sheet references will be added to the detail sheets. |
| 71 | M-300 Series | Please note that there should be a spool piece between a contiguous butterfly valve and 90-degree elbow. The same is true for contiguous butterfly valves and tees, and butterfly valves and reducers. Alternatively, relocate the butterfly valves away from fittings. | All butterfly valves are being eliminated in favor of gate, knife gate, ball, or plug valves.<br><br>Critical comment will be discussed in Final Design discussions with EPA. |
| 72 | M Drawings | Please note that the majority of the M drawings are still missing. Please clarify when they will be provided. | Critical comment will be discussed in Final Design discussions with EPA. |
| 73 | M Drawings | Several pumps are shown on the M drawings; however, the pressures for the system are to be determined (TBD) as indicated on the table on 0-602. After the pressures are determined,<br>please check that the equipment shown on the drawings meets the capacity requirements. This information will be needed for the electrical design as well. | Critical comment will be discussed in Final Design discussions with EPA. |
| 74 | M Drawings | Please note that the standard and common drawing practice is to show the equipment and piping as dark lines on the mechanical drawings. Please consider using this standard practice. | Critical comment will be discussed in Final Design discussions with EPA. |
| 75 | M-601 | Please clarify why all the piping in the vaults is stainless steel while uncoated carbon steel is being used at the treatment plant. | The vaults will be difficult to access, and therefore stainless steel part was selected to prolong the life of the vault parts. Carbon steel, which is less expensive than stainless steel, will be used in most of the treatment plant because it can be visually inspected and readily accessed for repairs. |

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**4.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 76 | M-602 and 603 | Please clarify why the valves are specified with Viton components, but the piping (400513.19, paragraph 2.01.C) calls for Kel-F or Teflon exclusively. | Critical comment will be discussed in Final Design discussions with EPA. |
| **Process Comments** | | | |
| 77 | D-601 | Treatment assumption note 9 states that, "vapor effluent limits are based preliminary treatment and risk calculations. These limits may be changed based on AQMD input." Please provide these risk calculations for EPA review to confirm that the proposed VGAC system will provide substantial compliance with SCAQMD regulations. | A draft risk assessment calculation package was submitted for EPA review in December 2011, and the Basis of Design Report includes the updated risk assessment calculations and discussion of input parameters. |
| 78 | D-601 | Please provide a Basis of Design Report such that the proposed treatment process can be validated. | A Basis of Design Report is included with this submittal. |
| **Structural Comments** | | | |
| 79 | General | Please refer to comments NO.9 through No. 11 on the previous submittal review of this project. These comments were the reviewer's critical items that had a response from the designer that they would be addressed as part of the Pre-Final Design submittal. There are no additional critical comments other than those previous comments on this Intermediate Design submittal. | Will be done by subcontractor, will have by 16 March 2012 submittal. |

**4.2 Noncritical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| **Civil Comments** | | | |
| 80 | C-101 | Fonts and line-types are inconsistent and should be fixed. In addition, some text is not legible and should be corrected. | Agreed. Drafter coordination is a priiority for Final Design.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 81 | C-101 | For the sake of clarity, existing items should be screened back while proposed new work should be in bold font for differentiation purposes. | Agreed. Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 82 | C-101 | Please identify the rectangle on the north side of the treatment plant between the sewer lines. | Identify in C-102, existing condition. Believe this is guard shack. Remove from C-101.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 83 | C-102 | Please note that the topographic lines should be screened back. Please also fix the "wipeouts" that are blocking text call-outs. | Agreed. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 84 | C-102 | Please identify saw cut line. | Limits of AC to be removed have been identified.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 85 | C-103 | Please note that the topographic lines should be screened back. | Agreed. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 86 | C-103 | Please add grading notes and BMP notes. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 87 | C-103 | Please note that the proposed grading contour elevations are masked-please make them readable. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 88 | C-104 | Please identify the waterline into the restroom. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 89 | C-104 | Please show the water main at the tie-in. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 90 | C-501 | Please identify the Drop Inlet as Jensen Products or equivalent. | Agreed. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 91 | C-501 | Please correct typographic error on "Foundry" on Detail 3. | Agreed. Non-Critical Comment will be discussed in Final Design discussions with EPA. |

| Electrical Comments | | | |
|---|---|---|---|
| 92 | E-001 | Please change the word "CONTACTOR to "STARTER" on the Wiring Symbols table for motor control. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 93 | E-001 | Please create a symbol for "CKT BKR" on the Wiring Symbols table and do not use the abbreviation; for example, the symbol from one of the one-line diagrams (see Sheet 149) to be consistent. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 94 | E-101 | The conduit routing at LADWP Meter and MCC-200 is not accurate or correct. Please revise to show all circuits for P-101 through P-125 as leaving MCC-200, not the LADWP Revenue Meter and Main switch. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 95 | E-501 - E-505 | Please correct the symbols for 480-volt, 3-phase breakers to be 15A/3P everywhere in the Electrical Single-Line Drawings. | Need to change symbol to match legend. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 96 | E-501 - E-505 | Please correct the symbol for Motor Overload to match the symbol table in all places. | Need to change symbol to match legend. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 97 | E-501 - E-505 | Please correct or revise the motor symbols for three-phase motors and single-phase motors because they do not match the symbol table on E-001. | Need to change symbol to match legend. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 98 | E-501 - E-505 | Well Pump Motors require a local disconnect switch within sight of the controller but no more than 50 feet away per the NEC. Please add a local disconnect switch to all well pump motors; the switch should be in a wellhead vault. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 99 | T-101 | Well Vault Digital Input/output (I0) listings show an "HOA Switch." These should be deleted because there are no physical switches; and they represent the well motor, which is already in the list. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| | | | |
| **Instrumentation and Control Comments** | | | |
| 100 | W-511 | The detail callout 3/W-519 seems to point to what looks like the Baski ASR valve control panel and nitrogen cylinders, which are detailed on Drawing No. W-523. Please verify this callout and revise as needed. | That is correct, we will revise the call out to direct to W-523.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 101 | W-523 | For Detail 1, please consider using a concrete pull box with a bottom and route conduits straight into the pull box in lieu of the open-bottom-type utilizing "nineties" to minimize pulling tension on long runs of cables and conductors. In addition, the pull box specification relies on the pull boxes and sizes being shown on the drawing. Please update the Electrical Plans with pull box sizes and locations and confirm sizes specified are in conformance with the California Electrical Code (CEC) Article 314. In addition, Note 3 refers to a "flexible conduit system" and in Section 26 05 33, Paragraph 2.01, C, 5 liquid-tight flexible, metal type conduit is specified. Please confirm that its use is in accordance with CEC Article 350, which limits the uses that are permitted. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 102 | W-527 | Please verify the type of conduit indicated. The CEC recognizes several types of metal conduits; however, "SCH 40" is not one of them. In addition, one of the conduit callouts indicates it is for "Fiber Optic Controls." Please confirm that the text for conduit and cable type (fiber optic cable?) is applicable, modify the drawing as needed, and include a specification for them. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 103 | D-611 and D-613 | Please clarify, what is a "DOUBLE SLAB-MOUNTED MEYERS BOX" or "SLAB-MOUNTED MEYERS BOX"? There is a residential and commercial service pedestal manufacturer named Myers Power Products, Inc.; however, the equipment shown seems to be beyond their manufacturing capabilities. The specifications do not seem to adequately address this equipment or the motor controllers and other ancillary components required for controls. Please verify the intent and modify the specifications and drawings to clearly indicate the electrical and control equipment requirements. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 104 | D-615 | Please correct the Electrical Signals for BF-EW-6 and UBA-EW-2 Extraction Well Vaults as continuing on Drawing No. 0-618 and not 0-617 as incorrectly shown. In addition, Instrument Tag Numbers, ISA letter identifiers and loop number, are typically associated with the equipment number and not a location such as the vault equipment numbers used. Please confirm that appropriate tagging conventions have been followed and revise the loop numbers and the off-sheet references as needed. | Will change continuation drawing number.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 105 | D-616 | Please confirm off-sheet references and revise as needed. | Will change from D-617 to D-618<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
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| 106 | D-621 | The RUN STATUS for the pumps' Shared Display has an "XA" for the ISA letter identifiers.· However, "A" is defined as an ALARM not a status. At the same time, "I" is defined as INDICATE, which seems to be the proper letter according to the ISA table provided. In addition, if two bubbles for local mounted instruments are part of the same instrument, the conventional depiction standard is to show the bubbles touching or possibly connected with a solid line. The level elements and level-indicating transmitters on tanks are shown separately, connected with an electrical signal. Please review the designations being used and confirm that standard conventions are being followed, and revise as needed to comply with the standards. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 107 | D-621 | Please confirm if motor over-temperature protection is required for the VFD supplied pumps in accordance with CEC Article 430.126. Please revise as needed. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 108 | D-621 through D-627 | A smaller font size has been used on these drawings, which makes the half-size drawing difficult to read. Please confirm if this meets the drafting standards for the project. Please consider making the font size the same as the other drawings for consistency and readability. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 109 | D-622 | Please show the piping identification on the Hydrogen Peroxide piping. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 110 | D-622 | Typically, small metering pumps are solenoid operated, and medium meter pumps are driven by SCR drives not VFDs as shown. Please confirm what type of metering pumps and features are being specified and revise the drawing accordingly. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 111 | D-623 | The pipe identification on the continuation from the previous sheet does not match the previous sheet. Please coordinate flow stream information between drawings. In addition, for air strippers to work effectively, sufficient airflow is required and should be monitored. An alarm and possibly system shutdown should be provided if airflow is insufficient. Also, no operation, control, or status information is indicated for the Shared Display. Please provide information for this equipment, as done for other treatment process equipment. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 112 | D-624 | The off-sheet reference "L" comes from Drawing No. 0-625 not from D-624·as shown. Please verify and revise as needed. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 113 | D-625, D-626, D-627, D-631 and D-632 | The legend indicates two different process piping line types. One for UNTREATED and one for TREATED GROUNDWATER. It seems that after the LGAC vessels, no additional treatment is provided, yet the UNTREATED line type is still being shown. Please follow what is indicated on the legend sheet or modify the legend to match the piping used on the drawings. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 114 | D-627 | Please correct the "LGAC Load Connection" to VGAC Load Connection. | Will change |
| 115 | D-631 and D-632 | The Baski ASR valve control panel has an internal pressure transmitter that seems to monitor the nitrogen gas pressure as shown on Detail 3, Drawing No. W-523. The P&ID appears to show a connection of some type to PT-1771, which is connected to the Injection line. Please confirm instrumentation and connections for the Baski ASR valve and show accordingly. In addition, please identify and show electrical signals from the PLC to the Baski ASR valve control panel for remote control, status, and alarms. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

| Mechanical Comments | | | |
|---|---|---|---|
| 116 | W-501 through W-510 | Please relocate callout 4 (with hexagon) to bottom of the section (pointing to the opening for the well casing); this will clarify that the opening is for the vault and not the lid. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 117 | W-501 through W-510 | Please coordinate the reference drawing numbers called out on the bottom portion of the bubble for all the details shown on these drawings. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 118 | W-511 through W-517 (only odd number drawings) | In the table with the list of hexagons, please clarify that for hexagon 4, the hole is at the bottom of the vault. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 119 | W-511 through W-517 (only odd number drawings) | Please coordinate the location of the section-cut for Section B shown on the plan view with the information that needs to be on the corresponding Section B. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 120 | W-511 through W-518 | Please coordinate the reference information on the callouts for both the details and sections. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 121 | W-511 through W-517 (only odd number drawings) | On the plan view, please identify the rectangle that has a callout with a 3 and W-519 pointing to it and two circles next to it, and show them on the corresponding Section A on Drawings W-512, W-514, W-516, and W-518. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
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| 122 | W-501 through W-518 | Please state that the traffic loading requirement for the manhole frames and covers is H-20 (same traffic rating as the concrete well vaults). | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 123 | Mechanical Schedules | The design process, internal review and coordination would be more efficient if the items in the schedules were arranged in an alphanumeric order and not randomly as currently presented. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 124 | M Drawings | Please coordinate all the callouts with the information shown on the Mechanical Schedules. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 125 | M Drawings | Please consider using the standard and common practice of showing equipment and piping as dark lines on the mechanical drawings. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 126 | All | All font type and size should be the same for all drawings. Also, please standardize the symbol for cut sections on all plan views (e.g., sections A and Bare shown on W-511 and W-513 differently from the way they are shown on W-515 and W-517). | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

| Pipeline Comments | | | |
|---|---|---|---|
| 127 | W-101 | Consider showing the 57-inch and 66-inch sanitary sewer (SS) as double lines for clarity.<br>Once they are surveyed and plotted on the profile, it appears that the jacking pit will have to move west, perhaps 20 feet or so, and the "shaded area" depicting the 42-inch jacked casing must be much deeper and perhaps 20 feet or so longer.<br>Please check the depiction and callout of the 66-inch sanitary sewer easement; it seems to overlap the pipe. It would be helpful" if it were adjacent to the 57-inch sewer easement. | The bore depth is much more shallow than the existing sanitary sewers.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 128 | W-103 | Check each utility called out in the plan view versus each utility called out in the profile view. There is currently great disparity.<br>Note: There are apparently quite a few utilities left to pothole. Because of their contents, it appears that potholing for all of them will be needed in order to complete the design, and it may be quite difficult for the potholer to accurately identify each separate pipeline.<br>It appears that bore or jacking pit is schematically shown at the high end and receiving pit at the low end; please check on this as those roles are normally reversed and it may affect the space requirements. | Potholing has been completed along the entire route. The only utilities shown on the profile of the intermediate design drawings were at the jack and bore location. The remaining pothole information will be included on the final design drawings with the remainder of profiles. The bore and receiving pits have been relocated on drawing W-103.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
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| 129 | W-105 | For the description of conduits heading east on W. 204th, please add one 4-inch PVC injection redevelopment pipeline. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 130 | W-109 | Note in the profile that there will be a host of utilities including major 57-inch and 66-inch sanitary sewers, plus a railroad right-of-way (ROW) to cross. Please consider that this may be a place where a jacked casing might be needed or required. Please clarify if the railroad always requires a casing even if there are no tracks. The only conduits are two 4-inch and one 2-inch, and they would only require about a 12-inch "casing." Alternatively, please consider if they could be "bundled" for HOD or micro tunnel direct burial for a total length of about 120 feet. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 131 | W-129 | The Torrance Lateral crossing references 5/W-524, which seems incorrect. Please correct this reference. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 132 | W-141 | Please identify permanent and temporary (construction) easements for Contractor. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 133 | W-148, W-149, W-150 | Where is the "culture" from the previous drawings, such as an apparent walking path, several cul-de-sacs, perhaps a retaining wall? | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 134 | W-151 | There appears to be an error on the profile stationing; please also check the ground profile. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 135 | W-153 | Please clarify the private road ends (e.g., with a curb or barrier). Define the ROW (limits for the Contractor since this appears to be a private road not a public road or ROW). | A note will be added to describe to the contractor the alignment is exiting private property and entering public right of way.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 136 | W-154, W-155 | Please show the permanent and temporary ROW or easements for construction for the Contractor. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 137 | W-156 | Del Amo has at least 11 utilities to cross and many of a "fuel" nature. Please clarify if this location is being considered for a casing or micro tunnel, perhaps using a bundle of two pipes and a control conduit. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 138 | W-161 | Please correct Detail 2/W-524 2/W-527. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| Comment No. | Location/Section | Comment | Response |
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| 139 | W-301 | This is excellent help for the Contractor to define how you intend to construct. Please consider if more details or a more generic "typical" detail are needed since there are many more configurations that are similar to these three. These appear to be specifically for unimproved areas; however, please clarify if they do not also apply to "improved" areas, with asphalt. Please clarify what the little reference box is for with callout of W-101, W-133, and W-144 | More trench details will be added as the profiles are prepared. The current profiles on W-301 were provided due to being located on Montrose property and not being dictated by existing utilities.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 140 | W-501 to W-518 | Apparently, this Contractor will drill all extraction and injection wells and then cap with a plain steel plate. Then he comes back at a later date and will set a precast vault over the wellhead. Finally, he will cut off the plate and attach the key wellhead flange as described. Accordingly, a detail showing this critical flange welding requirement is suggested. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 141 | W-520 | In Detail 5, please describe connection requirements for the1-inch double walled air release pipe to extraction pipeline. This air release valve installation appears to be a manual valve in a 4-foot manhole with lid that could be placed in the street. Often, small air release piping is routed to a location behind a sidewalk, within the street ROW, with a small slab on grade and a steel or composite "can" (about 18-inch-diameter by 30-inch-high) with lock to enclose the valve. Please consider this approach to provide continuous ARV access without impeding traffic. | It is agreed that an "off street" air release valve location is an option to consider. As the profiles are completed as part of the final design, air relief locations and options will be evaluated and ultimately the air relief details may need to be adjusted.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 142 | W-520 | In Detail 6, please describe connection requirement such as service saddle, or fused connection for the air pipe to mainline. See previous comment on typical installation for ARV in aboveground "can." | We will be using a tee for this connection.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 143 | W-521 | Detail 1 and/or 2 show ground or asphalt. Detail 3 shows depiction of preplanned holes; we suggest adding detail for inevitable field-cut holes. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

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| 144 | W-521 | In Detail 6, the California Department of Public Health (CDPH) current Guidelines for pipeline separation are in a memo dated October 6, 2003. In Figure 2, Case 1 of the memo, New Sewer Main (which in this case would be extraction pipeline), we interpret the regulations to state that (a) a new crossing above is prohibited from being 4 inches or less clearance, and (b) a new crossing more than 4 inches must meet a criteria of "no joints" for 10 feet on either side of the water main, which for DCHDPE or HDPE could be accomplished in either case, without need for a steel casing (Guidelines Case 1, Zone C, item 2, Zone D Option 1). Additional protection for HDPE, such as a steel casing, may be provided but does not appear to be required. Please review the CDPH requirements for compliance. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 145 | W-523 | In Detail 3, please clarify if the stainless steel tubing is going to/from a pump or to a downhole Baski (injection/extraction) valve. | Will change. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 146 | W-523 | In Detail 5, under "advantages," it seems to describe that "up to 4-inch pipe" is acceptable and "many" 6-inch pipe materials may be as well. Please confirm that all the pipe sizes, especially double-walled HDPE where used, have been verified for acceptance by this Connector. The concept looks very good as a means to avoid field-patched pipe/conduit penetrations, when applicable. | It was confirmed that the Z-lok cast in place pipe connectors are available in the necessary pipe sizes needed for this project. The detail note will be adjusted.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 147 | W-527 | In Detail 1, please clarify the reference drawing because the current drawing is incorrectly referring to itself. Please check if Detail 1 should reference W-129-EXT instead. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 148 | C-101, C-103, C-104 | On all of these sheets, it appears that the injection and extraction piping both cross the railroad tracks and then parallel the railroad along the Normandie Street. Please confirm that our understanding is correct. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 149 | W-301 | The lettering is too small. Please increase the font size. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

| Process Comments |
|---|

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| 150 | D-602 | The Process Flow Diagram (PFD) shows a moisture-reduction step upstream of the vapor-phase carbon adsorbers (VGAC). This moisture-reduction step requirement is not indicated on this drawing or in the specifications. Please consider the use of an induced draft air stripper blower located between the air strippers and the VGAC system. The blower heat of compression may be sufficient to reduce moisture in the VGAC system (e.g., reduce relative humidity to about 50 percent), thereby eliminating the need for a separate moisture-education step and simplifying the treatment process. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |

| Structural Comments | | | |
|---|---|---|---|
| 151 | | Please refer to the (45) comments on the previous submittal of this project. The majority of the responses to these comments were deferred to the Pre-Final Design. As discussed above, deferring responses to the late stages of the design process is not appropriate. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 152 | S-101 | The dimension and note font sizes are extremely small. I believe this will make it difficult for the Contractor when he uses half-size drawings in the field. Please consider increasing the font size. | Agreed Will change scale and spread these details over additional sheets/details.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 153 | S-101 | The overall dimension string of 226'-1" does not match either the 225'-10" string total in Section A or the 228'-5" string total in Section B. Please verify and coordinate. | Will verify. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 154 | S-101 | Please clarify why Note 1 (regarding treatment of arsenic) is shown on this structural drawing. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 155 | S-101 | Please make sure that all of the intended top-of-concrete elevations are clear to the foundation Contractor, including all slopes to drainage items. | Will provide additional spot elevations on concrete slab. Need additional input from design team regarding any restrictions on housekeeping pad/tank foundations.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 156 | S-101 | In general, the pad sizes are noted but they are not all pinned down/located in the N/S direction and not at all in the E/W direction. This needs to be done. | Additional dimensioning will be provided to locate each of the features in plan view.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |

**Response Date:** February 3, 2012
**Comment Date:** October 20, 2011
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Intermediate Design Drawings
Montrose Chemical and Del Amo Superfund Sites
Dual Site Groundwater Operable Unit
Torrance, CA
**Reviewer**: U.S. EPA

**4.1 Critical Review Comments**

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 157 | S-101 | The 7-inch curb width shown on the left side of Section C does not coordinate with the typical 9-inch-wide curb shown on Detail 1 1S-501. Please resolve this discrepancy. | The 7" dimension is an error. Will resolve.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 158 | S-101 | Section C ~ the drainage trench (running through the slab in the N/S direction) shown at the center of the section does not look like that shown for it on Section AI S-502. Please resolve inconsistency. | There is some vertical exaggeration in section C. This can be addressed when additional sheets/details are prepared.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 159 | S-101 | Please locate the trench detail either on the Plan (including the locations where it kinks on the south side) and/or on Section C. | Will provide these additional dimensions both in the plan and section view.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 160 | S-101 | Please identify the component shown on the north side, just to the east of the ramp detailed in 1/S-502. There is no reference to it or any dimensions noted. | Transformer pad. Will provide foundation details for proposed pad.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 161 | S-101 | Section B line on the Plan needs to drop down on the sheet (to the east) to coordinate with what is actually shown on the section at the south side, which is the 53-foot O-inch long pad. It is currently taken through the sump shown on Sections A and B on Drawing S-501. Please revise. | Increase number of section lines. Minimize projection to section line.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 162 | S-101 | Please show the 2-foot 2-inch dimensions from the outside face of curb to the expansion joint (per Detail 1 I S-501) on both sides of Sections A and B for clarity of the dimension strings so everything gets located correctly without any misinterpretation. | Will provide appropriate dimension.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 163 | S-101 | There is a small Jenson box shown on Section A I C-501 at the west end of the treatment foundation but nothing is shown on Drawing S-101 at this location that the section is cut. Please coordinate. | Details are shown for this feature on the series. Will add to this plan view as a shaded back feature.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 164 | S-101 | Section A / C-501 shows a curb on the far outside west edge of the truck ramp but no line work for this curb shows on Drawing S-101. Please coordinate. | Will provide additional detail in plan view of truck ramp regarding this curb.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |

## Summary of Response to Comments on Previous Comments
## Received from U.S. EPA October 20, 2011
## Dual Site Groundwater Operable Unit
## Intermediate Design Drawings

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### 4.1 Critical Review Comments

| Comment No. | Location/Section | Comment | Response |
|---|---|---|---|
| 165 | S-102 | For Details 1 and 2, please clarify if there is any grout under the steel column base plates. | Foundation details these features are not yet complete.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 166 | S-102 | In Detail 1, please point to the base gusset plate correctly. | Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 167 | S-501 | In Detail 1, a note referencing the plan for the curb height is provided; however, the elevations of the foundation slab that would provide this height for the Contractor are not all shown. Please provide this information. | The top of curb and top of slab elevations shown on sheet C-101 are to be used. The height shown here is typical.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 168 | S-503 | In Section A, please resolve the discrepancy between the overall length of the ramp shown as 215 feet-10 % inches when it is shown as 226 feet-1 inch on S-101. | Will check and resolve. Non-Critical Comment will be discussed in Final Design discussions with EPA. |
| 169 | S-503 | No curbs are shown here (N/S ends); however, they are shown at the west end per Detail 1 / C-501. Please coordinate this information. | Dashed line is projection of west curb. No curbs are proposed at north and south. Will provide appropriate call out.<br><br>Non-Critical Comment will be discussed in Final Design discussions with EPA. |