FINAL
Phase 2 Treatability Study Report
Aerojet GET E/F Treatment Facility
Sacramento, California

Prepared for:

U.S. Environmental Protection Agency
Region IX

Prepared for:

Baldwin Park Operable Unit Cooperating Respondents
San Gabriel Basin, California

Harding ESE Project No. 52296 4.1

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CONTENTS

EXECUTIVE SUMMARY

The Baldwin Park Operable Unit Cooperating Respondents (BPOUCR), the U.S. EPA Region IX (EPA), and the Main San Gabriel Basin Watermaster (Watermaster) are collaborating on a groundwater extraction, treatment, and water supply project in the San Gabriel Basin of California to extract groundwater, remove perchlorate, nitrate, volatile organic compounds (VOCs), n-nitrosodimethylamine (NDMA), and 1,4-dioxane from the extracted groundwater, and supply this treated water to local water companies for potable use.

Perchlorate was discovered in basin groundwater in 1997 when no treatment technology was available to reduce perchlorate concentrations to drinking water action levels. Aerojet-General Corporation (Aerojet), with the other BPOU Cooperating Respondents, initiated a Phase 2 Treatability Study to demonstrate the potential of a biological reduction process to remove perchlorate from groundwater and demonstrate that a treatment train containing a biological process could produce water of potable quality.

The primary objectives of the Phase 2 Treatability Study were to: (1) demonstrate that the proposed treatment train effectively and reliably produces potable water pursuant to all applicable state and federal regulations, (2) confirm the treatment efficiency of each unit process in the treatment train, and (3) collect data to develop design criteria and operational procedures for a full-scale treatment facility. The Phase 2 Treatability Study was conducted over an eight-month study period at the Aerojet Sacramento facility with a pilot-scale treatment train consisting of a fluidized bed bioreactor, a multimedia filter, an air stripper, an ultraviolet light system with ultraviolet/oxidation (UV/OX), a liquid phase granular activated carbon (LPGAC) contactor, and a disinfection system.

The fluidized bed granular activated carbon bioreactor used biological reduction to remove DO and to transform nitrate and perchlorate into non-toxic compounds. The Phase 2 bioreactor consistently produced water with undetectable nitrate and perchlorate concentrations. A biofilm model was developed for the bioreactor and calibrated with data collected during the treatability study as well as data collected from the other bioreactors at the site. The calibrated biofilm model was used to perform several sensitivity analyses for the pilot scale bioreactor. The model and analyses indicated that the performance of the biological reduction process could be predicted and the pilot scale bioreactor was operating with a safety factor of approximately 1.5 with respect to influent concentrations of oxygen, nitrate, or perchlorate. Process stability and reliability regarding removal of nitrate and perchlorate under varying conditions was established during the treatability study.

The multimedia filter was designed to remove suspended solids consisting of waste biomass and granular activated carbon (GAC) fines present in the effluent from the bioreactor and to provide biological degradation of residual ethanol and metabolic breakdown products not fully removed in the bioreactor. Total organic carbon (TOC) and DO measurements showed that biological activity was occurring in the filter, indicating that residual organics were degraded. The multimedia filter reliably removed suspended solids and produced water that would meet the turbidity requirements of the California Department of Health Services (DHS) Surface Water Treatment Rule (SWTR).

The air stripper was designed to remove VOCs, primarily trichloroethylene (TCE) and chloroform. The air stripper was added during the study upstream of the UV/OX system as an alternative technology to UV/OX for VOC removal. Air strippers are typically of relatively low cost compared to other processes capable of removing VOCs, so an air stripper was selected to enhance the treatment of VOCs in the treatment train. The pilot-scale air strippers used in the Phase 2 treatment train consistently removed VOCs to below maximum contaminant levels.

The UV/OX system was designed to remove NDMA and 1,4-dioxane. Initially, the UV/OX system was also evaluated for removal of VOCs but was later replaced by the air stripper for this function due to low chloroform removal through the UV/OX. Low pressure mercury vapor UV lamps were pilot tested during this Treatability Study as an alternative to medium UV pressure lamps. Although both low pressure and medium pressure UV lamps are commercially available, medium pressure lamps have been more commonly used in treatment of water for chemical removal, while low pressure lamps have been more commonly used for disinfection. The UV/OX pilot study demonstrated the effectiveness of low pressure UV lamps in the removal of NDMA and 1,4-dioxane to below action levels. The low pressure lamps were as successful as medium pressure lamps in treating NDMA and 1,4-dioxane while requiring approximately an order of magnitude less in operating electricity.

The LPGAC system was designed to remove any remaining VOCs, VOC breakdown products, and any other organic compounds in the UV/OX effluent by adsorption onto the GAC or by biological processes. The LPGAC was also evaluated for removal of taste and odor. Prior to installation of the air stripper, the LPGAC unit process experienced relatively short run times due to breakthrough of chloroform. Following installation of the air stripper, GAC replacement was not necessary for the remainder of the study. A flavor profile analysis showed that the LPGAC system improved flavor characteristics from a very weak wet paper taste to an extremely weak sulfurous taste. Odor was undetectable for both the influent and effluent of the LPGAC.

The reclamation system was designed to treat multimedia filter backwash and filter-to-waste water. The reclamation system treated both of these streams to remove suspended solids. The reclaimed water was returned to the process upstream of the multimedia filter. The reclamation system consisted of coagulant and polymer feed systems and an inclined plate clarifier. Several coagulants were tested during the study and a combination of aluminum sulfate (alum) and a cationic quaternary ammonium compound polymer (poly[DADMAC]) provided the most effective solids removal. Turbidity was reduced through the reclamation system by approximately 75 to 85 percent. For the pilot system, the solids were returned to the GET E/F treatment train. For a full scale system, the solids could either be discharged to sewer or further reduced by a filter press to produce a cake.

The disinfection system was designed to create product water similar to that produced by a full-scale potable water treatment facility with the same treatment processes. This treatment step was provided to model the operation of a disinfection system, establish chlorine dose and required contact time, and quantify the formation of significant disinfection by-products (DBPs). The water produced during the study was effectively disinfected without the production of DBP. This system demonstrated that groundwater containing the organic compounds present at the study site and with similar treatment the water in the BPOU can be treated to a quality exceeding drinking water standards.

The last primary objective of the treatability study was to collect data for the design and construction a full-scale treatment facility. These data were collected by adjusting system throughput and increasing the efficiency of unit operations while maintaining treated water quality objectives. During optimization each unit process was monitored for response to operational problems and perturbations. Criteria for full-scale unit process design were developed that incorporated results of the optimization studies and anticipated variances in conditions between the pilot study site and BPOU.

The operation of the Phase 2 Treatability study demonstrated that the unit processes were effective in achieving their target removals for perchlorate, nitrate, VOCs, NDMA, and 1,4-dioxane in accordance with all applicable state and federal regulations.

1.0 INTRODUCTION

BPOUSP, the EPA, and Watermaster have been planning a combined groundwater remediation and water supply project in the BPOU portion of the San Gabriel Basin, California. Project planning was initiated in response to a requirement by the EPA to remediate various plumes of VOCs in groundwater in the BPOU. These plumes extend from north of Interstate 210 in the City of Azusa southwest, to locations in the vicinity of Interstate 10 in the City of Baldwin Park.

In June 1997, concentrations of perchlorate ion were detected in BPOU groundwater above the recently issued State of California Department of Health Services (DHS) action level of 18 micrograms per liter (µg/l). Before the BPOU project could move forward, the potential impact of perchlorate on the conceptual project design needed to be evaluated. At the time it was discovered in BPOU groundwater, perchlorate was considered troublesome because no treatment technology had effectively demonstrated the ability to reduce concentrations of perchlorate to the action level.

In 1997, pilot-scale perchlorate treatability testing was performed at the Aerojet facility near Sacramento, California. The technology tested was a biological reduction process using a fixed film attached to granular activated carbon, operated as a fluidized bed (GAC/FB) bioreactor. This pilot-scale test demonstrated the technology was effective in treating perchlorate in groundwater. However, several differences exist between the objectives of the previous pilot-scale work and the current objectives of the BPOU project. First, the pilot-scale study flow rate was 0.1 percent of that needed in the San Gabriel Basin. Second, the influent perchlorate concentration was greater than that expected in the San Gabriel Basin. Third, the pilot system was not designed to achieve, nor did it achieve effluent perchlorate concentrations less than the 18 µg/l action level. Finally, the previous testing was not designed to document that the treatment process produced potable water.

To further develop the biological reduction process for application in the San Gabriel Basin, a Phase 1 Treatability Study was performed between November 1997 and May 1998 at Aerojet's Sacramento, California facility. The results of this study are documented in *Final Phase 1 Treatability Study Report* (Harding Lawson Associates [HLA], 1999a). In summary, the Phase 1 Treatability Study demonstrated that the biological reduction method using GAC/FB technology successfully reduced low concentrations of perchlorate to concentrations below the 4 µg/l laboratory reporting limit. At the same time, concentrations of nitrate were reduced from approximately 10 milligrams per liter (mg/l) (as nitrogen) to less than the laboratory reporting limit of 0.1 mg/l. Additionally, the alternative source of microorganisms used for the biological process proved to be satisfactory in building the microbial population needed to destroy perchlorate and nitrate. Operational parameters (e.g., hydraulic retention time, recycle ratio, ethanol dose, and phosphorus dose) were evaluated to establish design criteria necessary for successful treatment of groundwater. The Phase 1 Treatability Study identified several monitoring parameters that could be used as indicators to optimize system performance.

Although a considerable amount of information was obtained from the Phase 1 Treatability Study, several important issues required further evaluation, prompting a second phase of treatability testing. The Phase 1 flow rates were still too low to allow for scale-up to the full-scale flow. The design flow rates used for the Phase 2 Treatability Study were selected to allow for scale-up of the pilot-scale design to the full-scale system design. Most importantly, the Phase 2 system includes all of the unit processes required to produce potable water while the Phase 1 system was not designed to produce potable water.

The Aerojet Sacramento Facility has several operating groundwater extraction and treatment (GET) systems. The Phase 1 treatability study was performed at GET B. The Phase 2 system was constructed at GET E/F. A water quality comparison between GET E/F water quality and expected water qualities in the BPOU is presented Table 1. GET E/F is an operating treatment facility that includes biological treatment for perchlorate removal, continuous backwash sand filters for suspended solids removal, UV/OX for NDMA removal, and air stripping for VOC removal. The Phase 2 system utilizes the biological treatment component at GET E/F by removing a slipstream immediately downstream of one of the four existing bioreactors at this facility. The bioreactor used for the Phase 2 system is known as fluidized bed reactor number four (FBR-4). The slipstream is treated by the Phase 2 system and returned to the GET E/F system.

Following issuance of the Draft Phase 2 Treatability Study Work Plan in May 1998, NDMA and 1,4-dioxane were detected in BPOU groundwater. The discovery of NDMA prompted a change in the treatment strategy proposed for the Phase 2 Pilot System. NDMA is neither effectively adsorbable nor strippable, but can be effectively destroyed by UV radiation, which, with the addition of an oxidizing chemical (e.g., hydrogen peroxide), is additionally an effective treatment for removal of VOCs and 1,4-dioxane. Therefore, air stripping, which was originally proposed for removal of VOCs, was replaced with UV/OX. During the study this strategy was reversed and an air stripper added to the treatment train to remove concentrations of chloroform not effectively removed by UV/OX. LPGAC contactors were present at the end of the treatment train for removal of any VOCs not removed in upstream processes. Because the concentrations of NDMA and 1,4-dioxane were not known at GET E/F, a chemical feed system was installed in the Phase 2 system to add these chemicals, if required.

The Phase 2 Treatability Study was conducted over an eight-month study period at the Aerojet Sacramento facility with the final pilot-scale treatment train consisting of a bioreactor, a multimedia filter, an air stripper, an ultraviolet light system with oxidation (UV/OX), a liquid phase granular activated carbon (LPGAC) contactor, and a disinfection system. A process flow diagram showing both the GET E/F system and the final Phase 2 system is presented in Figure 1.

Following this introductory section, Section 2.0 reiterates the Phase 2 objectives that were originally presented in the Phase 2 Treatability Study Work Plan. Section 3.0 provides descriptions of each of the unit processes used in the Phase 2 treatment train. Section 4.0 presents the data collected and provides data interpretation for each of the optimization studies performed as well as overall data interpretation for the entire treatment train. Section 5.0 presents a brief summary and conclusions.

2.0 PHASE 2 TREATABILITY STUDY OBJECTIVES

The Phase 2 Treatability Study objectives were to demonstrate that the proposed treatment train effectively and reliably produces potable water pursuant to all applicable state and federal regulations, to confirm the destruction/removal efficiency of each unit process in the treatment train, to optimize the system operating parameters, and to collect data for the design and construction of a full-scale treatment facility.

2.1 Confirm Destruction/Removal Efficiencies

The primary objective of the Phase 2 Treatability Study was to confirm the ability of the treatment train to remove or destroy the contaminants of concern including nitrate, perchlorate, VOCs, 1,4-dioxane, and NDMA, and to produce treated water that meets drinking water standards. Because each unit process in the treatment train treats specific contaminants, the water quality for each unit process, as well as for the overall system, was tested during the pilot study.

Individual unit operations and the contaminants to be removed by each system are summarized below:

- **Bioreactor**
  - Nitrate
  - Perchlorate
- **Multimedia Filter**
  - Suspended Solids
  - Ethanol and breakdown products
  - Pathogens (if present)
- **Air Stripper**
  - VOCs
  - DBP Precursors

- **UV/ Oxidation System**
  - VOCs
  - NDMA
  - 1,4-dioxane
- **Liquid Phase Granular Activated Carbon**
  - VOCs
  - DBP Precursors
- **Disinfection System**
  - Pathogens (if present)

2.2 Establish Operating Parameters

A second objective of the Phase 2 Treatability Study was to collect data to optimize the operation of each unit process and the treatment system as a whole. This objective was accomplished by varying the operating conditions for each unit process and using the readings from local instrumentation and the results from sample collection and analysis to evaluate system response. The optimization focused on maximizing system throughput and efficiency of unit operations while maintaining treated water quality. It also included characterizing the treatment process response to plausible operational problems and perturbations to verify the Phase 1 findings. Optimization procedures included variation of physical parameters such as flow rates, hydraulic loading rates, and chemical feed dosages to affect system performance. Optimization procedures also included measurement of parameters such as pH, oxidation-reduction potential (ORP), and DO (DO), and sampling for a multitude of analytes to assess system performance.

The following is a summary of key operating parameters for each unit process. Each listed parameter followed by a (v) can be varied to affect system performance. Listed parameters followed by a (p) signify that the parameter is an indicator of system performance, but is not a parameter that can be adjusted to control system performance.

- **Bioreactor**
  - Recycle ratio (v)
  - Ethanol dosage (v)
  - Nutrient (phosphorous and organic nitrogen) dosage (v)
  - Hydraulic loading rate (v)
  - Nitrate concentration (p)
  - Perchlorate concentration (p)
  - Sulfide concentration (p)
  - DO profile (p)
  - ORP profile (p)
  - Turbidity (p)
  - Total and dissolved organic carbon concentration (p)
  - Ethanol (and breakdown products) concentration (p)
  - Mean cell residence time (p)
  - Substrate utilization rate (p)

- **Multimedia Filter**
  - Surface loading rate (v)
  - Polymer dosage (v)
  - Filter cycle time (v)
  - Filter backwash procedures (v)
  - Turbidity (p)
  - Total and dissolved organic carbon concentration (p)

- Particle count (p)
- Ethanol (and breakdown products) concentration (p)
- Suspended solids (p)
- Virus and bacteria removal (p)
- DO concentration (p)

• **Air Stripper**

- Air – water ratio (v)
- Temperature (v)
- Gas pressure drop (v)
- VOC concentrations (p)

• **UV/ Oxidation System**

- UV power (v)
- Hydrogen peroxide dosage (v)
- VOC concentrations (p)
- NDMA concentration (p)
- 1,4-dioxane concentration (p)
- Concentration of breakdown products (e.g., aldehydes) (p)

• **Liquid Phase Granular Activated Carbon Vessel**

- VOC concentrations (p)
- GAC bed life (p)

• **Disinfection System**

- Sodium hypochlorite dosage (v)
- Chlorine contact time (v)
- Microbial water quality (p)

- Residual free and total chlorine concentration (p)
- Trihalomethane formation potential (THMFP) (p)
- DBP concentration (p)

2.3 Collect Data to Support Use of Process for Potable Water Treatment

Another objective of the Phase 2 Treatability Study was to demonstrate a reliable, stable treatment process and to collect data to support the use of this process for potable water treatment. Regarding the use of this treatment train for potable purposes, the formation of DBPs and the microbiological water quality of the treated water are important factors. DBPs were evaluated by directly analyzing for specific DBPs and by testing the THMFP (also referred to as the total potential trihalomethanes [TPTHM]) of the water. Modifying one or more system operating parameters (e.g. chemical dosages, pH, and type of disinfectant) can often mitigate DBP formation. The absence of flocculation and sedimentation in the treatment train required that the proposed filtration system be rigorously tested to demonstrate its effectiveness in removing DBP precursors.

The biological population in the existing GET E/F bioreactors was characterized to identify the microorganisms present with particular attention paid to whether human pathogens were present. The existing GET E/F bioreactors were inoculated using sludge from a jelly processing plant. This source of microorganisms was selected due to the stringent monitoring for human pathogens in the food processing industry. The characterization of the biological population included bacteriology (total and fecal coliform and heterotrophic plate count), giardia and cryptosporidium, viruses, and coliphage. Possible formation of taste, color, and odor and the potential for biological re-growth in the distribution system were also evaluated.

2.4 Collect Data to Support Design of Full-Scale System

The final objective of the Phase 2 Treatability Study was to collect data and practical operating information to support the design, construction, and operation of a full-scale treatment system. The information collected during operation of the Pilot System including analytical data, instrument readings, power consumption data, removal efficiencies, hydraulic loading rates, control logic functionality, and maintenance requirements are intended to be taken into consideration during the conceptual and detailed design of a full-scale treatment system.

2.5 Additional Data Collection and Interpretation Activities

The following issues were also targeted for evaluation as part of the Phase 2 Treatability Study:

- Collection of data to develop an operating Electrical Energy per Order (EE/O) for the UV system in the presence of hydrogen peroxide
- Assess the interactions of peroxide, UV light absorbance, and the increase of EE/O requirements for NDMA and 1,4-dioxane removal
- Address the potential for the presence of intermediates or breakdown products, and monitor for their presence at various locations along the treatment train
- Assess the potential for NDMA reformation
- Assess the reliability of the bioreactor to produce repeatable results following upset events
- Assess the stability of the bioreactor with respect to consistent day-to-day operation.

3.0 TREATMENT SYSTEM DESCRIPTION

This section contains a discussion of each treatment system unit process. The unit processes include a bioreactor, a multimedia filter, an air stripper, a UV/OX unit, a LPGAC contactor, a disinfection system, and a backwash reclamation system. A process flow diagram of the phase 2 system is presented in Figure 1.

3.1 Bioreactor

The Phase 2 treatment system utilized fluidized bed reactor 4 (FBR-4) at Aerojet's GET E/F Facility. The cylindrical stainless steel bioreactor is 14 feet in diameter, approximately 22 feet tall, with a fluidized bed depth of 15 feet. The influent groundwater is fed into the bottom of the reactor through a network of nozzles and the upward velocity of the water fluidizes the GAC media contained in the reactor. The fluidized media provides extensive surface area for growth of microorganisms. The total design flow rate for this bioreactor is 1,800 gallons per minute (gpm) based on the fluidization requirements of the GAC media and is not variable. Bioreactor forward flow is variable depending on the desired recycle rate. For example, a bioreactor forward flow rate of 1,200 gpm would correspond to a recycle flow of 600 gpm, or 33 percent of the total flow. The Phase 2 Treatability Study included an optimization study of the forward flow rate up to 1,440 gpm, corresponding to a 20 percent recycle rate. The corresponding empty bed contact time (EBCT) was approximately 12 minutes.

FBR-4 contains a biogrowth control system to control the fluidized bed depth and the amount of biomass in the reactor. As biomass accumulates on the GAC particles, the fluidized bed height increases. To control the fluidized bed level, the biogrowth control system shears excess biomass from the GAC. Bioreactor bed height control is accomplished using an eductor system that shears biomass from the GAC and discharges clean GAC and sheared biomass back into the reactor. The clean GAC is less buoyant than the biomass-coated GAC and sinks toward the bottom of the bioreactor. The sheared biomass is carried out of the bioreactor in the effluent.

The original waste biomass collection system provided by the manufacturer for the bioreactor was designed to operate with the original airlift style bed height limiters installed in the bioreactor. These original bed height limiters did not adequately control the bed height, either because the agitation was not sufficient to shear biomass from the GAC, or because the bed level at which the air lifts were drawing GAC was not where the bulk of the biological growth was occurring. Since the airlift system was not shearing biomass from the GAC, the original waste biomass collection system also did not function as designed.

A modified waste biomass collection system was installed to work with the eductor-type bed height limiter. The modified system utilized a wedge wire screen to separate the clean GAC and the sheared biomass. The clean GAC was directed back into the bioreactor and the sheared biomass was routed directly to the Phase 2 reclamation system, bypassing the multimedia filter. However, the wedge wire screen deflected most of the sheared biomass back into the reactor and this system also could not be utilized for separating and collecting waste biomass. A further improvement to this system would be to use a parabolic screen that allows the sheared biomass to fall through the screen while the clean GAC is pushed off the end of the screen. The project schedule did not allow time for this system to be designed, fabricated, installed and tested as part of the treatability study. However, parabolic screens are well established and could readily be incorporated into a full-scale bioreactor design. Collecting waste biomass separately would likely result in more consistent filter runs since the filter would not receive biological solids spikes during eductor operation.

The Phase 2 Treatability Study included focused studies to identify reliable process control parameters for the bioreactor. Possible process control parameters included influent and effluent ORP, DO, nitrate, and sulfide. The focused studies were designed to determine if correlations exist between the possible control parameters and bioreactor performance and evaluate the feasibility of using these control parameters in a full-scale application.

Ethanol was added to the groundwater upstream of the bioreactor as a carbon source for biomass growth. The ethanol dose was based on the bioreactor forward flow rate and the influent concentrations of oxygen, nitrate, and perchlorate. The DO in the influent groundwater was quickly utilized via aerobic breakdown of the ethanol, creating an anoxic condition in the bioreactor. Under these conditions, facultative organisms utilize nitrate and perchlorate as electron acceptors while metabolizing ethanol. Nitrate is reduced to nitrogen gas, and perchlorate is reduced to chloride ion. Nutrients (phosphorous and nitrogen) can also be added upstream of the bioreactor to satisfy the minimum nutrient requirements of the biomass, if required. Initial nutrient doses were based on the bioreactor manufacturer's recommendations. The Phase 2 Treatability Study included focused optimization studies for both ethanol and nutrient requirements.

The bioreactor was the first unit operation in the treatment train because nitrate interferes with the UV/OX system and the lower DO levels present in the groundwater are conducive to developing anoxic conditions within the reactor. Minimizing influent DO concentration also minimizes the contact time required in the bioreactor and reduces the required ethanol dosage. Low influent DO concentrations ensure that aerobic activity is limited to a small portion of the bottom of the bioreactor, leaving most of the bioreactor column available for nitrate and perchlorate reduction.

Following treatment in the bioreactor, a post-aeration tank was used to raise the DO level in the water to a concentration (approximately 4 to 5 milligrams per liter [mg/l]) sufficient to maintain aerobic conditions in the multimedia filter, which was operated in a biologically active mode. In the aeration tank, air was gently sparged into the water using fine bubble diffusers to raise the DO level while minimizing stripping of VOCs. The aeration tank was covered and vented through a vapor phase GAC adsorber.

3.1.1 Biofilm Model

A biofilm model was developed to aid in bioreactor performance evaluation, provide a means of performing sensitivity analyses, and allow for scale-up of the treatment process. Development of the model included defining the stoichiometry of the reduction processes, estimating or measuring the required model parameters, and developing procedures for solving the biofilm kinetics equations involved. Model development was based on procedures presented by Rittman and McCarty (2000).

3.1.1.1 Stoichiometry

The first step in developing the biofilm model included a rigorous procedure for developing the stoichiometry of oxygen, nitrate, and perchlorate reduction specific to the bioreactor used in this study. This procedure utilizes reaction energetics, endogenous decay rate, and biomass detachment rate to estimate the ethanol fraction used for cell synthesis and the ethanol fraction used for energy. Biomass detachment rate is further correlated with particle density, porosity, and specific surface area of the fluidized media bed. These calculations are presented in Table 2 and result in an estimated 47 percent of the ethanol used for cell synthesis and 53 percent of the ethanol used for energy conversion. Since the endogenous decay rate varies with water temperature, these percentages are valid only for a water temperature of 19 degrees C, the average temperature for the treatability study. The Final Phase 2 Treatability Study Work Plan preliminarily assumed values of 30 percent and 70 percent, respectively. Based on the revised ethanol usage fractions, the balanced stoichiometric equations were revised (Table 2) as follows:

$$O_2 + 0.126\ NO_3^- + 0.628\ CH_3CH_2OH + 0.126\ H^+ \rightarrow 0.126\ C_5H_7O_2N + 0.625\ CO_2 + 1.506\ H_2O$$

$$NO_3^- + 0.678\ CH_3CH_2OH + H^+ \rightarrow 0.137\ C_5H_7O_2N + 0.432\ N_2 + 0.674\ CO_2 + 2.057\ H_2O$$

$$ClO_4^- + 0.253\ NO_3^- + 1.257\ CH_3CH_2OH + 0.253\ H^+ \rightarrow 0.253\ C_5H_7O_2N + Cl^- + 1.249\ CO_2 + 3.012\ H_2O$$

Based on this revised stoichiometry, the following empirical equations describe the theoretical ethanol requirement, cell yield, and nitrogen requirement (as nutrient):

$C_e = 0.903\ O_2 + 2.229\ NO_3^{-}\text{-}N + 0.581\ ClO_4^{-}$

$Y = 0.447\ O_2 + 1.102\ NO_3^{-}\text{-}N + 0.287\ ClO_4^{-}$

$C_N = 0.055\ O_2 + 0.036\ ClO_4$

where:

C_e = required ethanol concentration (mg/l)

Y = cell yield (mg/l)

C_N = nitrogen requirement for synthesis of oxygen and perchlorate (mg/l)

NO_3^{-}-N = influent nitrate-nitrogen concentration (mg/l)

O_2 = influent DO concentration (mg/l)

ClO_4^{-} = influent perchlorate concentration (mg/l)

The above stoichiometric equations and calculations are based on the average water temperature for the treatability study (19 degrees Celsius). Figure 2 shows the required ethanol concentration, cell yield, and nitrogen requirement over a range of temperatures. This figure is based on the bioreactor, media, flow rates, and influent water quality parameters for the pilot system and is not valid for other systems. The figure shows that the required ethanol concentration, cell yield, and nitrogen requirement all decrease as temperature increases. At higher temperatures, the endogenous decay rate increases and the biomass cells use a higher percentage of the ethanol for energy and a lower percentage for cell synthesis. Since oxygen, nitrate, and perchlorate are reduced in the energy conversion process, less ethanol is required at higher temperatures.

The above ethanol equation calculates the stoichiometric amount of ethanol required for biological reduction of DO, nitrate, and perchlorate. The calculation is slightly conservative because it does not take into account the nitrate-nitrogen used for cell synthesis in oxygen and perchlorate reduction. Based on the average influent concentrations for the treatability study (DO=5.6 mg/l, NO3 = 1.6 mg/l, ClO4 = 2.7 mg/l), the stoichiometric ethanol dose is approximately 10.2 mg/l. While minimum substrate requirements are not considered in the stoichiometric equations, these requirements are incorporated into the biofilm model.

The stoichiometric cell yield for the pilot system is approximately 5 mg/l. The cell yield represents the amount of volatile suspended solids (VSS) added to the water through the biorector. This allows prediction of the bioreactor effluent suspended solids concentration.

The stoichiometric nitrogen requirement for the pilot system is approximately 0.4 mg/l. The influent nitrate nitrogen concentration for the pilot system was approximately 1.6 mg/l so no additional nitrogen was required. If the influent nitrate nitrogen concentration had been less than the stoichiometric nitrogen requirement, additional nitrogen (preferably in the form of ammonia) would have been required as a nutrient. Possible nitrogen sources include ammonium chloride, ammonium phosphate, aqueous ammonia, or anhydrous ammonia.

Although phosphorous was not included in the stoichiometric equations, the phosphorous requirement can be estimated as 2 percent of the cell yield (typical nitrate reducers contain approximately two percent phosphorous by weight). For the pilot system, this results in a phosphorous requirement of approximately 0.1 mg/l. The influent phosphorous concentration for the pilot system was approximately 0.1 mg/l so no additional phosphorous was required. If the influent phosphorous concentration had been less than the design phosphorous requirement, additional phosphorous would have been required as a nutrient. Possible phosphorous sources include phosphoric acid, ammonium phosphate, or an orthophosphate solution. If nitrogen and phosphorous addition are both required, ammonium phosphate can be used to satisfy both nutrient requirements.

3.1.1.2 Model Parameters

The biofilm model required that parameters be estimated or measured for the bioreactor, the GAC media, the water, the biofilm, the electron donor (ethanol), and each of the electron acceptors (oxygen, nitrate, and perchlorate). A complete list of the input parameters required is presented in Table 3 and only specific surface area will be discussed here for clarification.

The specific surface area of the fluidized bed was originally assumed to be constant throughout the bioreactor but this assumption was found to be invalid as model development progressed. To determine specific surface area versus bed height, particle size analyses and bulk bed density measurements were performed on the bioreactor. Particle size analyses showed that the particle size decreased with bed height, indicating that the biofilm in this bioreactor was very thin. If the biofilm had been thick, the particle size would have increased with bed height because bulk particle density decreases as biofilm thickness increases. The particle size analyses indicated that the mean particle diameter ranged from approximately 13.3 mm at the bottom of the bed to approximately 10.7 mm at the top of the bed (Figure 3).

Measurement of bulk bed density was accomplished by taking grab samples of the fluidized bed at different bed levels and measuring volume of GAC media as a percentage of the total grab sample volume. This analysis revealed that approximately 12 percent of the total particle volume was concentrated in the first foot of the bed and approximately 50 percent was contained in the bottom third of the bed (Figure 3).

Based on the particle size and bulk bed density measurements, a fluidized specific surface area curve was calculated for use in the biofilm model. The specific surface area decreased from 16.6 cm^2/cm^3 at the bottom of the reactor to 8.2 cm^2/cm^3 at the 10-foot bed level, then increased to 8.9 cm^2/cm^3 at the top of the bed (Figure 3). The specific surface area initially decreased with bed height because the volume of particles per unit bed volume (bulk bed density) decreased with bed height. The specific surface area then increased toward the top of the bed because the bulk bed density remained relatively constant toward the top of the bed but the particle size continued to decrease, resulting in an increase in specific surface area.

3.1.1.3 Biofilm Kinetics

The biofilm model was based on the steady-state biofilm solution detailed in Rittman and McCarty (2000). This required simultaneous solution of the substrate mass-balance, the external mass transport, and the active biomass growth/loss equations. Dispersion was assumed to be negligible and was not considered in the model.

Since three electron acceptors were involved in the process, simultaneous solution of the Monod multiplicative limitation equation for each acceptor was also required. This limitation equation accounts for reduction in acceptor and donor utilization rates based on the concentration of each within the biofilm. The model assumed that the biofilm utilized oxygen in the outer layer of the film, nitrate in the next layer, and perchlorate in the inner layer. Although perchlorate thermodynamically yields more energy than nitrate, this layer configuration was used based on the experimental results that nitrate was preferred over perchlorate as an electron acceptor.

The bioreactor was modeled as a series of completely mixed reactors, each 1-foot thick, resulting in 15 linked models in series. The model results for one section were used as input parameters for the adjacent downstream section. This allowed for profile modeling of the bioreactor. Simultaneous solution of the above equations required several levels of iterative procedures. Basic numerical methods were developed for each iterative solution and coded into a Visual Basic program utilizing Microsoft Excel spreadsheets for model input and output.

3.1.1.4 Model Output

Model output included calculated results for the GAC media, DO, nitrate, perchlorate, ethanol, biomass, organic carbon, and soluble microbial products (SMP) for each 1-foot model increment (Table 4). Although the exact nature of SMP is not known, it is thought to contain cellular components that are released during cell lysis, diffuse through the cell membrane, are lost during synthesis, or are excreted for some purpose. SMP generally do not include intermediates of catabolic pathways but usually make up the majority of the effluent COD and BOD and are also biodegradable (Rittman and McCarty, 2001). Since the GAC media specific surface area was not constant throughout the bed, the fluidized porosity and Reynolds number also varied with bed height. Output for DO, nitrate, perchlorate, and ethanol included calculated values for concentration, flux, diffusion layer thickness, and biofilm thickness. Concentration profiles are presented graphically in Figure 4. Organic carbon, soluble microbial products, and suspended solids profiles are presented graphically in Figure 5. The model output also included the ethanol profile within the biofilm used for solution of the Monod multiplicative limitation equations. Typical ethanol profiles within the biofilm are presented graphically in Figure 6 for a shallow, nearly fully penetrated biofilm and Figure 7 for a deep biofilm.

3.2 Multimedia Filter

The primary function of the multimedia filter was to remove suspended solids consisting of waste biomass and GAC fines present in the effluent from the bioreactors. The secondary function of the multimedia filter was to provide biological degradation of residual ethanol, metabolic breakdown products, and SMP not fully removed in the bioreactor. The multimedia filter was positioned between the bioreactor and the UV/OX unit in the treatment train to take advantage of these functions and maximize the efficiency of the UV/OX unit. Suspended solids interfere with the performance of the UV/OX unit, and the presence of dissolved organics increase the required dosage of hydrogen peroxide. Removal of suspended solids was also necessary to prevent clogging of the LPGAC system and to minimize the required chlorine dosage during disinfection.

The multimedia filter operated in constant-rate mode, treating effluent from the bioreactor at a rate of 350 gpm and a liquid loading rate of approximately 4.9 gpm/ft^2. The filter vessel was an 8-foot wide by 9-foot long steel tank. The filter bed included layers of anthracite, silica sand, and garnet sand, and had a total media depth of 2.6 feet. The filter was equipped with turbidimeters and particle counters on both the influent and effluent lines. These instruments provided real time quantification and characterization of suspended solids. The multimedia filter also included a system to add polymer upstream of the filter as a filter aid.

The multimedia filter was equipped with a backwash system including a backwash pump, backwash storage tanks, and an air scour system. The backwash system operated at a water flow rate of 20 gpm/ft^2 and an air flow rate of 3 standard cubic feet per minute per square foot (scfm/ft^2). Air scour only was first initiated for 2 minutes, followed by combined air and water for 20 seconds, after which the air scour was stopped and water only was continued for 5 minutes. The backwash cycle could be initiated based on head loss through the filter bed, effluent turbidity, or elapsed time. During the backwash cycle, the valve on the multimedia filter influent pipe was closed and forward flow was interrupted. The backwash pump was activated to reverse flow through the filter bed. Solids trapped in the filter media were swept out with the backwash water and carried into the reclamation system holding tanks to await processing. Treated water from the pilot-scale system was diverted into holding tanks prior to being chlorinated for use as backwash water. Use of non-chlorinated water for backwash allowed the microbial population in the filter bed to remain viable. A filter-to-waste cycle was implemented immediately following each backwash cycle during which filter effluent was routed to the reclamation system for a short period of time.

Oxygen was added to the bioreactor effluent upstream of the multimedia filter in a post-aeration tank using fine bubble diffusers. The aeration tank increased the DO concentration from 0 mg/l to approximately 5 mg/l. Addition of oxygen creates aerobic conditions in the filter bed and also enables the biomass in the filter bed to consume residual dissolved organics possibly present in the bioreactor effluent.

3.3 Air Stripper

An air stripper was added to the Phase 2 treatment system on October 3, 2000 after initial operation and optimization of the UV/OX unit showed that it was not removing trichloroethylene (TCE) and chloroform to a sufficient level. Addition of a stripper was determined to be the most cost-effective approach to improving VOC removal in the treatment train.

Prior to installation of the air stripper, TCE concentrations influent to the UV/OX unit ranged from 500 parts per billion (ppb) to 1100 ppb and effluent concentrations ranged from 10 to 60 ppb. Prior to installation of the air stripper, chloroform concentration influent to the UV/OX unit ranged from 3 ppb to 27 ppb and effluent concentrations were in a similar range. A secondary objective for installing the air stripper was to attempt to confirm the source of small concentrations of aldehydes being formed in the UV/OX unit.

In addition to addressing VOC and aldehyde formation concerns in the UV/OX unit, addition of an air stripper to the treatment train allowed for a slightly decreased hydrogen peroxide dose in the UV/OX unit. Hydrogen peroxide is required for oxidation and destruction of 1,4-dioxane and VOCs. It interferes, however, with the photolysis that destroys NDMA as it absorbs some of the available UV light. Decreasing VOC concentrations to be treated in the UV/OX unit allowed for smaller doses of hydrogen peroxide in the UV/OX unit and thus decreased the loss of UV energy to peroxide absorption.

The air stripper was positioned between the multimedia filter and the UV/OX unit to remove VOCs prior to the UV/OX system. Since the presence of VOCs increase the required peroxide dose and possibly the required UV dose, this location allowed optimization of the UV/OX system for NDMA and 1,4-dioxane only. Although packed towers will be used in the full-scale system, tray aerators achieve similar treatment results and are readily available for uses such as that required in the pilot study. Air stripper manufacturers of both tray and tower strippers design equipment capable of removing over 99 percent of most VOCs while providing a system that is relatively simple and easy to maintain.

The air stripper installed as part of the Phase 2 treatment system was a low profile tray type system including four rectangular trays with dimensions of 74 by 64 by 12 inches each. The sieve trays were selected based on the influent concentrations of VOCs and the need to maintain a minimum of 4 inches of water in the trays. Water in the air stripper flowed downward through the successive tray levels as the air flowed upward providing the stripping action to remove the VOCs. After being stripped, water was collected in an integral sump located at the bottom of the stripper. The treated water was transferred to the UV/OX unit with a centrifugal effluent pump.

The air stripper had a maximum hydraulic capacity of 160 gpm. For the Phase 2 study, the hydraulic loading was 100 gpm. The blower was sized for approximately 900 cubic feet per minute (cfm) of air flow. The air to water ratio was therefore approximately 67 to 1.

Carbon dioxide (CO_2) was injected downstream of the air stripper to reduce the pH from approximately pH 8 to between 6 and 7 to avoid scaling. The purpose of the pH reduction was to maximize the effectiveness of chlorination. Vapor phase treatment of the off-gas was not required for the pilot system but may be required at other sites, depending on the VOC concentrations present and the applicable regulations.

3.4 UV/OX System

The UV/OX system was designed to photolytically decompose NDMA and oxidize trace VOCs and 1,4-dioxane using a combination of UV light and hydrogen peroxide. The UV/OX unit included a hydrogen peroxide dosing system followed by low-pressure mercury vapor lamps submerged in an unpressurized stainless steel tank.

The unit received 100 gpm of flow directly from the multimedia filter between April 2000 and October 2000. For the remainder of the study (October 2000 through December 2000), the UV/OX unit received flow from the air stripper, which was installed between the multimedia filter and the UV/OX unit. Groundwater treated at the GET E/F facility contained approximately 1,500 ppb VOCs (primarily TCE), approximately 150 parts per trillion (ppt) NDMA, and approximately 4.5 ppb of 1,4-dioxane. The UV/OX unit was positioned after the bioreactor and the multimedia filters in the treatment train so that nitrate and suspended solids, which interfere with the UV process, were removed from the water before it entered the UV/OX system.

At the onset of the project, available groundwater quality data suggested that influent to the GET E/F facility might not contain sufficient concentrations of NDMA or 1,4-dioxane to achieve Phase 2 Treatability Study objectives. Therefore, a chemical feed system was added to the treatment train for possible introduction of a dilute solution containing these compounds directly upstream of the UV/OX unit. Water quality testing of treatment system influent resulted in the detection of NDMA and 1,4-dioxane at concentrations sufficient to satisfy Phase 2 Treatability Study objectives and, therefore, the chemical feed system was not used.

The effectiveness of UV/OX technology for destruction of NDMA and 1,4-dioxane, as well as many VOCs, is well documented. NDMA is destroyed via photolysis and 1,4-dioxane and VOCs are destroyed via oxidation. In the oxidation reaction, UV light reacts with hydrogen peroxide to form hydroxyl radicals. The hydroxyl radicals rapidly react with VOCs and 1,4-dioxane present in the water. In general, hydroxyl radicals will cleave a contaminant molecule into two or more breakdown products that, in turn, react with oxidants in successive steps to the end products carbon dioxide (CO_2), water (H_2O), and chloride ion (CL^-).

The rate of photolytic decomposition of a dissolved species depends on the intensity of the UV light field, the wavelength of the light, the species extinction coefficient, and the yield of decomposition of the substance. Optimizing light intensity, wavelength and residence time enhances photodecomposition. It is important to select a light source with wavelength(s) that are effectively absorbed by the species requiring photolysis, and that are not well absorbed by competitive species.

The Phase 2 Treatability Study UV/OX treatment system utilized low-pressure, mercury lamps housed in an unpressurized, 950-gallon, stainless steel tank. The treatment tank's dimensions were 69 inches in length, 66 inches in width, and 55 inches in depth. The operational water depth in the tank was 48 inches. Additionally, the tank contained baffle and weir plates, and side partitions to control the hydrodynamics within the tank.

Low-pressure, UV lamp modules (Trojan® model UV-3000) were utilized in the Phase 2 system. Each lamp module contained 8 or 16 lamps. Each lamp was approximately 58 inches in length and 3/4-inch diameter and was housed in an individual quartz sleeve. Above the lamp assembly, an aluminum enclosure contained the electronic ballasts and module circuit boards.

The low-pressure UV lamp modules resided within the tank in a submerged configuration. Initially (April 19, 2000 through August 18, 2000), two 16-lamp modules were installed and operated. In August 2000, two additional 8-lamp modules were installed to determine the effect of the additional UV dose on removal efficiencies. Each individual lamp (32 total initially, 48 total after August 18) required 87.5 watts input power and emits 99 percent of its electromagnetic spectrum at 253.7 nanometers (nm).

3.5 Liquid Phase Granular Activated Carbon

The LPGAC adsorption system was designed to remove VOCs, VOC breakdown products, any other organic compounds remaining in the UV/OX unit effluent, and taste and odor by adsorption onto the GAC or by biological degradation. In addition, the GAC system was installed to minimize the potential for the creation of THMs during disinfection, and to act as a final polishing unit for the overall treatment process. It also served as a final barrier for VOCs and perchlorate should the bioreactor or UV/OX unit experience a failure. Positioning the LPGAC at the end of the treatment train maximized utilization of the destruction unit operations upstream and minimized use of the GAC and associated bed replacement demands.

The GAC contactor received 100 gpm of the UV/OX effluent at a liquid loading rate of 5 gpm/ft^2. The cylindrical carbon steel pressure vessel was 5 feet in diameter and 8 feet in height. The vessel had dished heads and was skid-mounted. It contained 2,500 pounds of GAC and had an EBCT of 6 minutes. The unit was equipped with sample ports at 25, 50, and 75 percent bed depth, a pressure relief valve and a drain.

The flow rate of 100 gpm through the LPGAC vessel was selected to provide a contactor of sufficient size to demonstrate its efficacy at a scale large enough to be confidently applied to a full-scale design. Process control parameters for the LPGAC included influent and effluent VOC concentrations and GAC bed life. Performance of the GAC contactor was evaluated throughout the pilot study based on VOC samples taken at several sampling ports located along the length of the contactor. Sample ports were located at the influent and effluent points as well as at the 25-, 50- and 75-percent elevations on the vessel. Influent and effluent VOC concentrations were measured regularly throughout the study. The results were monitored to determine breakthrough characteristics of any VOCs remaining in the process stream at this point in the treatment train.

At the onset of the study, it was known that the carbon bed life would be dependent upon effectiveness of VOC removal upstream of the GAC contactor. If the UV/OX were to remove a sufficient amount of VOCs, the GAC could last for the duration of the pilot test. If, however, the UV/OX unit were found to be less efficient at VOC removal, an air stripper would be needed. Treatment system performance monitoring data and information on VOC breakthrough of the carbon dictated the need for the addition of an air stripper to the treatment train.

3.6 Disinfection

A disinfection treatment unit was the final unit process in the Phase 2 treatment system. The purpose of this unit process was to create treatment plant product water similar to that produced by a full-scale potable water treatment facility with the same treatment processes. Samples from the treatment train were then collected and analyzed to verify that produced water met all drinking water requirements. Effluent from the disinfection system was pumped to the GET E/F facility after sampling.

At the onset of the Phase 2 pilot study, the DHS indicated that in order to obtain approval for the use of treatment technology in drinking water systems, a disinfection system was needed as part of the study. The amount of disinfection required for a pumped groundwater supply where these unit treatment processes are to be employed had not been determined, but it was expected that the level of required disinfection would be less than what was required under the Surface Water Treatment Rule. DHS had indicated that the level of treatment required in the full-scale treatment plant would be determined based on the microbiological water quality produced in the Phase 2 treatment system.

The Phase 2 treatment system included a disinfection treatment step for 10 gpm of the total 100-gpm flow exiting the LPGAC contactor. This flow rate was selected to provide a disinfection system of sufficient size to demonstrate its efficacy at a scale large enough to provide results that could be confidently applied to a full-scale design. This treatment step was provided to model the operation of a disinfection system, establish chlorine dose and required contact time, and quantify the formation of DBPs. The remaining 90 gpm of flow was returned to the GET E/F facility without disinfection.

The disinfection system utilized sodium hypochlorite to introduce chlorine into the treated water. The disinfectant was mixed into the water using a static mixer and routed through a long pipe arranged in a serpentine fashion to provide approximately 22 minutes of contact time. The sodium hypochlorite feed system was initially set for a chlorine dose of 3 mg/l. The bulk sodium hypochlorite was stored in a sealed container to ensure its integrity (i.e., no degradation). In addition, fresh feed batches were mixed frequently (i.e., at least every 7 days). Chlorine concentration was analyzed daily with a field-test kit immediately downstream of the injection point to ensure that the feed solution had not degraded.

The goals for the disinfection portion of the Phase 2 Treatability Study included quantification of DBP formation and disinfection efficiency. Microbial water quality parameters such as heterotrophic plate count, total coliform count and total culturable virus were monitored throughout the study.

3.7 Reclamation System

The reclamation system received filter backwash and filter-to-waste water. Filter-to-waste water was the filter effluent created immediately following a backwash cycle when the filter was operated in forward flow. The reclamation system treated both of these streams to remove suspended solids. The reclaimed water was then returned to the main process flow at the aeration tank upstream of the multimedia filter.

Filter backwash and filter-to-waste streams were collected in two polyethylene holding tanks. Each tank was 14 feet in diameter and 13 feet in height with a storage capacity of 13,050 gallons. The two tanks were hydraulically connected and behaved as a single tank such that the water levels within the two tanks rose and fell in unison.

The water held in the tanks was transferred to an inclined plate clarifier where suspended solids were settled out. While in transfer to the clarifier, the feed stream was injected with a coagulant and a polymer. The coagulant and polymer alter the electrical charge in suspended particles in the feed stream, thus causing the particles to agglomerate and grow to larger, heavier, more settleable solids.

The clarifier was sized for a surface overflow rate of 0.5 gpm/ft^2. A flow rate of approximately 25 gpm, which corresponds to a surface overflow rate of 0.25 gpm/ft^{2,} was used most frequently during the pilot test. The clarifier was equipped with a flash mix tank and a flocculation tank. The feed stream passed through the flash and the flocculation zone prior to entering the inclined plate-settling chamber. After a brief residence in the flash mix zone, which provided rapid mixing, the feed stream moved to the flocculation basin. The flocculation mixer facilitated floc formation by provided longer duration low energy mixing.

The feed stream, now containing flocs, exited the flocculation basin via a bottomless duct and entered at the base and along the perimeter of the inclined plate settling chamber. As water flowed upward through the inclined plates, flocs and other solids descended. After descending a short distance, the solids encountered the plates. The inclined plates provided a slick surface that carried the solids downward to a sludge collection hopper.

The water that flowed upward and reached the top of the plates was clarified. The clarified water overflowed the settling chamber and was conveyed by gravity to the clarifier effluent tank. Reclaimed water was conveyed from the clarifier effluent tank and returned to the Phase 2 treatment train at a continuous flow rate to the aeration tank upstream of the multimedia filter.

4.0 DATA INTERPRETATION

This section presents the data collected and provides data interpretation for each of the optimization studies performed as well as overall data interpretation for each unit process of the treatment train. Data is discussed for the bioreactor, the multimedia filter, the air stripper, the UV/OX unit, LPGAC contactor, the disinfection system, and the backwash reclamation system.

4.1 Bioreactor

The Phase 2 treatment system utilized one of the fluidized bed reactors (FBR-4) at Aerojet's GET E/F Facility. FBR-4 operation began on October 1, 1999, approximately 5 months prior to start-up of the remaining Phase 2 treatment train in April 2000. FBR-4 was seeded with approximately 6,000 pounds of biomass-coated GAC from FBR-2 that had been operating for several months prior to that time. Approximately 6,000 pounds of GAC was then returned to FBR-2 after 2 weeks of FBR-4 operation to maintain the carbon inventory in each reactor. FBR-4 data collected between October 1999 and April 2000 (Table A10), while not strictly part of the Phase 2 Treatability Study, is included in this report to present a complete picture of the bioreactor's performance since startup. FBR-4 data collected after April 2000 is presented in Tables A1 through A10. Analytical samples and field data for the bioreactor were collected at sample ports 1 through 6 (see Figure 1 for locations). Analytical methods used for each parameter of interest are listed in table A9.

This section presents data in support of the Phase 2 Treatability Study objectives for the bioreactor. These objectives included assessment of removal efficiencies for nitrate, perchlorate, VOCs, ethanol, and ethanol breakdown products; optimization of operating parameters such as ethanol dose, nutrient dosages, recycle rate, bed height control, and waste biomass collection; evaluation of possible system control parameters; microbiological characterization of the biomass; assessment of system reliability and stability; and development of design criteria for full-scale design.

4.1.1 Contaminant Removal

The target chemicals to be treated in the bioreactor were nitrate and perchlorate. The mechanism of removal was biological reduction, a destructive process that transforms nitrate and perchlorate into non-toxic compounds. DO was also removed in the biological reduction process. The fate of ethanol (added as a carbon source and electron donor for the biological reduction process) was also evaluated through the bioreactor. Finally, incidental removal of VOCs through the bioreactor was tracked throughout the treatability study.

FBR-4 influent concentrations (prior to recycle) for nitrate, perchlorate, and DO are presented in Figure 8. Nitrate concentrations were relatively constant at approximately 1.6 mg/l (as N) throughout the study. Perchlorate and DO concentrations varied during the first four months of operation depending on which extraction wells were in operation and at what flow rates. During the first four months of operation, perchlorate concentrations ranged from 2 to 7 mg/l and DO concentrations ranged from 4 to 6.5 mg/l. Subsequently, the extraction wells were operated in such a way as to maintain relatively constant perchlorate and DO concentrations. Perchlorate and DO concentrations remained relatively constant for the remainder of the study at approximately 2.7 mg/l and 5.6 mg/l, respectively.

FBR-4 effluent concentrations for nitrate, perchlorate, and DO are presented in Figure 9. DO concentrations in the effluent ranged from 0.01 to 0.25 mg/l but were typically below 0.1 mg/l. Nitrate was only detected once in the reactor effluent at 68 μg/l (as N) on October 1, the reactor startup date. Nitrate samples were analyzed by the Aerojet Laboratory at a detection limit of 11 μg/l and Sequoia Analytical at a detection limit of 23 μg/l. Perchlorate was detected for the first two weeks of reactor operation starting at 6 mg/l on the reactor startup date and declining nearly linearly to non-detectable concentrations over two weeks. Perchlorate samples were analyzed by the Aerojet Laboratory and Del Mar Analytical, both at a detection limit of 4 μg/l. Effluent perchlorate concentrations remained undetectable after the initial startup period except for one detection on March 9 (6 µg/l) and several detections during the ethanol optimization study, when the ethanol overdose percentage was intentionally decreased to force incomplete perchlorate reduction. The ethanol optimization study is discussed in detail in the next section. The intentional decreased ethanol dose between March 3 and March 9 was also the most likely cause of the perchlorate detection on March 9.

In addition to documentation of nitrate and perchlorate removal, another objective of bioreactor operation was to determine the fate of the ethanol added as a carbon source and electron donor for the biomass. The ethanol used in the pilot study was denatured with ethyl acetate (1 percent by volume). Ethanol was detected in the bioreactor influent at an average concentration of approximately 4.1 mg/l and at the one-foot bed level at an average concentration of approximately 1.8 mg/l. Ethanol was not detected at the 3-foot or 6-foot bed levels or in the bioreactor effluent. The detection limit for ethanol was 0.186 mg/l. Methanol was also monitored but was not detected in any samples. The detection limit for methanol was 0.934 mg/l.

Based on the stoichiometry presented in Section 3 of this report, ethanol is oxidized to carbon dioxide during the biological reduction process. Because this oxidation reaction may not proceed to 100 percent completion for all of the ethanol added, intermediate ethanol oxidation products may be formed in the bioreactor. Ethanol is a primary alcohol and as such, can only be oxidized into an aldehyde or a carboxylic acid. Oxidation of ethanol will not result in a ketone (only secondary alcohols oxidize into ketones). The aldehydes and carboxylic acids for which analyses were performed include formaldehyde, acetaldehyde, formate, acetate, propionate, oxalate, and pyruvate. These seven chemicals constitute the most likely intermediate oxidation products of ethanol. All of these chemicals are themselves readily biodegradable.

Acetaldehyde and formaldehyde were detected in the bioreactor as shown in Figure 10. Acetaldehyde peaked at the 1-foot bed level at an average concentration of approximately 4.8 µg/l and decreased to an average concentration of approximately 2.0 µg/l at the 6-foot bed level. Acetaldehyde was not detected in the bioreactor effluent. The detection limit for acetaldehyde is 1 µg/l. Formaldehyde peaked at the 6-foot bed level at an average concentration of approximately 5.8 µg/l, then decreased to an average concentration of approximately 5.1 µg/l in the bioreactor effluent. The detection limit for formaldehyde is 5 µg/l. It was assumed that non-detections were equal to the detection limit. No other aldehydes were detected in the bioreactor.

Montgomery Watson Laboratories (MWL) finalized a standard operating procedure for analysis of carboxylic acids during the treatability study. The analyte list for this procedure includes acetate, formate, oxalate, propionate, and pyruvate. The reporting limit was 20 µg/l for all 5 analytes. Pyruvate, propionate, and oxalate were detected in the bioreactor as shown in Figure 11. Oxalate exceeded the detection limit in the bioreactor influent during a single sampling event and was never detected inside the reactor or in the reactor effluent. Propionate exceeded the detection limit at the 1, 3, 6, and 15 foot levels in the reactor during a single sampling event, with a peak value of 25 µg/l at a bed height of 1 foot. Pyruvate was routinely detected throughout the bioreactor and in the influent. The average pyruvate concentration reached a maximum of 55 µg/l at a bed height of 3 feet, and dropped back to near influent levels by a bed height of 6 feet. Pyruvate is a common intermediate formed during cell synthesis, which may explain the presence of this compound despite the fact that it contains three carbon atoms and the original substrate (ethanol) contains only two carbon atoms.

In addition to ethanol breakdown products, soluble microbial products (SMP) can also be created during the biological reduction process. Although the exact nature of SMP is not known, it is thought to contain cellular components that are released during cell lysis, diffuse through the cell membrane, are lost during synthesis, or are excreted for some purpose. SMP generally do not include intermediates of catabolic pathways but usually make up the majority of the effluent COD and BOD and are also biodegradable (Rittman and McCarty, 2001). Analytical methods do not exist for direct measurement of SMP but COD and BOD can be used as an indirect indication. Measured effluent BOD (1.2 mg/l) was consistently much lower than predicted by the biofilm model (8.1 mg/l). Measured effluent COD (11 mg/l) correlated well with the biofilm model prediction (10.2 mg/l).

Although not target chemicals for the bioreactor, significant reductions in VOC concentrations were measured through the bioreactor (Figure 12). TCE reduction decreased nearly linearly over time from approximately 65 percent to approximately 5 percent. Based on this declining reduction over time, the mechanism for TCE reduction was likely adsorption to the GAC in the bioreactor. Chloroform reduction trended downward more gradually than TCE reduction, from approximately 85 percent to approximately 55 percent. Based on this more gradual reduction over time, the mechanism for chloroform removal was likely a combination of adsorption to GAC in the reactor and biological degradation. Decline in chloroform reduction may have also been due to the increase in bioreactor forward flow rate, which reduced the contact time available for biodegradation.

4.1.2 Optimization of Operating Parameters

Operating parameters for the bioreactor included ethanol dose, nutrient doses, bed height control, and recycle rate. The Phase 2 Treatability Study included specific tests to optimize each of these operating parameters.

4.1.2.1 Ethanol Optimization Study

The objective of the ethanol optimization study was to determine the minimum ethanol overdose percentage that consistently resulted in non-detectable effluent nitrate and perchlorate concentrations. This not only minimizes operating cost but also minimizes the possibility of ethanol breakdown product formation. The stoichiometric ethanol requirement was based on the stoichiometry presented in Section 3 of this report. For the purposes of this study, the most useful ethanol measurement was the ethanol overdose percentage, or the percentage difference between the actual ethanol dose and the stoichiometric ethanol dose.

During the first 8 weeks of bioreactor operation, the ethanol overdose was gradually decreased from approximately 50 percent to approximately 5 percent (Figure 13). The ethanol overdose was initially set high to promote biomass growth during the first 8 weeks of operation. The ethanol overdose percentage was maintained between -5 and +10 percent for the next 21 weeks, during which nitrate and perchlorate were not detected in the bioreactor effluent, with the exception of one perchlorate detection on March 9, 2000. This perchlorate detection (6 μg/l) corresponded with an extended period (approximately 1 week) when the ethanol overdose percentage was inadvertently set below -5 percent.

The focused ethanol optimization study began on April 18, 2000 with a reduction in the ethanol overdose from approximately 0 percent to approximately -10 percent (Figure 13). The overdose generally remained between -10 and 0 percent until June 5. During that period, effluent perchlorate was detected in every sample taken from the bioreactor effluent at concentrations up to 810 μg/l. Effluent nitrate concentrations remained non-detectable (Figure 9). Effluent DO concentrations increased slightly from an average of approximately 0.07 mg/l to an average of approximately 0.15 mg/l. Also, the bed height started to decline during this period, indicating that biomass growth was significantly reduced. The ethanol overdose percentage was then increased to between 0 and 10 percent starting on June 5 and nitrate and perchlorate were not detected in the bioreactor effluent for the remainder of the study. Also, the bed height began increasing again, indicating that biomass growth had returned to approximately the same rate (1.5 inches per day) as prior to the decrease in ethanol overdose percentage. Based on the results of the ethanol optimization study, the optimum ethanol overdose percentage is 0 to 10 percent. Extended ethanol overdoses below -5 percent are likely to result in incomplete perchlorate reduction and effluent perchlorate detections.

4.1.2.2 Nutrient Optimization Study

The objective of the nutrient optimization study was to determine the minimum nutrient requirements of the biomass. The nutrients included in this study were phosphorous and nitrogen. Nutrient addition originally consisted of a phosphoric acid/urea blend specified by the bioreactor manufacturer. Nitrogen (from urea) and phosphorous doses for FBR-4 were originally set at approximately 5 and 0.35 mg/l, respectively (Figure 15). These doses were decreased to 2.5 and 0.18 mg/l, respectively in February with no adverse effects observed. The phosphoric acid/urea mixture was then replaced with phosphoric acid only on March 24, eliminating nitrogen addition. After this switch, the phosphorous dose was inadvertently increased to approximately 0.5 mg/l for 5 weeks, then decreased to 0.2 mg/l for 9 weeks, then to 0.1 mg/l for 6 weeks. The phosphorous dose was again inadvertently increased to 0.2 mg/l for 3 weeks, then eliminated entirely on September 12. No nutrients were added for the remainder of the study (3 months).

No adverse effects on bioreactor performance were observed throughout the nutrient optimization study. The stoichiometry presented in Section 3 of this report assumed that nitrate is utilized as the nitrogen source for cell growth during the biological reduction process. The nitrogen (as nutrient) requirement was calculated as 0.4 mg/l, indicating that the nitrate already present in the groundwater (1.6 mg/l as N) was sufficient and no additional nitrogen was required. Based on the results of the nutrient optimization study, it appears that the stoichiometric calculations were valid.

The stoichiometry also indicated that approximately 0.1 mg/l of phosphorous was required for cell growth during the biological reduction process, based on the influent concentrations of oxygen, nitrate, and perchlorate at this site. Analytical results for influent groundwater samples indicated the presence of phosphorous in the groundwater at a concentration of approximately 0.1 mg/l, indicating that no additional phosphorous was required. Based on the results of the nutrient optimization study, it appears that the stoichiometric calculations were valid.

4.1.2.3 Bed Height Control

The rate of increase in bed height (Figure 14) during the first 29 weeks of operation (from startup to start of the ethanol optimization study) clearly demonstrates the biomass growth occurring in the bioreactor during that period. The sharp declines in bed height indicate periods where the eductor was operating to maintain the bed height below approximately 16 feet. Bed growth during this period averaged approximately 1.5 inches per day. During the ethanol optimization study, the bed height initially continued to increase until eductor operation began, then decreased for the remainder of the ethanol optimization study. After the ethanol optimization study, bed growth returned to approximately the same rate as before the optimization study.

Bioreactor bed height was originally controlled with air-lift type bed limiters but these were found to be ineffective at controlling the bed height. These were replaced with an eductor system that shears biomass from the GAC and discharges clean GAC and sheared biomass back to the reactor. Bed height was measured daily and the eductor system was operated when the bed height exceeded 15 feet. Originally, the eductor was operated for 1 or 2 days at a time, reducing the bed height from 15 to 16 feet to between 13 and 14 feet (Figure 14). In this mode, eductor operation was required every one to two weeks. However, operating the eductor for 1 or 2 days at a time resulted in extended periods of high bioreactor effluent (and multimedia filter influent) turbidity which caused decreased filter run times and increased filter effluent turbidity. During eductor operation, bioreactor effluent turbidity increased from approximately 1 NTU to 3-6 NTU and multimedia filter effluent turbidity increased from approximately 0.1 NTU to 0.4-0.6 NTU. Based on this observation, the operating procedure for the eductor was changed to limit its operation to no more than 2 hours at a time. In this mode, eductor operation was required every

1 to 2 days. This operational change to intermittent eductor operation resulted in more consistent filter run times but still caused filter effluent turbidity to increase to approximately 0.4 NTU during eductor operation.

At the highest forward flow rate (1440 gpm), eductor operation did not effectively control reactor bed height. The eductor was operated continuously during this period and bed height continued to increase slowly. This was probably because the eductor intake was at a fixed level in the reactor bed and thus sheared biomass only from the GAC that occupied that level in the fluidized bed. The bed height control system therefore requires further refinement to shear biomass throughout the depth of the reactor bed in order to effectively control bed height in future applications of this technology.

Because filter effluent turbidity increased above 0.3 NTU (the proposed filter standard) during eductor operation, waste biomass collection was determined to be necessary for this system to prevent filter effluent turbidity spikes. The waste biomass system would collect sheared biomass from the bed height controllers and route this directly to the reclamation system, bypassing the filter. The original waste biomass collection system was provided by the bioreactor manufacturer and designed to operate with the original air-lift style bed height limiters used in the bioreactor. Since the air-lift style bed height limiters were replaced with the eductor system, the original waste biomass collection system was not used. A separate waste biomass collection system designed for use with the eductor system was installed. This system utilized a wedge wire screen to separate the clean GAC from the biomass-laden water and transferred the clean GAC back into the bioreactor while the biomass-laden water was transferred directly to the reclamation system. This system was intended to prevent the filter from receiving high turbidity spikes during eductor operation. The new waste biomass collection system was unsuccessful in providing a continuous high-solids stream to the reclamation system in large part because of insufficient screen area, which resulted in the majority of the waste biomass returning to the bioreactor. It will be necessary to refine the design of the waste biomass collection system in future applications of this technology. One improvement would be to use a parabolic screen to separate the sheared biomass from the clean GAC. This would allow the sheared biomass to fall through the screen and be collected separately while the clean GAC would be pushed off the end of the screen back into the bioreactor.

4.1.2.4 Recycle Rate Optimization

The objective for optimizing the bioreactor recycle rate was to determine the minimum recycle rate (or maximum forward flow rate) achievable without causing perchlorate to be detected in the bioreactor effluent. Optimization consisted of adjusting the bioreactor forward flow rate over time. The total flow rate (forward flow rate plus recycle flow rate) for the bioreactor was constant at 1,800 gpm based on the fluidization requirements of the GAC bed. The recycle rate could therefore only be adjusted by changing the bioreactor forward flow rate. For this bioreactor, a 900 gpm forward flow rate resulted in a 50 percent recycle rate and a 1,440 gpm forward flow rate resulted in a 20 percent recycle rate. Hydraulic limitations limited the maximum forward flow for this bioreactor to approximately 1,500 gpm based on the effluent pipe diameter (the reactor would overflow at higher forward flow rates).

Forward flow was initially set at 250 gpm and gradually increased to approximately 900 gpm over the first 8 weeks of operation (Figure 14). This flow rate was maintained for another 8 weeks while the biomass became established in the reactor. The bed height increased from approximately 12 feet to over 15 feet after approximately 14 weeks of operation. As the bed continued to increase to over 16 feet over the next 2 weeks, it was determined that the air-lift bed height limiters were unable to control the bed height at this forward flow rate. The eductor, originally installed as an emergency backup system for the air-lift bed limiters, was then operated to bring the bed height down to approximately 15 feet and the forward flow decreased to between 600 gpm and 700 gpm for 4 weeks. The air-lift bed limiters continued to allow bed growth beyond 15 feet so the flow was again decreased to approximately 450 gpm for 3 weeks. Again, the air-lift bed limiters allowed bed growth beyond 15 feet and use of the air lift bed height limiters was stopped in favor of the eductor system.

Forward flow was then maintained at approximately 700 gpm for the next 18 weeks while the remainder of the Phase 2 treatment system was brought on line and various optimization studies were performed. Forward flow was then gradually increased to 1,440 gpm over 6 weeks, corresponding to a 20 percent recycle rate. Effluent perchlorate concentrations were undetectable at this flow rate for the remainder of the study (approximately 3 months).

4.1.3 Evaluation of Control Parameters

The purpose of the control parameter study was to identify and evaluate possible parameters that could be used to control operation of the bioreactor in a full-scale system. The following operational controls would be required for an operating bioreactor as part of a drinking water treatment system:

- Ethanol dose control
- Bioreactor emergency alarms including
  - Effluent perchlorate detection
  - Effluent nitrate detection
  - Effluent ethanol detection (or high dissolved organic carbon detection)

The study focused on parameters with online or real-time measurement capabilities that may provide indication of the performance status of the bioreactor.

4.1.3.1 Ethanol Dose Control

The control parameters tested in this study included ORP, sulfide concentration, and bed growth. ORP was chosen as a possible ethanol dose control parameter due to the nature of the biological reduction reaction. Biological nitrate and perchlorate reduction will only proceed under anoxic, or slightly reducing conditions and ORP gives a general, overall indication of the redox status of the water being tested. A high ORP value indicates that, overall, the environment is under oxidizing conditions and a low ORP (especially negative) indicates that, overall, the environment is under reducing conditions. The term overall is used here because several redox reactions can be taking place at the same time and the ORP measurement indicates the overall condition of all of these reactions combined. This term is also used because the ORP measurement does not directly indicate the redox condition within the biofilm, where the great majority of the redox reactions (including oxygen, nitrate, and perchlorate reduction) take place.

The biological reduction process utilized in the Phase 2 Treatability Study occurred in an anoxic (oxygen lacking) environment. The microorganisms that carry out the reduction process are facultative aerobes that can, in the absence of oxygen, obtain oxygen from nitrate or perchlorate. The biochemical pathways involved are not anaerobic but modifications of aerobic pathways.

ORP could function as a control parameter if the overall redox condition can be directly correlated with the redox condition within the biofilm where most of the redox reactions take place. The redox condition where nitrate and perchlorate become undetectable just at the top of the bed would be the system control point that could be used to adjust system operating parameters such as ethanol dose. If the effluent ORP measurement could be correlated directly with this control point, ORP could be used as an ethanol dose control parameter.

Bioreactor influent and effluent ORP measurements are presented in Figure 16. Over the first 4 weeks of operation effluent ORP remained within 100 millivolt (mV) of influent ORP. Over the next 8 weeks, influent ORP remained between approximately 50 mV and 100 mV while effluent ORP dropped from approximately -50 mV to approximately –175 mV, corresponding with establishment of the biomass. Over the next 8 weeks, influent ORP drifted up slightly but remained between approximately 50 mV and 150 mV. Effluent ORP also drifted up slightly but remained below –40 mV with only two exceptions, one of which corresponded to the one effluent perchlorate detection on March 9. During the focused ethanol optimization study, several effluent ORP measurements were above –40 mV, corresponding with the effluent perchlorate detections during the study. After the study, however, effluent ORP measurements continued to increase up to approximately 125 mV while effluent perchlorate concentrations were undetectable. The reason that effluent ORP did not correlate with bioreactor performance after the ethanol optimization study is unknown. Possible reasons could be ORP probe drift or malfunction, or a change in biomass conditions. Because of this observation, ORP may not be feasible as a control parameter for the bioreactor.

After ORP was ruled out as a control parameter, field measurement of effluent sulfide concentrations began. Effluent sulfide was selected as a possible ethanol dose control parameter because of the order of the biological reduction process. The organisms that carry out the reduction process are facultative aerobes and in the absence of DO, can obtain oxygen first from nitrate, then perchlorate, and finally sulfate. After oxygen, nitrate, and perchlorate have been reduced to trace levels, sulfate is then reduced to sulfide. Therefore, if sulfide is present in the bioreactor effluent, perchlorate has likely been reduced to trace levels. Conversely, if sulfide is not detected in the bioreactor effluent, perchlorate may be present in the effluent. Effluent sulfide measurements ranged from non-detectable (at 4 μg/l) to 30 μg/l but when ethanol dose was decreased to force perchlorate detections, it was found that sulfide detections and non-detections did not correlate well with perchlorate non-detections and detections. Therefore, effluent sulfide concentration may not be feasible as a control parameter.

As discussed previously, the bioreactor bed height consistently increased except during the ethanol optimization study, during which effluent perchlorate was detected. Based on this observation, bed growth could serve as an indicator of bioreactor performance but the correlation is not considered to be reliable enough to allow for ethanol dose control.

Based on the above findings that correlation of indirect parameters (ORP, sulfide, bed height) with bioreactor performance could not be reliably achieved, direct parameters may be the best, if not only, choice for controlling ethanol dose for this system. As presented in Section 3 of this report, the required ethanol dose is directly related to influent concentrations of DO, nitrate, and perchlorate. While DO and nitrate concentrations can be measured continuously using online probes, a probe has not been developed for perchlorate measurement at very low concentrations.

The analysis of very low perchlorate concentrations (4 μg/l) is performed with an ion chromatograph (IC) using a large injection loop (EPA Method 314.0). Discussions with Dionex Corporation have led to the conclusion that real-time measurements of perchlorate concentration can be accomplished accurately and reliably with a Dionex DX-800 instrument. The DX-800 contains the same components as the standard laboratory instrument (DX-500) but is built specifically for industrial environments requiring continuous monitoring. A letter from Dionex containing recommendations for this application and a DX-800 brochure is included in Appendix B. Dionex indicated that each analysis for perchlorate would take approximately 10 minutes to complete with the DX-800. Assuming that a typical treatment system contains 4 bioreactors, the DX-800 could be configured to sample from the influent groundwater (for ethanol dose control) and each of the bioreactor effluents (for effluent perchlorate detection alarm, see next section) in succession. For this configuration, each sample point would be analyzed for perchlorate approximately once per hour. Testing of a DX-800 system was not within the scope of the treatability study but the accuracy and reliability of the system has been well established. Several laboratories are currently approved for analysis of low-low perchlorate concentrations and most, if not all, of these labs use the Dionex DX-500 system for this analysis. The DX-800 system contains the same components as the DX-500 system, but is designed specifically for industrial environments and continuous sampling.

In conclusion, the results of the ethanol dose control study indicated that direct measurement of influent perchlorate, nitrate, and DO concentration appear to be required to automatically control ethanol dose. Real-time perchlorate measurements can be obtained using a Dionex DX-800 IC system. Online DO and nitrate measurements can be obtained using inline probes. An alternative method of obtaining nitrate measurements would be to install an additional DX-800 system dedicated for nitrate. The stoichiometric ethanol dose can then be directly calculated by a programmable logic controller (PLC) using the ethanol dose equation presented in Section 3 and the ethanol feed pumps automatically controlled based on the calculated ethanol dose.

The PLC would also contain algorithms that would alarm if the perchlorate, nitrate, or DO concentration trends indicated possible malfunctions with the measuring devices. In addition, extra DO and nitrate probes could be installed, allowing the PLC to alarm if the difference between the two measurements was above a set point. The DX-800 system includes automated calibration and therefore would not require a continuous backup system. However, an additional DX-800 system could be installed that sampled less frequently (approximately twice per day) for spot checking the primary DX-800 and to serve as a standby system if the primary system breaks down or during maintenance of the primary system.

4.1.3.2 Bioreactor Emergency Alarms

The emergency alarms required for the bioreactor include performance failure alarms (effluent perchlorate or nitrate detections) and an ethanol overdose alarm. The performance failure alarm for perchlorate can be obtained from the DX-800 system described in the previous section taking samples from the effluent streams of each bioreactor. Either a nitrate probe or an additional DX-800 system can provide the performance failure alarm for nitrate detection. Ethanol overdose indication could be obtained from an online gas chromatograph (GC) (e.g., a Rosemount GCX system) or possibly from an online TOC analyzer (e.g., a Rosemount 2100A TOC system). Testing of an online GC or TOC analyzer was beyond the scope of this study but the reliability and accuracy of these systems has been well established.

4.1.4 Process Reliability and Stability

At the completion of the treatability study, FBR-4 had been operating for more than 1 year (October 1999 through December 2000) without any unforced performance upsets. After completion of the treatability study, all four bioreactors located at this site have continued to operate as part of the GET E/F treatment system without performance failures. The bioreactor consistently produced effluent with undetectable nitrate and perchlorate concentrations. During the ethanol optimization study (forced upset), the reactor responded as expected and immediately rebounded when the ethanol overdose percentage was increased at the end of the test. The reactor withstood several significant changes in nutrient doses and forward flow rate without upset. Four power outages occurred during the study resulting in bioreactor down times between 5 minutes and 2 hours and the bioreactor restarted each time with no effluent perchlorate detections. On two occasions, maintenance was performed on the GET E/F system resulting in down times of 1 to 2 days and the bioreactor restarted each time with no effluent perchlorate detections. During power outages and maintenance activities, flow through the reactor was stopped and the bed was allowed to settle.

An extended shutdown (i.e., longer than 1 week) and restart test of the bioreactor was not part of the scope of the pilot study. However, the following discussion presents a possible strategy for extended shutdowns. An extended shutdown could be caused by loss of electricity, maintenance activities, performance failure, or decreased water demand. Whatever the cause, the main priority during an extended shutdown would be to maintain the biomass such that the system could be restarted and quickly returned to full flow. If the biomass is not maintained, it will begin to lose viability after 1 to 2 weeks and system restart would require a ramp-up process to regain the required biomass and return the system to full flow. The time required for the ramp-up process would depend on the extent that the biomass was affected but, in general, could range from 1 to 8 weeks. If the biomass is maintained during an extended shutdown, however, the system could be returned to full flow in a matter of hours.

In order to maintain the biomass during an extended bioreactor shutdown, the bed should remain fluidized and the ethanol and electron acceptor loading rates should remain at approximately the same levels as prior to the shutdown. Supplemental phosphorous may also be required as a nutrient. To maintain fluidization of the bed during shutdown, the recycle pumps need to continue to operate. Therefore, backup recycle pumps and backup electricity are required. To maintain the ethanol loading rate, the ethanol feed pumps need to continue to operate at the same ethanol flow rate as previous to the shutdown. Backup ethanol feed pumps and backup electricity are required to do this. To maintain the electron acceptor loading rate, a supply of supplemental electron acceptor solution needs to be stored on site with feed pumps connected to backup electricity.

One possible supplemental electron acceptor solution is sodium nitrate. The required supplemental feed rate for a 30 percent sodium nitrate solution can be calculated based on the stoichiometry developed in Section 3 as follows:

$N_S = 0.024\ F_F\ (NO_3^- \text{-} N + 0.405\ O_2 + 0.261\ ClO_4^-)$

where:

N_S = supplemental nitrogen feed requirement (gpd of 30% sodium nitrate solution)

F_F = bioreactor forward flow rate prior to shutdown (gpm)

NO_3^--N = influent nitrate-nitrogen concentration prior to shutdown (mg/l)

O_2 = influent DO concentration prior to shutdown (mg/l)

ClO_4^- = influent perchlorate concentration prior to shutdown (mg/l)

As an example, the supplemental nitrogen feed requirement for the pilot study (F_F=1440 gpm, DO=5.6 mg/l, NO_3 = 1.6 mg/l, ClO_4 = 2.7 mg/l) was approximately 160 gallons of 30 percent sodium nitrate solution per day. Using a 7-day storage requirement, approximately 1,200 gallons of on-site storage would have been required. Phosphorous could also be added to the sodium nitrate solution to satisfy the nutrient requirements during shutdown. The phosphorous requirement can be calculated from the equations developed in Section 3.

In order to prevent solids from building up in the bioreactor during shutdowns, a small forward flow should be maintained to flush out the solids. The forward flow should be approximately 2 percent of the forward flow prior to the shutdown. Since potable water should always be available, a potable water connection (with backflow prevention) could be provided with a valve that automatically opens if a power outage occurs or if the forward flow to the bioreactor is stopped for any reason. During the shutdown, the flush water exiting the bioreactor could be discharged to sewer.

Upon re-startup, the bioreactor forward flow can be increased to full flow. Since the initial effluent from the bioreactor will contain higher suspended solids than usual, the filters downstream of the bioreactors should be operated in filter-to-waste mode until all parameters fall within acceptable ranges. The filters should then be backwashed, after which the system can be returned to normal operation.

4.1.5 Microbiological Characterization

Microbiological characterization of the biomass consisted of sampling for total and fecal coliforms, giardia, cryptosporidium, E. Coli, viruses, somatic and male specific coliphage, and heterotrophic plate count (Table A6). Fecal coliforms, giardia, cryptosporidium, E. Coli, somatic coliphage, and total culturable viruses were not detected in any sample. Total coliforms were detected in the groundwater, the bioreactor effluent, the multimedia filter effluent, and the LPGAC effluent. A single detection of male specific coliphage occurred in the bioreactor effluent. Heterotrophic bacteria were detected in the groundwater at 25 to 100 colony forming units per milliliter (CFU/ml), increasing significantly through the bioreactor, decreasing through the filter and UV/OX, increasing again through the liquid phase GAC, and finally decreasing to approximately 80 CFU/ml in the treated water. Based on this data, it does not appear that the bioreactor introduces any pathogenic bacteria or viruses into the treated water.

Several general organic parameters were also monitored throughout the study, including TOC, dissolved organic carbon (DOC), assimilable organic carbon (AOC), biodegradable organic carbon (BDOC), biological oxygen demand (BOD), chemical oxygen demand (COD), and suspended solids (see Appendix A3). The results for these parameters are discussed in the Biofilm model calibration section below. Unfortunately, TOC results received from Sequoia Analytical had to be disregarded because split sample results from 2 independent labs (Aerojet and MWL) indicated that Sequoia's results were invalid. Fortunately, the Aerojet Laboratory had been analyzing FBR-4 influent and effluent TOC as part of a separate sampling program.

4.1.6 Biofilm Model Calibration

FBR-4 data collected during the treatability study and FBR-2 and FBR-3 data collected as part of a separate project were utilized for biofilm model calibration. Calibration was accomplished by adjusting the half-velocity constants (K) for ethanol, oxygen, nitrate, and perchlorate to best fit all of the sampling data. The FBR-4 data was grouped into three distinct data sets and the FBR-2 and FBR-3 (operated in series) data was also grouped into three distinct data sets. Each data set represents a time period during which no major operational changes were made.

The first FBR-4 data set included sampling results from April 19, 2000 (the start date of the treatability study) to June 4, 2000. This period is characterized as the ethanol optimization study. The average operational parameters during this period are shown on Figure 17 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results. The second FBR-4 data set included sampling results from June 5 to August 14, 2000. The average operational parameters during this period are shown on Figure 18 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results. The third FBR-4 data set included sampling results from September 13 to December 13, 2000 (end of treatability study). This period is characterized as the drinking water compliance period, during which the bioreactor was operated at its treatability study design condition. The average operational parameters during this period are shown on Figure 19 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results.

The biofilm model results for the FBR-4 data sets correlate well with the actual sampling data for all three FBR-4 data sets with the minor exception of nitrate within the bioreactor. The bioreactor performed significantly better than the model predicted for nitrate within the bioreactor in all three data sets and for the nitrate effluent concentration in the first data set. The FBR-4 data from all three data sets also verified that the theoretical required ethanol dose calculated in Section 3.1 was virtually identical to the actual required ethanol dose (ethanol overdose of 0 percent).

FBR-2 and FBR-3 were operated in series beginning in April 2000 and the ethanol dose to FBR-2 was set to reduce oxygen to minimal levels in FBR-2 without reducing nitrate or perchlorate. This configuration was set based on the objectives of a separate project that evaluated the effect of DO on bed growth rates. The first data set included samples taken during April and May 2000. The average operational parameters during this period are shown on Figure 20 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results. The second data set included samples taken during June 2000. The average operational parameters during this period are shown on Figure 21 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results. The third data set included samples taken during July 2000. The average operational parameters during this period are shown on Figure 22 as well as sampling results for oxygen, nitrate, and perchlorate, and biofilm model results.

Biofilm model results for the FBR-2/FBR-3 in series configuration correlated well with actual data except for perchlorate during May through June when the bioreactor performed much better than predicted by the model. In July, the perchlorate data agree very well with the model prediction. One possible explanation may be that since both reactors were operating in parallel just prior to the first data set, the biofilm population was steadily decreasing from May through June. During this period, the active parts of the biofilm may have obtained extra carbon from the inactive parts of the biofilm.

The biofilm model was also used to predict concentration profiles for TOC, DOC, BOD, COD, and VSS for the pilot scale bioreactor at 20 percent recycle (see Figure 5). These predictions were compared to actual measurements (see Appendix A3) to further determine if the biofilm model correlates with actual bioreactor performance. The following table presents a comparison of model predictions and actual measurements for the bioreactor.

	Bioreactor Influent		Bioreactor Effluent	
Analyte	**Model Prediction**	**Average Concentration**	**Model Prediction**	**Average Concentration**
TOC	5.1	4.1	4.1	0.5
DOC	4.5	3.8	1.4	0.4
BOD_5	12.3	1.4	3.1	1.2
COD	19.2	18	10.9	11
VSS	1	1.9	5	1.8

All values in mg/l.

Influent TOC, COD, and DOC concentrations correlated well with model predictions. Effluent COD also correlated well. The difference in effluent TOC, DOC, and VSS may be due to the bed height controllers only being operated intermittently. The samples taken during the pilot study were collected during periods where the bed height controllers were not operating. During these periods, biological solids were building up in the bioreactor instead of exiting the bioreactor. During periods where the bed height controllers were operated, the solids that had built up were flushed from the bioreactor. Although not quantified as part of the study, it is possible that the average effluent TOC and VSS could have correlated with the model prediction. It is unknown why measured BOD_5 did not correlate well with the model predictions.

4.1.7 Biofilm Model Sensitivity Analyses

The calibrated biofilm model was used to perform sensitivity analyses for the following parameters:

- Ethanol dose vs. oxygen, nitrate, and perchlorate removal efficiencies
- Reactor forward flow rate vs. oxygen, nitrate, and perchlorate removal efficiencies
- Total bed depth vs. effluent perchlorate concentration
- Perchlorate half-velocity constant vs. effluent perchlorate concentration
- Influent oxygen, nitrate, and perchlorate concentrations vs. effluent perchlorate concentration

Predicted effluent concentrations resulting from ethanol doses ranging from an overdose percentage of –100 percent to 0 percent are presented in Figure 23. The pilot system bioreactor operating conditions were used for this analysis including average influent concentrations of oxygen (5.6 mg/l), nitrate (1.6 mg/l as N), and perchlorate (2.7 mg/l). The model predicts that only DO is reduced up to an ethanol overdose of approximately 50 percent, after which both nitrate and perchlorate are reduced simultaneously. This agrees very well with the results from FBR-2 and FBR-3 operated in series where oxygen was reduced in FBR-2 without reducing nitrate or perchlorate. The analysis also shows that perchlorate concentrations increase significantly at ethanol concentrations only slightly less than the theoretical dose. This agrees very well with the sampling results from the FBR-4 ethanol optimization study, where perchlorate concentrations up to 0.8 mg/l were detected at an ethanol overdose of –4 percent.

Effluent concentration sensitivity was also determined for reactor forward flow rate for flow rates ranging from 50 to 2,500 gpm (Figure 24). For forward flow rates less than 1,800 gpm, the reactor total flow rate was held constant at 1,800 gpm. For forward flow rates greater than 1,800 gpm, the reactor total flow rate was set equal to the forward flow rate. This condition assumes that the GAC media bed properties would not significantly change at higher total flow rates. FBR-4 operating conditions were used for this analysis. The model predicts that pilot scale bioreactor effluent perchlorate concentration will remain below 4 ppb up to a forward flow rate (and total flow rate) of approximately 1,900 gpm.

Total bed height was varied from 10 to 15 feet in the model to determine the effect on effluent perchlorate concentration (Figure 24). In addition to reducing the total bed height in the model, the settled bed depth was also reduced by the same percentage. For example, if total bed height was reduced from 15 to 10 feet, settled bed depth was also reduced from 9 to 6 feet. This was necessary to maintain the fluidization properties of the media. All other model parameters were unchanged from the base model for the pilot scale bioreactor at 20 percent recycle. Decreasing total bed depth decreases the contact time and total biofilm surface area for biofilm growth. As shown in the figure, predicted effluent perchlorate concentrations increase as total bed depth decreases. With a total bed depth of 10 feet, the predicted effluent perchlorate concentration is 30 to 35 μg/l. To achieve an effluent perchlorate concentration of 4 μg/l with a total bed depth of 10 feet, the recycle rate would need to be increased to approximately 80 percent (400 gpm forward flow).

Effluent perchlorate concentration was also computed over a range of perchlorate half velocity constants (Kp) from 0.01 to 10 mg/l (Figure 26). The half velocity constant is defined as the perchlorate concentration at which the utilization rate is half of the maximum rate. As shown in the figure, predicted effluent perchlorate concentration increases linearly with the half velocity constant. The primary factor in this relationship is that the minimum substrate concentration is directly related to the half velocity constant. For the pilot system bioreactor, a perchlorate half velocity constant of 0.01 mg/l was found to most accurately reflect actual bioreactor performance. Half velocity constants of 0.2 mg/l for DO, 0.01 mg/l for nitrate, and 0.25 mg/l for ethanol were also found to most accurately reflect actual bioreactor performance. These half-velocity constants were based on the pilot system data and it is unknown if they apply to other sites using a similar bioreactor.

Bioreactor performance curves were also developed over typical ranges of oxygen, nitrate, and perchlorate (Figure 27). The figure contains information for both the pilot scale bioreactor and the BPOU bioreactor. The pilot scale bioreactor is discussed here and the BPOU bioreactor is discussed in the following section. The pilot system operating parameters were used for this analysis including flow rates, bioreactor size, media properties, and water temperature. The ethanol overdose was set at 0 percent. The curves were developed for a design condition of 3 μg/l effluent perchlorate concentration. The graph indicates the maximum influent concentrations of oxygen, nitrate, and perchlorate that will result in an effluent perchlorate concentration of 3 μg/l. This graph can be used to determine the maximum predicted influent concentration of any one parameter when the other two parameters are known. If the actual concentration is greater than the maximum concentration, then the predicted effluent perchlorate concentration will be greater than 3 μg/l and vice versa. Using this graph, it was estimated that the pilot system influent perchlorate concentration could increase from its current value of 2.7 to 4.1 mg/l (if the other two parameter concentrations remain constant at their current values), or the influent nitrate nitrogen concentration could increase from 1.6 to 2.9 mg/l, or the influent DO concentration could increase from 5.6 to 10 mg/l without increasing the predicted effluent perchlorate concentration above 3 μg/l. This correlates to a safety factor for the pilot system bioreactor of approximately 1.5 with respect to influent concentrations of oxygen, nitrate, or perchlorate.

4.1.8 Full-scale Design Criteria

One of the objectives of the Phase 2 Treatability Study is to develop design criteria for use in full-scale treatment plant designs. Since the primary intent of the treatability study was to develop a treatment train that could be used in the BPOU, the expected water quality at the BPOU was used for design criteria development. The design criteria required for full-scale design include total liquid loading rate, recycle rate, ethanol dose, nutrient doses, empty bed contact time (or fluidized bed depth), media (GAC) specifications, instrumentation requirements, and system control strategy (including bed height control and ethanol dose control). In addition, expected influent DO, nitrate, perchlorate, and total phosphorous concentrations and water temperature are required for the combined groundwater influent to the treatment plant. The bioreactor size, total flow rate, bed depth, media properties, and water temperature used for the pilot system were assumed to be the same for the BPOU bioreactor. The expected influent oxygen concentration at the BPOU was assumed to be 4 mg/l. The expected influent nitrate and perchlorate concentrations for the BPOU are presented in Table 1. For the purposes of design criteria development, the expected influent nitrate-nitrogen was assumed to be 5 mg/l and the expected influent perchlorate concentration was assumed to be 0.2 mg/l. These data (for organics) are flow-weighted values that include data from four treatment plant wells in the BPOU. The inorganic values are flow weighted based on data presented in the 1997 Camp Dresser McKee Report.

The following design criteria were assumed to be the same for the pilot system bioreactor and the BPOU bioreactor. Total liquid loading rate for the bioreactor used in the pilot system was set at 11.7 gpm/ft^2 (1,800 gpm through a 14-foot diameter reactor) based on a design bed expansion of 33 percent for clean (no biomass) GAC. The media (GAC) specifications called for a clean, unfluidized bed depth of 9 feet, resulting in a clean, fluidized bed depth of 12 feet (33 percent expansion). The design operating bed depth for the reactor used in the pilot system was 15 feet, allowing for another 3 feet of bed expansion due to biomass growth. The minimum recycle rate achieved in the pilot study was 20 percent based on the maximum hydraulic capacity of the bioreactor. The BPOU bioreactor should be designed so that hydraulics do not limit the recycle rate (i.e., a recycle rate of 0 percent can be achieved hydraulically). A recycle rate of 20 percent results in a forward flow rate of 1,440 gpm for a 14-foot diameter reactor. The empty bed contact time at this recycle rate is approximately 12 minutes based on a design bed depth of 15 feet. The actual contact time is approximately 9.5 minutes based on the physical properties of the GAC. The water temperature for the pilot study was approximately 19 degrees Celsius. The water temperature at the BPOU is unknown but was assumed to also be 19 degrees Celsius. If the actual water temperature at the BPOU is significantly different, the design criteria will require adjustment.

The ethanol requirement for the BPOU bioreactor was calculated to be approximately 15 mg/l based on the expected influent concentrations of oxygen, nitrate, and perchlorate and the stoichiometric equations developed in Section 3 of this report. Cell yield was calculated to be approximately 7.4 mg/l. Nitrogen and phosphorous requirements were calculated to be approximately 0.4 mg/l and 0.15 mg/l, respectively. Since the influent nitrate-nitrogen concentration is expected to be higher than the nitrogen requirement, supplemental nitrogen should not be required. Phosphorous addition may or may not be required as the expected influent phosphorous concentration is unknown.

The calibrated biofilm model was used to test sensitivity to influent concentration variations for the BPOU bioreactor (Figure 28). If a recycle rate of 20 percent is used, influent perchlorate can increase from 0.2 to 2 mg/l or influent nitrate can increase from 5 to 23 mg/l or influent DO can increase from 4 mg/l to greater than saturation (>10 mg/l) without resulting in an effluent perchlorate concentration above 3 ppb. This analysis is intended to give a general indication of the expected performance of the BPOU bioreactor but since the biofilm model was calibrated based on the pilot scale bioreactor, actual performance of the BPOU bioreactor may vary from the model predictions. However, this analysis indicates that a bioreactor similar in size and design to the pilot scale bioreactor should be more than adequate for the expected BPOU water quality.

Model input, output, and graphics for a 20 percent recycle bioreactor using the expected BPOU conditions described above are presented in Tables 5 and 6 and Figures 28 and 29. Based on this and Figure 27, using a 20 percent recycle may be overly conservative for this system. Results for the same system except with a 0 percent recycle are presented in Tables 7 and 8 and Figures 30 and 31. Also, as a worst case scenario, the same system (0 percent recycle) was modeled with doubled concentrations of oxygen (8 mg/l), nitrate (10 mg/l), and perchlorate (0.4 mg/l) and results are presented in Tables 9 and 10 and Figures 32 and 33. Even for this worst case scenario, the biofilm model predicts that the effluent perchlorate concentration would be 3.6 ppb. Based on the above model results, it may be possible to operate the BPOU bioreactors at 0 percent recycle.

The control parameters required for a full-scale bioreactor include the following:

- Ethanol dose control – influent DO, nitrate, and perchlorate concentrations, water temperature, and reactor forward flow rate
- Bed height control – real-time bed height measurement
- Performance alarms – effluent nitrate and perchlorate concentrations, effluent TOC or ethanol concentration

As described in Section 4.1.3, DO and temperature can be measured using inline probes. Perchlorate can be measured with a Dionex DX-800 ion chromatograph. Nitrate can be measured with either an inline probe or a separate Dionex DX-800. Flow rates can be measured with flow meters. Bed height can be measured with a continuous ultrasonic sludge level monitor (e.g., Hach OptiQuant Sludge Level Monitor). TOC can be measured with an online TOC analyzer. Ethanol can be measured with a gas chromatograph or possibly a Dionex DX-800. In addition, standard instrumentation such as high level alarms, pressure gauges, ethanol and nutrient feed pump controllers and flow meters will be required.

4.2 Multimedia Filter

The multimedia filter received 350 gpm of flow from the bioreactor. Influent and effluent filter data was collected throughout the study period and is presented in Figures 34 to 49. This section presents data in support of the Phase 2 Treatability Study objectives for the multimedia filter. These objectives included assessment of the removal of suspended solids, ethanol, and ethanol breakdown products, assessment of particle counts, optimization of polymer dosage, evaluation of backwash procedures and filter run time, and development of design criteria for a full-scale design.

4.2.1 Turbidity Removal

The multimedia filter reliably removed suspended solids and produced water that would meet typical potable water facility turbidity reduction requirements. TSS results indicated a removal efficiency of approximately 92 percent through the filter (1.7 mg/l to 0.14 mg/l). TSS concentrations were frequently below the detection limit of 0.1 mg/l. Figures 34 through 46 show influent and effluent turbidity over a several month period. Removal efficiency for turbidity was approximately 90 percent, consistently producing water with turbidity less than 0.3 NTU.

4.2.2 Particle Size Analysis

Figures 47 and 48 summarize the removal efficiency of particles in the four size ranges tracked by the influent and effluent particle counting instruments. Removal efficiency of particles in the 2 to 5 micron size range was low during the first 3 months of operation, ranging between 38 percent and 57 percent. By the fourth month of operation, when treatment performance had normalized, the removal rate of particles in this size range had increased to an average of approximately 80 percent [0.70 log removal]. This is considered to be high performance for particles in this size range. Removal of particles in the 5 to 10 micron size range ranged between 77 percent and 97 percent, with an average removal efficiency of approximately 85 percent [0.82 log removal] during the operating period. The removal efficiency of particles in the 10 to 15 micron size range was consistently above 90 percent during the operating period, with an average of approximately 95 percent [1.30 log removal]. The removal efficiency of particles in the 15 to 20 micron size range ranged between 84 percent and 99 percent, with an average of approximately 93 percent [1.15 log removal].

The cumulative removal rates for all particles in the 2 to 20 micron size ranged between 56 percent and 89 percent, with an average of approximately 72 percent [0.55 log removal]. The fact that cumulative removal rates are lower than removal rates for individual particle sizes reflects that 50 to 60 percent of the particles fall within the 2 to 5 micron size range, which has the lowest removal efficiency. Overall, particle removal rates showed some fluctuations during the first 3 months of operation, but remained consistent thereafter.

4.2.3 Ethanol Removal

Influent and effluent samples were collected and analyzed for ethanol, DOC, TOC, and DO to assess the ability of the multimedia filter to biodegrade ethanol and its metabolic breakdown products. Results for ethanol in both influent and effluent samples were below the method detection limit of 186 μg/l, making it impossible to quantitatively assess the reduction of ethanol in the filter. DOC results indicated a reduction of approximately 23 percent through the filter (417 μg/l to 322 μg/l). TOC results indicated a reduction of approximately 40 percent through the filter (460 μg/l to 275 μg/l). The average reduction of DO through the filter was approximately 1 mg/l. These results indicate biological activity within the filter, although, as noted above, specific reduction of ethanol could not be quantified.

4.2.4 Polymer Testing

For a period of 3 days, an acrylamide modified cationic copolymer was added to the filter influent stream at a dosage of 0.1 mg/l. The result dramatically reduced filter run times with no appreciable reduction of effluent turbidity. Polymer testing was subsequently discontinued because the treated water effluent turbidity criterion was met without polymer addition.

4.2.5 Backwash Cycle Optimization

Optimization of the backwash cycle was performed on a qualitative basis. The backwash duration was initially set at approximately 6 minutes following the air scour cycle. The clarity of the backwash water exiting the filter was visually observed during the course of the backwash cycle, and the effluent turbidity immediately following the backwash cycle was observed. Based on observations that backwash water exiting the filter was predominantly clear, the backwash cycle was eventually shortened to a 5-minute duration following air scour to ensure the maintenance of some solids in the filter media following backwash. By maintaining some of the solids in the filter bed, the biological population remained viable while the post-backwash effluent turbidity spike was kept to an acceptable level.

Another adjustment made to the backwash cycle was the implementation of a process to slowly ramp the flow rate up at the onset of backwash and to slowly ramp the flow down at the completion of backwash. This was accomplished by incrementally changing the position of the inlet control valve. Gradual ramping up of the flow rate from the backwash pump protected the underdrain assembly from damage due to water hammer or air bubbles. Gradual ramping down of the flow rate promoted more complete stratification of the individual layers in the filter bed as they resettled. As the flow decreased, particles of a greater specific gravity settled, while lighter particles remain fluidized, minimizing interbedding of filter media layers.

4.2.6 Filter Run Time

Following optimization of the filter backwash and filter to waste cycles, the filter was operated on a continuous basis under consistent operating conditions. Once effluent turbidity became consistent, the backwash cycle was set to initiate automatically when head loss across the filter bed reached 55 inches of water. As shown in Figures 34 through 45, typical filter run times ranged between 7 hours and 12 hours with an average of approximately 11 hours.

4.2.7 Full Scale Design Criteria

It is expected that the multimedia filters in a full-scale plant will be designed to operate with a maximum head loss of 120 inches of water. Using the curve presented in Figure 49 to predict filter run time the filters in a full-scale plant with similar water quality conditions could have an average run time of between 18 and 30 hours. Actual design criteria could conservatively assume a run time of 20 hours.

4.3 Air Stripper

The air stripper was installed on October 3, 2000. It received 100 gpm of flow from the multimedia filter effluent. Data was collected for influent and effluent samples between October 4, 2000 and the conclusion of the study period. This section presents data in support of an assessment of the air stripper as part of the Phase 2 pilot study. Objectives for this portion of the Phase 2 Treatability Study include evaluation of removal efficiencies for VOCs, optimization of operating parameters to maximize removal efficiencies, identification and evaluation of control parameters, assessment of system stability and reliability, and development of full-scale design criteria.

4.3.1 Removal Efficiencies

The contaminants of concern in the influent groundwater that were targeted for removal by the air stripper were primarily TCE and chloroform. Low levels of other VOCs amenable to air stripping were present in the influent groundwater, but TCE and chloroform comprised over 95 percent of the VOCs to be removed. Influent TCE concentration ranged from 500 ppb to 1100 ppb and chloroform concentration ranged from 3 ppb to 27 ppb. At an air-water ratio of approximately 67 to 1, the air stripper effluent typically contained less than 3 ppb of TCE and non-detectable levels of chloroform. For both constituents, air stripper removal exceeded 99 percent.

4.3.2 Optimization of Operating Parameters

The operating parameters for the pilot air stripper were air-water ratio, contaminant loading, and liquid loading. The air-water ratio for this system was fixed at 67.3 as the air flow was provided by a single speed blower at 900 cfm, and the flow through the system was maintained constant at 100 gpm. The concentrations of VOCs in the influent and effluent were consistent over the course of the study.

Had there been a need to alter air stripper performance due to a change in VOC influent concentrations, treatment goals, or other factors, several components of the system would have been adjusted. Potential adjustments included the number of trays – or in a packed tower, the amount of packing, the volume of air flow rate, the water flow rate, or the number of packed towers in service. In addition a variable speed blower could have been installed. Optimization involves balancing system performance, minimization of scale formation and minimization of operating costs.

4.3.3 Control Parameters

The primary control parameter providing near real-time feedback on the performance status of the gas stripper was effluent VOC concentrations. Additionally, pH across the air stripper should be monitored so that conditions conducive to scale formation can be detected and addressed.

4.3.4 Scale Formation

The buildup of precipitated solids on packing material, resulting in an increased gas pressure drop, is common in air strippers. Precipitation of solids, or scaling, occurs due to CO_2 being stripped in the treatment process similar to VOC stripping. As CO_2 is a weak acid, the pH in the treated water increases. The pH can increase to the point that magnesium or calcium carbonate solubility may be exceeded, causing scaling to occur.

There are several methods to remove and control scaling. Acid washing is a common method used to remove scale. To acid wash, the air stripper is shut down and rinsed with hydrochloric or a carbonic acid. The acid dissolves and removes the scale. Another common method employed to control scaling is pH adjustment. The pH of the influent water can be lowered so the solubility of magnesium and calcium carbonate are not exceeded when the pH rises in the air stripper.

4.3.5 Stability and Reliability

Air strippers are typically stable and reliable in that they can achieve high removal efficiencies over a wide range of operating conditions and generally require minimal maintenance. It is important that influent water is free of solids capable of plugging the packing (mass transfer media) and that pH is maintained at a level to minimize scale formation. The water influent to the tray aerator was relatively free of suspended solids, as it had previously been treated in the multimedia filter. As is the case with the GET E/F air strippers that are stripping essentially the same water, calcium carbonate precipitation was not a problem at this site.

Air strippers can be adjusted in numerous ways to handle increased VOC concentrations or more stringent treatment standards. Adding trays to a tray aerator or packing to a packed tower can increase air stripper performance. Performance can also be increased by increasing air to water ratio by increasing air flow rate and/or decreasing water flow rate to the air stripper. Finally, air stripping process reliability can be enhanced by incorporating ancillary systems and features providing for the adjustment of pH, addition of sequestering agent to prevent precipitation, and addition of acid for dissolving scale should such action be required.

4.3.6 Full-scale Design Criteria

Tray aerators were used in the pilot study due to their availability and applicability to the study requirements. In the full-scale system, it is likely that packed towers will be used to accomplish the VOC removal objectives. Packed towers provide a larger surface area for contact between air and water and can accommodate higher loading rates than tray aerators, which are limited to a maximum of approximately 1,000 gpm. Packed towers require significantly lower air flow than do tray aerators and consequently are much more cost effective.

In design of air strippers, it is conventional practice to design based on a stripping factor (S). The stripping factor is equivalent to the product of the air to water ratio and the Henry's Law coefficient for the VOC of interest. The optimum design is based on a stripping factor of approximately 3.5 for the controlling contaminant. This results in a much higher stripping factor and more conservative design for the remainder of the contaminants.

The water quality in the BPOU will need to be considered in identifying the controlling contaminant specific to that location. For example, in the BPOU, tetra-chloroethylene (PCE) is the VOC with the highest concentration. As such, PCE will need to be considered among the VOCs treated in the Phase 2 study in determining the controlling contaminant for the full-scale design.

The model selected for use should incorporate resistances to mass transfer in both the liquid and the gas phase. Other factors to be considered include the cost of vapor phase treatment requirements and selection of materials of construction appropriate for the service conditions.

4.4 UV/OX System

The UV/OX system received 100 gpm of water directly from the multimedia filter (prior to October 3, 2000) or from the air stripper (after October 3, 2000). Throughout the study period, influent and effluent samples were routinely collected and analyzed. This data is presented in Figures 50 to 60.

Primary contaminants to be treated by the UV/OX system included NDMA, 1,4-dioxane, TCE, cis-1, 2-DCE, and chloroform. NDMA is neither adsorbable nor strippable, but can be effectively destroyed by UV radiation, which, with the addition of an oxidizing chemical (e.g., hydrogen peroxide), is also an effective treatment for removal of 1,4-dioxane and some VOCs.

4.4.1 Removal of Target Chemicals

Influent and effluent concentrations over the duration of the Phase 2 Treatability Study are graphically presented in Figures 50 through 54 for NDMA, 1,4-dioxane, TCE, cis-1,2-DCE, and chloroform, respectively. The changes in influent concentrations reflect both changes in flow rates from groundwater extraction wells with differing water quality and changes in treatment process operation prior to the UV/OX system. It should also be noted that 2 additional 8-lamp UV modules were installed in the UV/OX system on August 18, 2000, and an air stripper was installed upstream of the UV/OX system on October 3, 2000.

The table below summarizes the influent and effluent concentrations for each of the primary chemicals of concern for the duration of the Phase 2 Treatability Study, including periods when the system had not yet been optimized:

	Concentrations (µg/l)		
Analyte	**Influent**	**Effluent**	**% Removal Range**
NDMA	0.07 to 0.15	0.003 to 0.012	90 to 98
1,4-dioxane	3.5 to 4.5	<3	
TCE	500 to 1,000	15 to 70	94 to 98
Cis-1,2-DCE	13 to 23	0.1 to 1.1	95 to 99
Chloroform	12 to 37	6 to 26	0 to 20

TCE and cis-1,2-DCE had removal efficiencies between 94 and 98 percent, and 95 and 99 percent, respectively. However, the 5 µg/l effluent goal for TCE was not achieved using only UV/OX during the demonstration study due to the relatively high influent concentrations. The TCE effluent goal was achieved once the air stripper was added to the treatment train in October 2000.

Chloroform, as anticipated, was not degraded efficiently using oxidation processes. Typical removal efficiencies for chloroform were between 0 and 20 percent.

1,4-dioxane effluent concentrations were below detection levels of 3 µg/l. Removal efficiencies for 1,4-dioxane were not calculated because influent concentrations were only slightly above this detection limit. Estimates of 1,4-dioxane effluent concentrations were obtained using the known rate constant of 2.8×10^9 L mol^{-1} sec^{-1}, the observed rate of H_2O_2 decomposition to hydroxyl radicals, and the UV treatment design tools described in Section 3. Conservatively, at a hydrogen peroxide (H_2O_2) concentration of 5 ppm, the 1,4-dioxane effluent concentration of the Phase 2 UV/OX system was predicted to be less than 1 µg/l. Based on this, an EE/O value (defined as the kilowatt hours used per 1,000 gallons per order of magnitude reduction in contaminant concentration) of 0.9 was calculated.

NDMA removal efficiencies for the UV/OX system ranged between 90-98 percent over the course of the Phase 2 Treatability Study. Following optimization efforts in August 2000, removal efficiencies in excess of 98 percent were achieved and maintained. Additional decreases in NDMA effluent concentrations were realized following the addition of the air stripper on October 4, 2000 because UV absorbance of the influent water decreased. UV absorbance decreased because the H_2O_2 requirement decreased. EE/O values for NDMA were calculated between 0.30 and 0.47.

The underlying goal of this UV/OX system evaluation was to demonstrate that this treatment technology successfully removes targeted chemicals of concern (NDMA and 1,4-dioxane) to concentrations acceptable for potable use. In addition, the UV/OX system was evaluated for production of breakdown products that exceed appropriate drinking water standards. Water quality samples were collected from sample ports that were both influent to and effluent from the UV/OX system, and these samples were analyzed for targeted chemicals of concern and a wide range of potential breakdown products.

4.4.2 Formation of Intermediate Breakdown Products

UV/OX treatment results in the photodisintegration of NDMA and other photo-absorbing species. In addition, the hydroxyl radicals produced by photolysis of H_2O_2 are strong non-specific oxidizers of organic constituents. Ultimately, oxidized organic compounds completely mineralize to CO_2, H_2O, Cl^-, and nitrogen compounds. However, a number of intermediary organic compounds may be created during the UV/OX process. Therefore, samples were routinely collected and analyzed to evaluate the production of breakdown or daughter products created by the UV/OX system.

Possible intermediate breakdown products resulting from UV/OX of the following dissolved constituents are listed below:

NDMA	1,4-dioxane	TCE	Nitrate	Ethanol
Nitrate	Methoxyacetic acid	Organic acids	Nitrite	Acetaldehyde
Nitrite	Oxalate	Dichloroacetic acid		Acetate
Dimethylamine	Acetate	Trichloroacetaldehyde		Formaldehyde
	Glycolic acid	Acetic Acid		Formate
	Acetaldehyde	Glyoxal		
	Glyoxal	Formaldehyde		
	Formaldehyde	Formate		
	Formate			

The dissolved constituents that were primarily responsible for these intermediary compounds were NDMA, 1,4-dioxane, and TCE. Once the air stripper was added to the Phase 2 treatment system on October 3, 2000, the potential to form breakdown products of TCE in the UV/OX system was significantly reduced or eliminated. Low concentrations of ethanol or ethanol breakdown products (below the detection limit of 186 µg/l) may be entering the UV/OX system unit from the bioreactor. The oxidation of ethanol may create intermediate breakdown products. Concentrations of breakdown products of ethanol (acetaldhyde, acetate, and formaldehyde) were not consistently detected in the UV/OX system influent. Except for nitrite, these intermediary compounds will be produced in equivalent amounts for either the medium-pressure or low-pressure UV/OX process. In nitrate containing waters, nitrite was formed by photolysis of nitrate. This nitrate was produced at a much higher rate by medium-pressure UV lamps, where greater emission of sub-250 nm light intercepts nitrate's strong UV-absorbance band photochemically converting nitrate to nitrite.

Influent and effluent concentrations for three of these compounds (acetaldehyde, formaldehyde, and glyoxal) over the duration of the entire Phase 2 Treatability Study are shown in Figures 55, 56, and 57 and in the analytical data tables. Influent concentrations of acetaldehyde, formaldehyde, and glyoxal, for the most part, were below detection levels. Acetaldehyde effluent concentrations typically averaged between 3 and 15 µg/l, formaldehyde effluent concentrations ranged from less than 10 to greater than 40 µg/l and glyoxal ranged between 3 and 5 µg/l. Commercial analysis was not available for dimethylamine (DMA) (a break down product of NDMA). However DMA (and nitrite) are strongly photolyzed and oxidized. Therefore, DMA should break down readily with UV light and certainly with the addition of H_2O_2.

4.4.3 Optimization of Operating Parameters

Operating parameters for the UV/OX system included H_2O_2 concentration, UV intensity, weir plate configuration, side-partition configuration, and hydrodynamic dispersion. The Phase 2 Treatability Study included specific test to optimize each of these parameters.

4.4.3.1 Hydrogen Peroxide Concentration

Hydrogen peroxide was metered into the influent process water stream to oxidize the 1,4-dioxane and VOCs by hydroxyl radicals generated via UV/OX. Figure 58 graphically depicts the observed relationship between H_2O_2 influent concentrations versus effluent concentration for the UV/OX system containing two 16-lamp modules. The difference between influent and effluent H_2O_2 concentrations was directly proportional to hydroxyl radical concentration.

Because hydrogen peroxide has a relatively high absorbance value, the addition of hydrogen peroxide decreases the overall UV transmission of the water. At a wavelength of 253.7 nanometers the extinction coefficient of hydrogen peroxide was 19.7 liters per mole per centimeter. The following table presents the decrease in UVC transmission at 253.7 nm for three different hydrogen peroxide concentrations.

H_2O_2 Concentration (ppm)	Decrease in UVC Transmission @ 253.7 nm (%)
5.0	0.7
13.0	1.7
22.0	2.9

The UVC transmission at 253.7 nm for the GET-EF demonstration study was 97.9 percent prior to the addition of H_2O_2. The addition of 5, 13 or 22 ppm of hydrogen peroxide to GET E/F water was calculated to decrease its UVC transmission at 253.7 nm to 97.2 percent, 96.2 percent and 95.0 percent, respectively. Using the previously discussed UV treatment design tools, the impact of hydrogen peroxide addition on UV/OX treatment efficiencies can be simulated by adjusting the absorbance of the water. The benefit of minimizing the addition of hydrogen peroxide was not only related to costs and meeting NSF standards, but also increased the overall treatment efficiencies associated with the treatment of NDMA because of the increase in UVC transmission at 253.7 nm.

The effect of H_2O_2 concentrations on treatment efficiencies and by-product generation was evaluated. Hydrogen peroxide influent concentration was maintained at 5, 13, and 22 ppm. Samples were collected for 1,4-dioxane and VOCs from both the influent and effluent sampling ports following equilibrium of H_2O_2 concentrations. These tests were conducted with two 16-lamp modules prior to the addition of two 8-lamp modules to the UV treatment system. The table below summarizes the influent and effluent concentrations measured at H_2O_2 concentrations of 5, 13, and 22 ppm.

	H_2O_2 Concentration								
	22 ppm			**13 ppm**			**5 ppm**		
Analyte (µg/l)	**Influent**	**Effluent**	**% Removal**	**Influent**	**Effluent**	**% Removal**	**Influent**	**Effluent**	**% Removal**
1,4-dioxane	4	<3	–	4.2	<3	–	4	<3	–
TCE	658	37.4	94	686	39	94	775	65.5	92
Cis-1,2-DDCEDCE	21.6	0.85	96	23.7	0.86	96	24.6	1.53	94
1,1-DCE	8.1	<0.42	–	8.7	0.22	97	9.6	0.41	96
Chloroform	13.2	11.2	15	13.6	12.1	11	14.9	12.5	16

The incremental increase in treatment efficiencies with increasing H_2O_2 was less than predicted and was inconsistent with those measurements presented in Figure 58.

With the addition of the air stripper to the Phase 2 treatment system in October 2000, hydrogen peroxide doses were reduced to 5 mg/l. Results of performance monitoring on October 4, 2000 suggest that prior removal of VOCs (TCE and chloroform) will allow the hydrogen peroxide dose to be decreased, and therefore UV transmittance increased.

4.4.3.2 UV Intensity

Tests were conducted on-site to evaluate the effect of increasing UV intensity (through the addition of custom Trojan lamp modules) on treatment efficiencies. Influent and effluent concentrations were measured for NDMA, 1,4-dioxane, and VOCs for various lamp-module configurations. The results for one 16-lamp module, two 16-lamp modules, and two 16-lamp modules with two 8-lamp modules are summarized below:

	One 16-lamp module			Two 16-lamp modules			Two 16-lamp modules and Two 8-lamp modules		
Analyte (µg/l)	**Influent**	**Effluent**	**% Reduction**	**Influent**	**Effluent**	**% Reduction**	**Influent**	**Effluent**	**% Reduction**
NDMA	0.094	0.017	82	0.093	<0.0075	92	0.124	0.0036	97
1,4-dioxane	–	–	–	4.2	<3	–	4.1	<3	–
TCE	–	–	–	686	39	94	1,070	14.8	99
Cis-1,2-DCE	–	–	–	23.7	0.86	96	17.2	0.19	99
Chloroform	–	–	–	13.6	12.1	11	17.5	15.3	13

As predicted, substantial increases in treatment efficiencies were realized. The EE/O (KWh/1,000 gal/order) for NDMA using one 16-lamp module was 0.3. For two 16-lamp modules plus two 8-lamp modules, the EE/O was 0.45. This difference was assumed to be related to preferential flow beneath the two 8-lamp modules that only extended into the upper half of the reactor process depth.

4.4.3.3 Weir Plate Configuration

A weir plate was designed and installed in the discharge end of the UV treatment tank. The weir plate maintains water levels within the reactor at 48 inches. The weir was designed and constructed with sixteen ½-inch holes in the bottom half of the plate so that half of the treatment stream would flow over the weir and half would flow through the weir. This design was utilized to minimize convergent flow over the weir and create a more uniform flow pattern across the reactor. To evaluate the impact on treatment efficiencies, influent and effluent NDMA concentrations were measured with, and without, holes in the weir plate. The table below summarizes these results utilizing one 16-lamp module.

Analyte	With Holes Influent	With Holes Effluent	Without Holes Influent	Without Holes Effluent
NDMA (ppt)	100	17	110	17

No significant changes in treatment efficiencies were observed.

4.4.3.4 Side Partition Configuration

The reactor housing was originally designed and constructed with side partitions. These partitions were designed to minimize the potential of short circuiting. To evaluate the potential for short circuiting, influent and effluent NDMA concentrations were measured with, and without, one of the side partitions. The table below summarizes these results utilizing one 16-lamp module.

Analyte	With Partition Influent	With Partition Effluent	Without Partition Influent	Without Partition Effluent
NDMA (ppt)	100	17	110	17

No discernable changes in treatment efficiencies were observed.

4.4.3.5 Hydrodynamic Dispersion

A tracer test was conducted to evaluate the degree of mixing that occurs within the reactor. A large longitudinal dispersion has the effect of decreasing the residence time of a portion of the treatment stream. Due to the first-order kinetic relationship between contaminant treatment and residence time, increases in longitudinal dispersion decrease treatment efficiencies.

Using H_2O_2 as a conservative tracer (UV lamps were turned off), H_2O_2 was introduced at time zero into the treatment tank under steady state flow conditions with no initial H_2O_2 concentration. The average influent H_2O_2 concentration was 18 ppm. Figure 59 presents the observed normalized H_2O_2 effluent concentrations versus time. These results show that 50 percent breakthrough occurs at one reactor volume or 9.5 minutes. Additionally, at 3 reactor volumes, essentially 100 percent breakthrough was observed. Using a one-dimensional, analytical solution of the transport equation (Fetter, 1992) a longitudinal dispersion value of less than 1 $foot^2$/min was calculated. The UV treatment design tools were then used to evaluate the effects of longitudinal dispersion on treatment efficiencies. Less than a 10 percent difference in treatment efficiency was realized in simulations comparing no dispersion (plug flow assumption) to simulations using the dispersion value observed during the tracer test.

4.4.4 Evaluation of Control Parameters

A number of control/alarm parameters may be considered to ensure that discharge requirements are not exceeded. These include electrical current, H_2O_2, turbidity, water level, and flow rate. Some of these parameters may be maintained by control/alarm parameters of up-stream treatment systems.

Electrical Current. Monitoring alarm conditions created by UV lamp shut-downs or failures was best achieved through electrical current measurements. Electrical current or amperage load was directly proportional to the number of operating UV lamps. In addition, a system control center monitors the status of each integrated UV lamp module independently, providing appropriate alarms and control.

Hydrogen Peroxide. Maintaining H_2O_2 concentration in the treatment tank was necessary for 1,4-dioxane treatment. To ensure continued H_2O_2 metering, H_2O_2 flow rates should be monitored.

Turbidity. Increases in turbidity will interfere with the efficient use of UV light, which can be manifested as decreases in treatment efficiencies. The probability of turbidity changes was related to up-stream processes and the source of the process stream. However, the UV intensity meter will be able to measure these occurrences and appropriate action can be taken.

Water Level. Low-level alarms would detect catastrophic reactor-housing failure or water levels below normal operation depth that would decrease residence time. High-level alarms would detect water levels above normal operating conditions caused by failures in discharge pumps (if required), or obstructions in the treatment system.

Flow Rate. Flow-rate control was required to maintain flow within treatment system specifications. Low flow rates indicate some water delivery problem; however, low flow rates will not adversely effect treatment efficiencies. High flow rates will decrease residence time and hence, treatment efficiencies. This can be addressed by designing the full-scale treatment system for peak flow conditions.

4.4.5 Comparison of Low Pressure and Medium Pressure UV/OX Systems

Aerojet chose to pilot test a custom low pressure lamp based UV/OX system rather than rely on the industrial medium-pressure lamp based UV/OX provided by Calgon Carbon Corporation (Calgon). The low pressure lamp based UV/OX piloted in this study was provided by Trojan Technologies, Inc. (Trojan). Components of Trojan's system were integrated into a hydraulically and photochemically optimized reactor housing that was unpressurized. Initial testing of the UV/OX technology, performed at GET-B, demonstrated that the technology was able to treat NDMA and 1,4-dioxane to desired target effluent concentrations and resulted in more than an order of magnitude decrease in operating electricity costs.

In parallel with the custom Trojan UV/OX system was a Calgon Rayox medium pressure UV/OX system. Since both systems were treating the same water, a direct comparison of system performance, reliability, stability, and operating requirements was possible. In addition, comparative capital and operating costs were available.

4.4.6 Process Reliability and Stability

Factors that may affect treatment system reliability and stability are constituent influent concentration and lamp life. Significant increases in influent concentrations may result in effluent quality that exceeds targeted effluent concentrations. A system designed with provisions to meet a range of anticipated influent concentrations would increase reliability and stability. Increases in other dissolved constituents, including nitrate and other organic compounds, can also effect effluent concentrations by increasing UV absorbance. However UV/OX systems are far less sensitive to nitrate or virtually all organic species concentrations than medium pressure UV/OX systems. As an example, if nitrate concentrations were to increase from less than 0.1 mg/l to 25 mg/l, a medium pressure treatment system would need to be increased by 100 percent to maintain the same effluent concentrations. The same increase in nitrate in a treatment system utilizing technology would increase treatment requirements by less than 10 percent.

Changes within a range of anticipated influent concentrations are typically handled cost effectively through additional lamp modules. These modules are not operated under normal conditions but can be brought on line to meet changes in water quality or during periods of maintenance. The unpressurized reactor housing should be designed to easily accept additional lamp modules at a later date, affording even greater operational flexibility.

Lamp life or reduction in UV output with time can ultimately affect process reliability. Trojan specifications ensure 86 percent of initial UV output after 9,000 hours of operation. Replacing half a system's lamps every 4,500 hours further minimizes these reductions in UV output.

4.4.7 Full-scale Design Criteria

The design criteria for full-scale treatment systems are based on source water characteristics. The primary design parameters include treatment flow rate, target contaminant influent concentrations, effluent concentration requirements, spectral analysis, influent ancillary VOCs, and TOC, and inorganic water quality analyses.

Spectral analyses are used to measure the water UV transmittance at 253.7 nanometers to determine the overall water quality absorbance characteristics. Ancillary VOCs in the influent stream are evaluated to identify potentials for by-product generation. Inorganic constituents, such as iron, are evaluated to predict potential precipitation or fouling problems.

To optimize treatment efficiencies or confirm that by-product generation was within acceptable levels, pilot tests may be performed. These short-term pilot tests would be conducted on site and would allow direct measurements of influent and effluent concentrations, treatment efficiencies, and analysis of by-products. Pilot test results would be used in conjunction with the UV treatment design tools to optimize full-scale treatment systems.

Preliminary data to be collected would include full spectral analysis of the influent water, influent concentrations of chemicals to be treated (e.g. NDMA, 1,4-dioxane, etc.), influent concentrations of other organic chemicals (e.g. VOCs, semivolatile organic compounds [SVOCs], etc.), influent concentrations of inorganic chemicals (e.g., nitrate, magnesium, calcium, iron, etc.), and other water quality data (e.g., pH, TOC, hardness, etc.). Based on these data and using the previously discussed UV treatment design tools, a pilot test protocol can be specified.

The UV treatment design was developed to simulate full-scale operation and predict effluent concentrations, H_2O_2 usage, and power consumption. Full-scale operational parameters are then varied and optimized to address reliability, flexibility, robustness and operational parameter limits using the UV treatment design tools. Optimized operational parameters include number of UV lamps, lamp spacing, lamp type, lamp geometry relative to reactor housing, reactor dimensions, mixing, flow rates, water velocity/residence time, influent contaminant concentrations, H_2O_2 concentrations, water depth and water absorbance/transmittance. Each optimized parameter was then incorporated into the full-scale UV system to ensure overall system performance and robustness.

4.5 Liquid Phase Granular Activated Carbon Contactor

The LPGAC contactor was included in the treatment train as an additional barrier for several of the target contaminants and as a polishing unit to improve taste and odor and minimize DBP precursors. Granular activated carbon is able to remove VOCs and SVOCs, precursors to disinfection byproducts, and constituents contributing to taste and odor through adsorption and biological assimilation. Adsorption and biological assimilation may occur simultaneously within the same contactor. Additional objectives for this portion of the Phase 2 Treatability Study were to identify and evaluate parameters that will govern full scale LPGAC operation such as loading rate and empty bed contact time; and to develop design criteria for full-scale design. Analytical samples and field data for the LPGAC were collected at sample ports 12 through 16 (see Figure 1 for locations).

4.5.1 LPGAC Contactor Operation

The pilot LPGAC contactor received 100 gpm of the UV/OX effluent. Prior to October 3, the LPGAC contactor followed UV/OX without an air-stripping process preceding it. During the period without an air stripper, chloroform concentrations were observed to increase over time in the effluent as illustrated in Figure 61. The gradual increase in chloroform concentration over time is illustrative of an adsorption removal mechanism.

After October 3, an air stripper was added prior to the UV/OX and fresh GAC was placed into the contactor. The lack of a well-defined breakthrough curve after the installation of the air stripper suggests that adsorption is no longer the predominant removal mechanism. Unless there is a failure in an upstream treatment process, removal of contaminant mass via biological assimilation is likely to be the prominent removal mechanism although adsorption and desorption of contaminants remaining after air-stripping and UV/OX will continue in response to local equilibrium conditions.

The GAC both adsorbs and assimilates VOCs and SVOCs remaining in the UV/OX effluent and as such serves as a desirable second or third barrier for most contaminants should the UV/OX or air-stripping system fail or under-perform. The GAC contactor will also provide a limited duration (1 week) secondary barrier for perchlorate should the bioreactor fail or under-perform. In addition, the GAC will act as a biologically active media so that it will reduce assimiliable carbon and most byproducts of the UV/OX process. The presence of LPGAC should minimize problems with biological regrowth from occurring in the distribution system. Finally, the GAC contactor was intended to act as a final polishing unit with the purpose of improving taste and odor and removing precursors to DBP before the treated water undergoes the final step of disinfection.

4.5.2 Evaluation of Operating Parameters

The hydraulic loading rate through the pilot GAC contactor was based on standard industry practice. The contactor was sized for a liquid loading rate of 5 gpm/ft^2, a common value for filter systems.

Performance of the LPGAC was evaluated based on VOC samples taken at several sampling ports located along the length of the contactor. The ports were located at the influent point, at the 25 percent, 50 percent and 75 percent bed depths, and at the effluent point. Prior to process train modifications on October 3, the GAC system experienced breakthrough of chloroform twice during the pilot study. Both breakthrough events occurred prior to the installation of an air stripper upstream and optimization of the UV/OX unit.

4.5.3 Control Parameters

Operational control parameters for the LPGAC include head loss across the GAC bed and breakthrough of contaminants above an maximum contaminant level (MCL) or other threshold condition for either a single contactor or a blend of contactor effluents. If the head loss across a contactor becomes excessive, the GAC contactor will need backwashing to remove the trapped solids or media compaction causing the head loss. Throughout the pilot study, the head loss across the bed was minimal (less than 2 pounds per square inch [psi]) and a backwash was not required. Full-scale LPGAC facilities require backwashing capabilities and a means for moving and preparing GAC for service.

The frequency at which LPGAC would need to be exchanged depends on the mode of operation. In taste and odor applications, the total mass of LPGAC on-line is typically exchanged every 2 to 5 years. The exchange of LPGAC in individual LPGAC contactors is normally staggered over an assumed carbon life in order to eliminate perceptible variations in finished water taste that have resulted from the entire mass of LPGAC being replaced at one time.

LPGAC is operated in an adsorptive mode when LPGAC is exchanged based on the specific breakthrough of a contaminant. The frequency of carbon exchange when LPGAC is operated in an adsorptive mode is highly variable from one situation to another. In multiple contaminant situations, carbon change out can vary from months to years. The frequency of carbon exchange is highly dependent on influent concentrations and EBCT.

If the LPGAC is operated in an adsorptive mode, an optimum EBCT range exists from an operational cost minimization perspective. The determination of an optimal EBCT range for adsorption is a standard engineering assessment and was beyond the scope of the treatability study.

If the LPGAC is operated in a predominantly biological mode (i.e. a polishing mode), influent and effluent concentrations of the contaminants or constituents of concern will need to be regularly monitored.

4.5.4 System Reliability and Multiple Barrier Operation

It is desirable for an LPGAC system, following air-stripping and UV/OX processes on a water with multiple contaminants, to have the ability to function either as an adsorption process or as a predominantly biological process depending on the circumstances. For an upstream process failure, a downstream adsorption process is desirable and is consistent with the philosophy of multiple barriers. For normal control of taste, odor, AOC, and DBP precursors, the LPGAC will operate primarily in biological mode. Additional LPGAC contactors can be held off-line as a reserve (for use in an adsorption mode, if required) while other contactors are in service and operated as a biological process. Such an arrangement is reliable, cost effective and flexible from an operational perspective.

4.5.5 Full-scale Design Criteria

Without the inclusion of LPGAC at the end of the treatment train, a higher degree of reliability is required in upstream processes. The risks mitigated by using LPGAC include having the ability to address taste and odor, the ability to reduce AOC, the ability to catalytically destroy residual peroxide prior to disinfection, and the ability to provide an additional barrier to VOCs and SVOCs.

LPGAC contactors that are arranged to provide either adsorptive or predominantly biological removal of contaminants or constituents would be a cost effective, reliable, and flexible configuration.

For taste and odor removal and AOC reduction, EBCTs on the order of 3 to 6 minutes have been successful. For the adsorption of specific organic contaminants, EBCTs in the 15 to 30 minute range would be optimum from an operational cost minimization standpoint. Biological activity will occur in any size activated carbon system but only improves marginally as the size increases. For residual hydrogen peroxide destruction, shorter EBCTs than that required for adsorption are desirable and a pathway for oxygen gas to exit the contactor must exist.

Hydraulic loading rates for downflow LPGAC contactors typically do not exceed 5 gpm/ft^2. Upflow contactors can accommodate higher hydraulic loading rates as long as sidewall depth exists for expansion of the media. As stated previously, an upflow LPGAC contactor would be more forgiving with respect to residual or inadvertent hydrogen peroxide carried over from the UV/OX process. Hydraulic loading rates of 15 to 20 gpm/ft^2 are required during backwashing and for preparation of recently re-bedded LPGAC contactors.

4.6 Disinfection System

A sodium hypochlorite disinfection system was put into operation on May 4, 2000. It received 10 gpm of flow from the LPGAC and was the final unit process of the Phase 2 system. Sodium hypochlorite solution was metered into the flow prior to a segment of 8-inch serpentine pipe that provided a contact time of 22 minutes at 10 gpm. A fresh batch of sodium hypochlorite solution was mixed once per week to maintain consistent solution strength. The chlorine concentration immediately after mixing but before detention time (i.e., the applied dose) was measured in the process piping with a field test kit twice per week. The chlorine concentration after detention time (i.e., residual) was similarly measured.

This section presents data in support of the Phase 2 Treatability Study objectives for the disinfection system. These included verification of plug flow condition, assessment of chlorine demand, chlorine contact time and chlorine residual concentration, and assessment of DBP formation.

4.6.1 Tracer Study

A tracer study was conducted to verify that contact piping was providing acceptable plug flow conditions. Results are presented in Figure 64. A sodium chloride solution was injected at the upstream end of the system and conductivity was measured at each of the downstream sampling ports over time. The resulting curves were integrated and the calculated areas for sample ports 18 through 22 agreed within 12 percent, indicating conservation of mass. Dispersion numbers were calculated for each sample port based on an empirical equation for dispersion in long pipes (Montgomery, 1985). These dispersion numbers were then used to predict the response at each sample port. Actual data agreed very well with these predictions.

4.6.2 Chlorine Demand, Contact Time and Residual Concentration

The applied free chlorine dose averaged approximately 1.8 mg/l and the residual free chlorine concentration averaged approximately 1.25 mg/l after 22 minutes of contact time. The resulting free chlorine demand therefore averaged approximately 0.55 mg/l. The CT value is the product of free chlorine residual multiplied by actual detention time. For the pilot system, the average CT value was therefore approximately 28. This CT value can provide approximately 1.5 log *Giardia lamblia* inactivation at a water temperature of 20 degrees Celsius and a pH of 6.5. It is approximately 9 times the value necessary to achieve 4-log inactivation of viruses.

In addition, the Phase 2 Treatment System produced water containing no viruses or pathogens, and only small amounts of heterotrophic bacteria.

4.6.3 Disinfection By-Product (DBP) Formation

The use of a form of chlorine as a disinfectant introduces the potential of having chlorine react with natural organic matter (NOM) in the water and formation of DBPs. These DBPs may include halogenated organic byproducts (THMs) including chloroform, bromodichloromethane, dibromochloromethane, and bromoform; and haloacetic acids that include monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. Samples taken in the system were analyzed for all of these DBPs.

Samples collected for analysis of DBPs were taken in five locations in the Phase 2 Treatment System. Samples were taken (1) before the bioreactor, (2) between the bioreactor and the multi-media filter,

(3) between the multi-media filter and the UV/OX unit, (4) between the UV/OX unit and the LPGAC contactor, and (5) between the LPGAC contactor and the disinfection system.

THM formation potential through the treatment train was evaluated both before and after the installation of the air stripper. Results from several sampling events prior to the air stripper installation indicate that THM formation potential was reduced by approximately 45 to 60 percent (70 to 37 μg/l and 70 to 30 μg/l exclusive of the contaminant chloroform) through the multimedia filter. THM formation potential data collected prior to the installation of the air stripper includes chloroform concentrations existing in the treatment train prior to disinfection in addition to true THMs. To quantify true THMs, it is necessary to subtract chloroform concentrations in the raw groundwater from the THM values reported by the laboratory. Low levels of THM formation potential were observed both after UV/OX and LPGAC. It can be concluded from these data that the treatment processes adequately controlled THM formation potential and that compliance with foreseeable THM MCLs is achievable for similar systems.

The magnitude of THM formation potential after an activated carbon process will be dependent on time because effluent concentrations of TOC and other contaminants will increase over time as adsorption capacity is used.

4.6.4 Impact of Hydrogen Peroxide on Chlorine Demand

The 7-day chlorine demand ranges from a minimum of 3 mg/l to a maximum of almost 24 mg/l. The effects of hydrogen peroxide addition upstream of the UV/OX treatment unit increases the 7-day demand from 6 mg/l to the 24 mg/l maximum. Before the flow enters the disinfection loop in the treatment system, the 7-day demand averaged approximately 3 mg/l, confirming that the arrangement of unit treatment processes reduces chlorine demand as water flows through the system.

4.7 Reclamation System

The reclamation system was operated throughout the study. Analytical samples and field data were collected at sample ports 102 through 104. Additional field data was also collected during focused optimization studies on the clarifier.

The objectives for the reclamation system were to assess the removal efficiencies for turbidity; optimize operating parameters such as type and dose of coagulant and polymer, and system flow rate; identify and evaluate system control parameters; assess system reliability, and develop design criteria for full-scale design.

4.7.1 Reclamation System Operation

The reclamation system was incorporated into the treatment system to process backwash and filter-to-waste water from the multimedia filter. Two reclamation system equalization tanks allowed the reclamation system's influent stream to be equalized and its flow rate to be controlled. A lamella clarifier was installed downstream of the holding tanks to remove solids and turbidity from the water. Continuous flow was conveyed from the tanks to the clarifier. Flow to the clarifier ranged from 20 gpm to 50 gpm, averaging approximately 25 gpm.

Coagulant and a polymer were injected into the process stream prior to the clarifier. The water and chemicals were mixed in a flash mix zone of the clarifier. The water then flowed through a flocculation basin before entering the main settling chamber of the clarifier. Reclaimed water was returned to the Phase 2 treatment train at the aeration tank upstream of the multimedia filter.

For the Phase 2 Treatability Study, the clarifier sludge was routed to the GET E/F waste biomass tank. In a full-scale system, the clarifier solids could be discharged directly to sewer or a filter press could be used to further concentrate the clarifier sludge prior to disposal.

4.7.2 Optimization of Operating Parameters

Optimization of the lamella clarifier operation involved the comparison of different chemicals at varying dosages and combinations. The objective was to identify the combination that would maximize the production of floc and its settling rate, and that would also minimize the turbidity of the reclaimed water. Comparison of chemicals and dosages were first made from jar tests. This allowed many variations to be tested in a short amount of time. Results from the jar tests were used to design tests to be run for the Phase 2 treatment system.

Ultimately it was determined that injecting a significant dose of coagulant and a very small dose of polymer into the clarifier influent was most effective at optimizing clarifier performance. Coagulant alone produced large floc. However, the flocs formed and settled very slowly, and therefore turbidity was not reduced in an acceptable amount of time. Polymer alone produced minimal floc, settling and turbidity reduction. The use of coagulant and polymer together resulted in the production of large floc that settle well and a significant decrease of turbidity across the clarifier.

The primary coagulant used was alum (alum). Ferric chloride was also tested and was found to be slightly less effective. Figures 65 and 66 show influent and effluent turbidities and percent reduction across the clarifier for alum and ferric chloride respectively.

The polymer used throughout the test period was a cationic quaternary ammonium compound (QAC) polymer (poly[DADMAC]). Based on bench scale studies of several polymers, Poly(DADMAC) was recommended by the lamella clarifier manufacturer and performed effectively in combination with coagulant.

Jar tests showed that alum over a large range of doses (25 ppm to 70 ppm) was effective at producing floc. Adding a small dose of polymer (1.5 ppm to 4.0 ppm) increased the settling velocity of the floc formed by alum and resulted in a significant decrease in turbidity of the water over the test period.

Combinations of alum and poly(DADMAC) doses over the ranges found to be effective in the jar tests were repeated in the pilot scale clarifier. It was found that alum was effective at producing floc over the full range identified in the jar test with minimal distinction between 30 ppm and 70 ppm. Therefore, the lower alum dose of 30 ppm was selected for operation to minimize the opportunity for alum to appear in plant discharge water. It was also found that a polymer dose of greater than 3 ppm decreased clarifier performance and that a dose of approximately 2 ppm was most effective at increasing the settling characteristics of the floc formed by the alum. After several weeks of operation with 30 ppm of alum and 2 ppm of polymer, filter run times averaged 9 to 10 hours

4.7.3 Control Parameters

During the treatability study, the primary control parameter for the reclamation system was effluent turbidity. A secondary indicator of system performance and removal efficiency was the length of the filter runs for each operating condition. In the full-scale system, a streaming current detector could be used to measure net ionic and particle surface charge in the clarifier effluent. The current detector could be equipped with alarms to allow particle surface charge to be used as a coagulant dose control parameter.

4.7.4 Full-Scale Design Criteria

Based on results from the Phase 2 Treatability Study, the following criteria were developed for a full-scale traditional flocculator/clarifier:

- Loading rate: 25 gpm/ft^2
- Coagulant: 30 ppm of alum or ferric chloride
- Polymer: 2 ppm of poly(DADMAC), a cationic QAC

Netzsch, Inc. performed bench scale dewatering testing on a settled sludge from the reclamation system's lamella clarifier using a recessed chamber filter press. The testing indicated that the sludge was difficult to dewater. However, with body feed conditioning, a filter cake of at least 30 percent dry solids was accomplished. The filtrate quality for this test was rated excellent and a cycle time of approximately 120 minutes was possible. Netzsch indicated that other dewatering technologies may provide better results and that more testing would be required to determine the most effective dewatering technique. Netzsch's bench test report is included as Appendix C.

Although Netzsch examined plate and frame filter press technology, other dewatering devices , such as belt filter presses, belt thickeners, membranes, and centrifuges, could be used. Also, disposal of unthickened sludge directly to the sanitary sewer could be an alternative.

4.8 Overall System Performance

This section presents data in support of the Phase 2 objectives for the overall treatment system. These objectives included demonstration of a multi-barrier treatment system, assessment of the biological regrowth potential of the treated water, evaluation of NDMA reformation potential, and compliance with all applicable federal and state drinking water regulations.

4.8.1 Multi-Barrier Treatment

The Phase 2 treatment train incorporated a multi-barrier treatment approach, where possible, for each of the contaminants of concern. These contaminants included nitrate, perchlorate, VOCs, NDMA, and 1,4-dioxane. In addition, use of biological reduction in the treatment train created the need to verify removal of ethanol and its breakdown products, and suspended solids. Pathogens and viruses were not considered contaminants of concern because they were not detected at any point in the treatment system. The barriers provided for each of the contaminants of concern are discussed within this section along with failure scenarios for each barrier.

The primary barrier for removal of nitrate and perchlorate is the bioreactor. In the pilot study, nitrate and perchlorate were reliably removed by an optimized bioreactor system and never entered the subsequent treatment processes. The secondary barrier for perchlorate is the LPGAC contactor, albeit for only a short time. Nitrate does not have a secondary barrier in this treatment train. Possible failure scenarios for the bioreactor include ethanol or nutrient feed system failure, failure of one or more of the control systems, a sudden significant increase in influent oxygen, nitrate, or perchlorate concentrations, or introduction of a substance that is toxic to the biomass population. Several measures can be implemented to reduce the risk of failure or to detect a failure and automatically shut the system down before producing treated water that does not meet drinking water standards.

To reduce the risk of failure, control systems can include redundant instrumentation. A full-scale bioreactor will include online or real-time measurement for influent and effluent oxygen, nitrate, perchlorate, and TOC or ethanol concentrations, bed height, ethanol and nutrient flow rates, bioreactor forward flow, recycle flow, and total flow rates, and ethanol and nutrient feed tank levels. To detect a concentration measurement failure, redundant systems could be installed and monitored for the most critical measurements, such as influent oxygen, nitrate, and perchlorate and effluent nitrate, perchlorate, and TOC or ethanol. If the difference between the two redundant measurements exceeds a set point, an alarm condition would alert the plant operator of the problem. If the problem persists past a maximum time set point, the plant could be automatically shut down until the problem is rectified.

Performance failure would be detected by effluent nitrate and perchlorate measurements. Ethanol feed system failure, if not detected by the run status of the feed pump or the ethanol flow meter, would eventually cause an alarm on effluent perchlorate. Ethanol overdose, if not detected by the ethanol flow meter, would be detected by effluent TOC or ethanol measurements. Introduction of a toxic substance would cause the biofilm population to decrease and trigger an effluent perchlorate alarm. If influent DO, nitrate, or perchlorate concentrations suddenly increased (and were detected by the influent concentration measurements), the system could be programmed to automatically reduce the forward flow rate so that the electron acceptor loading rate did not change, and then gradually increase the forward flow to allow the biomass to adjust to the new condition. If the influent concentration measurements did not detect the sudden increase or if the biomass could not adjust to the new concentrations, an effluent perchlorate alarm would shut the plant down.

The primary barrier for ethanol and its breakdown products is the bioreactor. As demonstrated in the Phase 2 Treatability Study, ethanol and its breakdown products (aldehydes and carboxylic acids) are reduced to non-detectable or near non-detectable levels in the bioreactor. The second barrier for ethanol and its breakdown products is biological activity within the multimedia filter. As demonstrated in the Phase 2 Treatability Study, DO was consumed through the multimedia filter, suggesting biological activity. The third barrier for ethanol is the LPGAC contactor, which also is biologically active. Possible failure scenarios for ethanol and its breakdown products include adding ethanol at a concentration much higher than required, or causing an ethanol residual exiting the bioreactor. This failure would be detected by the bioreactor effluent TOC or ethanol concentrations.

The primary barrier for suspended solids (biomass) is the multimedia filter. As demonstrated in the Phase 2 Treatability Study, the optimized multi-media filter removed approximately 90 percent of the particles in the 2 to 20 micron size range and consistently produced effluent with a turbidity less than 0.3 NTU and undetectable or nearly undetectable suspended solids concentrations. A second barrier for suspended solids is the UV/OX system, not for removal but for inactivation. In the treatability study, the UV/OX system inactivated more than 90 percent of the influent biosolids (based on heterotrophic plate counts). A third, more robust barrier for inactivation of suspended biosolids is the disinfection system. In the treatability study, the disinfection system consistently produced treated water with heterotrophic plate counts below 100 CFU/ml, suspended solids below 0.5 mg/l, and turbidities below 0.3 NTU. Possible failure scenarios for suspended solids include filter breakthrough, UV/OX failure, or disinfection failure. A filter effluent turbidimeter would detect turbidity breakthrough. An ultraviolet light transmittance monitor would detect failure of the UV/OX system. A residual chlorine analyzer would detect disinfection failure. All of these failures would result in an alarm condition.

Although some reduction of VOCs occurred in the bioreactor, the primary barrier for VOCs is the air stripper. The second barrier for VOCs is the UV/OX unit although chloroform, DCA, TCA, CTC, and vinyl chloride may only be partially oxidized depending on their concentration and other factors. The third barrier for VOCs is the LPGAC contactor. Possible failure scenarios for VOCs include air stripper blower failure, UV/OX system failure, or contaminant breakthrough on LPGAC. An air stripper blower failure would be detected by the air flow meter. The UV/OX system failure would be detected by the ultraviolet light transmittance monitor or peroxide flow meter. LPGAC breakthrough can only be detected through analytical results. To prevent LPGAC breakthrough and preserve the adsorption capacity, the GAC should be replaced at regular intervals.

The primary barrier for NDMA and 1,4-dioxane is the UV/OX system. 1,4-dioxane is also slightly adsorbable in the LPGAC contactor. A secondary barrier for NDMA is not available. Possible failure scenarios for NDMA and 1,4-dioxane include UV/OX system failure. The UV transmittance monitor or the peroxide flow meter would detect this failure. In addition, regular samples should be taken from the UV/OX effluent for NDMA and 1,4-dioxane analysis. Depending on the degree of UV/OX system failure, water production could be curtailed instead of a complete shutdown.

In addition to removal of the target contaminants, the treatment system must also produce drinking water that is not offensive to the customers. This is primarily caused by taste and odor problems. LPGAC, in addition to being a final barrier process for upstream process failures and partially treated substances, also reliably removes taste and odor. In order to preserve the capability of removing taste and odor, the GAC should be changed at regular intervals.

The frequency with which sampling is required is affected by the level of multi-barrier treatment provided. Systems that are more effective will often require less sampling. This means that adding a unit process that provides an additional barrier and greater reliability can have cost benefits. For example, the addition of a LPGAC can result in decreased sampling requirements that over time compensate for the cost of installing and operating the LPGAC.

In addition to the level of multi-barrier treatment, sampling frequency requirements can also be affected by treatment performance. At plant start-up, sampling is often rigorous. If sampling results stabilize, the option to decrease sampling frequency can be considered. Conversely, if sampling results are sporadic and unpredictable, sampling frequency will need to be relatively high.

4.8.2 Biological Regrowth Potential

The potential to influence biological re-growth within water distribution systems was present whenever treatment includes an oxidation process. In an attempt to quantify and qualify this issue, two parameters were routinely monitored throughout the Phase 2 Treatability Study, AOC and BDOC. These parameters were measured in the untreated water as well as at various locations within the treatment train.

Two different analytical methods were used to determine BDOC. A method described in the WQTC proceedings was initially followed but replaced by the method of Allgeier. The detection limit of Allgeier method was dependent on the detection limit of dissolved organic carbon measurements, which was 0.5 mg/l.

Approximately 94 percent of the 116 samples analyzed for BDOC have concentrations less than the detection limit. All but one of the 6 samples above the detection limit was obtained from sample ports associated with the fluidized bed reactor or its recycle. No other conclusive statements or trends were evident from the BDOC data.

The AOC data was more informative than the BDOC data. In general, the magnitude of the AOC data was consistent with the majority of the BDOC data being reported at or below its 0.5 mg/l detection limit. AOC results after UV/OX were 2.19, 3.45, and 1.17 times higher than AOC in the untreated water on 5/10/00, 5/23/00, and 7/13/00, respectively.

The benefit of having LPGAC in the treatment train was discernable on 5/10/00 and 5/23/00. In general, AOC concentrations increased after UV/OX and then decreased after LPGAC (6 minutes EBCT). On 5/10/00, AOC concentrations in untreated water, following UV/OX, and following LPGAC were 42, 98, and 58 μg/l respectively. On 5/23/00, AOC concentrations in untreated water, following UV/OX, and following LPGAC were 72, 249, and 105 μg/l respectively. These data indicate that AOC concentrations increase in magnitude by a factor of 2 to 3 because of the treatment processes prior to and including UV/OX. LPGAC with an EBCT of 6 minutes was able to reduce the AOC to within a factor of 1.4 of the value in the untreated water. Longer EBCTs are likely to produce water with AOC concentrations closer to the value of untreated water.

The results of this study generally agree with findings from others in regard to increases in AOC due to oxidation and subsequent control with LPGAC. Since untreated groundwater has a relatively low concentration of organic matter, AOC concentrations after treatment processes are also likely to be low. Whether the 2 to 3 fold increases in AOC concentration were large enough to require LPGAC to be part of the treatment train is unknown. The need for LPGAC is partially dependent on AOC concentrations in the water presently in the distribution system, originating from other supplies, and the distance water travels to the point of consumption. AOC concentrations will diminish with travel time as material is assimilated. If water distributed today has higher AOC concentrations than that produced by the treatment train, inclusion of LPGAC in the treatment train is not justified. If water distributed has lower concentrations of AOC, than treated water additional treatment using LPGAC may be justified.

The heterotrophic plate count (HPC) values observed after disinfection in the Phase 2 Treatability study further support that bacteriological regrowth will not be significant. HPC values after 8 months of operation were still well below the 500 CFU/ml, the value regarded by the EPA and many large water system operators as indicative of biological regrowth. Based on the discussion above, water quality produced from this treatment processes will be manageable from a biological regrowth perspective.

4.8.3 NDMA Reformation Potential

NDMA is known to form directly in solutions containing nitrite (NO_2^-) and dimethylamine (DMA), both breakdown products resulting from the UV-photolysis of NDMA. However, the reaction only takes place at low pH, consistent with the reaction of DMA with nitrous acid (HONO), the protonated form of nitrite. Aerojet conducted testing of NDMA reformation on UV-oxidation reactor effluents at their Sacramento facility (Aerojet, 2000). The experiments were conducted by adding 28 ppm sodium nitrite to deoxygenated effluents of GETA, GETB, GETE/F and non-deoxygenated mixtures of these effluents with site groundwater and American River water. Effluent samples were tested as received at pH levels of 6.0, 6.5, and 7.0. Standing at room temperature for 21 days, none of the samples showed a measurable increase of NDMA.

Research (Graham and others, 1995) suggests that chlorine reaction with DMA can result in low yields of NDMA and that chloramine (as opposed to free chlorine) addition to water can result in NDMA formation (Najm and Trussel, 2000), an effect enhanced by the presence of nitrite.

Whatever the mechanism for NDMA formation, the addition of H_2O_2 to the UV process was expected to virtually eliminate the NDMA precursors nitrite and DMA, particularly when low-pressure UV lamps were employed. Medium pressure lamps produce significant amounts of nitrite. The reaction rates of either of these constituents with the hydroxyl radical produced by UV-photolysis of H_2O_2 was extraordinarily fast, exceeding 10^{10} liters/mole-second. Thus both nitrite and DMA will be removed from solution as a result of the UV-treatment process.

Regardless of the theoretical determination that NDMA should not be reformed following UV-treatment or during disinfection, results of analysis for NDMA following disinfection (Table 13) show concentrations of NDMA were reduced to approximately 2 nanogram per liter (ng/l) (ppt), well below the 20 ng/l (ppt) action level.

4.8.4 Compliance with Federal and State Drinking Water Regulations

Applicable regulations for the treatment of contaminated groundwater and subsequent consumption as potable water include the Federal Safe Drinking Water Act as administered by the EPA and the California Safe Drinking Water Act as administered DHS. Since the State of California has maintained primacy on drinking water issues, DHS is the organization whose criteria and policies must be satisfied for acceptance of treatment processes for reliable production of potable water.

The California Department of Health Services has issued guidance in form of Policy Memo 97-005 entitled “Guidance for Direct Domestic Use of Extremely Impaired Sources: Last Update February 1, 2001”. The purpose of the guidance document is to set forth the position and the basic tenets by which the Drinking Water Program (DWP) of DHS would evaluate proposals, establish appropriate drinking water facility permit conditions, and approve the use of an extremely impaired source for any direct potable use. Policy 97-005 applies to the BPOU since the situation meets the criteria for an extremely impaired source and the goal is direct potable reuse. The policy includes requirements that treatment processes must be commensurate with the degree of risk associated with the contaminants present, that treatment shall include at a minimum the use of Best Available Technology defined for the contaminants by the EPA, and that treatment processes must have reliability features consistent with the type and degree of contamination. The policy also discusses situations in which multi-barrier treatment would be deemed appropriate.

The source water for the Phase 2 Treatability Study contains contaminants similar to the contaminants present in the BPOU. The main treatment processes examined in the treatability study were a fluidized bed GAC bioreactor, multi-media filtration, air stripping, UV/OX, liquid-phase GAC, and sodium hypochlorite disinfection. A complete drinking water sampling event occurred on November 8, 2000. On this date both untreated water (port #1) and treated water (port #22, after the aforementioned process train) were analyzed for compliance with applicable regulations. On November 28 and December 12, treated water from port 22 was analyzed again for compliance. Data from these compliance sampling dates are summarized in Tables 11 to 13.

Treated water perchlorate concentrations for all three compliance sampling events were undetectable at a method detection limit of 0.43 µg/l, significantly less than the action level of 18 µg/l. In addition to the compliance sampling, treated water perchlorate concentration was also monitored throughout the treatability study and of the 25 treated water samples taken after completion of the ethanol optimization study (June 12, 2000), only four detections occurred (Table A4). The highest detection was at 6.9 µg/l, still below the action level of 18 µg/l. Prior to the start of the treatability study, the bioreactor effluent perchlorate concentration was also monitored (starting October 1, 1999) and of the 81 samples taken after the bioreactor startup (October 14, 1999), only 1 detection occurred at 6 µg/l (Table A9). Method detection limits ranged from 0.43 to 4 µg/l, depending on which laboratory was performing the analysis.

The average raw water perchlorate concentration was approximately 2,700 μg/l for the pilot study. The expected raw water perchlorate concentration at the BPOU is between 50 and 200 μg/l. Based on the results of the pilot study, perchlorate removal to below the action level is possible at the BPOU using a fluidized bed bioreactor.

Treated water NDMA concentrations for all three compliance sampling events were equal to the method detection limit of 2 ng/l, one order of magnitude below the action level of 20 ng/l. In addition to the compliance sampling, treated water NDMA concentration was also monitored throughout the treatability study and of the 28 treated water samples taken after startup of the UV/OX unit (May 5, 2000), only 8 detections occurred (Table A4). The highest detection was 10 ng/l, still below the action level of 20 ng/l. Method reporting limits were 20 ng/l from May through June, and 7 ng/l from July through December. Estimated values down to 2 ng/l were also reported between July and December. The raw water NDMA concentration for the November 8, 2000 compliance sampling event was 210 ng/l, although the average raw water concentration throughout the study was approximately 120 ng/l. The expected raw water NDMA concentration at the BPOU is between 150 and 300 ng/l. Based on the results of the pilot study, NDMA removal to below the action level is possible at the BPOU using a low-energy UV/OX system.

Treated water 1,4-dioxane concentrations for all three compliance sampling events were undetectable at the method detection limit of 3 μg/l. The action level for 1,4dioxane is also 3 μg/l. In addition to the compliance sampling, treated water 1,4-dioxane concentration was also monitored throughout the study (Table A2) and of the 24 samples taken, all were undetectable. The average raw water 1,4-dioxane concentration was approximately 4.2 μg/l for the pilot study. The expected raw water 1,4-dioxane concentration at the BPOU is between 3 and 4 μg/l. Based on the results of the pilot study, 1,4-dioxane removal to below the action level is possible at the BPOU using a low-energy UV/OX system.

With respect to VOCs and SVOCs on these dates, the aforementioned process train was able to treat all regulated and unregulated VOCs and SVOCs present in the untreated water to below each contaminant's detection limit without creating oxidation and DBP in concentrations above regulatory limits. Therefore, a group of treatment processes inclusive of Best Available Technology as defined by DHS Policy 97-005 for VOCs and SVOCs (i.e., air stripping and LPGAC) was demonstrated to be viable solution for this contaminant matrix and appropriate for similar water matrices.

With respect to oxidation and DBP, regulatory limits were achieved with the aforementioned process train. Observations regarding specific constituents are described below.

- Chlorate. Although occasionally detected within the treatment processes, chlorate was not detected after LPGAC in three sampling events. Elevated chlorate concentrations at sampling ports greater than No. 17 were likely the result of sodium hypochlorite addition.

- Chlorite. The measured concentrations of chlorite in the treatment system effluent were more than an order of magnitude below the standard of 1.0 mg/l.

- Bromate. The observed formation of bromate was not significant in the treatability study with all samples below detection (5 μg/l) despite approximately 60 μg/l of bromide present in the treatment plant effluent. UV/OX did not significantly change the bromide concentration, which limits bromate formation.

- Total Trihalomethane (TTHM). The observed formation of the sum of the four-trihalomethane compounds was extremely low (2 to 3 μg/l) for water exiting the pilot plant. Every indication is that the TTHM MCL of 80 μg/l will be easily satisfied for groundwater with low TOC treated by the aforementioned treatment processes. No trouble meeting the TTHM MCL in the BPOU is anticipated even if the degree of disinfection is more robust than that applied during the treatability study.

- HAA5. The observed formation of the five-haloacetic acids (HAA5) was not significant in the treatability study. Observed concentrations were rarely above detection limits. The sum of the five-haloacetic acids, assuming their detection values, were an order of magnitude less than the MCL of 60 μg/l.

With respect to disinfection, groundwater low in TOC treated by the aforementioned treatment train is easily disinfected. Parasitic organisms such as Cryptosporidium and Giardia were not detected at any time nor are they likely to be present in BPOU groundwater in significant numbers. E. Coli, Fecal Coliform, and Total Coliform were absent or less than 2.2 Most Probable Number (MPN/100 ml) in the water after disinfection at each time that the treated water was analyzed.

With respect to taste and odor, samples drawn on December 13, 2000 from samples collected throughout the pilot treatment train were examined for odor characteristics and intensities. Disinfected (potable) samples on the same date were also examined for flavor characteristics and intensities. The data for taste and odor and flavor profile analysis are presented in Tables 14 and 15. The odor detected in the potable samples was reported as chlorine like with a low intensity, which is markedly improved from the sweet solvent smell reported for the untreated water. A change in flavor across LPGAC was reported. Before LPGAC, the characteristic flavor was that of wet paper. After LPGAC, a slight sulfurous flavor was reported. After the samples reported in Table 14 and 15 were evaluated, it was discovered that filter aid polymer make-up water had been prepared with non-potable process water. These results reflect the contaminants present in the non-potable process stream.

In addition to the requirements of DHS Policy 97-005, it is anticipated that DHS may establish requirements similar to the SWTR as well as its recent modifications (IESWTR, LT1ESWTR, LT2ESWTR, and FBR). These requirements may be anticipated due to the presence of a biological based perchlorate removal process that generates suspended solids and turbidity. It is anticipated that filtration adequate to reliably satisfy the turbidity reduction requirements of the IESWTR (<0.3 NTU in 95% of the measurements each month) may be necessary. Similarly, it is anticipated that DHS may require a robust disinfection process more stringent than typical virus inactivation but not as extensive as a process designed to achieve Giardia and Cryptospridium inactivation.

With respect to SWTR/IESWTR compliance, the Treatability Study demonstrated that turbidity reduction requirements could be reliably met with a level of filtration of 0.55-log reduction of particles between 2 and 20 microns in size. Disinfection performance associated with CT values of 44 to 66 mg-L/min proved adequate and could probably be reduced since the level of disinfection applied was more than 10 times the value necessary to achieve 4-log inactivation of viruses.

The results of this treatability study provide some insight useful for establishing regulatory performance requirements. Since Giardia lamblia and Cryptosporidium are unlikely to present in significant numbers if present at all, the 3-log Giardia (SWTR) and 2-log Cryptosporidium (IESWTR) requirements of these rules are not appropriate. Turbidity reduction requirements and the associated reliability aspects of the increased monitoring frequency of these rules are appropriate. The degree of disinfection appropriate is arguably greater than that typically allowed for surface water systems, but must be set by DHS.

5.0 SUMMARY AND CONCLUSIONS

This section presents a summary of the Phase 2 Treatability Study. It first reviews the study background, including the overall objectives and planned approach. Next it summarizes each unit process, including specific objectives, technologies employed, data and information gathered, and recommendations for full-scale design. Finally, conclusions are presented by revisiting the primary study objectives and how they were met.

5.1 Phase 2 Treatability Study Background

The BPOUSP, the EPA Region IX, and Watermaster are collaborating to implement a combined groundwater extraction, treatment, and water supply project in the BPOU of the San Gabriel Basin in California. This report addresses the groundwater treatment portion of the project. Constituents to be treated include perchlorate, nitrate, VOCs, NDMA, and 1,4-dioxane.

When perchlorate was first identified as being present in BPOU groundwater in 1997, no treatment technology was sufficiently developed to allow implementation of a treatment system that would reduce perchlorate concentrations to drinking water action levels. During a Phase 1 Treatability Study, Aerojet initiated testing that effectively demonstrated the potential for a biological reduction process. The Phase 2 Treatability Study described in this report builds on results from the Phase 1 Treatability Study by conducting a more rigorous evaluation of biological treatment, by incorporating additional technologies to treat all of the constituents requiring treatment, and by setting as its goal the treatment of groundwater to potable water standards.

The primary objectives of the Phase 2 Treatability Study were to demonstrate that the proposed treatment train effectively and reliably produces potable water pursuant to all applicable state and federal regulations, to confirm the treatment efficiency of each unit process in the treatment train, and to collect data for the design and construction of a full-scale treatment facility.

The Phase 2 Treatability Study was conducted at the Aerojet Sacramento GET E/F facility, where four full-scale bioreactors were already in operation. The Phase 2 treatment train utilized one of the full-scale bioreactors. A slipstream was removed immediately downstream of the existing fluidized bed reactor (FBR-4) and conveyed to the pilot-scale treatment train consisting of a multimedia filter, an air stripper, a UV/OX system, a LPGAC contactor, and a disinfection system. Over the duration of the eight month study , data was collected at the influent and effluent point of each unit process and the capabilities of each process were continuously evaluated. Several optimization studies were performed and potential control parameters were identified evaluated.

5.2 Treatment Train Unit Processes

The full-scale bioreactor from which the slipstream was taken was designed to destroy perchlorate and nitrate. The pilot-scale treatment train that followed the bioreactor included a multimedia filter to remove suspended solids, an air stripper to remove VOCs, a UV/OX system to remove NDMA and 1,4-dioxane, a LPGAC contactor to serve as a final barrier for VOCs and perchlorate and as a polishing unit, and a disinfection system to evaluate formation of DBP. In addition, a reclamation system was installed to remove solids from the filter backwash water and return the reclaimed water to the main process stream.

5.2.1 Fluidized Bed GAC Bioreactor

The bioreactor uses biological reduction to remove DO and to transform nitrate and perchlorate into non-toxic compounds. Influent concentrations of nitrate, perchlorate and DO during the study ranged from 1.4 to 1.7 mg/l (as N), 2 to 7 mg/l, and 4 to 6.5 mg/l, respectively.

Effluent DO concentrations ranged from 0.01 to 0.25 mg/l but were typically below 0.1 mg/l. Nitrate was only detected once in the reactor effluent at 68 μg/l (as N) on the reactor startup date. The detection limit for nitrate-nitrogen was 11 μg/l or 23 μg/l, depending on the laboratory performing the analysis. Perchlorate was detected for the first two weeks of reactor operation starting at 6 mg/l on the reactor startup date and declining nearly linearly to non-detectable concentrations over two weeks. The detection limit for perchlorate ranged from 0.43 μg/l to 4 μg/l, depending on which laboratory was performing the analysis. Effluent perchlorate concentrations were undetectable throughout the study except during startup, one detection on March 9 (6 μg/l), and several detections during the ethanol optimization study, when the ethanol overdose percentage was decreased to intentionally cause incomplete destruction of perchlorate. Decreased ethanol overdose percentage between March 3 and March 9 was also the most likely cause of the perchlorate detection on March 9.

Ethanol denatured with ethyl acetate was added as a carbon source and electron donor for the biological reduction process, and the fate of ethanol was evaluated as a part of this study. Ethanol was detected in the bioreactor influent at an average concentration of approximately 4.1 mg/l and at the one-foot bed level at an average concentration of approximately 1.8 mg/l. Ethanol was not detected at the 3-foot or 6-foot bed levels or in the bioreactor effluent. The detection limit for ethanol was 0.186 mg/l. Methanol was also analyzed but was not detected in any samples. The detection limit for methanol was 0.934 mg/l.

Possible ethanol breakdown products (aldehydes and carboxylic acids) were also monitored throughout the study. The results of aldehyde and carboxylic acid measurements are summarized in Figures 10 and 11, respectively. Acetaldehyde, formaldehyde, pyruvate, propionate, and oxalate were detected in the bioreactor at low concentrations and effluent concentrations were either undetectable or very near the detection limits. All of these chemicals are biodegradable.

In addition to ethanol breakdown products, soluble microbial products (SMP) were also evaluated. SMP generally do not include intermediates of catabolic pathways but usually make up the majority of the effluent COD and BOD and are also biodegradable (Rittman and McCarty, 2001). Analytical methods do not exist for direct measurement of SMP but COD and BOD can be used as an indirect indication. Measured effluent BOD (1.2 mg/l) was consistently much lower than predicted by the biofilm model (8.1 mg/l). Measured effluent COD (11 mg/l) correlated well with the biofilm model prediction (10.2 mg/l).

Operating parameters for the bioreactor included ethanol dose, nutrient doses, bed height control, and recycle rate. The Phase 2 Treatability Study included specific tests to optimize each of these operating parameters. The ethanol optimization study indicated that the optimum ethanol overdose percentage was 0 to 10 percent and that extended ethanol overdoses below -5 percent were likely to result in incomplete perchlorate reduction and effluent perchlorate detections. The nutrient optimization study confirmed that no additional nutrients were required for this bioreactor, as predicted by stoichiometric calculations. The bed height control study indicated that an eductor based system was more effective at controlling bed height than an air-lift system. Also, bed height should be controlled at several bed levels and the waste biomass should be collected separately and routed directly to the reclamation system, bypassing the filter. Forward flow rate optimization indicated that a recycle rate as low as 20 percent could be achieved for the pilot scale bioreactor without performance upsets. The limiting factors for increasing forward flow with the pilot scale bioreactor were hydraulic limitations of the reactor effluent pipe and the need to control bed height at more than one location.

The operational control parameters tested for this study included parameters that could be used to control ethanol dose and to detect bioreactor performance failures. The study focused on parameters with online or real-time measurement capabilities that may provide indication of the performance status of the bioreactor. Measurement of ORP, sulfide, and bed growth were investigated as control parameters but were found to be inadequate and somewhat unreliable. Although not part of the scope of this study, the following parameters and instruments may provide an adequate control strategy for future installations.

Based on the results of the control parameter studies, direct measurement of influent perchlorate, nitrate, and DO concentration appear to be required to automatically control ethanol dose. Real-time perchlorate measurements can be obtained using a Dionex DX-800 ion chromatograph. Online DO and nitrate measurements can be obtained using inline probes. An alternative method of obtaining nitrate measurements would be to install an additional DX-800 system dedicated for nitrate. The stoichiometric ethanol dose can then be directly calculated by a PLC and the ethanol feed pumps automatically controlled based on the calculated ethanol dose.

The emergency alarms required for the bioreactor include performance failure alarms (effluent perchlorate or nitrate detections) and an ethanol overdose alarm. The performance failure alarm for perchlorate can be obtained from the DX-800 system described in the previous section taking samples from the effluent streams of each bioreactor. Either a nitrate probe or an additional DX-800 system can provide the performance failure alarm for nitrate detection. Ethanol overdose indication could be obtained from an online gas chromatograph or possibly from an online TOC analyzer.

Process stability and reliability regarding removal of nitrate and perchlorate under varying conditions was established during the treatability study. The reactor withstood several significant changes in nutrient doses and forward flow rate without upset. Four power outages occurred during the study resulting in bioreactor down times between 5 minutes and 2 hours and the bioreactor restarted each time with no effluent perchlorate detections. On two occasions, maintenance was performed on the GET E/F system resulting in down times of 1 to 2 days and the bioreactor restarted each time with no effluent perchlorate detections. Although an extended shutdown (more than 1 week) test was beyond the scope of the treatability study, a shutdown and restart procedure was developed to maintain bioreactor performance.

By maintaining fluidization of the bed, continuing to add ethanol and nutrients, supplying a supplemental electron acceptor (nitrate), and providing a small flushing flow (potable water) during shutdown, the biofilm could be maintained for extended periods. Upon restart, the bioreactor could then quickly be returned to full flow.

Microbiological characterization of the biomass consisted of sampling for total and fecal coliforms, giardia, cryptosporidium, E. Coli, viruses, somatic and male specific coliphage, and HPC (Table A6). Based on this data, it does not appear that the bioreactor introduced any pathogenic bacteria, cysts, or viruses into the treated water.

A biofilm model was developed for the bioreactor and calibrated with data collected during the treatability study as well as data collected from the other bioreactors at the site. The calibrated biofilm model was used to perform several sensitivity analyses for the pilot scale bioreactor. The analyses indicated that the pilot scale bioreactor was operating with a safety factor of approximately 1.5 with respect to influent concentrations of oxygen, nitrate, or perchlorate.

The biofilm model was also used to develop design criteria for use with planned BPOU treatment systems. The bioreactor size, total flow rate, bed depth, media properties, and water temperature used for the pilot system were assumed to be the same for the BPOU bioreactor. The ethanol requirement for the BPOU bioreactor was calculated to be approximately 15 mg/l based on the expected influent concentrations of oxygen, nitrate, and perchlorate. Cell yield was calculated to be approximately 7.4 mg/l. Nitrogen and phosphorous requirements were calculated to be approximately 0.4 mg/l and 0.15 mg/l, respectively. Based on the biofilm model results, it appears that the BPOU bioreactors can be operated with no recycle and produce effluent with undetectable nitrate and perchlorate concentrations. Even if the influent concentrations of oxygen, nitrate, and perchlorate are all twice the expected concentrations, the biofilm model predicts that nitrate and perchlorate would still not be detected in the bioreactor effluent.

A competing technology for the treatment of perchlorate and nitrate is the ion exchange process. This technology has been evaluated and determined to be a viable treatment alternative, and comparative cost estimates have been developed to compare the cost of implementation and operation. Capital and operations and maintenance (O&M) costs for the bioreactor were developed based on data from bioreactor vendors, and experience in the procurement, construction, and operation of similar facilities. For the bioreactor, the capital and annual O&M costs are $6,000,000 and $400,000, respectively. The ion exchange costs were provided in a quotation from Calgon Carbon Corporation for a treatment facility in the BPOU. The capital and annual O&M costs for the ion exchange process without brine destruction are $8,000,000 and $940,000, respectively. The capital and annual O&M costs for the ion exchange process with brine destruction are $14,000,000 and $580,000. The higher O&M cost for the ion exchange alternative without brine destruction assumes all of the brine solution will be discharged and make-up salt will be needed for 100 percent of the brine flow. The alternative with brine destruction assumes 90 percent of the salt can be re-used.

5.2.2 Multimedia Filter

The multimedia filter was designed to remove suspended solids consisting of waste biomass and GAC fines present in the effluent from the bioreactor and to provide biological degradation of residual ethanol and metabolic breakdown products not fully removed in the bioreactor. The positioning of the multimedia filter immediately downstream of the bioreactor was important as performance of the downstream unit processes are enhanced by the minimization of suspended solids.

The multimedia filter processed 350 gpm of bioreactor effluent. Prior to being routed to the filter, the bioreactor effluent was routed through an aeration tank where its DO was increased. Addition of oxygen created aerobic conditions in the filter bed to enable the biomass to consume residual dissolved organics present in the bioreactor effluent. The filter bed included layers of anthracite, silica sand, and garnet sand. The filter was equipped with a backwash system and with turbidimeters and particle counting instruments.

The multimedia filter reliably removed suspended solids and produced water meeting the turbidity requirements of both the SWTR and the IESWTR. Suspended solids removal was greater than 90 percent. Turbidity removal averaged approximately 90 percent with effluent turbidities consistently below 0.3 NTU. The cumulative removal rates for all particles in the 2 to 20 micron size range averaged approximately 72 percent.

TOC, DOC, and DO concentrations decreased through the filter, indicating biological activity within the filter. TOC concentrations were reduced by approximately 40 percent and DOC concentrations by approximately 23 percent. Approximately 1 mg/l of DO was consumed in the filter. Ethanol removal could not be quantified as its concentration was undetectable in both the influent and effluent.

Polymer addition to aid in small particle removal was tested and subsequently rejected. Addition of polymer to filter influent substantially increased filter run times without a corresponding decrease in effluent turbidity. The backwash cycle was observed and adjusted to 5 minutes to allow sufficient time for filter cleaning while maintaining viability of the biological population. Filter run times leveled out during the course of the study to an average of 11 hour cycles.

Pilot-scale results indicate design criteria for several full-scale design parameters. It is anticipated that the full-scale filter would operate at a maximum head loss of 120 inches of water. This corresponds, based on the Phase 2 results, to a filter run time of approximately 24 hours. For design purposes, a filter run time of 20 hours would be a reasonably conservative assumption for a filter with similar influent water quality. The pilot test indicated that increasing DO in the filter influent enhanced biological activity in the filter and that polymer addition to remove small particles did not enhance performance of the filter.

5.2.3 Air Stripper

The air stripper was added to the treatment train during the study as an alternative to UV/OX for VOC removal. TCE and chloroform were the constituents of primary concern. Air strippers are typically of relatively low cost compared to other processes capable of removing VOCs. In order to minimize costs of expensive downstream processes such as UV/OX and LPGAC, an air stripper was selected to enhance the treatment of VOCs in the treatment train.

The air stripper processed 100 gpm of flow from the multimedia filter effluent. A tray aerator consisting of four rectangular sieve trays was used. The air to water ratio in the stripper was 67.3. Carbon dioxide was injected downstream of the air stripper to reduce the pH of the effluent to pH 6 or pH 7 in order to maximize effectiveness of chlorination. Vapor treatment of the off-gas air stream was not required at this site.

For both TCE and chloroform, removal efficiencies across the air stripper exceeded 99.9 percent. Air stripper effluent contained less than 3 ppb of TCE and was non-detect for chloroform. As the air stripper was downstream of the multimedia filter, the influent water was free of solids and plugging of the trays was not an issue. Calcium carbonate scaling was also absent in the stripper over the course of the study.

While tray aerators were used in this pilot study, it is anticipated that packed towers will be employed in the full-scale treatment system. Packed towers achieve similar performance results to tray aerators but are generally less expensive to operate. An expanded range of VOCs, including PCE, will need to be considered in determining the controlling contaminant for the air-stripper design.

When constructed at full-scale, the incorporation of ancillary systems to provide for the adjustment of pH, addition of a sequestering agent to prevent precipitation and provisions for acid washing to dissolve scale should be considered. The air stripper off-gas will likely be treated by VPGAC in the full-scale system. Factors to be considered in the VPGAC design include regulatory requirements pertaining to the off-gas of the particular constituents treated, the type of VPGAC to be utilized, and the ability to adjust relative humidity within the system.

5.2.4 UV/OX System

The UV/OX system was designed to remove NDMA, 1,4-dioxane, and VOCs. NDMA is destroyed via photolysis. 1,4-dioxane and VOCs are broken down via oxidation promoted by the reaction of UV light and hydrogen peroxide to the end products CO_2, H_2O, and Cl^-. The UV/OX system was positioned downstream of the multimedia filter so that the presence of nitrate and suspended solids, which interfere with the UV/OX process, was minimized.

The UV/OX system processed the full 100 gpm of flow from the multimedia filter. Prior to October 2000, the UV/OX was immediately downstream of the filter. Once the air stripper was installed in October, filter effluent was treated in the air stripper prior to being conveyed to the UV/OX system. The UV/OX system included a hydrogen peroxide dosing system followed by low pressure mercury vapor lamps submerged in a pressurized stainless steel tank. Low pressure lamps were piloted in this Treatability Study as an alternative to the standard medium pressure lamps.

The UV/OX system effectively removed NDMA and 1,4-dioxane. This system did not have the capacity to sufficiently remove VOCs, prompting addition of the air stripper to the treatment train. Decreased concentrations of VOCs allow the UV/OX to be operated more efficiently because it allowed the hydrogen peroxide dose to be decreased. While peroxide is needed to oxidize 1,4-dioxane and VOCs, it interferes with the removal of NDMA. Peroxide absorbs UV light and thereby decreases the amount of light available for destruction of NDMA. Minimization of peroxide introduced to the UV/OX influent increases the efficiency of the unit, especially with respect to NDMA.

An additional reaction that occurs due to the oxidation promoted within the UV/OX system is the formation of intermediate breakdown products. Some aldehydes were formed within the UV/OX system. Those that were formed are possible breakdown products of 1,4-dioxane or natural organic matter. Although present in some UV/OX effluent samples, the aldehyde concentrations were very small and did not cause the final treated water to exceed any existing drinking water standards.

The UV/OX pilot study demonstrated the effectiveness of low pressure UV lamps in the removal of NDMA and 1,4-dioxane. The low pressure lamps were as successful as medium pressure lamps in treating NDMA and 1,4-dioxane while requiring approximately an order of magnitude less in operating electricity.

Design parameters for the full-scale UV/OX system will include treatment flow rate, projected influent concentrations, required effluent concentrations, spectral analysis to determine the overall water quality absorbance characteristics, and evaluation of the potential for formation of intermediate breakdown products.

5.2.5 LPGAC Contactor

The LPGAC was installed to remove any remaining VOCs, VOC breakdown products, and any other organic compounds remaining in the UV/OX effluent by adsorption onto the GAC or by biological degradation. In addition, the GAC contactor was installed to minimize the potential for the creation of THMs during disinfection, to act as a final polishing unit for the overall treatment process, and to serve as a final barrier for VOCs and perchlorate should the bioreactor or UV/OX system experience a failure. Positioning the LPGAC at the end of the treatment train maximized utilization of the destruction unit operations upstream and minimized use of the GAC and associated bed replacement demands.

The LPGAC processed the full 100 gpm of the UV/OX effluent. The contactor was a cylindrical carbon steel pressure vessel containing 2,500 pounds of GAC and operated at an EBCT of 6 minutes. Sample ports were located at the influent and effluent points as well as at the 25-, 50- and 75 percent elevations on the vessel. Influent and effluent VOC concentrations were monitored throughout the study to determine breakthrough characteristics.

Prior to the addition of the air stripper upstream of the LPGAC and UV/OX units, the GAC system experienced breakthrough of chloroform twice during the pilot study. Following installation of the air stripper in October 2000, the LPGAC did not again experience breakthrough nor need to have the GAC replaced.

Hydraulic loading rates for downflow LPGAC contactor typically do not exceed 5 gpm/ft^2. Upflow contactors can accommodate higher hydraulic loading rates. An upflow LPGAC contactor will be more forgiving with respect to residual or inadvertent hydrogen peroxide carried over from the UV/OX process.

5.2.6 Disinfection System

The disinfection system was designed to create treatment plant product water similar to that produced by a full-scale potable water treatment facility. This treatment step was included to model the operation of a disinfection system, establish chlorine dose and required contact time, and quantify the formation of DBP. The disinfection system was positioned at the end of the treatment train following the LPGAC contactor.

The disinfection system processed 10 gpm of the 100 gpm of LPGAC effluent. It utilized sodium hypochlorite to introduce chlorine into the treated water. The disinfectant was mixed into the water using a static mixer and routed through a long pipe arranged in a serpentine fashion to provide approximately 22 minutes of contact time.

The applied free chlorine dose averaged approximately 1.8 mg/l and the residual free chlorine concentration averaged approximately 1.25 mg/l after 22 minutes of contact time, resulting in a CT value of approximately 28. This CT value can provide approximately 1.5 log *Giardia lamblia* inactivation at a water temperature of 20 degrees Celsius and a pH of 6.5. It is approximately 9 times the value necessary to achieve 4-log inactivation of viruses. In addition, the Phase 2 Treatment System produced water essentially free of viruses, cysts and pathogens, and only small amounts of heterotrophic bacteria. The water produced during the study was effectively disinfected without the production of significant DBPs.

The design criteria for the full-scale treatment system will need to be established based on disinfection requirements to be established by DHS. Assuming DHS establishes a disinfection requirement for the BPOU at least as stringent as the forthcoming Ground Water Rule, a basin or length of pipeline will be necessary to achieve a detention time sufficient to inactivate at least 4-log of viruses. Chlorine dose to be used in the full-scale system is another criterion to be determined in consultation with DHS. The target chlorine dose will incorporate requirements to inactivate pathogens, maintain water quality in pipelines, provide a sufficient residual for water entering the distribution system and prevent the water distribution system from bacterial re-growth

5.2.7 Reclamation System

The reclamation system was designed to treat multimedia filter backwash and filter-to-waste water. The reclamation system treated both of these streams to remove suspended solids. The reclamation system was positioned between the multimedia filter and the aeration tank upstream of the multimedia filter.

The reclamation system typically processed backwash water at a flow rate of 25 gpm. The reclamation system included an inclined plate clarifier consisting of a rapid mix zone, a flocculation basin and a settling chamber. Coagulant and polymer feed systems were installed immediately upstream of the clarifier. As backwash water was conveyed to the clarifier, it was injected with coagulant and polymer to enhance flocculation within the rapid mix and flocculation basins to improve settling characteristics of the flocs in the inclined plate chamber. Clarified water was returned to the aeration tank upstream of the multimedia filter for treatment. Settled solids, or sludge, was collected in a hopper at the bottom of the clarifier and delivered to a waste biomass facility independent of the pilot plant.

Coagulation and flocculation were determined to be most effectively facilitated with a coagulant dose of 30 ppm alum, and a polymer dose of 2 ppm of a cationic QAC. With these dosages, filter run times averaged 9 to 10 hours.

Based on results from the Phase 2 Treatability Study, the design criteria developed for the full-scale clarifier are a loading rate of 25 gpm/ft^2, a coagulant dose of 30 ppm of alum, and a polymer dose of 2 ppm of a cationic QAC. In the full-scale system, these dosages will have to be confirmed and adjusted based on testing with the actual water to be treated. The clarifier sludge was discharged to an on-site biomass facility for this study, in the full-scale system, the sludge is likely to be more efficiently handled by a filter press, other dewatering technology, or direct discharge to a sanitary sewer. Bench testing indicated that a filter press could concentrate the clarifier sludge to approximately 30 percent solids by conditioning the sludge with a body feed.

5.3 Conclusions

The primary objectives of the Phase 2 Treatability Study were to confirm the ability of the treatment train to remove or destroy the contaminants of concern and to demonstrate that treated water could be produced to meet drinking water standards. The operation of the Phase 2 Treatability study demonstrated that the unit processes are effective in achieving their target removals for perchlorate, nitrate, VOCs, NDMA, and 1,4-dioxane. In treating groundwater containing these contaminants to drinking water standards, the formation of DBPs and the microbiological water quality of the treated water were factors to be evaluated. DBPs were evaluated by directly analyzing for specific DBPs as well as by testing the total

THMFP. Both of these evaluations demonstrated that groundwater containing the organic compounds present at the study site and within the BPOU can be treated to a quality exceeding drinking water standards. Tables 11 through 13 summarize compliance sampling on multiple dates and demonstrate that potable water standards can be reliably met with the Phase 2 treatment train.

Another key objective of the Phase 2 Treatability Study was to collect data to optimize treatment system performance and to establish design criteria for the design and construction of a full-scale treatment facility. Optimization focused on maximizing system throughput and efficiency of unit operations while maintaining treated water quality. It also included characterizing the treatment process response to plausible operational problems and perturbations. Results of the optimization studies and anticipated variances in conditions between the pilot study site and BPOU were used to develop design criteria for full-scale processes.

The Phase 2 treatment train was successful at treating the project water to meet drinking water standards. The applicability of the Phase 2 system to other areas is likely but not yet proven. Incorporating results of this Treatability Study to the BPOU will require testing, analysis, and design specific to the groundwater to be treated.

6.0 ACRONYMS

Aerojet	Aerojet-General Corporation
alum	Aluminum sulfate
AOC	Assimilable organic compound
BDOC	Biodegradable organic carbon
BOD	Biological oxygen demand
BPOUCR	Baldwin Park Operable Unit Cooperating Respondents
BPOUSP	Baldwin Park Operating Unit Settling Parties
BPOU	Baldwin Park Operating Unit
Calgon	Calgon Carbon Corporation
cfm	Cubic feet per minute
Cl	Chloride
COD	Chemical oxygen demand
CO_2	Carbon dioxide
CFU/ml	Colony forming units per ml
DBP	Disinfection By-Products
DHS	Department of Health Services
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DWP	Drinking Water Program
EBCT	Empty bed contact time
EE/O	Electrical Energy per Order
EPA	U.S. Environmental Protection Agency
FBR	Fluidized bed reactor
ft	Foot (or feet, as appropriate)

GAC	Granular activated carbon
GAC/FB	Granular activated carbon operated as a fluidized bed
GC	Gas chromatograph
GET	Groundwater extraction and treatment
gpm	Gallons per minute
H_2O	Water
H_2O_2	Hydrogen peroxide
HLA	Harding Lawson Associates
HPC	Heterotrophic plate count
IC	Ion chromatograph
Kp	Perchlorate half velocity constants
LPGAC	Liquid phase granular activated carbon
MCL	Maximum contaminant level
mg/l	Milligrams per liter
MPN	Most probable number
mV	Millivolt
MWL	Montgomery Watson Laboratories
ng/l	Nanograms per liter
nm	Nanometers
NO_2	Nitrite
NDMA	N-nitrosodimethylamine
NOM	Natural organic matter
NTU	Nephelometric turbidity unit
O&M	Operations and maintenance
ORP	Oxidation reduction potential
OX	Oxidation

PCE	Tetra-chloroethylene
PLC	Programmable logic controller
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per trillion
psi	Pounds per square inch
QAC	Quaternary ammonium compound
SCFM	Standard cubic feet per minute
SMP	Soluble Microbial Products
SOC	Synthetic organic compound
SWTR	Surface water treatment rule
TCE	Trichloroethylene
THM	Trihalomethane
THMFP	Trihalomethane formation potential
TOC	Total organic carbon
TPTHM	Total potential trihalomethane
TSS	Total suspended solid
TTHMs	Total Trihalomethane
μg/l	Micrograms per liter
UV	Ultraviolet
UV/OX	Acronym for an oxidation process utilizing UV and H_2O_2
VOC	Volatile organic compound
VPGAC	Vapor phase granular activated carbon
VSS	Volatile suspended solids
Watermaster	Main San Gabriel Basin Watermaster

WQTC	Water quality technical conference

7.0 REFERENCES

Aerojet. 2000. Memo to C. Berry, A. MacDonald, and D. Austin C. Caulk. June 15.

Camp Dresser and McKee. 1997. Pre-remedial Design Report, September 4.

Harding Lawson Associates. 1999. Final Phase 1 Treatability Study Report.

Harding Lawson Associates. 2000. Draft Operations and Maintenance Manual, Phase 2 Treatability Study Treatment System.

Harding Lawson Associates. 2000. Draft Sampling and Analysis Plan for Phase 2 Treatability Study.

Harding Lawson Associates. 2000. Final Phase 2 Treatability Study Work Plan, February 25

Harding Lawson Associates. 2000. Draft Final Conceptual Design Report, August 4.

Harding ESE/Hydro Geo Chem, Inc. 2000. Custom Low-pressure UV/Oxidation Treatment Technology Report, December 15.

James M. Montgomery Consulting Engineers, Inc. 1985. "Water Treatment Principles and Design," John Wiley and Sons.

Rittman, Bruce E. and McCarty, Perry L. 2001. "Environmental Biotechnology: Principles and Applications". McGraw –Hill.

TABLES

Table 1
Water Quality Comparison
Phase 2 Treatability Study vs BPOU Subareas 1 and 3

Analyte	Phase 2	BPOU Subarea 1*	BPOU Subarea 3*
General Inorganics (mg/l)			
Calcium	na	68	56
Chloride	8.4	33	15
Magnesium	na	17	13
Nitrate (as N)	1.5	3.8	4.0
Perchlorate	2.6	0.015	0.05
Potassium	na	5	3.8
Sodium	na	30	16
Sulfate	16	36	30
Total Dissolved Solids	202	400	281
Total Suspended Solids	0.2	10	11
Hardness (as CaCO3)	120	218	206
Alkalinity	120	220	171
pH	7.2	7.5	7.7
Metals (ug/l)			
Aluminum	*0.0013U*	0.04	0.04
Arsenic	0.0008	0.005	0.002
Barium	0.10	0.15	0.11
Cadmium	*0.000026U*	*.0017U*	0.001
Chromium	0.001	0.007	0.005
Copper	0.004	0.013	0.010
Iron	*0.000027U*	0.19	0.09
Lead	*0.00034U*	0.002	0.001
Manganese	0.0002	0.32	0.005
Mercury	*0.00016U*	0.0002	0.0001
Nickel	0.0009	0.009	0.006
Zinc	0.003	0.18	0.03
VOCs (ug/l)**			
1,1,1-TCA	*0.08 U*	2.9	1.0
1,1-DCA	*2.0 U*	7.9	1.4
1,1-DCE	8.2	18.3	7.8
1,2-DCA	*4.0 U*	2.1	2.0
1,4-Dichlorobenzene	*5.5 U*	7.1	3.3
Benzene	*2.5 U*	2.0	6.9
cis-1,2-DCE	15.6	15	6.6
Carbon Tetrachloride	*3 U*	2.1	1.2
Carbon Disulfide	*68 U*	33.6	16.9
Chloroform	90	2.1	1.2
Ethylbenzene	*5.0 U*	2.0	0.9
Methylene Chloride	*3.0 U*	8.6	3.9
PCE	*2.0 U*	162.7	50.1
trans-1,2-DCE	*4.5 U*	2.0	0.9
TCE	1425	103.7	76.5
Toluene	*3.5 U*	2.0	0.9
SVOCs (ug/l)			
1,4 Dioxane	3.8	5.0	4.4
NDMA	0.14	0.04	0.16

* Expected water quality based on flow-weighted averages from representative well samples.
Subarea 1 Blend SA1-1 @ 3,000 gpm; SA1-2 @ 2,000 gpm; Sa1-3 @ 2,000 gpm
Subarea 3 Blend SA3-1 @ 5,000 gpm; SA3-2 @ 1,500 gpm
All BPOU data (except inorganic) based on BPOU Conceptual Design Report (HLA, 2000) and recent BPOU sampling events through July 3, 2001
BPOU inorganic data (except inorganic) based on BPOU Pre-Remedial Design Report (CDM, 1997)

TABLE 2
BIOFILM MODEL
STOICHIOMETRY CALCULATIONS

Formula Weights, Electron Equivalents, Equivalent Weights

	Formula Weight	Electron Equivalents	Equivalent Weight
Cells	113 g/mol	28 e^-eq/mol	4.04 g/e^-eq
Ethanol	46 g/mol	12 e^-eq/mol	3.83 g/e^-eq
Dissolved Oxygen	32 g/mol	4 e^-eq/mol	8.00 g/e^-eq
Nitrate-N	14 g/mol	5 e^-eq/mol	2.80 g/e^-eq
Perchlorate	99.5 g/mol	8 e^-eq/mol	12.44 g/e^-eq

Reaction Energetics

$\Delta G_d^{0'}$ =	31.18	kJ/e^- eq	(ethanol to carbon dioxide)
ΔG_p =	3.91	kJ/e^- eq	(ethanol to pyruvate)
ΔG_{pc} =	13.44	kJ/e^- eq	(pyruvate carbon to cell carbon)
ε =	0.6		(energy transfer efficiency)
n =	1		(+1=energy required, -1=energy obtained)
ΔG_s =	28.91	kJ/e^- eq	(cell synthesis energy requirement)
$\Delta G_a^{0'}$ =	-75.46	kJ/e^- eq	(aerobic/anoxic reaction - average for O2 & NO3)
ΔG_r =	-106.64	kJ/e^- eq	(nonstandard free energy change)
A =	0.452		(required equivalents of donor oxidized to obtain energy)
f_s^o =	0.689		(maximum fraction of donor used for synthesis)
f_e^o =	0.311		(minimum fraction of donor used for energy)
q_{maxe} =	12.32	mg/mg/day	(max donor utilization rate - not corrected for temp)
q_{maxo} =	13.63	mg/mg/day	(max oxygen utilization rate - not corrected for temp)
q_{maxn} =	4.77	mg/mg/day	(max nitrate-N utilization rate - not corrected for temp)
q_{maxp} =	21.19	mg/mg/day	(max perchlorate utilization rate - not corrected for temp)
Y_e =	0.73	mg/mg	(cell yield - mg cells/mg donor)
Y_o =	0.655	mg/mg	(cell yield - mg cells/mg oxygen)
Y_n =	1.872	mg/mg	(cell yield - mg cells/mg nitrate-N)
Y_p =	0.421	mg/mg	(cell yield - mg cells/mg perchlorate)

Stoichiometry, Net Yield, Ethanol Requirement

f_d =	0.80	none	(biodegradable fraction - from Inputs)
b =	0.14	1/day	(endogenous decay rate - from Inputs - adjusted for temperature)
b_{det} =	0.21	1/day	(detachment rate - from Inputs)
θ_x =	4.7	days	(solids retention time)
f_s =	0.470		(fraction of donor used for synthesis)
f_e =	0.530		(fraction of donor used for energy)

TABLE 2
BIOFILM MODEL
STOICHIOMETRY CALCULATIONS

Dissolved Oxygen

Ra:	0.250 O_2 +	1.000 H^+ +	1.000 e^-		=	0.500 H_2O			
Rd:	0.167 CO_2 +	1.000 H^+ +	1.000 e^-		=	0.083 CH_3CH_2OH +	0.250 H_2O		
Rc:	0.036 NO_3^- +	0.179 CO_2 +	1.036 H^+ +	1.000 e^-	=	0.036 $C_5H_7O_2N$ +	0.393 H_2O		
Re (Ra-Rd):	0.083 CH_3CH_2OH +	0.25 O_2			=	0.167 CO_2 +	0.250 H_2O		
Rs (Rc-Rd):	0.083 CH_3CH_2OH +	0.036 NO_3^- +	0.012 CO_2 +	0.036 H^+	=	0.036 $C_5H_7O_2N$ +	0.143 H_2O		
feRe:	0.0442 CH_3CH_2OH +	0.1326 O_2			=	0.0884 CO_2 +	0.1326 H_2O		
fsRs:	0.0391 CH_3CH_2OH +	0.0168 NO_3^- +	0.0056 CO_2 +	0.0168 H^+	=	0.0168 $C_5H_7O_2N$ +	0.0671 H_2O		
R (feRe+fsRs):	0.0833 CH_3CH_2OH +	0.0168 NO_3^- +	0.1326 O_2	0.0168 H^+	=	0.0828 CO_2 +	0.0168 $C_5H_7O_2N$ +	0.1997 H_2O	
R (normalized):	1 O_2 +	0.126 NO_3^- +	0.628 CH_3CH_2OH +	0.126 H^+	=	0.126 $C_5H_7O_2N$ +	0.625 CO_2 +	1.506 H_2O	

Ceo =	0.903	mg ethanol/mg dissolved oxygen
Yne =	0.494	mg cells/mg ethanol
Yno =	0.447	mg cells/mg dissolved oxygen
Cno=	0.055	mg nitrate/mg dissolved oxygen (nutrient requirement)

Nitrate

Ra:	0.200 NO_3^- +	1.200 H^+ +	1.000 e^-		=	0.100 N_2 +	0.600 H_2O		
Rd:	0.167 CO_2 +	1.000 H^+ +	1.000 e^-		=	0.083 CH_3CH_2OH +	0.250 H_2O		
Rc:	0.036 NO_3^- +	0.179 CO_2 +	1.036 H^+ +	1.000 e^-	=	0.036 $C_5H_7O_2N$ +	0.393 H_2O		
Re (Ra-Rd):	0.083 CH_3CH_2OH +	0.2 NO_3^- +	0.2 H^+		=	0.167 CO_2 +	0.100 N_2 +	0.350 H_2O	
Rs (Rc-Rd):	0.083 CH_3CH_2OH +	0.036 NO_3^- +	0.012 CO_2 +	0.036 H^+	=	0.036 $C_5H_7O_2N$ +	0.143 H_2O		
feRe:	0.0442 CH_3CH_2OH +	0.1061 NO_3^- +	0.1061 H^+		=	0.0884 CO_2 +	0.0530 N_2 +	0.1856 H_2O	
fsRs:	0.0391 CH_3CH_2OH +	0.0168 NO_3^- +	0.0056 CO_2 +	0.0168 H^+	=	0.0168 $C_5H_7O_2N$ +	0.0671 H_2O		
R (feRe+fsRs):	0.0833 CH_3CH_2OH +	0.1228 NO_3^- +	0.1228 H^+		=	0.0828 CO_2 +	0.0168 $C_5H_7O_2N$ +	0.0530 N_2 +	0.2527 H_2O
R (normalized):	1 NO_3^- +	0.678 CH_3CH_2OH +	1 H^+		=	0.137 $C_5H_7O_2N$ +	0.432 N_2 +	0.674 CO_2 +	2.057 H_2O

Cen =	2.229	mg ethanol/mg nitrate-N
Yne =	0.494	mg cells/mg ethanol
Ynn =	1.102	mg cells/mg nitrate-N

TABLE 2
BIOFILM MODEL
STOICHIOMETRY CALCULATIONS

Perchlorate

Ra:	0.125 ClO_4^- +	1.000 H^+ +	1.000 e^-		=	0.125 Cl^- +	0.500 H_2O		
Rd:	0.167 CO_2 +	1.000 H^+ +	1.000 e^-		=	0.083 CH_3CH_2OH +	0.250 H_2O		
Rc:	0.036 NO_3^- +	0.179 CO_2 +	1.036 H^+ +	1.000 e^-	=	0.036 $C_5H_7O_2N$ +	0.393 H_2O		
Re (Ra-Rd):	0.083 CH_3CH_2OH +	0.125 ClO_4^-			=	0.167 CO_2 +	0.125 Cl^- +	0.250 H_2O	
Rs (Rc-Rd):	0.083 CH_3CH_2OH +	0.036 NO_3^- +	0.012 CO_2 +	0.036 H^+	=	0.036 $C_5H_7O_2N$ +	0.143 H_2O		
feRe:	0.0442 CH_3CH_2OH +	0.0663 ClO_4^-			=	0.0884 CO_2 +	0.0663 Cl^- +	0.1326 H_2O	
fsRs:	0.0391 CH_3CH_2OH +	0.0168 NO_3^- +	0.0056 CO_2 +	0.0168 H^+	=	0.0168 $C_5H_7O_2N$ +	0.0671 H_2O		
R (feRe+fsRs):	0.0833 CH_3CH_2OH +	0.0168 NO_3^- +	0.0663 ClO_4^-	0.0168 H^+	=	0.0828 CO_2 +	0.0168 $C_5H_7O_2N$ +	0.0663 Cl^- +	0.1997 H_2O
R (normalized):	1 ClO_4^-	0.253 NO_3^- +	1.257 CH_3CH_2OH +	0.253 H^+	=	0.253 $C_5H_7O_2N$ +	1.000 Cl^- +	1.249 CO_2 +	3.012 H_2O

Cep =	0.581	mg ethanol/mg perchlorate
Yne =	0.494	mg cells/mg ethanol
Ynp =	0.287	mg cells/mg perchlorate
Cnp=	0.036	mg nitrate/mg perchlorate (nutrient requirement)

TABLE 3
BIOFILM MODEL INPUT TABLE
PILOT-SCALE BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Reactor					
Reactor Diameter	14	ft	-	-	-
Surface Area	153.9	ft^2	A_c	143,013	cm^2
Fluidized Bed Height	-	-	H	15	ft
Fluidized Bed Volume	17272	gal	Vtot	6.54E+07	cm^3
Total Flow	1800	gpm	Qtot	9.81E+09	cm^3/d
Forward Flow	1440	gpm	Qfor	7.85E+09	cm^3/d
Recycle Rate	20.0	%	-	-	-
Loading Rate	11.7	gpm/sf	u	68,600	cm/d
Empty Bed Contact Time	12.0	minutes	-	-	-
Model Increment	-	-	minc	1.0	foot
Incremental Volume	1151.5	gal	Vinc	4.36E+06	cm^3
Incremental Hydraulic Detention Time			θinc	0.00056	days
Media					
Clean GAC Settled Depth	9	ft	-	-	-
Clean GAC Settled Volume	1385	ft^3	-	-	-
Clean GAC Settled Porosity	35	%	-	-	-
Clean GAC Bulk Density	32	lbs/ft^3	-	-	-
Clean GAC Dry Weight	44,334	lbs	-	-	-
Mean Particle Diameter	1.2	mm	d_p	0.12	cm
Mean Particle Volume	0.90	mm^3	-	-	-
Number of Particles	1.52E+10	particles	-	-	-
Total Particle Volume	-	-	V_p	1.37E+10	mm^3
Particle Surface Area	4.52	mm^2	-	-	-
Total Particle Surface Area	6.87E+10	mm^2	A_p	6.87E+08	cm^2
Fluidized Specific Surface Area			a	10.50	cm^2/cm^3
Fluidized Porosity			ε	0.79	
Uniformity Coefficient	-	-	c_u	1.3	none
Particle Density	-	-	ρ_d	1.25	g/cm^3
Actual Contact Time	9.5	minutes	-	-	-
Water					
Temperature	-	-	T	19	ºC
Density	999	kg/m^3	ρ	0.999	g/cm^3
Dynamic Viscosity	0.00104	$N\text{-}s/m^2$	μ	895.4	g/cm/d
Biofilm					
Biofilm Density	60,000	mg/l	X_f	60	mg/cm^3
Specific Detachment Loss	-	-	b_{det}	0.21	1/d
Endogenous Decay	0.15	1/d (20ºC)	b	0.14	1/d (19ºC)
Biofilm Loss Coeffecient	0.36	1/d (20ºC)	b'	0.35	1/d (19ºC)
Biodegradable Fraction	-	-	f_d	0.80	none

TABLE 3
BIOFILM MODEL INPUT TABLE
PILOT-SCALE BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Ethanol					
Molecular Diffusion in Water	-	-	D_e	1.4	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_e	1.12	cm^2/d
Ethanol Overdose Percentage	0	%	-	-	-
Forward Flow Concentration	10.19	mg/l	So_e	0.0102	mg/cm^3
Half Velocity Constant	0.250	mg/l	K_e	0.000250	mg/cm^3
Maximum Specific Utilization	12.32	mg/mg/d (20ºC)	q_{maxe}	11.51	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_e	0.725	mg/mg
Schmidt Number	-	-	Sc_e	640.4	none
Minimum Substrate Concentration	0.0110	mg/l	$Smin_e$	0.000011	mg/cm^3
Growth Potential	-	-	S^*min_e	0.0441	none
Alpha Coefficient	-	-	α_e	1.9161	none
Beta Coefficient	-	-	β_e	0.5260	none
Dissolved Oxygen					
Molecular Diffusion in Water	-	-	D_o	2.64	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_o	2.112	cm^2/d
Forward Flow Concentration	5.6	mg/l	So_o	0.0056	mg/cm^3
Half Velocity Constant	0.200	mg/l	K_o	0.000200	mg/cm^3
Maximum Specific Utilization	13.63	mg/mg/d (20ºC)	q_{maxo}	12.74	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_o	0.655	mg/mg
Schmidt Number	-	-	Sc_o	339.6	none
Minimum Substrate Concentration	0.0088	mg/l	$Smin_o$	0.0000088	mg/cm^3
Growth Potential	-	-	S^*min_o	0.0441	none
Alpha Coefficient	-	-	α_o	1.9161	none
Beta Coefficient	-	-	β_o	0.5260	none
Nitrate-N					
Molecular Diffusion in Water	-	-	D_n	1.57	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_n	1.256	cm^2/d
Forward Flow Concentration	1.6	mg/l	So_n	0.0016	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_n	0.000010	mg/cm^3
Maximum Specific Utilization	4.77	mg/mg/d (20ºC)	q_{maxn}	4.46	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_n	1.872	mg/mg
Schmidt Number	-	-	Sc_n	571.1	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_n$	0.00000044	mg/cm^3
Growth Potential	-	-	S^*min_n	0.0441	none
Alpha Coefficient	-	-	α_n	1.9161	none
Beta Coefficient	-	-	β_n	0.5260	none

TABLE 3
BIOFILM MODEL INPUT TABLE
PILOT-SCALE BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Perchlorate					
Molecular Diffusion in Water	-	-	D_p	1.52	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_p	1.216	cm^2/d
Forward Flow Concentration	2.70	mg/l	So_p	0.0027	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_p	0.000010	mg/cm^3
Maximum Specific Utilization	21.19	mg/mg/d (20ºC)	q_{maxp}	19.81	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_p	0.421	mg/mg
Schmidt Number	-	-	Sc_p	589.9	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_p$	0.0000004	mg/cm^3
Growth Potential	-	-	S^*min_p	0.0441	none
Alpha Coefficient	-	-	α_p	1.9161	none
Beta Coefficient	-	-	β_p	0.5260	none
Soluble Microbial Products					
UAP Formation Coefficient			k_1	0.12	gCODp/gCODs
BAP Formation Coefficient			k_2	0.09	gCODp/gVSSa-d
UAP Utilization Rate			qUAP	1.8	gCODp/gVSSa-d
UAP Half Velocity Constant			KUAP	0.1	mgCODp/cm3
BAP Utilization Rate			qBAP	0.1	gCODp/gVSSa-d
BAP Half Velocity Constant			KBAP	0.085	mgCODp/cm3
Ethanol BOD Exertion Rate	0.23	1/d (20ºC)	ks	0.21	1/d (19ºC)
SMP BOD Exertion Rate	0.03	1/d (20ºC)	ksmp	0.028	1/d (19ºC)

TABLE 4
BIOFILM MODEL OUTPUT TABLE
PILOT-SCALE BIOREACTOR WITH 20% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Media																			
Mean Particle Diameter	d_{pinc}	cm			0.133	0.131	0.129	0.128	0.126	0.124	0.122	0.120	0.118	0.116	0.114	0.112	0.111	0.109	0.107
Mean Particle Volume	Vpm_{inc}	cm3			0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006
Mean Particle Surface Area	Apm_{inc}	cm2			0.056	0.054	0.053	0.051	0.050	0.048	0.047	0.045	0.044	0.042	0.041	0.040	0.038	0.037	0.036
Percent of Total Particle Volume in Increment	P_{inc}	%			11.7	10.1	9.1	8.2	7.4	6.7	6.0	5.5	5.2	5.0	5.0	5.0	5.0	5.0	5.0
Total Particle Volume in Increment	Vp_{inc}	cm3			1.6E+06	1.4E+06	1.2E+06	1.1E+06	1.0E+06	9.2E+05	8.3E+05	7.6E+05	7.1E+05	6.9E+05	6.9E+05	6.9E+05	6.9E+05	6.8E+05	6.9E+05
Number of Particles in Increment	Np_{inc}	particles			1.3E+09	1.2E+09	1.1E+09	1.0E+09	9.8E+08	9.2E+08	8.7E+08	8.4E+08	8.3E+08	8.4E+08	8.8E+08	9.3E+08	9.7E+08	1.0E+09	1.1E+09
Total Particle Surface Area in Increment	Ap_{inc}	cm2			7.2E+07	6.3E+07	5.8E+07	5.3E+07	4.9E+07	4.4E+07	4.1E+07	3.8E+07	3.6E+07	3.6E+07	3.6E+07	3.7E+07	3.7E+07	3.8E+07	3.9E+07
Fluidized Specific Surface Area	a_{inc}	cm^2/cm^3			16.6	14.6	13.2	12.2	11.1	10.2	9.3	8.7	8.3	8.2	8.3	8.4	8.6	8.7	8.9
Fluidized Porosity	ε_{inc}	none			0.632	0.681	0.714	0.741	0.767	0.790	0.810	0.826	0.836	0.841	0.842	0.842	0.842	0.843	0.842
Reynolds Number	Re_{inc}	none			55.364	63.030	69.338	75.496	82.373	90.178	98.333	105.531	110.270	111.805	110.763	108.703	107.053	106.031	103.431
Dissolved Oxygen																			
Maximum Specific Utilization for Increment	qmaxoinc	mg/mg/d			11.2856	9.6136	5.9358	2.8078	1.4289	0.8178	0.6017	0.5104	0.4733	0.4582	0.4546	0.4577	0.4631	0.4682	0.4721
Diffusion Layer Thickness	L_o	cm			0.0068	0.0075	0.0081	0.0086	0.0092	0.0098	0.0105	0.0110	0.0114	0.0115	0.0114	0.0113	0.0112	0.0111	0.0109
Transport/Utilization Ratio	K^*_o	none			1.37E-01	1.24E-01	1.62E-01	2.04E-01	2.92E-01	3.54E-01	3.84E-01	3.88E-01	3.87E-01	3.88E-01	3.92E-01	3.96E-01	3.99E-01	4.00E-01	4.06E-01
Concentration	S_o	mg/cm^3		4.48E-03	1.30E-03	4.33E-04	1.64E-04	6.98E-05	3.50E-05	2.10E-05	1.49E-05	1.20E-05	1.05E-05	9.76E-06	9.33E-06	9.09E-06	8.96E-06	8.89E-06	8.86E-06
Concentration	S_o	mg/l	5.60	4.4818	1.3037	0.4331	0.1636	0.0698	0.0350	0.0210	0.0149	0.0120	0.0105	0.0098	0.0093	0.0091	0.0090	0.0089	0.0089
Dimensionless Concentration	S^*_o	none			6.519	2.166	0.818	0.349	0.175	0.105	0.074	0.060	0.053	0.049	0.047	0.045	0.045	0.044	0.044
Steady-State Flux	Jss_o	$mg/cm^2/d$			0.4314	0.1345	0.0458	0.0174	0.0070	0.0031	0.0015	0.0007	0.0004	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
Dimensionless Flux	Jss^*_o	none			0.759	0.237	0.114	0.057	0.036	0.020	0.011	0.006	0.003	0.002	0.001	0.001	0.000	0.000	0.000
Dimensionless Boundary Concentration	Ss^*_o	none			0.962	0.256	0.119	0.067	0.053	0.047	0.045	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_o	mg/l		0.00000	0.19243	0.05117	0.02388	0.01340	0.01063	0.00943	0.00901	0.00888	0.00884	0.00883	0.00882	0.00882	0.00882	0.00882	0.00882
Deep Biofilm Ratio	f_o	none			1.0000	0.9997	0.9876	0.8760	0.6816	0.4395	0.2529	0.1377	0.0753	0.0415	0.0228	0.0123	0.0065	0.0034	0.0018
Specific Biomass Concentration	X_fL_{fo}	mg/cm^2			0.8017	0.2500	0.0851	0.0323	0.0131	0.0058	0.0027	0.0014	0.0007	0.0004	0.0002	0.0001	0.0001	0.0000	0.0000
Biofilm Thickness	L_{fo}	cm			0.01336	0.00417	0.00142	0.00054	0.00022	0.00010	0.00005	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
Nitrate																			
Maximum Specific Utilization for Increment	qmaxninc	mg/mg/d			3.9027	3.3221	1.9988	0.8803	0.4401	0.2608	0.2013	0.1736	0.1618	0.1569	0.1558	0.1569	0.1589	0.1607	0.1620
Diffusion Layer Thickness	L_n	cm			0.0224	0.0115	0.0086	0.0079	0.0080	0.0084	0.0089	0.0093	0.0096	0.0097	0.0096	0.0095	0.0094	0.0093	0.0092
Transport/Utilization Ratio	K^*_n	none			1.21E-02	2.35E-02	4.75E-02	7.73E-02	1.13E-01	1.33E-01	1.45E-01	1.48E-01	1.48E-01	1.49E-01	1.50E-01	1.52E-01	1.53E-01	1.53E-01	1.55E-01
Concentration	S_n	mg/cm^3		1.28E-03	8.49E-04	4.58E-04	2.27E-04	1.15E-04	6.20E-05	3.57E-05	2.19E-05	1.40E-05	9.19E-06	6.10E-06	4.05E-06	2.70E-06	1.83E-06	1.29E-06	9.49E-07
Concentration	S_n	mg/l	1.60	1.2801	0.8492	0.4580	0.2274	0.1151	0.0620	0.0357	0.0219	0.0140	0.0092	0.0061	0.0040	0.0027	0.0018	0.0013	0.0009
Dimensionless Concentration	S^*_n	none			84.923	45.801	22.745	11.508	6.201	3.573	2.187	1.400	0.919	0.610	0.405	0.270	0.183	0.129	0.095
Steady-State Flux	Jss_n	$mg/cm^2/d$			0.0585	0.0605	0.0392	0.0208	0.0107	0.0058	0.0033	0.0020	0.0013	0.0008	0.0006	0.0004	0.0002	0.0001	0.0001
Dimensionless Flux	Jss^*_n	none			1.009	1.043	1.015	0.809	0.615	0.412	0.274	0.179	0.118	0.078	0.051	0.033	0.021	0.013	0.008
Dimensionless Boundary Concentration	Ss^*_n	none			1.373	1.433	1.383	1.041	0.747	0.471	0.300	0.190	0.124	0.084	0.063	0.052	0.047	0.045	0.045
Boundary Concentration	Ss_n	mg/l		0.00000	0.01373	0.01433	0.01383	0.01041	0.00747	0.00471	0.00300	0.00190	0.00124	0.00084	0.00063	0.00052	0.00047	0.00045	0.00045
Deep Biofilm Ratio	f_n	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9985	0.9893	0.9497	0.8376	0.6476	0.4456	0.2861	0.1777
Specific Biomass Concentration	X_fL_{fn}	mg/cm^2			0.3105	0.3210	0.2081	0.1104	0.0569	0.0309	0.0177	0.0108	0.0069	0.0045	0.0030	0.0019	0.0012	0.0007	0.0005
Biofilm Thickness	L_{fn}	cm			0.00518	0.00535	0.00347	0.00184	0.00095	0.00051	0.00030	0.00018	0.00011	0.00008	0.00005	0.00003	0.00002	0.00001	0.00001
Perchlorate																			
Maximum Specific Utilization for Increment	qmaxpinc	mg/mg/d			17.2503	14.5064	8.2259	2.9070	1.2036	0.7433	0.7353	0.7081	0.6928	0.6860	0.6874	0.6951	0.7048	0.7133	0.7196
Diffusion Layer Thickness	L_p	cm			0.0288	0.0181	0.0128	0.0101	0.0091	0.0089	0.0091	0.0095	0.0097	0.0097	0.0096	0.0094	0.0093	0.0092	0.0091
Transport/Utilization Ratio	K^*_p	none			4.38E-03	6.97E-03	1.55E-02	3.39E-02	6.68E-02	7.20E-02	7.33E-02	7.10E-02	7.01E-02	7.01E-02	7.07E-02	7.15E-02	7.19E-02	7.21E-02	7.32E-02
Concentration	S_p	mg/cm^3		2.16E-03	1.56E-03	1.01E-03	6.02E-04	3.39E-04	1.93E-04	1.13E-04	6.93E-05	4.40E-05	2.85E-05	1.86E-05	1.21E-05	7.76E-06	4.98E-06	3.24E-06	2.13E-06
Concentration	S_p	mg/l	2.70	2.1601	1.5583	1.0135	0.6020	0.3393	0.1933	0.1133	0.0693	0.0440	0.0285	0.0186	0.0121	0.0078	0.0050	0.0032	0.0021
Dimensionless Concentration	S^*_p	none			155.825	101.349	60.204	33.930	19.325	11.333	6.931	4.396	2.852	1.861	1.207	0.776	0.498	0.324	0.213
Steady-State Flux	Jss_p	$mg/cm^2/d$			0.0817	0.0842	0.0699	0.0486	0.0295	0.0177	0.0106	0.0066	0.0042	0.0027	0.0018	0.0011	0.0007	0.0005	0.0003
Dimensionless Flux	Jss^*_p	none			0.680	0.700	0.914	1.100	1.178	0.748	0.468	0.290	0.186	0.121	0.079	0.051	0.032	0.020	0.012
Dimensionless Boundary Concentration	Ss^*_p	none			0.841	0.872	1.211	1.535	1.680	0.945	0.544	0.318	0.198	0.128	0.086	0.062	0.051	0.047	0.045
Boundary Concentration	Ss_p	mg/l		0.00000	0.00841	0.00872	0.01211	0.01535	0.01680	0.00945	0.00544	0.00318	0.00198	0.00128	0.00086	0.00062	0.00051	0.00047	0.00045
Deep Biofilm Ratio	f_p	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9988	0.9907	0.9524	0.8351	0.6348	0.4304	0.2749
Specific Biomass Concentration	X_fL_{fp}	mg/cm^2			0.0976	0.1006	0.0836	0.0581	0.0353	0.0211	0.0127	0.0078	0.0050	0.0032	0.0021	0.0014	0.0009	0.0005	0.0003
Biofilm Thickness	L_{fp}	cm			0.00163	0.00168	0.00139	0.00097	0.00059	0.00035	0.00021	0.00013	0.00008	0.00005	0.00004	0.00002	0.00001	0.00001	0.00001

TABLE 4
BIOFILM MODEL OUTPUT TABLE
PILOT-SCALE BIOREACTOR WITH 20% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ethanol																			
Diffusion Layer Thickness	L_e	cm			0.0055	0.0061	0.0065	0.0070	0.0074	0.0080	0.0085	0.0089	0.0092	0.0093	0.0093	0.0092	0.0090	0.0090	0.0088
Transport/Utilization Ratio	K^*_e	none			0.1443	0.1309	0.1219	0.1143	0.1071	0.1001	0.0938	0.0889	0.0861	0.0852	0.0858	0.0870	0.0880	0.0886	0.0903
Concentration	S_e	mg/cm^3		8.16E-03	3.98E-03	2.00E-03	1.00E-03	5.17E-04	2.83E-04	1.65E-04	1.03E-04	6.79E-05	4.69E-05	3.36E-05	2.48E-05	1.91E-05	1.54E-05	1.32E-05	1.17E-05
Concentration	S_e	mg/l	10.19	8.1576	3.9765	2.0014	1.0050	0.5171	0.2825	0.1648	0.1028	0.0679	0.0469	0.0336	0.0248	0.0191	0.0154	0.0132	0.0117
Dimensionless Concentration	S^*_e	none			15.906	8.006	4.020	2.068	1.130	0.659	0.411	0.272	0.188	0.134	0.099	0.076	0.062	0.053	0.047
Steady-State Flux	Jss_e	$mg/cm^2/d$			0.568	0.305	0.169	0.090	0.047	0.026	0.015	0.009	0.006	0.004	0.002	0.002	0.001	0.001	0.000
Dimensionless Flux	Jss^*_e	none			1.291	0.694	0.385	0.205	0.108	0.059	0.034	0.021	0.013	0.008	0.005	0.003	0.002	0.001	0.001
Dimensionless Boundary Concentration	Ss^*_e	none			6.961	2.704	0.859	0.272	0.124	0.068	0.049	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_e	mg/l		0.00000	1.74015	0.67601	0.21472	0.06812	0.03103	0.01693	0.01222	0.01024	0.00945	0.00913	0.00906	0.00912	0.00924	0.00934	0.00943
Oxygen Layer Concentration	Seo	mg/l		0.00000	1.74015	0.67601	0.21472	0.06812	0.03103	0.01693	0.01222	0.01024	0.00945	0.00913	0.00906	0.00912	0.00924	0.00934	0.00943
Nitrate Layer Concentration	Sen	mg/l		0.00000	1.57129	0.64123	0.20344	0.06152	0.02763	0.01551	0.01185	0.01013	0.00941	0.00912	0.00905	0.00912	0.00923	0.00934	0.00943
Perchlorate Layer Concentration	Sep	mg/l		0.00000	1.51037	0.59919	0.17829	0.04340	0.01667	0.00972	0.00968	0.00928	0.00906	0.00897	0.00899	0.00909	0.00922	0.00934	0.00942
Wall Concentration	Sw_e	mg/l		0.00000	1.49978	0.59204	0.17216	0.03788	0.01306	0.00752	0.00861	0.00881	0.00886	0.00888	0.00895	0.00908	0.00922	0.00934	0.00942
Deep Biofilm Ratio	f_e	none			1.0000	1.0000	1.0000	0.9998	0.9895	0.8810	0.5345	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Specific Biomass Concentration	X_fL_{fe}	mg/cm^2			1.1674	0.6278	0.3485	0.1857	0.0975	0.0535	0.0307	0.0186	0.0117	0.0075	0.0049	0.0031	0.0020	0.0012	0.0007
Biofilm Thickness	L_{fe}	cm			0.01946	0.01046	0.00581	0.00310	0.00162	0.00089	0.00051	0.00031	0.00019	0.00013	0.00008	0.00005	0.00003	0.00002	0.00001
Soluble Microbial Products																			
Utilization Associated Products	UAPinc	mgCOD/l		0.000	0.526	0.272	0.143	0.072	0.035	0.018	0.009	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000
Utilization Associated Products	UAP	mgCOD/l		0.272	0.798	1.069	1.212	1.284	1.318	1.336	1.345	1.351	1.354	1.356	1.357	1.358	1.358	1.359	1.359
Biomass Associated Products	BAPinc	mgCOD/l		0.000	0.956	0.454	0.230	0.113	0.054	0.027	0.014	0.008	0.005	0.003	0.002	0.001	0.001	0.001	0.000
Biomass Associated Products	BAP	mgCOD/l		0.467	1.423	1.877	2.107	2.220	2.274	2.302	2.316	2.324	2.329	2.332	2.334	2.335	2.336	2.337	2.337
Soluble Microbial Products	SMP	mgCOD/l		0.739	2.221	2.947	3.319	3.504	3.593	3.638	3.661	3.675	3.683	3.688	3.691	3.693	3.695	3.695	3.696
Bulk Inactive Biomass Density	XfiLfainc	mgVSS/l		0.0	2556.7	1207.7	609.3	298.3	143.4	72.0	37.9	21.3	12.8	8.2	5.4	3.5	2.2	1.4	0.9
Bulk Inactive Biomass Density	XfiLfa	mgVSS/l		1245	3802	5010	5619	5917	6061	6133	6171	6192	6205	6213	6218	6222	6224	6226	6226
Bulk Total Biomass Density	XfvLfainc	mgVSS/l		0	21916	10352	5223	2557	1230	617	325	183	110	70	46	30	19	12	8
Bulk Total Biomass Density	XfvLfa	mgVSS/l		10675	32591	42944	48167	50724	51954	52571	52896	53079	53189	53259	53305	53335	53354	53366	53373
Active Biomass Density	Xfainc	mgVSS/l		0.0000	1.8260	0.8625	0.4352	0.2131	0.1025	0.0514	0.0271	0.0152	0.0092	0.0058	0.0038	0.0025	0.0016	0.0010	0.0006
Active Biomass Density	Xfa	mgVSS/l		0.89	2.72	3.58	4.02	4.23	4.33	4.38	4.41	4.42	4.43	4.44	4.44	4.45	4.45	4.45	4.45
Inactive Biomass Density	Xfiinc	mgVSS/l		0.00000	0.24115	0.11391	0.05747	0.02814	0.01353	0.00679	0.00358	0.00201	0.00121	0.00077	0.00051	0.00033	0.00021	0.00013	0.00008
Inactive Biomass Density	Xfi	mgVSS/l		0.12	0.36	0.48	0.53	0.56	0.57	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Total Biomass Density	Xfv	mgVSS/l		1.01	3.08	4.06	4.55	4.79	4.91	4.96	4.99	5.01	5.02	5.03	5.03	5.04	5.04	5.04	5.04
Dissolved Organic Carbon	DOC	mg/l		4.53	2.90	2.14	1.76	1.58	1.49	1.44	1.42	1.41	1.40	1.39	1.39	1.39	1.39	1.39	1.38
Total Organic Carbon	TOC	mg/l		5.07	4.54	4.30	4.18	4.12	4.09	4.08	4.07	4.07	4.06	4.06	4.06	4.06	4.06	4.06	4.06
Soluble COD	CODs	mg/l		17.79	10.53	7.13	5.42	4.58	4.18	3.98	3.88	3.82	3.78	3.76	3.74	3.73	3.73	3.72	3.72
Total COD	CODt	mg/l		19.23	14.90	12.89	11.88	11.39	11.15	11.03	10.97	10.93	10.91	10.90	10.89	10.88	10.88	10.88	10.88
Ultimate BOD	BODL	mg/l		18.80	13.62	11.20	9.98	9.39	9.10	8.96	8.89	8.84	8.82	8.80	8.79	8.78	8.78	8.78	8.78
Soluble BOD5	BOD5s	mg/l		11.75	5.99	3.27	1.90	1.23	0.90	0.74	0.66	0.61	0.58	0.56	0.55	0.54	0.54	0.53	0.53
Total BOD5	BOD5t	mg/l		12.26	7.54	5.32	4.20	3.65	3.38	3.25	3.18	3.14	3.12	3.10	3.09	3.09	3.08	3.08	3.08

TABLE 5
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Reactor					
Reactor Diameter	14	ft	-	-	-
Surface Area	153.9	ft^2	A_c	143,013	cm^2
Fluidized Bed Height	-	-	H	15	ft
Fluidized Bed Volume	17272	gal	Vtot	6.54E+07	cm^3
Total Flow	1800	gpm	Qtot	9.81E+09	cm^3/d
Forward Flow	1440	gpm	Qfor	7.85E+09	cm^3/d
Recycle Rate	20.0	%	-	-	-
Loading Rate	11.7	gpm/sf	u	68,600	cm/d
Empty Bed Contact Time	12.0	minutes	-	-	-
Model Increment	-	-	minc	1.0	foot
Incremental Volume	1151.5	gal	Vinc	4.36E+06	cm^3
Incremental Hydraulic Detention Time			θinc	0.00056	days
Media					
Clean GAC Settled Depth	9	ft	-	-	-
Clean GAC Settled Volume	1385	ft^3	-	-	-
Clean GAC Settled Porosity	35	%	-	-	-
Clean GAC Bulk Density	32	lbs/ft^3	-	-	-
Clean GAC Dry Weight	44,334	lbs	-	-	-
Mean Particle Diameter	1.2	mm	d_p	0.12	cm
Mean Particle Volume	0.90	mm^3	-	-	-
Number of Particles	1.52E+10	particles	-	-	-
Total Particle Volume	-	-	V_p	1.37E+10	mm^3
Particle Surface Area	4.52	mm^2	-	-	-
Total Particle Surface Area	6.87E+10	mm^2	A_p	6.87E+08	cm^2
Fluidized Specific Surface Area			a	10.50	cm^2/cm^3
Fluidized Porosity			ε	0.79	
Uniformity Coefficient	-	-	c_u	1.3	none
Particle Density	-	-	ρ_d	1.25	g/cm^3
Actual Contact Time	9.5	minutes	-	-	-
Water					
Temperature	-	-	T	19	ºC
Density	999	kg/m^3	ρ	0.999	g/cm^3
Dynamic Viscosity	0.00104	$N\text{-}s/m^2$	μ	895.4	g/cm/d
Biofilm					
Biofilm Density	60,000	mg/l	X_f	60	mg/cm^3
Specific Detachment Loss	-	-	b_{det}	0.21	1/d
Endogenous Decay	0.15	1/d (20ºC)	b	0.14	1/d (19ºC)
Biofilm Loss Coeffecient	0.36	1/d (20ºC)	b'	0.35	1/d (19ºC)
Biodegradable Fraction	-	-	f_d	0.80	none

TABLE 5
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Ethanol					
Molecular Diffusion in Water	-	-	D_e	1.4	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_e	1.12	cm^2/d
Ethanol Overdose Percentage	0	%	-	-	-
Forward Flow Concentration	14.87	mg/l	So_e	0.0149	mg/cm^3
Half Velocity Constant	0.250	mg/l	K_e	0.000250	mg/cm^3
Maximum Specific Utilization	12.32	mg/mg/d (20ºC)	q_{maxe}	11.51	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_e	0.725	mg/mg
Schmidt Number	-	-	Sc_e	640.4	none
Minimum Substrate Concentration	0.0110	mg/l	$Smin_e$	0.000011	mg/cm^3
Growth Potential	-	-	S^*min_e	0.0441	none
Alpha Coefficient	-	-	α_e	1.9161	none
Beta Coefficient	-	-	β_e	0.5260	none
Dissolved Oxygen					
Molecular Diffusion in Water	-	-	D_o	2.64	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_o	2.112	cm^2/d
Forward Flow Concentration	4.0	mg/l	So_o	0.0040	mg/cm^3
Half Velocity Constant	0.200	mg/l	K_o	0.000200	mg/cm^3
Maximum Specific Utilization	13.63	mg/mg/d (20ºC)	q_{maxo}	12.74	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_o	0.655	mg/mg
Schmidt Number	-	-	Sc_o	339.6	none
Minimum Substrate Concentration	0.0088	mg/l	$Smin_o$	0.0000088	mg/cm^3
Growth Potential	-	-	S^*min_o	0.0441	none
Alpha Coefficient	-	-	α_o	1.9161	none
Beta Coefficient	-	-	β_o	0.5260	none
Nitrate-N					
Molecular Diffusion in Water	-	-	D_n	1.57	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_n	1.256	cm^2/d
Forward Flow Concentration	5.0	mg/l	So_n	0.0050	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_n	0.000010	mg/cm^3
Maximum Specific Utilization	4.77	mg/mg/d (20ºC)	q_{maxn}	4.46	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_n	1.872	mg/mg
Schmidt Number	-	-	Sc_n	571.1	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_n$	0.00000044	mg/cm^3
Growth Potential	-	-	S^*min_n	0.0441	none
Alpha Coefficient	-	-	α_n	1.9161	none
Beta Coefficient	-	-	β_n	0.5260	none

TABLE 5
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 20% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Perchlorate					
Molecular Diffusion in Water	-	-	D_p	1.52	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_p	1.216	cm^2/d
Forward Flow Concentration	0.20	mg/l	So_p	0.0002	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_p	0.000010	mg/cm^3
Maximum Specific Utilization	21.19	mg/mg/d (20ºC)	q_{maxp}	19.81	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_p	0.421	mg/mg
Schmidt Number	-	-	Sc_p	589.9	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_p$	0.0000004	mg/cm^3
Growth Potential	-	-	S^*min_p	0.0441	none
Alpha Coefficient	-	-	α_p	1.9161	none
Beta Coefficient	-	-	β_p	0.5260	none
Soluble Microbial Products					
UAP Formation Coefficient			k_1	0.12	gCODp/gCODs
BAP Formation Coefficient			k_2	0.09	gCODp/gVSSa-d
UAP Utilization Rate			qUAP	1.8	gCODp/gVSSa-d
UAP Half Velocity Constant			KUAP	0.1	mgCODp/cm3
BAP Utilization Rate			qBAP	0.1	gCODp/gVSSa-d
BAP Half Velocity Constant			KBAP	0.085	mgCODp/cm3
Ethanol BOD Exertion Rate	0.23	1/d (20ºC)	ks	0.21	1/d (19ºC)
SMP BOD Exertion Rate	0.03	1/d (20ºC)	ksmp	0.028	1/d (19ºC)

TABLE 6
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 20% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Media																			
Mean Particle Diameter	d_{pinc}	cm			0.133	0.131	0.129	0.128	0.126	0.124	0.122	0.120	0.118	0.116	0.114	0.112	0.111	0.109	0.107
Mean Particle Volume	Vpm_{inc}	cm3			0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006
Mean Particle Surface Area	Apm_{inc}	cm2			0.056	0.054	0.053	0.051	0.050	0.048	0.047	0.045	0.044	0.042	0.041	0.040	0.038	0.037	0.036
Percent of Total Particle Volume in Increment	P_{inc}	%			11.7	10.1	9.1	8.2	7.4	6.7	6.0	5.5	5.2	5.0	5.0	5.0	5.0	5.0	5.0
Total Particle Volume in Increment	Vp_{inc}	cm3			1.6E+06	1.4E+06	1.2E+06	1.1E+06	1.0E+06	9.2E+05	8.3E+05	7.6E+05	7.1E+05	6.9E+05	6.9E+05	6.9E+05	6.9E+05	6.8E+05	6.9E+05
Number of Particles in Increment	Np_{inc}	particles			1.3E+09	1.2E+09	1.1E+09	1.0E+09	9.8E+08	9.2E+08	8.7E+08	8.4E+08	8.3E+08	8.4E+08	8.8E+08	9.3E+08	9.7E+08	1.0E+09	1.1E+09
Total Particle Surface Area in Increment	Ap_{inc}	cm2			7.2E+07	6.3E+07	5.8E+07	5.3E+07	4.9E+07	4.4E+07	4.1E+07	3.8E+07	3.6E+07	3.6E+07	3.6E+07	3.7E+07	3.7E+07	3.8E+07	3.9E+07
Fluidized Specific Surface Area	a_{inc}	cm^2/cm^3			16.6	14.6	13.2	12.2	11.1	10.2	9.3	8.7	8.3	8.2	8.3	8.4	8.6	8.7	8.9
Fluidized Porosity	ε_{inc}	none			0.632	0.681	0.714	0.741	0.767	0.790	0.810	0.826	0.836	0.841	0.842	0.842	0.842	0.843	0.842
Reynolds Number	Re_{inc}	none			55.364	63.030	69.338	75.496	82.373	90.178	98.333	105.531	110.270	111.805	110.763	108.703	107.053	106.031	103.431
Dissolved Oxygen																			
Maximum Specific Utilization for Increment	qmaxoinc	mg/mg/d			11.9525	10.3231	6.1823	4.2029	1.9790	1.1227	0.7980	0.6510	0.5702	0.5246	0.4966	0.4787	0.4692	0.4672	0.4695
Diffusion Layer Thickness	L_o	cm			0.0068	0.0075	0.0081	0.0086	0.0092	0.0098	0.0105	0.0110	0.0114	0.0115	0.0114	0.0113	0.0112	0.0111	0.0109
Transport/Utilization Ratio	K^*_o	none			1.37E-01	1.24E-01	1.59E-01	1.74E-01	2.13E-01	3.10E-01	3.36E-01	3.51E-01	3.58E-01	3.67E-01	3.78E-01	3.89E-01	3.97E-01	4.01E-01	4.07E-01
Concentration	S_o	mg/cm^3		3.20E-03	9.25E-04	3.07E-04	1.16E-04	5.01E-05	2.61E-05	1.67E-05	1.27E-05	1.09E-05	9.92E-06	9.42E-06	9.14E-06	8.99E-06	8.91E-06	8.87E-06	8.84E-06
Concentration	S_o	mg/l	4.00	3.2018	0.9253	0.3069	0.1160	0.0501	0.0261	0.0167	0.0127	0.0109	0.0099	0.0094	0.0091	0.0090	0.0089	0.0089	0.0088
Dimensionless Concentration	S^*_o	none			4.627	1.535	0.580	0.251	0.131	0.084	0.064	0.054	0.050	0.047	0.046	0.045	0.045	0.044	0.044
Steady-State Flux	Jss_o	$mg/cm^2/d$			0.3090	0.0956	0.0325	0.0122	0.0048	0.0021	0.0010	0.0005	0.0003	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Dimensionless Flux	Jss^*_o	none			0.544	0.168	0.079	0.035	0.018	0.012	0.006	0.004	0.002	0.001	0.001	0.000	0.000	0.000	0.000
Dimensionless Boundary Concentration	Ss^*_o	none			0.646	0.178	0.085	0.053	0.046	0.045	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_o	mg/l		0.00000	0.12929	0.03562	0.01701	0.01052	0.00930	0.00904	0.00889	0.00884	0.00883	0.00882	0.00882	0.00882	0.00882	0.00882	0.00882
Deep Biofilm Ratio	f_o	none			1.0000	0.9979	0.9511	0.6680	0.3923	0.2679	0.1474	0.0812	0.0450	0.0253	0.0141	0.0078	0.0042	0.0022	0.0011
Specific Biomass Concentration	X_fL_{fo}	mg/cm^2			0.5742	0.1776	0.0603	0.0227	0.0090	0.0039	0.0018	0.0009	0.0005	0.0003	0.0001	0.0001	0.0000	0.0000	0.0000
Biofilm Thickness	L_{fo}	cm			0.00957	0.00296	0.00101	0.00038	0.00015	0.00006	0.00003	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Nitrate																			
Maximum Specific Utilization for Increment	qmaxninc	mg/mg/d			4.1715	3.5836	2.0566	1.3567	0.5166	0.3662	0.2710	0.2232	0.1959	0.1803	0.1705	0.1643	0.1610	0.1603	0.1611
Diffusion Layer Thickness	L_n	cm			0.0177	0.0100	0.0080	0.0077	0.0079	0.0083	0.0089	0.0093	0.0096	0.0097	0.0096	0.0095	0.0094	0.0093	0.0092
Transport/Utilization Ratio	K^*_n	none			1.53E-02	2.70E-02	4.97E-02	1.03E-01	1.00E-01	1.15E-01	1.24E-01	1.31E-01	1.34E-01	1.39E-01	1.44E-01	1.48E-01	1.52E-01	1.53E-01	1.56E-01
Concentration	S_n	mg/cm^3		4.00E-03	2.45E-03	1.25E-03	6.14E-04	3.22E-04	1.74E-04	1.00E-04	6.12E-05	3.91E-05	2.56E-05	1.69E-05	1.11E-05	7.24E-06	4.69E-06	3.06E-06	2.02E-06
Concentration	S_n	mg/l	5.00	4.0001	2.4537	1.2543	0.6144	0.3221	0.1741	0.1002	0.0612	0.0391	0.0256	0.0169	0.0111	0.0072	0.0047	0.0031	0.0020
Dimensionless Concentration	S^*_n	none			245.370	125.431	61.444	32.207	17.405	10.023	6.118	3.906	2.559	1.691	1.112	0.724	0.469	0.306	0.202
Steady-State Flux	Jss_n	$mg/cm^2/d$			0.2099	0.1853	0.1088	0.0541	0.0299	0.0163	0.0094	0.0057	0.0036	0.0024	0.0016	0.0010	0.0007	0.0004	0.0003
Dimensionless Flux	Jss^*_n	none			3.621	3.197	2.770	2.744	1.512	0.997	0.658	0.443	0.299	0.204	0.139	0.093	0.061	0.039	0.024
Dimensionless Boundary Concentration	Ss^*_n	none			8.841	7.217	5.744	5.662	2.353	1.353	0.809	0.511	0.330	0.219	0.146	0.099	0.070	0.055	0.048
Boundary Concentration	Ss_n	mg/l		0.00000	0.08841	0.07217	0.05744	0.05662	0.02353	0.01353	0.00809	0.00511	0.00330	0.00219	0.00146	0.00099	0.00070	0.00055	0.00048
Deep Biofilm Ratio	f_n	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9993	0.9948	0.9727	0.8925	0.7178	0.5040
Specific Biomass Concentration	X_fL_{fn}	mg/cm^2			1.1145	0.9841	0.5776	0.2873	0.1587	0.0867	0.0500	0.0304	0.0193	0.0126	0.0084	0.0055	0.0035	0.0023	0.0014
Biofilm Thickness	L_{fn}	cm			0.01857	0.01640	0.00963	0.00479	0.00265	0.00144	0.00083	0.00051	0.00032	0.00021	0.00014	0.00009	0.00006	0.00004	0.00002
Perchlorate																			
Maximum Specific Utilization for Increment	qmaxpinc	mg/mg/d			18.4216	15.1346	5.6731	4.6584	0.0167	0.3740	0.7070	0.7850	0.7784	0.7588	0.7383	0.7212	0.7114	0.7106	0.7150
Diffusion Layer Thickness	L_p	cm			0.0409	0.0304	0.0200	0.0136	0.0111	0.0101	0.0098	0.0098	0.0099	0.0099	0.0097	0.0095	0.0094	0.0093	0.0091
Transport/Utilization Ratio	K^*_p	none			3.10E-03	4.15E-03	1.19E-02	1.76E-02	3.92E-01	1.14E-01	6.81E-02	6.51E-02	6.44E-02	6.56E-02	6.75E-02	6.97E-02	7.13E-02	7.20E-02	7.32E-02
Concentration	S_p	mg/cm^3		1.60E-04	1.26E-04	9.52E-05	6.60E-05	4.15E-05	2.86E-05	1.77E-05	1.11E-05	7.17E-06	4.75E-06	3.21E-06	2.20E-06	1.54E-06	1.12E-06	8.60E-07	6.93E-07
Concentration	S_p	mg/l	0.20	0.1601	0.1258	0.0952	0.0660	0.0415	0.0286	0.0177	0.0111	0.0072	0.0048	0.0032	0.0022	0.0015	0.0011	0.0009	0.0007
Dimensionless Concentration	S^*_p	none			12.576	9.519	6.604	4.148	2.856	1.775	1.110	0.717	0.475	0.321	0.220	0.154	0.112	0.086	0.069
Steady-State Flux	Jss_p	$mg/cm^2/d$			0.0047	0.0047	0.0050	0.0045	0.0026	0.0024	0.0016	0.0010	0.0007	0.0004	0.0003	0.0002	0.0001	0.0001	0.0000
Dimensionless Flux	Jss^*_p	none			0.039	0.039	0.078	0.072	0.749	0.181	0.070	0.043	0.027	0.018	0.012	0.008	0.005	0.003	0.002
Dimensionless Boundary Concentration	Ss^*_p	none			0.055	0.055	0.084	0.079	0.946	0.192	0.078	0.057	0.050	0.047	0.045	0.045	0.044	0.044	0.044
Boundary Concentration	Ss_p	mg/l		0.00000	0.00055	0.00055	0.00084	0.00079	0.00946	0.00192	0.00078	0.00057	0.00050	0.00047	0.00045	0.00045	0.00044	0.00044	0.00044
Deep Biofilm Ratio	f_p	none			0.7204	0.7266	0.9486	0.9335	1.0000	0.9986	0.9297	0.7657	0.5627	0.3931	0.2653	0.1742	0.1110	0.0691	0.0425
Specific Biomass Concentration	X_fL_{fp}	mg/cm^2			0.0056	0.0056	0.0059	0.0054	0.0031	0.0029	0.0019	0.0012	0.0008	0.0005	0.0003	0.0002	0.0001	0.0001	0.0001
Biofilm Thickness	L_{fp}	cm			0.00009	0.00009	0.00010	0.00009	0.00005	0.00005	0.00003	0.00002	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000

TABLE 6
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 20% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ethanol																			
Diffusion Layer Thickness	L_e	cm			0.0055	0.0061	0.0065	0.0070	0.0074	0.0080	0.0085	0.0089	0.0092	0.0093	0.0093	0.0092	0.0090	0.0090	0.0088
Transport/Utilization Ratio	K^*_e	none			0.1443	0.1309	0.1219	0.1143	0.1071	0.1001	0.0938	0.0889	0.0861	0.0852	0.0858	0.0870	0.0880	0.0886	0.0903
Concentration	S_e	mg/cm^3		1.19E-02	6.38E-03	3.13E-03	1.51E-03	7.88E-04	4.29E-04	2.49E-04	1.55E-04	1.01E-04	6.91E-05	4.84E-05	3.47E-05	2.55E-05	1.95E-05	1.57E-05	1.33E-05
Concentration	S_e	mg/l	14.87	11.9014	6.3782	3.1286	1.5130	0.7876	0.4285	0.2492	0.1547	0.1014	0.0691	0.0484	0.0347	0.0255	0.0195	0.0157	0.0133
Dimensionless Concentration	S^*_e	none			25.513	12.514	6.052	3.150	1.714	0.997	0.619	0.406	0.277	0.194	0.139	0.102	0.078	0.063	0.053
Steady-State Flux	Jss_e	$mg/cm^2/d$			0.750	0.502	0.275	0.134	0.073	0.040	0.023	0.014	0.009	0.006	0.004	0.002	0.002	0.001	0.001
Dimensionless Flux	Jss^*_e	none			1.705	1.142	0.625	0.305	0.165	0.090	0.052	0.031	0.020	0.013	0.008	0.006	0.004	0.002	0.001
Dimensionless Boundary Concentration	Ss^*_e	none			13.697	3.791	0.927	0.480	0.174	0.096	0.066	0.053	0.046	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_e	mg/l		0.00000	3.42415	0.94775	0.23180	0.12001	0.04353	0.02399	0.01650	0.01328	0.01152	0.01054	0.00994	0.00957	0.00936	0.00932	0.00937
Oxygen Layer Concentration	Seo	mg/l		0.00000	3.42415	0.94775	0.23180	0.12001	0.04353	0.02399	0.01650	0.01328	0.01152	0.01054	0.00994	0.00957	0.00936	0.00932	0.00937
Nitrate Layer Concentration	Sen	mg/l		0.00000	3.27281	0.90747	0.21419	0.11596	0.03274	0.02244	0.01617	0.01318	0.01148	0.01053	0.00994	0.00956	0.00936	0.00932	0.00937
Perchlorate Layer Concentration	Sep	mg/l		0.00000	2.99791	0.71336	0.10054	0.07501	0.00022	0.00499	0.00925	0.01034	0.01023	0.00996	0.00968	0.00945	0.00932	0.00930	0.00936
Wall Concentration	Sw_e	mg/l		0.00000	3.03271	0.73617	0.11061	0.07895	0.00039	0.00583	0.00977	0.01058	0.01034	0.01002	0.00971	0.00946	0.00932	0.00931	0.00936
Deep Biofilm Ratio	f_e	none			1.0000	1.0000	1.0000	1.0000	0.9977	0.9697	0.8684	0.6813	0.3572	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Specific Biomass Concentration	X_fL_{fe}	mg/cm^2			1.5421	1.0330	0.5650	0.2762	0.1492	0.0815	0.0469	0.0284	0.0179	0.0117	0.0077	0.0050	0.0032	0.0020	0.0013
Biofilm Thickness	L_{fe}	cm			0.02570	0.01722	0.00942	0.00460	0.00249	0.00136	0.00078	0.00047	0.00030	0.00019	0.00013	0.00008	0.00005	0.00003	0.00002
Soluble Microbial Products																			
Utilization Associated Products	UAPinc	mgCOD/l		0.000	0.661	0.424	0.226	0.105	0.053	0.027	0.014	0.008	0.005	0.003	0.002	0.001	0.001	0.001	0.000
Utilization Associated Products	UAP	mgCOD/l		0.383	1.043	1.467	1.693	1.798	1.851	1.878	1.892	1.900	1.905	1.908	1.910	1.911	1.912	1.913	1.913
Biomass Associated Products	BAPinc	mgCOD/l		0.000	1.258	0.745	0.372	0.168	0.083	0.041	0.022	0.012	0.007	0.005	0.003	0.002	0.001	0.001	0.001
Biomass Associated Products	BAP	mgCOD/l		0.680	1.938	2.683	3.055	3.222	3.305	3.347	3.369	3.381	3.388	3.393	3.396	3.398	3.400	3.401	3.401
Soluble Microbial Products	SMP	mgCOD/l		1.063	2.981	4.150	4.747	5.020	5.156	5.224	5.260	5.281	5.293	5.301	5.306	5.310	5.312	5.313	5.314
Bulk Inactive Biomass Density	XfiLfainc	mgVSS/l		0.0	3377.4	1987.1	987.9	443.6	219.6	109.6	57.8	32.6	19.7	12.7	8.4	5.6	3.7	2.3	1.5
Bulk Inactive Biomass Density	XfiLfa	mgVSS/l		1817	5195	7182	8170	8613	8833	8943	9000	9033	9053	9065	9074	9079	9083	9085	9087
Bulk Total Biomass Density	XfvLfainc	mgVSS/l		0	28951	17034	8468	3802	1882	940	496	279	169	109	72	48	31	20	13
Bulk Total Biomass Density	XfvLfa	mgVSS/l		15579	44530	61563	70032	73834	75717	76656	77152	77431	77600	77709	77781	77829	77860	77880	77893
Active Biomass Density	Xfainc	mgVSS/l		0.0000	2.4121	1.4192	0.7056	0.3168	0.1568	0.0783	0.0413	0.0233	0.0141	0.0090	0.0060	0.0040	0.0026	0.0017	0.0011
Active Biomass Density	Xfa	mgVSS/l		1.30	3.71	5.13	5.84	6.15	6.31	6.39	6.43	6.45	6.47	6.48	6.48	6.49	6.49	6.49	6.49
Inactive Biomass Density	Xfiinc	mgVSS/l		0.00000	0.31856	0.18743	0.09318	0.04184	0.02071	0.01034	0.00545	0.00307	0.00186	0.00119	0.00079	0.00053	0.00035	0.00022	0.00014
Inactive Biomass Density	Xfi	mgVSS/l		0.17	0.49	0.68	0.77	0.81	0.84	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Total Biomass Density	Xfv	mgVSS/l		1.47	4.21	5.81	6.61	6.97	7.15	7.24	7.28	7.31	7.32	7.33	7.34	7.35	7.35	7.35	7.35
Dissolved Organic Carbon	DOC	mg/l		6.61	4.44	3.18	2.56	2.28	2.15	2.08	2.04	2.02	2.01	2.00	2.00	1.99	1.99	1.99	1.99
Total Organic Carbon	TOC	mg/l		7.39	6.67	6.27	6.07	5.98	5.94	5.92	5.91	5.90	5.90	5.90	5.90	5.89	5.89	5.89	5.89
Soluble COD	CODs	mg/l		25.94	16.31	10.69	7.91	6.67	6.05	5.75	5.58	5.49	5.44	5.40	5.38	5.36	5.35	5.35	5.34
Total COD	CODt	mg/l		28.03	22.28	18.94	17.30	16.56	16.20	16.02	15.92	15.87	15.84	15.82	15.80	15.79	15.79	15.78	15.78
Ultimate BOD	BODL	mg/l		27.41	20.53	16.52	14.54	13.66	13.22	13.00	12.89	12.82	12.79	12.76	12.74	12.73	12.72	12.72	12.72
Soluble BOD5	BOD5s	mg/l		17.15	9.52	5.05	2.82	1.82	1.33	1.08	0.95	0.88	0.84	0.81	0.79	0.78	0.77	0.76	0.76
Total BOD5	BOD5t	mg/l		17.89	11.65	7.98	6.16	5.35	4.94	4.74	4.63	4.57	4.54	4.52	4.50	4.49	4.48	4.48	4.48

TABLE 7
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Reactor					
Reactor Diameter	14	ft	-	-	-
Surface Area	153.9	ft^2	A_c	143,013	cm^2
Fluidized Bed Height	-	-	H	15	ft
Fluidized Bed Volume	17272	gal	Vtot	6.54E+07	cm^3
Total Flow	1800	gpm	Qtot	9.81E+09	cm^3/d
Forward Flow	1800	gpm	Qfor	9.81E+09	cm^3/d
Recycle Rate	0.0	%	-	-	-
Loading Rate	11.7	gpm/sf	u	68,600	cm/d
Empty Bed Contact Time	9.6	minutes	-	-	-
Model Increment	-	-	minc	1.0	foot
Incremental Volume	1151.5	gal	Vinc	4.36E+06	cm^3
Incremental Hydraulic Detention Time			θinc	0.00044	days
Media					
Clean GAC Settled Depth	9	ft	-	-	-
Clean GAC Settled Volume	1385	ft^3	-	-	-
Clean GAC Settled Porosity	35	%	-	-	-
Clean GAC Bulk Density	32	lbs/ft^3	-	-	-
Clean GAC Dry Weight	44,334	lbs	-	-	-
Mean Particle Diameter	1.2	mm	d_p	0.12	cm
Mean Particle Volume	0.90	mm^3	-	-	-
Number of Particles	1.52E+10	particles	-	-	-
Total Particle Volume	-	-	V_p	1.37E+10	mm^3
Particle Surface Area	4.52	mm^2	-	-	-
Total Particle Surface Area	6.87E+10	mm^2	A_p	6.87E+08	cm^2
Fluidized Specific Surface Area			a	10.50	cm^2/cm^3
Fluidized Porosity			ε	0.79	
Uniformity Coefficient	-	-	c_u	1.3	none
Particle Density	-	-	ρ_d	1.25	g/cm^3
Actual Contact Time	7.6	minutes	-	-	-
Water					
Temperature	-	-	T	19	ºC
Density	999	kg/m^3	ρ	0.999	g/cm^3
Dynamic Viscosity	0.00104	$N\text{-}s/m^2$	μ	895.4	g/cm/d
Biofilm					
Biofilm Density	60,000	mg/l	X_f	60	mg/cm^3
Specific Detachment Loss	-	-	b_{det}	0.21	1/d
Endogenous Decay	0.15	1/d (20ºC)	b	0.14	1/d (19ºC)
Biofilm Loss Coeffecient	0.36	1/d (20ºC)	b'	0.35	1/d (19ºC)
Biodegradable Fraction	-	-	f_d	0.80	none

TABLE 7
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Ethanol					
Molecular Diffusion in Water	-	-	D_e	1.4	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_e	1.12	cm^2/d
Ethanol Overdose Percentage	0	%	-	-	-
Forward Flow Concentration	14.87	mg/l	So_e	0.0149	mg/cm^3
Half Velocity Constant	0.250	mg/l	K_e	0.000250	mg/cm^3
Maximum Specific Utilization	12.32	mg/mg/d (20ºC)	q_{maxe}	11.51	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_e	0.725	mg/mg
Schmidt Number	-	-	Sc_e	640.4	none
Minimum Substrate Concentration	0.0110	mg/l	$Smin_e$	0.000011	mg/cm^3
Growth Potential	-	-	S^*min_e	0.0441	none
Alpha Coefficient	-	-	α_e	1.9161	none
Beta Coefficient	-	-	β_e	0.5260	none
Dissolved Oxygen					
Molecular Diffusion in Water	-	-	D_o	2.64	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_o	2.112	cm^2/d
Forward Flow Concentration	4.0	mg/l	So_o	0.0040	mg/cm^3
Half Velocity Constant	0.200	mg/l	K_o	0.000200	mg/cm^3
Maximum Specific Utilization	13.63	mg/mg/d (20ºC)	q_{maxo}	12.74	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_o	0.655	mg/mg
Schmidt Number	-	-	Sc_o	339.6	none
Minimum Substrate Concentration	0.0088	mg/l	$Smin_o$	0.0000088	mg/cm^3
Growth Potential	-	-	S^*min_o	0.0441	none
Alpha Coefficient	-	-	α_o	1.9161	none
Beta Coefficient	-	-	β_o	0.5260	none
Nitrate-N					
Molecular Diffusion in Water	-	-	D_n	1.57	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_n	1.256	cm^2/d
Forward Flow Concentration	5.0	mg/l	So_n	0.0050	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_n	0.000010	mg/cm^3
Maximum Specific Utilization	4.77	mg/mg/d (20ºC)	q_{maxn}	4.46	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_n	1.872	mg/mg
Schmidt Number	-	-	Sc_n	571.1	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_n$	0.00000044	mg/cm^3
Growth Potential	-	-	S^*min_n	0.0441	none
Alpha Coefficient	-	-	α_n	1.9161	none
Beta Coefficient	-	-	β_n	0.5260	none

TABLE 7
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Perchlorate					
Molecular Diffusion in Water	-	-	D_p	1.52	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_p	1.216	cm^2/d
Forward Flow Concentration	0.20	mg/l	So_p	0.0002	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_p	0.000010	mg/cm^3
Maximum Specific Utilization	21.19	mg/mg/d (20ºC)	q_{maxp}	19.81	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_p	0.421	mg/mg
Schmidt Number	-	-	Sc_p	589.9	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_p$	0.0000004	mg/cm^3
Growth Potential	-	-	S^*min_p	0.0441	none
Alpha Coefficient	-	-	α_p	1.9161	none
Beta Coefficient	-	-	β_p	0.5260	none
Soluble Microbial Products					
UAP Formation Coefficient			k_1	0.12	gCODp/gCODs
BAP Formation Coefficient			k_2	0.09	gCODp/gVSSa-d
UAP Utilization Rate			qUAP	1.8	gCODp/gVSSa-d
UAP Half Velocity Constant			KUAP	0.1	mgCODp/cm3
BAP Utilization Rate			qBAP	0.1	gCODp/gVSSa-d
BAP Half Velocity Constant			KBAP	0.085	mgCODp/cm3
Ethanol BOD Exertion Rate	0.23	1/d (20ºC)	ks	0.21	1/d (19ºC)
SMP BOD Exertion Rate	0.03	1/d (20ºC)	ksmp	0.028	1/d (19ºC)

TABLE 8
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Media																			
Mean Particle Diameter	d_{pinc}	cm			0.133	0.131	0.129	0.128	0.126	0.124	0.122	0.120	0.118	0.116	0.114	0.112	0.111	0.109	0.107
Mean Particle Volume	Vpm_{inc}	cm3			0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006
Mean Particle Surface Area	Apm_{inc}	cm2			0.056	0.054	0.053	0.051	0.050	0.048	0.047	0.045	0.044	0.042	0.041	0.040	0.038	0.037	0.036
Percent of Total Particle Volume in Increment	P_{inc}	%			11.7	10.1	9.1	8.2	7.4	6.7	6.0	5.5	5.2	5.0	5.0	5.0	5.0	5.0	5.0
Total Particle Volume in Increment	Vp_{inc}	cm3			1.6E+06	1.4E+06	1.2E+06	1.1E+06	1.0E+06	9.2E+05	8.3E+05	7.6E+05	7.1E+05	6.9E+05	6.9E+05	6.9E+05	6.9E+05	6.8E+05	6.9E+05
Number of Particles in Increment	Np_{inc}	particles			1.3E+09	1.2E+09	1.1E+09	1.0E+09	9.8E+08	9.2E+08	8.7E+08	8.4E+08	8.3E+08	8.4E+08	8.8E+08	9.3E+08	9.7E+08	1.0E+09	1.1E+09
Total Particle Surface Area in Increment	Ap_{inc}	cm2			7.2E+07	6.3E+07	5.8E+07	5.3E+07	4.9E+07	4.4E+07	4.1E+07	3.8E+07	3.6E+07	3.6E+07	3.6E+07	3.7E+07	3.7E+07	3.8E+07	3.9E+07
Fluidized Specific Surface Area	a_{inc}	cm^2/cm^3			16.6	14.6	13.2	12.2	11.1	10.2	9.3	8.7	8.3	8.2	8.3	8.4	8.6	8.7	8.9
Fluidized Porosity	ε_{inc}	none			0.632	0.681	0.714	0.741	0.767	0.790	0.810	0.826	0.836	0.841	0.842	0.842	0.842	0.843	0.842
Reynolds Number	Re_{inc}	none			55.364	63.030	69.338	75.496	82.373	90.178	98.333	105.531	110.270	111.805	110.763	108.703	107.053	106.031	103.431
Dissolved Oxygen																			
Maximum Specific Utilization for Increment	qmaxoinc	mg/mg/d			12.1779	11.1265	7.7673	4.3259	2.5710	1.4614	0.9430	0.7252	0.6095	0.5440	0.5037	0.4768	0.4596	0.4515	0.4510
Diffusion Layer Thickness	L_o	cm			0.0068	0.0075	0.0081	0.0086	0.0092	0.0098	0.0105	0.0110	0.0114	0.0115	0.0114	0.0113	0.0112	0.0111	0.0109
Transport/Utilization Ratio	K^*_o	none			1.37E-01	1.24E-01	1.44E-01	1.71E-01	1.96E-01	2.72E-01	3.12E-01	3.34E-01	3.48E-01	3.61E-01	3.76E-01	3.90E-01	4.00E-01	4.06E-01	4.14E-01
Concentration	S_o	mg/cm^3		4.00E-03	1.16E-03	3.85E-04	1.44E-04	6.13E-05	3.08E-05	1.89E-05	1.38E-05	1.14E-05	1.02E-05	9.59E-06	9.23E-06	9.04E-06	8.94E-06	8.88E-06	8.85E-06
Concentration	S_o	mg/l	4.00	4.0000	1.1607	0.3854	0.1442	0.0613	0.0308	0.0189	0.0138	0.0114	0.0102	0.0096	0.0092	0.0090	0.0089	0.0089	0.0089
Dimensionless Concentration	S^*_o	none			5.804	1.927	0.721	0.307	0.154	0.094	0.069	0.057	0.051	0.048	0.046	0.045	0.045	0.044	0.044
Steady-State Flux	Jss_o	$mg/cm^2/d$			0.3854	0.1198	0.0410	0.0153	0.0062	0.0026	0.0012	0.0006	0.0003	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
Dimensionless Flux	Jss^*_o	none			0.678	0.211	0.090	0.043	0.021	0.013	0.008	0.004	0.002	0.001	0.001	0.000	0.000	0.000	0.000
Dimensionless Boundary Concentration	Ss^*_o	none			0.839	0.226	0.096	0.057	0.047	0.045	0.045	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_o	mg/l		0.00000	0.16788	0.04521	0.01920	0.01141	0.00946	0.00909	0.00891	0.00885	0.00883	0.00882	0.00882	0.00882	0.00882	0.00882	0.00882
Deep Biofilm Ratio	f_o	none			1.0000	0.9994	0.9697	0.7637	0.4489	0.2975	0.1730	0.0982	0.0556	0.0317	0.0179	0.0099	0.0053	0.0028	0.0015
Specific Biomass Concentration	X_fL_{fo}	mg/cm^2			0.7162	0.2227	0.0762	0.0285	0.0114	0.0049	0.0023	0.0011	0.0006	0.0003	0.0002	0.0001	0.0001	0.0000	0.0000
Biofilm Thickness	L_{fo}	cm			0.01194	0.00371	0.00127	0.00048	0.00019	0.00008	0.00004	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
Nitrate																			
Maximum Specific Utilization for Increment	qmaxninc	mg/mg/d			4.2536	3.8757	2.6478	1.0640	0.6918	0.4436	0.3164	0.2479	0.2092	0.1869	0.1730	0.1636	0.1576	0.1548	0.1546
Diffusion Layer Thickness	L_n	cm			0.0207	0.0110	0.0084	0.0078	0.0080	0.0084	0.0089	0.0093	0.0096	0.0097	0.0096	0.0095	0.0094	0.0093	0.0092
Transport/Utilization Ratio	K^*_n	none			1.31E-02	2.47E-02	4.20E-02	6.10E-02	8.68E-02	1.02E-01	1.15E-01	1.24E-01	1.30E-01	1.36E-01	1.43E-01	1.49E-01	1.53E-01	1.56E-01	1.59E-01
Concentration	S_n	mg/cm^3		5.00E-03	3.24E-03	1.73E-03	8.64E-04	4.39E-04	2.37E-04	1.36E-04	8.29E-05	5.29E-05	3.46E-05	2.29E-05	1.51E-05	9.80E-06	6.34E-06	4.10E-06	2.66E-06
Concentration	S_n	mg/l	5.00	5.0000	3.2441	1.7337	0.8642	0.4385	0.2366	0.1359	0.0829	0.0529	0.0346	0.0229	0.0151	0.0098	0.0063	0.0041	0.0027
Dimensionless Concentration	S^*_n	none			324.408	173.372	86.420	43.852	23.658	13.589	8.286	5.287	3.464	2.289	1.505	0.980	0.634	0.410	0.266
Steady-State Flux	Jss_n	$mg/cm^2/d$			0.2383	0.2334	0.1478	0.0788	0.0408	0.0223	0.0128	0.0078	0.0049	0.0032	0.0021	0.0014	0.0009	0.0006	0.0004
Dimensionless Flux	Jss^*_n	none			4.111	4.026	3.306	2.395	1.793	1.206	0.827	0.569	0.393	0.271	0.186	0.126	0.083	0.054	0.034
Dimensionless Boundary Concentration	Ss^*_n	none			10.930	10.551	7.618	4.588	2.991	1.732	1.068	0.682	0.445	0.296	0.198	0.132	0.089	0.064	0.052
Boundary Concentration	Ss_n	mg/l		0.00000	0.10930	0.10551	0.07618	0.04588	0.02991	0.01732	0.01068	0.00682	0.00445	0.00296	0.00198	0.00132	0.00089	0.00064	0.00052
Deep Biofilm Ratio	f_n	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9988	0.9921	0.9599	0.8544	0.6588
Specific Biomass Concentration	X_fL_{fn}	mg/cm^2			1.2655	1.2392	0.7848	0.4183	0.2165	0.1182	0.0679	0.0412	0.0262	0.0171	0.0113	0.0074	0.0048	0.0031	0.0019
Biofilm Thickness	L_{fn}	cm			0.02109	0.02065	0.01308	0.00697	0.00361	0.00197	0.00113	0.00069	0.00044	0.00029	0.00019	0.00012	0.00008	0.00005	0.00003
Perchlorate																			
Maximum Specific Utilization for Increment	qmaxpinc	mg/mg/d			18.8225	16.7160	8.9689	0.0032	0.0187	0.0546	0.5180	0.7328	0.7639	0.7534	0.7328	0.7107	0.6931	0.6846	0.6856
Diffusion Layer Thickness	L_p	cm			0.0470	0.0367	0.0246	0.0165	0.0124	0.0107	0.0102	0.0101	0.0101	0.0100	0.0098	0.0096	0.0094	0.0093	0.0091
Transport/Utilization Ratio	K^*_p	none			2.69E-03	3.44E-03	7.78E-03	6.08E-01	3.33E-01	2.24E-01	7.59E-02	6.58E-02	6.41E-02	6.51E-02	6.73E-02	6.99E-02	7.20E-02	7.32E-02	7.47E-02
Concentration	S_p	mg/cm^3		2.00E-04	1.62E-04	1.28E-04	9.38E-05	7.59E-05	5.38E-05	3.58E-05	2.27E-05	1.47E-05	9.69E-06	6.42E-06	4.26E-06	2.84E-06	1.93E-06	1.36E-06	9.93E-07
Concentration	S_p	mg/l	0.20	0.2000	0.1616	0.1276	0.0938	0.0759	0.0538	0.0358	0.0227	0.0147	0.0097	0.0064	0.0043	0.0028	0.0019	0.0014	0.0010
Dimensionless Concentration	S^*_p	none			16.160	12.756	9.382	7.589	5.378	3.579	2.275	1.472	0.969	0.642	0.426	0.284	0.193	0.136	0.099
Steady-State Flux	Jss_p	$mg/cm^2/d$			0.0052	0.0053	0.0057	0.0033	0.0045	0.0040	0.0031	0.0021	0.0014	0.0009	0.0006	0.0004	0.0002	0.0001	0.0001
Dimensionless Flux	Jss^*_p	none			0.043	0.044	0.072	2.185	1.210	0.630	0.160	0.091	0.058	0.038	0.025	0.017	0.011	0.007	0.004
Dimensionless Boundary Concentration	Ss^*_p	none			0.057	0.058	0.079	3.995	1.740	0.768	0.169	0.096	0.067	0.054	0.049	0.046	0.045	0.044	0.044
Boundary Concentration	Ss_p	mg/l		0.00000	0.00057	0.00058	0.00079	0.03995	0.01740	0.00768	0.00169	0.00096	0.00067	0.00054	0.00049	0.00046	0.00045	0.00044	0.00044
Deep Biofilm Ratio	f_p	none			0.7698	0.7736	0.9358	1.0000	1.0000	1.0000	0.9973	0.9700	0.8777	0.7145	0.5288	0.3655	0.2402	0.1522	0.0943
Specific Biomass Concentration	X_fL_{fp}	mg/cm^2			0.0062	0.0063	0.0069	0.0040	0.0053	0.0048	0.0038	0.0025	0.0016	0.0011	0.0007	0.0005	0.0003	0.0002	0.0001
Biofilm Thickness	L_{fp}	cm			0.00010	0.00010	0.00011	0.00007	0.00009	0.00008	0.00006	0.00004	0.00003	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000

TABLE 8
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ethanol																			
Diffusion Layer Thickness	L_e	cm			0.0055	0.0061	0.0065	0.0070	0.0074	0.0080	0.0085	0.0089	0.0092	0.0093	0.0093	0.0092	0.0090	0.0090	0.0088
Transport/Utilization Ratio	K^*_e	none			0.1443	0.1309	0.1219	0.1143	0.1071	0.1001	0.0938	0.0889	0.0861	0.0852	0.0858	0.0870	0.0880	0.0886	0.0903
Concentration	S_e	mg/cm^3		1.49E-02	8.37E-03	4.29E-03	2.11E-03	1.08E-03	5.86E-04	3.41E-04	2.10E-04	1.37E-04	9.21E-05	6.34E-05	4.44E-05	3.17E-05	2.33E-05	1.79E-05	1.45E-05
Concentration	S_e	mg/l	14.87	14.8740	8.3730	4.2865	2.1110	1.0769	0.5864	0.3407	0.2103	0.1367	0.0921	0.0634	0.0444	0.0317	0.0233	0.0179	0.0145
Dimensionless Concentration	S^*_e	none			33.492	17.146	8.444	4.307	2.346	1.363	0.841	0.547	0.368	0.254	0.177	0.127	0.093	0.072	0.058
Steady-State Flux	Jss_e	$mg/cm^2/d$			0.882	0.631	0.370	0.191	0.099	0.054	0.031	0.019	0.012	0.008	0.005	0.003	0.002	0.001	0.001
Dimensionless Flux	Jss^*_e	none			2.007	1.436	0.841	0.435	0.225	0.124	0.071	0.043	0.027	0.018	0.012	0.008	0.005	0.003	0.002
Dimensionless Boundary Concentration	Ss^*_e	none			19.584	6.176	1.543	0.501	0.242	0.129	0.079	0.060	0.049	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_e	mg/l		0.00000	4.89588	1.54398	0.38574	0.12514	0.06062	0.03218	0.01977	0.01490	0.01237	0.01096	0.01010	0.00953	0.00916	0.00899	0.00898
Oxygen Layer Concentration	Seo	mg/l		0.00000	4.89588	1.54398	0.38574	0.12514	0.06062	0.03218	0.01977	0.01490	0.01237	0.01096	0.01010	0.00953	0.00916	0.00899	0.00898
Nitrate Layer Concentration	Sen	mg/l		0.00000	4.67927	1.48698	0.36529	0.07479	0.04595	0.02756	0.01909	0.01473	0.01231	0.01093	0.01009	0.00952	0.00916	0.00899	0.00898
Perchlorate Layer Concentration	Sep	mg/l		0.00000	4.31968	1.20612	0.20838	0.00004	0.00024	0.00066	0.00670	0.00962	0.01003	0.00989	0.00961	0.00931	0.00907	0.00895	0.00896
Wall Concentration	Sw_e	mg/l		0.00000	4.36538	1.23977	0.22388	0.00010	0.00044	0.00094	0.00729	0.00994	0.01018	0.00996	0.00964	0.00932	0.00907	0.00895	0.00897
Deep Biofilm Ratio	f_e	none			1.0000	1.0000	1.0000	1.0000	0.9996	0.9910	0.9350	0.8026	0.5599	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Specific Biomass Concentration	X_fL_{fe}	mg/cm^2			1.8152	1.2990	0.7607	0.3937	0.2037	0.1117	0.0647	0.0392	0.0248	0.0162	0.0106	0.0070	0.0045	0.0029	0.0018
Biofilm Thickness	L_{fe}	cm			0.03025	0.02165	0.01268	0.00656	0.00340	0.00186	0.00108	0.00065	0.00041	0.00027	0.00018	0.00012	0.00008	0.00005	0.00003
Soluble Microbial Products																			
Utilization Associated Products	UAPinc	mgCOD/l		0.000	0.630	0.426	0.242	0.120	0.058	0.029	0.016	0.009	0.005	0.003	0.002	0.002	0.001	0.001	0.000
Utilization Associated Products	UAP	mgCOD/l		0.000	0.630	1.056	1.297	1.417	1.475	1.504	1.519	1.528	1.534	1.537	1.539	1.541	1.542	1.543	1.543
Biomass Associated Products	BAPinc	mgCOD/l		0.000	1.185	0.749	0.401	0.191	0.091	0.045	0.024	0.014	0.008	0.005	0.004	0.002	0.002	0.001	0.001
Biomass Associated Products	BAP	mgCOD/l		0.000	1.185	1.934	2.335	2.526	2.617	2.662	2.686	2.700	2.708	2.714	2.717	2.719	2.721	2.722	2.723
Soluble Microbial Products	SMP	mgCOD/l		0.000	1.815	2.990	3.632	3.943	4.091	4.166	4.206	4.228	4.242	4.251	4.256	4.260	4.263	4.265	4.266
Bulk Inactive Biomass Density	XfiLfainc	mgVSS/l		0.0	3975.3	2498.9	1330.3	632.3	299.9	150.2	79.7	45.0	27.3	17.5	11.6	7.8	5.1	3.3	2.1
Bulk Inactive Biomass Density	XfiLfa	mgVSS/l		0	3975	6474	7804	8437	8737	8887	8967	9012	9039	9057	9068	9076	9081	9084	9086
Bulk Total Biomass Density	XfvLfainc	mgVSS/l		0	34077	21421	11403	5420	2571	1288	683	386	234	150	100	67	44	28	18
Bulk Total Biomass Density	XfvLfa	mgVSS/l		0	34077	55497	66901	72321	74892	76180	76863	77249	77483	77633	77733	77800	77843	77872	77890
Active Biomass Density	Xfainc	mgVSS/l		0.0000	2.8392	1.7847	0.9501	0.4516	0.2142	0.1073	0.0569	0.0322	0.0195	0.0125	0.0083	0.0055	0.0036	0.0023	0.0015
Active Biomass Density	Xfa	mgVSS/l		0.00	2.84	4.62	5.57	6.03	6.24	6.35	6.40	6.44	6.46	6.47	6.48	6.48	6.49	6.49	6.49
Inactive Biomass Density	Xfiinc	mgVSS/l		0.00000	0.37496	0.23570	0.12547	0.05964	0.02829	0.01417	0.00752	0.00425	0.00257	0.00165	0.00110	0.00073	0.00048	0.00031	0.00020
Inactive Biomass Density	Xfi	mgVSS/l		0.00	0.37	0.61	0.74	0.80	0.82	0.84	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	0.86
Total Biomass Density	Xfv	mgVSS/l		0.00	3.21	5.23	6.31	6.82	7.06	7.19	7.25	7.29	7.31	7.32	7.33	7.34	7.34	7.34	7.35
Dissolved Organic Carbon	DOC	mg/l		7.76	5.05	3.35	2.46	2.03	1.83	1.73	1.68	1.65	1.63	1.62	1.61	1.61	1.60	1.60	1.60
Total Organic Carbon	TOC	mg/l		7.76	6.75	6.13	5.81	5.66	5.58	5.55	5.53	5.52	5.51	5.51	5.50	5.50	5.50	5.50	5.50
Soluble COD	CODs	mg/l		31.09	19.31	11.95	8.04	6.19	5.32	4.88	4.65	4.51	4.43	4.38	4.35	4.33	4.31	4.30	4.30
Total COD	CODt	mg/l		31.09	23.88	19.38	17.00	15.88	15.35	15.08	14.94	14.86	14.81	14.78	14.76	14.75	14.74	14.73	14.73
Ultimate BOD	BODL	mg/l		31.09	22.54	17.20	14.38	13.04	12.41	12.09	11.92	11.83	11.77	11.73	11.71	11.69	11.68	11.67	11.67
Soluble BOD5	BOD5s	mg/l		21.24	12.21	6.54	3.52	2.09	1.41	1.07	0.89	0.78	0.72	0.68	0.66	0.64	0.63	0.62	0.61
Total BOD5	BOD5t	mg/l		21.24	13.84	9.19	6.71	5.54	4.98	4.70	4.55	4.47	4.42	4.39	4.36	4.35	4.34	4.33	4.33

TABLE 9
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE - WORST CASE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Reactor					
Reactor Diameter	14	ft	-	-	-
Surface Area	153.9	ft^2	A_c	143,013	cm^2
Fluidized Bed Height	-	-	H	15	ft
Fluidized Bed Volume	17272	gal	Vtot	6.54E+07	cm^3
Total Flow	1800	gpm	Qtot	9.81E+09	cm^3/d
Forward Flow	1800	gpm	Qfor	9.81E+09	cm^3/d
Recycle Rate	0.0	%	-	-	-
Loading Rate	11.7	gpm/sf	u	68,600	cm/d
Empty Bed Contact Time	9.6	minutes	-	-	-
Model Increment	-	-	minc	1.0	foot
Incremental Volume	1151.5	gal	Vinc	4.36E+06	cm^3
Incremental Hydraulic Detention Time			θinc	0.00044	days
Media					
Clean GAC Settled Depth	9	ft	-	-	-
Clean GAC Settled Volume	1385	ft^3	-	-	-
Clean GAC Settled Porosity	35	%	-	-	-
Clean GAC Bulk Density	32	lbs/ft^3	-	-	-
Clean GAC Dry Weight	44,334	lbs	-	-	-
Mean Particle Diameter	1.2	mm	d_p	0.12	cm
Mean Particle Volume	0.90	mm^3	-	-	-
Number of Particles	1.52E+10	particles	-	-	-
Total Particle Volume	-	-	V_p	1.37E+10	mm^3
Particle Surface Area	4.52	mm^2	-	-	-
Total Particle Surface Area	6.87E+10	mm^2	A_p	6.87E+08	cm^2
Fluidized Specific Surface Area			a	10.50	cm^2/cm^3
Fluidized Porosity			ε	0.79	
Uniformity Coefficient	-	-	c_u	1.3	none
Particle Density	-	-	ρ_d	1.25	g/cm^3
Actual Contact Time	7.6	minutes	-	-	-
Water					
Temperature	-	-	T	19	ºC
Density	999	kg/m^3	ρ	0.999	g/cm^3
Dynamic Viscosity	0.00104	$N\text{-}s/m^2$	μ	895.4	g/cm/d
Biofilm					
Biofilm Density	60,000	mg/l	X_f	60	mg/cm^3
Specific Detachment Loss	-	-	b_{det}	0.21	1/d
Endogenous Decay	0.15	1/d (20ºC)	b	0.14	1/d (19ºC)
Biofilm Loss Coeffecient	0.36	1/d (20ºC)	b'	0.35	1/d (19ºC)
Biodegradable Fraction	-	-	f_d	0.80	none

TABLE 9
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE - WORST CASE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Ethanol					
Molecular Diffusion in Water	-	-	D_e	1.4	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_e	1.12	cm^2/d
Ethanol Overdose Percentage	0	%	-	-	-
Forward Flow Concentration	29.75	mg/l	So_e	0.0297	mg/cm^3
Half Velocity Constant	0.250	mg/l	K_e	0.000250	mg/cm^3
Maximum Specific Utilization	12.32	mg/mg/d (20ºC)	q_{maxe}	11.51	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_e	0.725	mg/mg
Schmidt Number	-	-	Sc_e	640.4	none
Minimum Substrate Concentration	0.0110	mg/l	$Smin_e$	0.000011	mg/cm^3
Growth Potential	-	-	S^*min_e	0.0441	none
Alpha Coefficient	-	-	α_e	1.9161	none
Beta Coefficient	-	-	β_e	0.5260	none
Dissolved Oxygen					
Molecular Diffusion in Water	-	-	D_o	2.64	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_o	2.112	cm^2/d
Forward Flow Concentration	8.0	mg/l	So_o	0.0080	mg/cm^3
Half Velocity Constant	0.200	mg/l	K_o	0.000200	mg/cm^3
Maximum Specific Utilization	13.63	mg/mg/d (20ºC)	q_{maxo}	12.74	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_o	0.655	mg/mg
Schmidt Number	-	-	Sc_o	339.6	none
Minimum Substrate Concentration	0.0088	mg/l	$Smin_o$	0.0000088	mg/cm^3
Growth Potential	-	-	S^*min_o	0.0441	none
Alpha Coefficient	-	-	α_o	1.9161	none
Beta Coefficient	-	-	β_o	0.5260	none
Nitrate-N					
Molecular Diffusion in Water	-	-	D_n	1.57	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_n	1.256	cm^2/d
Forward Flow Concentration	10.0	mg/l	So_n	0.0100	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_n	0.000010	mg/cm^3
Maximum Specific Utilization	4.77	mg/mg/d (20ºC)	q_{maxn}	4.46	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_n	1.872	mg/mg
Schmidt Number	-	-	Sc_n	571.1	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_n$	0.00000044	mg/cm^3
Growth Potential	-	-	S^*min_n	0.0441	none
Alpha Coefficient	-	-	α_n	1.9161	none
Beta Coefficient	-	-	β_n	0.5260	none

TABLE 9
BIOFILM MODEL INPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE - WORST CASE

Parameter	Value	Units	Model Symbol	Model Value	Model Units
Perchlorate					
Molecular Diffusion in Water	-	-	D_p	1.52	cm^2/d
Molecular Diffusion in Biofilm	-	-	Df_p	1.216	cm^2/d
Forward Flow Concentration	0.40	mg/l	So_p	0.0004	mg/cm^3
Half Velocity Constant	0.010	mg/l	K_p	0.000010	mg/cm^3
Maximum Specific Utilization	21.19	mg/mg/d (20ºC)	q_{maxp}	19.81	mg/mg/d (19ºC)
True Yield for Cell Synthesis	-	-	Y_p	0.421	mg/mg
Schmidt Number	-	-	Sc_p	589.9	none
Minimum Substrate Concentration	0.0004	mg/l	$Smin_p$	0.0000004	mg/cm^3
Growth Potential	-	-	S^*min_p	0.0441	none
Alpha Coefficient	-	-	α_p	1.9161	none
Beta Coefficient	-	-	β_p	0.5260	none
Soluble Microbial Products					
UAP Formation Coefficient			k_1	0.12	gCODp/gCODs
BAP Formation Coefficient			k_2	0.09	gCODp/gVSSa-d
UAP Utilization Rate			qUAP	1.8	gCODp/gVSSa-d
UAP Half Velocity Constant			KUAP	0.1	mgCODp/cm3
BAP Utilization Rate			qBAP	0.1	gCODp/gVSSa-d
BAP Half Velocity Constant			KBAP	0.085	mgCODp/cm3
Ethanol BOD Exertion Rate	0.23	1/d (20ºC)	ks	0.21	1/d (19ºC)
SMP BOD Exertion Rate	0.03	1/d (20ºC)	ksmp	0.028	1/d (19ºC)

TABLE 10
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE - WORST CASE

Parameter	Symbol	Units	GW	Bed Height (ft) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Media																			
Mean Particle Diameter	d_{pinc}	cm			0.133	0.131	0.129	0.128	0.126	0.124	0.122	0.120	0.118	0.116	0.114	0.112	0.111	0.109	0.107
Mean Particle Volume	Vpm_{inc}	cm3			0.0012	0.0012	0.0011	0.0011	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006
Mean Particle Surface Area	Apm_{inc}	cm2			0.056	0.054	0.053	0.051	0.050	0.048	0.047	0.045	0.044	0.042	0.041	0.040	0.038	0.037	0.036
Percent of Total Particle Volume in Increment	P_{inc}	%			11.7	10.1	9.1	8.2	7.4	6.7	6.0	5.5	5.2	5.0	5.0	5.0	5.0	5.0	5.0
Total Particle Volume in Increment	Vp_{inc}	cm3			1.6E+06	1.4E+06	1.2E+06	1.1E+06	1.0E+06	9.2E+05	8.3E+05	7.6E+05	7.1E+05	6.9E+05	6.9E+05	6.9E+05	6.9E+05	6.8E+05	6.9E+05
Number of Particles in Increment	Np_{inc}	particles			1.3E+09	1.2E+09	1.1E+09	1.0E+09	9.8E+08	9.2E+08	8.7E+08	8.4E+08	8.3E+08	8.4E+08	8.8E+08	9.3E+08	9.7E+08	1.0E+09	1.1E+09
Total Particle Surface Area in Increment	Ap_{inc}	cm2			7.2E+07	6.3E+07	5.8E+07	5.3E+07	4.9E+07	4.4E+07	4.1E+07	3.8E+07	3.6E+07	3.6E+07	3.6E+07	3.7E+07	3.7E+07	3.8E+07	3.9E+07
Fluidized Specific Surface Area	a_{inc}	cm^2/cm^3			16.6	14.6	13.2	12.2	11.1	10.2	9.3	8.7	8.3	8.2	8.3	8.4	8.6	8.7	8.9
Fluidized Porosity	ε_{inc}	none			0.632	0.681	0.714	0.741	0.767	0.790	0.810	0.826	0.836	0.841	0.842	0.842	0.842	0.843	0.842
Reynolds Number	Re_{inc}	none			55.364	63.030	69.338	75.496	82.373	90.178	98.333	105.531	110.270	111.805	110.763	108.703	107.053	106.031	103.431
Dissolved Oxygen																			
Maximum Specific Utilization for Increment	qmaxoinc	mg/mg/d			12.5317	12.2925	11.4406	8.8813	5.8083	3.8198	2.4823	1.5608	1.0741	0.8205	0.6880	0.5972	0.5359	0.4948	0.4694
Diffusion Layer Thickness	L_o	cm			0.0068	0.0075	0.0081	0.0086	0.0092	0.0098	0.0105	0.0110	0.0114	0.0115	0.0114	0.0113	0.0112	0.0111	0.0109
Transport/Utilization Ratio	K^*_o	none			1.37E-01	1.24E-01	1.15E-01	1.08E-01	1.43E-01	1.58E-01	1.74E-01	2.34E-01	2.70E-01	3.00E-01	3.30E-01	3.54E-01	3.76E-01	3.91E-01	4.07E-01
Concentration	S_o	mg/cm^3		8.00E-03	2.37E-03	7.91E-04	2.91E-04	1.18E-04	5.45E-05	2.96E-05	1.90E-05	1.42E-05	1.17E-05	1.04E-05	9.67E-06	9.28E-06	9.06E-06	8.94E-06	8.88E-06
Concentration	S_o	mg/l	8.00	8.0000	2.3697	0.7911	0.2909	0.1176	0.0545	0.0296	0.0190	0.0142	0.0117	0.0104	0.0097	0.0093	0.0091	0.0089	0.0089
Dimensionless Concentration	S^*_o	none			11.848	3.956	1.455	0.588	0.272	0.148	0.095	0.071	0.059	0.052	0.048	0.046	0.045	0.045	0.044
Steady-State Flux	Jss_o	$mg/cm^2/d$			0.7642	0.2439	0.0850	0.0321	0.0127	0.0055	0.0025	0.0013	0.0007	0.0004	0.0002	0.0001	0.0001	0.0000	0.0000
Dimensionless Flux	Jss^*_o	none			1.345	0.429	0.150	0.056	0.032	0.016	0.009	0.006	0.004	0.002	0.001	0.001	0.000	0.000	0.000
Dimensionless Boundary Concentration	Ss^*_o	none			2.004	0.493	0.158	0.066	0.051	0.046	0.045	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Boundary Concentration	Ss_o	mg/l		0.00000	0.40088	0.09855	0.03156	0.01326	0.01026	0.00921	0.00894	0.00888	0.00884	0.00883	0.00882	0.00882	0.00882	0.00882	0.00882
Deep Biofilm Ratio	f_o	none			1.0000	1.0000	0.9964	0.8704	0.6279	0.3561	0.1990	0.1414	0.0887	0.0541	0.0323	0.0185	0.0103	0.0056	0.0030
Specific Biomass Concentration	X_fL_{fo}	mg/cm^2			1.4202	0.4533	0.1580	0.0596	0.0237	0.0102	0.0047	0.0023	0.0012	0.0007	0.0004	0.0002	0.0001	0.0001	0.0000
Biofilm Thickness	L_{fo}	cm			0.02367	0.00756	0.00263	0.00099	0.00039	0.00017	0.00008	0.00004	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000
Nitrate																			
Maximum Specific Utilization for Increment	qmaxninc	mg/mg/d			4.3824	4.2976	3.9916	3.0506	1.7928	1.1480	0.7630	0.5108	0.3659	0.2819	0.2370	0.2056	0.1843	0.1699	0.1611
Diffusion Layer Thickness	L_n	cm			0.0353	0.0158	0.0101	0.0085	0.0082	0.0085	0.0089	0.0093	0.0096	0.0097	0.0096	0.0095	0.0094	0.0093	0.0092
Transport/Utilization Ratio	K^*_n	none			7.67E-03	1.72E-02	2.69E-02	3.20E-02	5.20E-02	6.29E-02	7.31E-02	8.55E-02	9.82E-02	1.10E-01	1.22E-01	1.33E-01	1.42E-01	1.49E-01	1.56E-01
Concentration	S_n	mg/cm^3		1.00E-02	7.58E-03	4.73E-03	2.58E-03	1.34E-03	7.27E-04	4.16E-04	2.51E-04	1.59E-04	1.04E-04	6.84E-05	4.49E-05	2.91E-05	1.88E-05	1.20E-05	7.61E-06
Concentration	S_n	mg/l	10.00	10.0000	7.5799	4.7350	2.5810	1.3410	0.7272	0.4158	0.2514	0.1593	0.1039	0.0684	0.0449	0.0291	0.0188	0.0120	0.0076
Dimensionless Concentration	S^*_n	none			757.986	473.497	258.101	134.102	72.716	41.576	25.141	15.929	10.385	6.838	4.485	2.913	1.877	1.203	0.761
Steady-State Flux	Jss_n	$mg/cm^2/d$			0.3285	0.4396	0.3661	0.2295	0.1240	0.0688	0.0396	0.0238	0.0150	0.0097	0.0064	0.0042	0.0027	0.0018	0.0011
Dimensionless Flux	Jss^*_n	none			5.666	7.583	6.316	3.959	3.375	2.337	1.644	1.213	0.903	0.663	0.480	0.337	0.231	0.155	0.102
Dimensionless Boundary Concentration	Ss^*_n	none			19.053	32.257	23.131	10.258	7.878	4.420	2.646	1.746	1.192	0.818	0.560	0.375	0.249	0.163	0.107
Boundary Concentration	Ss_n	mg/l		0.00000	0.19053	0.32257	0.23131	0.10258	0.07878	0.04420	0.02646	0.01746	0.01192	0.00818	0.00560	0.00375	0.00249	0.00163	0.00107
Deep Biofilm Ratio	f_n	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9996	0.9969	0.9807
Specific Biomass Concentration	X_fL_{fn}	mg/cm^2			1.7442	2.3342	1.9442	1.2186	0.6582	0.3656	0.2104	0.1265	0.0796	0.0516	0.0339	0.0222	0.0144	0.0093	0.0060
Biofilm Thickness	L_{fn}	cm			0.02907	0.03890	0.03240	0.02031	0.01097	0.00609	0.00351	0.00211	0.00133	0.00086	0.00057	0.00037	0.00024	0.00015	0.00010
Perchlorate																			
Maximum Specific Utilization for Increment	qmaxpinc	mg/mg/d			19.4452	18.9697	16.9242	6.8191	0.0496	0.0098	0.0219	0.0585	0.4560	0.6895	0.7893	0.7886	0.7614	0.7295	0.7046
Diffusion Layer Thickness	L_p	cm			0.0716	0.0643	0.0505	0.0338	0.0218	0.0160	0.0132	0.0119	0.0112	0.0107	0.0103	0.0099	0.0096	0.0094	0.0092
Transport/Utilization Ratio	K^*_p	none			1.77E-03	1.97E-03	2.50E-03	5.93E-03	1.16E-01	3.55E-01	2.88E-01	1.80E-01	1.00E-01	6.23E-02	6.25E-02	6.43E-02	6.73E-02	7.00E-02	7.31E-02
Concentration	S_p	mg/cm^3		4.00E-04	3.46E-04	3.00E-04	2.55E-04	2.05E-04	1.59E-04	1.27E-04	9.63E-05	6.89E-05	4.75E-05	3.20E-05	2.11E-05	1.37E-05	8.80E-06	5.64E-06	3.60E-06
Concentration	S_p	mg/l	0.40	0.4000	0.3460	0.3002	0.2551	0.2055	0.1591	0.1272	0.0963	0.0689	0.0475	0.0320	0.0211	0.0137	0.0088	0.0056	0.0036
Dimensionless Concentration	S^*_p	none			34.599	30.019	25.514	20.550	15.911	12.724	9.634	6.894	4.752	3.197	2.114	1.372	0.880	0.564	0.360
Steady-State Flux	Jss_p	$mg/cm^2/d$			0.0073	0.0071	0.0077	0.0092	0.0094	0.0070	0.0074	0.0071	0.0058	0.0043	0.0029	0.0020	0.0013	0.0008	0.0005
Dimensionless Flux	Jss^*_p	none			0.061	0.059	0.064	0.121	1.557	2.632	1.864	0.997	0.427	0.187	0.124	0.083	0.055	0.036	0.023
Dimensionless Boundary Concentration	Ss^*_p	none			0.070	0.068	0.072	0.127	2.451	5.306	3.163	1.352	0.490	0.199	0.130	0.089	0.065	0.053	0.048
Boundary Concentration	Ss_p	mg/l		0.00000	0.00070	0.00068	0.00072	0.00127	0.02451	0.05306	0.03163	0.01352	0.00490	0.00199	0.00130	0.00089	0.00065	0.00053	0.00048
Deep Biofilm Ratio	f_p	none			0.8940	0.8836	0.9060	0.9905	1.0000	1.0000	1.0000	1.0000	1.0000	0.9988	0.9915	0.9584	0.8609	0.6831	0.4835
Specific Biomass Concentration	X_fL_{fp}	mg/cm^2			0.0088	0.0085	0.0092	0.0110	0.0112	0.0084	0.0089	0.0085	0.0069	0.0051	0.0035	0.0024	0.0015	0.0010	0.0006
Biofilm Thickness	L_{fp}	cm			0.00015	0.00014	0.00015	0.00018	0.00019	0.00014	0.00015	0.00014	0.00012	0.00008	0.00006	0.00004	0.00003	0.00002	0.00001

TABLE 10
BIOFILM MODEL OUTPUT TABLE
BPOU BIOREACTOR WITH 0% RECYCLE - WORST CASE

				Bed Height (ft)															
Parameter	**Symbol**	**Units**	**GW**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Ethanol																			
Diffusion Layer Thickness	L_e	cm			0.0055	0.0061	0.0065	0.0070	0.0074	0.0080	0.0085	0.0089	0.0092	0.0093	0.0093	0.0092	0.0090	0.0090	0.0088
Transport/Utilization Ratio	K^*_e	none			0.1443	0.1309	0.1219	0.1143	0.1071	0.1001	0.0938	0.0889	0.0861	0.0852	0.0858	0.0870	0.0880	0.0886	0.0903
Concentration	S_e	mg/cm^3		2.97E-02	1.92E-02	1.14E-02	6.16E-03	3.21E-03	1.76E-03	1.03E-03	6.34E-04	4.08E-04	2.70E-04	1.80E-04	1.21E-04	8.13E-05	5.51E-05	3.82E-05	2.71E-05
Concentration	S_e	mg/l	29.75	29.7481	19.2360	11.4426	6.1637	3.2145	1.7624	1.0274	0.6335	0.4079	0.2697	0.1804	0.1210	0.0813	0.0551	0.0382	0.0271
Dimensionless Concentration	S^*_e	none			76.944	45.770	24.655	12.858	7.050	4.109	2.534	1.632	1.079	0.721	0.484	0.325	0.220	0.153	0.108
Steady-State Flux	Jss_e	$mg/cm^2/d$			1.427	1.204	0.897	0.546	0.293	0.163	0.095	0.058	0.037	0.024	0.016	0.011	0.007	0.004	0.003
Dimensionless Flux	Jss^*_e	none			3.245	2.739	2.041	1.241	0.667	0.370	0.216	0.133	0.085	0.056	0.037	0.024	0.016	0.010	0.006
Dimensionless Boundary Concentration	Ss^*_e	none			54.455	24.849	7.910	2.001	0.823	0.416	0.232	0.139	0.091	0.068	0.056	0.048	0.044	0.044	0.044
Boundary Concentration	Ss_e	mg/l		0.00000	13.61364	6.21236	1.97739	0.50029	0.20567	0.10410	0.05793	0.03469	0.02281	0.01699	0.01409	0.01210	0.01078	0.00991	0.00937
Oxygen Layer Concentration	Seo	mg/l		0.00000	13.61364	6.21236	1.97739	0.50029	0.20567	0.10410	0.05793	0.03469	0.02281	0.01699	0.01409	0.01210	0.01078	0.00991	0.00937
Nitrate Layer Concentration	Sen	mg/l		0.00000	12.94719	6.02055	1.91726	0.46949	0.16812	0.08664	0.05155	0.03233	0.02235	0.01685	0.01405	0.01208	0.01078	0.00990	0.00937
Perchlorate Layer Concentration	Sep	mg/l		0.00000	12.17318	5.12271	1.31125	0.12812	0.00062	0.00012	0.00029	0.00073	0.00593	0.00898	0.01040	0.01037	0.01000	0.00956	0.00922
Wall Concentration	Sw_e	mg/l		0.00000	12.27226	5.23385	1.37859	0.15119	0.00121	0.00026	0.00047	0.00095	0.00634	0.00920	0.01050	0.01042	0.01002	0.00957	0.00923
Deep Biofilm Ratio	f_e	none			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9995	0.9935	0.9629	0.8826	0.7521	0.5104	0.0000	0.0000	0.0000
Specific Biomass Concentration	X_fL_{fe}	mg/cm^2			2.9351	2.4773	1.8460	1.1229	0.6032	0.3343	0.1953	0.1201	0.0769	0.0503	0.0332	0.0218	0.0141	0.0091	0.0058
Biofilm Thickness	L_{fe}	cm			0.04892	0.04129	0.03077	0.01871	0.01005	0.00557	0.00326	0.00200	0.00128	0.00084	0.00055	0.00036	0.00024	0.00015	0.00010
Soluble Microbial Products																			
Utilization Associated Products	UAPinc	mgCOD/l		0.000	0.910	0.727	0.530	0.319	0.165	0.086	0.047	0.027	0.017	0.011	0.007	0.005	0.003	0.002	0.001
Utilization Associated Products	UAP	mgCOD/l		0.000	0.910	1.637	2.168	2.487	2.652	2.738	2.785	2.811	2.828	2.839	2.846	2.850	2.854	2.856	2.857
Biomass Associated Products	BAPinc	mgCOD/l		0.000	1.899	1.417	0.965	0.542	0.268	0.136	0.073	0.042	0.026	0.017	0.011	0.007	0.005	0.003	0.002
Biomass Associated Products	BAP	mgCOD/l		0.000	1.899	3.316	4.281	4.823	5.091	5.227	5.299	5.341	5.367	5.383	5.394	5.402	5.407	5.410	5.412
Soluble Microbial Products	SMP	mgCOD/l		0.000	2.809	4.953	6.448	7.310	7.743	7.965	8.084	8.153	8.195	8.222	8.240	8.252	8.260	8.265	8.269
Bulk Inactive Biomass Density	XfiLfainc	mgVSS/l		0.0	6428.0	4765.6	3228.0	1803.4	888.0	449.5	240.8	138.0	84.5	54.6	36.3	24.3	16.0	10.4	6.8
Bulk Inactive Biomass Density	XfiLfa	mgVSS/l		0	6428	11194	14422	16225	17113	17562	17803	17941	18026	18080	18117	18141	18157	18167	18174
Bulk Total Biomass Density	XfvLfainc	mgVSS/l		0	55101	40851	27670	15459	7612	3853	2064	1183	724	468	311	208	137	89	58
Bulk Total Biomass Density	XfvLfa	mgVSS/l		0	55101	95952	123623	139082	146693	150546	152610	153793	154518	154986	155297	155505	155642	155731	155789
Active Biomass Density	Xfainc	mgVSS/l		0.0000	4.5909	3.4036	2.3054	1.2880	0.6342	0.3210	0.1720	0.0985	0.0604	0.0390	0.0259	0.0173	0.0114	0.0074	0.0048
Active Biomass Density	Xfa	mgVSS/l		0.00	4.59	7.99	10.30	11.59	12.22	12.54	12.72	12.81	12.87	12.91	12.94	12.96	12.97	12.98	12.98
Inactive Biomass Density	Xfiinc	mgVSS/l		0.00000	0.60630	0.44950	0.30447	0.17010	0.08375	0.04239	0.02271	0.01301	0.00797	0.00515	0.00343	0.00229	0.00151	0.00098	0.00064
Inactive Biomass Density	Xfi	mgVSS/l		0.00	0.61	1.06	1.36	1.53	1.61	1.66	1.68	1.69	1.70	1.71	1.71	1.71	1.71	1.71	1.71
Total Biomass Density	Xfv	mgVSS/l		0.00	5.20	9.05	11.66	13.12	13.84	14.20	14.39	14.51	14.57	14.62	14.65	14.67	14.68	14.69	14.69
Dissolved Organic Carbon	DOC	mg/l		15.53	11.09	7.82	5.62	4.40	3.81	3.51	3.35	3.25	3.20	3.16	3.14	3.12	3.11	3.10	3.10
Total Organic Carbon	TOC	mg/l		15.53	13.85	12.63	11.81	11.37	11.16	11.05	10.99	10.96	10.94	10.92	10.91	10.91	10.91	10.90	10.90
Soluble COD	CODs	mg/l		62.17	43.01	28.87	19.33	14.03	11.43	10.11	9.41	9.01	8.76	8.60	8.49	8.42	8.38	8.35	8.33
Total COD	CODt	mg/l		62.17	50.39	41.72	35.89	32.66	31.07	30.28	29.85	29.60	29.45	29.36	29.29	29.25	29.22	29.20	29.19
Ultimate BOD	BODL	mg/l		62.17	48.23	37.95	31.03	27.19	25.31	24.36	23.85	23.56	23.38	23.27	23.19	23.14	23.11	23.08	23.07
Soluble BOD5	BOD5s	mg/l		42.49	27.86	17.03	9.70	5.61	3.60	2.58	2.03	1.72	1.53	1.40	1.32	1.27	1.23	1.21	1.19
Total BOD5	BOD5t	mg/l		42.49	30.49	21.61	15.60	12.24	10.59	9.76	9.31	9.05	8.90	8.79	8.73	8.68	8.65	8.63	8.62

Table 11 - Primary Maximum Contaminant Levels

Contaminant	Primary MCL	Nov. 8, 2000 Raw Water*	MDL	Nov. 8, 2000 Treated Water*	MDL	Nov. 28, 2000 Treated Water*	MDL	Dec. 12, 2000 Treated Water*	MDL
Inorganic Chemicals									
Aluminum	1	ND	0.0013	0.0452	0.0013	ND	0.05	ND	0.05
Antimony	0.006	ND	0.0000707	0.000354	0.0000707	ND	0.05	ND	0.05
Arsenic	0.05	0.000793	0.000105	0.000713	0.000105	ND	0.05	ND	0.05
Asbestos (MFL = million fibers per liter)	7 MFL	ND	0.2	ND	0.2	ND	0.021	ND	0.2
Barium	1	0.102	0.00024	0.101	0.00024	0.116	0.05	0.108	0.05
Beryllium	0.004	ND	0.0000395	ND	0.0000395	ND	0.005	ND	0.005
Cadmium	0.005	ND	0.0000264	ND	0.0000264	ND	0.005	ND	0.005
Chromium	0.05	0.00127	0.0000648	0.000766	0.0000648	ND	0.005	ND	0.005
Cyanide (total)	0.2	ND	0.002	ND	0.002	ND	0.002	ND	0.002
Fluoride	2	ND	0.084	ND	0.084	ND	0.43	0.101	0.043
Mercury	0.002	ND	0.000161	ND	0.000161	ND	0.000161	ND	0.000017
Nickel	0.1	0.000885	0.000115	0.000433	0.000115	ND	0.02	ND	0.02
Nitrate (as NO_3)	45	6.86	0.89	ND	0.89	0.769	0.2	0.443	0.02
Nitrate + Nitrite (sum as nitrogen)	10	1.55	0.391	ND	0.391	0.174	0.088	0.1	0.0088
Nitrite (as nitrogen)	1	ND	0.189	ND	0.189	ND	0.043	ND	0.014
Selenium	0.05	ND	0.000659	ND	0.000659	ND	0.05	ND	0.05
Thallium	0.002	ND	0.0000776	ND	0.0000776	ND	0.05	ND	0.05
Radioactivity									
Gross alpha particle activity (pCi/L=picocuries/liter)	15 pCi/L	-0.505+/-0.91	1.95	0.45+/-0.89	1.55	0.238+/-0.83	1.54	0.79+/-1.1	1.75
Gross beta particle activity	50 pCi/L	1.77+/-1.5	2.43	2.52+/-1.5	2.37	2.23+/-1.5	2.39	2.38+/-1.3	2.04
Combined Radium-226 and Radium-228	5 pCi/L	-0.098+/-0.91	2.14	0.474+/-1.14	2.19	NA		-0.07+/-0.66	1.72
Strontium-90	8 pCi/L	-0.022+/-0.10	0.14	0.033+/-0.097	0.132	-0.112+/-0.26	0.366	-0.1+/-0.18	0.242
Tritium	20,000 pCi/L	42.0+/-110	184	2.06+/-110	190	245+/-180	288	-19.2+/-130	229
Uranium	20 pCi/L	0.378+/-0.056	0.067	0.419+/-0.060	0.067	0.226+/-0.038	0.063	0.21+/-0.07	0.148
Total Trihalomethanes									
Sum of bromodichloromethane, dibromochloromethane, bromoform, and chloroform	0.1	0.075	0.004	0.0031	0.004	0.0024	0.00029	0.002	0.00029
Volatile Organic Chemicals (VOCs)									
Benzene	0.001	ND	0.0025	ND	0.00005	ND	0.00005	ND	0.00005
Carbon tetrachloride	0.0005	ND	0.003	ND	0.00006	ND	0.00006	ND	0.00006
1,2-Dichlorobenzene	0.6	ND	0.0055	ND	0.00011	ND	0.00011	ND	0.00011
1,4-Dichlorobenzene	0.005	ND	0.0055	ND	0.00011	ND	0.00011	ND	0.00011
1,1-Dichloroethane	0.005	ND	0.002	0.0000585	0.00004	0.000044	0.00004	ND	0.00004
1,2-Dichloroethane	0.0005	ND	0.004	ND	0.00008	ND	0.00008	ND	0.00008
1,1-Dichloroethene	0.006	0.00927	0.003	ND	0.00006	ND	0.00006	ND	0.00006
cis-1,2-Dichloroethene	0.006	0.0157	0.0045	ND	0.00009	ND	0.00009	ND	0.00009
trans-1,2-Dichloroethene	0.01	ND	0.0045	ND	0.00009	ND	0.00009	ND	0.00009
Methylene chloride	0.005	ND	0.003	0.0000687	0.00006	0.000474	0.00006	0.000814	0.00006
1,2-Dichloropropane	0.005	ND	0.0035	ND	0.00007	ND	0.00007	ND	0.00007
1,3-Dichloropropene	0.0005	ND	0.0075	ND	0.00015	ND	0.00015	ND	0.00015
Ethylbenzene	0.7	ND	0.005	ND	0.0001	ND	0.0001	ND	0.0001
Chlorobenzene	0.07	ND	0.0035	ND	0.00007	ND	0.00007	ND	0.00007
Methyl tert-Butyl Ether	0.013	ND	0.004	ND	0.00008	ND	0.00008	ND	0.00008
Styrene	0.1	ND	0.0045	ND	0.00009	ND	0.00009	ND	0.00009
1,1,2,2-Tetrachloroethane	0.001	ND	0.0085	ND	0.00017	ND	0.00017	ND	0.00017
Tetrachloroethene	0.005	ND	0.004	ND	0.00008	ND	0.00008	ND	0.00008
Toluene	0.15	ND	0.0035	ND	0.00007	ND	0.00007	ND	0.00007
1,2,4-Trichlorobenzene	0.07	ND	0.005	ND	0.0001	ND	0.0001	ND	0.0001
1,1,1-Trichloroethane	0.2	ND	0.0025	ND	0.00005	ND	0.00005	ND	0.00005
1,1,2-Trichloroethane	0.005	ND	0.004	ND	0.00008	ND	0.00008	ND	0.00008
Trichloroethene	0.005	1.37	0.003	ND	0.00006	ND	0.00006	ND	0.00006
Trichlorofluoromethane	0.15	ND	0.0035	ND	0.00007	ND	0.00007	ND	0.00007
Freon 113	1.2	ND	0.0025	ND	0.00005	ND	0.00005	ND	0.00005
Vinyl chloride	0.0005	ND	0.003	ND	0.00006	ND	0.00006	ND	0.00006
o-Xylene	1.75	ND	0.0035	ND	0.00007	ND	0.00007	ND	0.00007

All values are in milligrams per liter (mg/L), unless otherwise noted.
NA = Not Analyzed
ND = Not Detected

* Raw Water samples taken from Sample Port 1 (groundwater)
Treated Water samples taken from Sample Port 22 (post disinfection)

Table 11 (Continued) - Primary Maximum Contaminant Levels

Contaminant	Primary MCL	Nov. 8, 2000 Raw Water*	MDL	Nov. 8, 2000 Treated Water*	MDL	Nov. 28, 2000 Treated Water*	MDL	Dec. 12, 2000 Treated Water*	MDL
Non-Volatile Synthetic Organic Chemicals (SOCs)									
Alachlor	0.002	ND	0.00005	ND	0.00005	ND	0.00005	ND	0.00005
Atrazine	0.003	ND	0.00005	ND	0.00005	ND	0.00005	ND	0.00005
Bentazon	0.018	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005
Benzo(a)pyrene	0.0002	ND	0.00002	ND	0.00002	ND	0.00002	ND	0.00002
Carbofuran (Furadan)	0.018	ND	0.0009	ND	0.0009	ND	0.0009	ND	0.0009
Chlordane	0.0001	ND	0.0001	ND	0.0001	ND	0.0001	NA	
2,4-D	0.07	ND	0.0001	ND	0.0001	ND	0.0001	ND	0.0001
Dalapon (qualitative)	0.2	ND	0.001	ND	0.001	ND	0.001	ND	0.001
1,2-Dibromo-3-chloropropane	0.0002	ND	0.0145	ND	0.00029	ND	0.00029	ND	0.00029
Di-(2-ethylhexyl)adipate	0.4	ND	0.0006	ND	0.0006	ND	0.0006	ND	0.0006
Di(2-ethylhexyl)phthalate	0.004	ND	0.0006	ND	0.0006	ND	0.0006	ND	0.0006
Dinoseb	0.007	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002
Diquat	0.02	ND	0.0004	ND	0.0004	ND	0.0004	ND	0.0004
Endrin	0.002	ND	0.00001	ND	0.00001	ND	0.00001	NA	
Endothall	0.1	ND	0.02	ND	0.02	ND	0.02	ND	0.02
Ethylene dibromide (EDB)	0.00005	ND	0.00001	ND	0.00001	ND	0.00001	ND	0.00001
Glyphosate	0.7	ND	0.006	ND	0.006	ND	0.006	ND	0.006
Heptachlor	0.00001	ND	0.00001	ND	0.00001	ND	0.00001	NA	
Heptachlor epoxide	0.00001	ND	0.00001	ND	0.00001	ND	0.00001	NA	
Hexachlorobenzene	0.001	ND	0.00005	ND	0.00005	ND	0.00005	ND	0.00005
Hexachlorocyclopentadiene	0.05	ND	0.00005	ND	0.00005	ND	0.00005	ND	0.00005
Lindane (gamma-BHC)	0.0002	ND	0.00001	ND	0.00001	ND	0.00001	NA	
Methoxychlor	0.04	ND	0.00005	ND	0.00005	ND	0.00005	NA	
Molinate	0.02	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002
Oxamyl (Vydate)	0.2	ND	0.002	ND	0.002	ND	0.002	ND	0.002
Pentachlorophenol	0.001	ND	0.00004	ND	0.00004	ND	0.00004	ND	0.00004
Picloram	0.5	ND	0.0001	ND	0.0001	ND	0.0001	ND	0.0001
Polychlorinated biphenyls (PCBs)	0.0005	ND	0.00067	ND	0.00067	ND	0.00067	NA	
Simazine	0.004	ND	0.00005	ND	0.00005	ND	0.00005	ND	0.00005
2,4,5-TP (Silvex)	0.05	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002
2,3,7,8-TCDD (Dioxin)	3E-08	ND	5E-09	ND	5E-09	ND	5E-09	ND	5E-09
Thiobencarb	0.07	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002
Toxaphene	0.003	ND	0.0005	ND	0.0005	ND	0.0005	NA	
Lead and Copper Action Levels									
Copper	1.3	0.00346	0.0000738	0.000464	0.0000738	ND	0.005	ND	0.005
Lead	0.015	ND	0.000339	ND	0.000339	ND	0.021	ND	0.021
Microbiological									
Total Coliforms (MPN/100 ml)	5%*	ND	2	ND	2	ND	2	ND	2
Fecal Coliforms (MPN/100 ml)	TT	ND	2	ND	2	ND	2	ND	2
Heterotrophic Plate Count (CFU/ml)	500	36	1	ND	1	3	1	ND	1

All values are in milligrams per liter (mg/L), unless otherwise noted.
ND = Not Detected
NA = Not Analyzed
TT = Treatment Technique
* No more than 5% of samples per month coliform-positive

* Raw Water samples taken from Sample Port 1 (groundwater)
Treated Water samples taken from Sample Port 22 (post disinfection)

Table 12 - Secondary Maximum Contaminant Levels

Chemical or Characteristic	Secondary MCL	Nov. 8, 2000 Raw Water*	MDL	Nov. 8, 2000 Treated Water*	MDL	Nov. 28, 2000 Treated Water*	MDL	Dec. 12, 2000 Treated Water*	MDL
Aluminum	0.2	ND	0.0013	0.0452	0.0013	ND	0.05	ND	0.05
Color	15 units	ND	3	ND	3	ND	3	ND	3
Copper	1	0.00346	0.0000738	0.000464	0.0000738	ND	0.005	ND	0.005
Corrosivity	Non-corrosive	pH=7.0	0.1	pH=7.0	0.1	pH=6.9	0.1	pH=6.8	0.1
Methylene Blue Active Substances	0.5	0.039	0.037	0.208	0.037	ND	0.037	ND	0.037
Iron	0.3	ND	0.0000267	0.0171	0.0000267	0.0194	0.0024	0.014	0.0024
Manganese	0.05	0.000196	0.000105	ND	0.000105	ND	0.005	ND	0.005
Methyl tert-butyl ether	0.005	ND	4	ND	0.08	ND	0.08	ND	0.00008
Threshold Odor Number	3 units	ND	1	ND	1	ND	1	ND	1
Silver	0.1	ND	0.0000681	0.000164	0.0000681	ND	0.005	ND	0.005
Thiobencarb	0.001	ND	0.2	ND	0.2	ND	0.2	ND	0.0002
Turbidity	5 units	0.15	0.02	0.18	0.02	0.19	0.02	0.16	0.02
Zinc	5	0.00329	0.0000139	0.0032	0.0000139	ND	0.005	ND	0.005
Total Dissolved Solids	500	202	2	226	2	210	10	205	1
Specific Conductance (micromhos)	900	280	-	300	-	290	-	300	-
Chloride	250	8.36	0.177	17.8	0.177	14.7	0.25	11.3	0.25
Sulfate as SO4	250	14.2	0.55	13.7	0.55	16.8	0.21	15.9	0.021

All values are in milligrams per liter (mg/L), unless otherwise noted.
ND = Not Detected
NA = Not Analyzed

* Raw Water samples taken from Sample Port 1 (groundwater)
Treated Water samples taken from Sample Port 22 (post disinfection)

Table 13 - Drinking Water Action Levels

Contaminant	Action Level	Nov. 8, 2000 Raw Water*	MDL	Nov. 8, 2000 Treated Water*	MDL	Nov. 28, 2000 Treated Water*	MDL	Dec. 12, 2000 Treated Water*	MDL
Inorganic Chemicals									
Boron	1	ND	0.05	0.00781	0.00678	ND	0.05	ND	0.05
Perchlorate	0.018	2.7	0.017	ND	0.00043	ND	0.00043	ND	0.00043
Vanadium	0.015	0.00886	0.000286	0.00648	0.000286	ND	0.02	ND	0.02
Chromium VI (Public Health Goal)	0.00025	0.001	0.0007	0.0025	0.0007	ND	0.0007	ND	0.0007
Organic Chemicals									
sec-Butylbenzene	0.26	ND	0.0045	ND	0.00009	ND	0.00009	ND	0.00009
tert-Butylbenzene	0.26	ND	0.005	ND	0.0001	ND	0.0001	ND	0.0001
2-Chlorotoluene	0.14	ND	0.0055	ND	0.00011	ND	0.00011	ND	0.00011
Dichlorodifluoromethane	1	ND	0.0045	ND	0.00009	ND	0.00009	ND	0.00009
1,4-Dioxane	0.003	0.0045	0.003	ND	0.003	ND	0.003	ND	0.003
Isopropylbenzene	0.77	ND	0.005	ND	0.0001	ND	0.0001	ND	0.0001
Methyl isobutyl ketone (MIBK)	0.12	ND	0.0545	ND	0.00109	ND	0.00109	ND	0.00109
N-Nitroso dimethylamine (NDMA)	0.000020	0.000210	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002
Naphthalene	0.17	ND	0.005	ND	0.0001	ND	0.0001	ND	0.0001
n-Propylbenzene	0.26	ND	0.0055	ND	0.00011	ND	0.00011	ND	0.00011
Tertiary butyl alcohol	0.012	ND	0.88	ND	0.0176	ND	0.0176	ND	0.0176
1,2,3-Trichloropropane	0.000005	ND	0.004	ND	0.00008	ND	0.00008	ND	0.00008

All values are in milligrams per liter (mg/L).

ND = Not Detected

NA = Not Analyzed

* Raw Water samples taken from Sample Port 1 (groundwater)

Treated Water samples taken from Sample Port 22 (post disinfection)

Table 14

Aerojet Pilot Treatment Study--
Taste and Odor Evaluation
Flavor Profile Analysis Results

Date Analyzed: 12/16/00
Analysis Temperature: 25 deg C
Reference Water: Sparkletts
Analysts: Michael J. McGuire

Sample ID	Date Sampled	Time Sampled	Odor Charcteristics and Intensities	Flavor Characteristics and Intensities
01121300	12/13/00	Unknown	Sweet solvent 2	NA
02121300	12/13/00	Unknown	Sweet solvent 2	NA
06121300	12/13/00	Unknown	Sulfurous 3; Septic 2	NA
07121300	12/13/00	Unknown	Decaying Vegetation 1	NA
09121300	12/13/00	Unknown	Grassy 2	NA
10121300	12/13/00	Unknown	Decaying Vegetation 1	NA
11121300	12/13/00	Unknown	---	Wet paper 2
16121300	12/13/00	Unknown	---	Sulfurous 1
20121300	12/13/00	Unknown	Cl2 2	Oily Mouthfeel 4
22121300	12/13/00	Unknown	Cl2 2	Oily Mouthfeel 5

Notes: Equipment--8 oz. Disposable plastic cups covered with watch glases
NA--Not Analyzed: Only finished water or otherwise potable water samples are analyzed by "flavor by mouth."

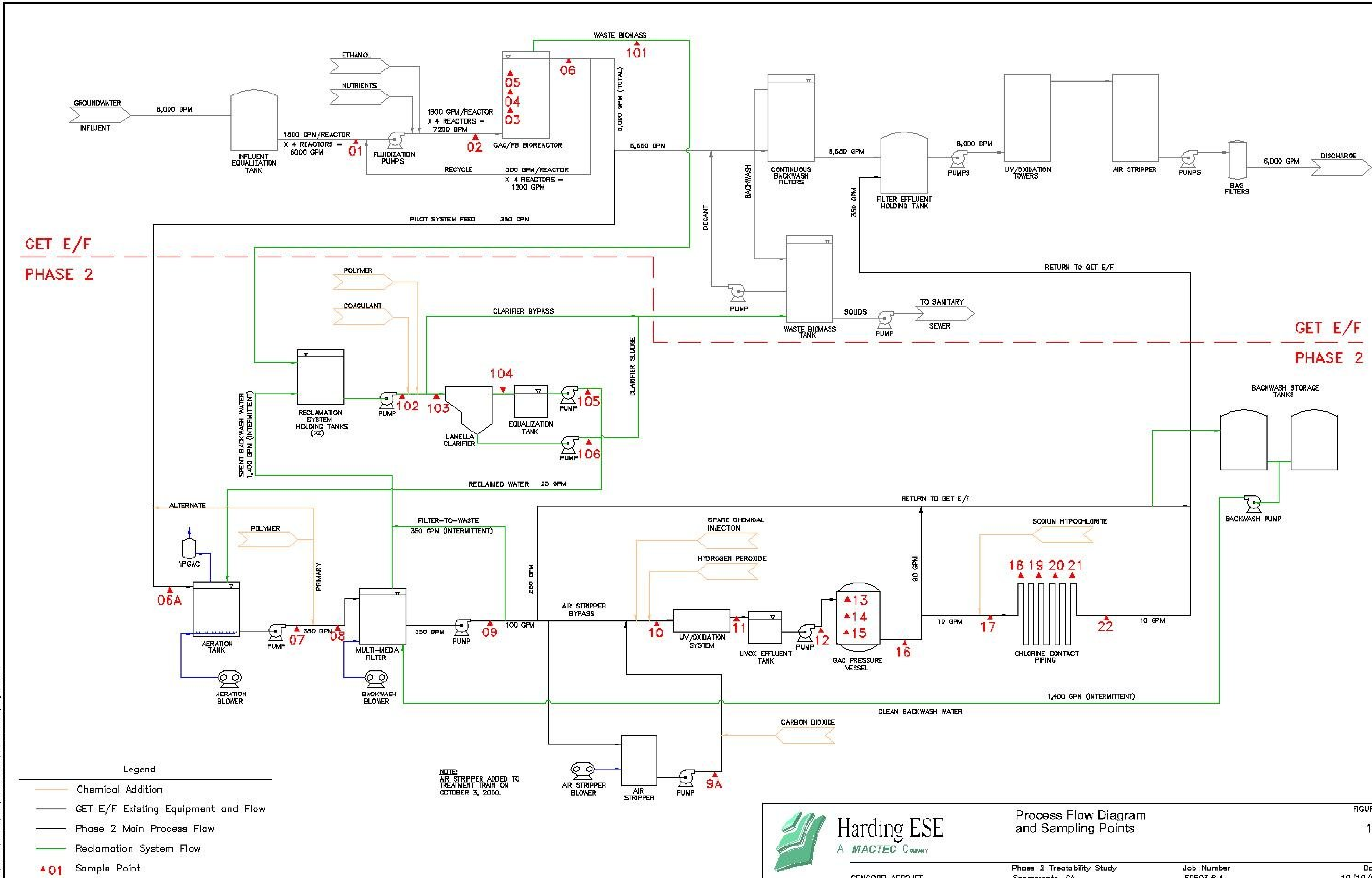
Table 15

Flavor Profile Analysis Intensity Scale

Intensity	Rating
Odor Free	---
Threshold	T
Very Weak	2
Weak	4
	6
Moderate	8
	10
Strong	12

Reference: Standard Methods for the Examination of Water and Wastewater, 20th Edition, APHA, AWWA WEF, 1998.

FIGURES



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Process Flow Diagram
and Sampling Points

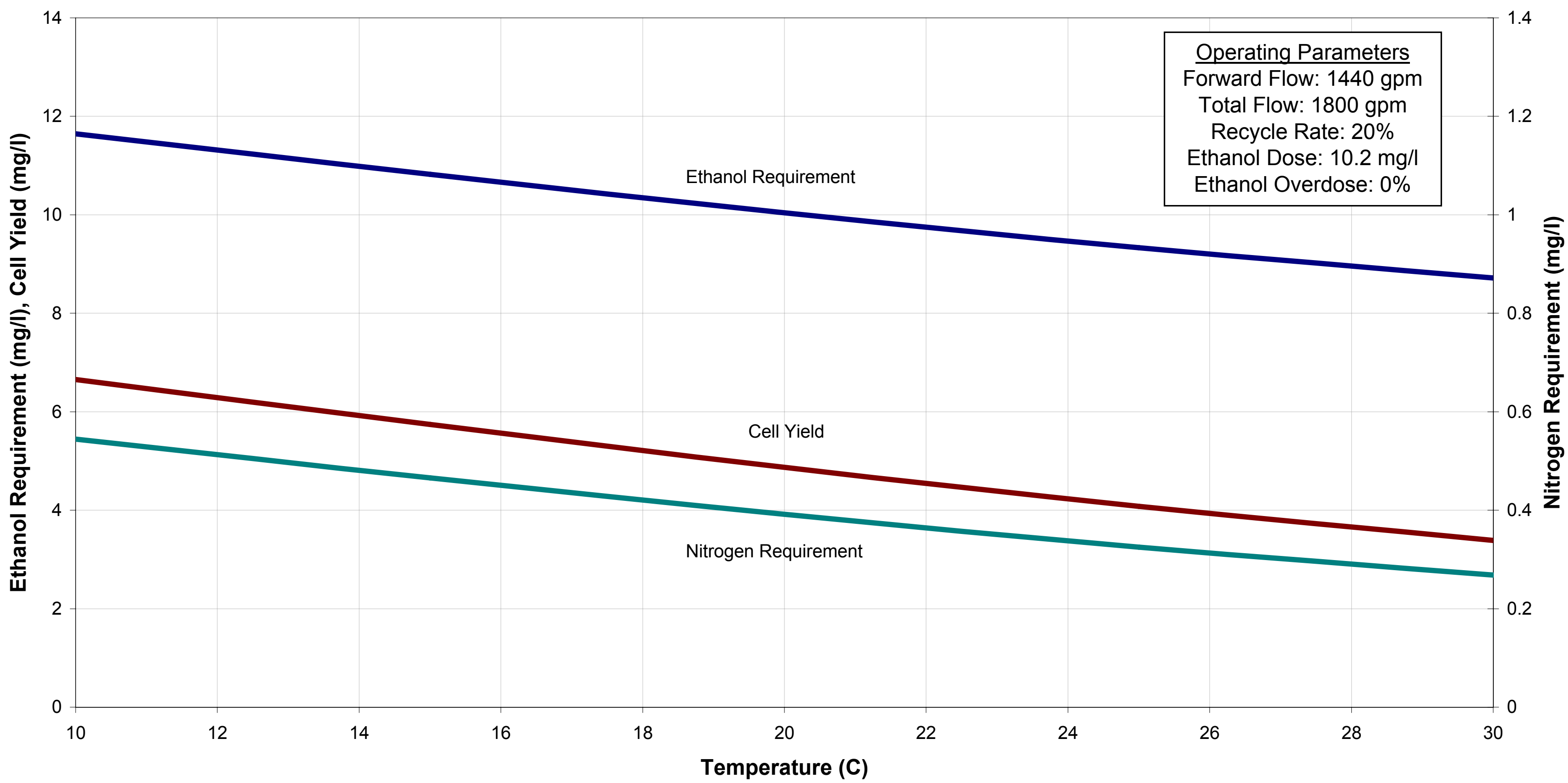
FIGURE 1

GENCORP AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 50503,6.4

Date 10/19/00



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BIOFILM MODEL RESULTS
STOICHIOMETRIC REQUIREMENTS VS. TEMPERATURE
PILOT SCALE BIOREACTOR AT 20% RECYCLE

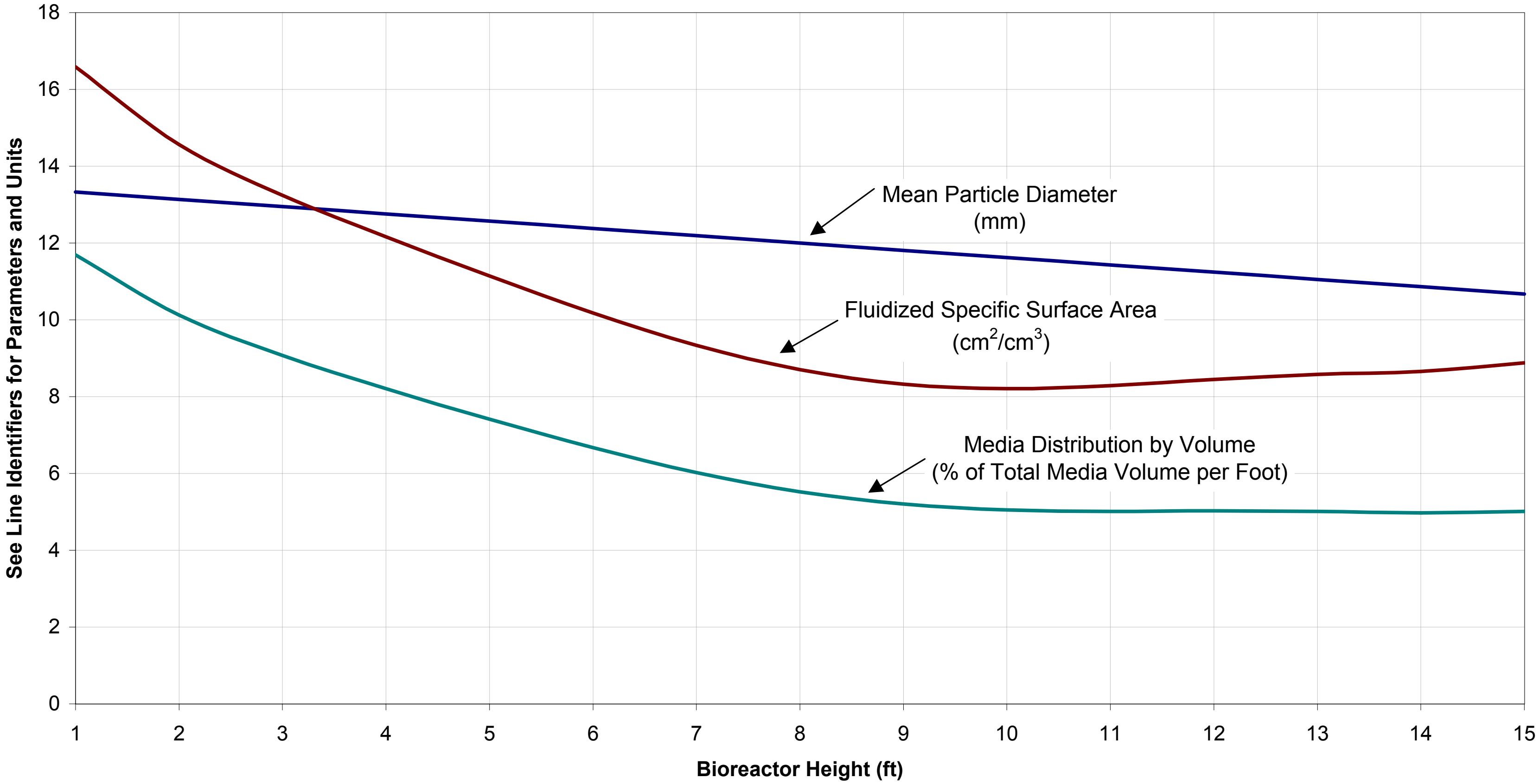
FIGURE
2

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
7/19/01



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BIOFILM MODEL
SPECIFIC SURFACE AREA / FLUIDIZED GAC

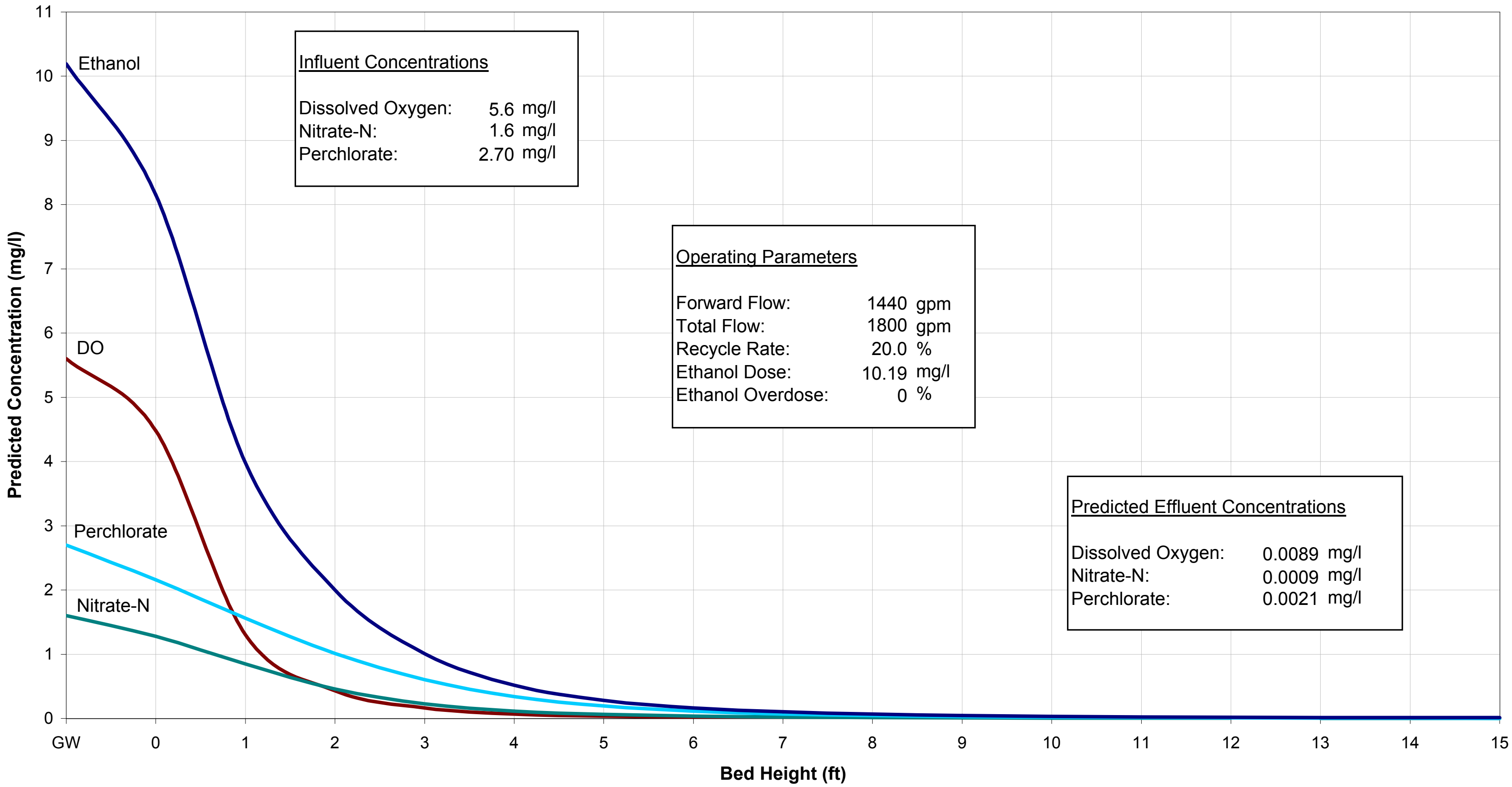
FIGURE
3

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



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Biofilm Model Results
Contaminant Concentration Profiles
Pilot-Scale Bioreactor at 20% Recycle

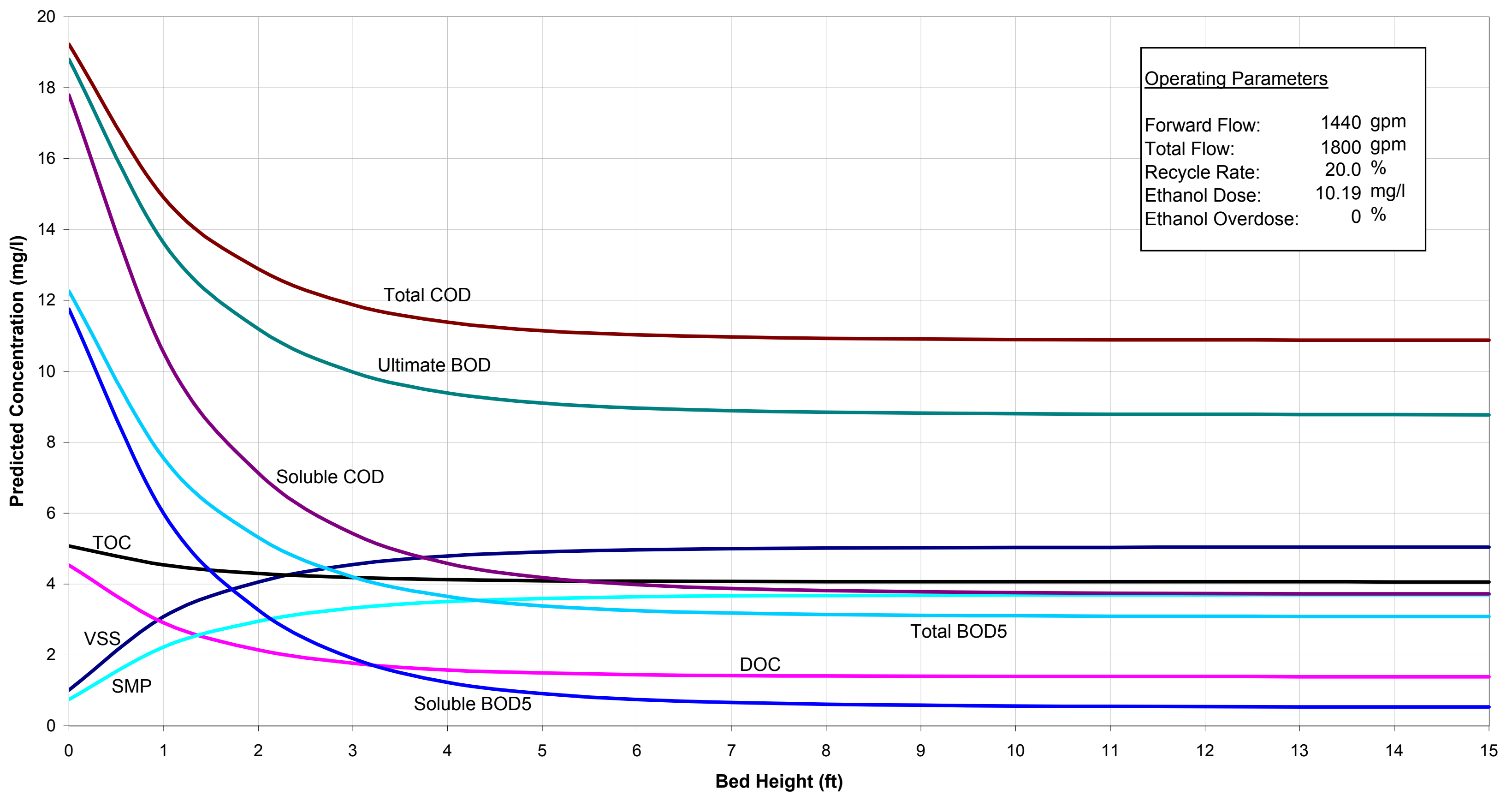
FIGURE
4

Prepared for AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
9/18/01



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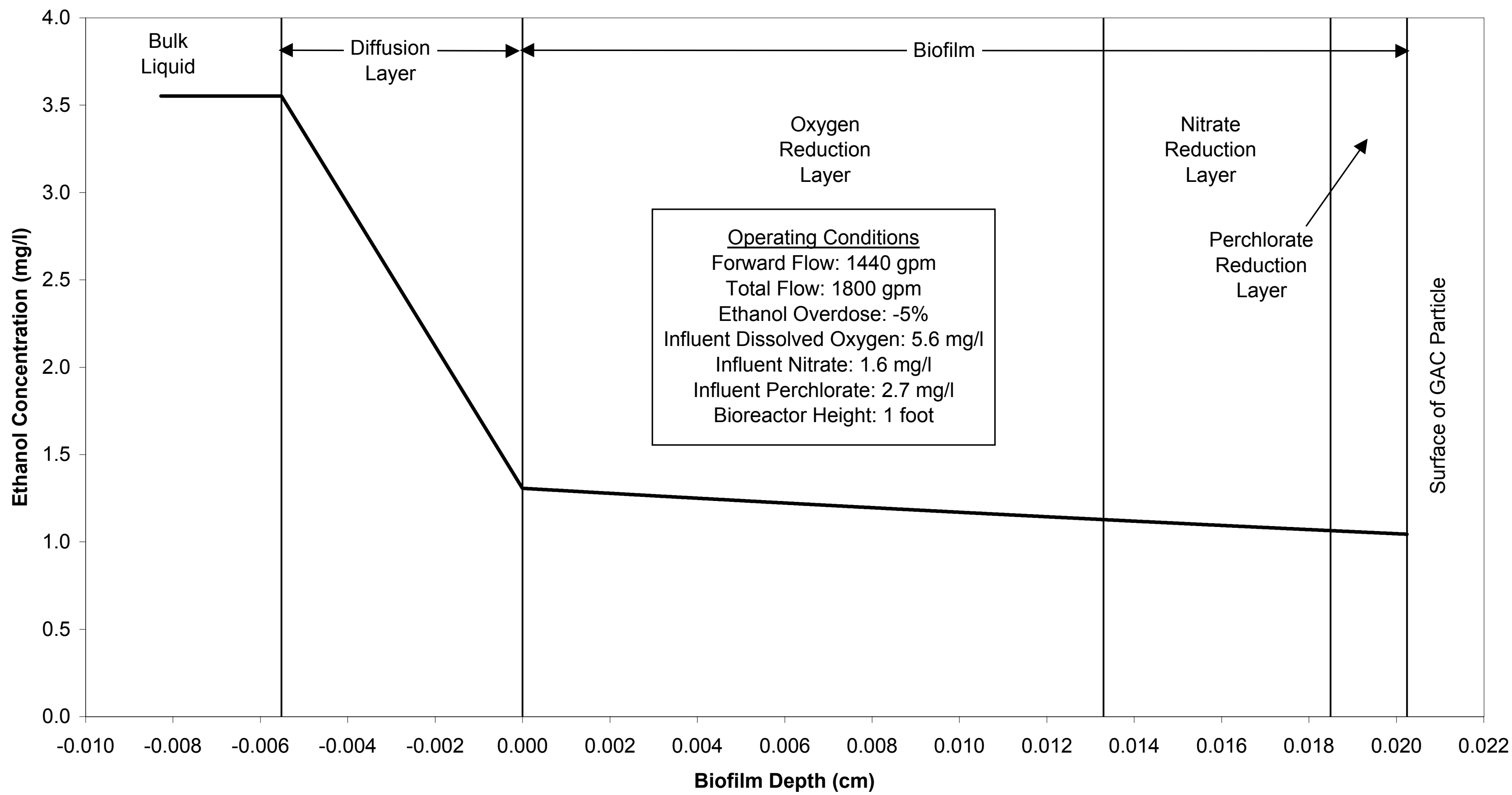
Biofilm Model Results
VSS, COD, TOC, DOC, BOD, SMP
Pilot-Scale Bioreactor at 20% Recycle

FIGURE
5

Prepared for AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	9/18/01



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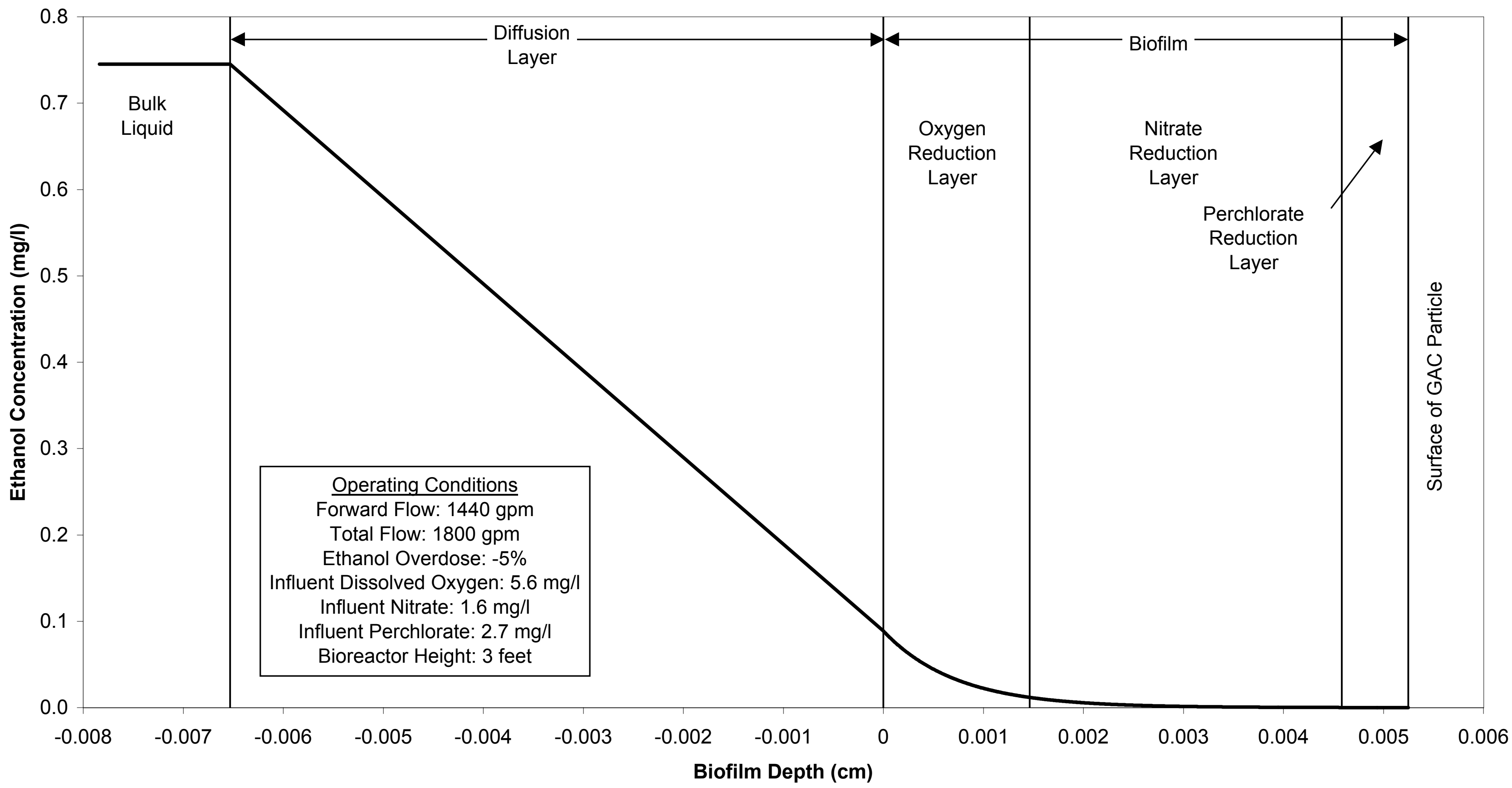
BIOFILM MODEL RESULTS
SHALLOW BIOFILM PROFILE

FIGURE
6

Prepared for: AEROJET

Phase 2 Treatability Study	**Job Number**	**Date**
Sacramento, CA	**52296.4.1**	**4/17/01**



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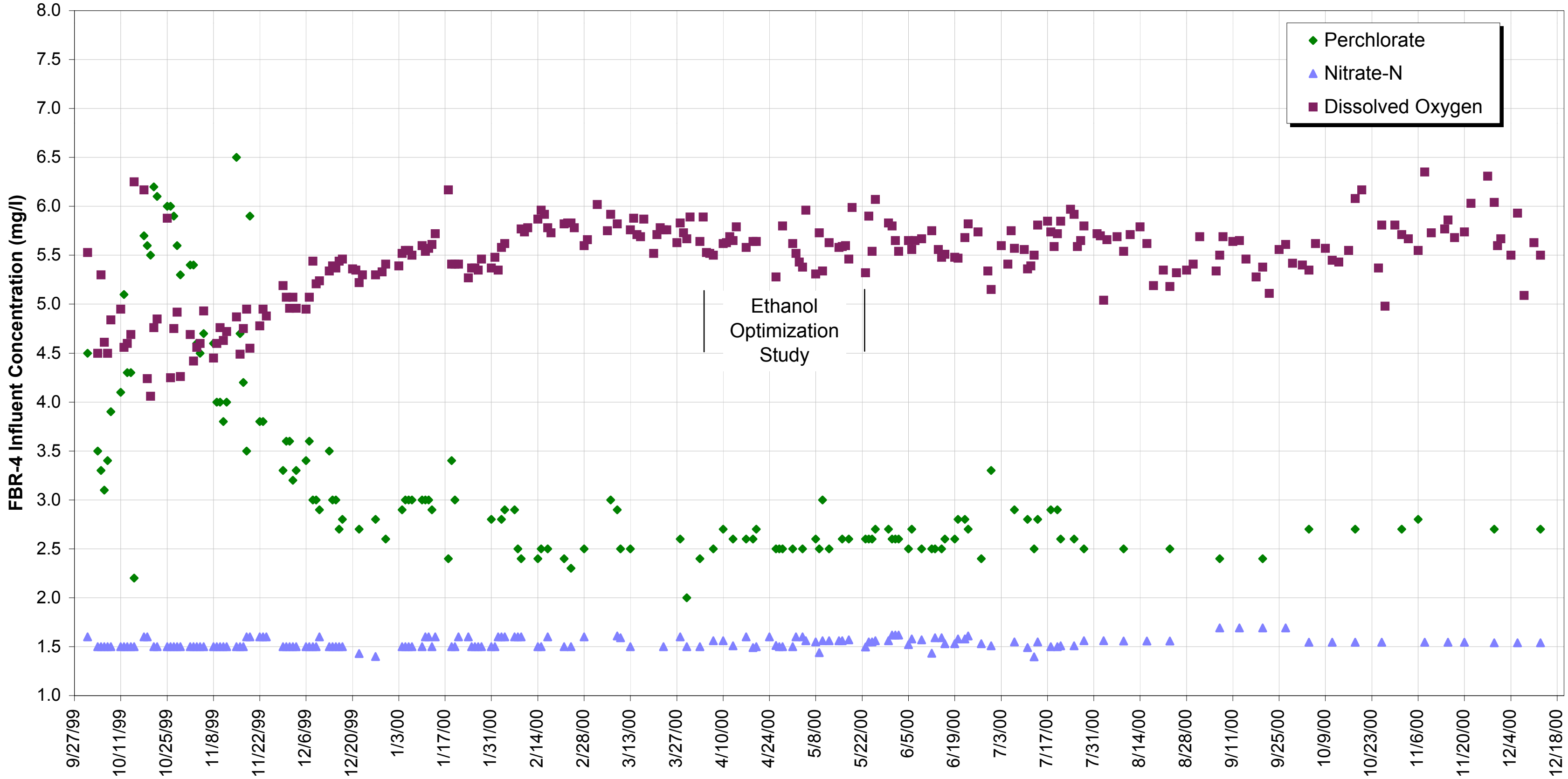
BIOFILM MODEL RESULTS
DEEP BIOFILM PROFILE

FIGURE
7

Prepared for: AEROJET

Phase 2 Treatability Study	**Job Number**	**Date**
Sacramento, CA	**52296.4.1**	**4/17/01**



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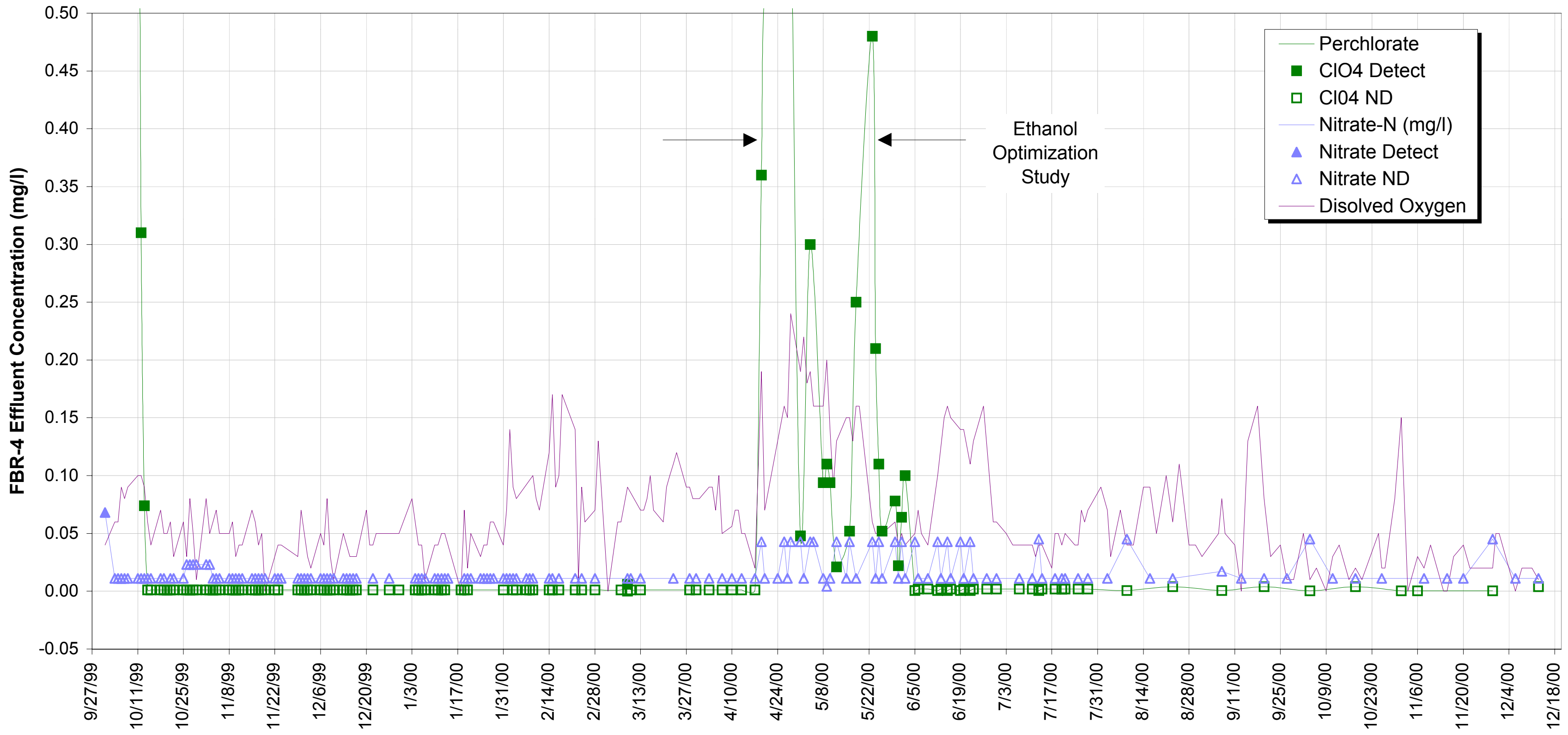
FBR-4: Influent Concentrations of Perchlorate, Nitrate and Dissolved Oxygen

FIGURE 8

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01

Fig8&9&13thru16-FBR4-2 Fig8



Harding ESE
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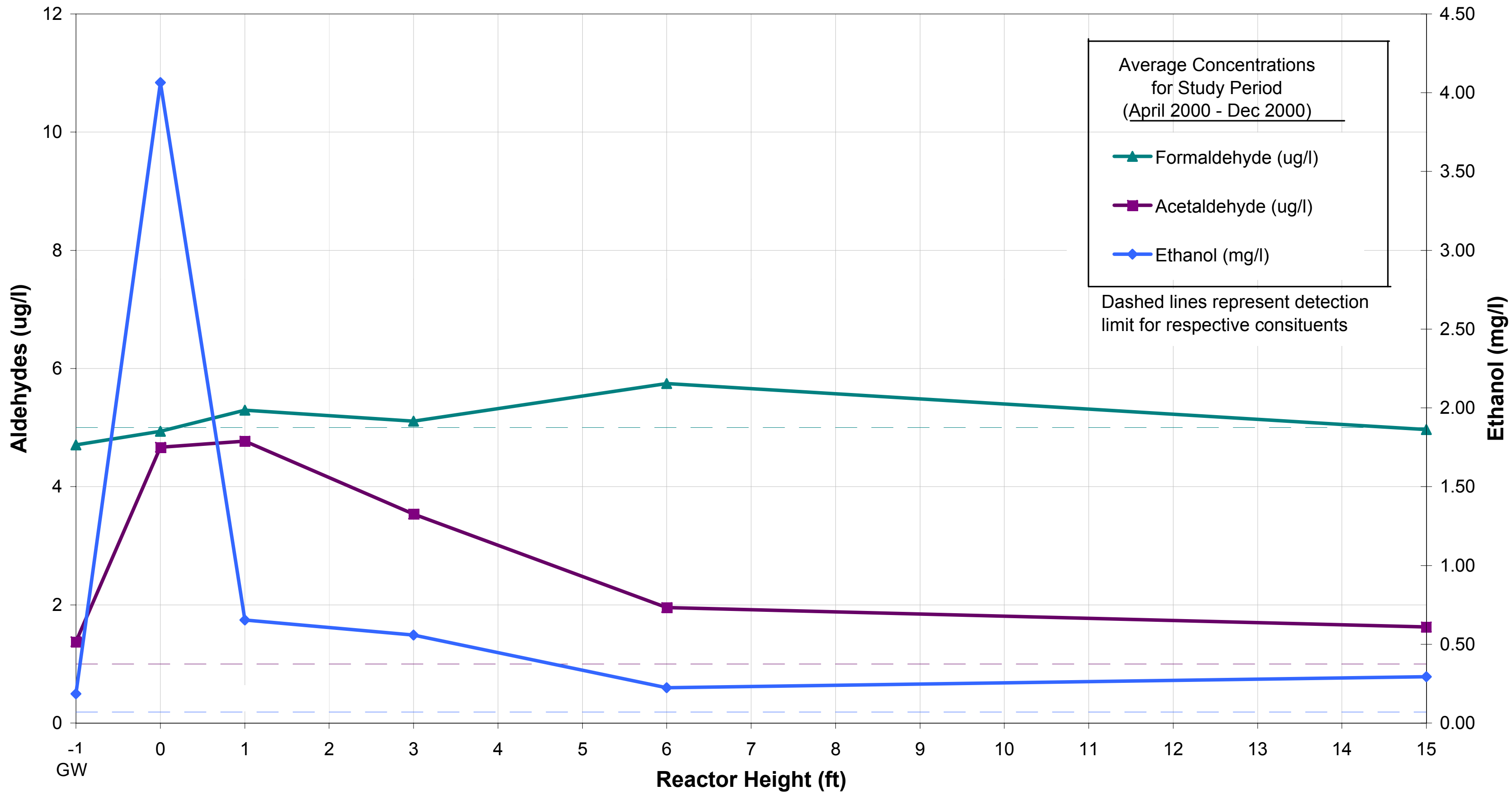
FBR-4: Effluent Concentrations of Perchlorate, Nitrate and Dissolved Oxygen

FIGURE 9

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01

Fig8&9&13thru16-FBR4-2 Fig9



Note: Averages for samples taken 4/00 - 12/00

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Ethanol and Breakdown Products

FIGURE 10

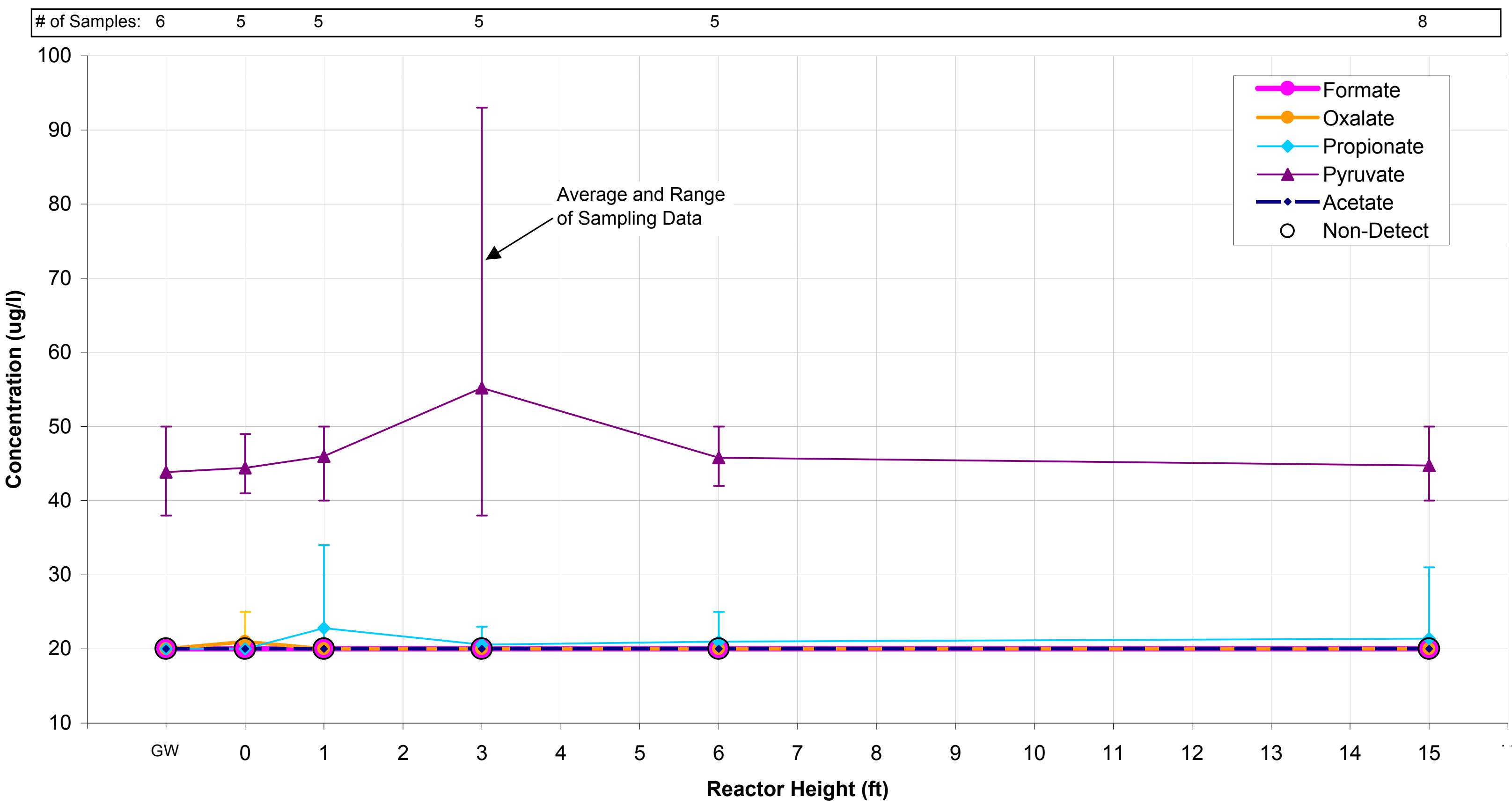
Phase 2 Treatability Study
Sacramento, CA

Job Numbe 52296.4.1

Date 8/6/01

Prepared for: AEROJET

Fig10&12&61-Op-Data Fig10



Detection Limit = 20 p
for all 5 analytes

Acetate and Formate
ND in all samples

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Carboxylic Acids (7/27/00 - 12/13/00)

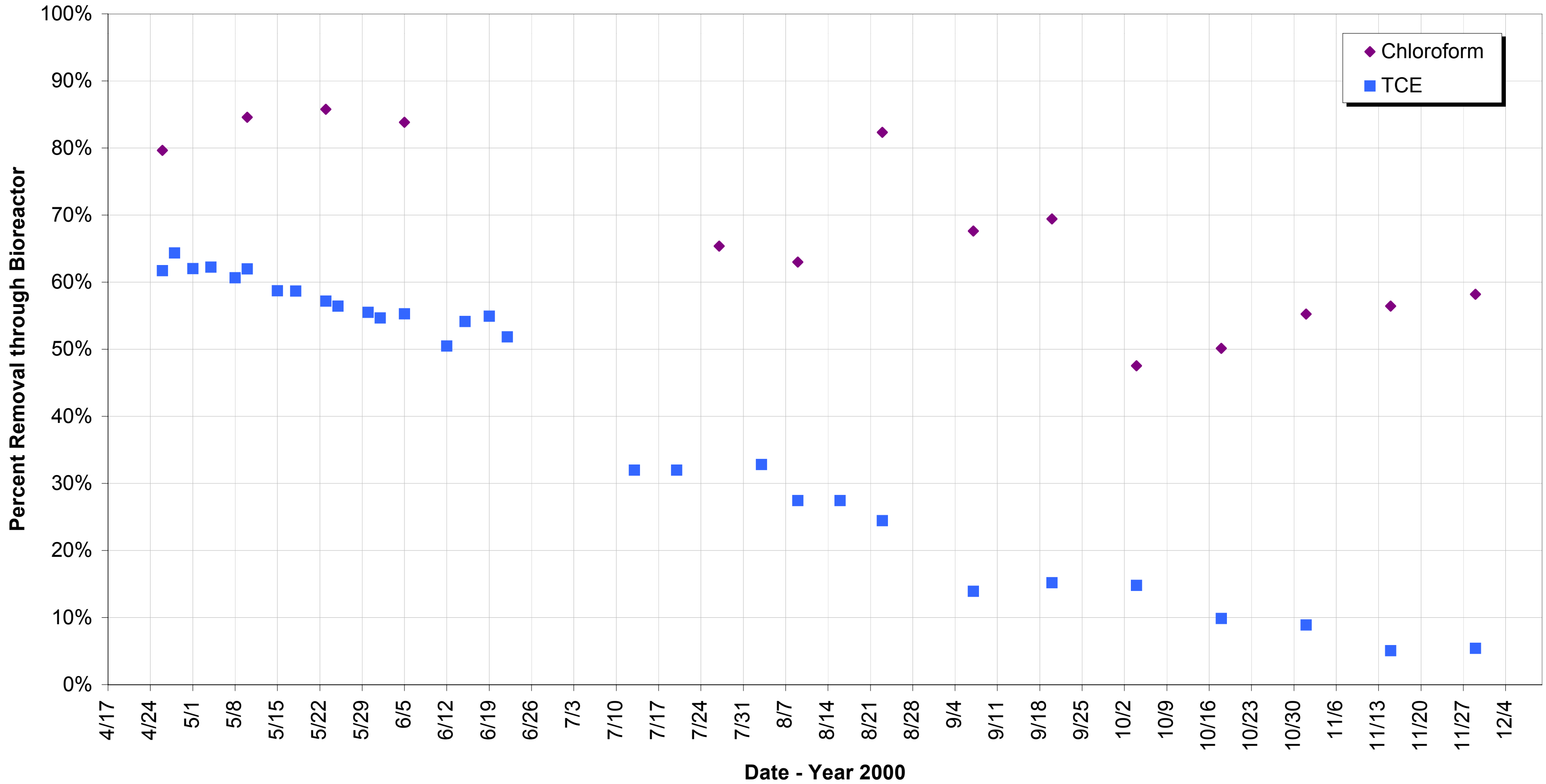
FIGURE
11

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



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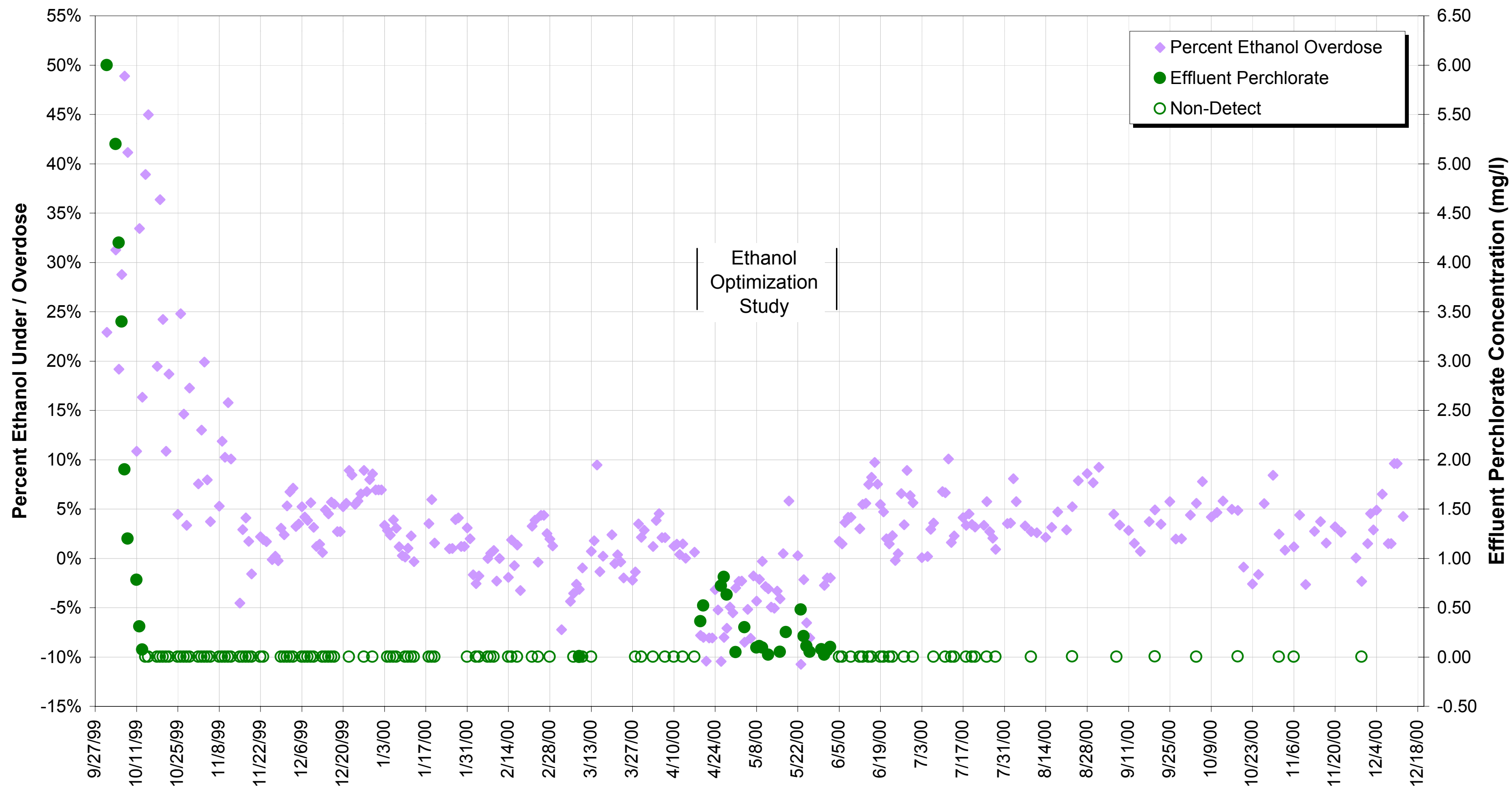
FBR-4 Chloroform and TCE Removal

FIGURE
12

Prepared for: AEROJET

Phase 2 Treatability Study	Job Numbe	Date
Sacramento, CA	52296.4.1	4/17/01

Fig10&12&61-Op-Data Fig12



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FBR-4: Ethanol Optimization

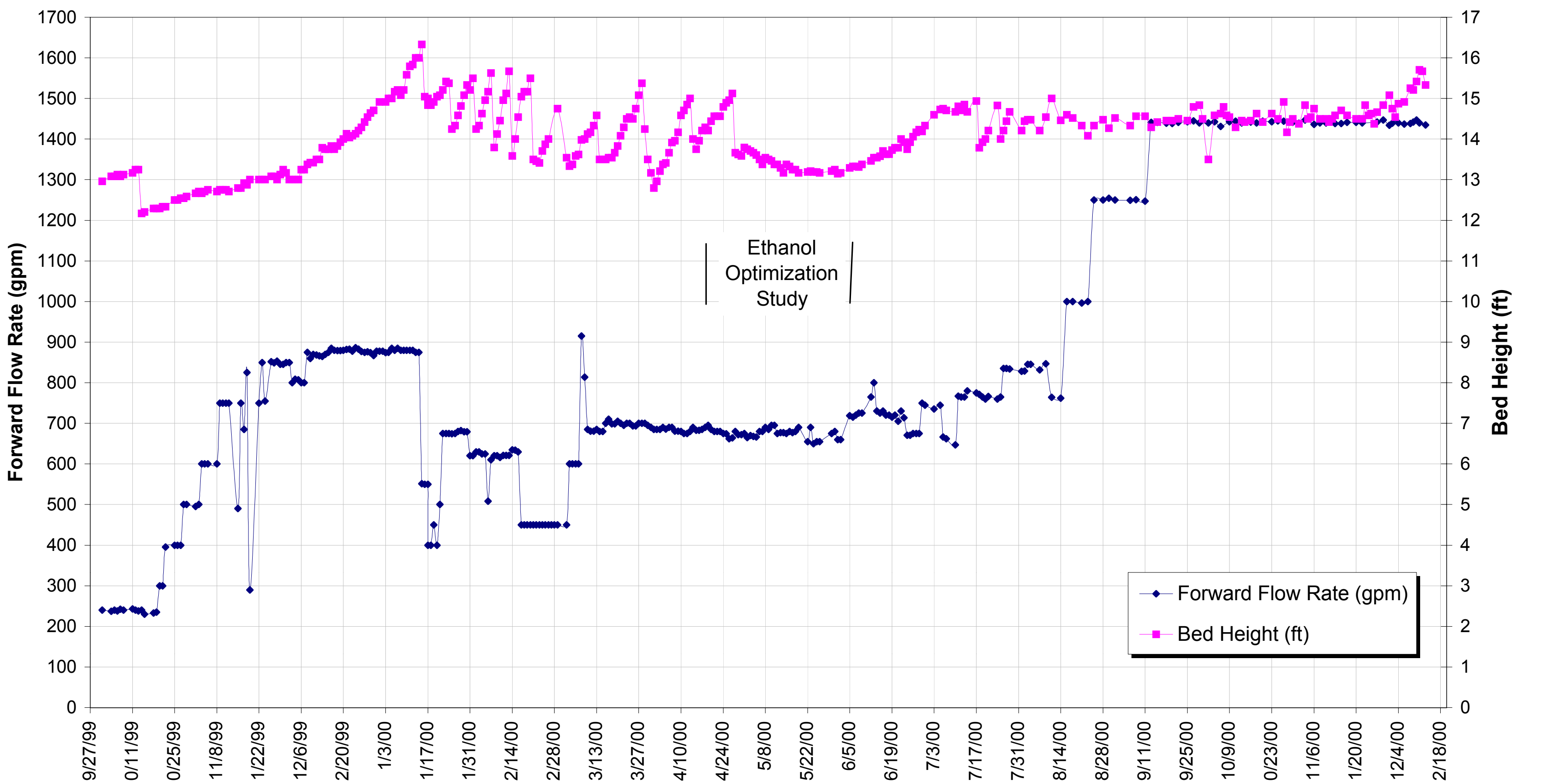
FIGURE 13

Prepared for: AEROJET

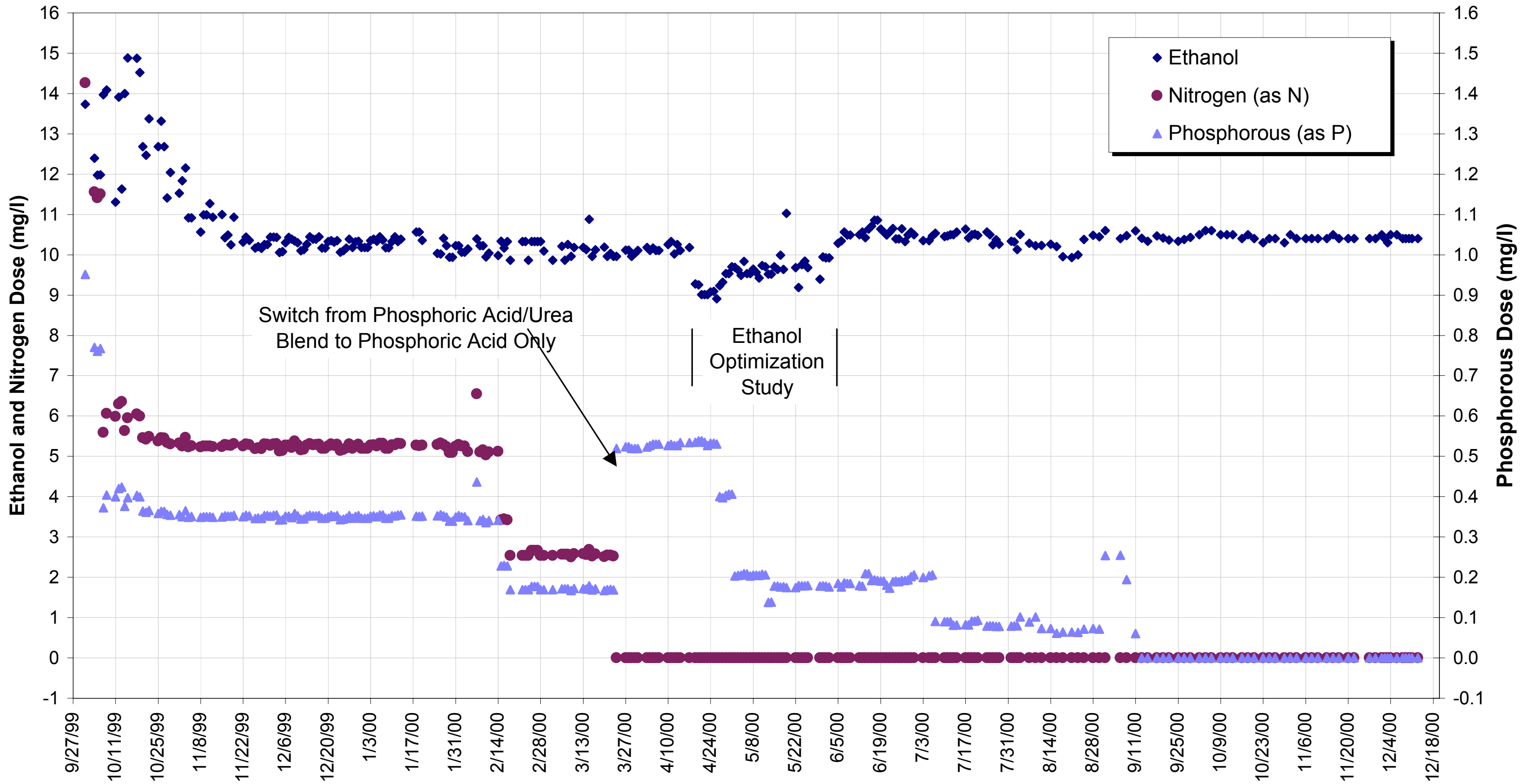
Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01



Harding ESE *A MACTEC COMPANY*	**FBR-4: Forward Flow Rate and Bed Height**		**FIGURE 14**
Prepared for: AEROJET	**Phase 2 Treatability Study** **Sacramento, CA**	**Job Number** **52296.4.1**	**Date** **4/17/01**



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A MACTEC COMPANY

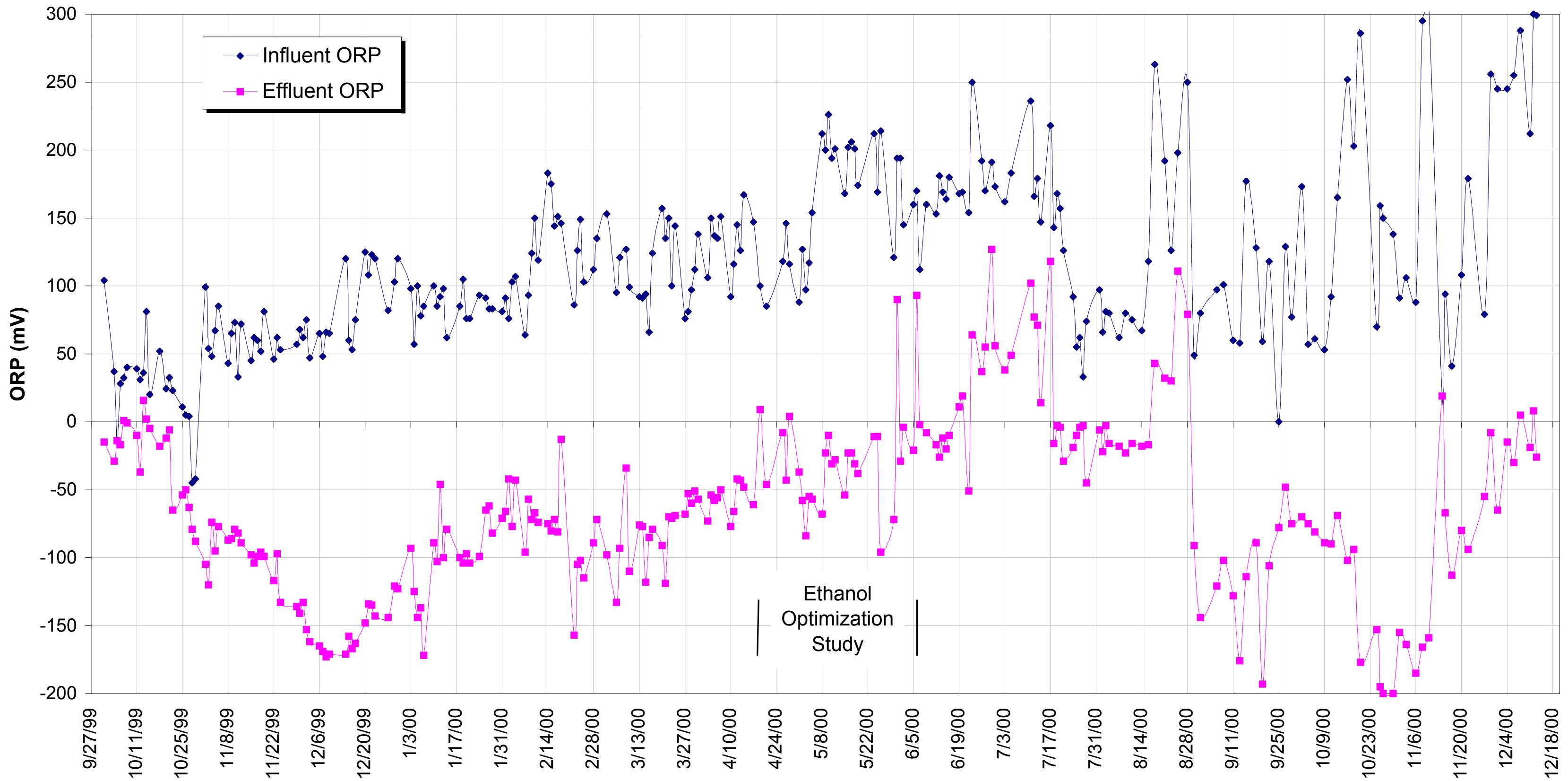
FBR-4: Ethanol and Nutrient Dosages

FIGURE 15

Prepared for AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01

Fig8&9&13thru16-FBR4-2 Fig15



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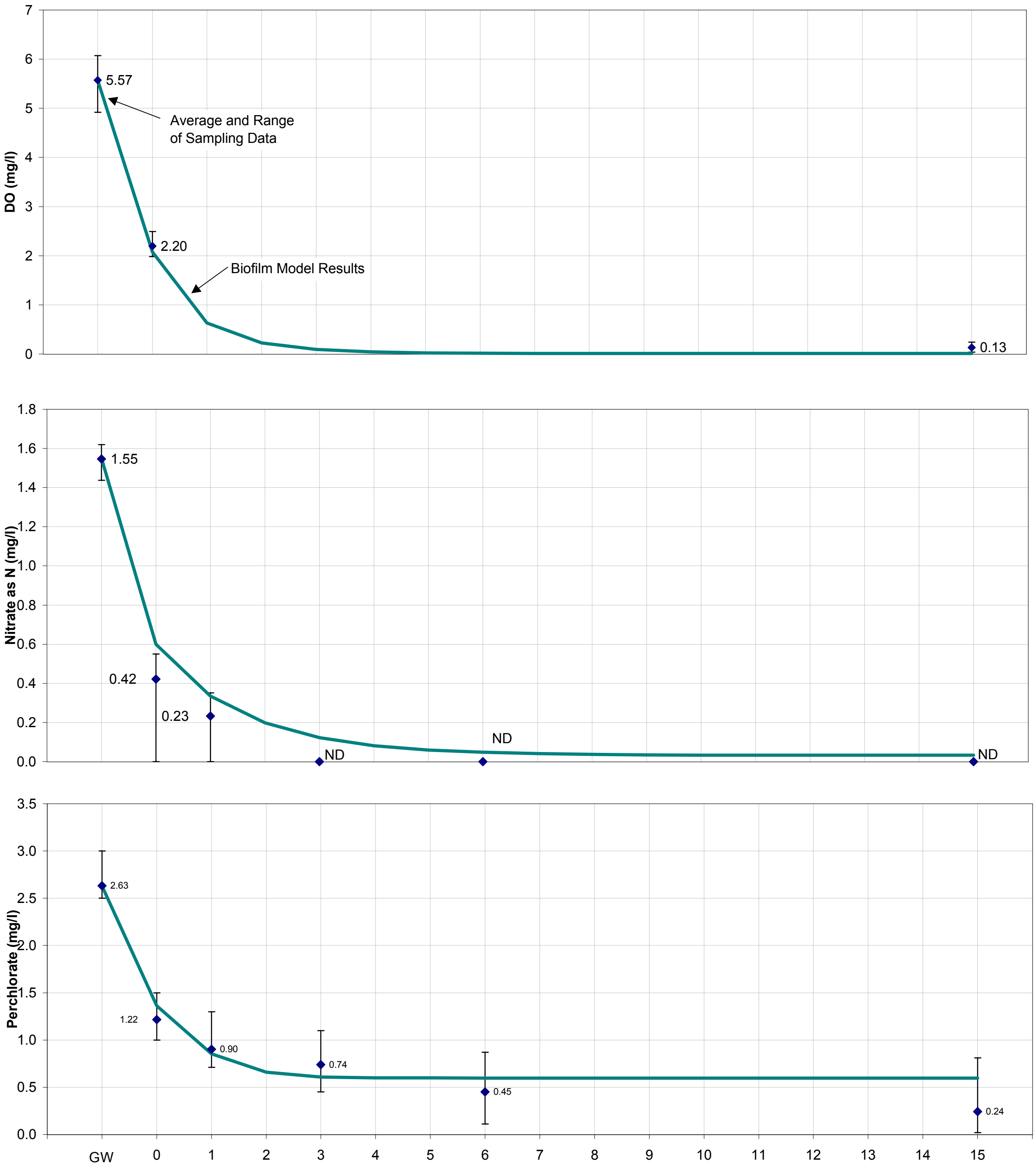
FBR-4: Influent and Effluent ORP

FIGURE 16

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Average Operating Parameters
Forward Flow: 675 gpm, Total Flow: 1816 gpm
Ethanol Dose: 9.6 mg/l, Ethanol Overdose: -4%

DO: 84 Samples
Nitrate: 94 Samples
Perchlorate: 83 Samples

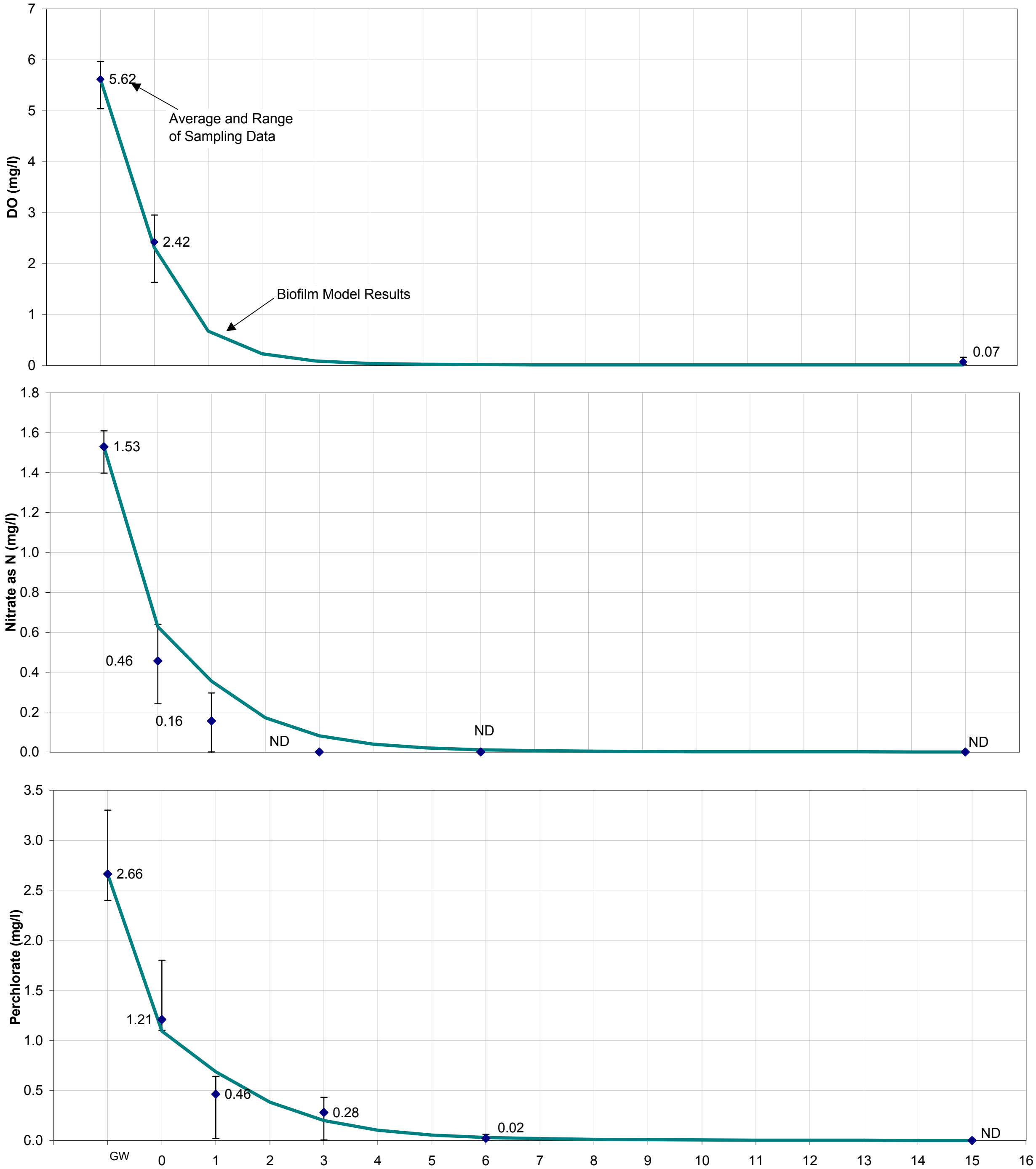
Harding ESE
A MACTEC COMPANY

Prepared for: AEROJET

FBR 4 Data (4/19/00 - 6/4/00)
and Biofilm Model Results

FIGURE
17

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Average Operating Parameters
Forward Flow: 749 gpm, Total Flow: 1824 gpm
Ethanol Dose: 10.5 mg/l, Ethanol Overdose: +5%

DO: 126 Samples
Nitrate: 78 Samples
Perchlorate: 78 Samples

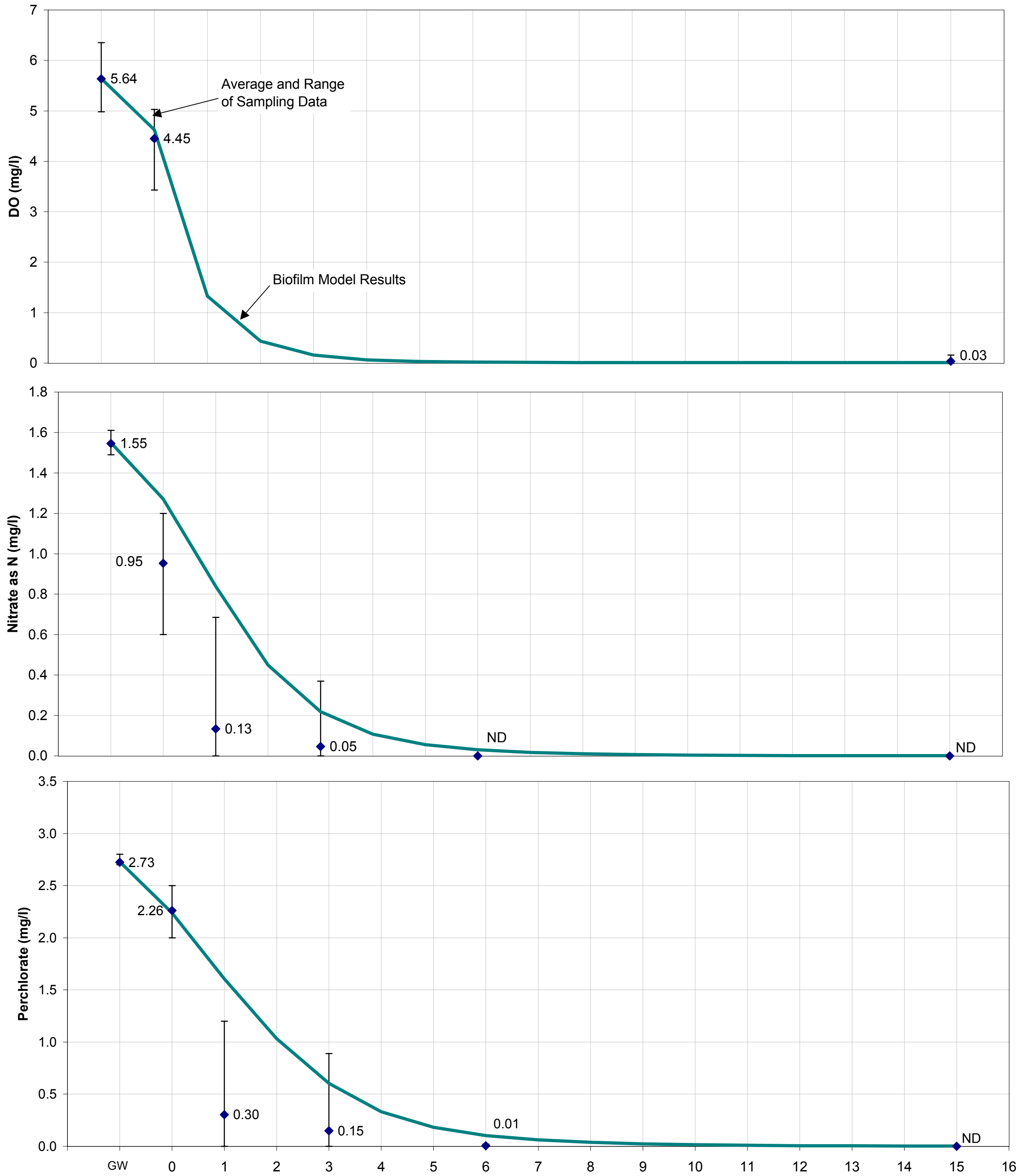
Harding ESE
A MACTEC COMPANY

Prepared for: AEROJET

FBR 4 Data (6/5/01 - 8/14/01) and Biofilm Model Results

FIGURE 18

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Average Operating Parameters
Forward Flow: 1441 gpm, Total Flow: 1757 gpm
Ethanol Dose: 10.4 mg/l, Ethanol Overdose: +3%

DO: 120 Samples
Nitrate: 51 Samples
Perchlorate: 51 Samples

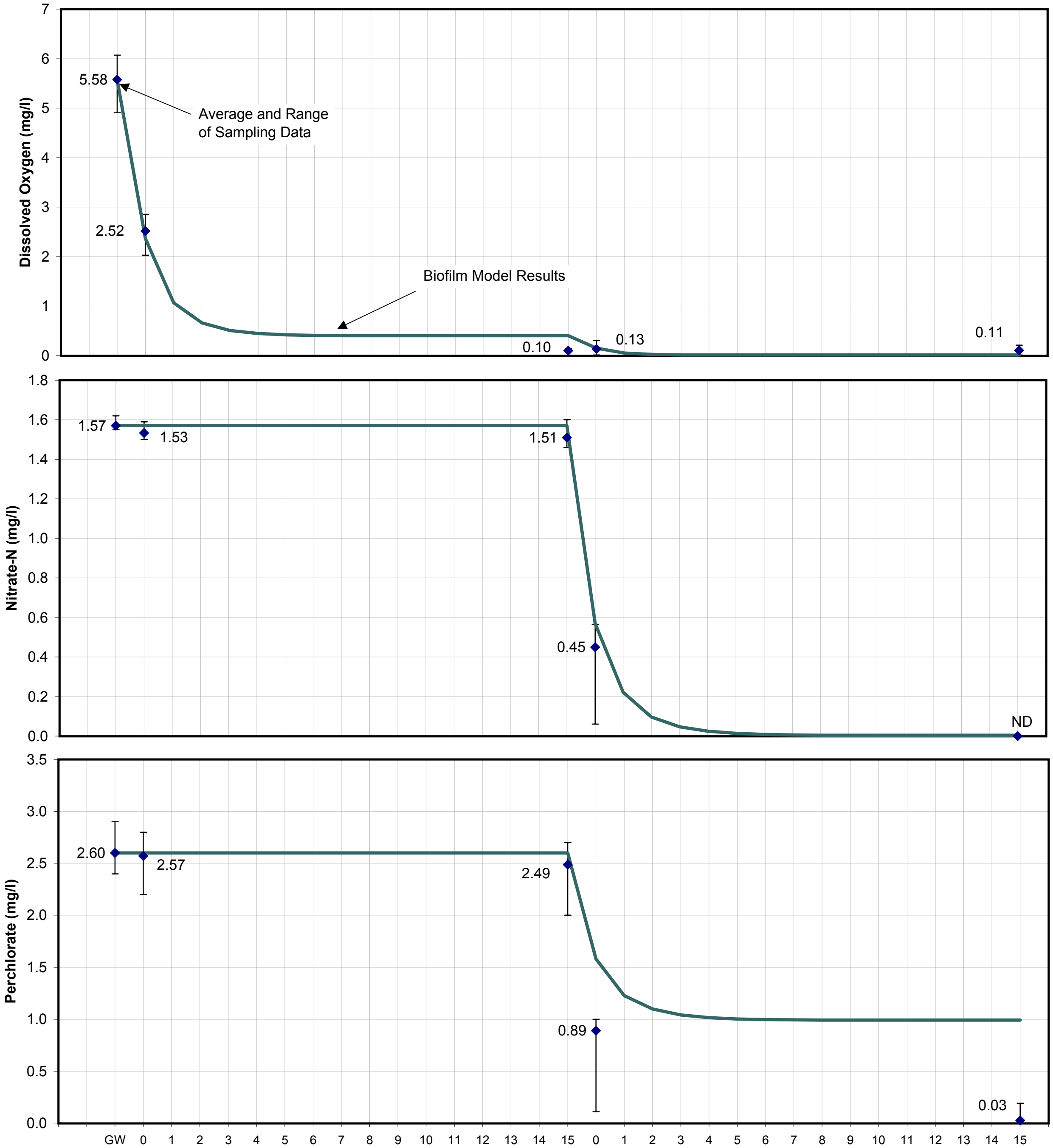
Harding ESE
A MACTEC COMPANY

Prepared for: AEROJET

FBR 4 Data (9/13/00 - 12/13/00) and Biofilm Model Results

FIGURE 19

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



FBR-2	FBR-3
Average Operating Parameters Forward Flow: 650 gpm, Total Flow: 1720 gpm Ethanol Dose: 4.7 mg/l, Ethanol Overdose: -53%	Average Operating Parameters Forward Flow: 650 gpm, Total Flow: 1803 gpm Ethanol Dose: 4.8 mg/l, Ethanol Overdose: -11%

DO: 37 Samples
Nitrate: 9 Samples
Perchlorate: 17 Samples

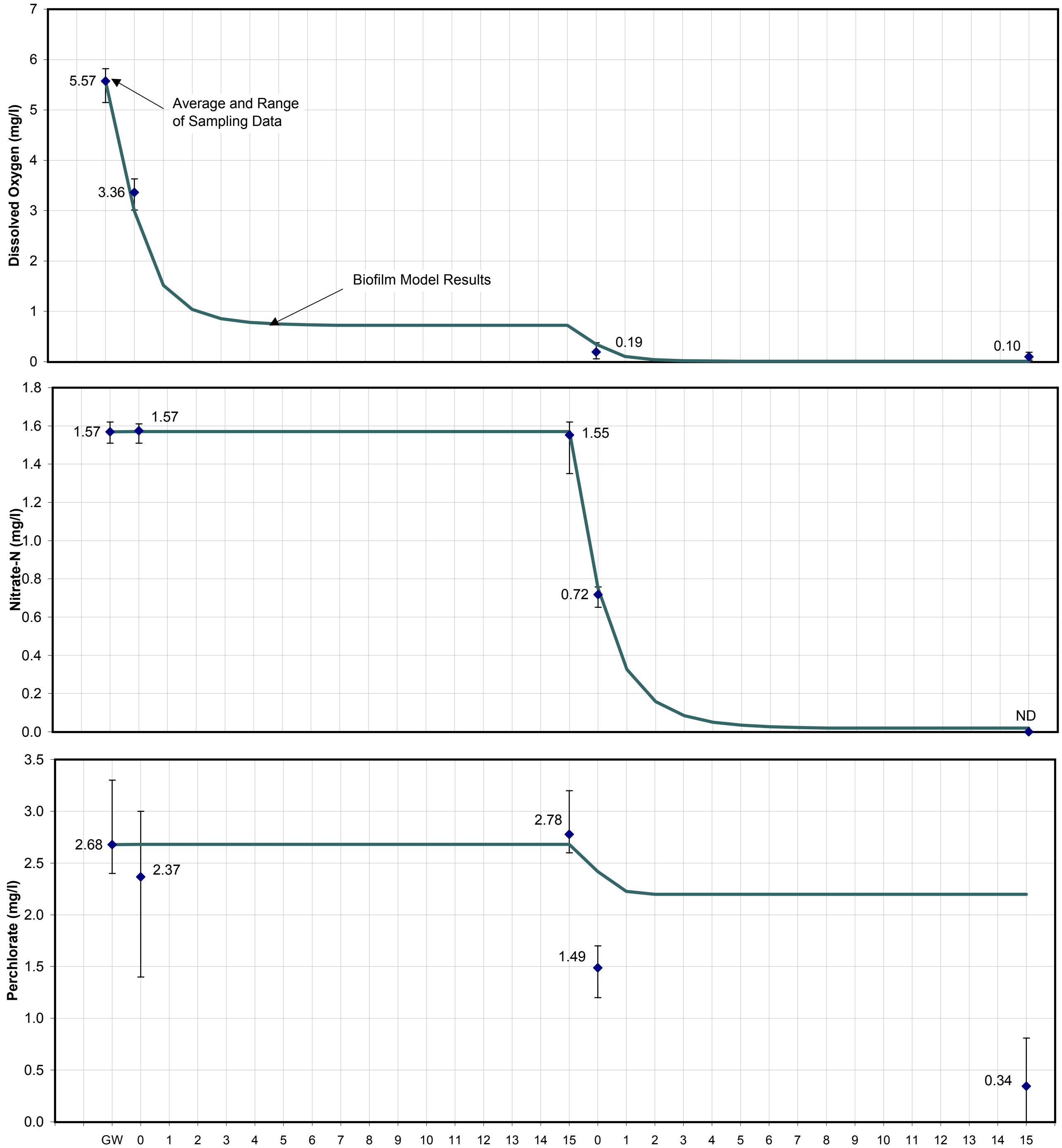
Harding ESE
A MACTEC COMPANY

FBR 2 & 3 In Series (April/May 2000) and Biofilm Model Results

FIGURE 20

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



FBR-2	FBR-3
Average Operating Parameters Forward Flow: 848 gpm, Total Flow: 1818 gpm Ethanol Dose: 4.4 mg/l, Ethanol Overdose: -56%	Average Operating Parameters Forward Flow: 848 gpm, Total Flow: 1806 gpm Ethanol Dose: 4.4 mg/l, Ethanol Overdose: -23%

DO: 18 Samples
Nitrate: 9 Samples
Perchlorate: 9 Samples

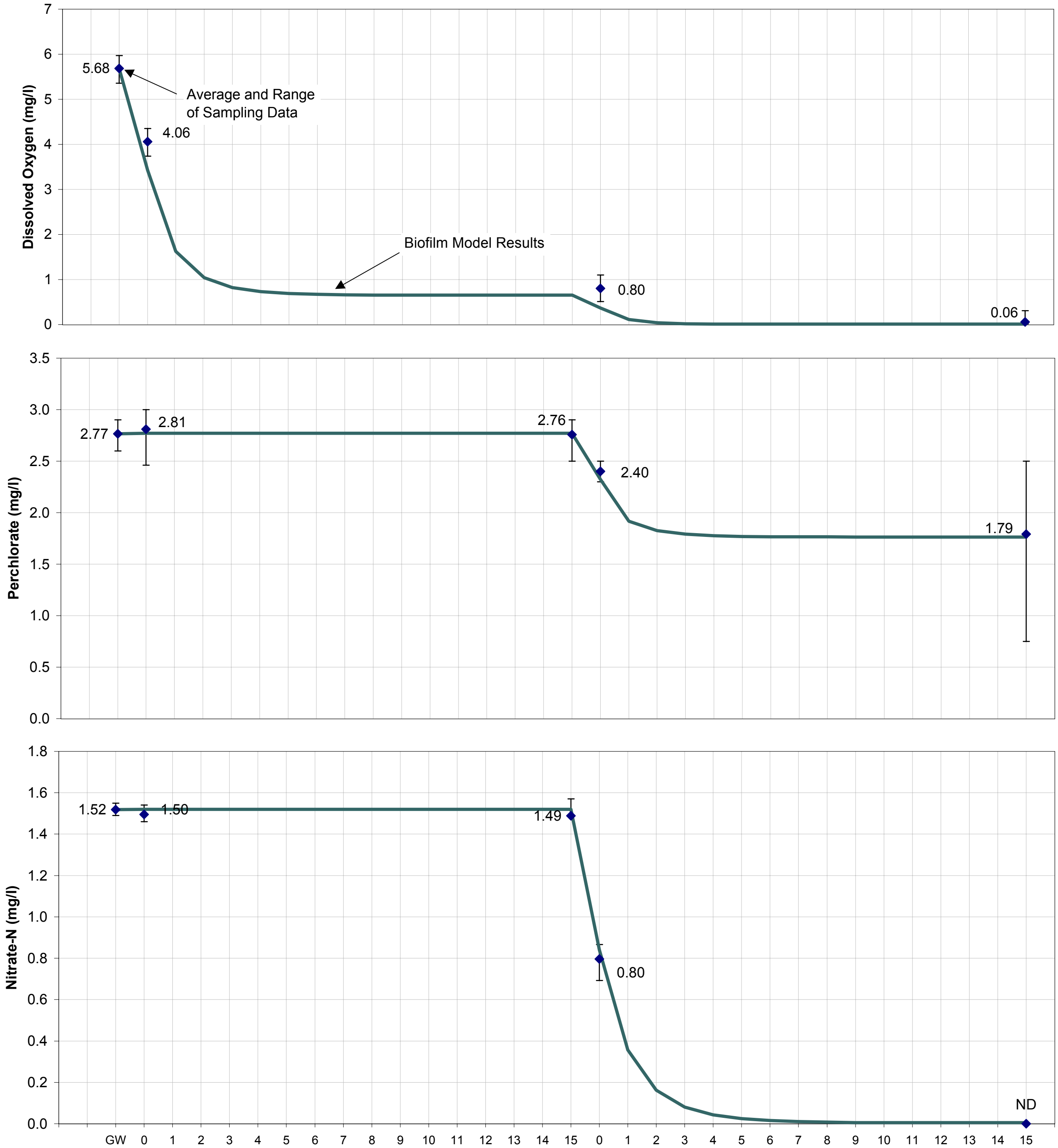
Harding ESE
A MACTEC COMPANY

FBR 2 & 3 In Series (June 2000) and Biofilm Model Results

FIGURE 21

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



FBR-2	FBR-3
Average Operating Parameters Forward Flow: 1000 gpm, Total Flow: 1815 gpm Ethanol Dose: 4.6 mg/l, Ethanol Overdose: -45%	Average Operating Parameters Forward Flow: 1000 gpm, Total Flow: 1815 gpm Ethanol Dose: 4.6 mg/l, Ethanol Overdose: -18.5%

DO: 14 Samples
Nitrate: 6 Samples
Perchlorate: 6 Samples

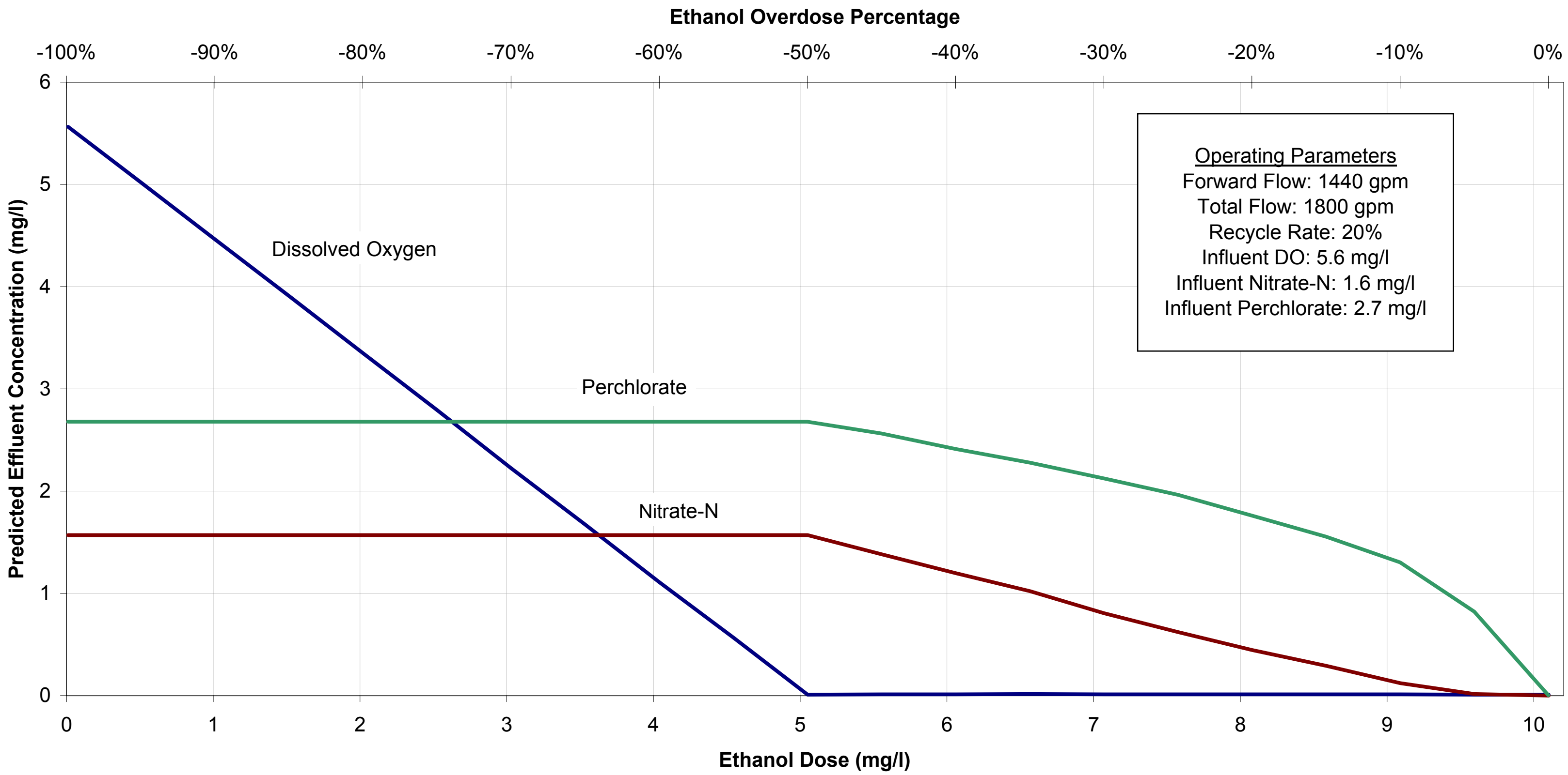
Harding ESE
A MACTEC COMPANY

FBR 2 & 3 In Series (July 2000) and Biofilm Model Results

FIGURE 22

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



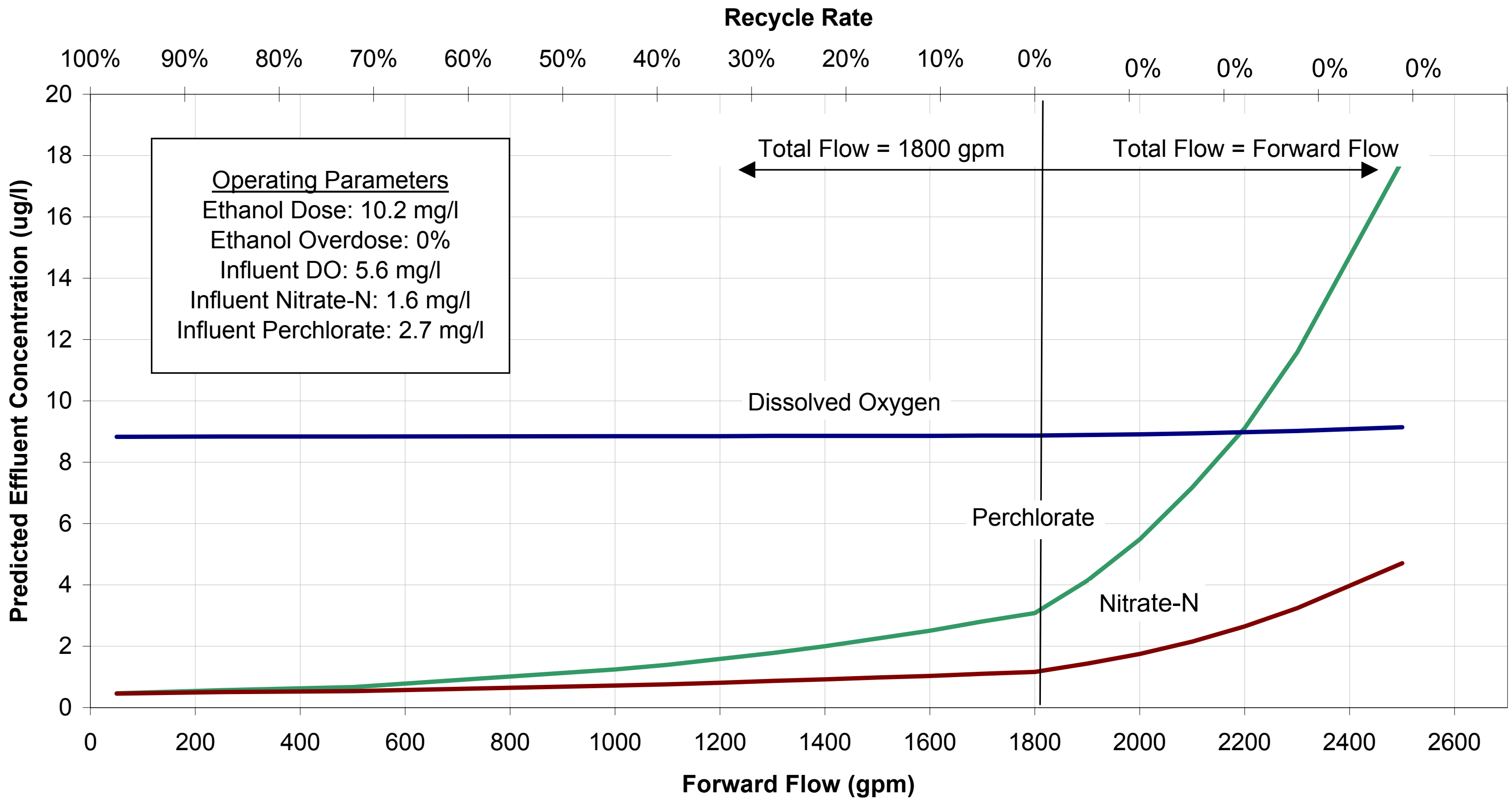
Harding ESE
A MACTEC COMPANY

BIOFILM MODEL RESULTS
ETHANOL DOSE VS. EFFLUENT CONCENTRATIONS

FIGURE
23

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



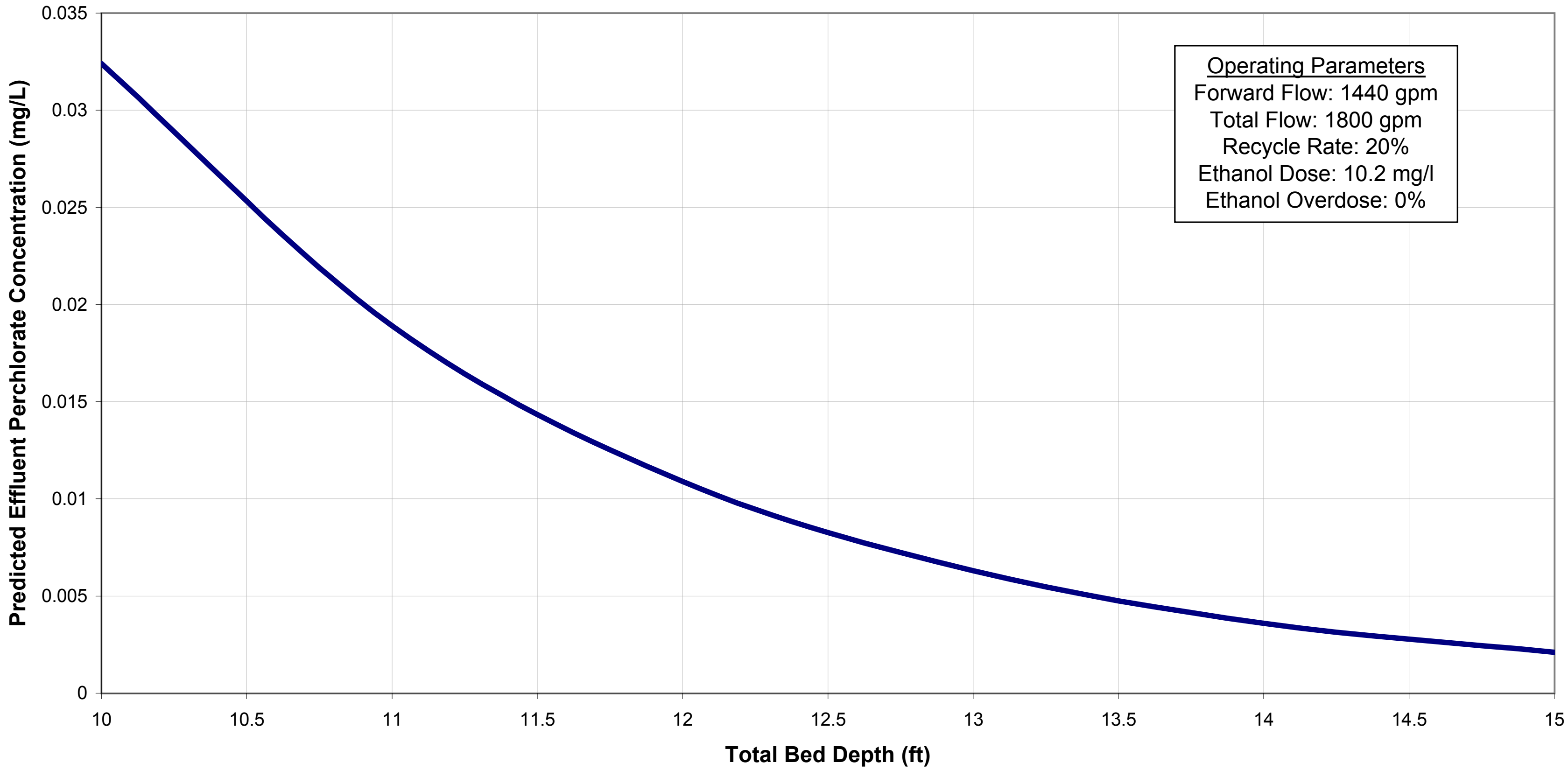
Harding ESE
A MACTEC COMPANY

BIOFILM MODEL RESULTS
FORWARD FLOW SENSITIVITY

FIGURE 24

Prepared for: AEROJET

Phase 2 Treatability Study	Job Numbe	Date
Sacramento, CA	52296.4.1	4/17/01



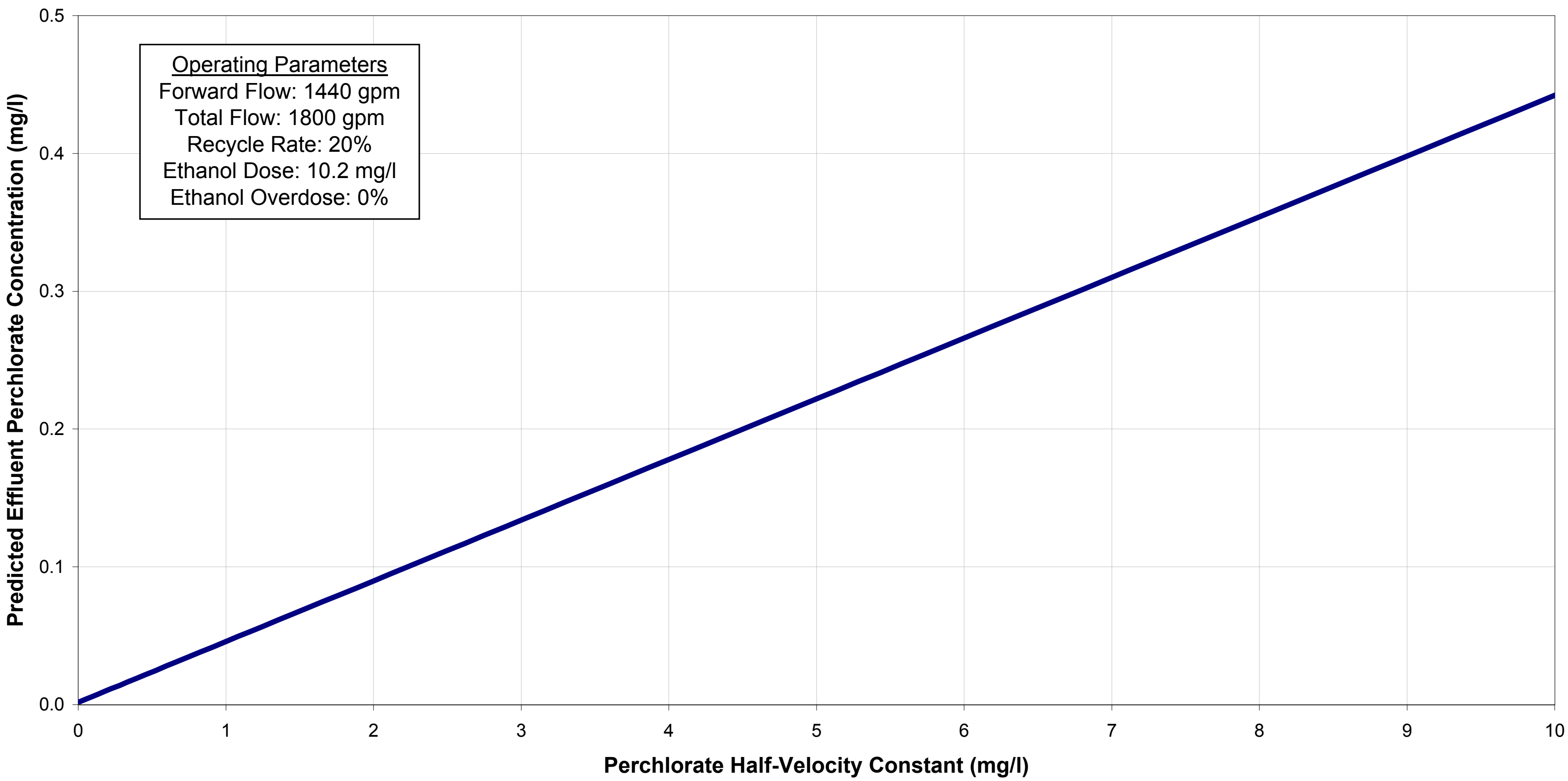
Harding ESE
A MACTEC COMPANY

BIOFILM MODEL RESULTS
EFF. PERCHLORATE CONC. VS. BED DEPTH
PILOT SCALE BIOREACTOR AT 20% RECYCLE

FIGURE
25

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	7/21/01



Harding ESE
A MACTEC COMPANY

BIOFILM MODEL RESULTS
PERCHLORATE CONC. VS. HALF VELOCITY
PILOT SCALE BIOREACTOR AT 20% RECYCLE

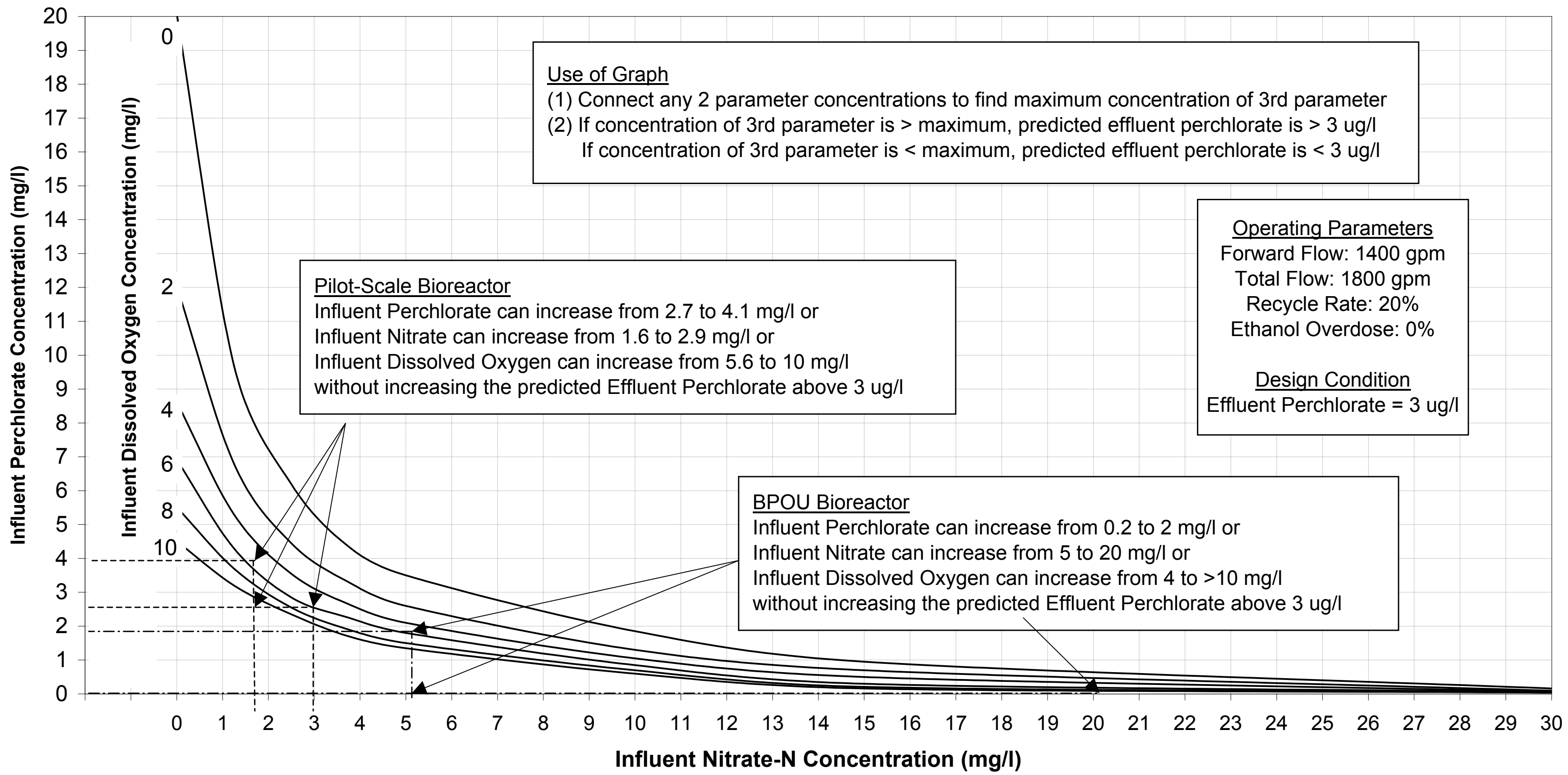
FIGURE
26

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
7/21/01



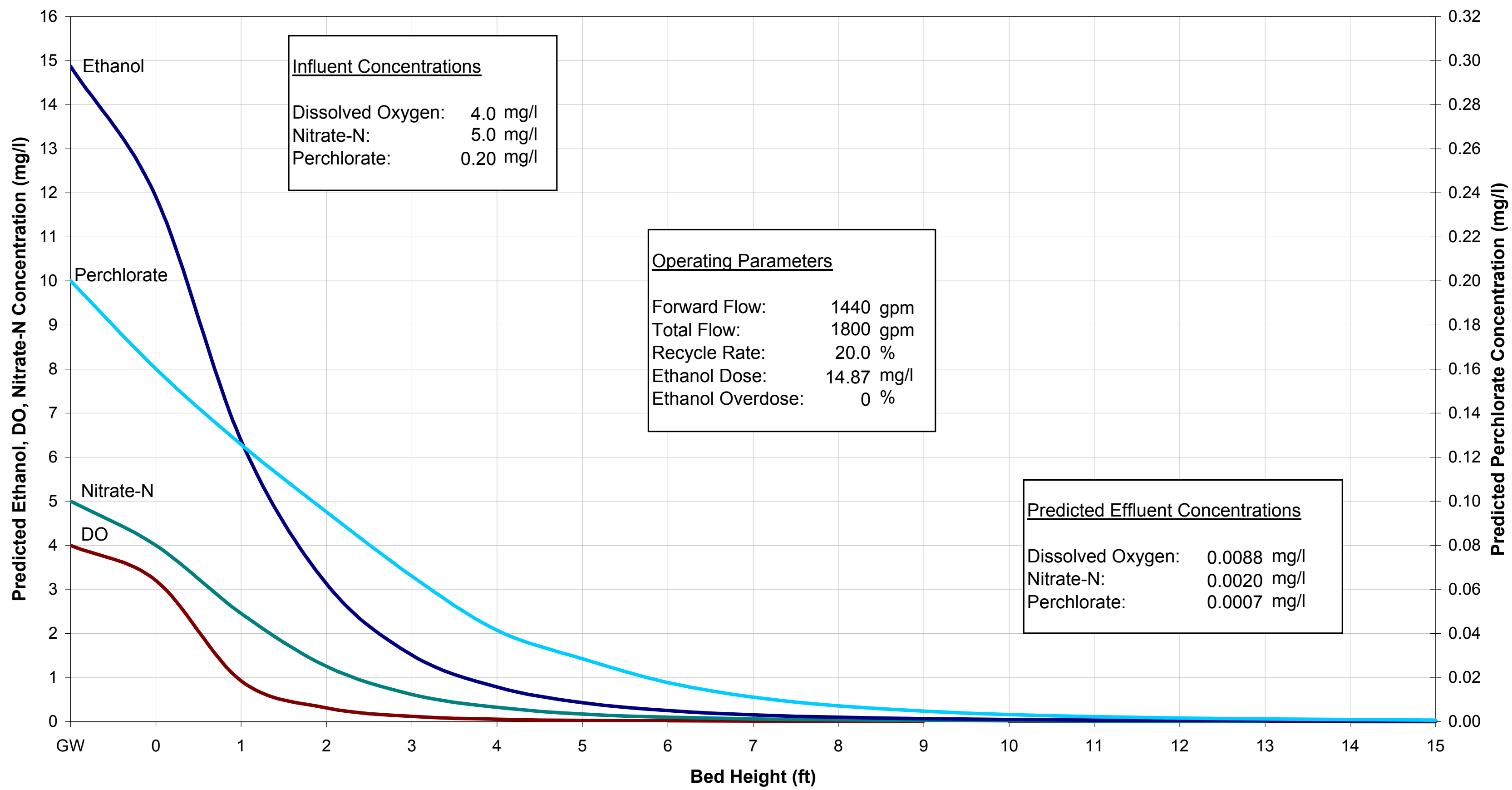
Harding ESE
A MACTEC COMPANY

Prepared for: AEROJET

BIOFILM MODEL RESULTS
BIOREACTOR PERFORMANCE CURVES

FIGURE 27

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

Biofilm Model Results
Contaminant Concentration Profiles
BPOU Bioreactor at 20% Recycle

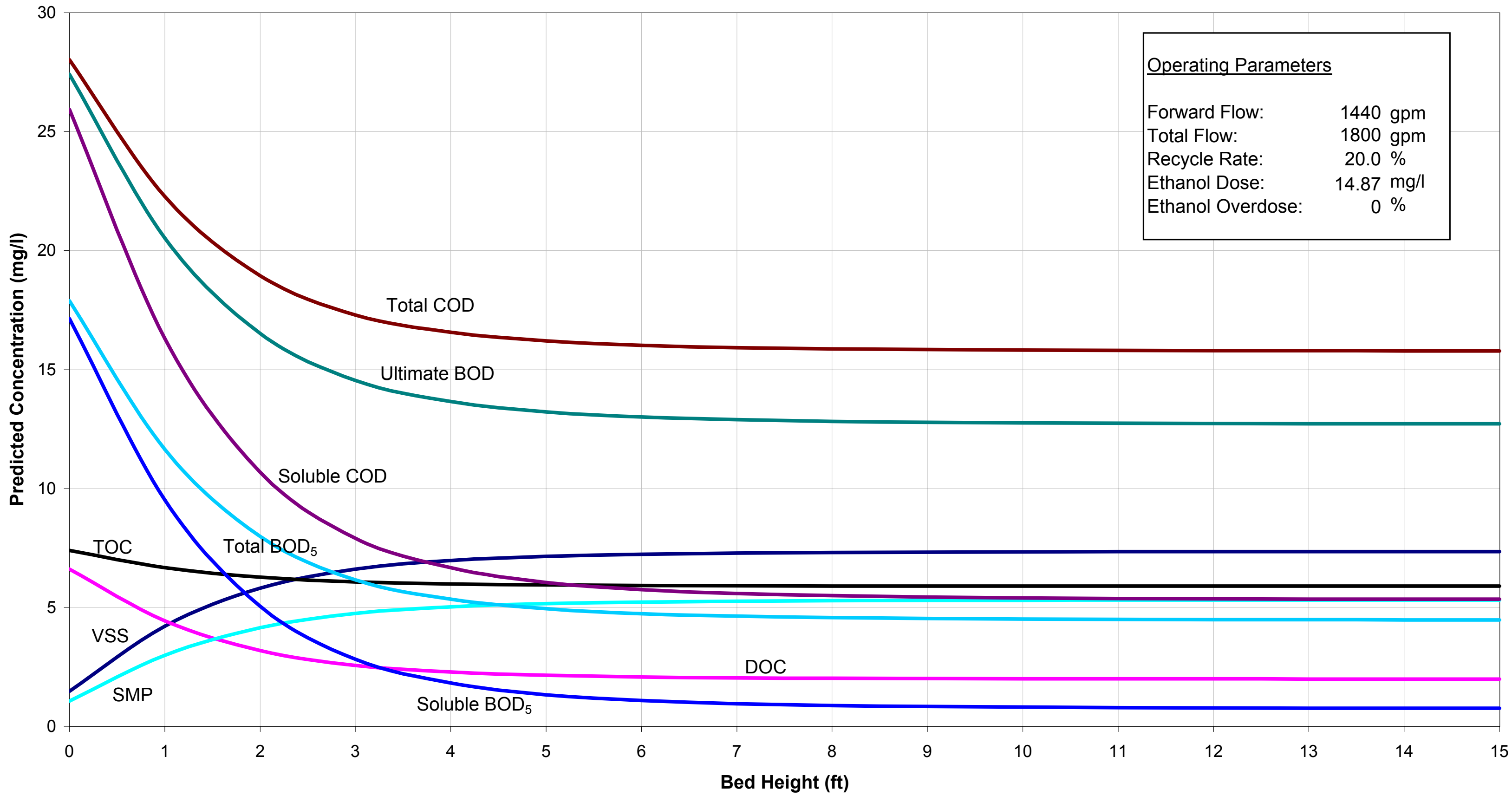
FIGURE 28

Prepared for AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 9/18/01



Harding ESE
A MACTEC COMPANY

Biofilm Model Results
VSS, COD, TOC, DOC, BOD, SMP
BPOU Bioreactor at 20% Recycle

FIGURE
29

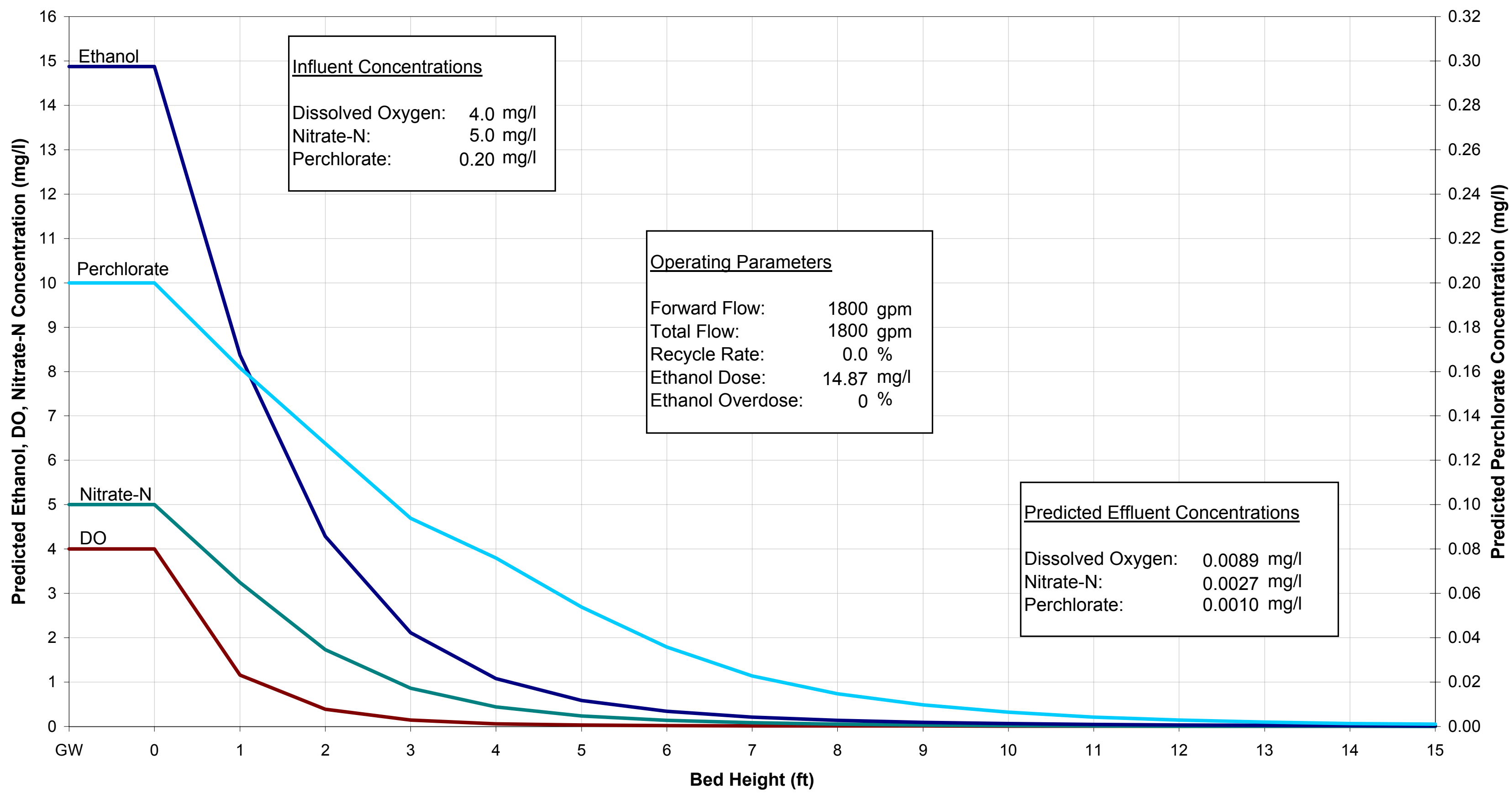
Prepared for AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
9/18/01

model2 Figure29



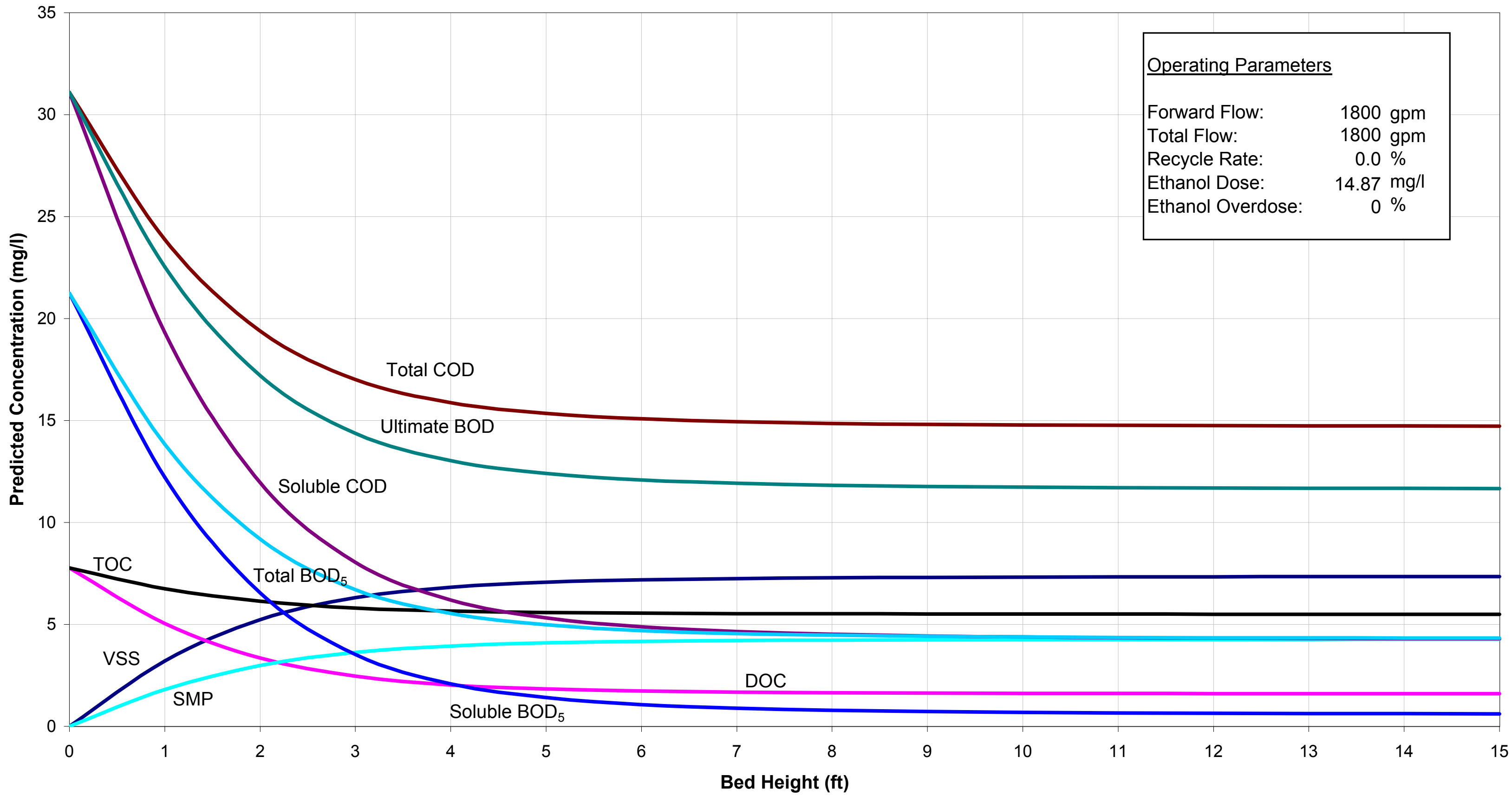
Harding ESE
A MACTEC COMPANY

Biofilm Model Results
Contaminant Concentration Profiles
BPOU Bioreactor at 0% Recycle

FIGURE 30

Prepared for AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	9/18/01



Harding ESE
A MACTEC COMPANY

Biofilm Model Results
VSS, COD, TOC, DOC, BOD, SMP
BPOU Bioreactor at 0% Recycle

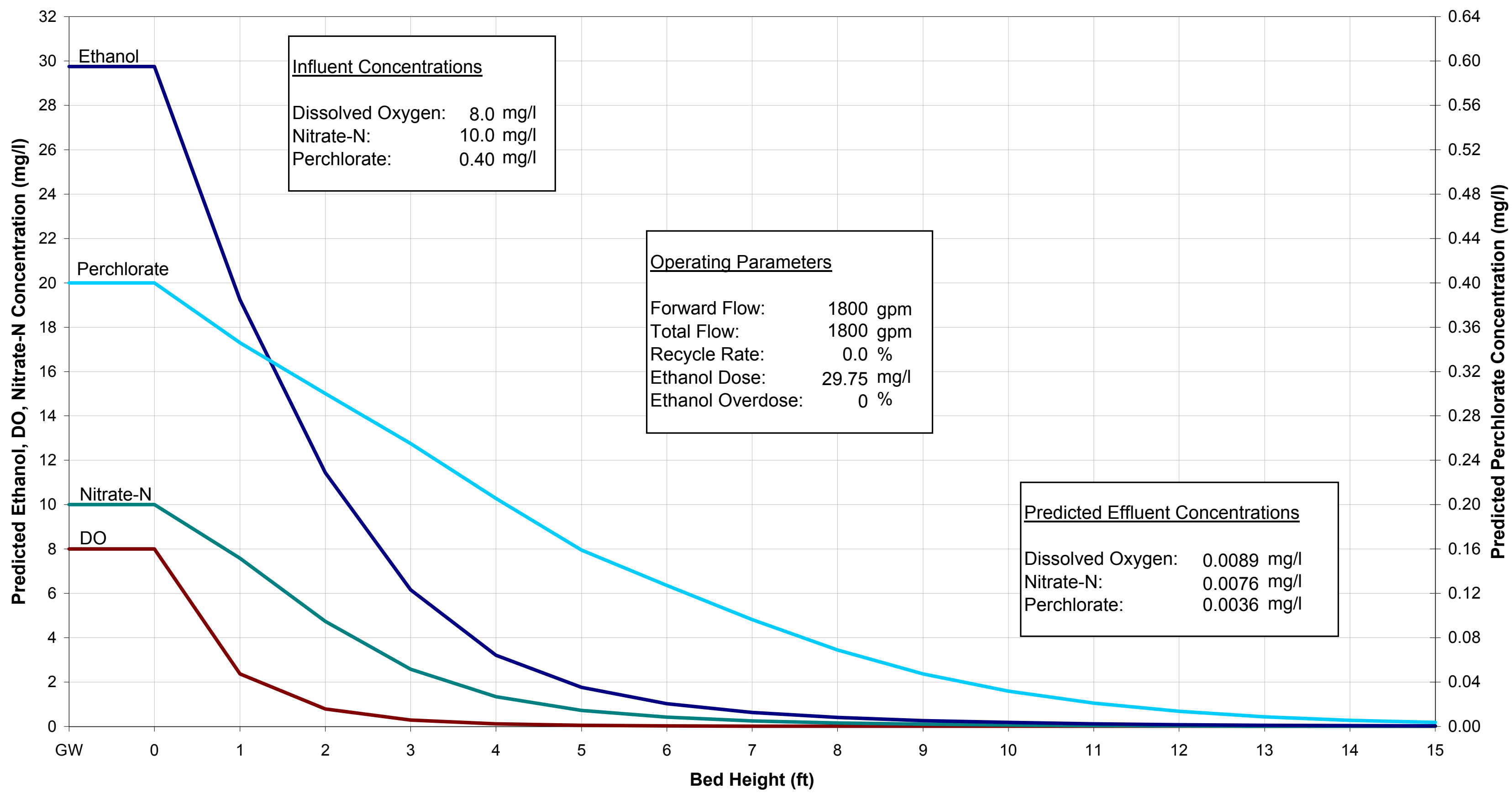
FIGURE
31

Prepared for AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
9/18/01



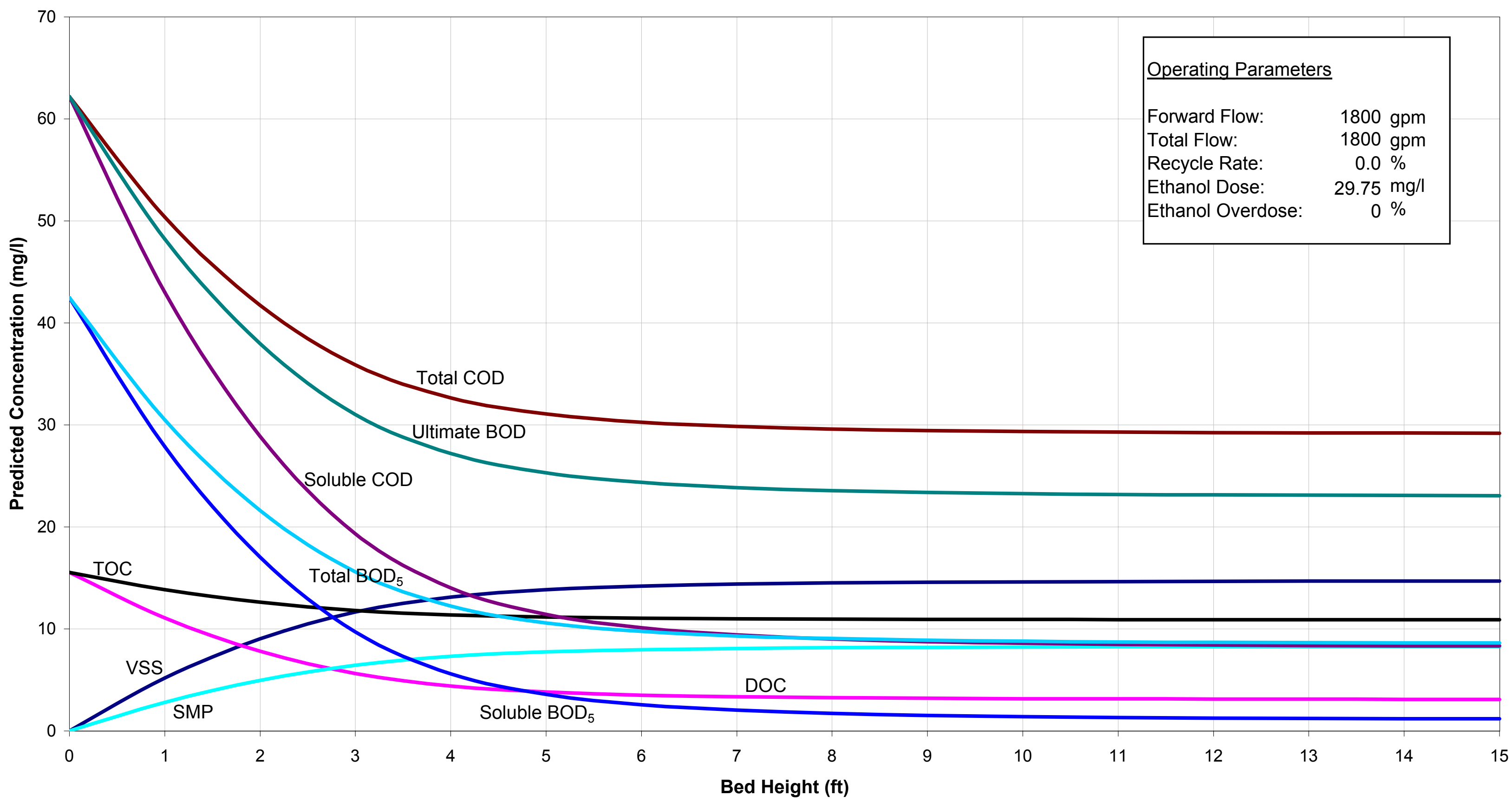
Harding ESE
A MACTEC COMPANY

Prepared for AEROJET

Biofilm Model Results
Contaminant Concentration Profiles
BPOU Bioreactor at 0% Recycle - Worst Case

FIGURE 32

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	9/18/01



Harding ESE
A MACTEC COMPANY

Prepared for AEROJET

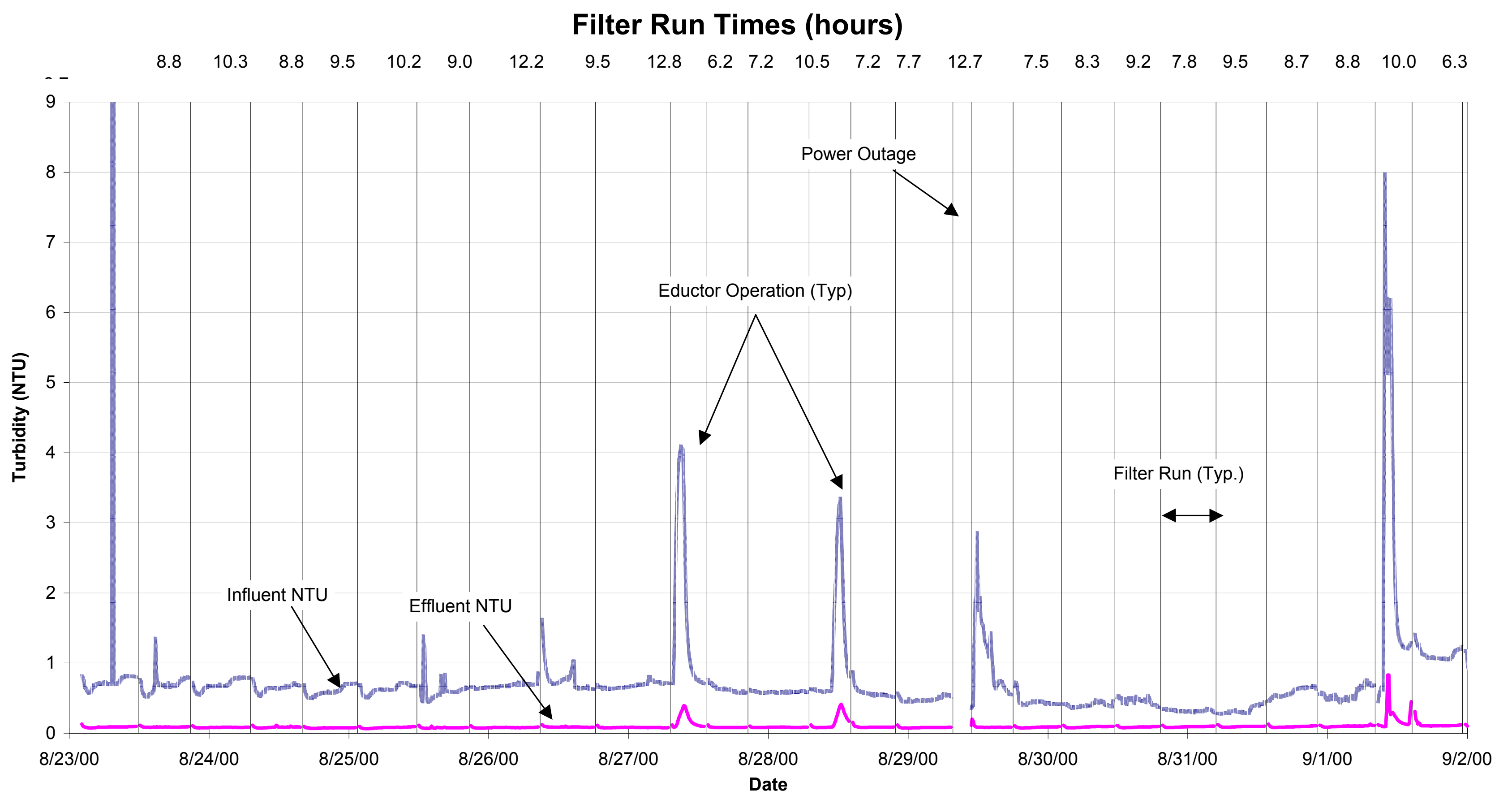
Biofilm Model Results
VSS, COD, TOC, DOC, BOD, SMP
BPOU Bioreactor at 0% Recycle - Worst Case

FIGURE
33

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
9/18/01



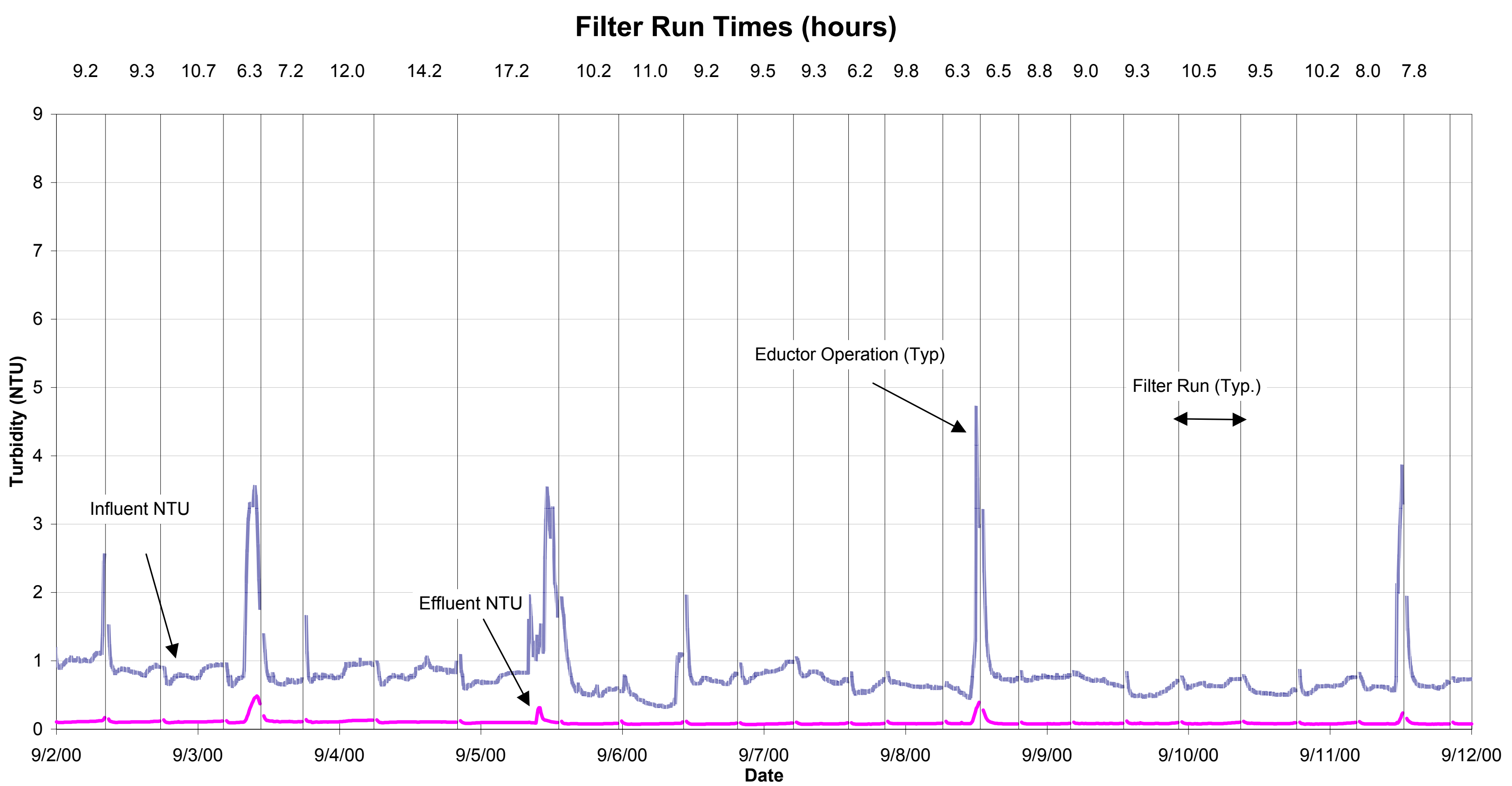
Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 8/23/00 - 9/2/00

FIGURE 34

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 9/2/00 - 9/12/00

FIGURE 35

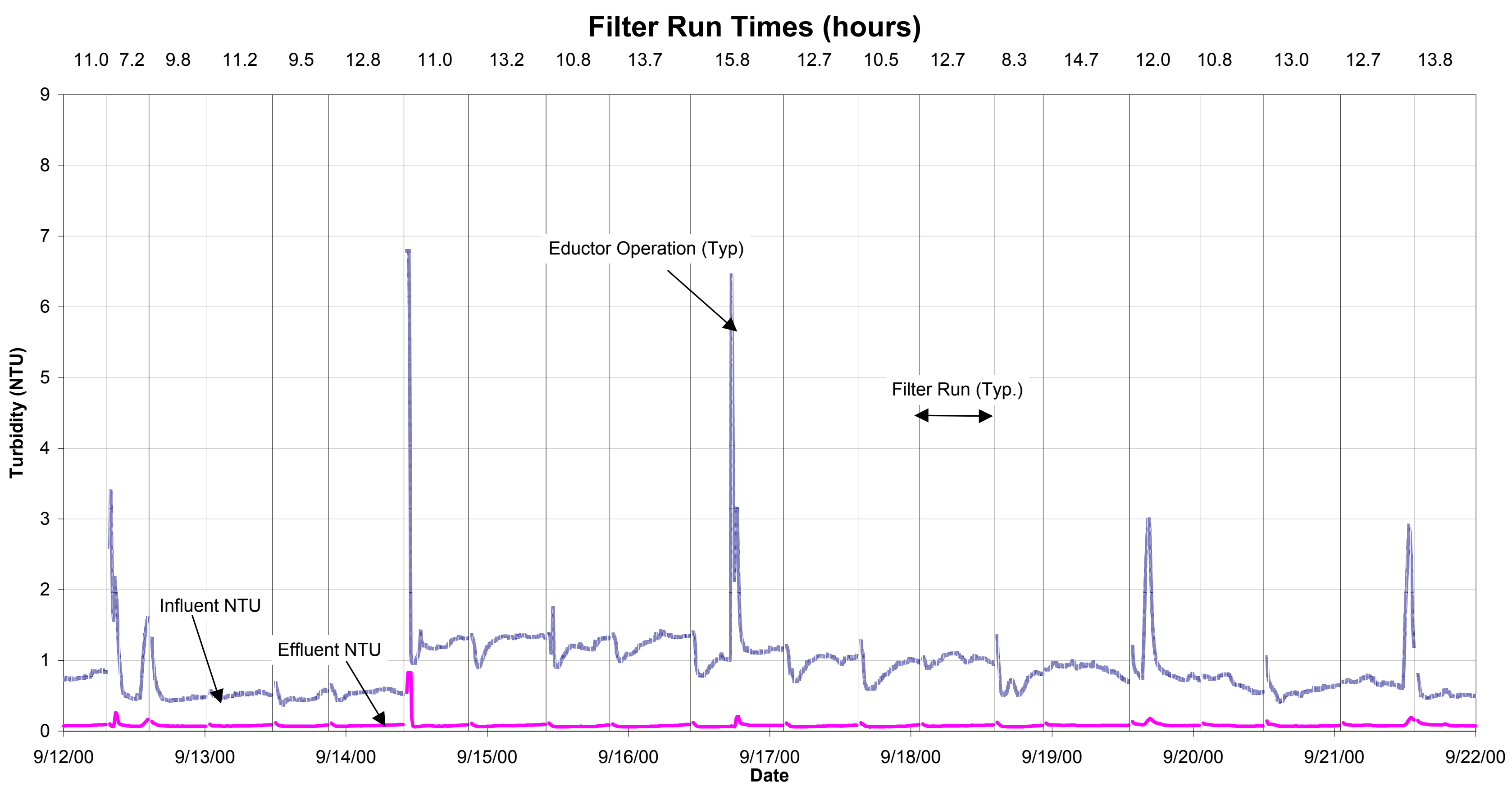
Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01

Fig34thru45-Filter_Runs Fig35

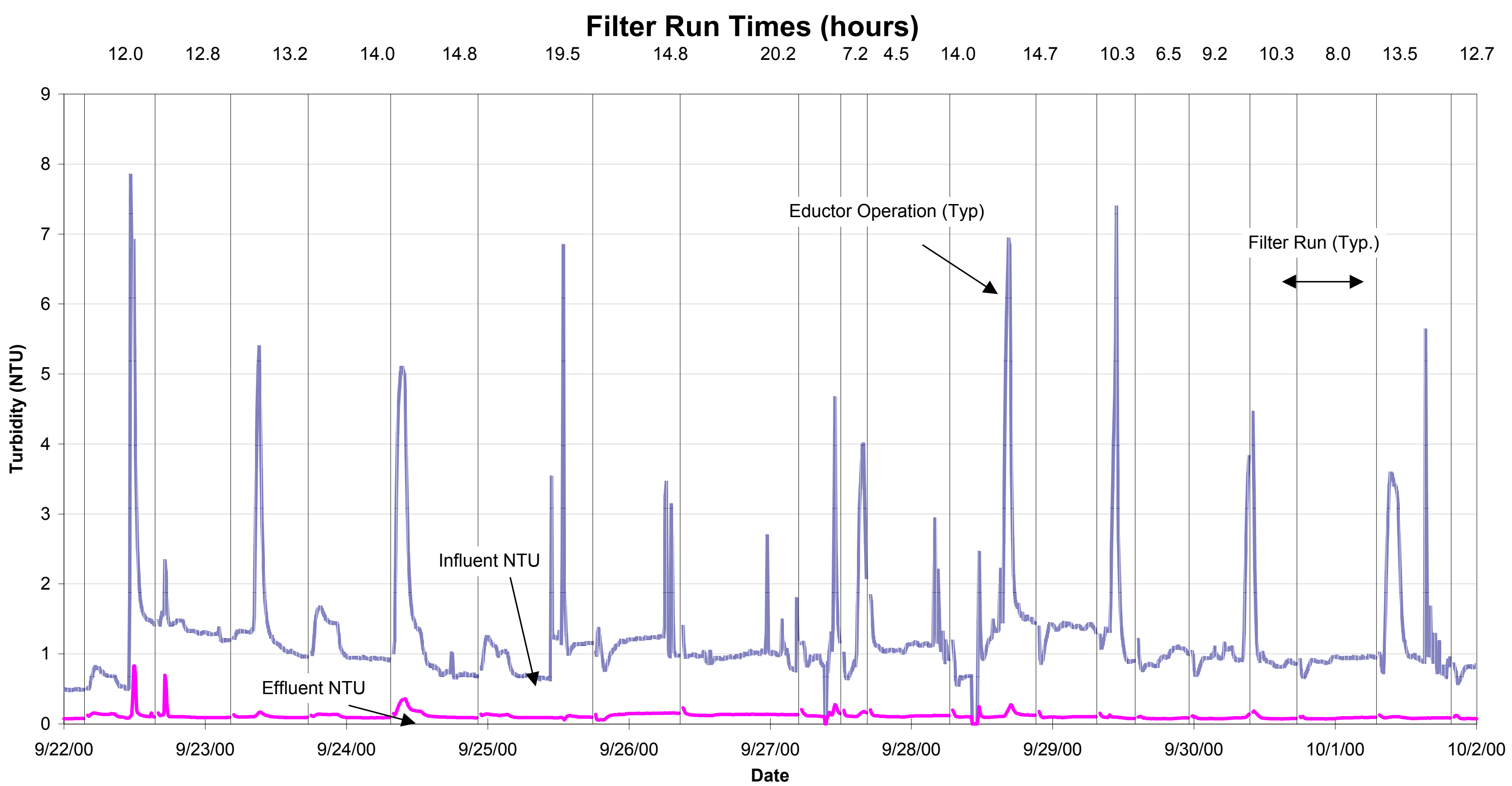


Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 9/12/00 - 9/22/00

FIGURE 36

Prepared for: AEROJET	Phase 2 Treatability Study Sacramento, CA	Job Number 52296.4.1	Date 4/17/01



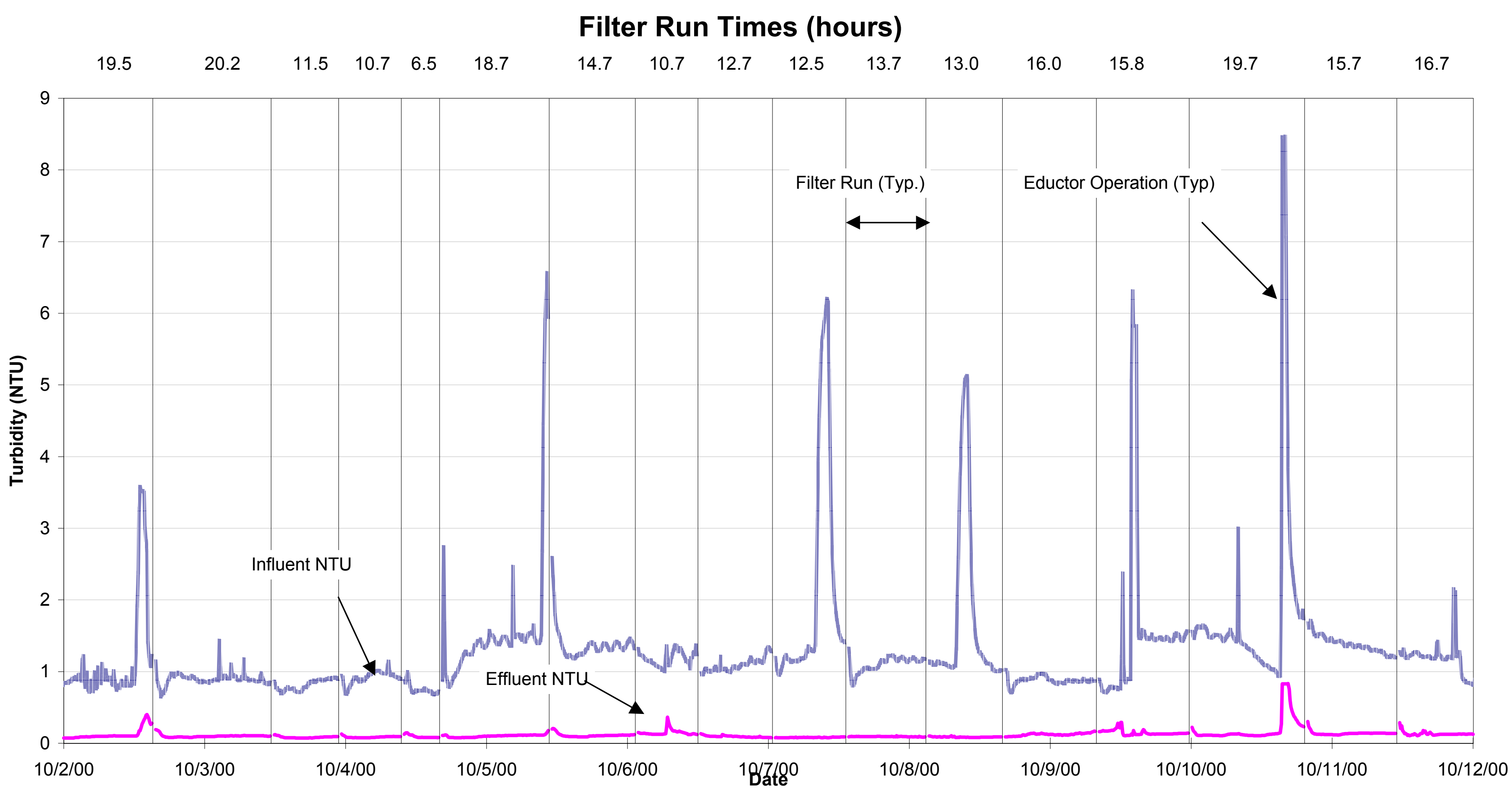
Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 9/22/00 - 10/2/00

FIGURE 37

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE

A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 10/2/00 - 10/12/00

FIGURE 38

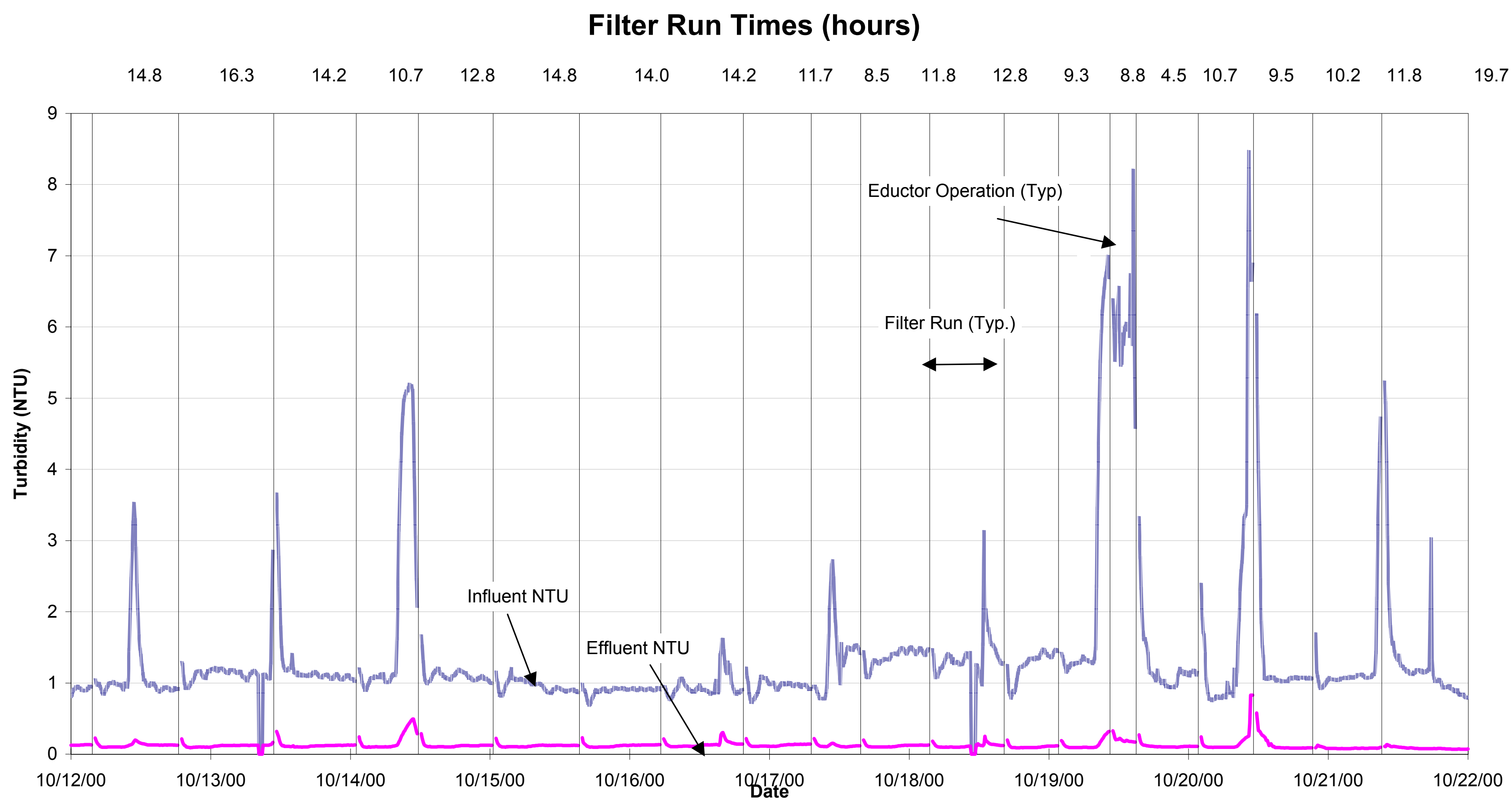
Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01

Fig34thru45-Filter_Runs Fig38



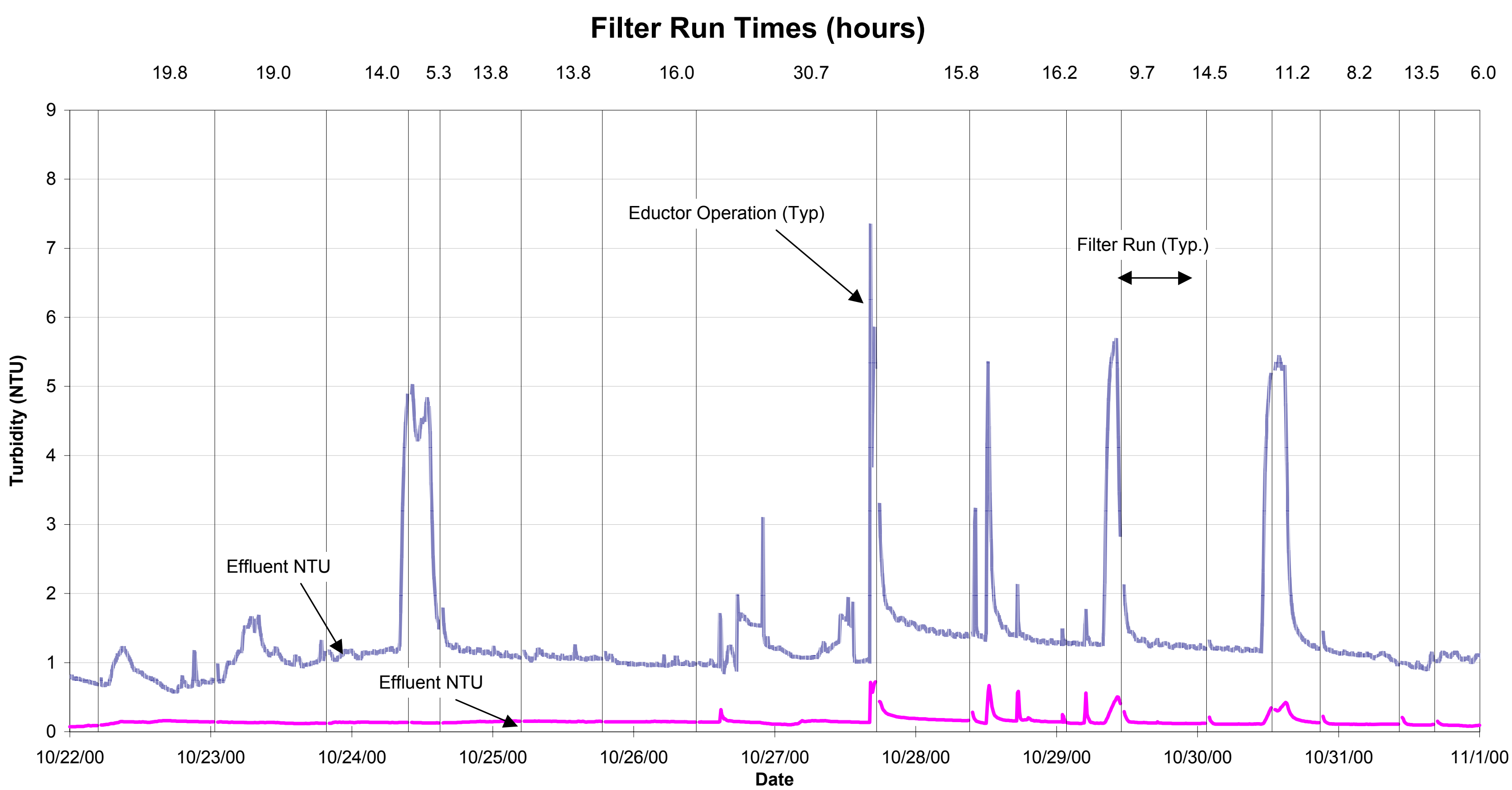
Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 10/12/00 - 10/22/00

FIGURE 39

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



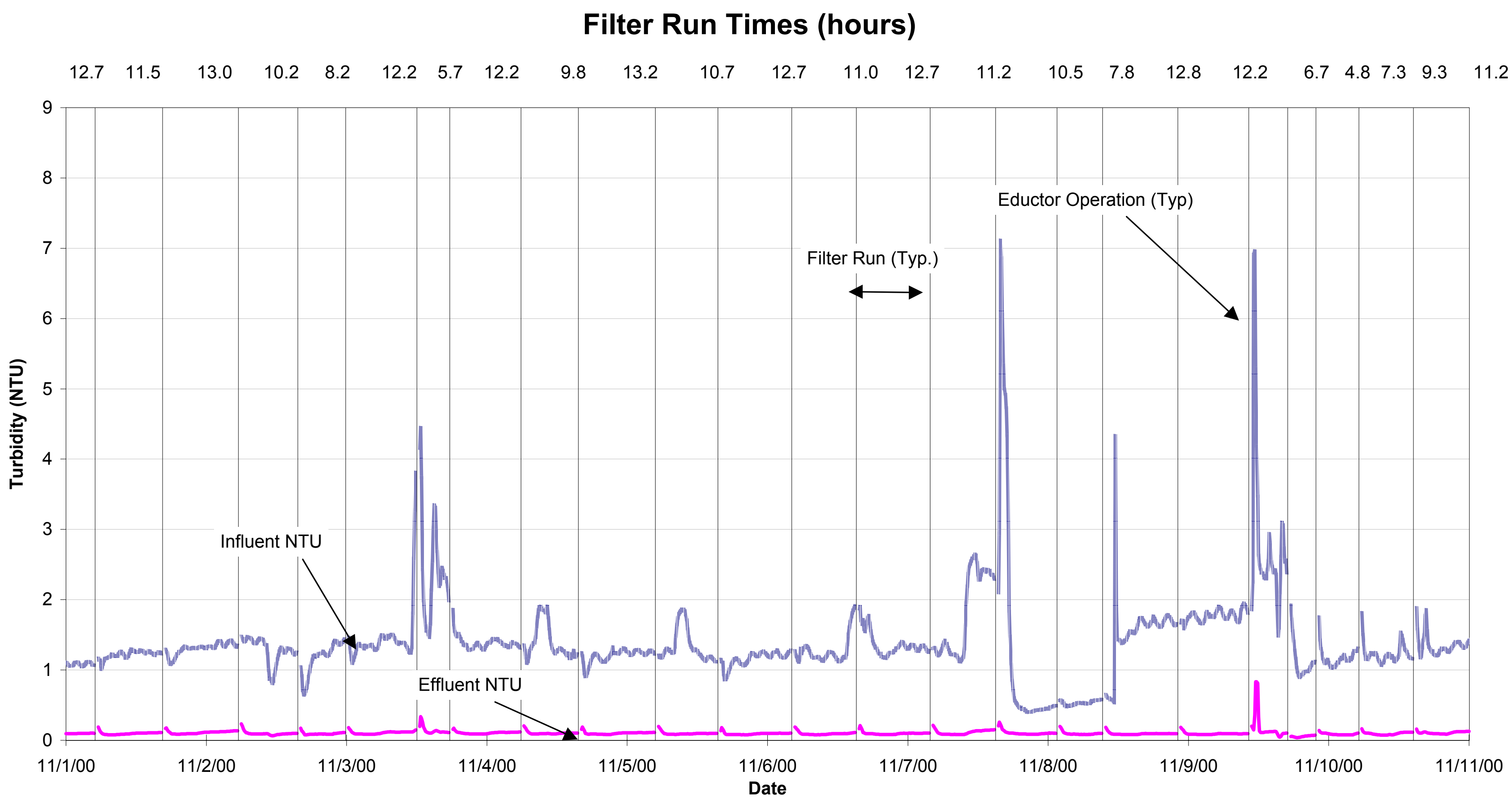
Harding ESE
A MACTEC COMPANY

Prepared for: AEROJET

Filter Turbidity Curves and Filter Run Times for 10/22/00 - 11/1/00

FIGURE 40

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 11/1/00 - 11/11/00

FIGURE 41

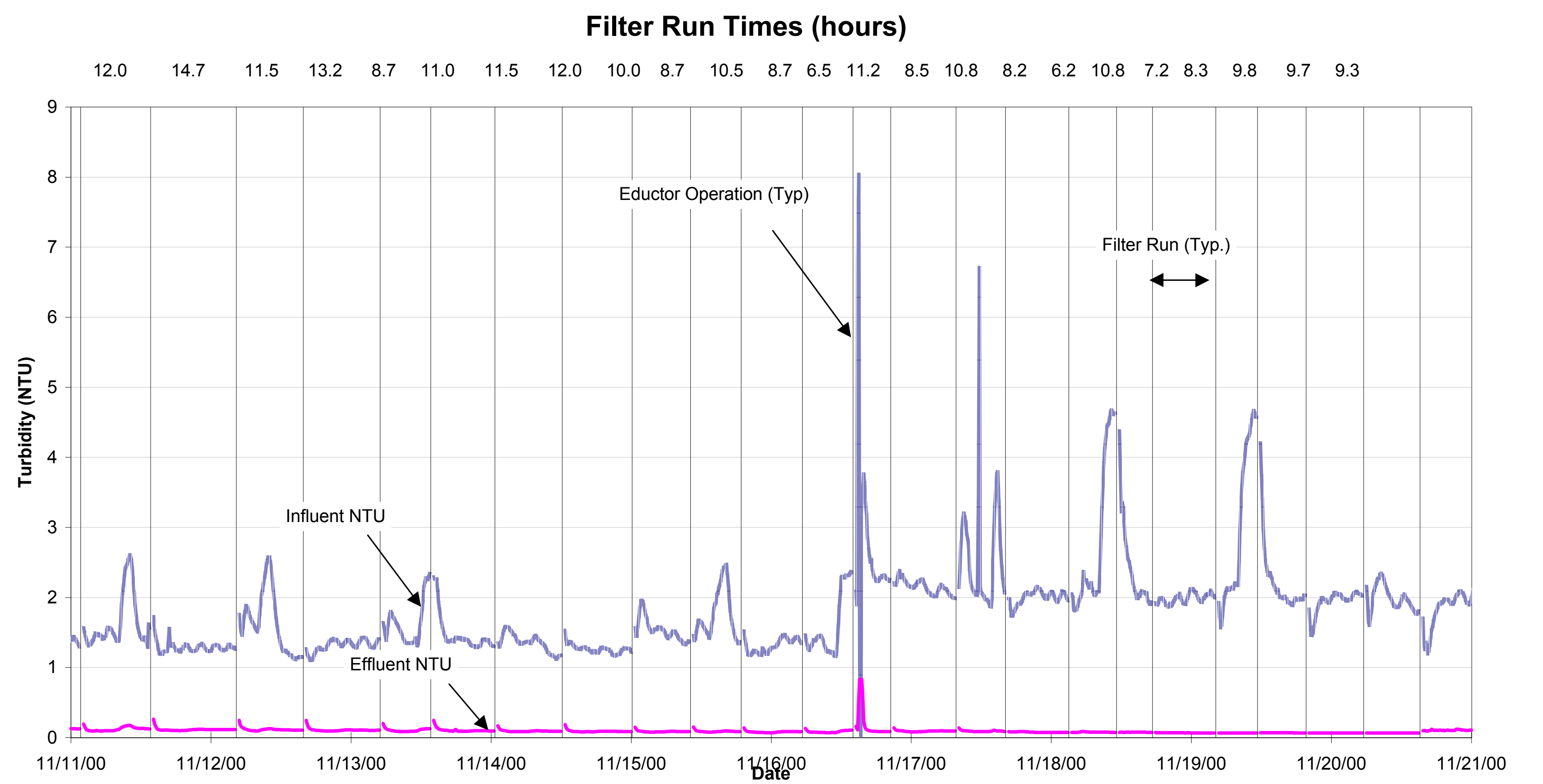
Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01

Fig34thru45-Filter_Runs Fig41



Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 11/11/00 - 11/21/00

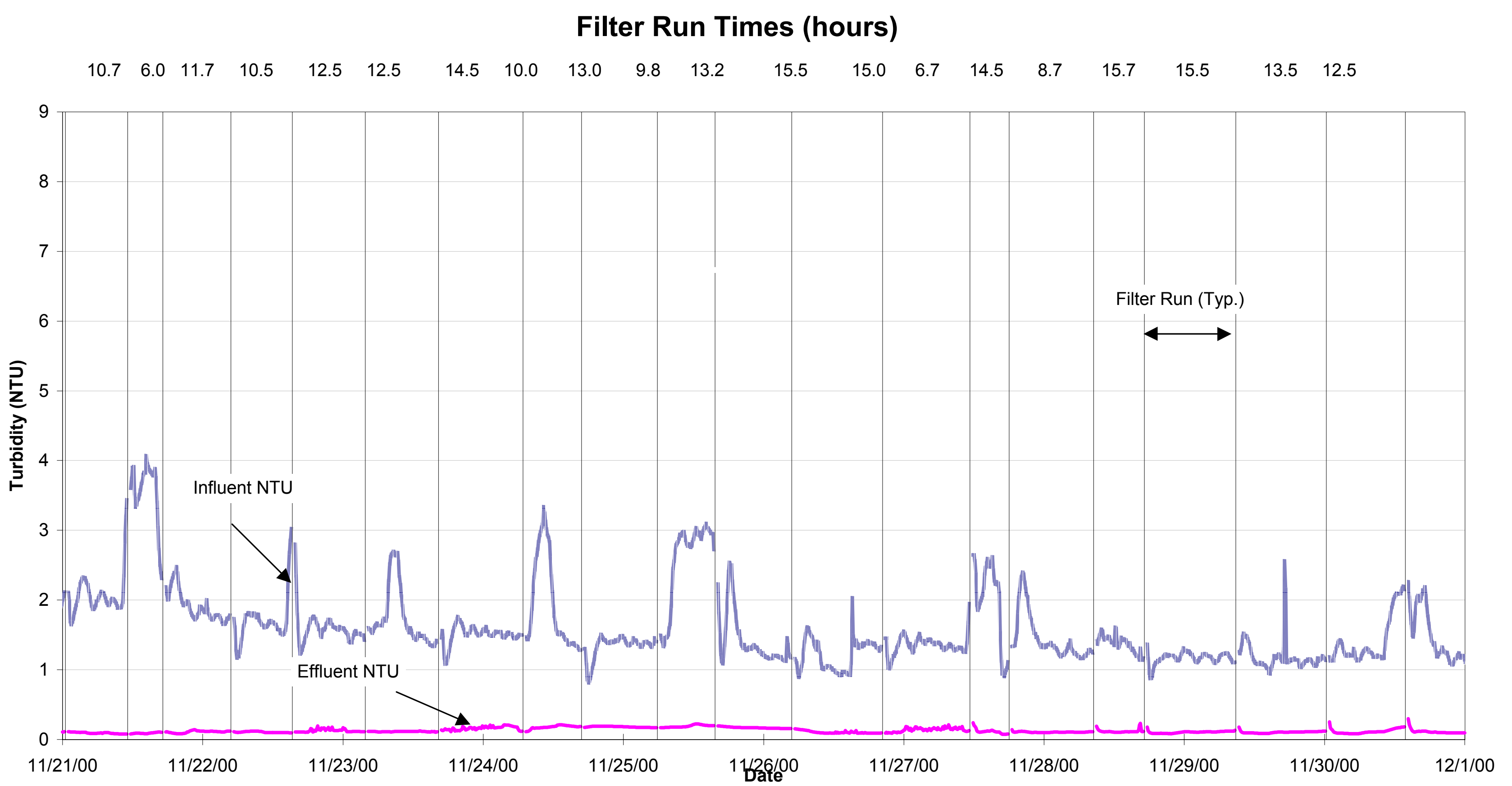
FIGURE 42

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01



Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 11/21/00 - 12/1/00

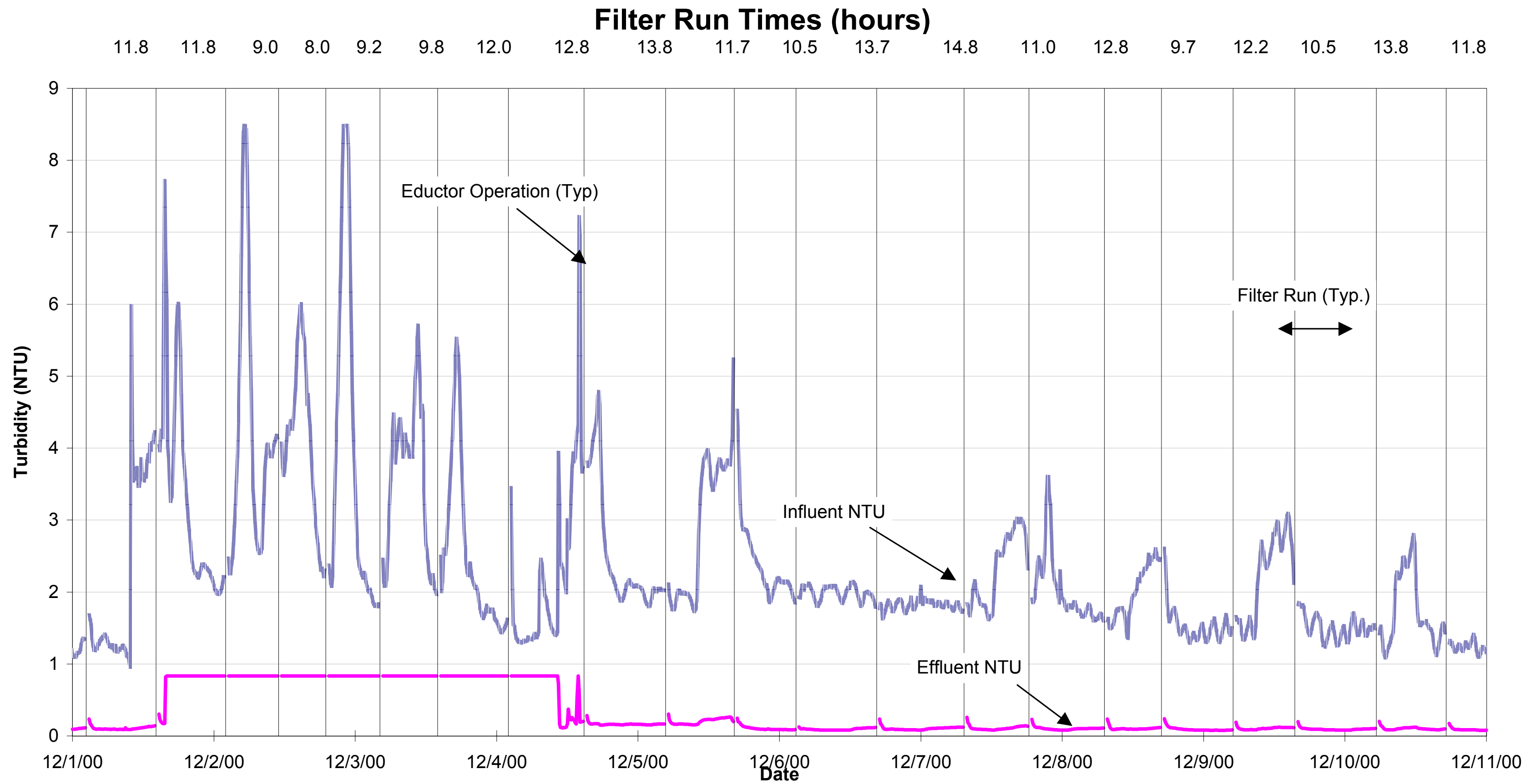
FIGURE 43

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01



Harding ESE
A MACTEC COMPANY

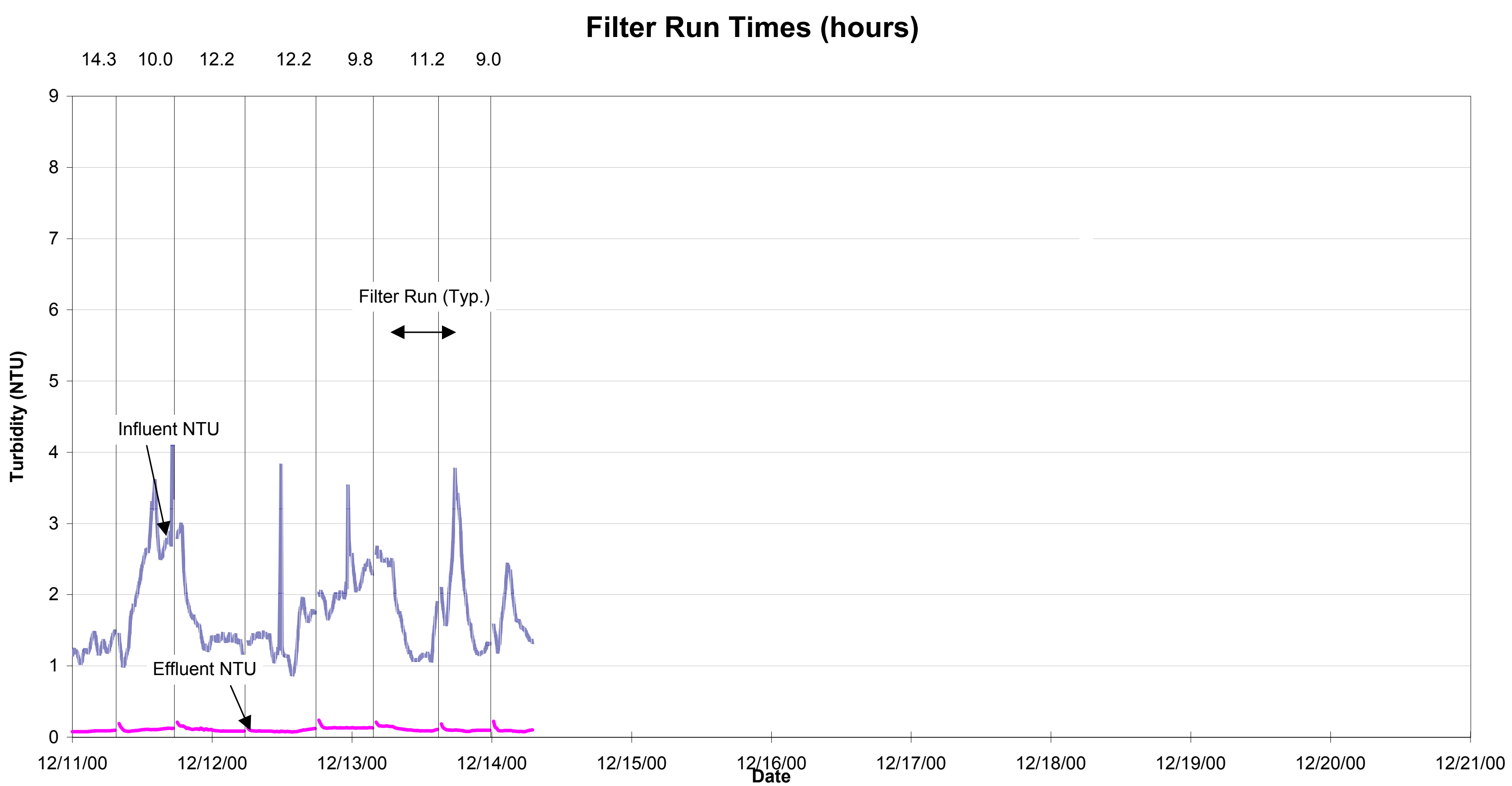
Filter Turbidity Curves and Filter Run Times for 12/1/00 - 12/11/00

FIGURE 44

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01

Fig34thru45-Filter_Runs Fig44

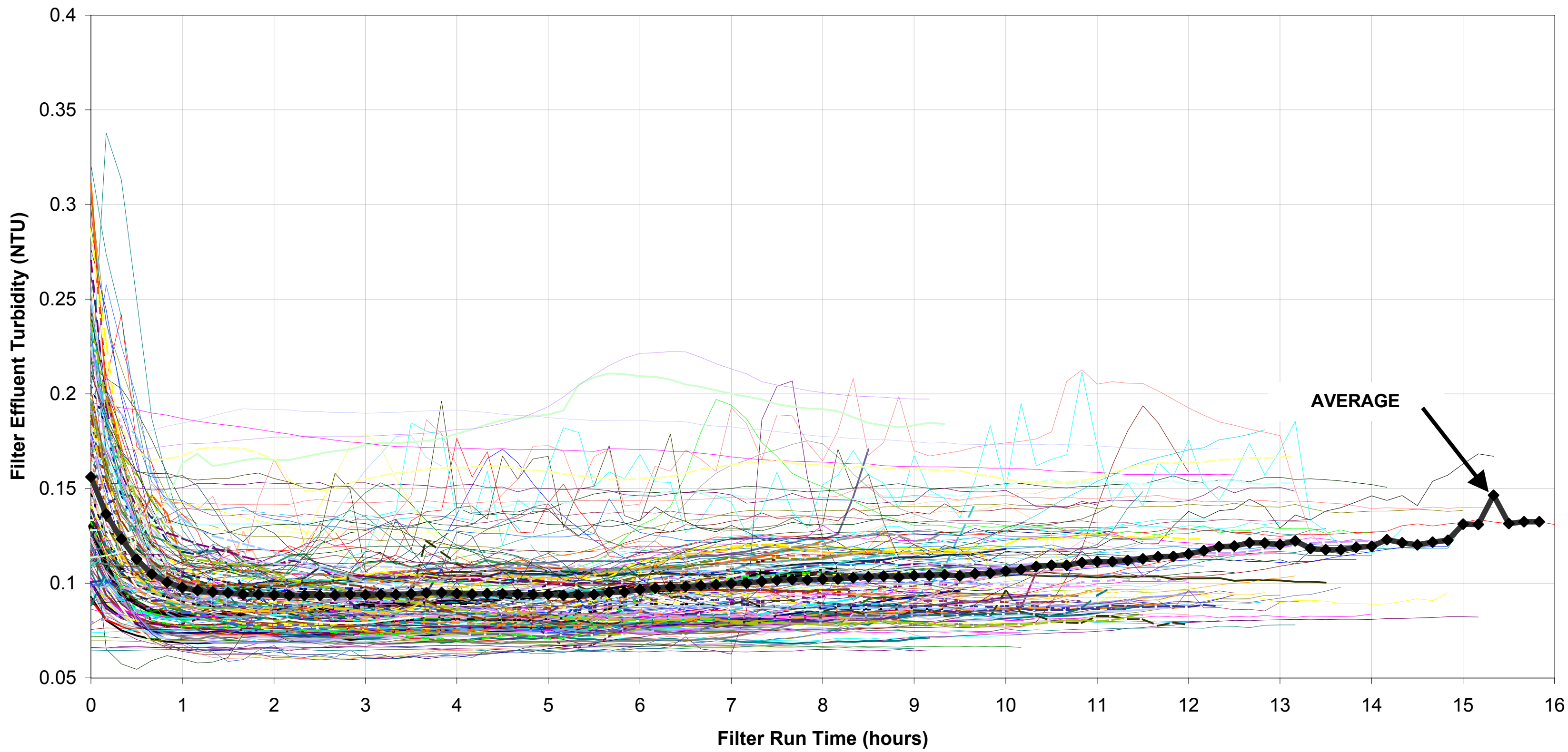


Harding ESE
A MACTEC COMPANY

Filter Turbidity Curves and Filter Run Times for 12/11/00 - 12/21/00

FIGURE 45

Prepared for: AEROJET	**Phase 2 Treatability Study** **Sacramento, CA**	**Job Number** **52296.4.1**	**Date** **4/17/01**



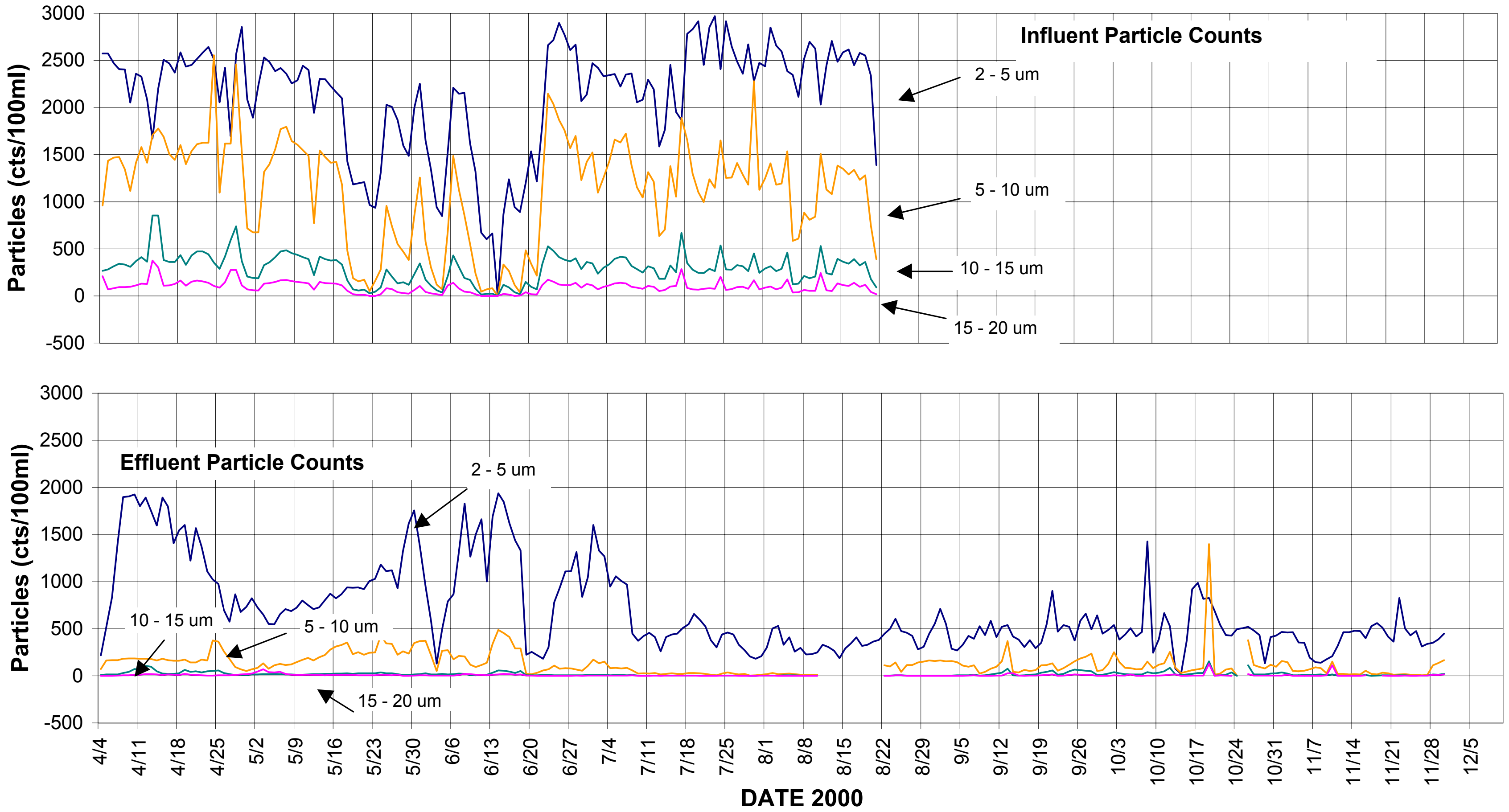
Note: Effluent turbidity curves not included for filter runs during and immediately after eductor operation

Harding ESE
A MACTEC COMPANY

Filter Effluent Turbidity Curves for 8/23/00 - 12/14/00 (Approx. 200 Filter Runs)

FIGURE 46

Prepared for: AEROJET	**Phase 2 Treatability Study**	**Job Number**	**Date**
	Sacramento, CA	**52296.4.1**	**4/17/01**



Harding ESE
A MACTEC COMPANY

Multimedia Filter Particle Counts

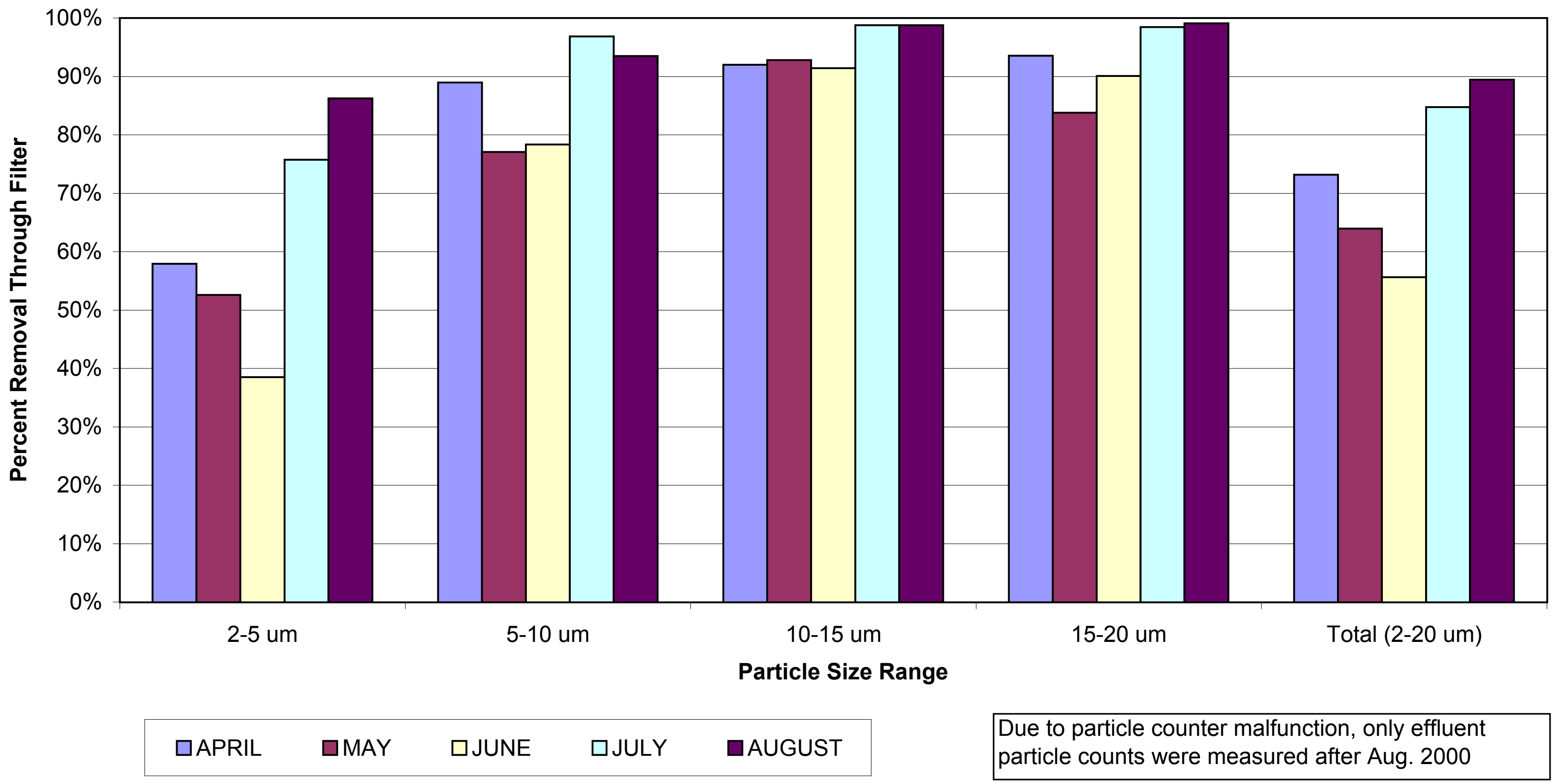
FIGURE 47

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Numbe 52296.4.1

Date 4/17/01



Harding ESE
A MACTEC COMPANY

Multimedia Filter Average Monthly Particle Removals

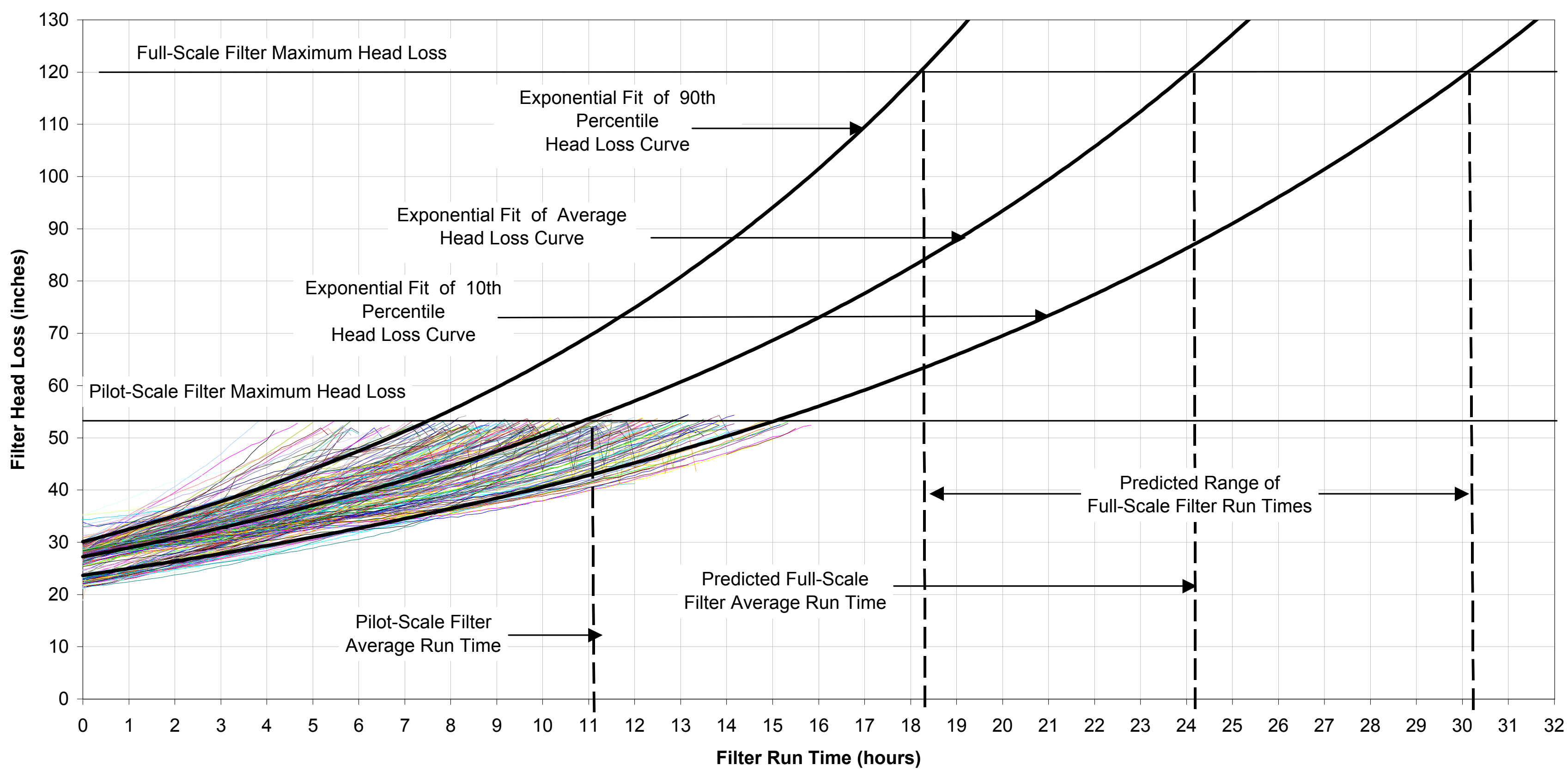
FIGURE 48

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



Note: Head loss curves not included for filter runs during and immediately after eductor operation

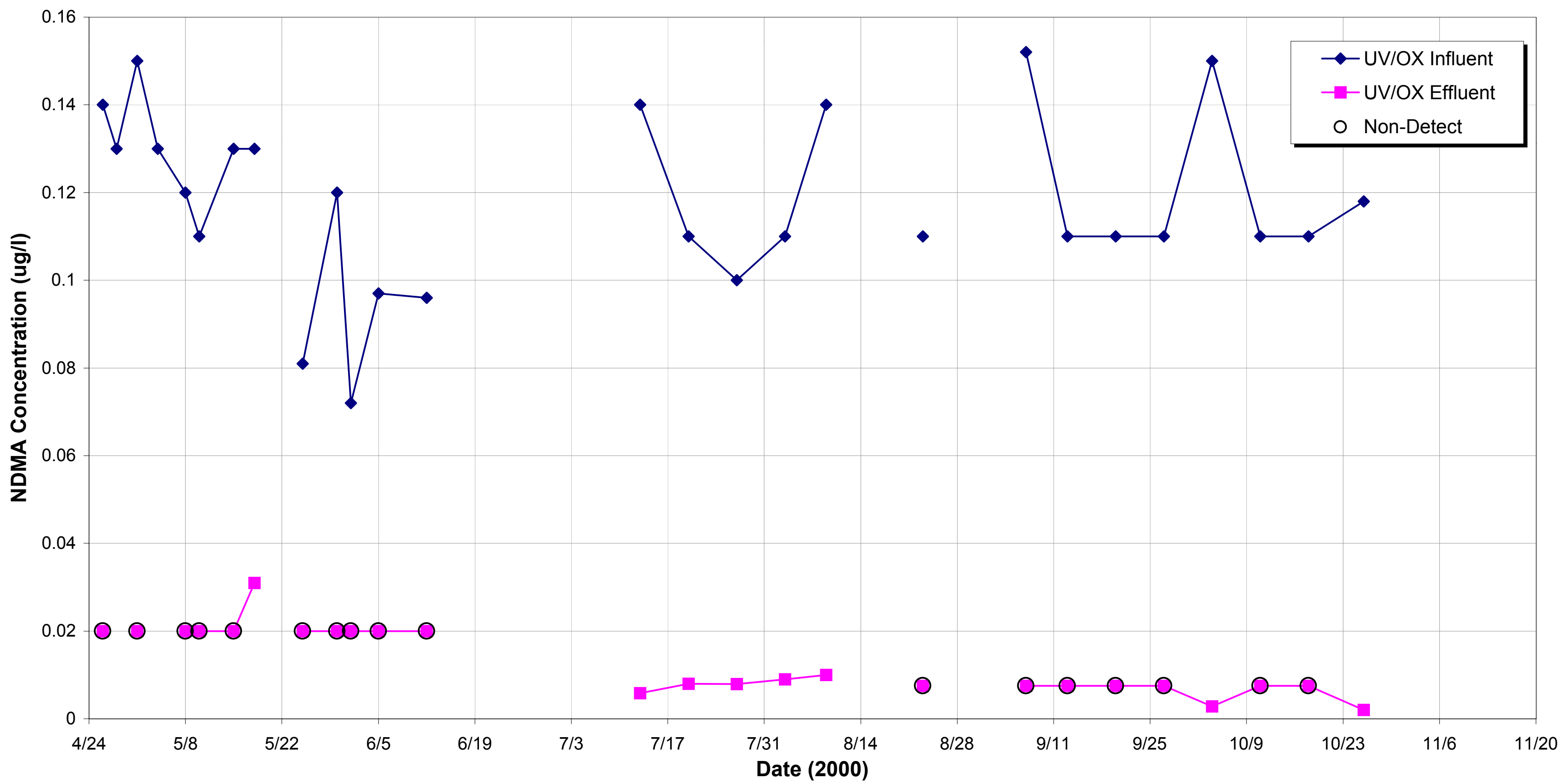
Harding ESE
A MACTEC COMPANY

Filter Head Loss Curves for
8/23/00 - 12/14/00 (Approx. 200 Filter Runs)

FIGURE
49

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	8/2/01



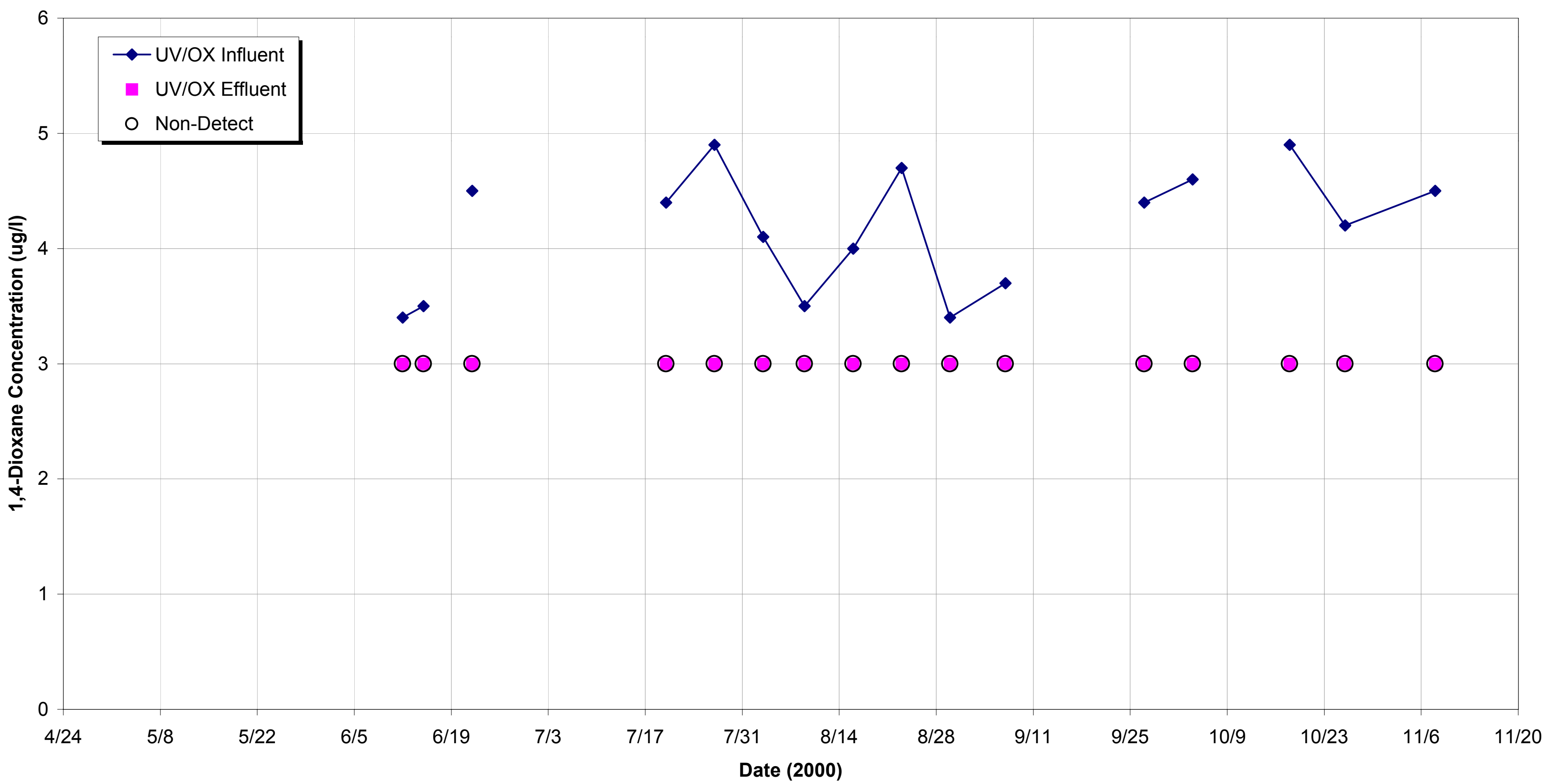
Harding ESE
A MACTEC COMPANY

UV/OX - NDMA Concentrations

FIGURE
50

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

UV/OX - 1,4 Dioxane Concentrations

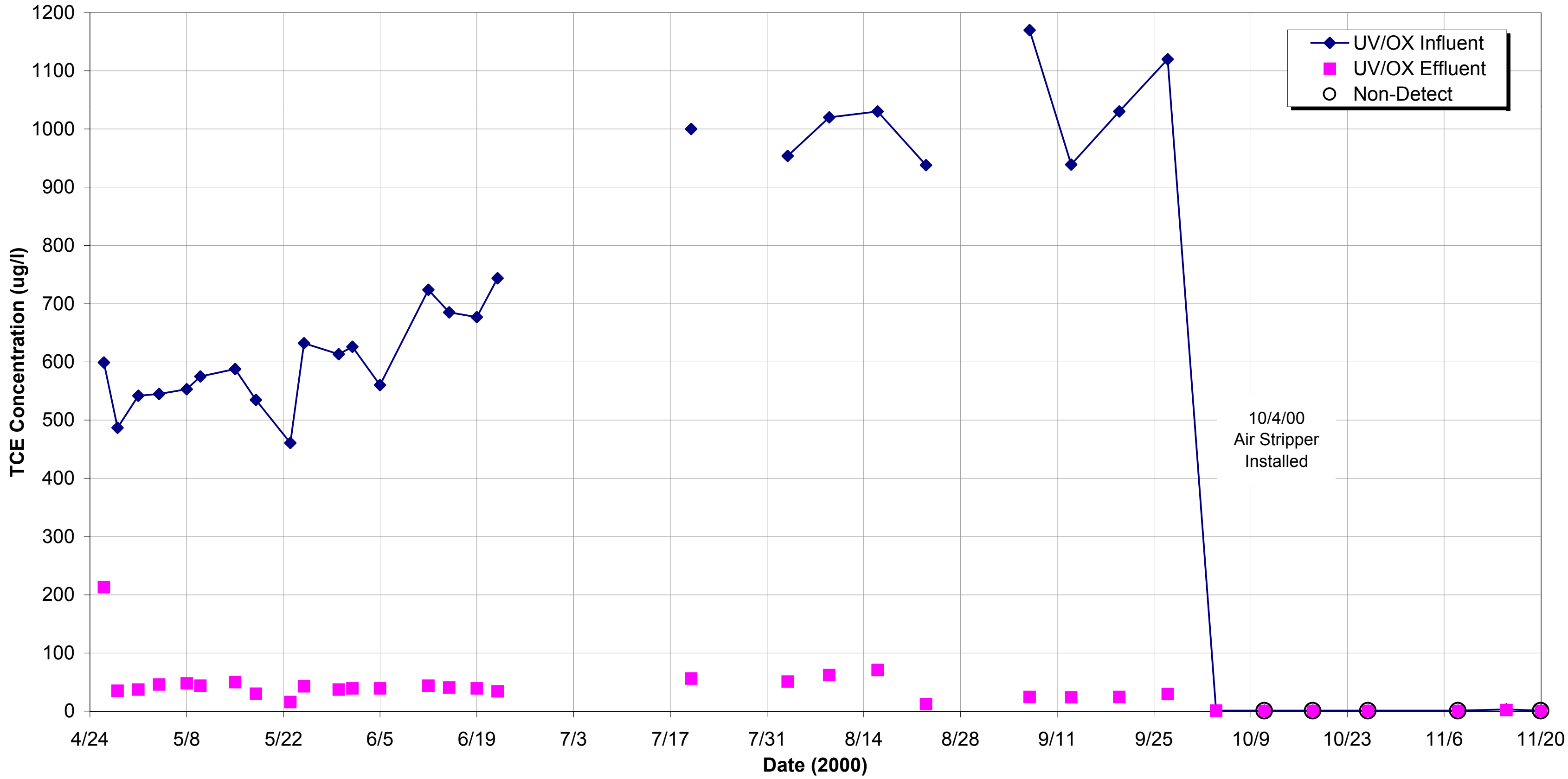
FIGURE
51

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



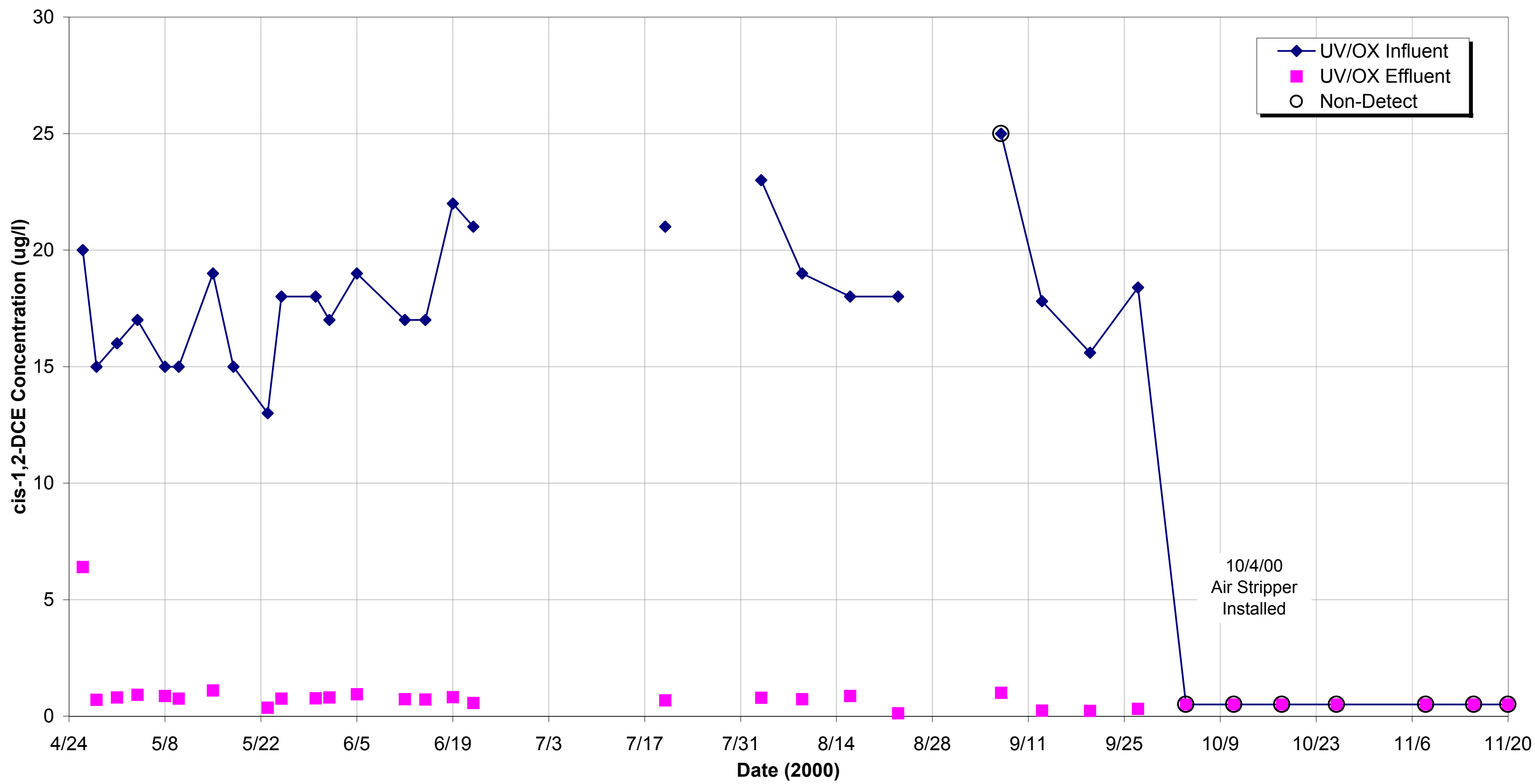
Harding ESE
A MACTEC COMPANY

UV/OX - TCE Concentrations

FIGURE
52

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



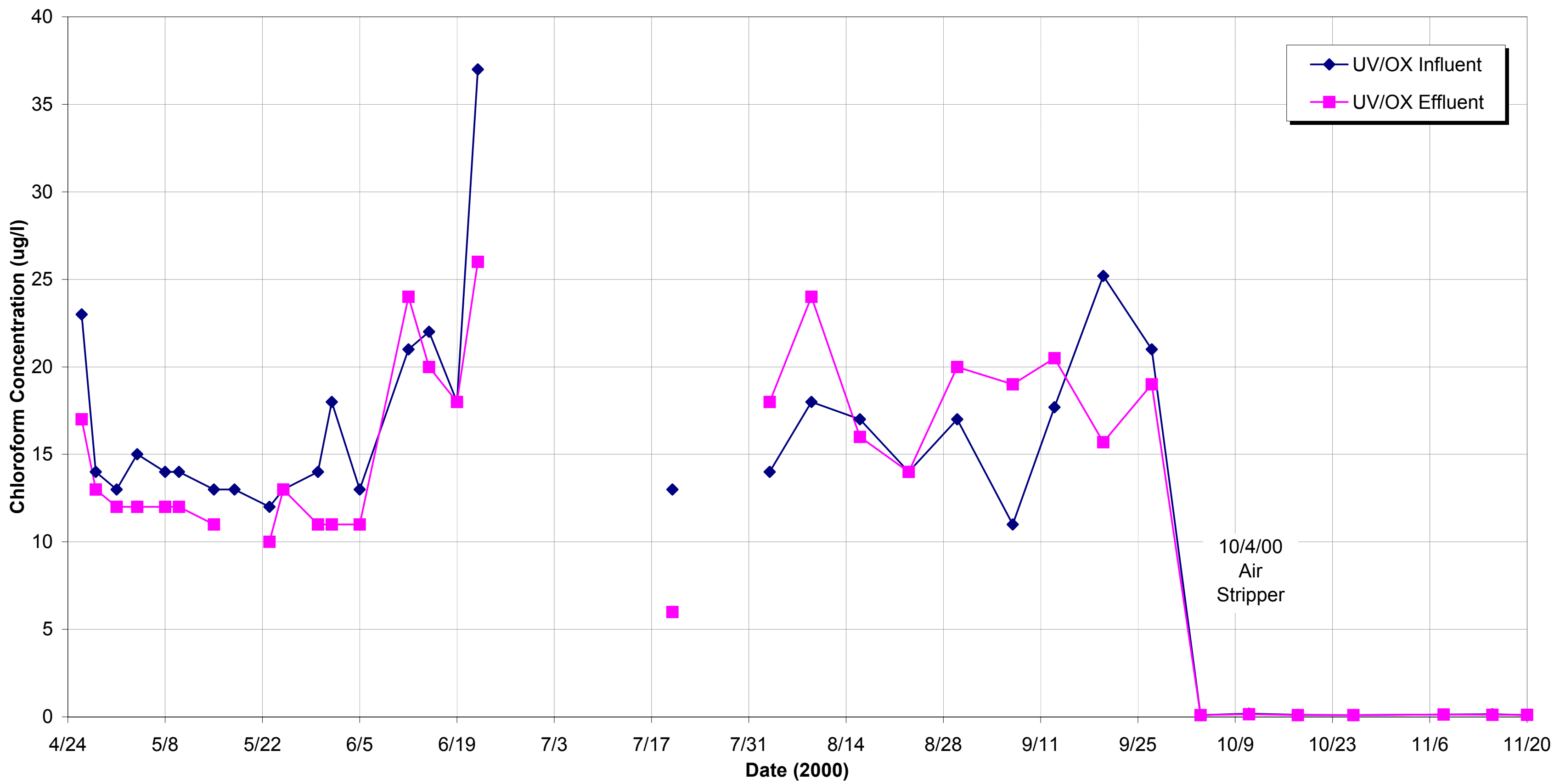
Harding ESE
A MACTEC COMPANY

UV/OX - cis - 1,2 - DCE Concentrations

FIGURE 53

Prepared for: AEROJET	Phase 2 Treatability Study Sacramento, CA	Job Number 52296.4.1	Date 4/17/01

Fig50thru57-UVOX-HESE Fig53



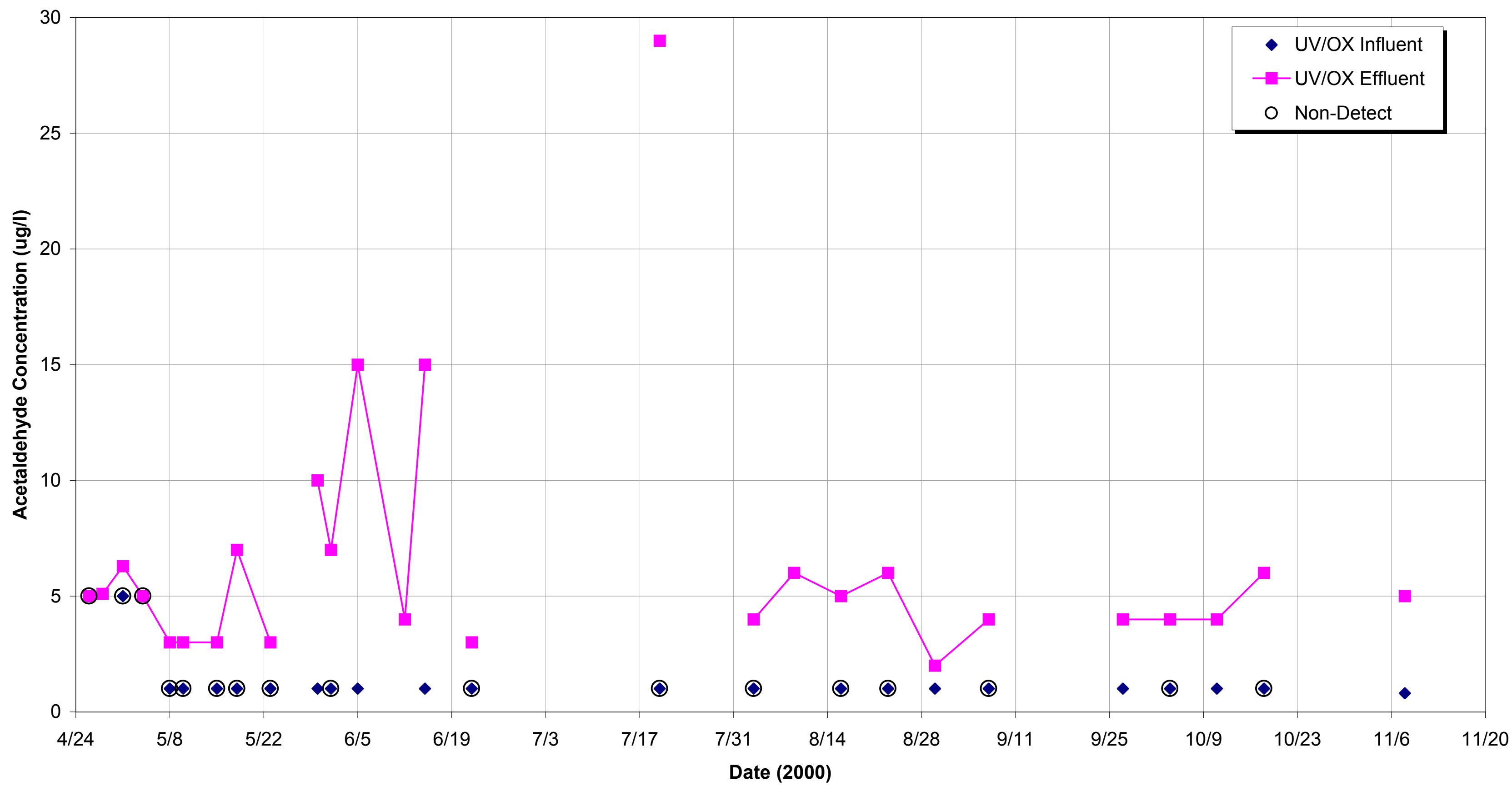
Harding ESE
A MACTEC COMPANY

UV/OX - Chloroform Concentrations

FIGURE
54

Prepared for: AEROJET

Phase 2 Treatability Study	**Job Number**	**Date**
Sacramento, CA	**52296.4.1**	**4/17/01**



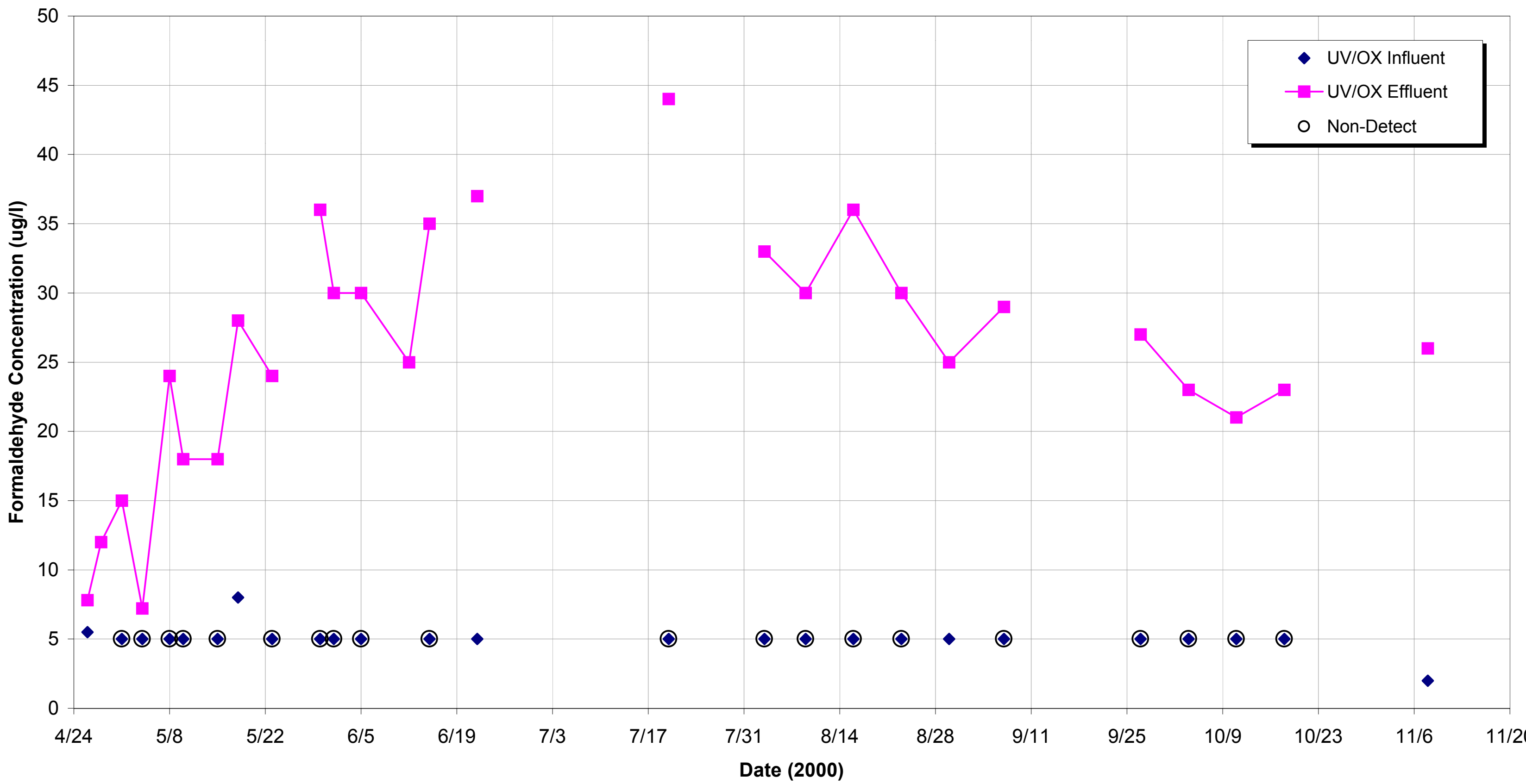
Harding ESE
A MACTEC COMPANY

UV/OX - Acetaldehyde Concentrations

FIGURE 55

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

UV/OX - Formaldehyde Concentrations

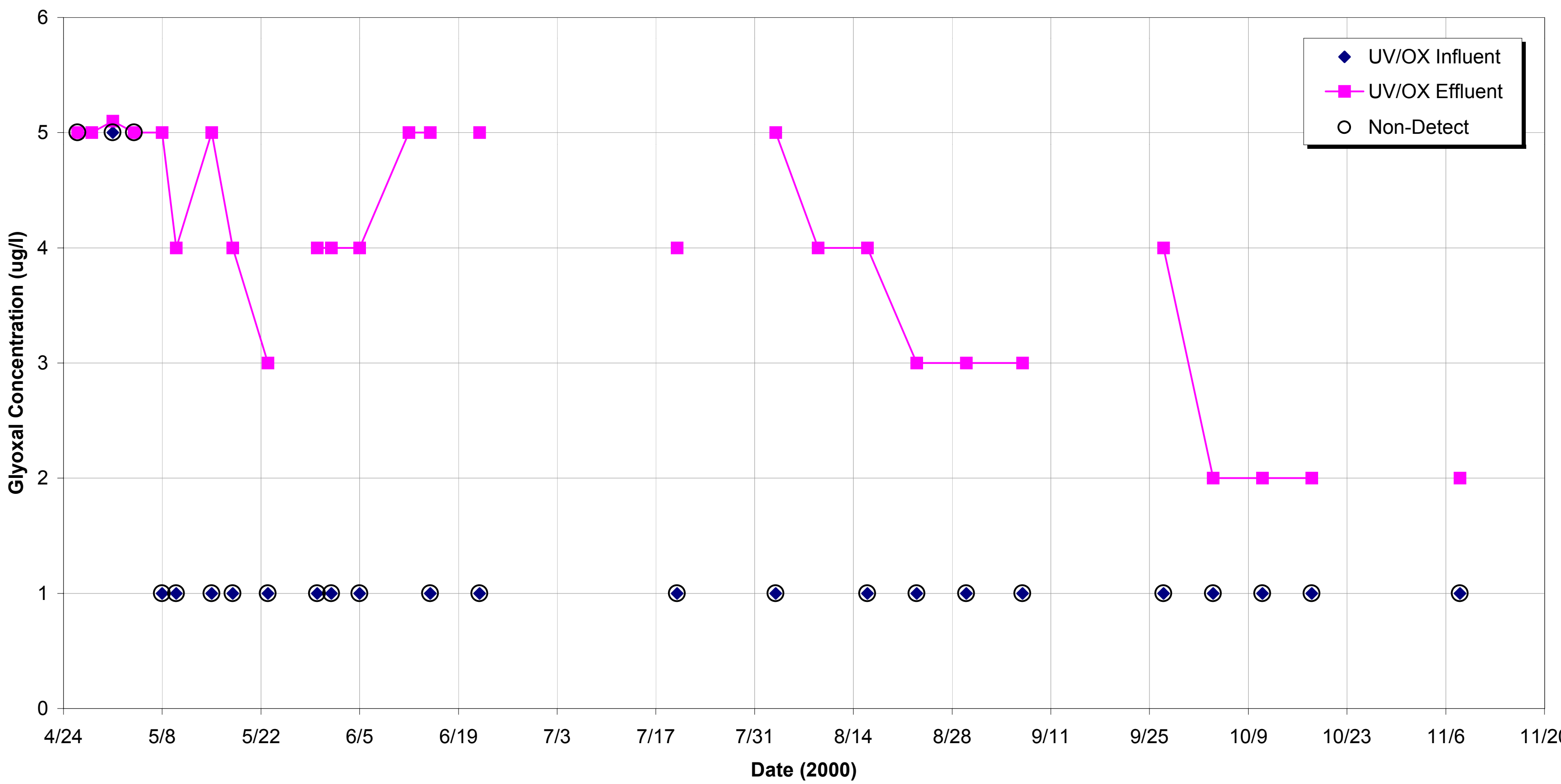
FIGURE
56

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



Harding ESE

A MACTEC COMPANY

UV/OX - Glyoxal Concentrations

FIGURE

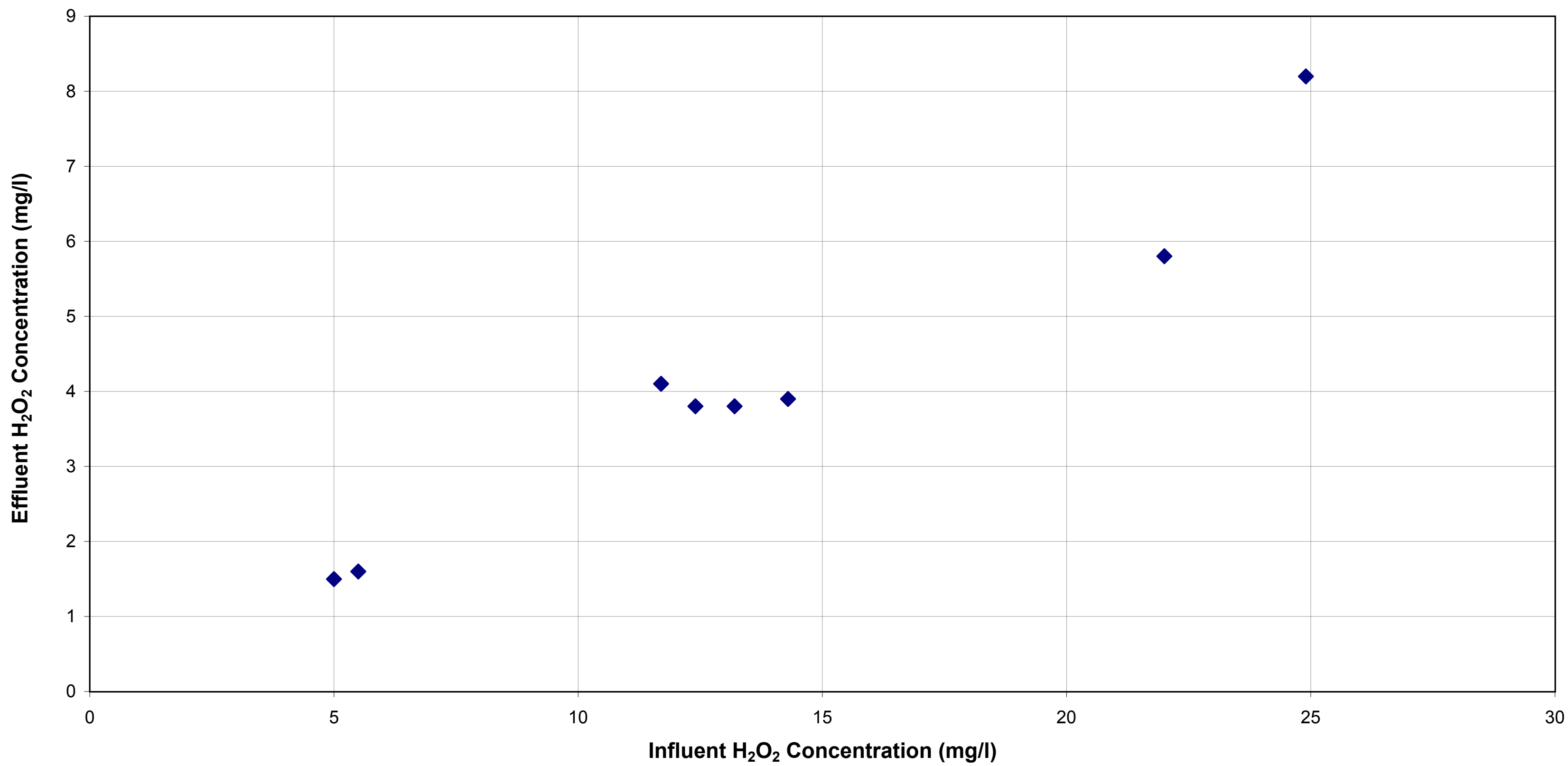
57

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



Harding ESE
A MACTEC COMPANY

HYDRO GEO CHEM, INC.
Environmental Science & Technology

H_2O_2 Influent Concentration vs. H_2O_2 Effluent Concentration

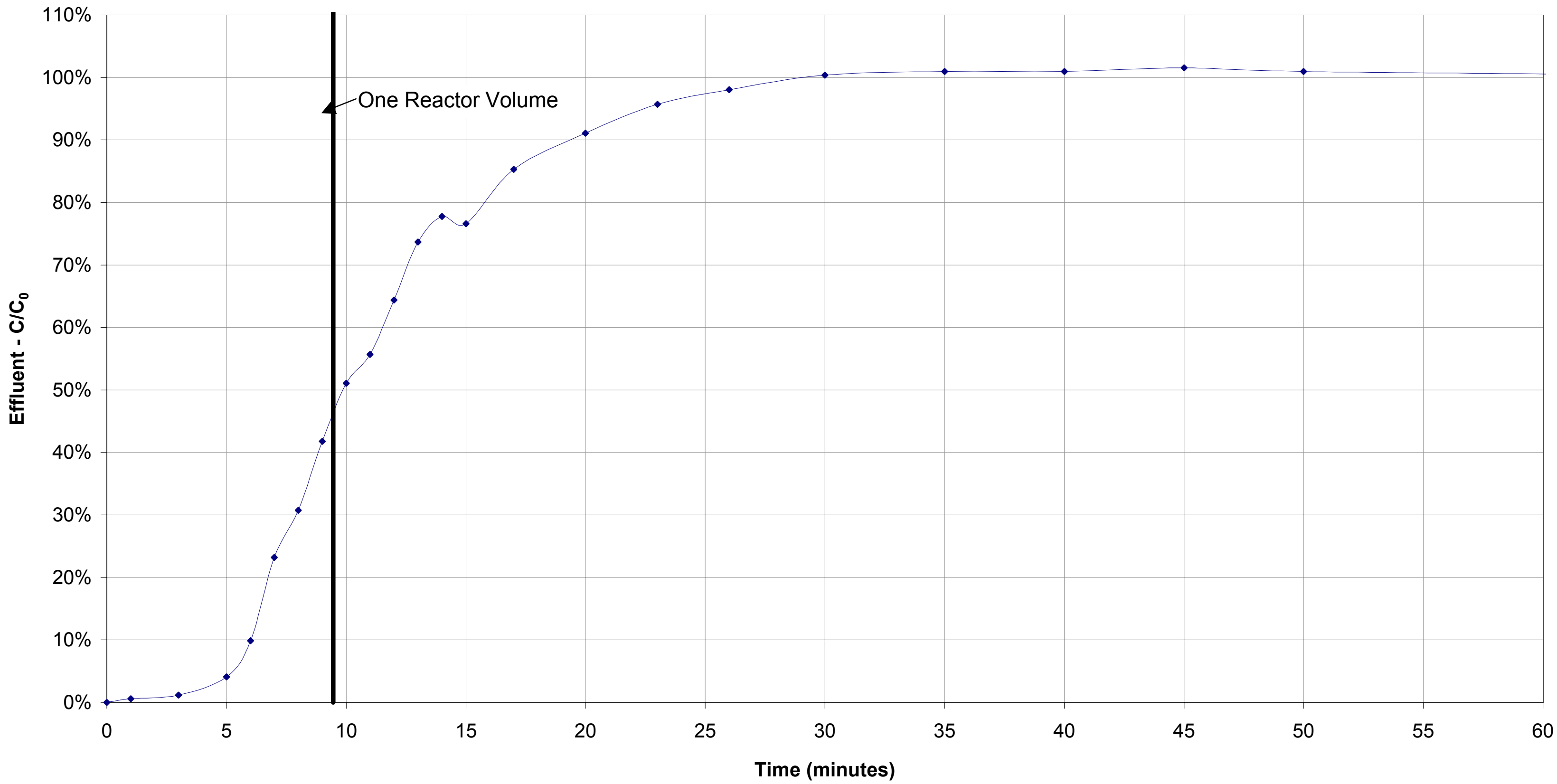
FIGURE 58

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number 52296.4.1

Date 4/17/01



Harding ESE
A MACTEC COMPANY

HYDRO GEO CHEM, INC.
Environmental Science & Technology

Tracer Test Breakthrough Curve

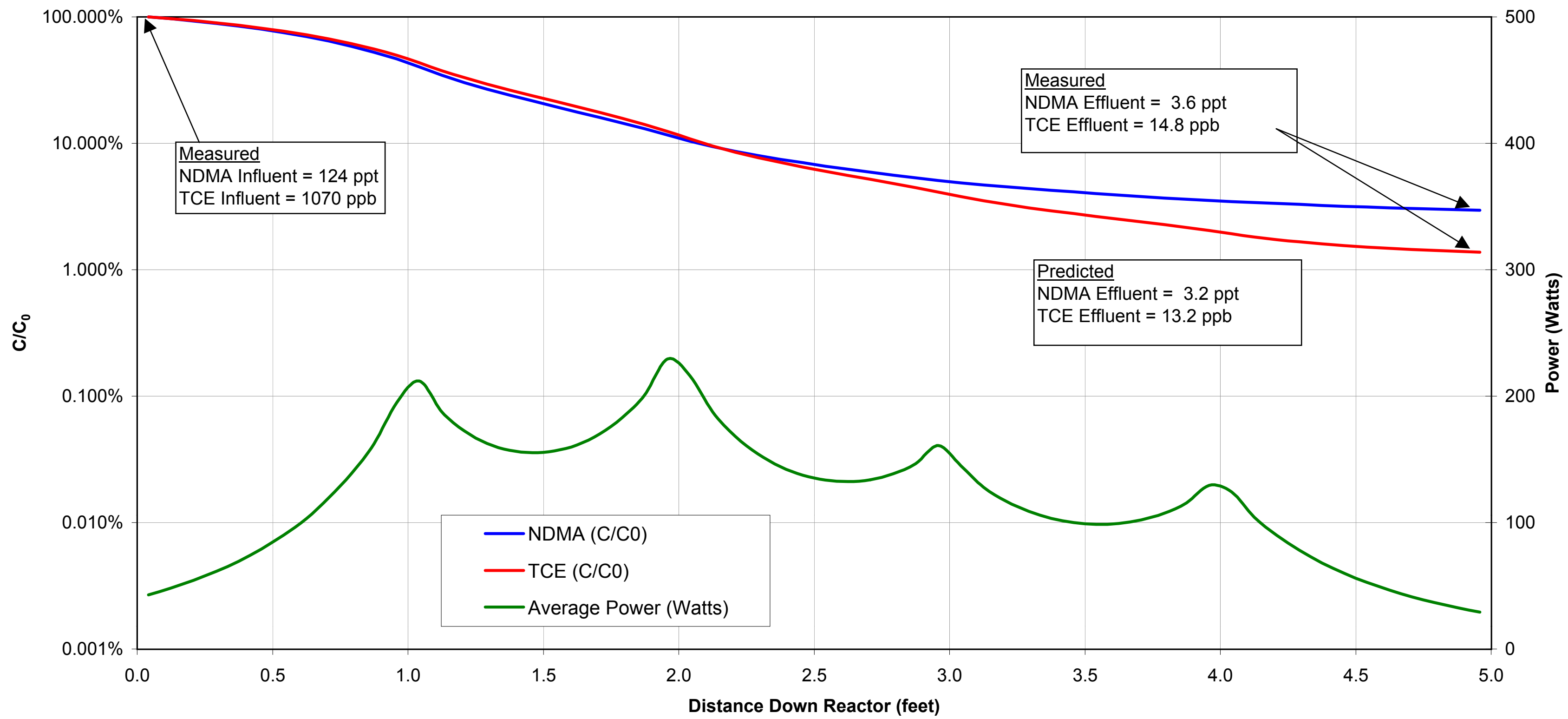
FIGURE
59

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



Harding ESE
A MACTEC COMPANY

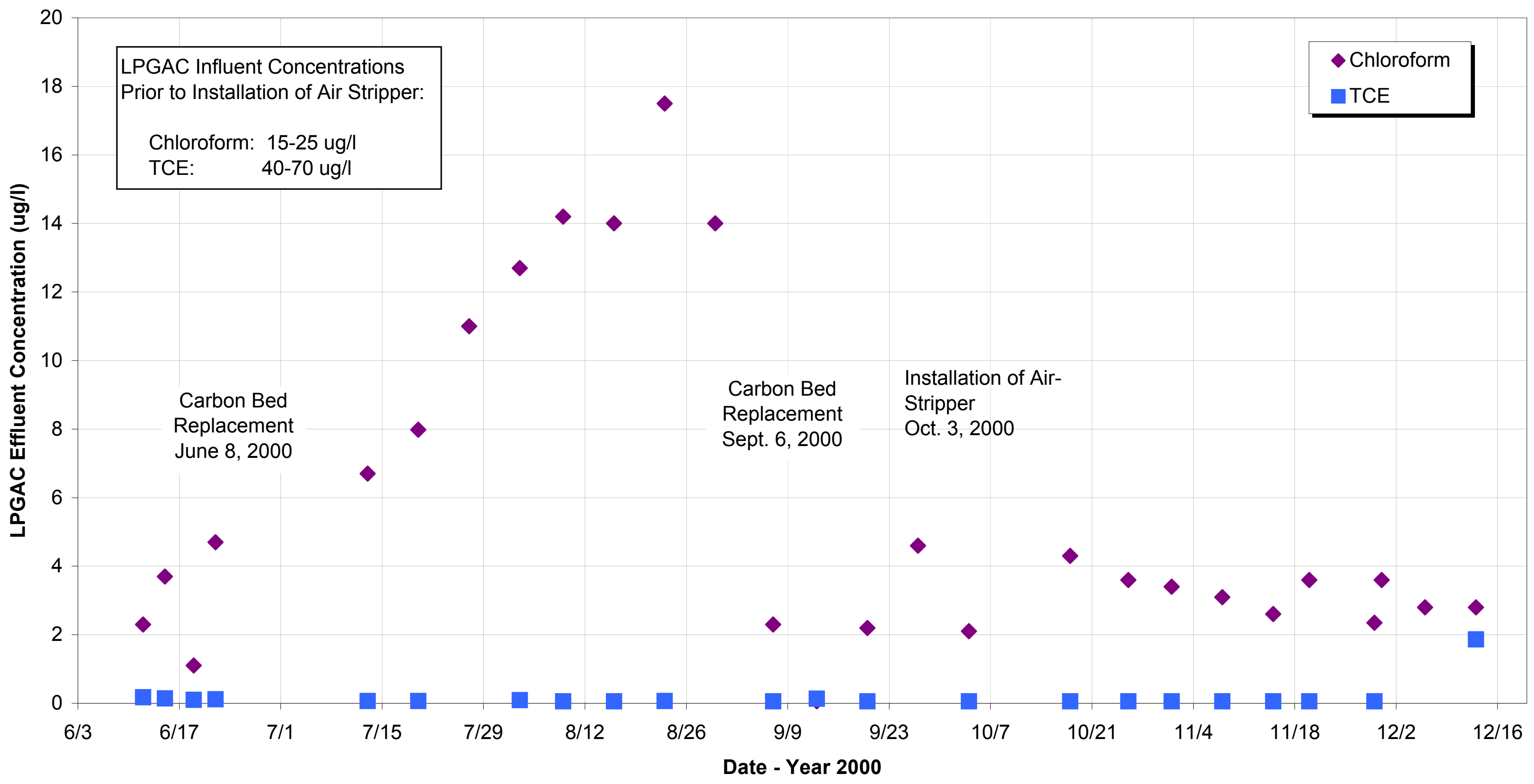
HYDRO GEO CHEM, INC.
Environmental Science & Technology

Predicted and Measured NDMA, TCE and Average Power vs. Distance Down Reactor 2 16-Lamp Modules and 2 8-Lamp Modules,

FIGURE
60

Prepared for: AEROJET

Phase 2 Treatability Study	Job Number	Date
Sacramento, CA	52296.4.1	4/17/01



Harding ESE
A MACTEC COMPANY

LPGAC Effluent Chloroform and TCE Concentrations

FIGURE 61

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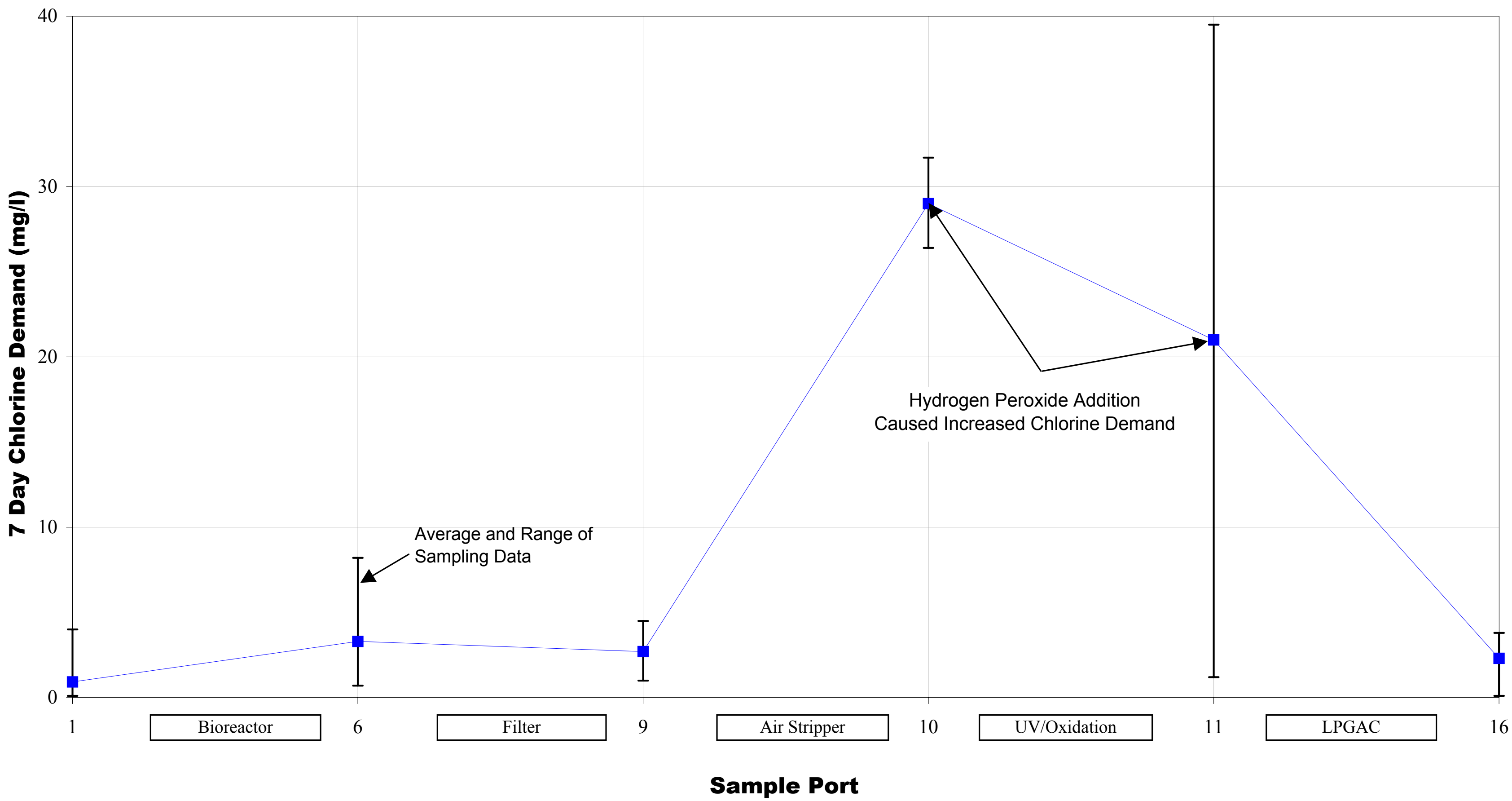
Phase 2 Treatability Study
Sacramento, CA

Job Numbe 52296.4.1

Date 4/17/01

Fig10&12&61-Op-Data Fig61



Harding ESE
A MACTEC COMPANY

Disinfection System
7 Day Chlorine Demand

FIGURE
62

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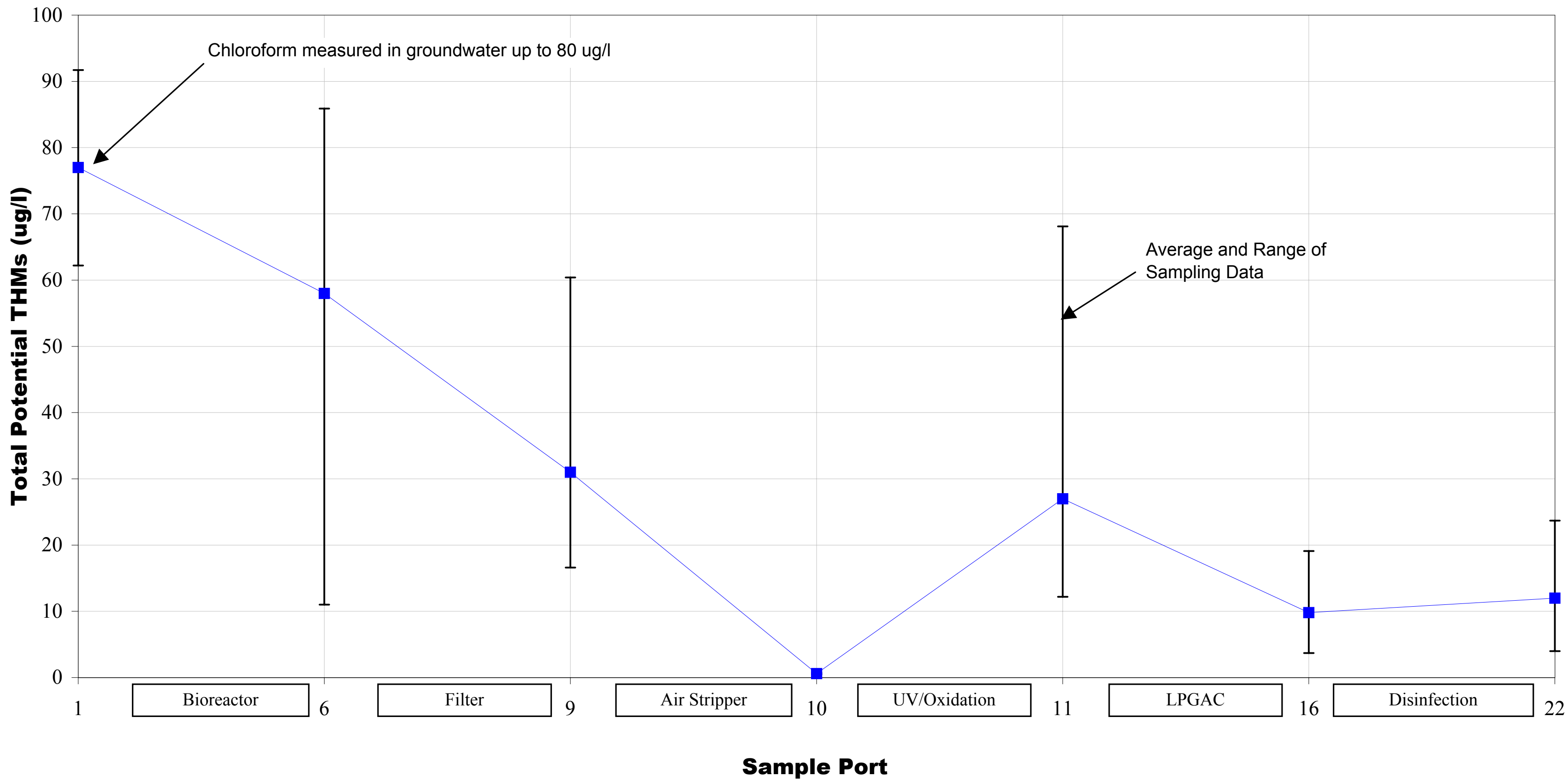
Phase 2 Treatability Study
Sacramento, CA

Job Numl
52296.4.1

Date
8/6/01



Harding ESE
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Disinfection System
Total Potential THM's

FIGURE
63

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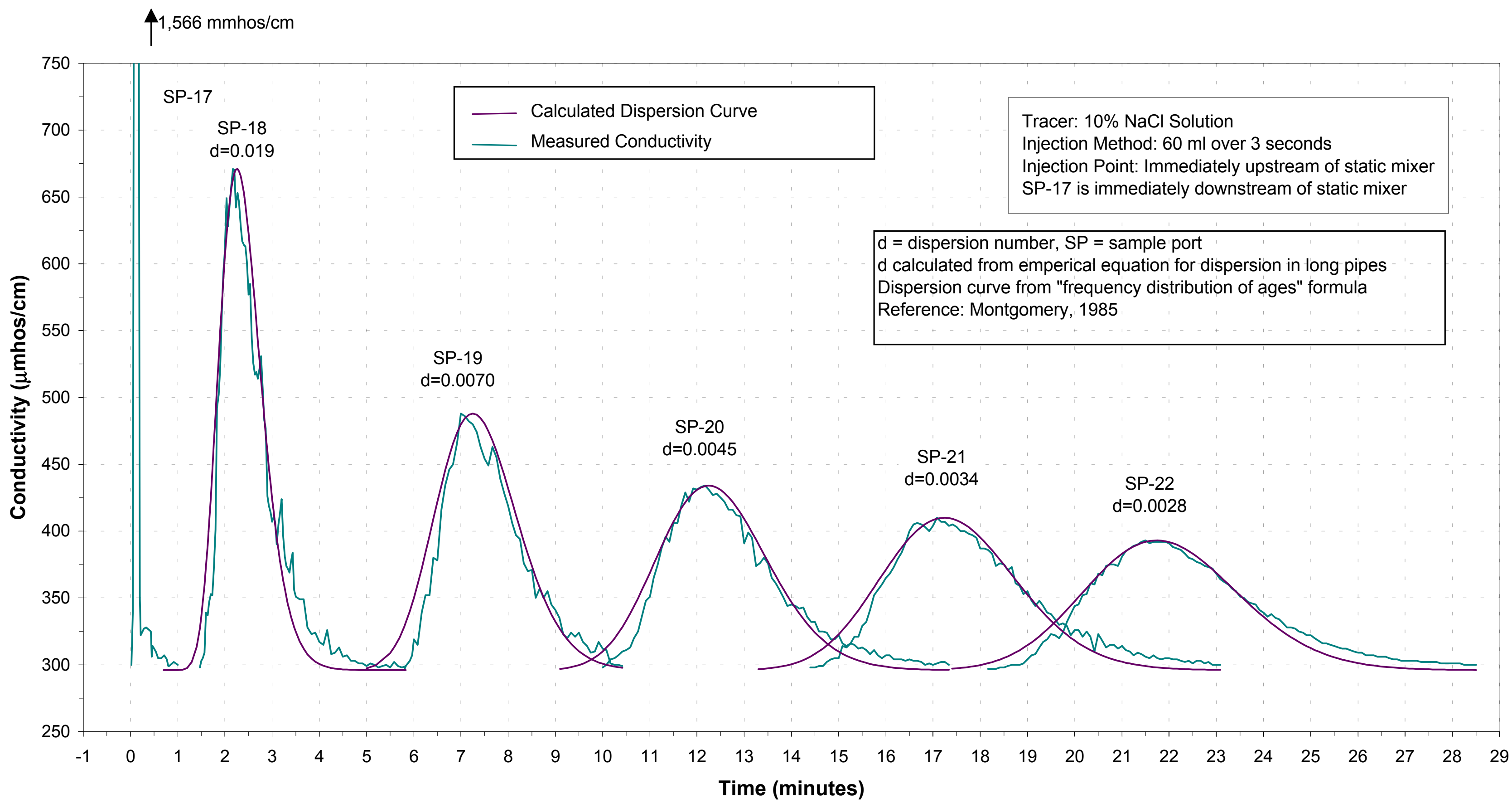
Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
8/6/01



Harding ESE
A MACTEC COMPANY

DISINFECTION SYSTEM TRACER STUDY

FIGURE
64

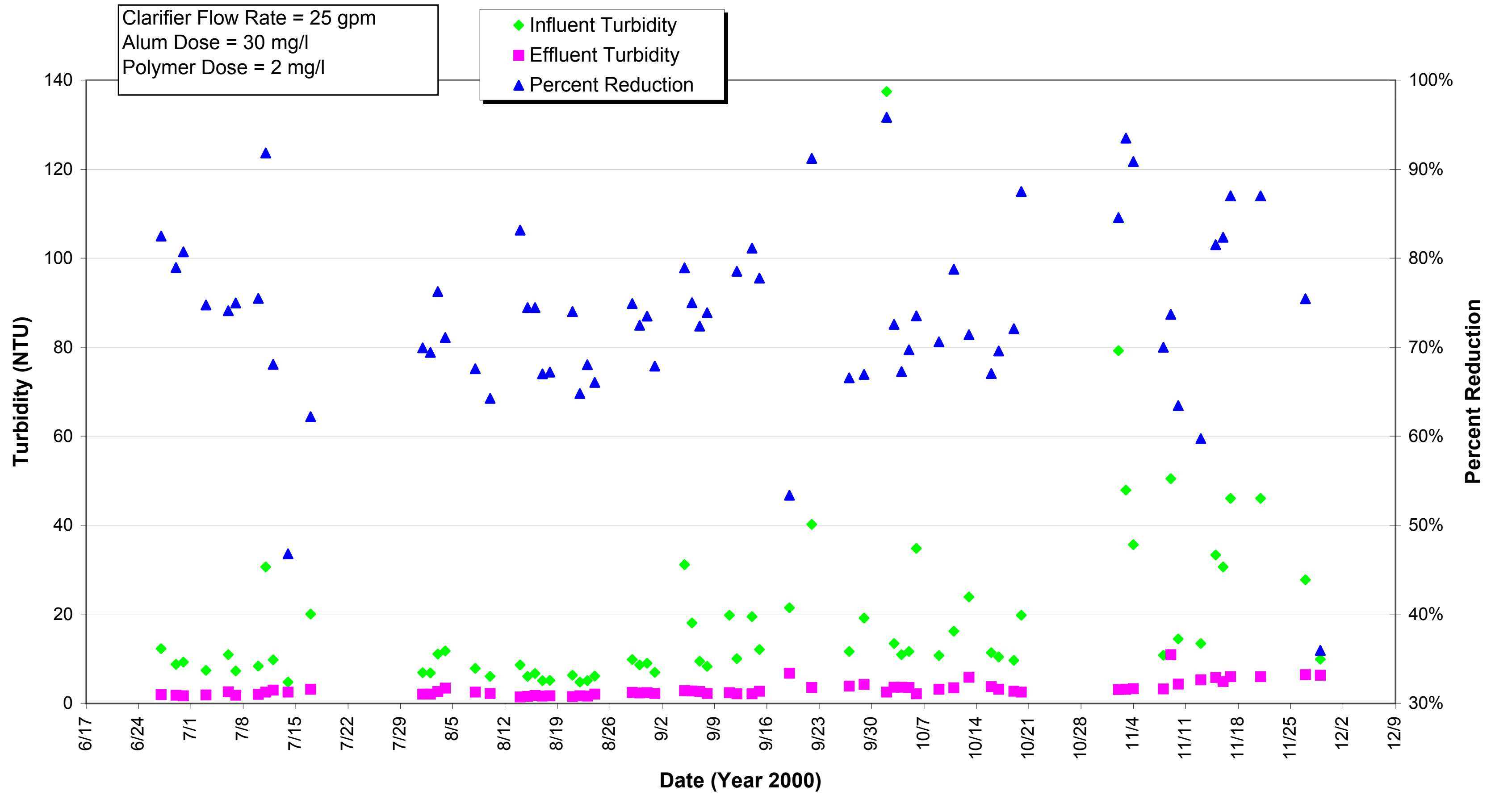
Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
8/6/01

Fig64-TracerStudy Fig64



Harding ESE
A MACTEC COMPANY

Clarifier Performance with Alum

FIGURE
65

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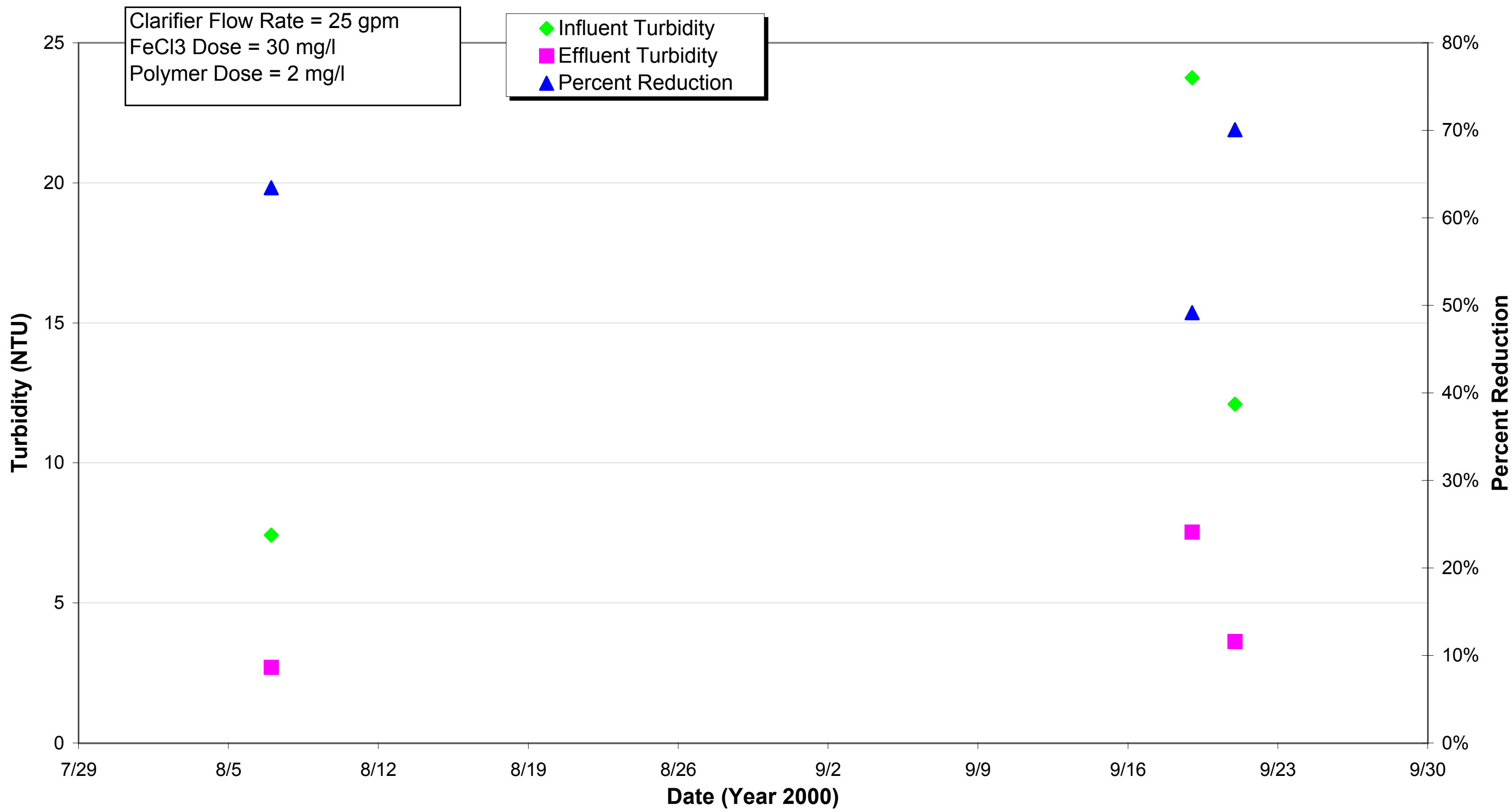
Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01



Harding ESE
A MACTEC COMPANY

Clarifier Performance with Ferric Chloride

FIGURE
66

Prepared for: AEROJET

Phase 2 Treatability Study
Sacramento, CA

Job Number
52296.4.1

Date
4/17/01

Appendix A

ANALYTICAL DATA

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Acetone (ug/L)	1	90 U	90 U	-	-	-	-	90 U	-	-	90 U	-	-	-	179 U	179 U	-
	6	36 U	45 U	-	-	-	-	36 U	45 U	45 U	45 U	-	45 U	72 U	90 U	72 U	72 U
	7	-	45 U	45 U	36 U	45 U	36 U	36 U	45 U	-	45 U	-	-	72 U	45 U	72 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	45 U	36 U	36 U	129 J	36 U	36 U	45 U	45 U	18 U	45 U	45 U	72 U	45 U	72 U	72 U
	11	-	18 U	3.6 U	3.6 U	1.8 U	3.6 U	3.6 U	3.6 U	2.3 J	2.3 J	3.6 U	4.5 U	5.0 J	4.5 U	3.6 U	7.2 U
	13	-	24 J	16 J	8.9 U	8.9 U	4.5 U	7.2 U	4.5 U	4.5 U	3.6 U	7.2 U	4.5 U	7.3 J	4.5 U	1.8 U	1.8 U
	14	-	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	8.7 J	4.5 U	1.9 J	1.8 U
	15	-	1.8 U	1.9 J	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.4 J	1.8 U	1.8 U	1.8 U
	16	-	1.8 U	1.8 U	2.0 J	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 J	1.8 U	2.3 J	1.8 U	1.8 J	1.9 J
	17	-	-	-	-	6.2 J	1.8 U	1.8 U	1.8 U	6.8 J	1.8 U	4.1 J	3.4 J	2.4 J	1.8 U	-	-
	18	-	-	-	-	10	1.8 U	1.8 U	1.8 U	4.7 J	2.0 J	4.9 J	3.4 J	1.8 U	1.8 U	-	-
	19	-	-	-	-	3.9 J	-	1.8 U	1.8 U	3.4 J	1.8 U	3.9 J	1.9 J	2.8 J	1.8 U	-	-
	20	-	-	-	-	4.9 J	-	1.8 U	1.8 U	3.6 J	2.4 J	4.4 J	2.8 J	1.8 U	2.3 J	-	-
	21	-	-	-	-	7.2 J	-	1.8 U	1.8 U	4.8 J	1.8 U	4.3 J	2.6 J	1.8 U	1.9 J	-	-
	22	-	-	-	-	4.8 J	1.8 U	1.8 U	1.9 J	2.9 J	1.8 U	4.2 J	2.3 J	2.3 J	1.8 U	3.9 J	-
Tert-amyl methyl ether (ug/L)	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Acetone (ug/L)	1	-	-	90 U	-	-	90 U	90 U	90 U	-	72 U	-	90 U	-	90 U	-	90 U
	6	72 U	72 U	45 U	-	-	72 U	72 U	90 U	-	90 U	-	90 U	-	90 U	-	90 U
	7	45 U	-	45 U	-	-	72 U	-	72 U	-	-	-	90 U	-	-	-	90 U
	9	-	-	-	72 U	72 U	72 U	72 U	90 U	30 U	72 U	90 U	90 U	72 U	90 U	90 U	-
	10	45 U	72 U	-	-	-	-	-	-	-	-	-	-	1.8 U	1.8 U	1.8 U	1.8 U
	11	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	1.8 U	3.6 U	1.4	1.8 U	3.6 U	1.8 U	2.3	2.5 J	1.8 U	1.8 U
	13	1.8 U	1.8 U	2.7 J	-	-	1.8 U	1.8 U	1.8 U	-	1.8 U	-	1.8 J	-	2.2 J	-	1.8 U
	14	1.8 J	1.9 J	1.8 U	-	-	1.8 U	1.8 U	1.8 U	-	1.8 U	-	2.4 J	-	1.8 U	-	1.8 U
	15	1.8 U	1.9 J	1.8 U	-	-	1.8 U	1.8 U	1.8 U	-	1.8 U	-	2.0 J	-	1.8 U	-	1.8 U
	16	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	0.75 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	4.5 J	-	1.8 U	1.8 U	12	1.8 U	1.8 J	1.8 U	0.75 U	1.8 U	3.5 J	1.8 U	4.5	2.4 J	3.4 J	1.8 U
Tert-amyl methyl ether (ug/L)	9	-	-	-	-	-	-	-	-	1.6 U	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	0.04 U	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	0.04 U	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	0.04 U	-	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Acetone (ug/L)	1	-	90 U	-	90 U	-	90 U
	6	-	72 U	-	90 U	-	90 U
	7	-	-	-	90 U	-	-
	9	90 U	90 U	90 U	90 U	90 U	90 U
	10	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	11	2.0 J	1.8 U	1.9	1.8 U	2.0 J	1.8 U
	13	-	1.8 U	-	1.8 U	-	1.8 U
	14	-	1.8 U	-	1.8 U	-	1.8 U
	15	-	1.8 U	-	1.8 U	-	1.8 U
	16	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	2.5 J	1.9 J	1.8 U	1.8 U	1.8 U	1.8 U
Tert-amyl methyl ether (ug/L)	9	-	-	-	-	-	-
	11	-	-	-	-	-	-
	16	-	-	-	-	-	-
	22	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	06/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Benzene (ug/L)	1	2.5 U	2.5 U	-	-	-	-	2.5 U	-	-	2.5 U	-	-	-	5.0 U	5.0 U	-
	6	1.0 U	1.3 U	-	-	-	-	1.0 U	1.3 U	2.5 J	1.3 U	-	1.3 U	2.0 U	2.5 U	2.0 U	2.0 U
	7	-	1.3 U	1.3 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	-	1.3 U	-	-	2.0 U	1.3 U	2.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.3 U	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	1.6 J	0.50 U	1.3 U	1.3 U	2.0 U	1.3 U	2.0 U	2.0 U
	11	-	0.50 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.05 U	0.05 U	0.10 U	0.13 U	0.10 U	0.13 U	0.10 U	0.20 U
	13	-	0.25 U	0.25 U	0.25 U	0.25 U	0.13 U	0.20 U	0.44 J	0.13 U	0.10 U	0.20 U	0.13 U	0.20 U	0.13 U	0.05 U	0.05 U
	14	-	0.05 U	0.05 U	0.05 J	0.05 U	0.05 U	0.05 U	0.06 J	0.06 J	0.10 U	0.10 U	0.10 U	0.13 U	0.13 U	0.05 U	0.05 U
	15	-	0.05 U	0.05 U	0.05 U	0.05 J	0.05 U	0.05 U	0.06 J	0.05 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	16	-	0.05 U	0.05 U	0.32 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	0.71	0.05 U	0.09 J	0.05 U	3.1	0.05 U	0.29 J	0.23 J	0.19 J	0.05 U	-	-
	18	-	-	-	-	1.2	0.05 U	0.05 U	0.05 U	1.1	0.33 J	0.31 J	0.26 J	0.05 U	0.05 U	-	-
	19	-	-	-	-	0.21 J	-	0.05 U	0.06 J	0.92	0.13 J	0.16 J	0.09 J	0.13 J	0.05 U	-	-
	20	-	-	-	-	0.41 J	-	0.05 U	0.06 J	0.71	0.32 J	0.22 J	0.09 J	0.05 U	0.05 U	-	-
	21	-	-	-	-	0.50	-	0.05 U	0.06 J	0.65	0.14 J	0.28 J	0.10 J	0.05 U	0.05 U	-	-
	22	-	-	-	-	0.27 J	0.05 U	0.05 U	0.05 U	0.48 J	0.07 J	0.14 J	0.05 U	0.09 J	0.05 U	0.10 J	-
Bromobenzene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 J	0.07 U	0.07 U	0.07 U	0.12 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.09 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.21 J	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.20 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Benzene (ug/L)	1	-	-	2.5 U	-	-	2.5 U	2.5 U	2.5 U	-	2.0 U	-	2.5 U	-	2.5 U	-	2.5 U
	6	2.2 J	2.0 U	1.3 U	-	-	2.0 U	2.0 U	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U
	7	1.3 U	-	1.3 U	-	-	2.0 U	-	2.0 U	-	-	-	2.5 U	-	-	-	2.5 U
	9	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	2.0 U	2.5 U	2.5 U	-
	10	2.3 J	2.0 U	-	-	-	-	-	-	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.13 U	0.05 U	0.10 U	0.05 U	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	0.06 J	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	14	0.06 J	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	15	0.05 J	0.08 J	0.07 J	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.08 J	0.05 J	0.05 U	0.07 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.21 J	-	0.05 U	0.05 U	1.3	0.05 U	0.05 J	0.05 J	0.05 U	0.05 U	0.26 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromobenzene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	1.6 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.04 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.04 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.11 J	0.07 U	0.07 U	0.07 U	0.04 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Benzene (ug/L)	1	-	2.5 U	-	2.5 U	-	2.5 U
	6	-	2.0 U	-	2.5 U	-	2.5 U
	7	-	-	-	2.5 U	-	-
	9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	-	0.05 U	-	0.05 U	-	0.05 U
	14	-	0.05 U	-	0.05 U	-	0.05 U
	15	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.05 U	0.05 U	0.05 U	0.06	0.05 U	0.05 U
Bromobenzene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Bromochloromethane (ug/L)	1	2.5 U	2.5 U	-	-	-	-	2.5 U	-	-	2.5 U	-	-	-	5.0 U	5.0 U	-
	6	1.0 U	1.3 U	-	-	-	-	1.0 U	1.3 U	1.3 U	1.3 U	-	1.3 U	2.0 U	2.5 U	2.0 U	2.0 U
	7	-	1.3 U	1.3 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	-	1.3 U	-	-	2.0 U	1.3 U	2.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.3 U	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	1.3 U	0.50 U	1.3 U	1.3 U	2.0 U	1.3 U	2.0 U	2.0 U
	11	-	0.50 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.05 U	0.05 U	0.10 U	0.13 U	0.10 U	0.13 U	0.10 U	0.20 U
	13	-	0.25 U	0.25 U	0.25 U	0.25 U	0.13 U	0.20 U	0.13 U	0.13 U	0.10 U	0.20 U	0.13 U	0.20 U	0.13 U	0.05 U	0.05 U
	14	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.10 U	0.10 U	0.10 U	0.13 U	0.13 U	0.05 U	0.05 U
	15	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	16	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	18	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	19	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	20	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	21	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	22	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-
Bromodichloromethane (ug/L)	1	2.5 U	2.5 U	-	-	-	-	2.5 U	-	-	2.5 U	-	-	-	5.0 U	5.0 U	-
	6	1.0 U	1.3 U	-	-	-	-	1.0 U	1.3 U	1.3 U	1.3 U	-	1.3 U	2.0 U	2.5 U	2.0 U	2.0 U
	7	-	1.3 U	1.3 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	-	1.3 U	-	-	2.0 U	1.3 U	2.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.3 U	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	1.3 U	0.50 U	1.3 U	1.3 U	2.0 U	1.3 U	2.0 U	2.0 U
	11	-	0.50 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.05 U	0.05 U	0.10 U	0.13 U	0.10 U	0.13 U	0.10 U	0.20 U
	13	-	0.25 U	0.25 U	0.25 U	0.25 U	0.13 U	0.20 U	0.13 U	0.13 U	0.10 U	0.20 U	0.13 U	0.20 U	0.13 U	0.05 U	0.05 U
	14	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.10 U	0.10 U	0.10 U	0.13 U	0.13 U	0.05 U	0.05 U
	15	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	16	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	0.88	0.05 U	0.05 J	0.10 J	1.2	0.06 J	0.06 J	0.72	0.33 J	0.05 U	-	-
	18	-	-	-	-	3.1	0.05 U	0.05 U	0.08 J	3.0	0.21 J	0.18 J	0.67	0.32 J	0.06 J	-	-
	19	-	-	-	-	0.40 J	-	0.05 U	0.08 J	1.2	0.31 J	0.15 J	0.53	0.36 J	0.08 J	-	-
	20	-	-	-	-	0.63	-	0.05 U	0.22 J	0.76	0.17 J	0.16 J	0.29 J	0.14 J	0.14 J	-	-
	21	-	-	-	-	0.98	-	0.05 U	0.17 J	0.52	0.26 J	0.21 J	0.58	0.14 J	0.13 J	-	-
	22	-	-	-	-	1.0	0.07 J	0.05 U	0.13 J	0.64	0.24 J	0.29 J	0.29 J	0.52	0.15 J	1.3	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Bromochloromethane (ug/L)	1	-	-	2.5 U	-	-	2.5 U	2.5 U	2.5 U	-	2.0 U	-	2.5 U	-	2.5 U	-	2.5 U
	6	2.0 U	2.0 U	1.3 U	-	-	2.0 U	2.0 U	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U
	7	1.3 U	-	1.3 U	-	-	2.0 U	-	2.0 U	-	-	-	2.5 U	-	-	-	2.5 U
	9	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.5 U	1.6 U	2.0 U	2.5 U	2.5 U	2.0 U	2.5 U	2.5 U	-
	10	1.3 U	2.0 U	-	-	-	-	-	-	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.13 U	0.05 U	0.10 U	0.04 U	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	14	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	15	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.04 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.04 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromodichloromethane (ug/L)	1	-	-	2.5 U	-	-	2.5 U	2.5 U	2.5 U	-	2.0 U	-	2.5 U	-	2.5 U	-	2.5 U
	6	2.0 U	2.0 U	1.3 U	-	-	2.0 U	2.0 U	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U
	7	1.3 U	-	1.3 U	-	-	2.0 U	-	2.0 U	-	-	-	2.5 U	-	-	-	2.5 U
	9	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	2.0 U	2.5 U	2.5 U	-
	10	1.3 U	2.0 U	-	-	-	-	-	-	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.13 U	0.05 U	0.10 U	0.05 U	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	14	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	15	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 J	-	0.07 J	0.05 U	2.3	0.10 J	0.05 J	0.05 U	0.05 U	0.05 U	0.13 J	0.05 U	0.16	0.13 J	0.16 J	0.05 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Bromochloromethane (ug/L)	1	-	2.5 U	-	2.5 U	-	2.5 U
	6	-	2.0 U	-	2.5 U	-	2.5 U
	7	-	-	-	2.5 U	-	-
	9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	-	0.05 U	-	0.05 U	-	0.05 U
	14	-	0.05 U	-	0.05 U	-	0.05 U
	15	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Bromodichloromethane (ug/L)	1	-	2.5 U	-	2.5 U	-	2.5 U
	6	-	2.0 U	-	2.5 U	-	2.5 U
	7	-	-	-	2.5 U	-	-
	9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	-	0.05 U	-	0.05 U	-	0.05 U
	14	-	0.05 U	-	0.05 U	-	0.05 U
	15	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.18 J	0.19 J	0.12	0.27	0.06 J	0.09 J

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Bromoform (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.68	1.1	0.55	0.11 U	1.0	0.14 J	0.18 J	0.79	0.47 J	0.29 J	-	-
	18	-	-	-	-	1.5	0.58	0.56	0.11 U	1.0	0.11 U	0.11 U	0.83	0.52	0.47 J	-	-
	19	-	-	-	-	0.11 U	-	0.55	0.11 U	0.72	0.39 J	0.13 J	0.11 U	0.47 J	0.52	-	-
	20	-	-	-	-	0.53	-	0.60	0.33 J	0.49 J	0.11 U	0.11 U	0.18 J	0.11 U	0.55	-	-
	21	-	-	-	-	0.89	-	0.11 U	0.37 J	0.16 J	0.37 J	0.11 U	0.43 J	0.11 U	0.63	-	-
	22	-	-	-	-	0.73	1.1	0.11 U	0.22 J	0.44 J	0.38 J	0.31 J	0.11 U	0.43 J	0.28 J	0.84	-
Bromomethane (ug/L)	1	19 U	19 U	-	-	-	-	19 U	-	-	19 U	-	-	-	38 U	38 U	-
	6	7.6 U	9.5 U	-	-	-	-	7.6 U	9.5 U	9.5 U	9.5 U	-	9.5 U	15 U	19 U	15 U	15 U
	7	-	9.5 U	9.5 U	7.6 U	9.5 U	7.6 U	7.6 U	9.5 U	-	9.5 U	-	-	15 U	9.5 U	15 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	9.5 U	7.6 U	7.6 U	9.5 U	7.6 U	7.6 U	9.5 U	9.5 U	3.8 U	9.5 U	9.5 U	15 U	9.5 U	15 U	15 U
	11	-	3.8 U	0.76 U	0.76 U	0.38 U	0.76 U	0.76 U	0.76 U	0.38 U	0.38 U	0.76 U	0.95 U	0.76 U	0.95 U	0.76 U	1.5 U
	13	-	1.9 U	1.9 U	1.9 U	1.9 U	0.95 U	1.5 U	0.95 U	0.95 U	0.76 U	1.5 U	0.95 U	1.5 U	0.95 U	0.38 U	0.38 U
	14	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.76 U	0.76 U	0.76 U	0.95 U	0.95 U	0.38 U	0.38 U
	15	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	16	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	17	-	-	-	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-	-
	18	-	-	-	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-	-
	19	-	-	-	-	0.38 U	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-	-
	20	-	-	-	-	0.38 U	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-	-
	21	-	-	-	-	0.38 U	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-	-
	22	-	-	-	-	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Bromoform (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.4 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.06 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.06 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.42 J	-	0.11 U	0.55	1.3	0.11 U	0.11 J	0.11 J	0.36	0.18 J	0.39 J	0.26 J	0.11 U	0.24 J	0.11 U	0.29 J
Bromomethane (ug/L)	1	-	-	19 U	-	-	19 U	19 U	19 U	-	15 U	-	19 U	-	19 U	-	19 U
	6	15 U	15 U	9.5 U	-	-	15 U	15 U	19 U	-	19 U	-	19 U	-	19 U	-	19 U
	7	9.5 U	-	9.5 U	-	-	15 U	-	15 U	-	-	-	19 U	-	-	-	19 U
	9	-	-	-	15 U	15 U	15 U	15 U	19 U	4.4 U	15 U	19 U	19 U	15 U	19 U	19 U	-
	10	9.5 U	15 U	-	-	-	-	-	-	-	-	-	-	0.38 U	0.38 U	0.38 U	0.38 U
	11	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	0.95 U	0.38 U	0.76 U	0.11 U	0.38 U	0.76 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	13	0.38 U	0.38 U	0.38 U	-	-	0.38 U	0.38 U	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U
	14	0.38 U	0.38 U	0.38 U	-	-	0.38 U	0.38 U	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U
	15	0.38 U	0.38 U	0.38 U	-	-	0.38 U	0.38 U	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U	-	0.38 U
	16	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.11 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.38 U	-	0.38 U	0.38 U	0.50 J	0.38 U	0.38 U	0.38 U	0.11 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Bromoform (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.30	0.11 U	0.11 U
Bromomethane (ug/L)	1	-	19 U	-	19 U	-	19 U
	6	-	15 U	-	19 U	-	19 U
	7	-	-	-	19 U	-	-
	9	19 U	19 U	19 U	19 U	19 U	19 U
	10	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	11	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	13	-	0.38 U	-	0.38 U	-	0.38 U
	14	-	0.38 U	-	0.38 U	-	0.38 U
	15	-	0.38 U	-	0.38 U	-	0.38 U
	16	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
2-Butanone (ug/L)	1	35 U	35 U	-	-	-	-	35 U	-	-	35 U	-	-	-	70 U	70 U	-
	6	14 U	18 U	-	-	-	-	14 U	18 U	18 U	18 U	-	18 U	28 U	35 U	28 U	28 U
	7	-	18 U	18 U	14 U	18 U	14 U	14 U	18 U	-	18 U	-	-	28 U	18 U	28 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	18 U	14 U	14 U	18 U	14 U	14 U	18 U	18 U	7.0 U	18 U	18 U	28 U	18 U	28 U	28 U
	11	-	7.0 U	1.4 U	1.4 U	0.70 U	1.4 U	1.4 U	1.4 U	0.70 U	0.70 U	1.4 U	1.8 U	1.4 U	1.8 U	1.4 U	2.8 U
	13	-	3.5 U	3.5 U	3.5 U	3.5 U	1.8 U	2.8 U	1.8 U	1.8 U	1.4 U	2.8 U	1.8 U	2.8 U	1.8 U	0.70 U	0.70 U
	14	-	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	1.4 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	0.70 U
	15	-	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	16	-	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.71 J	0.70 U	0.70 U	1.1 J	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	17	-	-	-	-	0.70 U	0.70 U	0.70 U	0.70 U	0.91 J	0.70 U	1.5 J	0.70 U	0.70 U	0.70 U	-	-
	18	-	-	-	-	1.6 J	0.70 U	0.70 U	0.70 U	1.4 J	0.70 U	2.2 J	0.70 U	0.70 U	0.70 U	-	-
	19	-	-	-	-	0.70 U	-	0.70 U	0.70 U	0.91 J	0.70 U	1.3 J	0.70 U	0.70 U	0.70 U	-	-
	20	-	-	-	-	1.2 J	-	0.70 U	0.70 U	1.0 J	0.70 U	1.7 J	1.1 J	0.70 U	0.70 U	-	-
	21	-	-	-	-	0.70 U	-	0.70 U	0.80 J	1.0 J	0.75 J	1.7 J	1.3 J	0.70 U	0.70 U	-	-
	22	-	-	-	-	0.70 U	0.70 U	0.70 U	1.0 J	1.1 J	0.70 U	1.6 J	0.70 U	0.70 U	0.70 U	0.70 U	-
n-Butylbenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
2-Butanone (ug/L)	1	-	-	35 U	-	-	35 U	35 U	35 U	-	28 U	-	35 U	-	35 U	-	35 U
	6	28 U	28 U	18 U	-	-	28 U	28 U	35 U	-	35 U	-	35 U	-	35 U	-	35 U
	7	18 U	-	18 U	-	-	28 U	-	28 U	-	-	-	35 U	-	-	-	35 U
	9	-	-	-	28 U	28 U	28 U	28 U	35 U	15 U	28 U	35 U	35 U	28 U	35 U	35 U	-
	10	18 U	28 U	-	-	-	-	-	-	-	-	-	-	0.70 U	0.70 U	0.70 U	0.70 U
	11	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.8 U	0.70 J	1.4 U	0.37 U	0.70 U	1.9 J	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	13	0.70 U	0.70 U	0.70 U	-	-	0.70 U	0.70 U	0.70 U	-	0.70 U	-	0.74 J	-	0.70 U	-	0.70 U
	14	0.70 U	0.70 U	1.6 J	-	-	0.70 U	0.70 U	0.70 U	-	0.70 U	-	1.3 J	-	0.70 U	-	0.70 U
	15	0.70 U	0.70 U	2.0 J	-	-	0.70 U	0.70 J	0.70 U	-	0.70 U	-	1.4 J	-	0.70 U	-	0.70 U
	16	0.70 U	0.70 U	2.7 J	1.7 J	0.70 U	0.70 U	0.70 J	0.70 U	0.37 U	0.70 U	0.70 U	1.1 J	0.70 U	0.70 U	0.70 U	0.70 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.70 U	-	2.3 J	2.1 J	2.0 J	1.1 J	0.70 U	0.70 U	0.37 U	0.70 U	1.1 J	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
n-Butylbenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.8 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.07 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
2-Butanone (ug/L)	1	-	35 U	-	35 U	-	35 U
	6	-	28 U	-	35 U	-	35 U
	7	-	-	-	35 U	-	-
	9	35 U	35 U	35 U	35 U	35 U	35 U
	10	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	11	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	13	-	0.70 U	-	0.70 U	-	0.70 U
	14	-	0.70 U	-	0.70 U	-	0.70 U
	15	-	0.70 U	-	0.70 U	-	0.70 U
	16	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
n-Butylbenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
sec-Butylbenzene (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	18	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	19	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	20	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	22	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-
tert-Butylbenzene (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0 U	-	-	5.0 U	-	-	-	10 U	10 U	-
	6	2.0 U	2.5 U	-	-	-	-	2.0 U	2.5 U	2.5 U	2.5 U	-	2.5 U	4.0 U	5.0 U	4.0 U	4.0 U
	7	-	2.5 U	2.5 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	-	2.5 U	-	-	4.0 U	2.5 U	4.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.5 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	1.0 U	2.5 U	2.5 U	4.0 U	2.5 U	4.0 U	4.0 U
	11	-	1.0 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.25 U	0.20 U	0.25 U	0.20 U	0.40 U
	13	-	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.40 U	0.25 U	0.25 U	0.20 U	0.40 U	0.25 U	0.40 U	0.25 U	0.10 U	0.10 U
	14	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	0.10 U	0.10 U
	15	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	16	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	18	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	19	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	20	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	21	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	22	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
sec-Butylbenzene (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	2.0 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.05 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.05 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.05 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
tert-Butylbenzene (ug/L)	1	-	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-	4.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	6	4.0 U	4.0 U	2.5 U	-	-	4.0 U	4.0 U	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	7	2.5 U	-	2.5 U	-	-	4.0 U	-	4.0 U	-	-	-	5.0 U	-	-	-	5.0 U
	9	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	5.0 U	2.0 U	4.0 U	5.0 U	5.0 U	4.0 U	5.0 U	5.0 U	-
	10	2.5 U	4.0 U	-	-	-	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U	0.10 U	0.20 U	0.05 U	0.10 U	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	14	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	15	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
sec-Butylbenzene (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
tert-Butylbenzene (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U
	6	-	4.0 U	-	5.0 U	-	5.0 U
	7	-	-	-	5.0 U	-	-
	9	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	-	0.10 U	-	0.10 U	-	0.10 U
	14	-	0.10 U	-	0.10 U	-	0.10 U
	15	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Carbon Disulfide (ug/L)	1	68 U	68 U	-	-	-	-	68 U	-	-	68 U	-	-	-	136 U	136 U	-
	6	27 U	34 U	-	-	-	-	27 U	81 J	34 U	34 U	-	34 U	168 J	68 U	54 U	54 U
	7	-	34 U	34 U	27 U	34 U	27 U	27 U	34 U	-	34 U	-	-	54 U	34 U	54 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	34 U	27 U	27 U	34 U	27 U	27 U	34 U	34 U	14 U	34 U	34 U	98 J	34 U	54 U	54 U
	11	-	14 U	2.7 U	2.7 U	1.4 U	2.7 U	2.7 U	2.7 U	1.4 U	1.4 U	2.7 U	3.4 U	2.7 U	3.4 U	2.7 U	5.4 U
	13	-	6.8 U	6.8 U	6.8 U	6.8 U	3.4 U	5.4 U	3.4 U	3.4 U	2.7 U	5.4 U	3.4 U	5.4 U	3.4 U	1.4 U	1.4 U
	14	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	2.7 U	2.7 U	11	3.4 U	3.4 U	1.4 U	1.4 U
	15	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	16	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	18	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	19	-	-	-	-	1.4 U	-	1.4 U	1.8 J	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	20	-	-	-	-	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	21	-	-	-	-	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	22	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-
Carbon Tetrachloride (ug/L)	1	3.0 U	3.0 U	-	-	-	-	3.0 U	-	-	3.0 U	-	-	-	6.0 U	6.0 U	-
	6	1.2 U	1.5 U	-	-	-	-	1.2 U	1.5 U	1.5 U	1.5 U	-	1.5 U	2.4 U	3.0 U	2.4 U	2.4 U
	7	-	1.5 U	1.5 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	-	1.5 U	-	-	2.4 U	1.5 U	2.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.5 U	1.2 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	1.5 U	0.60 U	1.5 U	1.5 U	2.4 U	1.5 U	2.4 U	2.4 U
	11	-	0.60 U	0.12 U	0.12 U	0.06 U	0.12 U	0.12 U	0.12 U	0.06 U	0.06 U	0.12 U	0.15 U	0.12 U	0.15 U	0.12 U	0.24 U
	13	-	0.30 U	0.30 U	0.30 U	0.30 U	0.15 U	0.24 U	0.15 U	0.15 U	0.12 U	0.24 U	0.15 U	0.24 U	0.15 U	0.06 U	0.06 U
	14	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.12 U	0.12 U	0.12 U	0.15 U	0.15 U	0.06 U	0.06 U
	15	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	16	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	18	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	19	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	20	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	21	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	22	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Carbon Disulfide (ug/L)	1	-	-	68 U	-	-	68 U	68 U	68 U	-	54 U	-	68 U	-	68 U	-	68 U
	6	85 J	54 U	34 U	-	-	54 U	54 U	68 U	-	68 U	-	68 U	-	68 U	-	68 U
	7	34 U	-	34 U	-	-	54 U	-	54 U	-	-	-	68 U	-	-	-	68 U
	9	-	-	-	54 U	54 U	54 U	54 U	68 U	-	54 U	68 U	68 U	54 U	68 U	68 U	-
	10	148	54 U	-	-	-	-	-	-	-	-	-	-	1.4 U	2.6 J	1.4 U	1.4 U
	11	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	3.4 U	1.4 U	2.7 U	-	1.4 U	2.7 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	13	1.4 U	1.4 U	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	14	1.4 J	1.4 U	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	15	1.4 U	1.5 J	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	16	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Carbon Tetrachloride (ug/L)	1	-	-	3.0 U	-	-	3.0 U	3.0 U	3.0 U	-	2.4 U	-	3.0 U	-	3.0 U	-	3.0 U
	6	2.4 U	2.4 U	1.5 U	-	-	2.4 U	2.4 U	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U
	7	1.5 U	-	1.5 U	-	-	2.4 U	-	2.4 U	-	-	-	3.0 U	-	-	-	3.0 U
	9	-	-	-	2.4 U	2.4 U	2.4 U	2.4 U	3.0 U	1.2 U	2.4 U	3.0 U	3.0 U	2.4 U	3.0 U	3.0 U	-
	10	1.5 U	2.4 U	-	-	-	-	-	-	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.15 U	0.06 U	0.12 U	0.03 U	0.06 U	0.12 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	14	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	15	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.03 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.06 U	-	0.06 U	0.06 U	0.26 J	0.06 U	0.06 U	0.06 U	0.03 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Carbon Disulfide (ug/L)	1	-	68 U	-	68 U	-	68 U
	6	-	54 U	-	68 U	-	68 U
	7	-	-	-	68 U	-	-
	9	68 U	68 U	68 U	68 U	68 U	68 U
	10	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	11	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	13	-	1.4 U	-	1.4 U	-	1.4 U
	14	-	1.4 U	-	1.4 U	-	1.4 U
	15	-	1.4 U	-	1.4 U	-	1.4 U
	16	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Carbon Tetrachloride (ug/L)	1	-	3.0 U	-	3.0 U	-	3.0 U
	6	-	2.4 U	-	3.0 U	-	3.0 U
	7	-	-	-	3.0 U	-	-
	9	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
	10	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	-	0.06 U	-	0.06 U	-	0.06 U
	14	-	0.06 U	-	0.06 U	-	0.06 U
	15	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Chlorobenzene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.12 J	0.07 U	0.07 U	0.07 U	0.21 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.20 J	0.07 U	0.07 U	0.07 U	0.09 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.08 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.09 J	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.09 J	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.08 J	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-
Chloroethane (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Chlorobenzene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	2.0 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.05 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.05 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.32 J	0.07 U	0.07 U	0.07 U	0.05 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Chloroethane (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	4.4 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.11 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.17 J	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Chlorobenzene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Chloroethane (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
2-Chloroethyl vinyl ether (ug/L)	1	68 U	68 U	-	-	-	-	68 U	-	-	68 U	-	-	-	136 U	136 U	-
	6	27 U	34 U	-	-	-	-	27 U	34 U	34 U	34 U	-	34 U	54 U	68 U	54 U	54 U
	7	-	34 U	34 U	27 U	34 U	27 U	27 U	34 U	-	34 U	-	-	54 U	34 U	54 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	34 U	27 U	27 U	34 U	27 U	27 U	34 U	34 U	14 U	34 U	34 U	54 U	34 U	54 U	54 U
	11	-	14 U	2.7 U	2.7 U	1.4 U	2.7 U	2.7 U	2.7 U	1.4 U	1.4 U	2.7 U	3.4 U	2.7 U	3.4 U	2.7 U	5.4 U
	13	-	6.8 U	6.8 U	6.8 U	6.8 U	3.4 U	5.4 U	3.4 U	3.4 U	2.7 U	5.4 U	3.4 U	5.4 U	3.4 U	1.4 U	1.4 U
	14	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	2.7 U	2.7 U	2.7 U	3.4 U	3.4 U	1.4 U	1.4 U
	15	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	16	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	18	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	19	-	-	-	-	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	20	-	-	-	-	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	21	-	-	-	-	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	-
	22	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-
Chloroform (ug/L)	1	71	92	-	-	-	-	97	-	-	88	-	-	-	92	96	-
	6	17	19	-	-	-	-	15	13	14	13	-	14	14 J	15 J	17 J	15 J
	7	-	19	14	13	14	14	15	13	-	13	-	-	14 J	14	17 J	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	23	14	13	15	14	14	13	13	12	13	14	18 J	13	15 J	15 J
	11	-	17	13	12	12	12	12	11	11	10	13	11	11	11	14	13
	13	-	18	15	12	13	12	12	10	13	12	12	11	11	11	0.22 J	1.3
	14	-	21	18	17	14	15	13	13	13	12	12	11	33	11	0.07 U	0.32 J
	15	-	18	18	17	17	15	14	14	15	14	13	11	12	12	0.07 U	0.18 J
	16	-	11	12	15	14	14	12	13	15	14	14	13	4.5	13	0.25 J	0.21 J
	17	-	-	-	-	15	14	13	13	15	13	14	13	13	13	-	-
	18	-	-	-	-	19	14	12	12	20	14	14	14	14	13	-	-
	19	-	-	-	-	14	-	13	13	17	14	14	14	14	13	-	-
	20	-	-	-	-	15	-	13	13	17	14	15	13	13	13	-	-
	21	-	-	-	-	15	-	13	14	17	14	14	14	13	13	-	-
	22	-	-	-	-	16	14	13	13	16	14	14	14	14	14	1.6	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
2-Chloroethyl vinyl ether (ug/L)	1	-	-	68 U	-	-	68 U	68 U	68 U	-	54 U	-	68 U	-	68 U	-	68 U
	6	54 U	54 U	34 U	-	-	54 U	54 U	68 U	-	68 U	-	68 U	-	68 U	-	68 U
	7	34 U	-	34 U	-	-	54 U	-	54 U	-	-	-	68 U	-	-	-	68 U
	9	-	-	-	54 U	54 U	54 U	54 U	68 U	-	54 U	68 U	68 U	54 U	68 U	68 U	-
	10	34 U	54 U	-	-	-	-	-	-	-	-	-	-	1.4 U	1.4 U	1.4 U	1.4 U
	11	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	3.4 U	1.4 U	2.7 U	-	1.4 U	2.7 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	13	1.4 U	1.4 U	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	14	1.4 U	1.4 U	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	15	1.4 U	1.4 U	1.4 U	-	-	1.4 U	1.4 U	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U	-	1.4 U
	16	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	-	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Chloroform (ug/L)	1	-	-	93	-	-	93	96	87	-	82	-	86	-	88	-	83
	6	14 J	15 J	17	-	-	17 J	2.8 J	3.5 J	-	25	-	31	-	34	-	29
	7	14	-	16	-	-	17 J	-	2.8 J	-	-	-	30	-	-	-	26
	9	-	-	-	13 J	14 J	18 J	2.8 J	3.5 J	18	25	27	28	25	32	26	-
	10	14	14 J	-	-	-	-	-	-	-	-	-	-	0.11	0.18 J	0.11 J	0.11 J
	11	12	14	14	6.0	13	14	14	18	21	16	26	0.11 J	0.09	0.15 J	0.10 J	0.10 J
	13	4.1	6.5	15	-	-	16	16	0.07 U	-	5.1	-	4.5	-	5.4	-	2.9
	14	0.42 J	1.3	14	-	-	16	17	0.07 U	-	1.3	-	1.6	-	4.4	-	3.4
	15	0.07 U	0.07 U	10	-	-	14	17	0.07 U	-	0.09 J	-	0.10 J	-	1.4	-	3.0
	16	0.14 J	0.14 J	5.1	8.0	13	14	18	0.07 U	0.06 U	0.30 J	0.20 J	0.32 J	0.99	2.2	2.4	2.4
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.40 J	-	5.0	8.3	17	15	18	0.59	0.20	0.46 J	1.2	0.50	1.4	2.7	2.8	2.4

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
2-Chloroethyl vinyl ether (ug/L)	1	-	68 U	-	68 U	-	68 U
	6	-	54 U	-	68 U	-	68 U
	7	-	-	-	68 U	-	-
	9	68 U	68 U	68 U	68 U	68 U	68 U
	10	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	11	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	13	-	1.4 U	-	1.4 U	-	1.4 U
	14	-	1.4 U	-	1.4 U	-	1.4 U
	15	-	1.4 U	-	1.4 U	-	1.4 U
	16	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Chloroform (ug/L)	1	-	84	-	78	-	80
	6	-	37	-	35	-	40
	7	-	-	-	32	-	-
	9	32	31	28	30	31	36
	10	0.14 J	0.16 J	0.10	0.12	0.13 J	0.18 J
	11	0.13 J	0.13 J	0.11	0.11	0.10 J	0.16 J
	13	-	1.8	-	1.2	-	1.1
	14	-	2.4	-	1.7	-	1.4
	15	-	2.7	-	2.1	-	1.9
	16	2.5	2.6	2.5	2.4	2.2	2.0
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	2.6	2.8	2.7	3.0	1.9	2.1

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Chloromethane (ug/L)	1	7.0 U	7.0 U	-	-	-	-	7.0 U	-	-	7.0 U	-	-	-	14 U	14 U	-
	6	2.8 U	3.5 U	-	-	-	-	2.8 U	3.5 U	3.5 U	3.5 U	-	3.5 U	5.6 U	7.0 U	5.6 U	5.6 U
	7	-	3.5 U	3.5 U	2.8 U	3.5 U	2.8 U	2.8 U	3.5 U	-	3.5 U	-	-	5.6 U	3.5 U	5.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	3.5 U	2.8 U	2.8 U	3.5 U	2.8 U	2.8 U	3.5 U	3.5 U	1.4 U	3.5 U	3.5 U	5.6 U	3.5 U	5.6 U	5.6 U
	11	-	1.4 U	0.28 U	0.28 U	0.14 U	0.36 J	0.28 U	0.28 U	0.14 U	0.14 U	0.28 U	0.35 U	0.84 J	0.35 U	0.28 U	0.56 U
	13	-	0.70 U	0.70 U	0.70 U	0.70 U	0.35 U	0.56 U	0.35 U	0.35 U	0.28 U	0.56 U	0.35 U	0.59 J	0.35 U	0.14 U	0.14 U
	14	-	0.14 U	0.16 J	0.14 U	0.14 U	0.18 J	0.14 U	0.14 U	0.14 U	0.28 U	0.39 J	0.28 U	1.3	0.35 U	0.14 U	0.14 U
	15	-	0.14 U	0.32 J	0.22 J	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.19 J	0.14 U	0.47 J	0.14 U	0.14 U	0.14 U
	16	-	0.14 U	0.21 J	0.14 U	0.14 U	0.14 J	0.14 U	0.14 U	0.14 U	0.14 U	0.35 J	0.14 U	0.28 J	0.14 U	0.14 U	0.14 U
	17	-	-	-	-	0.41 J	0.14 U	0.14 U	0.14 U	0.40 J	0.14 U	0.49 J	0.14 U	0.14 U	0.17 J	-	-
	18	-	-	-	-	0.63	0.14 U	0.14 U	0.14 U	0.43 J	0.22 J	0.57	0.18 J	0.25 J	0.14 U	-	-
	19	-	-	-	-	0.29 J	-	0.14 U	0.22 J	0.36 J	0.14 U	0.67	0.14 J	0.14 J	0.14 U	-	-
	20	-	-	-	-	0.33 J	-	0.14 U	0.17 J	0.41 J	0.22 J	0.56	0.33 J	0.14 U	0.14 U	-	-
	21	-	-	-	-	0.34 J	-	0.14 U	0.15 J	0.35 J	0.14 U	1.0	0.26 J	0.14 U	0.14 U	-	-
	22	-	-	-	-	0.25 J	0.14 U	0.14 U	0.14 U	0.53	0.17 J	0.87	0.38 J	0.14 U	0.14 U	0.17 J	-
2-Chlorotoluene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Chloromethane (ug/L)	1	-	-	12 J	-	-	7.0 U	7.0 U	7.0 U	-	5.6 U	-	7.0 U	-	7.0 U	-	7.0 U
	6	5.6 U	5.6 U	3.5 J	-	-	5.6 U	5.6 U	7.0 U	-	7.0 U	-	7.0 U	-	7.0 U	-	7.0 U
	7	3.5 U	-	4.7 J	-	-	5.6 U	-	5.6 U	-	-	-	7.0 U	-	-	-	7.0 U
	9	-	-	-	5.6 U	5.6 U	5.6 U	5.6 U	7.0 U	3.6 U	5.6 U	7.0 U	7.0 U	5.6 U	7.0 U	7.0 U	-
	10	3.5 U	5.6 U	-	-	-	-	-	-	-	-	-	-	0.14 U	0.14 U	0.14 U	0.14 U
	11	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.35 U	0.14 U	0.28 U	0.09 U	0.14 U	0.28 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
	13	0.14 U	0.14 U	0.14 U	-	-	0.14 U	0.14 U	0.14 U	-	0.14 U	-	0.15 J	-	0.14 U	-	0.14 U
	14	0.14 U	0.14 U	0.14 U	-	-	0.14 U	0.14 U	0.14 U	-	0.14 U	-	0.14 U	-	0.14 U	-	0.14 U
	15	0.14 U	0.14 U	0.14 U	-	-	0.14 U	0.14 U	0.14 U	-	0.14 U	-	0.17 J	-	0.14 U	-	0.14 U
	16	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.09 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.14 U	-	0.14 U	0.14 U	1.5	0.14 U	0.14 J	0.14 U	0.09 U	0.14 U	0.14 J	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
2-Chlorotoluene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	1.6 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.04 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Chloromethane (ug/L)	1	-	7.0 U	-	7.0 U	-	7.0 U
	6	-	5.6 U	-	7.0 U	-	7.0 U
	7	-	-	-	7.0 U	-	-
	9	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U
	10	0.14 U	0.14 U	0.15	0.14 U	0.14 U	0.14 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
	13	-	0.14 U	-	0.14 U	-	0.14 U
	14	-	0.14 U	-	0.14 U	-	0.14 U
	15	-	0.14 U	-	0.14 U	-	0.14 U
	16	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.17 J	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
2-Chlorotoluene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
4-Chlorotoluene (ug/L)	1	6.0 U	6.0 U	-	-	-	-	6.0 U	-	-	6.0 U	-	-	-	12 U	12 U	-
	6	2.4 U	3.0 U	-	-	-	-	2.4 U	3.0 U	3.0 U	3.0 U	-	3.0 U	4.8 U	6.0 U	4.8 U	4.8 U
	7	-	3.0 U	3.0 U	2.4 U	3.0 U	2.4 U	2.4 U	3.0 U	-	3.0 U	-	-	4.8 U	3.0 U	4.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	3.0 U	2.4 U	2.4 U	3.0 U	2.4 U	2.4 U	3.0 U	3.0 U	1.2 U	3.0 U	3.0 U	4.8 U	3.0 U	4.8 U	4.8 U
	11	-	1.2 U	0.24 U	0.24 U	0.12 U	0.24 U	0.24 U	0.24 U	0.12 U	0.12 U	0.24 U	0.30 U	0.24 U	0.30 U	0.24 U	0.48 U
	13	-	0.60 U	0.60 U	0.60 U	0.60 U	0.30 U	0.48 U	0.30 U	0.30 U	0.24 U	0.48 U	0.30 U	0.48 U	0.30 U	0.12 U	0.12 U
	14	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.24 U	0.24 U	0.24 U	0.30 U	0.30 U	0.12 U	0.12 U
	15	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	16	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	18	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	19	-	-	-	-	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	20	-	-	-	-	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	21	-	-	-	-	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	22	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-
1,2-Dibromo-3-chloropropane (ug/L)	1	15 U	15 U	-	-	-	-	15 U	-	-	15 U	-	-	-	29 U	29 U	-
	6	5.8 U	7.3 U	-	-	-	-	5.8 U	7.3 U	7.3 U	7.3 U	-	7.3 U	12 U	15 U	12 U	12 U
	7	-	7.3 U	7.3 U	5.8 U	7.3 U	5.8 U	5.8 U	7.3 U	-	7.3 U	-	-	12 U	7.3 U	12 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	7.3 U	5.8 U	5.8 U	7.3 U	5.8 U	5.8 U	7.3 U	7.3 U	2.9 U	7.3 U	7.3 U	12 U	7.3 U	12 U	12 U
	11	-	2.9 U	0.58 U	0.58 U	0.29 U	0.58 U	0.58 U	0.58 U	0.29 U	0.29 U	0.58 U	0.72 U	0.58 U	0.72 U	0.58 U	1.2 U
	13	-	1.5 U	1.5 U	1.5 U	1.5 U	0.72 U	1.2 U	0.72 U	0.72 U	0.58 U	1.2 U	0.72 U	1.2 U	0.72 U	0.29 U	0.29 U
	14	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.58 U	0.58 U	0.58 U	0.72 U	0.72 U	0.29 U	0.29 U
	15	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	16	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	17	-	-	-	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-	-
	18	-	-	-	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-	-
	19	-	-	-	-	0.29 U	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-	-
	20	-	-	-	-	0.29 U	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-	-
	21	-	-	-	-	0.29 U	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-	-
	22	-	-	-	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
4-Chlorotoluene (ug/L)	1	-	-	6.0 U	-	-	6.0 U	6.0 U	6.0 U	-	4.8 U	-	6.0 U	-	6.0 U	-	6.0 U
	6	4.8 U	4.8 U	3.0 U	-	-	4.8 U	4.8 U	6.0 U	-	6.0 U	-	6.0 U	-	6.0 U	-	6.0 U
	7	3.0 U	-	3.0 U	-	-	4.8 U	-	4.8 U	-	-	-	6.0 U	-	-	-	6.0 U
	9	-	-	-	4.8 U	4.8 U	4.8 U	4.8 U	6.0 U	2.0 U	4.8 U	6.0 U	6.0 U	4.8 U	6.0 U	6.0 U	-
	10	3.0 U	4.8 U	-	-	-	-	-	-	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U
	11	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.30 U	0.12 U	0.24 U	0.05 U	0.12 U	0.24 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	13	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	14	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	15	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.05 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.05 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
1,2-Dibromo-3-chloropropane (ug/L)	1	-	-	15 U	-	-	15 U	15 U	15 U	-	12 U	-	15 U	-	15 U	-	15 U
	6	12 U	12 U	7.3 U	-	-	12 U	12 U	15 U	-	15 U	-	15 U	-	15 U	-	15 U
	7	7.3 U	-	7.3 U	-	-	12 U	-	12 U	-	-	-	15 U	-	-	-	15 U
	9	-	-	-	12 U	12 U	12 U	12 U	15 U	26 U	12 U	15 U	15 U	12 U	15 U	15 U	-
	10	7.3 U	12 U	-	-	-	-	-	-	-	-	-	-	0.29 U	0.29 U	0.29 U	0.29 U
	11	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.72 U	0.29 U	0.58 U	0.64 U	0.29 U	0.58 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	13	0.29 U	0.29 U	0.29 U	-	-	0.29 U	0.29 U	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U
	14	0.29 U	0.29 U	0.29 U	-	-	0.29 U	0.29 U	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U
	15	0.29 U	0.29 U	0.29 U	-	-	0.29 U	0.29 U	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U	-	0.29 U
	16	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.64 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.29 U	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.64 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
4-Chlorotoluene (ug/L)	1	-	6.0 U	-	6.0 U	-	6.0 U
	6	-	4.8 U	-	6.0 U	-	6.0 U
	7	-	-	-	6.0 U	-	-
	9	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
	10	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	11	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	13	-	0.12 U	-	0.12 U	-	0.12 U
	14	-	0.12 U	-	0.12 U	-	0.12 U
	15	-	0.12 U	-	0.12 U	-	0.12 U
	16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
1,2-Dibromo-3-chloropropane (ug/L)	1	-	15 U	-	15 U	-	15 U
	6	-	12 U	-	15 U	-	15 U
	7	-	-	-	15 U	-	-
	9	15 U	15 U	15 U	15 U	15 U	15 U
	10	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	11	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	13	-	0.29 U	-	0.29 U	-	0.29 U
	14	-	0.29 U	-	0.29 U	-	0.29 U
	15	-	0.29 U	-	0.29 U	-	0.29 U
	16	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Dibromochloromethane (ug/L)	1	3.0 U	3.0 U	-	-	-	-	3.0 U	-	-	3.0 U	-	-	-	6.0 U	6.0 U	-
	6	1.2 U	1.5 U	-	-	-	-	1.2 U	1.5 U	1.5 U	1.5 U	-	1.5 U	2.4 U	3.0 U	2.4 U	2.4 U
	7	-	1.5 U	1.5 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	-	1.5 U	-	-	2.4 U	1.5 U	2.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.5 U	1.2 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	1.5 U	0.60 U	1.5 U	1.5 U	2.4 U	1.5 U	2.4 U	2.4 U
	11	-	0.60 U	0.12 U	0.12 U	0.06 U	0.12 U	0.12 U	0.12 U	0.06 U	0.06 U	0.12 U	0.15 U	0.12 U	0.15 U	0.12 U	0.24 U
	13	-	0.30 U	0.30 U	0.30 U	0.30 U	0.15 U	0.24 U	0.15 U	0.15 U	0.12 U	0.24 U	0.15 U	0.24 U	0.15 U	0.06 U	0.06 U
	14	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.12 U	0.12 U	0.12 U	0.15 U	0.15 U	0.06 U	0.06 U
	15	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	16	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	0.67	0.15 J	0.14 J	0.10 J	1.2	0.14 J	0.17 J	0.95	0.46 J	0.12 J	-	-
	18	-	-	-	-	2.4	0.06 U	0.09 J	0.07 J	1.9	0.20 J	0.23 J	0.79	0.45 J	0.16 J	-	-
	19	-	-	-	-	0.26 J	-	0.12 J	0.11 J	0.97	0.46 J	0.21 J	0.34 J	0.46 J	0.19 J	-	-
	20	-	-	-	-	0.51	-	0.06 U	0.32 J	0.62	0.20 J	0.19 J	0.29 J	0.19 J	0.25 J	-	-
	21	-	-	-	-	0.86	-	0.06 U	0.27 J	0.36 J	0.36 J	0.28 J	0.65	0.21 J	0.26 J	-	-
	22	-	-	-	-	0.70	0.16 J	0.06 U	0.19 J	0.52	0.37 J	0.43 J	0.23 J	0.65	0.25 J	1.2	-
1,2-Dibromoethane (ug/L)	1	2.0 U	2.0 U	-	-	-	-	2.0 U	-	-	2.0 U	-	-	-	4.0 U	4.0 U	-
	6	0.80 U	1.0 U	-	-	-	-	0.80 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.6 U	2.0 U	1.6 U	1.6 U
	7	-	1.0 U	1.0 U	0.80 U	1.0 U	0.80 U	0.80 U	1.0 U	-	1.0 U	-	-	1.6 U	1.0 U	1.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.0 U	0.80 U	0.80 U	1.0 U	0.80 U	0.80 U	1.0 U	1.0 U	0.40 U	1.0 U	1.0 U	1.6 U	1.0 U	1.6 U	1.6 U
	11	-	0.40 U	0.08 U	0.08 U	0.04 U	0.08 U	0.08 U	0.08 U	0.04 U	0.04 U	0.08 U	0.10 U	0.08 U	0.10 U	0.08 U	0.16 U
	13	-	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.16 U	0.10 U	0.10 U	0.08 U	0.16 U	0.10 U	0.16 U	0.10 U	0.04 U	0.04 U
	14	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.08 U	0.08 U	0.08 U	0.10 U	0.10 U	0.04 U	0.04 U
	15	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	16	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	17	-	-	-	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-
	18	-	-	-	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-
	19	-	-	-	-	0.04 U	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-
	20	-	-	-	-	0.04 U	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-
	21	-	-	-	-	0.04 U	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-
	22	-	-	-	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Dibromochloromethane (ug/L)	1	-	-	3.0 U	-	-	3.0 U	3.0 U	3.0 U	-	2.4 U	-	3.0 U	-	3.0 U	-	3.0 U
	6	2.4 U	2.4 U	1.5 U	-	-	2.4 U	2.4 U	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U
	7	1.5 U	-	1.5 U	-	-	2.4 U	-	2.4 U	-	-	-	3.0 U	-	-	-	3.0 U
	9	-	-	-	2.4 U	2.4 U	2.4 U	2.4 U	3.0 U	1.2 U	2.4 U	3.0 U	3.0 U	2.4 U	3.0 U	3.0 U	-
	10	1.5 U	2.4 U	-	-	-	-	-	-	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.15 U	0.06 U	0.12 U	0.03 U	0.06 U	0.12 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	14	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	15	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.03 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.22 J	-	0.14 J	0.16 J	1.5	0.14 J	0.06 J	0.06 J	0.03 U	0.06 U	0.19 J	0.06 U	0.17	0.20 J	0.22 J	0.06 U
1,2-Dibromoethane (ug/L)	1	-	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	1.6 U	-	2.0 U	-	2.0 U	-	2.0 U
	6	1.6 U	1.6 U	1.0 U	-	-	1.6 U	1.6 U	2.0 U	-	2.0 U	-	2.0 U	-	2.0 U	-	2.0 U
	7	1.0 U	-	1.0 U	-	-	1.6 U	-	1.6 U	-	-	-	2.0 U	-	-	-	2.0 U
	9	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U	2.0 U	2.4 U	1.6 U	2.0 U	2.0 U	1.6 U	2.0 U	2.0 U	-
	10	1.0 U	1.6 U	-	-	-	-	-	-	-	-	-	-	0.04 U	0.04 U	0.04 U	0.04 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.10 U	0.04 U	0.08 U	0.06 U	0.04 U	0.08 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	13	0.04 U	0.04 U	0.04 U	-	-	0.04 U	0.04 U	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U
	14	0.04 U	0.04 U	0.04 U	-	-	0.04 U	0.04 U	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U
	15	0.04 U	0.04 U	0.04 U	-	-	0.04 U	0.04 U	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U
	16	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.06 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.04 U	-	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.06 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Dibromochloromethane (ug/L)	1	-	3.0 U	-	3.0 U	-	3.0 U
	6	-	2.4 U	-	3.0 U	-	3.0 U
	7	-	-	-	3.0 U	-	-
	9	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
	10	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	-	0.06 U	-	0.06 U	-	0.06 U
	14	-	0.06 U	-	0.06 U	-	0.06 U
	15	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.27 J	0.29 J	0.17	0.34	0.14 J	0.15 J
1,2-Dibromoethane (ug/L)	1	-	2.0 U	-	2.0 U	-	2.0 U
	6	-	1.6 U	-	2.0 U	-	2.0 U
	7	-	-	-	2.0 U	-	-
	9	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	10	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	11	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	13	-	0.04 U	-	0.04 U	-	0.04 U
	14	-	0.04 U	-	0.04 U	-	0.04 U
	15	-	0.04 U	-	0.04 U	-	0.04 U
	16	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Dibromomethane (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	18	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	19	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	20	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	22	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-
1,2-Dichlorobenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Dibromomethane (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	1.2 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.03 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.03 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.03 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,2-Dichlorobenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.8 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.07 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Dibromomethane (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,2-Dichlorobenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,3-Dichlorobenzene (ug/L)	1	6.5 U	6.5 U	-	-	-	-	6.5 U	-	-	6.5 U	-	-	-	13 U	13 U	-
	6	2.6 U	3.3 U	-	-	-	-	2.6 U	3.3 U	3.3 U	3.3 U	-	3.3 U	5.2 U	6.5 U	5.2 U	5.2 U
	7	-	3.3 U	3.3 U	2.6 U	3.3 U	2.6 U	2.6 U	3.3 U	-	3.3 U	-	-	5.2 U	3.3 U	5.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	3.3 U	2.6 U	2.6 U	3.3 U	2.6 U	2.6 U	3.3 U	3.3 U	1.3 U	3.3 U	3.3 U	5.2 U	3.3 U	5.2 U	5.2 U
	11	-	1.3 U	0.26 U	0.26 U	0.13 U	0.26 U	0.26 U	0.26 U	0.13 U	0.13 U	0.26 U	0.33 U	0.26 U	0.33 U	0.26 U	0.52 U
	13	-	0.65 U	0.65 U	0.65 U	0.65 U	0.33 U	0.52 U	0.33 U	0.33 U	0.26 U	0.52 U	0.33 U	0.52 U	0.33 U	0.13 U	0.13 U
	14	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.26 U	0.26 U	0.26 U	0.33 U	0.33 U	0.13 U	0.13 U
	15	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	16	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	17	-	-	-	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-	-
	18	-	-	-	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-	-
	19	-	-	-	-	0.13 U	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-	-
	20	-	-	-	-	0.13 U	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-	-
	21	-	-	-	-	0.13 U	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-	-
	22	-	-	-	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	-
1,4-Dichlorobenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,3-Dichlorobenzene (ug/L)	1	-	-	6.5 U	-	-	6.5 U	6.5 U	6.5 U	-	5.2 U	-	6.5 U	-	6.5 U	-	6.5 U
	6	5.2 U	5.2 U	3.3 U	-	-	5.2 U	5.2 U	6.5 U	-	6.5 U	-	6.5 U	-	6.5 U	-	6.5 U
	7	3.3 U	-	3.3 U	-	-	5.2 U	-	5.2 U	-	-	-	6.5 U	-	-	-	6.5 U
	9	-	-	-	5.2 U	5.2 U	5.2 U	5.2 U	6.5 U	2.4 U	5.2 U	6.5 U	6.5 U	5.2 U	6.5 U	6.5 U	-
	10	3.3 U	5.2 U	-	-	-	-	-	-	-	-	-	-	0.13 U	0.13 U	0.13 U	0.13 U
	11	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.33 U	0.13 U	0.26 U	0.06 U	0.13 U	0.26 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	13	0.13 U	0.13 U	0.13 U	-	-	0.13 U	0.13 U	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U
	14	0.13 U	0.13 U	0.13 U	-	-	0.13 U	0.13 U	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U
	15	0.13 U	0.13 U	0.13 U	-	-	0.13 U	0.13 U	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U	-	0.13 U
	16	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.06 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.13 U	-	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.06 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
1,4-Dichlorobenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.4 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.06 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.06 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.06 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,3-Dichlorobenzene (ug/L)	1	-	6.5 U	-	6.5 U	-	6.5 U
	6	-	5.2 U	-	6.5 U	-	6.5 U
	7	-	-	-	6.5 U	-	-
	9	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U
	10	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	11	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	13	-	0.13 U	-	0.13 U	-	0.13 U
	14	-	0.13 U	-	0.13 U	-	0.13 U
	15	-	0.13 U	-	0.13 U	-	0.13 U
	16	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
1,4-Dichlorobenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Dichlorodifluoromethane (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	18	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	19	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	20	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	22	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-
1,1-Dichloroethane (ug/L)	1	2.0 U	2.0 U	-	-	-	-	2.0 U	-	-	2.0 U	-	-	-	4.0 U	4.0 U	-
	6	0.80 U	1.0 U	-	-	-	-	0.80 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.6 U	2.0 U	1.6 U	1.6 U
	7	-	1.0 U	1.0 U	0.80 U	1.0 U	0.80 U	0.80 U	1.0 U	-	1.0 U	-	-	1.6 U	1.0 U	1.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.0 U	0.80 U	0.80 U	1.0 U	0.80 U	0.80 U	1.0 U	1.0 U	0.56 J	1.0 U	1.0 U	1.6 U	1.0 U	1.6 U	1.6 U
	11	-	0.40 U	0.39 J	0.49 J	0.49 J	0.44 J	0.41 J	0.50 J	0.44 J	0.31 J	0.49 J	0.42 J	0.44 J	0.42 J	0.51 J	0.42 J
	13	-	0.57 J	0.48 J	0.43 J	0.54 J	0.39 J	0.38 J	0.47 J	0.54 J	0.48 J	0.58 J	0.45 J	0.44 J	0.42 J	0.04 U	0.08 J
	14	-	0.66	0.56	0.62	0.55	0.47 J	0.44 J	0.54	0.49 J	0.49 J	0.50 J	0.48 J	1.2 J	0.47 J	0.04 U	0.04 U
	15	-	0.67	0.61	0.63	0.67	0.48 J	0.48 J	0.55	0.60	0.56	0.54	0.43 J	0.48 J	0.47 J	0.04 U	0.04 U
	16	-	0.47 J	0.50 J	0.62	0.57	0.49 J	0.43 J	0.55	0.62	0.55	0.56	0.52	0.17 J	0.50	0.04 U	0.04 U
	17	-	-	-	-	0.50	0.51	0.45 J	0.54	0.58	0.53	0.58	0.49 J	0.47 J	0.51	-	-
	18	-	-	-	-	0.53	0.50 J	0.43 J	0.45 J	0.63	0.57	0.57	0.52	0.51	0.48 J	-	-
	19	-	-	-	-	0.51	-	0.45 J	0.54	0.64	0.56	0.58	0.55	0.51	0.49 J	-	-
	20	-	-	-	-	0.52	-	0.44 J	0.55	0.64	0.56	0.60	0.52	0.49 J	0.48 J	-	-
	21	-	-	-	-	0.49 J	-	0.45 J	0.57	0.66	0.56	0.58	0.51	0.50	0.47 J	-	-
	22	-	-	-	-	0.50	0.48 J	0.44 J	0.55	0.65	0.57	0.59	0.52	0.48 J	0.50 J	0.04 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Dichlorodifluoromethane (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	2.8 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.07 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.07 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.07 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,1-Dichloroethane (ug/L)	1	-	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	1.6 U	-	2.0 U	-	2.0 U	-	2.0 U
	6	1.6 U	1.6 U	1.0 U	-	-	1.6 U	1.6 U	2.0 U	-	2.0 U	-	2.0 U	-	2.0 U	-	2.0 U
	7	1.0 U	-	1.0 U	-	-	1.6 U	-	1.6 U	-	-	-	2.0 U	-	-	-	2.0 U
	9	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U	2.0 U	2.0 U	1.6 U	2.0 U	2.0 U	1.6 U	2.0 U	2.0 U	-
	10	1.0 U	1.6 U	-	-	-	-	-	-	-	-	-	-	0.04 U	0.04 U	0.04 U	0.04 U
	11	0.38 J	0.47 J	0.47 J	0.45 J	0.42 J	0.39 J	0.04 J	0.08 J	0.43	0.23 J	0.48 J	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	13	0.19 J	0.30 J	0.53	-	-	0.48 J	0.04 J	0.04 U	-	0.14 J	-	0.14 J	-	0.04 U	-	0.04 U
	14	0.04 U	0.09 J	0.48 J	-	-	0.48 J	0.04 J	0.04 U	-	0.04 U	-	0.07 J	-	0.11 J	-	0.07 J
	15	0.04 U	0.04 U	0.46 J	-	-	0.50	0.04 J	0.04 U	-	0.04 U	-	0.04 U	-	0.04 U	-	0.07 J
	16	0.04 U	0.04 U	0.30 J	0.39 J	0.49 J	0.52	0.54	0.04 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.04 U	-	0.29 J	0.39 J	0.48 J	0.55	0.52	0.04 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Dichlorodifluoromethane (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,1-Dichloroethane (ug/L)	1	-	2.0 U	-	2.0 U	-	2.0 U
	6	-	1.6 U	-	2.0 U	-	2.0 U
	7	-	-	-	2.0 U	-	-
	9	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	10	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	11	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
	13	-	0.04 U	-	0.04 U	-	0.04 U
	14	-	0.04 U	-	0.04 U	-	0.04 U
	15	-	0.04 U	-	0.04	-	0.04 U
	16	0.04 U	0.04 U	0.05	0.05	0.04 J	0.04 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 J	0.04 U	0.06	0.04	0.04 U	0.04 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,2-Dichloroethane (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.92 J	0.49 J	0.55 J	0.50 J	0.57 J	0.54 J	0.49 J	0.42 J	0.29 J	0.50 J	0.39 J	0.43 J	0.45 J	0.48 J	0.53 J
	13	-	0.91 J	0.77 J	0.63 J	0.70 J	0.56 J	0.55 J	0.48 J	0.49 J	0.46 J	0.59 J	0.46 J	0.47 J	0.41 J	0.08 U	0.08 U
	14	-	0.82	0.64	0.65	0.61	0.60	0.55	0.51	0.47 J	0.48 J	0.44 J	0.49 J	1.2 J	0.50 J	0.08 U	0.08 U
	15	-	0.73	0.69	0.72	0.71	0.64	0.59	0.55	0.56	0.52	0.52	0.44 J	0.47 J	0.43 J	0.08 U	0.08 U
	16	-	0.46 J	0.51	0.64	0.57	0.65	0.53	0.52	0.54	0.52	0.51	0.46 J	0.21 J	0.49 J	0.08 U	0.08 U
	17	-	-	-	-	0.59	0.61	0.54	0.51	0.08 U	0.50	0.53	0.49 J	0.50	0.50	-	-
	18	-	-	-	-	0.63	0.63	0.51	0.47 J	0.62	0.55	0.56	0.48 J	0.49 J	0.48 J	-	-
	19	-	-	-	-	0.60	-	0.57	0.55	0.62	0.54	0.55	0.49 J	0.51	0.52	-	-
	20	-	-	-	-	0.60	-	0.55	0.49 J	0.62	0.55	0.55	0.49 J	0.46 J	0.52	-	-
	21	-	-	-	-	0.56	-	0.57	0.52	0.65	0.54	0.57	0.49 J	0.49 J	0.46 J	-	-
	22	-	-	-	-	0.59	0.59	0.56	0.50	0.61	0.54	0.57	0.50 J	0.51	0.53	0.08 U	-
1,1-Dichloroethene (ug/L)	1	4.5 J	8.4 J	-	-	-	-	6.4 J	-	-	9.1 J	-	-	-	10 J	9.6 J	-
	6	10	9.1 J	-	-	-	-	9.5 J	12 J	7.6 J	10.0 J	-	11 J	9.7 J	11 J	11 J	10 J
	7	-	7.2 J	7.7 J	8.0 J	8.5 J	8.3 J	8.3 J	10 J	-	9.2 J	-	-	9.2 J	8.9 J	10 J	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	9.0 J	7.4 J	8.4 J	8.8 J	7.5 J	8.1 J	10 J	4.3 J	6.6	9.8 J	9.9 J	9.2 J	8.1 J	9.4 J	9.6 J
	11	-	0.60 U	0.23 J	0.21 J	0.22 J	0.30 J	0.20 J	0.37 J	0.08 J	0.10 J	0.14 J	0.21 J	0.22 J	0.23 J	0.21 J	0.24 U
	13	-	5.5	4.0	0.67 J	0.70 J	0.37 J	0.24 U	1.0 J	0.15 U	0.17 J	0.30 J	0.21 J	0.24 U	0.22 J	0.06 U	0.06 U
	14	-	4.2	4.3	3.6	2.5	2.4	1.4	1.4	0.51	0.58 J	0.48 J	0.48 J	3.6	0.63 J	0.06 U	0.08 J
	15	-	1.7	2.3	2.7	3.0	2.3	2.1	2.4	2.3	1.9	1.6	1.4	1.6	1.4	0.06 U	0.07 J
	16	-	0.59	0.77	1.0	1.2	1.2	1.2	1.5	1.4	1.5	1.5	1.4	0.11 J	1.5	0.06 U	0.06 U
	17	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	18	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	19	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	20	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	21	-	-	-	-	0.06 U	-	1.1	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	22	-	-	-	-	0.06 U	0.06 U	1.0	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,2-Dichloroethane (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	2.8 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.43 J	0.52 J	0.45 J	0.43 J	0.41 J	0.38 J	0.08 J	0.16 J	0.30	0.22 J	0.34 J	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.14 J	0.22 J	0.44 J	-	-	0.43 J	0.08 J	0.08 U	-	0.09 J	-	0.09 J	-	0.10 J	-	0.09 J
	14	0.08 U	0.08 U	0.41 J	-	-	0.47 J	0.08 J	0.08 U	-	0.08 U	-	0.08 U	-	0.09 J	-	0.08 J
	15	0.08 U	0.08 U	0.31 J	-	-	0.51	0.52	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.15 J	0.23 J	0.40 J	0.42 J	0.54	0.08 U	0.07 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.15 J	0.23 J	0.41 J	0.43 J	0.51	0.08 U	0.07 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,1-Dichloroethene (ug/L)	1	-	-	9.1 J	-	-	7.3 J	3.0 J	3.0 J	-	9.6 J	-	11 J	-	8.1 J	-	9.4 J
	6	10 J	9.4 J	11 J	-	-	9.5 J	2.4 J	3.0 J	-	11 J	-	11 J	-	9.3 J	-	8.8 J
	7	8.4 J	-	9.8 J	-	-	8.9 J	-	2.4 J	-	-	-	11 J	-	-	-	8.2 J
	9	-	-	-	9.5 J	8.1 J	9.1 J	2.4 J	3.0 J	6.2	7.5 J	10 J	9.8 J	9.5	9.5 J	9.1 J	-
	10	8.3 J	8.7 J	-	-	-	-	-	-	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.20 J	0.12 U	0.29 J	0.25 J	0.18 J	0.22 J	0.06 U	0.12 U	0.05 U	0.06 U	0.12 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.06 U	0.06 U	0.16 J	-	-	0.33 J	0.06 J	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	14	0.06 U	0.06 U	0.06 U	-	-	0.19 J	0.06 J	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	15	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 J	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,2-Dichloroethane (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.09	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,1-Dichloroethene (ug/L)	1	-	9.7 J	-	11	-	9.3 J
	6	-	9.2 J	-	9.9	-	10 J
	7	-	-	-	8.0	-	-
	9	9.0 J	7.4 J	6.0	7.2	7.5 J	8.3 J
	10	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	-	0.06 U	-	0.06 U	-	0.06 U
	14	-	0.06 U	-	0.06 U	-	0.06 U
	15	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 J	0.06 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
cis-1,2-Dichloroethene (ug/L)	1	11 J	16 J	-	-	-	-	15 J	-	-	16 J	-	-	-	17 J	17 J	-
	6	18	17	-	-	-	-	17	19	18	17	-	20	19 J	18 J	20 J	18 J
	7	-	16	16	17	18	16	16	19	-	18	-	-	17 J	21	20 J	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	20	15	16	17	15	15	19	15	13	18	18	17 J	19	17 J	17 J
	11	-	6.4	0.70 J	0.80 J	0.91	0.86 J	0.75 J	1.1	0.53	0.37 J	0.75 J	0.76 J	0.80 J	0.94 J	0.73 J	0.72 J
	13	-	13	8.9	3.8	3.3	2.0	1.6 J	2.3	1.5	1.1	1.2 J	1.2 J	0.90 J	1.1 J	0.09 U	0.09 U
	14	-	12	11	9.2	6.6	5.3	3.7	3.4	3.0	2.3	2.1	1.8	9.4	1.6	0.09 U	0.22 J
	15	-	5.1	5.9	7.0	7.7	5.8	5.7	5.6	5.4	4.4	3.9	-	3.6	2.9	0.09 U	0.22 J
	16	-	1.6	2.0	3.1	3.4	3.6	3.4	4.1	4.5	4.1	4.0	4.0	0.65	3.6	0.10 J	0.09 J
	17	-	-	-	-	1.2	3.2	2.1	1.9	1.5	1.7	3.0	2.3	2.1	2.2	-	-
	18	-	-	-	-	1.6	3.1	2.1	1.6	0.45 J	2.3	2.6	2.8	2.0	2.7	-	-
	19	-	-	-	-	1.6	-	2.4	2.3	0.63	1.9	2.4	2.7	1.9	2.5	-	-
	20	-	-	-	-	0.75	-	2.8	2.3	0.74	2.9	2.5	2.7	1.7	2.4	-	-
	21	-	-	-	-	0.64	-	3.4	2.3	1.6	1.7	2.8	3.0	1.8	2.1	-	-
	22	-	-	-	-	0.55	3.0	3.4	2.4	1.1	2.2	2.7	3.0	1.8	1.9	0.09 U	-
trans-1,2-Dichloroethene (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.23 J	0.14 J	0.14 J	0.11 J	0.09 U	0.09 U	0.09 J	0.16 J	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.12 J	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.18 J	0.19 J	0.26 J	0.14 J	0.21 J	0.09 J	0.12 J	0.10 J	0.20 J	-	-
	18	-	-	-	-	0.09 U	0.31 J	0.32 J	0.21 J	0.09 U	0.10 J	0.09 U	0.09 U	0.21 J	0.25 J	-	-
	19	-	-	-	-	0.09 U	-	0.28 J	0.28 J	0.09 U	0.16 J	0.10 J	0.09 U	0.11 J	0.29 J	-	-
	20	-	-	-	-	0.09 U	-	0.43 J	0.25 J	0.09 U	0.09 U	0.12 J	0.09 U	0.16 J	0.19 J	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.26 J	0.09 U	0.13 J	0.09 U	0.09 U	0.23 J	0.19 J	-	-
	22	-	-	-	-	0.09 U	0.31 J	0.09 U	0.32 J	0.09 U	0.19 J	0.14 J	0.09 U	0.11 J	0.17 J	0.09 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
cis-1,2-Dichloroethene (ug/L)	1	-	-	18 J	-	-	16 J	4.5 J	4.5 J	-	15 J	-	17 J	-	17 J	-	14 J
	6	17 J	18 J	19	-	-	17 J	3.6 J	4.5 J	-	16 J	-	18 J	-	17 J	-	16 J
	7	23	-	21	-	-	17 J	-	3.6 J	-	-	-	21 J	-	-	-	16 J
	9	-	-	-	21	23	19 J	3.6 J	4.5 J	18	16 J	18 J	22 J	17	17 J	17 J	-
	10	22	21	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.81 J	0.57 J	0.91 J	0.68 J	0.79 J	0.73 J	0.09 J	0.18 J	0.23	0.23 J	0.31 J	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.77	-	-	1.1	1.0	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.22 J	-	-	0.82	1.1	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.49 J	0.68	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.14 J	0.15 J	0.09 J	0.09 U	0.07 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.12 J	0.09 J	0.09 U	0.07 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
trans-1,2-Dichloroethene (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	2.4 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.06 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.06 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.06 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
cis-1,2-Dichloroethene (ug/L)	1	-	17 J	-	15	-	15 J
	6	-	17 J	-	16	-	16 J
	7	-	-	-	23	-	-
	9	21 J	21 J	17	21	20 J	23 J
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.22 J	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.34 J	0.09 U
trans-1,2-Dichloroethene (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,2-Dichloropropane (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-
1,3-Dichloropropane (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	18	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	19	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	20	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	22	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,2-Dichloropropane (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	1.6	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.02 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.02 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.02 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
1,3-Dichloropropane (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	0.40 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.01 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.01 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.01 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/08/00	12/13/00
1,2-Dichloropropane (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
1,3-Dichloropropane (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
2,2-Dichloropropane (ug/L)	1	9.5 U	9.5 U	-	-	-	-	9.5 U	-	-	9.5 U	-	-	-	19 U	19 U	-
	6	3.8 U	4.8 U	-	-	-	-	3.8 U	4.8 U	4.8 U	4.8 U	-	4.8 U	7.6 U	9.5 U	7.6 U	7.6 U
	7	-	4.8 U	4.8 U	3.8 U	4.8 U	3.8 U	3.8 U	4.8 U	-	4.8 U	-	-	7.6 U	4.8 U	7.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	4.8 U	3.8 U	3.8 U	4.8 U	3.8 U	3.8 U	4.8 U	4.8 U	1.9 U	4.8 U	4.8 U	7.6 U	4.8 U	7.6 U	7.6 U
	11	-	1.9 U	0.38 U	0.38 U	0.19 U	0.38 U	0.38 U	0.38 U	0.19 U	0.19 U	0.38 U	0.47 U	0.38 U	0.47 U	0.38 U	0.76 U
	13	-	0.95 U	0.95 U	0.95 U	0.95 U	0.47 U	0.76 U	0.47 U	0.47 U	0.38 U	0.76 U	0.47 U	0.76 U	0.47 U	0.19 U	0.19 U
	14	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.38 U	0.38 U	0.38 U	0.47 U	0.47 U	0.19 U	0.19 U
	15	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	16	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	17	-	-	-	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-	-
	18	-	-	-	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-	-
	19	-	-	-	-	0.19 U	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-	-
	20	-	-	-	-	0.19 U	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-	-
	21	-	-	-	-	0.19 U	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-	-
	22	-	-	-	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	-
1,1-Dichloropropene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
2,2-Dichloropropane (ug/L)	1	-	-	9.5 U	-	-	9.5 U	9.5 U	9.5 U	-	7.6 U	-	9.5 U	-	9.5 U	-	9.5 U
	6	7.6 U	7.6 U	4.8 U	-	-	7.6 U	7.6 U	9.5 U	-	9.5 U	-	9.5 U	-	9.5 U	-	9.5 U
	7	4.8 U	-	4.8 U	-	-	7.6 U	-	7.6 U	-	-	-	9.5 U	-	-	-	9.5 U
	9	-	-	-	7.6 U	7.6 U	7.6 U	7.6 U	9.5 U	3.2 U	7.6 U	9.5 U	9.5 U	7.6 U	9.5 U	9.5 U	-
	10	4.8 U	7.6 U	-	-	-	-	-	-	-	-	-	-	0.19 U	0.19 U	0.19 U	0.19 U
	11	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.47 U	0.19 U	0.38 U	0.08 U	0.19 U	0.38 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	13	0.19 U	0.19 U	0.19 U	-	-	0.19 U	0.19 U	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U
	14	0.19 U	0.19 U	0.19 U	-	-	0.19 U	0.19 U	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U
	15	0.19 U	0.19 U	0.19 U	-	-	0.19 U	0.19 U	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U	-	0.19 U
	16	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.08 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.19 U	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.08 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,1-Dichloropropene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	1.6 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.04 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.04 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.04 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
2,2-Dichloropropane (ug/L)	1	-	9.5 U	-	9.5 U	-	9.5 U
	6	-	7.6 U	-	9.5 U	-	9.5 U
	7	-	-	-	9.5 U	-	-
	9	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U
	10	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	11	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	13	-	0.19 U	-	0.19 U	-	0.19 U
	14	-	0.19 U	-	0.19 U	-	0.19 U
	15	-	0.19 U	-	0.19 U	-	0.19 U
	16	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,1-Dichloropropene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
cis-1,3-Dichloropropene (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.08 U	0.16 U	0.16 U	0.16 U	0.08 U	0.08 U	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-
trans-1,3-Dichloropropene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
cis-1,3-Dichloropropene (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	1.6 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.20 U	0.08 U	0.16 U	0.04 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.04 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.04 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
trans-1,3-Dichloropropene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	0.80 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.02 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.02 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.02 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
cis-1,3-Dichloropropene (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
trans-1,3-Dichloropropene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Ethyl tert-butyl ether (ug/L)	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0 U	-	-	5.0 U	-	-	-	10 U	10 U	-
	6	2.0 U	2.5 U	-	-	-	-	2.0 U	2.5 U	2.5 U	2.5 U	-	2.5 U	4.0 U	5.0 U	4.0 U	4.0 U
	7	-	2.5 U	2.5 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	-	2.5 U	-	-	4.0 U	2.5 U	4.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.5 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	1.0 U	2.5 U	2.5 U	4.0 U	2.5 U	4.0 U	4.0 U
	11	-	1.0 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.25 U	0.20 U	0.25 U	0.20 U	0.40 U
	13	-	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.40 U	0.25 U	0.25 U	0.20 U	0.40 U	0.25 U	0.40 U	0.25 U	0.10 U	0.10 U
	14	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	0.10 U	0.10 U
	15	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	16	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	18	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	19	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	20	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	21	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	22	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	08/19/00	08/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Ethyl tert-butyl ether (ug/L)	9	-	-	-	-	-	-	-	-	1.2 U	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	0.03 U	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	0.03 U	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	0.03 U	-	-	-	-	-	-	-
Ethylbenzene (ug/L)	1	-	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-	4.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	6	4.0 U	4.0 U	2.5 U	-	-	4.0 U	4.0 U	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	7	2.5 U	-	2.5 U	-	-	4.0 U	-	4.0 U	-	-	-	5.0 U	-	-	-	5.0 U
	9	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	5.0 U	2.8 U	4.0 U	5.0 U	5.0 U	4.0 U	5.0 U	5.0 U	-
	10	2.5 U	4.0 U	-	-	-	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U	0.10 U	0.20 U	0.07 U	0.10 U	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	14	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	15	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Ethyl tert-butyl ether (ug/L)	9	-	-	-	-	-	-
	11	-	-	-	-	-	-
	16	-	-	-	-	-	-
	22	-	-	-	-	-	-
Ethylbenzene (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U
	6	-	4.0 U	-	5.0 U	-	5.0 U
	7	-	-	-	5.0 U	-	-
	9	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	-	0.10 U	-	0.10 U	-	0.10 U
	14	-	0.10 U	-	0.10 U	-	0.10 U
	15	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Hexachlorobutadiene (ug/L)	1	8.0 U	8.0 U	-	-	-	-	8.0 U	-	-	8.0 U	-	-	-	16 U	16 U	-
	6	3.2 U	4.0 U	-	-	-	-	3.2 U	4.0 U	4.0 U	4.0 U	-	4.0 U	6.4 U	8.0 U	6.4 U	6.4 U
	7	-	4.0 U	4.0 U	3.2 U	4.0 U	3.2 U	3.2 U	4.0 U	-	4.0 U	-	-	6.4 U	4.0 U	6.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	4.0 U	3.2 U	3.2 U	4.0 U	3.2 U	3.2 U	4.0 U	4.0 U	1.6 U	4.0 U	4.0 U	6.4 U	4.0 U	6.4 U	6.4 U
	11	-	1.6 U	0.32 U	0.32 U	0.16 U	0.32 U	0.32 U	0.32 U	0.16 U	0.16 U	0.32 U	0.40 U	0.32 U	0.40 U	0.32 U	0.64 U
	13	-	0.80 U	0.80 U	0.80 U	0.80 U	0.40 U	0.64 U	0.40 U	0.40 U	0.32 U	0.64 U	0.40 U	0.64 U	0.40 U	0.16 U	0.16 U
	14	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.32 U	0.32 U	0.32 U	0.40 U	0.40 U	0.16 U	0.16 U
	15	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	16	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	17	-	-	-	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-	-
	18	-	-	-	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-	-
	19	-	-	-	-	0.16 U	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-	-
	20	-	-	-	-	0.16 U	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-	-
	21	-	-	-	-	0.16 U	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-	-
	22	-	-	-	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	-
2-Hexanone (ug/L)	1	48 U	48 U	-	-	-	-	48 U	-	-	48 U	-	-	-	96 U	96 U	-
	6	19 U	24 U	-	-	-	-	19 U	24 U	24 U	24 U	-	24 U	38 U	48 U	38 U	38 U
	7	-	24 U	24 U	19 U	24 U	19 U	19 U	24 U	-	24 U	-	-	38 U	24 U	38 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	24 U	19 U	19 U	24 U	19 U	19 U	24 U	24 U	9.6 U	24 U	24 U	38 U	24 U	38 U	38 U
	11	-	9.6 U	1.9 U	1.9 U	0.96 U	1.9 U	1.9 U	1.9 U	0.96 U	0.96 U	1.9 U	2.4 U	1.9 U	2.4 U	1.9 U	3.8 U
	13	-	4.8 U	4.8 U	4.8 U	4.8 U	2.4 U	3.8 U	2.4 U	2.4 U	1.9 U	3.8 U	2.4 U	3.8 U	2.4 U	0.96 U	0.96 U
	14	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	1.9 U	1.9 U	1.9 U	2.4 U	2.4 U	0.96 U	0.96 U
	15	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	16	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	17	-	-	-	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-	-
	18	-	-	-	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-	-
	19	-	-	-	-	0.96 U	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-	-
	20	-	-	-	-	0.96 U	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-	-
	21	-	-	-	-	0.96 U	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-	-
	22	-	-	-	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Hexachlorobutadiene (ug/L)	1	-	-	8.0 U	-	-	8.0 U	8.0 U	8.0 U	-	6.4 U	-	8.0 U	-	8.0 U	-	8.0 U
	6	6.4 U	6.4 U	4.0 U	-	-	6.4 U	6.4 U	8.0 U	-	8.0 U	-	8.0 U	-	8.0 U	-	8.0 U
	7	4.0 U	-	4.0 U	-	-	6.4 U	-	6.4 U	-	-	-	8.0 U	-	-	-	8.0 U
	9	-	-	-	6.4 U	6.4 U	6.4 U	6.4 U	8.0 U	3.6 U	6.4 U	8.0 U	8.0 U	6.4 U	8.0 U	8.0 U	-
	10	4.0 U	6.4 U	-	-	-	-	-	-	-	-	-	-	0.16 U	0.16 U	0.16 U	0.16 U
	11	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.40 U	0.16 U	0.32 U	0.09 U	0.16 U	0.32 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	13	0.16 U	0.16 U	0.16 U	-	-	0.16 U	0.16 U	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U
	14	0.16 U	0.16 U	0.16 U	-	-	0.16 U	0.16 U	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U
	15	0.16 U	0.16 U	0.16 U	-	-	0.16 U	0.16 U	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U	-	0.16 U
	16	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.09 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.16 U	-	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.09 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
2-Hexanone (ug/L)	1	-	-	48 U	-	-	48 U	48 U	48 U	-	38 U	-	48 U	-	48 U	-	48 U
	6	38 U	38 U	24 U	-	-	38 U	38 U	48 U	-	48 U	-	48 U	-	48 U	-	48 U
	7	24 U	-	24 U	-	-	38 U	-	38 U	-	-	-	48 U	-	-	-	48 U
	9	-	-	-	38 U	38 U	38 U	38 U	48 U	20 U	38 U	48 U	48 U	38 U	48 U	48 U	-
	10	24 U	38 U	-	-	-	-	-	-	-	-	-	-	0.96 U	0.96 U	0.96 U	0.96 U
	11	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	2.4 U	0.96 U	1.9 U	0.49 U	0.96 U	1.9 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	13	0.96 U	0.96 U	0.96 U	-	-	0.96 U	0.96 U	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U
	14	0.96 U	0.96 U	0.96 U	-	-	0.96 U	0.96 U	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U
	15	0.96 U	0.96 U	0.96 U	-	-	0.96 U	0.96 U	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U	-	0.96 U
	16	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.49 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.96 U	-	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.49 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Hexachlorobutadiene (ug/L)	1	-	8.0 U	-	8.0 U	-	8.0 U
	6	-	6.4 U	-	8.0 U	-	8.0 U
	7	-	-	-	8.0 U	-	-
	9	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U
	10	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	13	-	0.16 U	-	0.16 U	-	0.16 U
	14	-	0.16 U	-	0.16 U	-	0.16 U
	15	-	0.16 U	-	0.16 U	-	0.16 U
	16	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
2-Hexanone (ug/L)	1	-	48 U	-	48 U	-	48 U
	6	-	38 U	-	48 U	-	48 U
	7	-	-	-	48 U	-	-
	9	48 U	48 U	48 U	48 U	48 U	48 U
	10	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	11	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	13	-	0.96 U	-	0.96 U	-	0.96 U
	14	-	0.96 U	-	0.96 U	-	0.96 U
	15	-	0.96 U	-	0.96 U	-	0.96 U
	16	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Isopropylbenzene (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0 U	-	-	5.0 U	-	-	-	10 U	10 U	-
	6	2.0 U	2.5 U	-	-	-	-	2.0 U	2.5 U	2.5 U	2.5 U	-	2.5 U	4.0 U	5.0 U	4.0 U	4.0 U
	7	-	2.5 U	2.5 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	-	2.5 U	-	-	4.0 U	2.5 U	4.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.5 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	1.0 U	2.5 U	2.5 U	4.0 U	2.5 U	4.0 U	4.0 U
	11	-	1.0 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.25 U	0.20 U	0.25 U	0.20 U	0.40 U
	13	-	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.40 U	0.25 U	0.25 U	0.20 U	0.40 U	0.25 U	0.40 U	0.25 U	0.10 U	0.10 U
	14	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	0.10 U	0.10 U
	15	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	16	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	18	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	19	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	20	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	21	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	22	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-
4-Isopropyltoluene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Isopropylbenzene (ug/L)	1	-	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-	4.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	6	4.0 U	4.0 U	2.5 U	-	-	4.0 U	4.0 U	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	7	2.5 U	-	2.5 U	-	-	4.0 U	-	4.0 U	-	-	-	5.0 U	-	-	-	5.0 U
	9	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	5.0 U	2.8 U	4.0 U	5.0 U	5.0 U	4.0 U	5.0 U	5.0 U	-
	10	2.5 U	4.0 U	-	-	-	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U	0.10 U	0.20 U	0.07 U	0.10 U	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	14	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	15	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4-Isopropyltoluene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.8 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.07 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.07 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Isopropylbenzene (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U
	6	-	4.0 U	-	5.0 U	-	5.0 U
	7	-	-	-	5.0 U	-	-
	9	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	-	0.10 U	-	0.10 U	-	0.10 U
	14	-	0.10 U	-	0.10 U	-	0.10 U
	15	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4-Isopropyltoluene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Methyl tert-butyl ether (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.08 U	0.16 U	0.16 U	0.16 U	0.08 U	0.08 U	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.12 J	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-
4-Methyl-2-Pentanone (ug/L)	1	55 U	55 U	-	-	-	-	55 U	-	-	55 U	-	-	-	109 U	109 U	-
	6	22 U	27 U	-	-	-	-	22 U	27 U	27 U	27 U	-	27 U	44 U	55 U	44 U	44 U
	7	-	27 U	27 U	22 U	27 U	22 U	22 U	27 U	-	27 U	-	-	44 U	27 U	44 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	27 U	22 U	22 U	27 U	22 U	22 U	27 U	27 U	11 U	27 U	27 U	44 U	27 U	44 U	44 U
	11	-	11 U	2.2 U	2.2 U	1.1 U	2.2 U	2.2 U	2.2 U	1.1 U	1.1 U	2.2 U	2.7 U	2.2 U	2.7 U	2.2 U	4.4 U
	13	-	5.5 U	5.5 U	5.5 U	5.5 U	2.7 U	4.4 U	2.7 U	2.7 U	2.2 U	4.4 U	2.7 U	4.4 U	2.7 U	1.1 U	1.1 U
	14	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	2.2 U	2.2 U	2.2 U	2.7 U	2.7 U	1.1 U	1.1 U
	15	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	16	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	17	-	-	-	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-	-
	18	-	-	-	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-	-
	19	-	-	-	-	1.1 U	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-	-
	20	-	-	-	-	1.1 U	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-	-
	21	-	-	-	-	1.1 U	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-	-
	22	-	-	-	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Methyl tert-butyl ether (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	1.2 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.10 J	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.20 U	0.08 U	0.16 U	0.03 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.13 J	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.03 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.03 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
4-Methyl-2-Pentanone (ug/L)	1	-	-	55 U	-	-	55 U	55 U	55 U	-	44 U	-	55 U	-	55 U	-	55 U
	6	44 U	44 U	27 U	-	-	44 U	44 U	55 U	-	55 U	-	55 U	-	55 U	-	55 U
	7	27 U	-	27 U	-	-	44 U	-	44 U	-	-	-	55 U	-	-	-	55 U
	9	-	-	-	44 U	44 U	44 U	44 U	55 U	14 U	44 U	55 U	55 U	44 U	55 U	55 U	-
	10	27 U	44 U	-	-	-	-	-	-	-	-	-	-	1.1 U	1.1 U	1.1 U	1.1 U
	11	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.7 U	1.1 U	2.2 U	0.36 U	1.1 U	2.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	13	1.1 U	1.1 U	1.1 U	-	-	1.1 U	1.1 U	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U
	14	1.1 U	1.1 U	1.1 U	-	-	1.1 U	1.1 U	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U
	15	1.1 U	1.1 U	1.1 U	-	-	1.1 U	1.1 U	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U	-	1.1 U
	16	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.36 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	1.1 U	-	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.36 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Methyl tert-butyl ether (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.18 J	0.08 U	0.08 U	0.14 J	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
4-Methyl-2-Pentanone (ug/L)	1	-	55 U	-	55 U	-	55 U
	6	-	44 U	-	55 U	-	55 U
	7	-	-	-	55 U	-	-
	9	55 U	55 U	55 U	55 U	55 U	55 U
	10	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	11	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	13	-	1.1 U	-	1.1 U	-	1.1 U
	14	-	1.1 U	-	1.1 U	-	1.1 U
	15	-	1.1 U	-	1.1 U	-	1.1 U
	16	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Methylene Chloride (ug/L)	1	3.0 U	3.0 U	-	-	-	-	3.0 U	-	-	6.8 J	-	-	-	6.0 U	6.0 U	-
	6	1.2 U	1.5 U	-	-	-	-	1.2 U	1.5 U	1.5 U	3.4 J	-	1.5 U	2.4 U	3.0 U	2.4 U	2.4 U
	7	-	1.5 U	2.5 J	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	-	2.9 J	-	-	2.4 U	1.5 U	2.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.5 U	1.2 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	1.5 U	1.2 J	1.5 U	1.5 U	2.4 U	1.5 U	2.4 U	2.4 U
	11	-	0.60 U	0.33 J	0.25 J	0.26 J	0.25 J	0.27 J	0.32 J	0.32 J	0.20 J	0.32 J	0.26 J	0.29 J	0.32 J	0.49 J	0.36 J
	13	-	0.44 J	0.58 J	0.33 J	0.30 U	0.29 J	0.24 U	0.95 J	0.31 J	0.28 J	0.44 J	0.26 J	0.24 U	0.49 J	0.33 J	0.32 J
	14	-	0.37 J	0.30 J	0.39 J	0.25 J	0.24 J	0.26 J	0.35 J	0.31 J	0.31 J	0.35 J	0.27 J	0.75 J	0.49 J	0.29 J	0.30 J
	15	-	0.41 J	0.30 J	0.29 J	0.29 J	0.25 J	0.28 J	0.34 J	0.30 J	0.28 J	0.30 J	0.80	0.29 J	0.26 J	0.23 J	0.22 J
	16	-	0.38 J	0.35 J	0.31 J	0.29 J	0.26 J	0.22 J	0.28 J	0.31 J	0.28 J	0.31 J	0.29 J	0.11 J	0.31 J	0.16 J	0.25 J
	17	-	-	-	-	0.26 J	0.28 J	0.25 J	0.30 J	0.31 J	0.28 J	0.31 J	0.26 J	0.28 J	0.31 J	-	-
	18	-	-	-	-	0.27 J	0.26 J	0.23 J	0.27 J	0.34 J	0.29 J	0.30 J	0.29 J	0.27 J	0.30 J	-	-
	19	-	-	-	-	0.29 J	-	0.27 J	0.31 J	0.33 J	0.28 J	0.33 J	0.30 J	0.29 J	0.27 J	-	-
	20	-	-	-	-	0.27 J	-	0.24 J	0.28 J	0.35 J	0.27 J	0.33 J	0.31 J	0.26 J	0.28 J	-	-
	21	-	-	-	-	0.27 J	-	0.27 J	0.33 J	0.33 J	0.28 J	0.34 J	0.28 J	0.27 J	0.27 J	-	-
	22	-	-	-	-	0.27 J	0.25 J	0.26 J	0.27 J	0.34 J	0.27 J	0.32 J	0.27 J	0.28 J	0.29 J	0.16 J	-
Naphthalene (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0 U	-	-	5.0 U	-	-	-	10 U	13 J	-
	6	2.0 U	2.5 U	-	-	-	-	2.0 U	2.5 U	2.5 U	2.5 U	-	2.9 J	4.0 U	6.9 J	4.0 U	4.0 U
	7	-	2.5 U	2.5 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	-	2.5 U	-	-	4.0 U	2.5 U	4.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.5 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	1.0 U	2.5 J	2.5 U	4.0 U	2.6 J	4.0 U	4.0 U
	11	-	1.0 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.25 U	0.20 U	0.25 U	0.20 U	0.40 U
	13	-	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.40 U	0.25 U	0.25 U	0.20 U	0.40 U	0.25 U	0.40 U	0.25 U	0.10 U	0.10 U
	14	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	0.10 U	0.10 U
	15	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 J	0.11 J	0.10 U	0.10 U	0.10 U	0.10 U
	16	-	0.10 U	0.10 U	0.15 J	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	18	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	19	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	20	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	21	-	-	-	-	0.10 U	-	0.10 U	0.18 J	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.11 J	-	-
	22	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Methylene Chloride (ug/L)	1	-	-	3.0 U	-	-	8.4 J	3.0 U	3.0 U	-	6.2 J	-	22 J	-	3.0 U	-	3.0 U
	6	2.4 U	2.4 U	1.5 U	-	-	7.5 J	2.4 U	3.0 U	-	26	-	22 J	-	3.0 U	-	3.0 U
	7	1.5 U	-	1.5 U	-	-	2.4 U	-	2.4 U	-	-	-	21 J	-	-	-	3.0 U
	9	-	-	-	2.4 U	2.4 U	2.4 U	2.4 U	3.0 U	4.1	20 J	3.0 U	11 J	2.4 U	3.0 U	3.0 U	-
	10	1.5 U	2.4 U	-	-	-	-	-	-	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.25 J	0.30 J	0.33 J	0.29 J	0.32 J	0.34 J	0.06 J	0.12 J	0.41	0.65	0.50 J	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.28 J	0.30 J	0.30 J	-	-	0.32 J	0.06 J	0.06 J	-	0.39 J	-	0.67	-	0.06 U	-	0.06 U
	14	0.30 J	0.30 J	0.31 J	-	-	0.29 J	0.06 J	0.06 J	-	0.73	-	0.77	-	0.06 U	-	0.06 U
	15	0.31 J	0.35 J	0.32 J	-	-	0.32 J	0.06 J	0.06 J	-	0.76	-	0.66	-	0.13 J	-	0.06 U
	16	0.31 J	0.33 J	0.33 J	0.31 J	0.33 J	0.32 J	0.06 J	0.06 J	0.37	0.42 J	0.49 J	0.69	0.18	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.31 J	-	0.28 J	0.35 J	0.31 J	0.32 J	0.06 J	0.06 J	0.39	0.43 J	0.50	0.73	0.17	0.06 U	0.06 U	0.06 U
Naphthalene (ug/L)	1	-	-	5.6 J	-	-	5.0 U	5.0 U	5.0 J	-	4.0 U	-	5.3 J	-	5.0 U	-	5.0 U
	6	4.0 U	4.0 U	2.5 U	-	-	4.0 U	4.0 U	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	7	2.5 U	-	2.5 U	-	-	4.0 U	-	4.0 U	-	-	-	5.0 U	-	-	-	5.0 U
	9	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	5.0 U	2.4 U	4.0 U	5.0 U	5.0 U	4.0 U	5.0 U	5.0 U	-
	10	2.5 U	4.0 U	-	-	-	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U	0.10 U	0.20 U	0.06 U	0.10 U	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.11 J	-	0.10 U	-	0.10 U
	14	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	15	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.06 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.06 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Methylene Chloride (ug/L)	1	-	3.0 U	-	3.0 U	-	3.0 U
	6	-	3.6 J	-	3.0 U	-	3.0 U
	7	-	-	-	3.0 U	-	-
	9	3.2 J	4.0 J	3.0 U	3.0 U	6.4 J	3.0 U
	10	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	-	0.06 U	-	0.06 U	-	0.09 J
	14	-	0.06 U	-	0.06 U	-	0.11 J
	15	-	0.06 U	-	0.06 U	-	0.13 J
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Naphthalene (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U
	6	-	4.0 U	-	5.0 U	-	5.0 U
	7	-	-	-	5.0 U	-	-
	9	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	-	0.10 U	-	0.10 U	-	0.10 U
	14	-	0.10 U	-	0.10 U	-	0.10 U
	15	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
n-Propylbenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-
Styrene (ug/L)	1	4.5 U	4.5 U	-	-	-	-	4.5 U	-	-	4.5 U	-	-	-	9.0 U	9.0 U	-
	6	1.8 U	2.3 U	-	-	-	-	1.8 U	2.3 U	2.3 U	2.3 U	-	2.3 U	3.6 U	4.5 U	3.6 U	3.6 U
	7	-	2.3 U	2.3 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	-	2.3 U	-	-	3.6 U	2.3 U	3.6 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.3 U	1.8 U	1.8 U	2.3 U	1.8 U	1.8 U	2.3 U	2.3 U	0.90 U	2.3 U	2.3 U	3.6 U	2.3 U	3.6 U	3.6 U
	11	-	0.90 U	0.18 U	0.18 U	0.09 U	0.18 U	0.18 U	0.18 U	0.09 U	0.09 U	0.18 U	0.23 U	0.18 U	0.23 U	0.18 U	0.36 U
	13	-	0.45 U	0.45 U	0.45 U	0.45 U	0.23 U	0.36 U	0.23 U	0.23 U	0.18 U	0.36 U	0.23 U	0.36 U	0.23 U	0.09 U	0.09 U
	14	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.18 U	0.18 U	0.18 U	0.23 U	0.23 U	0.09 U	0.09 U
	15	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	16	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	18	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	19	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	20	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	21	-	-	-	-	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-	-
	22	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
n-Propylbenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	1.6 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.04 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Styrene (ug/L)	1	-	-	4.5 U	-	-	4.5 U	4.5 U	4.5 U	-	3.6 U	-	4.5 U	-	4.5 U	-	4.5 U
	6	3.6 U	3.6 U	2.3 U	-	-	3.6 U	3.6 U	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U	-	4.5 U
	7	2.3 U	-	2.3 U	-	-	3.6 U	-	3.6 U	-	-	-	4.5 U	-	-	-	4.5 U
	9	-	-	-	3.6 U	3.6 U	3.6 U	3.6 U	4.5 U	2.0 U	3.6 U	4.5 U	4.5 U	3.6 U	4.5 U	4.5 U	-
	10	2.3 U	3.6 U	-	-	-	-	-	-	-	-	-	-	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.23 U	0.09 U	0.18 U	0.05 U	0.09 U	0.18 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	14	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	15	0.09 U	0.09 U	0.09 U	-	-	0.09 U	0.09 U	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.05 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 U	-	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.05 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
n-Propylbenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Styrene (ug/L)	1	-	4.5 U	-	4.5 U	-	4.5 U
	6	-	3.6 U	-	4.5 U	-	4.5 U
	7	-	-	-	4.5 U	-	-
	9	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
	10	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	11	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	13	-	0.09 U	-	0.09 U	-	0.09 U
	14	-	0.09 U	-	0.09 U	-	0.09 U
	15	-	0.09 U	-	0.09 U	-	0.09 U
	16	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,1,1,2-Tetrachloroethane (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.08 U	0.16 U	0.16 U	0.16 U	0.08 U	0.08 U	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-
1,1,2,2-Tetrachloroethane (ug/L)	1	8.5 U	8.5 U	-	-	-	-	8.5 U	-	-	8.5 U	-	-	-	17 U	17 U	-
	6	3.4 U	4.3 U	-	-	-	-	3.4 U	4.3 U	4.3 U	4.3 U	-	4.3 U	6.8 U	8.5 U	6.8 U	6.8 U
	7	-	4.3 U	4.3 U	3.4 U	4.3 U	3.4 U	3.4 U	4.3 U	-	4.3 U	-	-	6.8 U	4.3 U	6.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	4.3 U	3.4 U	3.4 U	4.3 U	3.4 U	3.4 U	4.3 U	4.3 U	1.7 U	4.3 U	4.3 U	6.8 U	4.3 U	6.8 U	6.8 U
	11	-	1.7 U	0.34 U	0.34 U	0.17 U	0.34 U	0.34 U	0.34 U	0.17 U	0.17 U	0.34 U	0.42 U	0.34 U	0.42 U	0.34 U	0.68 U
	13	-	0.85 U	0.85 U	0.85 U	0.85 U	0.42 U	0.68 U	0.42 U	0.42 U	0.34 U	0.68 U	0.42 U	0.68 U	0.42 U	0.17 U	0.17 U
	14	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.34 U	0.34 U	0.34 U	0.42 U	0.42 U	0.17 U	0.17 U
	15	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	16	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	17	-	-	-	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-	-
	18	-	-	-	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-	-
	19	-	-	-	-	0.17 U	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-	-
	20	-	-	-	-	0.17 U	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-	-
	21	-	-	-	-	0.17 U	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-	-
	22	-	-	-	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,1,1,2-Tetrachloroethane (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	1.2 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.20 U	0.08 U	0.16 U	0.03 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.03 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.03 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,1,2,2-Tetrachloroethane (ug/L)	1	-	-	8.5 U	-	-	8.5 U	8.5 U	8.5 U	-	6.8 U	-	8.5 U	-	8.5 U	-	8.5 U
	6	6.8 U	6.8 U	4.3 U	-	-	6.8 U	6.8 U	8.5 U	-	8.5 U	-	8.5 U	-	8.5 U	-	8.5 U
	7	4.3 U	-	4.3 U	-	-	6.8 U	-	6.8 U	-	-	-	8.5 U	-	-	-	8.5 U
	9	-	-	-	6.8 U	6.8 U	6.8 U	6.8 U	8.5 U	3.2 U	6.8 U	8.5 U	8.5 U	6.8 U	8.5 U	8.5 U	-
	10	4.3 U	6.8 U	-	-	-	-	-	-	-	-	-	-	0.17 U	0.17 U	0.17 U	0.17 U
	11	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.42 U	0.17 U	0.34 U	0.08 U	0.17 U	0.34 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	13	0.17 U	0.17 U	0.17 U	-	-	0.17 U	0.17 U	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U
	14	0.17 U	0.17 U	0.17 U	-	-	0.17 U	0.17 U	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U
	15	0.17 U	0.17 U	0.17 U	-	-	0.17 U	0.17 U	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U	-	0.17 U
	16	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.08 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.17 U	-	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.08 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,1,1,2-Tetrachloroethane (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,1,2,2-Tetrachloroethane (ug/L)	1	-	8.5 U	-	8.5 U	-	8.5 U
	6	-	6.8 U	-	8.5 U	-	8.5 U
	7	-	-	-	8.5 U	-	-
	9	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U
	10	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	11	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	13	-	0.17 U	-	0.17 U	-	0.17 U
	14	-	0.17 U	-	0.17 U	-	0.17 U
	15	-	0.17 U	-	0.17 U	-	0.17 U
	16	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Tetrachloroethene (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.08 U	0.16 U	0.16 U	0.16 U	0.08 U	0.08 U	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 J	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-
Toluene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Tetrachloroethene (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	2.8 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.20 U	0.08 U	0.16 U	0.07 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.07 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.07 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Toluene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	4.4 J	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.6 J	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.6 J	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	1.2 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.03 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 J	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 J	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.03 U	0.07 U	0.07 U	0.07 J	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.03 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Tetrachloroethene (ug/L)	1	-	7.6 J	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Toluene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Total organic halogens (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Freon 113 (ug/L)	1	2.5 U	2.5 U	-	-	-	-	2.5 U	-	-	2.5 U	-	-	-	5.0 U	5.0 U	-
	6	1.0 U	1.3 U	-	-	-	-	1.0 U	1.3 U	1.3 U	1.3 U	-	1.3 U	2.0 U	2.5 U	2.0 U	2.0 U
	7	-	1.3 U	1.3 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	-	1.3 U	-	-	2.0 U	1.3 U	2.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.3 U	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	1.3 U	0.50 U	1.3 U	1.3 U	2.0 U	1.3 U	2.0 U	2.0 U
	11	-	0.50 U	0.13 J	0.10 U	0.15 J	0.16 J	0.10 J	0.24 J	0.17 J	0.15 J	0.20 J	0.13 U	0.15 J	0.17 J	0.22 J	0.20 U
	13	-	0.25 U	0.25 U	0.25 U	0.25 U	0.13 U	0.20 U	0.13 U	0.13 U	0.10 U	0.20 U	0.13 U	0.20 U	0.13 J	0.05 U	0.05 U
	14	-	0.08 J	0.06 J	0.05 U	0.08 J	0.10 J	0.11 J	0.09 J	0.09 J	0.10 U	0.10 U	0.10 U	0.21 J	0.13 U	0.05 U	0.05 U
	15	-	0.05 U	0.05 U	0.05 U	0.06 J	0.05 U	0.06 J	0.08 J	0.06 J	0.09 J	0.10 J	0.05 U	0.08 J	0.07 J	0.05 U	0.05 U
	16	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.07 J	0.05 U	0.05 U	0.06 J	0.05 U	0.06 J	0.05 U	0.05 U
	17	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 J	0.05 U	-	-
	18	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.06 J	0.07 J	0.06 J	-	-
	19	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 J	0.05 U	0.08 J	-	-
	20	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.06 J	0.05 U	0.06 J	0.06 J	0.08 J	-	-
	21	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.07 J	0.06 J	0.05 U	-	-
	22	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.06 J	0.06 J	0.05 U	0.08 J	0.05 U	0.05 U	0.05 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Total organic halogens (ug/L)	1	-	-	822	-	-	1,300	-	1,570	-	996	-	1,030	-	1,270	-	1,510
	6	-	-	560	-	-	473	-	573	-	744	-	732	-	714	-	678
	9	-	-	461	-	-	-	-	625	-	314	-	686	-	611	-	-
	10	-	-	-	-	-	-	-	573	-	-	-	-	-	-	-	-
	11	-	-	21	-	-	46	-	31	-	17	-	7.5 U	-	7.5 U	-	7.5 U
	16	-	-	7.5 U	-	-	7.5 J	-	7.5 U	-	7.5 U	-	7.5 U	-	7.5 U	-	7.5 U
	22	-	-	29	-	-	47	-	7.5 J	-	13	-	7.5 U	-	26	-	7.5 U
	102	-	-	155	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	133	-	-	-	-	-	-	-	-	-	-	-	-	-
Freon 113 (ug/L)	1	-	-	2.5 U	-	-	2.5 U	2.5 U	2.5 U	-	2.0 U	-	2.5 U	-	2.5 U	-	2.5 U
	6	2.0 U	2.0 U	1.3 U	-	-	2.0 U	2.0 U	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U
	7	1.3 U	-	1.3 U	-	-	2.0 U	-	2.0 U	-	-	-	2.5 U	-	-	-	2.5 U
	9	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.5 U	4.0 U	2.0 U	2.5 U	2.5 U	2.0 U	2.5 U	2.5 U	-
	10	1.3 U	2.0 U	-	-	-	-	-	-	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.18 J	0.23 J	0.26 J	0.27 J	0.25 J	0.24 J	0.05 J	0.10 J	0.36	0.22 J	0.22 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	0.05 U	0.05 U	0.09 J	-	-	0.17 J	0.05 J	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	14	0.05 U	0.05 U	0.05 U	-	-	0.14 J	0.05 J	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	15	0.05 U	0.05 U	0.05 U	-	-	0.07 J	0.05 J	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.06 J	0.05 U	0.05 J	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 J	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Total organic halogens (ug/L)	1	-	1,260	-	1,020	-	-
	6	-	789	-	1,540	-	-
	9	-	692	-	458	-	-
	10	-	-	-	-	-	-
	11	-	7.5 U	-	7.5 U	-	-
	16	-	7.5 U	-	7.5 U	-	-
	22	-	48	-	30	-	-
	102	-	-	-	-	-	-
	104	-	-	-	-	-	-
Freon 113 (ug/L)	1	-	2.5 U	-	2.5 U	-	2.5 U
	6	-	2.0 U	-	2.5 U	-	2.5 U
	7	-	-	-	2.5 U	-	-
	9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	-	0.05 U	-	0.05 U	-	0.05 U
	14	-	0.05 U	-	0.05 U	-	0.05 U
	15	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.05 U	0.05 U	0.07	0.05 U	0.05 U	0.05 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,2,3-Trichlorobenzene (ug/L)	1	6.0 U	6.0 U	-	-	-	-	6.0 U	-	-	6.0 U	-	-	-	12 U	12 U	-
	6	2.4 U	3.0 U	-	-	-	-	2.4 U	3.0 U	3.0 U	3.0 U	-	3.0 U	4.8 U	6.0 U	4.8 U	4.8 U
	7	-	3.0 U	3.0 U	2.4 U	3.0 U	2.4 U	2.4 U	3.0 U	-	3.0 U	-	-	4.8 U	3.0 U	4.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	3.0 U	2.4 U	2.4 U	3.0 U	2.4 U	2.4 U	3.0 U	3.0 U	1.2 U	3.0 U	3.0 U	4.8 U	3.0 U	4.8 U	4.8 U
	11	-	1.2 U	0.24 U	0.24 U	0.12 U	0.24 U	0.24 U	0.24 U	0.12 U	0.12 U	0.24 U	0.30 U	0.24 U	0.30 U	0.24 U	0.48 U
	13	-	0.60 U	0.60 U	0.60 U	0.60 U	0.30 U	0.48 U	0.30 U	0.30 U	0.24 U	0.48 U	0.30 U	0.48 U	0.30 U	0.12 U	0.12 U
	14	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.24 U	0.24 U	0.24 U	0.30 U	0.30 U	0.12 U	0.12 U
	15	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	16	-	0.12 U	0.12 U	0.12 J	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	18	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	19	-	-	-	-	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	20	-	-	-	-	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	21	-	-	-	-	0.12 U	-	0.12 U	0.18 J	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-	-
	22	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	-
1,2,4-Trichlorobenzene (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0 U	-	-	5.0 U	-	-	-	10 U	10 U	-
	6	2.0 U	2.5 U	-	-	-	-	2.0 U	2.5 U	2.5 U	2.5 U	-	2.5 U	4.0 U	5.0 U	4.0 U	4.0 U
	7	-	2.5 U	2.5 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	-	2.5 U	-	-	4.0 U	2.5 U	4.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.5 U	2.0 U	2.0 U	2.5 U	2.0 U	2.0 U	2.5 U	2.5 U	1.0 U	2.5 U	2.5 U	4.0 U	2.5 U	4.0 U	4.0 U
	11	-	1.0 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.25 U	0.20 U	0.25 U	0.20 U	0.40 U
	13	-	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.40 U	0.25 U	0.25 U	0.20 U	0.40 U	0.25 U	0.40 U	0.25 U	0.10 U	0.10 U
	14	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	0.10 U	0.10 U
	15	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	16	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	18	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	19	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	20	-	-	-	-	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	21	-	-	-	-	0.10 U	-	0.10 U	0.12 J	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-	-
	22	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,2,3-Trichlorobenzene (ug/L)	1	-	-	6.0 U	-	-	6.0 U	6.0 U	6.0 J	-	4.8 U	-	6.0 U	-	6.0 U	-	6.0 U
	6	4.8 U	4.8 U	3.0 U	-	-	4.8 U	4.8 U	6.0 U	-	6.0 U	-	6.0 U	-	6.0 U	-	6.0 U
	7	3.0 U	-	3.0 U	-	-	4.8 U	-	4.8 U	-	-	-	6.0 U	-	-	-	6.0 U
	9	-	-	-	4.8 U	4.8 U	4.8 U	4.8 U	6.0 U	2.0 U	4.8 U	6.0 U	6.0 U	4.8 U	6.0 U	6.0 U	-
	10	3.0 U	4.8 U	-	-	-	-	-	-	-	-	-	-	0.12 U	0.12 U	0.12 U	0.12 U
	11	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.30 U	0.12 U	0.24 U	0.05 U	0.12 U	0.24 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	13	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	14	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	15	0.12 U	0.12 U	0.12 U	-	-	0.12 U	0.12 U	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U	-	0.12 U
	16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.05 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.12 U	-	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.05 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
1,2,4-Trichlorobenzene (ug/L)	1	-	-	5.0 U	-	-	5.0 U	5.0 U	5.0 J	-	4.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	6	4.0 U	4.0 U	2.5 U	-	-	4.0 U	4.0 U	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U
	7	2.5 U	-	2.5 U	-	-	4.0 U	-	4.0 U	-	-	-	5.0 U	-	-	-	5.0 U
	9	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	5.0 U	2.8 U	4.0 U	5.0 U	5.0 U	4.0 U	5.0 U	5.0 U	-
	10	2.5 U	4.0 U	-	-	-	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25 U	0.10 U	0.20 U	0.07 U	0.10 U	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	14	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	15	0.10 U	0.10 U	0.10 U	-	-	0.10 U	0.10 U	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.07 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,2,3-Trichlorobenzene (ug/L)	1	-	6.0 U	-	6.0 U	-	6.0 U
	6	-	4.8 U	-	6.0 U	-	6.0 U
	7	-	-	-	6.0 U	-	-
	9	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
	10	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	11	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	13	-	0.12 U	-	0.12 U	-	0.12 U
	14	-	0.12 U	-	0.12 U	-	0.12 U
	15	-	0.12 U	-	0.12 U	-	0.12 U
	16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
1,2,4-Trichlorobenzene (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U
	6	-	4.0 U	-	5.0 U	-	5.0 U
	7	-	-	-	5.0 U	-	-
	9	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	13	-	0.10 U	-	0.10 U	-	0.10 U
	14	-	0.10 U	-	0.10 U	-	0.10 U
	15	-	0.10 U	-	0.10 U	-	0.10 U
	16	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,1,1-Trichloroethane (ug/L)	1	2.5 U	2.5 U	-	-	-	-	2.5 U	-	-	2.5 U	-	-	-	5.0 U	5.0 U	-
	6	1.0 U	1.3 U	-	-	-	-	1.0 U	1.3 U	1.3 U	1.3 U	-	1.3 U	2.0 U	2.5 U	2.0 U	2.0 U
	7	-	1.3 U	1.3 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	-	1.3 U	-	-	2.0 U	1.3 U	2.0 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.3 U	1.0 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U	1.3 U	0.50 U	1.3 U	1.3 U	2.0 U	1.3 U	2.0 U	2.0 U
	11	-	0.50 U	0.10 U	0.10 U	0.05 U	0.10 U	0.10 U	0.10 U	0.05 U	0.05 U	0.10 U	0.13 U	0.10 U	0.13 U	0.10 U	0.20 U
	13	-	0.25 U	0.25 U	0.25 U	0.25 U	0.13 U	0.20 U	0.13 U	0.13 U	0.10 U	0.20 U	0.13 U	0.20 U	0.13 U	0.05 U	0.05 U
	14	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.10 U	0.10 U	0.10 U	0.13 U	0.13 U	0.05 U	0.05 U
	15	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	16	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	18	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	19	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	20	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	21	-	-	-	-	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-	-
	22	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	-
1,1,2-Trichloroethane (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.14 J	0.16 U	0.16 U	0.16 U	0.16 J	0.08 J	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.10 J	0.10 J	0.11 J	0.13 J	0.11 J	0.13 J	0.13 J	0.14 J	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.09 J	0.08 J	0.14 J	0.10 J	0.10 J	0.10 J	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 J	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.09 J	0.08 U	0.08 U	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.09 J	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,1,1-Trichloroethane (ug/L)	1	-	-	2.5 U	-	-	2.5 U	2.5 U	2.5 U	-	2.0 U	-	2.5 U	-	2.5 U	-	2.5 U
	6	2.0 U	2.0 U	1.3 U	-	-	2.0 U	2.0 U	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U	-	2.5 U
	7	1.3 U	-	1.3 U	-	-	2.0 U	-	2.0 U	-	-	-	2.5 U	-	-	-	2.5 U
	9	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.5 U	2.4 U	2.0 U	2.5 U	2.5 U	2.0 U	2.5 U	2.5 U	-
	10	1.3 U	2.0 U	-	-	-	-	-	-	-	-	-	-	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.13 U	0.05 U	0.10 U	0.06 U	0.05 U	0.10 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	14	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	15	0.05 U	0.05 U	0.05 U	-	-	0.05 U	0.05 U	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.05 U	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2-Trichloroethane (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	1.6 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.18 J	0.17 J	0.16 U	0.20 U	0.08 J	0.16 U	0.14	0.13 J	0.20 J	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.14 J	0.08 J	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 J	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.04 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.04 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,1,1-Trichloroethane (ug/L)	1	-	4.8 J	-	2.5 U	-	2.5 U
	6	-	2.0 U	-	2.5 U	-	2.5 U
	7	-	-	-	2.5 U	-	-
	9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	10	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	11	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	13	-	0.05 U	-	0.05 U	-	0.05 U
	14	-	0.05 U	-	0.05 U	-	0.05 U
	15	-	0.05 U	-	0.05 U	-	0.05 U
	16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
1,1,2-Trichloroethane (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Trichloroethene (ug/L)	1	986	1,440	-	-	-	-	1,500	-	-	1,450	-	-	-	1,490	1,640	-
	6	575	551	-	-	-	-	570	619	620	621	-	645	657	666	812	752
	7	-	499	513	547	566	590	582	595	-	624	-	-	621	598	788	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	599	487	542	545	553	575	588	535	461	632	613	626	560	724	685
	11	-	213	35	37	46	48	44	50	30	16	43	37	39	39	44	41
	13	-	106	83	91	92	81	72	69	79	64	66	58	51	55	0.10 J	0.36 J
	14	-	18	24	28	35	26	38	40	37	39	44	42	8.1	43	0.09 J	4.1
	15	-	0.48 J	0.67	1.0	1.9	2.7	3.5	6.0	6.6	8.9	12	9.6	8.3	15	0.06 U	2.0
	16	-	0.14 J	0.91	0.85	0.44 J	0.72	0.85	1.4	1.8	2.2	2.5	3.0	15	3.8	0.18 J	0.14 J
	17	-	-	-	-	0.31 J	0.81	1.4	0.97	1.2	1.5	2.1	2.3	2.6	3.0	-	-
	18	-	-	-	-	0.38 J	0.72	0.71	0.81	0.61	1.7	2.0	2.5	2.6	3.5	-	-
	19	-	-	-	-	0.35 J	-	0.79	1.1	0.81	1.5	2.0	2.6	2.4	3.3	-	-
	20	-	-	-	-	0.22 J	-	0.86	1.1	0.89	1.8	2.0	2.5	2.3	3.0	-	-
	21	-	-	-	-	0.20 J	-	0.84	1.1	1.2	1.5	2.0	2.7	2.4	2.9	-	-
	22	-	-	-	-	0.25 J	0.68	0.85	1.2	1.1	1.8	2.0	2.8	2.4	2.9	0.06 U	-
Trichlorofluoromethane (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Trichloroethene (ug/L)	1	-	-	1,470	-	-	1,420	1,350	1,510	-	1,380	-	1,420	-	1,420	-	1,350
	6	739	790	1,000	-	-	1,030	1,020	1,300	-	1,170	-	1,210	-	1,280	-	1,230
	7	667	-	912	-	-	1,010	-	1,130	-	-	-	1,120	-	-	-	1,170
	9	-	-	-	1,000	954	1,020	938	1,170	939	1,030	1,120	1,050	1,150	1,180	1,080	-
	10	677	744	-	-	-	-	-	-	-	-	-	-	0.93	1.0	0.92	0.87
	11	39	34	57	56	51	62	12	24	24	25	30	1.2	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.07 J	0.10 J	0.73	-	-	7.0	12	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 J
	14	0.06 U	0.06 U	0.06 U	-	-	0.16 J	0.52	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	15	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.10 J	0.12 J	0.07 J	0.07 J	0.09 J	0.06 U	0.06 J	0.06 U	0.14	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.09 J	-	0.06 U	0.07 J	0.57	3.0	1.3	0.06 U	0.69	0.21 J	0.06 J	0.42 J	0.06 U	0.06 U	0.06 U	0.06 U
Trichlorofluoromethane (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	2.8 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.07 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Trichloroethene (ug/L)	1	-	1,380	-	1,290	-	1,350
	6	-	1,310	-	1,220	-	1,290
	7	-	-	-	1,120	-	-
	9	1,080	1,180	948	1,110	1,080	1,200
	10	0.97	2.9	0.91	0.85	1.6	2.0
	11	0.06 U	2.0	0.06 U	0.06 U	0.16 J	1.1
	13	-	0.12 J	-	0.14	-	0.84
	14	-	0.06 U	-	0.06 U	-	0.06 U
	15	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	11	1.9
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 U	0.06 U	2.2	0.06 U	3.4	0.47 J
Trichlorofluoromethane (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,2,3-Trichloropropane (ug/L)	1	4.0 U	4.0 U	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	8.0 U	8.0 U	-
	6	1.6 U	2.0 U	-	-	-	-	1.6 U	2.0 U	2.0 U	2.0 U	-	2.0 U	3.2 U	4.0 U	3.2 U	3.2 U
	7	-	2.0 U	2.0 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	-	2.0 U	-	-	3.2 U	2.0 U	3.2 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.0 U	1.6 U	1.6 U	2.0 U	1.6 U	1.6 U	2.0 U	2.0 U	0.80 U	2.0 U	2.0 U	3.2 U	2.0 U	3.2 U	3.2 U
	11	-	0.80 U	0.16 U	0.16 U	0.08 U	0.16 U	0.16 U	0.16 U	0.08 U	0.08 U	0.16 U	0.20 U	0.16 U	0.20 U	0.16 U	0.32 U
	13	-	0.40 U	0.40 U	0.40 U	0.40 U	0.20 U	0.32 U	0.20 U	0.20 U	0.16 U	0.32 U	0.20 U	0.32 U	0.20 U	0.08 U	0.08 U
	14	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.16 U	0.16 U	0.16 U	0.20 U	0.20 U	0.08 U	0.08 U
	15	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	16	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	18	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	19	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	20	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	21	-	-	-	-	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-
	22	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-
1,2,4-Trimethylbenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,2,3-Trichloropropane (ug/L)	1	-	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	3.2 U	-	4.0 U	-	4.0 U	-	4.0 U
	6	3.2 U	3.2 U	2.0 U	-	-	3.2 U	3.2 U	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U	-	4.0 U
	7	2.0 U	-	2.0 U	-	-	3.2 U	-	3.2 U	-	-	-	4.0 U	-	-	-	4.0 U
	9	-	-	-	3.2 U	3.2 U	3.2 U	3.2 U	4.0 U	3.2 U	3.2 U	4.0 U	4.0 U	3.2 U	4.0 U	4.0 U	-
	10	2.0 U	3.2 U	-	-	-	-	-	-	-	-	-	-	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.20 U	0.08 U	0.16 U	0.08 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	14	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	15	0.08 U	0.08 U	0.08 U	-	-	0.08 U	0.08 U	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.08 U	-	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,2,4-Trimethylbenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	2.4 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.06 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.06 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.06 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,2,3-Trichloropropane (ug/L)	1	-	4.0 U	-	4.0 U	-	4.0 U
	6	-	3.2 U	-	4.0 U	-	4.0 U
	7	-	-	-	4.0 U	-	-
	9	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	10	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	11	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	13	-	0.08 U	-	0.08 U	-	0.08 U
	14	-	0.08 U	-	0.08 U	-	0.08 U
	15	-	0.08 U	-	0.08 U	-	0.08 U
	16	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1,2,4-Trimethylbenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,3,5-Trimethylbenzene (ug/L)	1	5.5 U	5.5 U	-	-	-	-	5.5 U	-	-	5.5 U	-	-	-	11 U	11 U	-
	6	2.2 U	2.8 U	-	-	-	-	2.2 U	2.8 U	2.8 U	2.8 U	-	2.8 U	4.4 U	5.5 U	4.4 U	4.4 U
	7	-	2.8 U	2.8 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	-	2.8 U	-	-	4.4 U	2.8 U	4.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	2.8 U	2.2 U	2.2 U	2.8 U	2.2 U	2.2 U	2.8 U	2.8 U	1.1 U	2.8 U	2.8 U	4.4 U	2.8 U	4.4 U	4.4 U
	11	-	1.1 U	0.22 U	0.22 U	0.11 U	0.22 U	0.22 U	0.22 U	0.11 U	0.11 U	0.22 U	0.28 U	0.22 U	0.28 U	0.22 U	0.44 U
	13	-	0.55 U	0.55 U	0.55 U	0.55 U	0.28 U	0.44 U	0.28 U	0.28 U	0.22 U	0.44 U	0.28 U	0.44 U	0.28 U	0.11 U	0.11 U
	14	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.22 U	0.22 U	0.28 U	0.28 U	0.11 U	0.11 U
	15	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	16	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	18	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	19	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	20	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	21	-	-	-	-	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-	-
	22	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	-
Vinyl Acetate (ug/L)	1	82 U	82 U	-	-	-	-	82 U	-	-	82 U	-	-	-	164 U	164 U	-
	6	33 U	41 U	-	-	-	-	33 U	41 U	41 U	41 U	-	41 U	66 U	82 U	66 U	66 U
	7	-	41 U	41 U	33 U	41 U	33 U	33 U	41 U	-	41 U	-	-	66 U	41 U	66 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	41 U	33 U	33 U	41 U	33 U	33 U	41 U	41 U	16 U	41 U	41 U	66 U	41 U	66 U	66 U
	11	-	16 U	3.3 U	3.3 U	1.6 U	3.3 U	3.3 U	3.3 U	1.6 U	1.6 U	3.3 U	4.1 U	3.3 U	4.1 U	3.3 U	6.6 U
	13	-	8.2 U	8.2 U	8.2 U	8.2 U	4.1 U	6.6 U	4.1 U	4.1 U	3.3 U	6.6 U	4.1 U	6.6 U	4.1 U	1.6 U	1.6 U
	14	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.3 U	3.3 U	3.3 U	4.1 U	4.1 U	1.6 U	1.6 U
	15	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	16	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	17	-	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	-
	18	-	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	-
	19	-	-	-	-	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	-
	20	-	-	-	-	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	-
	21	-	-	-	-	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	-
	22	-	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,3,5-Trimethylbenzene (ug/L)	1	-	-	5.5 U	-	-	5.5 U	5.5 U	5.5 U	-	4.4 U	-	5.5 U	-	5.5 U	-	5.5 U
	6	4.4 U	4.4 U	2.8 U	-	-	4.4 U	4.4 U	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U	-	5.5 U
	7	2.8 U	-	2.8 U	-	-	4.4 U	-	4.4 U	-	-	-	5.5 U	-	-	-	5.5 U
	9	-	-	-	4.4 U	4.4 U	4.4 U	4.4 U	5.5 U	1.6 U	4.4 U	5.5 U	5.5 U	4.4 U	5.5 U	5.5 U	-
	10	2.8 U	4.4 U	-	-	-	-	-	-	-	-	-	-	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.28 U	0.11 U	0.22 U	0.04 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	14	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	15	0.11 U	0.11 U	0.11 U	-	-	0.11 U	0.11 U	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.11 U	-	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.04 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Vinyl Acetate (ug/L)	1	-	-	82 U	-	-	82 U	82 U	82 U	-	66 U	-	82 U	-	82 U	-	82 U
	6	66 U	66 U	41 U	-	-	66 U	66 U	82 U	-	82 U	-	82 U	-	82 U	-	82 U
	7	41 U	-	41 U	-	-	66 U	-	66 U	-	-	-	82 U	-	-	-	82 U
	9	-	-	-	66 U	66 U	66 U	66 U	82 U	-	66 U	82 U	82 U	66 U	82 U	82 U	-
	10	41 U	66 U	-	-	-	-	-	-	-	-	-	-	1.6 U	1.6 U	1.6 U	1.6 U
	11	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	1.6 U	3.3 U	-	1.6 U	3.3 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	13	1.6 U	1.6 U	1.6 U	-	-	1.6 U	1.6 U	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U
	14	1.6 U	1.6 U	1.6 U	-	-	1.6 U	1.6 U	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U
	15	1.6 U	1.6 U	1.6 U	-	-	1.6 U	1.6 U	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U	-	1.6 U
	16	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,3,5-Trimethylbenzene (ug/L)	1	-	5.5 U	-	5.5 U	-	5.5 U
	6	-	4.4 U	-	5.5 U	-	5.5 U
	7	-	-	-	5.5 U	-	-
	9	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
	10	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	11	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	13	-	0.11 U	-	0.11 U	-	0.11 U
	14	-	0.11 U	-	0.11 U	-	0.11 U
	15	-	0.11 U	-	0.11 U	-	0.11 U
	16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Vinyl Acetate (ug/L)	1	-	82 U	-	82 U	-	82 U
	6	-	66 U	-	82 U	-	82 U
	7	-	-	-	82 U	-	-
	9	82 U	82 U	82 U	82 U	82 U	82 U
	10	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	11	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	13	-	1.6 U	-	1.6 U	-	1.6 U
	14	-	1.6 U	-	1.6 U	-	1.6 U
	15	-	1.6 U	-	1.6 U	-	1.6 U
	16	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Vinyl Chloride (ug/L)	1	3.0 U	3.0 U	-	-	-	-	3.0 U	-	-	3.0 U	-	-	-	6.0 U	6.0 U	-
	6	1.2 U	1.5 U	-	-	-	-	1.2 U	1.5 U	1.5 U	1.5 U	-	1.5 U	2.4 U	3.0 U	2.4 U	2.4 U
	7	-	1.5 U	1.5 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	-	1.5 U	-	-	2.4 U	1.5 U	2.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.5 U	1.2 U	1.2 U	1.5 U	1.2 U	1.2 U	1.5 U	1.5 U	0.60 U	1.5 U	1.5 U	2.4 U	1.5 U	2.4 U	2.4 U
	11	-	0.60 U	0.12 U	0.12 U	0.06 U	0.12 U	0.12 U	0.12 U	0.06 U	0.06 U	0.12 U	0.15 U	0.12 U	0.15 U	0.12 U	0.24 U
	13	-	0.30 U	0.30 U	0.30 U	0.30 U	0.15 U	0.24 U	0.15 U	0.15 U	0.12 U	0.24 U	0.15 U	0.24 U	0.15 U	0.06 U	0.06 U
	14	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.12 U	0.12 U	0.12 U	0.15 U	0.15 U	0.06 U	0.06 U
	15	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	16	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	18	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	19	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	20	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	21	-	-	-	-	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-	-
	22	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	-
o-Xylene (ug/L)	1	3.5 U	3.5 U	-	-	-	-	3.5 U	-	-	3.5 U	-	-	-	7.0 U	7.0 U	-
	6	1.4 U	1.8 U	-	-	-	-	1.4 U	1.8 U	1.8 U	1.8 U	-	1.8 U	2.8 U	3.5 U	2.8 U	2.8 U
	7	-	1.8 U	1.8 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	-	1.8 U	-	-	2.8 U	1.8 U	2.8 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	1.8 U	1.4 U	1.4 U	1.8 U	1.4 U	1.4 U	1.8 U	1.8 U	0.70 U	1.8 U	1.8 U	2.8 U	1.8 U	2.8 U	2.8 U
	11	-	0.70 U	0.14 U	0.14 U	0.07 U	0.14 U	0.14 U	0.14 U	0.07 U	0.07 U	0.14 U	0.17 U	0.14 U	0.17 U	0.14 U	0.28 U
	13	-	0.35 U	0.35 U	0.35 U	0.35 U	0.17 U	0.28 U	0.17 U	0.17 U	0.14 U	0.28 U	0.17 U	0.28 U	0.17 U	0.07 U	0.07 U
	14	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.14 U	0.14 U	0.14 U	0.17 U	0.17 U	0.07 U	0.07 U
	15	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.09 J
	16	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	18	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	19	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	20	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	21	-	-	-	-	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-	-
	22	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Vinyl Chloride (ug/L)	1	-	-	3.0 U	-	-	3.0 U	3.0 U	3.0 U	-	2.4 U	-	3.0 U	-	3.0 U	-	3.0 U
	6	2.4 U	2.4 U	1.5 U	-	-	2.4 U	2.4 U	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U	-	3.0 U
	7	1.5 U	-	1.5 U	-	-	2.4 U	-	2.4 U	-	-	-	3.0 U	-	-	-	3.0 U
	9	-	-	-	2.4 U	2.4 U	2.4 U	2.4 U	3.0 U	1.6 U	2.4 U	3.0 U	3.0 U	2.4 U	3.0 U	3.0 U	-
	10	1.5 U	2.4 U	-	-	-	-	-	-	-	-	-	-	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.15 U	0.06 U	0.12 U	0.04 U	0.06 U	0.12 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	14	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	15	0.06 U	0.06 U	0.06 U	-	-	0.06 U	0.06 U	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.04 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.06 U	-	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.04 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
o-Xylene (ug/L)	1	-	-	3.5 U	-	-	3.5 U	3.5 U	3.5 U	-	2.8 U	-	3.5 U	-	3.5 U	-	3.5 U
	6	2.8 U	2.8 U	1.8 U	-	-	2.8 U	2.8 U	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U	-	3.5 U
	7	1.8 U	-	1.8 U	-	-	2.8 U	-	2.8 U	-	-	-	3.5 U	-	-	-	3.5 U
	9	-	-	-	2.8 U	2.8 U	2.8 U	2.8 U	3.5 U	2.8 U	2.8 U	3.5 U	3.5 U	2.8 U	3.5 U	3.5 U	-
	10	1.8 U	2.8 U	-	-	-	-	-	-	-	-	-	-	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.07 U	0.14 U	0.07 U	0.07 U	0.14 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	14	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	15	0.07 U	0.07 U	0.07 U	-	-	0.07 U	0.07 U	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.07 U	-	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Vinyl Chloride (ug/L)	1	-	3.0 U	-	3.0 U	-	3.0 U
	6	-	2.4 U	-	3.0 U	-	3.0 U
	7	-	-	-	3.0 U	-	-
	9	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
	10	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	11	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	13	-	0.06 U	-	0.06 U	-	0.06 U
	14	-	0.06 U	-	0.06 U	-	0.06 U
	15	-	0.06 U	-	0.06 U	-	0.06 U
	16	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
o-Xylene (ug/L)	1	-	3.5 U	-	3.5 U	-	3.5 U
	6	-	2.8 U	-	3.5 U	-	3.5 U
	7	-	-	-	3.5 U	-	-
	9	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
	10	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	11	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	13	-	0.07 U	-	0.07 U	-	0.07 U
	14	-	0.07 U	-	0.07 U	-	0.07 U
	15	-	0.07 U	-	0.07 U	-	0.07 U
	16	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
m,p-Xylenes (ug/L)	1	11 U	11 U	-	-	-	-	11 U	-	-	11 U	-	-	-	21 U	21 U	-
	6	4.2 U	5.3 U	-	-	-	-	4.2 U	5.3 U	5.3 U	5.3 U	-	5.3 U	8.4 U	11 U	8.4 U	8.4 U
	7	-	5.3 U	5.3 U	4.2 U	5.3 U	4.2 U	4.2 U	5.3 U	-	5.3 U	-	-	8.4 U	5.3 U	8.4 U	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	5.3 U	4.2 U	4.2 U	5.3 U	4.2 U	4.2 U	5.3 U	5.3 U	2.1 U	5.3 U	5.3 U	8.4 U	5.3 U	8.4 U	8.4 U
	11	-	2.1 U	0.42 U	0.42 U	0.21 U	0.42 U	0.42 U	0.42 U	0.21 U	0.21 U	0.42 U	0.53 U	0.42 U	0.53 U	0.42 U	0.84 U
	13	-	1.1 U	1.1 U	1.1 U	1.1 U	0.53 U	0.84 U	0.53 U	0.53 U	0.42 U	0.84 U	0.53 U	0.84 U	0.53 U	0.21 U	0.21 U
	14	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.42 U	0.42 U	0.42 U	0.53 U	0.53 U	0.21 U	0.21 U
	15	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	16	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	17	-	-	-	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-	-
	18	-	-	-	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-	-
	19	-	-	-	-	0.21 U	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-	-
	20	-	-	-	-	0.21 U	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-	-
	21	-	-	-	-	0.21 U	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-	-
	22	-	-	-	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	-
4-Bromofluorobenzene (%)	1	95	100	-	-	-	-	94	-	-	92	-	-	-	104	110	-
	6	95	102	-	-	-	-	98	98	103	99	-	106	104	105	100	100
	7	-	103	99	103	115	89	94	102	-	104	-	-	100	106	103	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	104	102	110	110	92	94	99	103	100	97	103	104	107	102	101
	11	-	94	100	103	105	93	93	99	96	97	101	105	103	103	97	112
	13	-	103	101	106	114	95	93	100	99	102	103	104	104	107	99	103
	14	-	101	104	114	108	96	94	100	103	102	100	104	101	103	103	101
	15	-	96	100	104	111	94	97	104	104	97	95	106	104	104	104	102
	16	-	94	101	109	112	96	95	100	103	98	97	103	104	107	98	100
	17	-	-	-	-	92	95	93	100	97	102	100	103	105	107	-	-
	18	-	-	-	-	93	93	89	100	102	100	100	103	105	108	-	-
	19	-	-	-	-	97	-	96	98	100	103	97	108	104	111	-	-
	20	-	-	-	-	92	-	93	100	95	102	100	107	101	106	-	-
	21	-	-	-	-	92	-	91	104	102	96	101	108	103	107	-	-
	22	-	-	-	-	92	94	94	100	98	96	98	106	104	106	100	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
m,p-Xylenes (ug/L)	1	-	-	11 U	-	-	11 U	11 U	11 U	-	8.4 U	-	11 U	-	11 U	-	11 U
	6	8.4 U	8.4 U	5.3 U	-	-	8.4 U	8.4 U	11 U	-	11 U	-	11 U	-	11 U	-	11 U
	7	5.3 U	-	5.3 U	-	-	8.4 U	-	8.4 U	-	-	-	11 U	-	-	-	11 U
	9	-	-	-	8.4 U	8.4 U	8.4 U	8.4 U	11 U	4.4 U	8.4 U	11 U	11 U	8.4 U	11 U	11 U	-
	10	5.3 U	8.4 U	-	-	-	-	-	-	-	-	-	-	0.21 U	0.21 U	0.21 U	0.21 U
	11	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.53 U	0.21 U	0.42 U	0.11 U	0.21 U	0.42 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	13	0.21 U	0.21 U	0.21 U	-	-	0.21 U	0.21 U	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U
	14	0.21 U	0.21 U	0.21 U	-	-	0.21 U	0.21 U	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U
	15	0.21 U	0.21 U	0.21 U	-	-	0.21 U	0.21 U	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U	-	0.21 U
	16	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.11 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	0.21 U	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.11 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
4-Bromofluorobenzene (%)	1	-	-	109	-	-	99	110	107	-	107	-	-	-	-	-	-
	6	104	109	101	-	-	102	111	111	-	106	-	-	-	-	-	-
	7	102	-	107	-	-	99	-	107	-	-	-	-	-	-	-	-
	9	-	-	-	93	95	110	110	112	96	105	-	-	-	-	-	-
	10	105	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	103	106	103	95	97	100	107	108	100	106	-	-	-	-	-	-
	13	108	105	103	-	-	99	108	111	-	103	-	-	-	-	-	-
	14	105	105	103	-	-	101	109	101	-	107	-	-	-	-	-	-
	15	103	102	103	-	-	102	110	114	-	108	-	-	-	-	-	-
	16	104	109	104	96	97	97	110	108	103	110	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	103	-	103	94	96	100	110	111	102	106	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
m,p-Xylenes (ug/L)	1	-	11 U	-	11 U	-	11 U
	6	-	8.4 U	-	11 U	-	11 U
	7	-	-	-	11 U	-	-
	9	11 U	11 U	11 U	11 U	11 U	11 U
	10	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	11	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	13	-	0.21 U	-	0.21 U	-	0.21 U
	14	-	0.21 U	-	0.21 U	-	0.21 U
	15	-	0.21 U	-	0.21 U	-	0.21 U
	16	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
4-Bromofluorobenzene (%)	1	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	13	-	-	-	-	-	-
	14	-	-	-	-	-	-
	15	-	-	-	-	-	-
	16	-	-	-	-	-	-
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Dibromofluoromethane (%)	1	99	102	-	-	-	-	101	-	-	102	-	-	-	104	98	-
	6	104	105	-	-	-	-	104	109	107	99	-	106	107	104	97	94
	7	-	107	101	96	104	102	104	105	-	102	-	-	100	108	100	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	106	102	99	105	100	104	105	107	102	100	104	108	104	104	96
	11	-	103	103	99	96	101	101	103	99	100	106	100	102	109	102	104
	13	-	105	101	101	107	103	99	104	108	104	102	104	107	104	96	101
	14	-	108	103	108	97	106	102	106	105	99	104	104	103	105	100	99
	15	-	106	104	102	107	103	105	109	107	100	104	101	101	103	103	96
	16	-	105	103	110	103	102	97	105	108	102	103	106	103	106	101	97
	17	-	-	-	-	98	106	100	101	104	101	103	102	108	108	-	-
	18	-	-	-	-	105	103	95	104	107	101	103	105	105	108	-	-
	19	-	-	-	-	105	-	105	104	111	105	104	109	105	107	-	-
	20	-	-	-	-	105	-	100	100	111	104	103	103	99	102	-	-
	21	-	-	-	-	99	-	102	104	114	99	106	106	101	100	-	-
	22	-	-	-	-	104	102	103	103	111	103	105	105	103	106	100	-
1,2-Dichloroethane-d4 (%)	1	101	110	-	-	-	-	101	-	-	102	-	-	-	107	106	-
	6	109	116	-	-	-	-	117	109	107	101	-	103	108	106	108	108
	7	-	117	111	106	115	109	108	108	-	106	-	-	101	105	110	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	118	112	109	112	107	110	107	107	105	101	99	110	106	114	108
	11	-	106	114	107	102	109	106	104	101	104	105	98	103	111	113	117
	13	-	115	110	107	114	110	106	107	108	106	104	99	113	100	107	114
	14	-	116	108	117	106	112	105	112	107	105	106	101	104	104	112	106
	15	-	116	110	109	120	109	116	114	112	104	105	96	98	103	115	103
	16	-	112	111	120	110	111	99	107	113	107	107	103	108	109	113	110
	17	-	-	-	-	100	113	106	104	103	104	107	99	110	111	-	-
	18	-	-	-	-	108	111	95	103	111	106	107	105	107	108	-	-
	19	-	-	-	-	109	-	112	107	114	112	107	109	108	111	-	-
	20	-	-	-	-	108	-	106	102	112	108	108	105	94	114	-	-
	21	-	-	-	-	103	-	108	104	116	105	114	104	102	101	-	-
	22	-	-	-	-	108	105	107	105	117	108	110	105	104	111	113	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
Dibromofluoromethane (%)	1	-	-	107	-	-	113	109	107	-	104	-	-	-	-	-	-
	6	99	103	105	-	-	115	113	105	-	102	-	-	-	-	-	-
	7	101	-	107	-	-	104	-	107	-	-	-	-	-	-	-	-
	9	-	-	-	100	98	107	106	109	-	99	-	-	-	-	-	-
	10	103	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	102	108	103	109	104	103	100	111	-	102	-	-	-	-	-	-
	13	101	105	102	-	-	108	101	113	-	98	-	-	-	-	-	-
	14	101	103	104	-	-	105	106	100	-	102	-	-	-	-	-	-
	15	99	106	108	-	-	106	103	111	-	103	-	-	-	-	-	-
	16	99	103	110	101	100	107	110	114	-	97	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	101	-	105	109	96	107	116	113	-	99	-	-	-	-	-	-
1,2-Dichloroethane-d4 (%)	1	-	-	107	-	-	110	124	106	-	104	-	-	-	-	-	-
	6	103	111	107	-	-	114	129	108	-	102	-	-	-	-	-	-
	7	107	-	108	-	-	102	-	107	-	-	-	-	-	-	-	-
	9	-	-	-	93	97	120	121	110	-	101	-	-	-	-	-	-
	10	109	112	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	108	116	102	100	97	103	107	110	-	104	-	-	-	-	-	-
	13	106	112	99	-	-	102	108	111	-	99	-	-	-	-	-	-
	14	105	111	104	-	-	101	112	96	-	105	-	-	-	-	-	-
	15	108	115	105	-	-	107	113	113	-	105	-	-	-	-	-	-
	16	104	112	106	93	97	104	127	117	-	92	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	104	-	104	99	90	106	129	117	-	100	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Dibromofluoromethane (%)	1	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	13	-	-	-	-	-	-
	14	-	-	-	-	-	-
	15	-	-	-	-	-	-
	16	-	-	-	-	-	-
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	-	-	-	-	-	-
1,2-Dichloroethane-d4 (%)	1	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	13	-	-	-	-	-	-
	14	-	-	-	-	-	-
	15	-	-	-	-	-	-
	16	-	-	-	-	-	-
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,2-Dibromopropane (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene-d4 (%)	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene-d8 (%)	1	97	100	-	-	-	-	101	-	-	96	-	-	-	103	97	-
	6	99	102	-	-	-	-	102	100	99	98	-	102	104	100	95	99
	7	-	101	101	95	100	95	102	99	-	102	-	-	99	103	96	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	99	101	99	97	96	103	99	99	100	98	100	104	100	98	99
	11	-	99	101	96	97	98	99	98	87	97	87	94	99	100	92	97
	13	-	102	99	96	99	99	101	101	98	97	99	97	102	98	98	94
	14	-	103	99	98	99	99	101	100	103	100	97	102	101	101	96	99
	15	-	98	99	100	101	99	100	102	101	98	98	103	102	104	97	95
	16	-	98	100	100	101	100	99	102	97	100	98	102	102	102	94	97
	17	-	-	-	-	4.00	14	15	26	23	55	92	5.00	4.00	15	-	-
	18	-	-	-	-	30	58	52	44	2.00	56	36	18	4.00	11	-	-
	19	-	-	-	-	5.00	-	27	42	2.00	11	29	22	4.00	41	-	-
	20	-	-	-	-	3.00	-	93	15	2.00	96	23	28	10	17	-	-
	21	-	-	-	-	5.00	-	99	8.00	4.00	4.00	54	8.00	19	86	-	-
	22	-	-	-	-	3.00	14	100	8.00	2.00	4.00	22	18	5.00	37	3.00	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	08/03/00	08/09/00	08/23/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00
1,2-Dibromopropane (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene-d4 (%)	9	-	-	-	-	-	-	-	-	86	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	90	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	98	-	-	-	-	-	-	-
Toluene-d8 (%)	1	-	-	109	-	-	102	106	92	-	99	-	-	-	-	-	-
	6	101	101	102	-	-	102	104	93	-	98	-	-	-	-	-	-
	7	101	-	104	-	-	100	-	91	-	-	-	-	-	-	-	-
	9	-	-	-	103	98	104	103	94	-	95	-	-	-	-	-	-
	10	104	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	99	94	106	103	98	99	102	84	-	86	-	-	-	-	-	-
	13	100	101	104	-	-	99	104	86	-	98	-	-	-	-	-	-
	14	100	102	104	-	-	104	105	90	-	98	-	-	-	-	-	-
	15	101	98	103	-	-	105	103	93	-	97	-	-	-	-	-	-
	16	101	100	106	104	104	103	104	95	-	99	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	37	-	12	18	5.00	22	4.00	2.00	-	92	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

Parameter	SITE	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,2-Dibromopropane (%)	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	3	-	-	-	-	-	-
	4	-	-	-	-	-	-
	5	-	-	-	-	-	-
	6	-	-	-	-	-	-
	11	-	-	-	-	-	-
	22	-	-	-	-	-	-
1,2-Dichlorobenzene-d4 (%)	9	-	-	-	-	-	-
	11	-	-	-	-	-	-
	16	-	-	-	-	-	-
	22	-	-	-	-	-	-
Toluene-d8 (%)	1	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	13	-	-	-	-	-	-
	14	-	-	-	-	-	-
	15	-	-	-	-	-	-
	16	-	-	-	-	-	-
	17	-	-	-	-	-	-
	18	-	-	-	-	-	-
	19	-	-	-	-	-	-
	20	-	-	-	-	-	-
	21	-	-	-	-	-	-
	22	-	-	-	-	-	-

Table A1 Analytical Data
Volatile Organic Compounds

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
1,4-Dioxane (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8	3.8
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.1	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4	3.5
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0 U	3.0 U
n-Nitrosodimethylamine (ug/L)	1	0.11	0.16	-	-	-	-	0.12	-	-	0.07	-	-	-	0.11	-	-
	6	-	0.14	-	-	-	-	0.13	0.13	0.14	0.09	0.16	0.12	-	0.11	0.11	-
	9	-	0.14	0.13	0.15	-	-	0.11	0.13	-	-	81	-	-	0.10	0.10	0.02 U
	10	-	0.12	0.12	-	0.13	0.12	0.11	0.12	0.13	0.06	0.07	0.12	0.07	0.10	-	-
	11	-	0.02 U	-	0.02 U	-	0.02 U	0.02 U	0.03	0.03	-	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	-
	22	-	-	-	-	0.04	-	-	0.02 U	0.02 U	0.02 U	-	-	-	0.02 U	0.02 U	-
2-Fluorobiphenyl (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	88
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	94
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	100
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	77	95
	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83	101
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74	98
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81	95
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	101

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00
1,4-Dioxane (ug/L)	1	-	4.1	-	5.3	-	4.2	-	4.6	-	3.7	-	2.8 J	-	4.5	-	4.2
	6	4.7	3.8	-	-	-	3.8	-	4.8	-	4.0	-	2.4 J	-	4.2	-	4.3
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	4.4	4.9	4.1	3.5	4.0	4.7	3.4	3.7	1.6 J	1.7 J	4.4	4.6	4.6	4.3
	10	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7	4.9
	11	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
	13	3.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	3.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	3.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	3.0 U	3.0 U	-	3.0 U	-	3.0 U	-	-	-	3.0 U	-	-	-	3.0 U	-	-
	22	-	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
n-Nitrosodimethylamine (ug/L)	1	-	0.13	-	0.12	-	0.15	-	0.12	-	0.18	-	0.12	-	0.14	-	0.10
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	0.14	0.11	0.10	0.11	0.14	0.11	0.11	0.11	0.15	0.11	0.11	0.10	0.15	0.11	0.11
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.12
	11	-	0.006	0.008	0.008	0.009	0.01	0.007 U	0.007 U	0.007 U	0.007	0.007 U	0.007 U	0.007 U	0.003	0.007 U	0.07 U
	22	-	0.007	0.007 U	0.007 U	0.008	0.009	0.01	0.007 U	0.007 U	0.005	0.007 U	0.007 U	0.007 U	0.01	0.007 U	0.007 U
2-Fluorobiphenyl (%)	1	-	89	-	98	-	87	-	101	-	83	-	58	-	86	-	85
	6	85	80	-	-	-	85	-	103	-	99	-	53	-	81	-	75
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	95	97	95	80	80	109	83	81	56	56	92	82	82	87
	10	88	-	-	-	-	-	-	-	-	-	-	-	-	-	73	85
	11	100	90	92	95	91	90	91	105	73	86	54	58	89	89	76	83
	13	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	93	88	-	96	-	87	-	-	-	73	-	-	-	88	-	-
	22	-	87	90	86	89	79	89	109	86	87	60	53	82	82	72	80

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
1,4-Dioxane (ug/L)	1	-	4.2	-	-	-	5.0	-	4.9
	6	-	4.2	-	-	-	3.8	-	4.5
	7	-	-	-	-	-	-	-	-
	9	4.1	4.5	4.5	-	4.6	4.8	4.6	5.0
	10	4.2	4.4	4.5	-	5.6	4.1	4.6	5.9
	11	3.0 U	3.0 U	3.0 U	-	3.0 U	3.0 U	3.0 U	3.0 U
	13	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-
	16	-	3.0 U	-	-	-	3.0 U	-	-
	22	3.0 U	3.0 U	3.0 U	-	3.0 U	3.0 U	3.0 U	3.0 U
n-Nitrosodimethylamine (ug/L)	1	-	0.13	-	0.11	-	0.15	-	0.12
	6	-	-	-	-	-	-	-	-
	9	0.11	0.13	0.09	0.11	0.11	0.15	0.11	0.11
	10	0.12	0.12	0.10	0.11	0.11	0.14	0.11	0.11
	11	0.007 U	0.002 J	0.007 U	0.007 U	0.007 U	0.004	0.007 U	0.007 U
	22	0.007 U	0.001 J	0.007 U	0.007 U	0.007 U	0.003	0.007 U	0.007 U
2-Fluorobiphenyl (%)	1	-	88	-	-	-	72	-	84
	6	-	79	-	-	-	65	-	78
	7	-	-	-	-	-	-	-	-
	9	73	83	89	-	86	70	75	86
	10	70	90	86	-	85	65	77	97
	11	76	77	90	-	94	68	62	82
	13	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-
	16	-	82	-	-	-	74	-	-
	22	76	79	77	-	91	71	69	85

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Nitrobenzene-d5 (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62	80
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65	83
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76	85
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	85
	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	82
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	83
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	87
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	83
N-Nitrosodimethylamine-d6 (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Terphenyl-d14 (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	18
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	32
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	31
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	35
	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	42
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	27
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	31
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	36

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00
Nitrobenzene-d5 (%)	1	-	79	-	91	-	77	-	82	-	65	-	64	-	84	-	84
	6	76	75	-	-	-	73	-	91	-	77	-	53	-	80	-	78
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	78	79	81	68	77	91	85	67	57	59	92	88	82	85
	10	77	-	-	-	-	-	-	-	-	-	-	-	-	-	73	85
	11	79	78	83	91	82	72	75	91	81	69	53	52	92	88	69	84
	13	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	86	82	-	74	-	78	-	-	-	63	-	-	-	80	-	-
	22	-	79	83	83	75	71	78	92	81	73	56	47	89	83	67	83
N-Nitrosodimethylamine-d6 (%)	1	-	76	-	-	-	109	-	-	-	72	-	-	-	104	-	-
	9	-	91	-	-	-	119	-	-	-	73	-	-	-	103	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	82	-	-	-	108	-	-	-	-	-	-	-	81	-	-
	22	-	83	-	-	-	95	-	-	-	76	-	-	-	98	-	-
Terphenyl-d14 (%)	1	-	58	-	116	-	69	-	73	-	78	-	52	-	29	-	84
	6	30	38	-	-	-	45	-	79	-	81	-	26	-	19	-	50
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	46	90	86	60	78	76	70	73	46	46	38	35	37	83
	10	49	-	-	-	-	-	-	-	-	-	-	-	-	-	39	68
	11	51	54	28	114	74	71	54	74	74	77	42	45	31	36	37	68
	13	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	57	62	-	102	-	61	-	-	-	74	-	-	-	27	-	-
	22	-	38	31	109	79	61	75	92	42	75	44	40	30	32	27	70

Table A2 Analytical Data
Semi-volatile Organic Compounds

Parameter	SITE	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Nitrobenzene-d5 (%)	1	-	84	-	-	-	78	-	88
	6	-	81	-	-	-	66	-	85
	7	-	-	-	-	-	-	-	-
	9	71	86	91	-	88	68	77	93
	10	64	83	83	-	88	68	75	98
	11	74	77	89	-	90	71	70	86
	13	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-
	16	-	83	-	-	-	73	-	-
	22	75	86	87	-	93	69	74	89
N-Nitrosodimethylamine-d6 (%)	1	-	111	-	-	-	120	-	108
	9	-	121	-	-	-	126	-	-
	10	122	115	-	-	-	128	-	121
	11	118	128	-	-	-	98	-	87
	22	-	120	-	-	-	118	84	128
Terphenyl-d14 (%)	1	-	97	-	-	-	95	-	89
	6	-	44	-	-	-	87	-	34
	7	-	-	-	-	-	-	-	-
	9	64	93	114	-	88	78	58	77
	10	50	88	86	-	92	84	53	45
	11	61	62	88	-	111	90	56	86
	13	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-
	16	-	76	-	-	-	92	-	-
	22	55	55	61	-	98	84	47	92

Table A2 Analytical Data
Semi-volatile Organic Compounds

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/19/00	05/23/00	05/24/00	05/25/00
Assimilable Organic Carbon (ug/L)	1	360	-	-	170	-	-	-	-	-	42	-	-	-	72	-	-
	2	570	-	-	190	-	290	250	540	204	256	-	-	-	-	-	-
	3	540	-	-	220	-	270	290	400	250	222	-	-	-	-	-	-
	4	490	-	-	280	-	330	360	420	215	240	-	-	-	291	-	-
	5	340	-	-	220	-	240	310	350	228	304	-	-	-	242	-	-
	6	250	-	-	280	-	260	190	390	180	233	-	191	-	206	-	159
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	220	-	370	210	520	118	92	-	132	-	249	-	65
	22	-	-	-	-	-	-	-	430	-	58	-	88	-	105	-	-
Biodegradeable Organic Carbon (ug/L)	1	500 U	-	-	500 U	-	-	-	-	-	500 U	-	-	-	500 U	-	-
	2	500 U	-	-	2,800	-	500 U	500 U	500 U	500 U	500 U	-	-	-	500 U	-	-
	3	500 U	-	-	500 U	-	500 U	500 U	500 U	500 U	500 U	-	-	-	500 U	-	-
	4	500 U	-	-	500 U	-	500 U	500 U	500 U	500 U	500 U	-	-	-	500 U	-	-
	5	500 U	-	-	500 U	-	500 U	500 U	500 U	500 U	500 U	-	-	-	500 U	-	-
	6	500 U	-	-	500 U	-	500 U	500 U	500 U	500 U	500 U	-	500 U	-	500 U	-	500 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	500 U	-	1,700	500 U	-	500 U	500 U	-	500 U	-	500 U	-	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-	500 U	-	-
Biological oxygen demand (ug/L)	1	1,000 U	-	-	1,000 U	-	-	-	-	-	1,000 U	-	-	-	1,000 U	-	-
	2	1,000 U	-	-	1,000 U	-	3,900	1,000 U	1,900	1,300	1,900	1,700	-	-	1,340	-	-
	3	1,000 U	-	-	1,000 U	-	4,400	1,000 U	1,000 U	1,600	1,600	2,200	-	-	1,520	-	-
	4	1,000 U	-	-	1,000 U	-	5,200	1,000 U	1,000 U	1,600	1,000 U	2,200	-	-	1,760	-	-
	5	1,000 U	-	-	1,000 U	-	5,400	1,000 U	1,000 U	1,800	1,000 U	1,000 U	-	-	1,460	-	-
	6	1,000 U	-	-	1,000 U	-	5,200	1,000 U	2,200	1,000 U	1,900	1,000 U	1,000 U	-	1,500	-	1,000 U
	11	-	-	-	1,000 U	-	-	1,500	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	-	1,000 U	-	1,000 U
	22	-	-	-	-	-	-	-	1,000 U	-	1,000 U	1,000 U	1,400	-	1,490	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	05/26/00	05/30/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00	06/19/00	06/22/00	06/27/00	06/30/00	07/07/00
Assimilable Organic Carbon (ug/L)	1	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-
	2	-	-	174	-	-	-	-	140	-	-	-	221	-	-	-	-
	3	-	-	195	-	-	-	-	164	-	-	-	151	-	-	-	-
	4	-	-	186	-	-	-	-	143	-	-	-	141	-	-	-	-
	5	-	-	171	-	-	-	-	195	-	-	-	208	-	-	-	-
	6	-	162	150	-	-	-	-	171	-	179	-	169	139	-	-	-
	9	-	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	103	-	-	-	-	1.0	-	1.0	-	51	1.0	-	-	-
	22	-	-	94	-	-	-	-	81	-	-	-	41	-	-	-	-
Biodegradeable Organic Carbon (ug/L)	1	-	-	-	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	2	-	-	500 U	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	3	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	4	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	-	-	-	-
	5	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	6	-	500 U	500 U	-	500 U	-	-	500 U	-	500 U	-	500 U	500 U	-	-	-
	9	-	500 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	500 U	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	-
	22	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
Biological oxygen demand (ug/L)	1	-	-	-	-	1,000 U	-	-	1,000 U	-	-	-	-	-	-	-	-
	2	-	-	1,000 U	-	1,000 U	-	-	1,000 U	-	-	-	1,000 U	-	-	-	-
	3	-	-	1,000 U	-	1,000 U	-	-	1,000 U	-	-	-	1,000 U	-	-	-	-
	4	-	-	1,800	-	1,000 U	-	-	1,000 U	-	-	-	1,000 U	-	-	-	-
	5	-	-	1,000 U	-	4,900	-	-	1,000 U	-	-	-	1,000 U	-	-	-	-
	6	-	1,000 U	3,800	-	1,000 U	-	-	1,000 U	-	1,000 U	-	1,000 U	1,000 U	-	-	-
	11	-	1,000 U	2,800	-	1,000 U	-	-	1,700	-	5,000	-	1,000 U	1,000 U	-	-	-
	22	-	-	8,400	-	1,000 U	-	-	2,600	-	-	-	1,000 U	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00
Assimilable Organic Carbon (ug/L)	1	-	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	122	-	-	-	-	-	131	-	-	-	-	-	-	-	-
	3	-	95	-	-	-	-	-	119	-	-	-	-	-	-	-	-
	4	-	110	-	-	-	-	-	96	-	-	-	-	-	-	-	-
	5	-	106	-	-	-	-	-	113	-	-	-	-	-	-	-	-
	6	-	77	-	-	117	-	-	101	-	-	-	-	-	-	-	-
	9	-	1.0	-	-	33	-	-	45	-	-	-	-	-	-	-	-
	11	-	61	-	-	1.0	-	-	1.0	-	-	-	-	-	-	-	-
	22	-	-	-	-	46	-	-	61	-	-	-	-	-	-	-	-
Biodegradeable Organic Carbon (ug/L)	1	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-
	2	-	-	-	-	-	-	-	-	-	-	1,800	-	500 U	-	3,500	-
	3	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500	-
	4	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	5	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	6	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	9	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	11	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Biological oxygen demand (ug/L)	1	-	1,000 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	1,000 U	-	-	-	-	-	4,900	-	-	-	-	-	-	-	-
	3	-	1,900	-	-	-	-	-	1,800	-	-	-	-	-	-	-	-
	4	-	2,400	-	-	-	-	-	2,000	-	-	-	-	-	-	-	-
	5	-	1,000 U	-	-	-	-	-	1,600	-	-	-	-	-	-	-	-
	6	-	1,000 U	-	-	-	-	-	1,800	-	-	-	-	-	-	-	-
	11	-	8,200	-	-	-	-	-	1,000 U	-	-	-	-	-	-	-	-
	22	-	1,000 U	-	-	-	-	-	1,000 U	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	09/20/00	09/21/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Assimilable Organic Carbon (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biodegradeable Organic Carbon (ug/L)	1	-	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	2	3,700	-	-	3,900	-	-	-	-	-	-	-	-	-	-	-
	3	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	4	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	5	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	6	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	9	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	11	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	500 U	-	500 U	-	500 U	-	-	-	-	-	-	-	-	-	-
Biological oxygen demand (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/19/00	05/23/00	05/24/00	05/25/00
Chemical Oxygen Demand (ug/L)	1	9,650 U	-	-	9,650 U	-	-	-	-	-	9,650 U	-	-	-	11,900 J	-	-
	2	9,650 U	-	-	11,900 J	-	18,500 J	14,100 J	16,300 J	22,800	14,100 J	16,300 J	-	-	22,800	-	-
	3	9,650 U	-	-	11,900 J	-	9,650 U	9,650 U	14,100 J	18,500 J	9,650 U	9,650 U	-	-	20,600	-	-
	4	9,650 U	-	-	14,100 J	-	16,300 J	11,900 J	16,300 J	16,300 J	11,900 J	14,100 J	-	-	14,100 J	-	-
	5	9,650 U	-	-	9,650 U	-	11,900 J	9,650 U	16,300 J	16,300 J	11,900 J	11,900 J	-	-	14,100 J	-	-
	6	9,650 U	-	-	9,760 J	-	9,650 U	9,650 U	16,300 J	18,500 J	9,650 U	16,300 J	9,650 U	-	22,800	-	9,650 U
	11	-	-	-	9,760 J	-	-	9,650 U	16,300 J	11,900 J	9,650 U	22,800	9,650 U	-	20,600	-	9,650 U
	22	-	-	-	-	-	-	-	11,900 J	14,100 J	9,650 U	179,000	9,650 U	-	27,200	-	-
Dissolved org. carbon - final (ug/L)	1	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-	-
	2	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	3	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	4	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	5	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	6	-	-	-	-	-	-	-	-	500 U	500 U	-	500 U	-	500 U	-	500 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	500 U	500 U	-	500 U	-	500 U	-	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-	-
Dissolved org. carbon - initial (ug/L)	1	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-	-
	2	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	3	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	4	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	5	-	-	-	-	-	-	-	-	500 U	500 U	-	-	-	500 U	-	-
	6	-	-	-	-	-	-	-	-	500 U	500 U	-	500 U	-	500 U	-	500 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	500 U	500 U	-	500 U	-	500 U	-	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	05/26/00	05/30/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00	06/19/00	06/22/00	06/27/00	06/30/00	07/07/00
Chemical Oxygen Demand (ug/L)	1	-	-	-	-	9,650 U	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	27,200	-	18,500 J	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	35,900	-	9,650 U	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	16,300 J	-	9,650 U	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	312,000	-	11,900 J	-	-	-	-	-	-	-	-	-	-	-
	6	-	9,650 U	11,900 J	-	22,800	-	-	-	-	-	-	-	-	-	-	-
	11	-	9,650 U	-	-	25,000	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	11,900 J	-	9,650 U	-	-	-	-	-	-	-	-	-	-	-
Dissolved org. carbon - final (ug/L)	1	-	-	-	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	2	-	-	500 U	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	3	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	4	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	-	-	-	-
	5	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	6	-	500 U	500 U	-	500 U	-	-	500 U	-	500 U	-	500 U	500 U	-	-	-
	9	-	500 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	500 U	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	-
	22	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
Dissolved org. carbon - initial (ug/L)	1	-	-	-	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	2	-	-	500 U	-	500 U	-	-	500 U	-	-	-	-	-	-	-	-
	3	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	4	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	-	-	-	-
	5	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-
	6	-	500 U	500 U	-	500 U	-	-	500 U	-	500 U	-	500 U	500 U	-	-	-
	9	-	500 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	500 U	-	-	-	-	500 U	-	-	-	500 U	500 U	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	-
	22	-	-	500 U	-	500 U	-	-	500 U	-	-	-	500 U	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00
Chemical Oxygen Demand (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved org. carbon - final (ug/L)	1	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-
	2	-	-	-	-	-	-	-	-	-	-	500	-	500 U	-	500 U	-
	3	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	4	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	5	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	6	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	9	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	11	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	1,400	1,200	500	500 U
Dissolved org. carbon - initial (ug/L)	1	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-
	2	-	-	-	-	-	-	-	-	-	-	2,300	-	500 U	-	3,500	-
	3	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500	-
	4	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	5	-	-	-	-	-	-	-	-	-	-	500 U	-	500 U	-	500 U	-
	6	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	9	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	11	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	500 U	500 U	500 U	500 U	500 U	500 U	500 U

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	09/20/00	09/21/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Chemical Oxygen Demand (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved org. carbon - final (ug/L)	1	-	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	2	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	3	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	4	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	5	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	6	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	9	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	11	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	500 U	-	500 U	-	1,200	-	-	-	-	-	-	-	-	-	-
Dissolved org. carbon - initial (ug/L)	1	-	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	2	3,700	-	-	3,900	-	-	-	-	-	-	-	-	-	-	-
	3	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	4	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	5	500 U	-	-	500 U	-	-	-	-	-	-	-	-	-	-	-
	6	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	9	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	11	500 U	-	500 U	500 U	500 U	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	500 U	-	500 U	-	500 U	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/19/00	05/23/00	05/24/00	05/25/00
Dissolved organic carbon (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethanol (ug/L)	1	186 U	-	-	186 U	-	-	-	-	-	186 U	-	-	-	186 U	-	-
	2	186 U	-	-	186 U	-	1,910	2,710	4,130	186 U	3,620	2,940	-	-	3,460	-	-
	3	186 U	-	-	186 U	-	186 J	186 J	186 J	-	186 J	1,290	-	-	1,060	-	-
	4	186 U	-	-	186 U	-	186 U	186 U	186 U	-	186 U	186 J	-	-	186 U	-	-
	5	186 U	-	-	186 U	-	186 U	186 U	186 U	-	186 U	186 U	-	-	186 J	-	-
	6	186 U	-	-	186 U	-	186 U	186 U	186 U	186 U	186 U	186 U	186 U	-	186 J	-	186 J
	9	-	-	-	186 U	-	186 U	186 U	186 U	186 U	186 U	186 U	186 U	-	186 U	-	186 J
	11	-	-	-	186 U	-	186 U	186 U	186 U	186 U	186 J	186 U	186 U	-	186 U	-	186 U
	22	-	-	-	-	-	-	-	186 U	-	186 U	186 U	186 J	-	186 U	-	-
Isobutyl alcohol / Isobutanol (ug/L)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	225 U	-	-	-	-	-	-	-	-	-
Methanol (ug/L)	1	934 U	-	-	934 U	-	-	-	-	-	934 U	-	-	-	934 U	-	-
	2	934 U	-	-	934 U	-	934 U	934 U	934 U	934 U	934 U	934 U	-	-	934 U	-	-
	3	934 U	-	-	934 U	-	934 U	934 U	934 U	-	934 U	934 U	-	-	934 U	-	-
	4	934 U	-	-	934 U	-	934 U	934 U	934 U	-	934 U	934 U	-	-	934 U	-	-
	5	934 U	-	-	934 U	-	934 U	934 U	934 U	-	934 U	934 U	-	-	934 U	-	-
	6	934 U	-	-	934 U	-	934 U	934 U	934 U	934 U	934 U	934 U	934 U	-	934 U	-	934 U
	9	-	-	-	934 U	-	934 U	934 U	934 U	934 U	934 U	934 U	934 U	-	934 U	-	934 U
	11	-	-	-	934 U	-	934 U	934 U	934 U	934 U	934 U	934 U	934 U	-	934 U	-	934 U
	22	-	-	-	-	-	-	-	934 U	-	934 U	934 U	1,000	-	934 U	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	05/26/00	05/30/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00	06/19/00	06/22/00	06/27/00	06/30/00	07/07/00
Dissolved organic carbon (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethanol (ug/L)	1	-	-	-	-	186 U	-	-	186 U	-	-	-	-	-	-	-	-
	2	-	-	3,220	-	3,710	-	-	186 U	-	-	-	4,120	-	-	-	-
	3	-	-	1,110	-	186 J	-	-	186 U	-	-	-	186 U	-	-	-	-
	4	-	-	186 U	-	186 U	-	-	186 U	-	-	-	186 U	-	-	-	-
	5	-	-	186 U	-	186 U	-	-	186 U	-	-	-	186 U	-	-	-	-
	6	-	186 J	186 U	-	186 U	-	-	186 U	-	186 U	-	186 U	186 U	-	-	-
	9	-	186 U	186 U	-	186 U	-	-	186 U	-	186 U	-	186 U	186 U	-	-	-
	11	-	186 U	186 U	-	186 U	-	-	186 U	-	186 U	-	186 U	186 U	-	-	-
	22	-	-	186 U	-	186 U	-	-	186 U	-	-	-	186 U	-	-	-	-
Isobutyl alcohol / Isobutanol (ug/L)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methanol (ug/L)	1	-	-	-	-	934 U	-	-	934 U	-	-	-	-	-	-	-	-
	2	-	-	934 U	-	934 U	-	-	934 U	-	-	-	934 U	-	-	-	-
	3	-	-	934 U	-	934 U	-	-	934 U	-	-	-	934 U	-	-	-	-
	4	-	-	934 U	-	934 U	-	-	934 U	-	-	-	934 U	-	-	-	-
	5	-	-	934 U	-	934 U	-	-	934 U	-	-	-	934 U	-	-	-	-
	6	-	934 U	934 U	-	934 U	-	-	934 U	-	934 U	-	934 U	934 U	-	-	-
	9	-	934 U	934 U	-	934 U	-	-	934 U	-	934 U	-	934 U	934 U	-	-	-
	11	-	934 U	934 U	-	934 U	-	-	934 U	-	934 U	-	934 U	934 U	-	-	-
	22	-	-	934 U	-	934 U	-	-	934 U	-	-	-	934 U	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00
Dissolved organic carbon (ug/L)	1	-	-	-	-	-	-	-	-	-	-	500 U	-	-	-	500 U	-
	2	-	-	-	-	-	-	-	-	-	-	2,400	-	2,700	-	3,500	-
	3	-	-	-	-	-	-	-	1,160	-	-	500 U	-	400	-	500	-
	4	-	-	-	-	-	-	-	1,430	-	-	500 U	-	420	-	500 U	-
	5	-	-	-	-	-	-	-	980 U	-	-	500 U	-	380	-	500 U	-
	6	-	-	-	-	1,400	-	-	-	-	320	600	250	350	300	500 U	320
	9	-	-	-	-	1,020	-	-	980 U	-	250	500 U	310	350	240	500 U	200
	11	-	-	-	-	1,050	-	-	1,070	-	330	600	300	390	280	500 U	230
	22	-	-	-	-	980 U	-	-	980 U	-	260	500 U	210	-	170	500 U	100 U
	102	-	-	-	-	-	-	-	2,720	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	2,980	-	-	-	-	-	-	-	-
Ethanol (ug/L)	1	-	186 U	-	-	-	-	-	-	-	-	186 U	-	-	-	186 U	-
	2	-	4,220	-	-	-	-	-	-	-	-	186 U	-	-	-	5,400	-
	3	-	1,000 J	-	-	-	-	-	-	-	-	186 U	-	-	-	2,010	-
	4	-	1,000 J	-	-	-	-	-	-	-	-	186 U	-	-	-	186 J	-
	5	-	186 U	-	-	-	-	-	-	-	-	186 U	-	-	-	186 U	-
	6	-	186 U	-	-	-	-	-	-	-	-	186 U	-	-	-	186 U	-
	9	-	186 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	186 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	186 U	-	-	-	-	-	-	-	-	186 U	-	-	-	186 U	-
Isobutyl alcohol / Isobutanol (ug/L)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methanol (ug/L)	1	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	2	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	3	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	4	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	5	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	6	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-
	9	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	934 U	-	-	-	-	-	-	-	-	-	-	-	-	934 U	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	09/20/00	09/21/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Dissolved organic carbon (ug/L)	1	110,000	-	-	500 U	-	-	-	-	210 J	-	-	-	260 J	-	-
	2	3,300	-	-	-	4,300	3,700	-	-	-	-	3,100	-	4,150	-	4,400
	3	200	-	-	500 U	-	290	-	-	-	-	370	-	1,270	-	460
	4	260	-	-	500 U	-	430	-	-	-	-	370	-	830	-	370
	5	260	-	-	500 U	-	480	-	-	-	-	370	-	480 J	-	500
	6	280	-	240	500 U	300	270	330	-	-	170	380	260	410 J	430	900
	9	370	-	310	500 U	290	310	170	-	-	100 U	290	200	310 J	290	280
	11	340	-	540	500 U	400	280	160	-	-	100 U	330	240	290 J	330	290
	22	120	-	330	500 U	260	230	100 U	-	-	100 U	220	140	240 J	260	360
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethanol (ug/L)	1	-	-	-	186 U	-	-	-	186 U	-	-	-	-	186 U	-	-
	2	7,070	-	-	6,710	-	-	-	6,650	6,880	-	6,620	-	5,510	-	6,220
	3	186 J	-	-	186 U	-	-	-	186 U	2,340	-	186 U	-	1,960	-	186 U
	4	186 U	-	-	186 U	-	-	-	186 U	186 U	-	186 U	-	637 J	-	186 U
	5	186 U	-	-	186 U	-	-	-	186 U	186 U	-	186 U	-	186 U	-	186 U
	6	186 U	-	-	186 U	-	186 U	-	186 U	186 U	-	186 U	-	678 J	-	186 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	186 U	-	-	186 U	-	186 U	-	186 U	-	-	930 U	-	399 J	-	186 U
Isobutyl alcohol / Isobutanol (ug/L)	3	225 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methanol (ug/L)	1	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U
	3	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U
	4	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U
	5	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U
	6	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	934 U	-	-	-	-	-	-	-	-	-	-	934 U

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/19/00	05/23/00	05/24/00	05/25/00
2-Propanol (ug/L)	2	-	-	-	-	-	-	134 U	-	-	-	-	-	-	-	-	-
Total organic carbon (ug/L)	1	-	100 U	100 U	-	100 U	-	-	-	-	-	-	-	460	5,660	140	-
	2	-	1,800	1,600	-	1,500	-	-	-	-	-	-	-	840	5,350	1,800	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	4,830	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	1,170	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	3,150	-	-
	6	-	220	190	-	230	-	-	-	-	-	-	1,650	700	250 U	490	1,720
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	1,360	-	4,200	-	3,980
	22	-	-	-	-	-	-	-	-	-	-	-	2,450	-	2,210	-	-
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (mg/L)	1	5.0 U	-	-	5.0 U	-	-	-	-	-	5.0 U	-	-	-	5.0 U	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	6.0	-	-	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0	-	5.0 U	-	5.0
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10	5.0 U	-	5.0 U	-	5.0 U
	9	-	-	-	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	-	5.0
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	-	-
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	05/26/00	05/30/00	06/01/00	06/02/00	06/05/00	06/08/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00	06/19/00	06/22/00	06/27/00	06/30/00	07/07/00
2-Propanol (ug/L)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (ug/L)	1	100 U	-	-	710	-	400	300	-	290	-	320	-	-	360	340	320
	2	2,000	-	-	1,800	-	2,200	2,200	-	2,600	-	2,100	-	-	2,400	2,300	1,900
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	520	-	-	600	-	530	560	-	530	-	500	-	-	550	560	510
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (mg/L)	1	-	-	-	-	5.0 J	-	-	0.30 J	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	5.0 U	5.0 U	-	3.0 J	-	-	1.7	-	2.3	-	3.2	3.3	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	5.0 U	5.0 U	-	4.0 J	-	-	2.7	-	1.9	-	8.8	3.9	-	-	-
	9	-	5.0 U	5.0 U	-	5.0 J	-	-	0.10 J	-	2.3	-	0.30 J	0.20 J	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	5.0 U	-	5.0 J	-	-	0.10 U	-	-	-	0.10 J	-	-	-	-
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	14	-	-	7.0	-	-	-	6.1	167	-	-	-
	103	-	-	-	-	14	-	-	15	-	-	-	22	77	-	-	-
	104	-	-	-	-	7.0	-	-	6.8	-	-	-	60	31	-	-	-
	105	-	-	-	-	11	-	-	4.7	-	-	-	35	23	-	-	-
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00
2-Propanol (ug/L)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (ug/L)	1	310	500 U	270	350	-	390	200	-	210	-	500 U	-	-	-	500 U	-
	2	2,100	1,800	2,800	3,000	-	2,600	2,300	2,200	2,500	-	2,600	-	3,700	-	4,100	-
	3	-	500 U	-	-	-	-	-	1,100	-	-	500 U	-	510	-	1,500	-
	4	-	500 U	-	-	-	-	-	530	-	-	500 U	-	590	-	800	-
	5	-	500 U	-	-	-	-	-	410	-	-	500 U	-	570	-	500 U	-
	6	410	500 U	770	720	440	530	470	490	430	320	500 U	480	490	410	700	350
	9	-	500 U	-	-	290	-	-	300	-	260	500 U	300	280	260	500 U	170
	11	-	500 U	-	-	300	-	-	320	-	280	500 U	340	330	260	500 U	200
	22	-	500 U	-	-	210	-	-	2,800	-	200	1,100	200	280	180	500 U	100 U
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	800	-	-	-	-	-	190	-	-	1,700	-	1,900	-	1,900	-
	104	-	500 U	-	-	-	-	-	4,400	-	-	700	-	930	-	1,900	-
Total Suspended Solids (mg/L)	1	-	0.10 U	-	-	-	-	-	-	-	-	0.10 J	-	0.10 U	-	0.10 U	-
	2	-	1.8	-	-	-	-	-	-	-	-	1.7	-	2.4	-	2.2	-
	3	-	1.8	-	-	-	-	-	-	-	-	1.2	-	0.90	-	1.5	-
	4	-	1.7	-	-	-	-	-	-	-	-	0.60	-	0.80	-	1.6	-
	5	-	2.3	-	-	-	-	-	-	-	-	1.2	-	1.2	-	1.2	-
	6	-	1.5	-	-	-	-	-	-	-	2.4	1.5	0.70	1.2	0.80	1.5	1.3
	7	-	3.2	-	-	-	-	-	-	-	-	1.0	-	1.9	-	0.90	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	0.10 U	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 U	0.10 U	0.20 J	0.10 U	0.10 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	0.20 J	-	-	-	-	-	-	-	0.10 U	0.10 U	0.10 J	0.10 U	0.10 U	0.10 U	0.10 U
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	5.8	-	-	-	-	-	-	-	16	5.7	12	7.3	12	17	12
	103	-	34	-	-	-	-	-	-	-	25	37	40	41	43	52	38
	104	-	12	-	-	-	-	-	-	-	12	9.5	9.3	12	4.4	10	9.2
	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	766	-	-	-	-	-	-	-	595	2,360	1,400	7,740	2,360	2,260	2,860

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	09/20/00	09/21/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
2-Propanol (ug/L)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (ug/L)	1	120,000	-	-	500 U	-	-	-	-	280 J	-	-	-	300 J	-	-
	2	4,200	-	-	4,200	-	4,300	-	-	4,570	-	3,000	-	3,250	-	4,900
	3	420	-	-	1,200	-	650	-	-	1,620	-	540	-	1,420	-	570
	4	480	-	-	500 U	-	610	-	-	800	-	530	-	3,470	-	610
	5	480	-	-	1,400	-	640	-	-	530	-	560	-	680	-	550
	6	430	-	420	500 U	450	450	350	-	540	330	480	370	570	550	650
	9	210	-	320	500 U	480	270	110	-	-	100	300	170	330 J	270	300
	11	270	-	400	500 U	500	320	130	-	-	100 U	340	190	360 J	290	300
	22	100 U	-	330	-	220	120	100 U	-	-	110	230	130	320 J	740	260
	101	-	-	-	-	-	-	-	-	-	-	12,000	-	-	-	-
	102	2,400	-	-	3,500	-	2,500	-	-	-	-	1,500	-	3,290	-	1,700
	104	850	-	-	-	3,300	1,300	-	-	-	-	1,700	-	1,060	-	1,100
Total Suspended Solids (mg/L)	1	0.20 J	-	-	0.20 J	-	0.10 U	-	0.28 J	-	-	0.10 U	-	0.10 U	-	0.10 U
	2	1.3	-	-	1.2	-	1.7	-	2.6	-	-	1.9	-	2.1	-	2.4
	3	1.7	-	-	0.90	-	1.3	-	2.4	-	-	3.9	-	1.6	-	2.4
	4	2.0	-	-	1.3	-	1.1	-	2.2	-	-	2.0	-	1.7	-	2.0
	5	2.5	-	-	1.1	-	1.0	-	1.8	-	-	2.2	-	1.2	-	2.5
	6	2.5	9.0	1.7	1.4	1.1	1.6	1.6	2.0	-	1.1	1.8	0.90	1.1	1.3	0.10 J
	7	2.4	-	-	1.6	-	2.9	-	1.9	-	-	4.1	-	2.7	-	2.3
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	0.20 J	-	0.20 J	2.6	0.40 J	0.10 U	0.10 J	0.10 J	-	0.10 J	0.10 U	0.10 U	0.10 J	0.10 U	0.10 U
	11	-	-	-	0.10 U	-	-	-	-	-	-	-	-	-	-	-
	22	0.10 U	-	0.40 J	0.10 U	0.30 J	0.20 J	0.10 U	0.10 J	-	0.10 U	1.0 U	0.10 U	0.10 J	0.10 U	2.5
	101	-	-	-	-	-	-	-	-	-	363	275	-	-	14	53
	102	-	-	19	3.0 J	620	2.0 J	-	11	-	370	9.0	6.0	6.0	4.0 J	27
	103	62	-	19	41	580	32	-	40	-	310	32	40	47	8.0	8.0
	104	9.7	-	14	13	4.0 J	1.0 J	-	9.0	-	5.0	9.0	1.0 U	6.0	2.0 J	16
	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	-	4,000	2,730	9.0	2,650	-	86	-	2,290	3,800	4,120	2,970	4,070	1,860

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/19/00	05/23/00	05/24/00	05/25/00
Total volatile solids (mg/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (dbwax) (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	05/26/00	05/30/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00	06/19/00	06/22/00	06/27/00	06/30/00	07/07/00
Total volatile solids (mg/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (dbwax) (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00
Total volatile solids (mg/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,200	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 U	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	23
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76	23
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53	54
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,200
1-pentanol (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	116	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	123	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115	-
1-pentanol (dbwax) (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	107	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	189	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138	-

Table A3 Analytical Data
Organic Parameters

Parameter	SITE	09/20/00	09/21/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Total volatile solids (mg/L)	1	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	127	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-pentanol (dbwax) (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	151	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A3 Analytical Data
Organic Parameters

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/02/00	05/04/00	05/08/00	05/09/00	05/10/00	05/12/00	05/15/00	05/16/00	05/18/00
Alkalinity (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia as NH3 (ug/L)	1	63 U	121 U	121 U	63 U	121 U	-	-	-	-	-	-	73 J	-	-	-	-
	2	63 U	121 U	121 U	63 U	121 U	98 J	63 U	-	63 U	90 J	-	63 U	-	63 U	-	-
	3	63 U	-	-	63 U	-	327	63 U	-	63 U	63 U	-	63 U	-	63 U	-	-
	4	63 U	-	-	63 U	-	63 U	63 U	-	63 U	63 U	-	63 U	-	63 U	-	-
	5	63 U	-	-	63 U	-	63 U	63 U	-	63 U	63 U	-	63 U	-	63 U	-	-
	6	63 U	121 U	121 U	63 U	121 U	63 U	63 U	-	63 U	63 U	-	76 J	-	63 U	-	63 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	148
	22	-	-	-	-	-	-	-	-	85 J	65 J	-	123	-	63 U	-	63 U
Bromate by IC (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Alkalinity (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia as NH3 (ug/L)	1	-	63 U	-	-	-	-	-	-	121 U	63 U	121 U	121 U	63 U	121 U	-	121 U
	2	-	63 U	-	-	-	-	-	315	121 U	63 U	121 U	121 U	63 U	121 U	-	121 U
	3	-	63 U	-	-	-	-	-	63 U	-	63 U	-	-	63 U	-	-	-
	4	-	63 U	-	-	-	-	-	63 U	-	63 U	-	-	63 U	-	-	-
	5	-	63 U	-	-	-	-	-	63 U	-	63 U	-	-	63 U	-	-	-
	6	-	63 U	-	74 J	-	63 U	-	63 U	121 U	63 U	121 U	121 U	63 U	121 U	63 U	121 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	139	-	111	-	77 J	-	63 U	-	139	-	-	85 J	-	140	-
	22	-	63 U	-	-	-	-	-	63 U	-	63 U	-	-	63 U	-	-	-
Bromate by IC (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	06/19/00	06/20/00	06/22/00	06/23/00	06/27/00	06/30/00	07/07/00	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00
Alkalinity (ug/L)	1	-	-	-	-	-	-	-	-	135,000	-	-	-	-	-	120,000	-
	6	-	-	-	-	-	-	-	-	144,000	-	-	-	-	-	120,000	-
	9	-	-	-	-	-	-	-	-	141,000	-	-	-	-	-	120,000	-
	11	-	-	-	-	-	-	-	-	140,000	-	-	-	-	-	120,000	-
	16	-	-	-	-	-	-	-	-	152,000	-	-	-	-	-	120,000	-
	22	-	-	-	-	-	-	-	-	138,000	-	-	-	-	-	120,000	-
	102	-	-	-	-	-	-	-	-	144,000	-	-	-	-	-	140,000	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	121,000	-	-	-	-	-	120,000	-
Ammonia as NH3 (ug/L)	1	-	121 U	-	121 U	121 U	121 U	121 U	121 U	63 U	121 U	121 U	-	121 U	121 U	-	121 U
	2	63 U	121 U	-	121 U	121 U	121 U	121 U	121 U	63 U	121 U	121 U	-	121 U	121 U	-	121 U
	3	63 U	-	-	-	-	-	-	-	63 U	-	-	-	-	-	-	-
	4	63 U	-	-	-	-	-	-	-	63 U	-	-	-	-	-	-	-
	5	63 U	-	-	-	-	-	-	-	63 U	-	-	-	-	-	-	-
	6	63 U	121 U	63 U	121 U	121 U	121 U	121 U	121 U	63 U	121 U	121 U	-	121 U	121 U	-	121 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	218	-	206	-	-	-	-	-	144	-	-	-	-	-	-	-
	22	63 U	-	-	-	-	-	-	-	63 U	-	-	-	-	-	-	-
Bromate by IC (ug/L)	1	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	6	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	9	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	16	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	22	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	5.0 U	-
	102	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	5.0 U	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00
Alkalinity (ug/L)	1	-	143,000	-	120,000	-	-	-	-	-	117,000	-	120,000	-	113,000	-	-
	6	-	139,000	-	120,000	-	-	-	120,000	-	118,000	-	120,000	-	119,000	-	-
	9	-	141,000	-	120,000	-	-	-	120,000	-	128,000	-	120,000	-	118,000	-	-
	11	-	145,000	-	120,000	-	-	-	120,000	-	118,000	-	120,000	-	120,000	-	-
	16	-	136,000	-	120,000	-	120,000	-	120,000	-	139,000	-	120,000	-	117,000	-	-
	22	-	139,000	-	120,000	-	-	-	120,000	-	133,000	-	120,000	-	117,000	-	-
	102	-	148,000	-	120,000	-	125,000	-	130,000	-	154,000	-	98,000	-	130,000	-	-
	103	-	128,000	-	85,000	-	87,400	-	110,000	-	108,000	-	99,000	-	98,900	-	-
	104	-	120,000	-	88,000	-	94,900	-	110,000	-	104,000	-	99,000	-	95,000	-	-
Ammonia as NH3 (ug/L)	1	-	63 U	-	-	-	997	-	-	-	63 U	-	-	-	63 U	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	97 J	-	63 U	-	63 U	-	63 U	-	63 U	-	63 U	-	63 U	-	-
	9	-	214	-	209	-	168	-	292	-	363	-	143	-	105	-	-
	11	-	442	-	209	-	315	-	173	-	253	-	137	-	114	-	-
	22	-	63 U	-	63 U	-	1,767	-	63 U	-	163	-	63 U	-	63 U	-	-
Bromate by IC (ug/L)	1	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	4.0 U	-	-
	6	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	4.0 U	-	-
	9	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0 U	-	-
	11	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	4.0 U	-	-
	16	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	4.0 U	-	-
	22	-	6.3	-	5.0 U	-	5.0 U	-	5.0 U	-	-	-	5.0 U	-	4.0 U	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Alkalinity (ug/L)	1	120,000	-	117,000	-	110,000
	6	120,000	-	118,000	-	120,000
	9	120,000	-	119,000	-	120,000
	11	120,000	-	116,000	-	120,000
	16	120,000	-	115,000	-	-
	22	120,000	-	117,000	-	120,000
	102	120,000	-	126,000	-	130,000
	103	92,000	-	77,200	-	98,000
	104	100,000	-	79,200	-	100,000
Ammonia as NH3 (ug/L)	1	-	-	290	-	-
	2	-	-	-	-	-
	3	-	-	-	-	-
	4	-	-	-	-	-
	5	-	-	-	-	-
	6	63 U	-	93 J	-	63 U
	9	163	-	178	-	153
	11	150	-	157	-	119
	22	63 U	-	97 J	-	63 U
Bromate by IC (ug/L)	1	-	-	5.0 U	-	4.0 U
	6	-	-	4.0 U	-	4.0 U
	9	-	-	4.0 U	-	5.0 U
	10	-	-	-	-	-
	11	-	-	4.0 U	-	5.0 U
	16	-	-	4.0 U	-	4.0 U
	22	-	-	4.0 U	-	4.0 U
	102	-	-	-	-	-
	104	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/02/00	05/04/00	05/08/00	05/09/00	05/10/00	05/12/00	05/15/00	05/16/00	05/18/00
Bromide (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorate (ug/L)	1	10 U	-	-	10 U	-	-	-	-	-	-	-	20 U	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	10 U	-	-	40	-	-	10 U	-	-	-	-	20 U	-	20 U	-	20 U
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	1,500	380	-	490	-	930	-	1,000
	18	-	-	-	-	-	-	-	-	1,500	370	-	440	-	830	-	2,000
	19	-	-	-	-	-	-	-	-	1,400	370	-	370	-	830	-	2,000
	20	-	-	-	-	-	-	-	-	1,400	380	-	15 J	-	840	-	1,900
	21	-	-	-	-	-	-	-	-	1,300	370	-	20 U	-	850	-	1,400
	22	-	-	-	-	-	-	-	-	1,500	370	-	20 U	-	800	-	1,800

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Bromide (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Chlorate (ug/L)	1	-	20 U	-	-	-	-	-	-	-	20 U	-	-	20 U	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	26	-	-	-	20 U	-	20 U	-	20 U	-	-	20 U	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	-	960	-	1,300	-	1,800	-	1,500	-	810	-	-	780	-	560	-
	18	-	920	-	1,300	-	1,600	-	1,400	-	780	-	-	780	-	610	-
	19	-	910	-	1,300	-	1,600	-	1,400	-	820	-	-	780	-	620	-
	20	-	900	-	1,300	-	1,600	-	1,400	-	880	-	-	770	-	620	-
	21	-	900	-	1,300	-	1,600	-	1,400	-	930	-	-	760	-	600	-
	22	-	980	-	1,300	-	1,500	-	1,300	-	960	-	-	790	-	590	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	06/19/00	06/20/00	06/22/00	06/23/00	06/27/00	06/30/00	07/07/00	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00
Bromide (ug/L)	1	-	-	-	-	-	-	-	-	59	-	-	-	-	-	58	-
	6	-	-	-	-	-	-	-	-	57	-	-	-	-	-	63	-
	9	-	-	-	-	-	-	-	-	57	-	-	-	-	-	58	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	61	-	-	-	-	-	62	-
	16	-	-	-	-	-	-	-	-	65	-	-	-	-	-	65	-
	22	-	-	-	-	-	-	-	-	530	-	-	-	-	-	210 U	-
	102	-	-	-	-	-	-	-	-	210 U	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	210 U	-	-	-	-	-	-	-
Chlorate (ug/L)	1	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	6	-	-	20 U	-	-	-	-	-	20 U	-	-	70	-	-	20 U	-
	16	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	20 U	-
	17	-	-	-	-	-	-	-	-	750	-	-	-	-	-	2,400	-
	18	-	-	-	-	-	-	-	-	760	-	-	-	-	-	2,500	-
	19	-	-	-	-	-	-	-	-	820	-	-	-	-	-	2,600	-
	20	-	-	-	-	-	-	-	-	830	-	-	-	-	-	2,900	-
	21	-	-	1,800	-	-	-	-	-	840	-	-	-	-	-	-	-
	22	-	-	2,400	-	-	-	-	-	930	-	-	1,000	-	-	2,800	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00
Bromide (ug/L)	1	-	61	-	61	-	210 U	-	210 U	-	210 U	-	210 U	-	415 U	-	-
	6	-	60	-	61	-	210 U	-	210 U	-	210 U	-	210 U	-	415 U	-	-
	9	-	58	-	61	-	210 U	-	210 U	-	210 U	-	210 U	-	-	-	-
	10	-	-	-	-	-	210 U	-	-	-	-	-	-	-	83 U	-	-
	11	-	59	-	65	-	210 U	-	210 U	-	210 U	-	210 U	-	415 U	-	-
	16	-	58	-	68	-	210 U	-	210 U	-	210 U	-	210 U	-	83 U	-	-
	22	-	20 U	-	21 U	-	1,180	-	210 U	-	210 U	-	862 J	-	415 U	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorate (ug/L)	1	-	20 U	-	-	-	61	-	-	-	20 U	-	-	-	-	-	-
	2	-	20 U	-	-	-	23	-	-	-	52	-	-	-	-	-	-
	3	-	20 U	-	-	-	20 U	-	-	-	20 U	-	-	-	-	-	-
	4	-	20 U	-	-	-	20 U	-	-	-	20 U	-	-	-	-	-	-
	5	-	20 U	-	-	-	20 U	-	-	-	20 U	-	-	-	-	-	-
	6	68	20 U	20 U	20 U	65	65	20 U	-	20 U	20 U	20 U	20 U	20 U	-	-	20 U
	16	72	20 U	20 U	20 U	65	20 U	20 U	-	20 U	20 U	20 U	62	20 U	-	-	20 U
	17	3,400	1,900	2,600	1,700	1,200	712	1,200	-	2,000	960	2,800	1,200	1,500	-	-	2,200
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	4,500	2,000	1,700	1,700	1,200	1,200	1,500	-	3,000	20 U	2,600	1,100	1,500	-	-	2,100

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Bromide (ug/L)	1	210 U	-	210 U	-	21 U
	6	210 U	-	210 U	-	68 J
	9	210 U	-	210 U	-	68 J
	10	-	-	-	-	-
	11	210 U	-	210 U	-	67 J
	16	210 U	-	210 U	-	64 J
	22	1,290	-	1,210	-	21 U
	102	-	-	-	-	-
	104	-	-	-	-	-
Chlorate (ug/L)	1	-	-	10 U	-	10 U
	2	-	-	21	-	-
	3	-	-	17	-	-
	4	-	-	19	-	-
	5	-	-	10 U	-	-
	6	-	20 U	10 U	10 U	10 U
	16	-	20 U	10 U	10 U	10 U
	17	-	1,100	1,300	680	980
	18	-	-	-	-	-
	19	-	-	-	-	-
	20	-	-	-	-	-
	21	-	-	-	-	-
	22	-	1,500	1,400	650	1,000

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/02/00	05/04/00	05/08/00	05/09/00	05/10/00	05/12/00	05/15/00	05/16/00	05/18/00
Chlorite (ug/L)	1	50	-	-	55	-	-	-	-	-	-	-	36	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	40	-	-	30	-	-	59	-	-	-	-	36	-	35	-	37
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	64	240	-	42	-	20 U	-	20 U
	18	-	-	-	-	-	-	-	-	74	240	-	44	-	20 U	-	20 U
	19	-	-	-	-	-	-	-	-	65	230	-	46	-	20 U	-	20 U
	20	-	-	-	-	-	-	-	-	41	240	-	39	-	20 U	-	20 U
	21	-	-	-	-	-	-	-	-	29	240	-	35	-	20 U	-	20 U
	22	-	-	-	-	-	-	-	-	10 U	240	-	36	-	20 U	-	20 U
Nitrate as N (ug/L)	1	1,490	1,500	1,600	1,512	1,500	-	-	1,600	-	1,560	1,550	1,438	1,560	-	1,560	-
	2	479	400	500	481	550	537	395	400	465	450	420	370	400	373	480	-
	3	287	-	-	226 J	-	352	257	-	43 U	271	-	157	-	226	-	-
	4	43 U	-	-	43 U	-	43 U	43 U	-	43 U	43 U	-	24	-	43 U	-	-
	5	43 U	-	-	43 U	-	43 U	43 U	-	43 U	43 U	-	4.3 U	-	43 U	-	-
	6	43 U	11 U	11 U	43 U	11 U	43 U	43 U	11 U	43 U	43 U	11 U	4.3 U	11 U	43 U	11 U	43 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	275	43 U	-	4.3 U	-	43 U	-	334
Nitrite as N (ug/L)	1	70 U	15 U	15 U	70 U	15 U	-	-	15 U	-	15 U	15 U	7.0 U	15 U	-	15 U	-
	2	70 U	15 U	15 U	70 U	15 U	70 U	70 U	15 U	70 U	70 U	15 U	7.0 U	15 U	70 U	15 U	-
	3	70 U	-	-	70 U	-	70 U	70 U	-	70 U	70 U	-	7.0 U	-	70 U	-	-
	4	70 U	-	-	70 U	-	70 U	70 U	-	70 U	70 U	-	7.0 U	-	70 U	-	-
	5	70 U	-	-	70 U	-	70 U	70 U	-	70 U	70 U	-	7.0 U	-	70 U	-	-
	6	70 U	15 U	15 U	70 U	15 U	70 U	70 U	15 U	70 U	70 U	15 U	7.0 U	15 U	70 U	15 U	70 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	70 U	70 U	-	7.0 U	-	70 U	-	70 U

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Chlorite (ug/L)	1	-	37	-	-	-	-	-	-	-	38	-	-	37	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	38	-	-	-	38	-	39	-	39	-	-	37	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	-	20 U	-	20 U	-	29	-	20 U	-	23	-	-	20 U	-	20 U	-
	18	-	22	-	21	-	42	-	20 U	-	28	-	-	20 U	-	20 U	-
	19	-	22	-	21	-	39	-	20 U	-	39	-	-	20 U	-	20 U	-
	20	-	20	-	29	-	55	-	20 U	-	39	-	-	20 U	-	20 U	-
	21	-	21	-	36	-	58	-	20 U	-	45	-	-	20 U	-	20 U	-
	22	-	20 U	-	39	-	79	-	46	-	20 U	-	-	20 U	-	20 U	-
Nitrate as N (ug/L)	1	1,570	1,497	1,550	-	1,560	-	1,620	-	1,620	1,521	1,580	1,570	1,433	1,590	-	1,530
	2	11 U	382	360	-	420	-	430	447	550	357	400	590	336	590	-	400
	3	-	284	-	-	-	-	-	266	-	221 J	-	-	296	-	-	-
	4	-	43 U	-	-	-	-	-	43 U	-	43 U	-	-	43 U	-	-	-
	5	-	43 U	-	-	-	-	-	43 U	-	43 U	-	-	43 U	-	-	-
	6	11 U	43 U	11 U	43 U	11 U	43 U	11 U	43 U	11 U	43 U	11 U	11 U	43 U	11 U	43 U	11 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	300	-	-	-	-	-	43 U	-	251	-	-	43 U	-	-	-
Nitrite as N (ug/L)	1	15 U	70 U	15 U	-	15 U	-	15 U	-	15 U	70 U	15 U	15 U	70 U	15 U	-	15 U
	2	15 U	70 U	15 U	-	15 U	-	15 U	70 U	15 U	70 U	15 U	15 U	70 U	15 U	-	15 U
	3	-	70 U	-	-	-	-	-	70 U	-	70 U	-	-	70 U	-	-	-
	4	-	70 U	-	-	-	-	-	70 U	-	70 U	-	-	70 U	-	-	-
	5	-	70 U	-	-	-	-	-	70 U	-	70 U	-	-	70 U	-	-	-
	6	15 U	70 U	15 U	70 U	15 U	70 U	15 U	70 U	15 U	70 U	15 U	15 U	70 U	15 U	70 U	15 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	70 U	-	-	-	-	-	70 U	-	70 U	-	-	70 U	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	06/19/00	06/20/00	06/22/00	06/23/00	06/27/00	06/30/00	07/07/00	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00
Chlorite (ug/L)	1	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	34	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	36	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	36	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	37	-	-	-	-	-	-	-
	6	-	-	33	-	-	-	-	-	38	-	-	38	-	-	41	-
	16	-	-	-	-	-	-	-	-	38	-	-	-	-	-	39	-
	17	-	-	-	-	-	-	-	-	22	-	-	-	-	-	20 U	-
	18	-	-	-	-	-	-	-	-	23	-	-	-	-	-	20 U	-
	19	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	20 U	-
	20	-	-	-	-	-	-	-	-	20 U	-	-	-	-	-	20 U	-
	21	-	-	20 U	-	-	-	-	-	20 U	-	-	-	-	-	-	-
	22	-	-	20 U	-	-	-	-	-	20 U	-	-	20 U	-	-	20 U	-
Nitrate as N (ug/L)	1	-	1,580	-	1,610	1,530	1,510	1,550	1,490	1,397	1,550	1,500	-	1,510	1,510	-	1,560
	2	242	580	-	520	490	540	400	360	420	390	610	-	380	420	560	640
	3	262	-	-	-	-	-	-	-	45 U	-	-	-	-	-	68	-
	4	43 U	-	-	-	-	-	-	-	45 U	-	-	-	-	-	43	-
	5	43 U	-	-	-	-	-	-	-	45 U	-	-	-	-	-	11 U	-
	6	43 U	11 U	43 U	11 U	11 U	11 U	11 U	11 U	45 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	45 U	-	-	-	-	-	-	-
	22	209 J	-	-	-	-	-	-	-	45 U	-	-	11 U	-	-	50	-
Nitrite as N (ug/L)	1	-	15 U	-	15 U	15 U	15 U	15 U	15 U	42 U	15 U	15 U	-	15 U	15 U	-	15 U
	2	70 U	15 U	-	15 U	15 U	15 U	15 U	15 U	42 U	15 U	15 U	-	15 U	15 U	-	15 U
	3	70 U	-	-	-	-	-	-	-	42 U	-	-	-	-	-	-	-
	4	70 U	-	-	-	-	-	-	-	42 U	-	-	-	-	-	-	-
	5	70 U	-	-	-	-	-	-	-	42 U	-	-	-	-	-	-	-
	6	70 U	15 U	70 U	15 U	15 U	15 U	15 U	15 U	42 U	15 U	15 U	-	15 U	15 U	-	15 U
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	70 U	-	-	-	-	-	-	-	42 U	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00
Chlorite (ug/L)	1	-	36	-	-	-	36	-	-	-	39	-	-	-	-	-	-
	2	-	40	-	-	-	36	-	-	-	38	-	-	-	-	-	-
	3	-	38	-	-	-	36	-	-	-	38	-	-	-	-	-	-
	4	-	43	-	-	-	37	-	-	-	40	-	-	-	-	-	-
	5	-	42	-	-	-	37	-	-	-	37	-	-	-	-	-	-
	6	42	38	45	39	38	35	36	-	37	37	41	45	38	-	-	35
	16	41	41	42	34	35	33	43	-	37	43	43	39	39	-	-	39
	17	20 U	20 U	20 U	20 U	20 U	59	42	-	20 U	190	20 U	20 U	26	-	-	20 U
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	20 U	20 U	20 U	20 U	20 U	20 U	20 U	-	20 U	41	20 U	20 U	14	-	-	20 U
Nitrate as N (ug/L)	1	-	1,558	-	-	-	1,693	-	-	-	1,544	-	-	-	1,610	1,490	-
	2	-	456	-	350	-	17 U	-	600	-	747	-	640	-	1,050	1,130	-
	3	-	45 U	-	11 U	-	519	-	11 U	-	45 U	-	11 U	-	202 U	685 J	-
	4	-	45 U	-	11 U	-	17 U	-	11 U	-	45 U	-	11 U	-	202 U	370 J	-
	5	-	45 U	-	11 U	-	-	-	11 U	-	45 U	-	11 U	-	202 U	202 U	-
	6	11 U	45 U	11 U	11 U	-	17 U	11 U	11 U	11 U	45 U	11 U	11 U	11 U	202 U	202 U	11 U
	9	-	-	-	-	-	-	-	-	-	45 U	-	-	-	-	-	-
	11	-	45 U	-	-	-	17 U	-	-	-	45 U	-	-	-	202 U	-	-
	22	11 U	280	160	200	980	17 U	11 U	14	11 U	269	16	67	74	202 U	-	130
Nitrite as N (ug/L)	1	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-
	2	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-
	3	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-
	4	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-
	5	-	42 U	-	-	-	-	-	-	-	42 U	-	-	-	189 U	-	-
	6	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-
	9	-	42 U	-	-	-	-	-	-	-	42 U	-	-	-	-	-	-
	11	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	-	-	-
	22	-	42 U	-	-	-	21 U	-	-	-	42 U	-	-	-	189 U	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Chlorite (ug/L)	1	-	-	40	-	-
	2	-	-	36	-	-
	3	-	-	39	-	-
	4	-	-	36	-	-
	5	-	-	39	-	-
	6	-	47	39	36	-
	16	-	44	44	40	-
	17	-	49	13	10 U	-
	18	-	-	-	-	-
	19	-	-	-	-	-
	20	-	-	-	-	-
	21	-	-	-	-	-
	22	-	20 U	10 U	13	-
Nitrate as N (ug/L)	1	-	-	1,540	-	-
	2	1,200	-	1,054	-	1,200
	3	11 U	-	384	-	11 U
	4	11 U	-	45 U	-	11 U
	5	11 U	-	45 U	-	11 U
	6	11 U	11 U	45 U	11 U	11 U
	9	-	-	-	-	-
	11	-	-	45 U	-	-
	22	120	130	194 J	89	90
Nitrite as N (ug/L)	1	-	-	42 U	-	-
	2	-	-	42 U	-	-
	3	-	-	42 U	-	-
	4	-	-	42 U	-	-
	5	-	-	42 U	-	-
	6	-	-	42 U	-	-
	9	-	-	-	-	-
	11	-	-	-	-	-
	22	-	-	42 U	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/02/00	05/04/00	05/08/00	05/09/00	05/10/00	05/12/00	05/15/00	05/16/00	05/18/00
Perchlorate (ug/L)	1	2,600	2,700	2,900	2,500	2,500	-	-	-	-	2,600	2,500	3,000	2,500	-	2,600	-
	2	1,300	1,400	1,500	1,500	1,500	1,500	1,100	-	1,300	1,100	1,100	1,300	1,000	-	1,000	-
	3	990	-	-	1,300	-	1,100	710	-	780	760	-	750	-	-	-	-
	4	910	-	-	1,100	-	940	500	-	680	600	-	580	-	-	-	-
	5	710	-	-	870	-	620	200	-	360	300	-	290	-	-	-	-
	6	360	520	-	720	810	630	48	-	300	94	110	94	21	-	52	250
	22	-	-	-	-	-	-	-	-	250	170	-	150	-	-	-	140
Phosphate as P (ug/L)	1	-	101	87	-	102	-	-	-	-	90	76	-	75	-	53	-
	2	-	313	379	-	460	-	-	281	-	303	238	-	232	-	221	-
	6	-	330	330	-	454	-	-	296	-	272	295	-	202	-	193	-
Phosphorus (ug/L)	1	87	-	-	85	-	-	-	-	-	-	-	90	-	-	-	-
	2	540	-	-	276	-	466	306	-	226	222	-	94	-	214	-	-
	3	474	-	-	262	-	444	270	-	200	196	-	94	-	218	-	-
	4	474	-	-	276	-	404	270	-	196	200	-	165	-	204	-	-
	5	478	-	-	280	-	416	276	-	182	204	-	196	-	204	-	-
	6	540	-	-	244	-	430	292	-	218	258	-	103	-	200	-	231
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	204
	22	-	-	-	-	-	-	-	-	266	430	-	169	-	191	-	209
Sulfate (ug/L)	1	16,800	16,660	16,950	17,100	16,940	-	-	16,560	-	16,670	16,740	16,200	16,140	-	16,720	-
	2	-	16,600	16,850	-	16,920	-	-	16,500	-	16,580	16,500	-	16,090	-	16,430	-
	6	16,600	16,600	16,800	16,500	16,920	-	17,200	16,600	-	16,600	16,390	18,300	16,100	15,600	16,510	16,000
	22	-	-	-	-	-	-	-	-	16,800	18,200	-	16,100	-	15,200	-	15,500
Sulfide (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Perchlorate (ug/L)	1	2,600	2,600	2,600	-	2,700	-	2,600	-	2,600	2,500	2,700	2,500	2,500	2,500	-	2,600
	2	2.0 U	1,300	1,100	-	1,100	-	1,000	1,000	1,000	1,100	1,100	1,100	1,100	1,800	-	1,100
	3	-	970	-	-	-	-	-	760	-	570	-	-	640	-	-	-
	4	-	900	-	-	-	-	-	450	-	370	-	-	310	-	-	-
	5	-	610	-	-	-	-	-	110	-	16	-	-	27	-	-	-
	6	2.0 U	480	210	110	52	78	22	64	100	0.48 U	2.0 U	2.0 U	0.48 U	2.0 U	0.48 U	2.0 U
	22	-	300	-	-	-	-	-	160	-	120	-	-	0.48 U	-	-	-
Phosphate as P (ug/L)	1	84	-	55	-	40	-	65	-	66	-	78	75	-	82	-	62
	2	234	-	229	-	191	-	244	-	157	-	118	203	-	213	-	161
	6	220	-	162	-	170	-	193	-	154	-	115	153	-	165	-	173
Phosphorus (ug/L)	1	-	78	-	-	-	-	-	-	-	85	-	-	76	-	-	-
	2	-	240	-	-	-	-	-	196	-	156	-	-	232	-	-	-
	3	-	231	-	-	-	-	-	182	-	134	-	-	214	-	-	-
	4	-	235	-	-	-	-	-	174	-	138	-	-	218	-	-	-
	5	-	244	-	-	-	-	-	182	-	143	-	-	222	-	-	-
	6	-	222	-	218	-	235	-	191	-	147	-	-	214	-	182	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	222	-	228	-	219	-	226	-	143	-	-	214	-	205	-
	22	-	235	-	-	-	-	-	218	-	147	-	-	209	-	-	-
Sulfate (ug/L)	1	16,840	16,400	16,610	-	16,950	-	17,640	-	17,400	15,700	16,800	17,200	15,600	17,000	-	16,100
	2	16,670	-	16,540	-	16,700	-	17,760	-	17,400	-	16,800	17,200	-	17,000	-	16,100
	6	16,670	16,900	16,650	-	16,620	16,100	17,810	8,540	17,300	15,300	16,800	17,000	14,400	17,000	-	16,200
	22	-	16,600	-	-	-	-	-	15,400	-	15,300	-	-	14,500	-	-	-
Sulfide (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	500 U	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	500 U	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	06/19/00	06/20/00	06/22/00	06/23/00	06/27/00	06/30/00	07/07/00	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00
Perchlorate (ug/L)	1	-	2,800	-	2,700	2,400	3,300	2,900	2,800	2,500	2,800	2,900	-	2,600	2,600	-	2,500
	2	1,100	1,200	-	1,200	1,100	1,400	1,100	1,200	1,100	1,200	1,300	-	1,300	1,200	50	1,300
	3	510	-	-	-	-	-	-	-	580	-	-	-	-	-	49	-
	4	290	-	-	-	-	-	-	-	430	-	-	-	-	-	560	-
	5	61	-	-	-	-	-	-	-	0.48 U	-	-	-	-	-	130	-
	6	0.48 U	2.0 U	0.48 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.48 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	22	0.48 U	-	-	-	-	-	-	-	0.48 U	-	-	2.0 U	-	-	2.0 U	-
Phosphate as P (ug/L)	1	-	67	-	69	53	56	75	67	-	68	46	-	70	62	-	68
	2	-	208	-	229	242	215	84	61	-	129	103	-	92	94	-	158
	6	-	168	-	192	218	209	103	66	-	104	106	-	84	82	-	106
Phosphorus (ug/L)	1	-	-	-	-	-	-	-	-	87	-	-	-	-	-	-	-
	2	240	-	-	-	-	-	-	-	160	-	-	-	-	-	98	-
	3	209	-	-	-	-	-	-	-	147	-	-	-	-	-	110	-
	4	209	-	-	-	-	-	-	-	143	-	-	-	-	-	110	-
	5	213	-	-	-	-	-	-	-	151	-	-	-	-	-	110	-
	6	222	-	196	-	-	-	-	-	151	-	-	92	-	-	91	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	187	-	138	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	187	-	-	-	-	-	-	-	129	-	-	92	-	-	110	-
Sulfate (ug/L)	1	-	16,200	-	16,700	15,700	15,800	16,500	15,400	15,200	16,000	15,800	-	15,700	17,200	-	15,700
	2	-	16,200	-	16,700	16,100	15,900	16,500	15,300	-	15,100	15,900	-	15,800	17,700	-	15,600
	6	15,500	16,100	15,000	16,100	16,000	15,900	16,600	15,600	15,300	15,900	15,700	-	15,800	17,800	-	15,600
	22	16,200	-	-	-	-	-	-	-	16,500	-	-	-	-	-	-	-
Sulfide (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00
Perchlorate (ug/L)	1	-	2,500	-	-	-	2,400	-	-	-	2,700	-	-	-	2,700	2,800	-
	2	-	1,200	-	1,600	-	1,700	-	2,000	-	2,200	-	2,300	-	2,200	2,200	-
	3	-	19	-	30	-	970	-	4.0 U	-	0.43 U	-	4.0 U	-	0.43 U	1,200	-
	4	-	5.5	-	20	-	670	-	4.0 U	-	0.43 U	-	4.0 U	-	0.43 U	890	-
	5	-	0.48 J	-	4.0 U	-	11	-	4.0 U	-	0.43 U	-	4.0 U	-	0.43 U	20	-
	6	2.0 U	0.48 U	2.0 U	4.0 U	4.0 U	0.48 U	4.0 U	4.0 U	4.0 U	0.43 U	4.0 U	4.0 U	4.0 U	0.43 U	0.43 U	4.0 U
	22	2.0 U	0.48 U	4.0 U	6.7	6.9	0.48 J	4.0 U	4.0 U	4.0 U	0.43 U	4.0 U	4.0 U	4.0 U	0.43 U	-	4.0 U
Phosphate as P (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (ug/L)	1	-	81	-	-	-	214	-	-	-	98	-	-	-	87	-	-
	2	-	28	-	40	-	111	-	32 U	-	87	-	32 U	-	76	-	-
	3	-	147	-	60	-	117	-	32 U	-	78	-	32 U	-	51	-	-
	4	-	147	-	70	-	97	-	32 U	-	58	-	32 U	-	56	-	-
	5	-	143	-	60	-	68	-	32 U	-	58	-	32 U	-	47	-	-
	6	30 U	156	50	50	100 U	196	32 U	32 U	32 U	65	32 U	32 U	32 U	60	-	32 U
	9	-	121	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	111	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	290	116	70	32 U	290	253	32 U	43	52	60	32 U	32 U	32 U	36	-	32 U
Sulfate (ug/L)	1	-	16,400	-	-	-	17,000	-	-	-	15,800	-	-	-	15,300	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	15,400	-	-	-	17,000	-	-	-	15,600	-	-	-	23,600	-	-
	22	-	16,400	-	-	-	18,000	-	-	-	18,300	-	-	-	14,700	-	-
Sulfide (ug/L)	1	-	2,700	-	500 U	-	750	-	600	-	2,850	-	500 U	-	500 U	-	-
	2	-	2,250	-	500 U	-	4,800	-	500 U	-	1,500	-	500 U	-	500 U	-	-
	3	-	2,250	-	500 U	-	3,000	-	500 U	-	2,850	-	500 U	-	500 U	-	-
	4	-	2,250	-	500 U	-	1,200	-	7,350	-	4,200	-	500 U	-	500 U	-	-
	5	-	500 U	-	500 U	-	3,000	-	1,050	-	2,850	-	500 U	-	500 U	-	-
	6	-	500 U	-	500 U	-	3,900	-	500 U	-	1,500	-	500 U	-	500 U	-	-
	22	-	500 U	-	500 U	-	5,250	-	500 U	-	500 U	-	500 U	-	500 U	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Perchlorate (ug/L)	1	-	-	2,700	-	-
	2	2,500	-	2,200	-	2,500
	3	4.0 U	-	1,200	-	18
	4	4.0 U	-	300	-	4.0 U
	5	4.0 U	-	7.9	-	13
	6	4.0 U	4.0 U	0.43 U	4.0 U	4.0 U
	22	4.0 U	4.0 U	0.43 U	4.0 U	4.8
Phosphate as P (ug/L)	1	-	-	-	-	-
	2	-	-	-	-	-
	6	-	-	-	-	-
Phosphorus (ug/L)	1	-	-	2.8 J	-	-
	2	34	-	76	-	33
	3	32 U	-	58	-	32 U
	4	32 U	-	47	-	32 U
	5	32 U	-	51	-	32 U
	6	32 U	32 U	51	32 U	32 U
	9	-	-	-	-	-
	11	-	-	-	-	-
	22	32 U	38	34	32 U	32 U
Sulfate (ug/L)	1	-	-	15,600	-	-
	2	-	-	-	-	-
	6	-	-	15,800	-	-
	22	-	-	18,500	-	-
Sulfide (ug/L)	1	500 U	-	500 U	-	500 U
	2	500 U	-	500 U	-	500 U
	3	500 U	-	500 U	-	500 U
	4	500 U	-	500 U	-	500 U
	5	500 U	-	500 U	-	500 U
	6	500 U	-	500 U	-	500 U
	22	500 U	-	500 U	-	500 U

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	04/19/00	04/20/00	04/24/00	04/26/00	04/27/00	04/28/00	05/01/00	05/02/00	05/04/00	05/08/00	05/09/00	05/10/00	05/12/00	05/15/00	05/16/00	05/18/00
Sulfite (ug/L)	1	5,000 U	-	-	5,000 U	-	-	-	-	-	-	-	5,000 U	-	-	-	-
	6	5,000 U	-	-	5,000 U	-	-	5,000 U	-	-	-	-	5,000 U	-	5,000 U	-	5,000 U
	22	-	-	-	-	-	-	-	-	5,000 U	5,000 U	-	5,000 U	-	5,000 U	-	5,000 U
Sulfur (ug/L)	1	6,160	-	-	-	-	-	-	-	-	-	-	5,720	-	-	-	-
	6	6,480	-	-	-	-	-	-	-	-	-	-	5,890	-	6,260	-	6,350
	22	-	-	-	-	-	-	-	-	-	5,700	-	5,980	-	6,210	-	6,380
Total hardness (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UV absorbance at 254 nm (cm -1)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	05/19/00	05/23/00	05/24/00	05/25/00	05/26/00	05/30/00	05/31/00	06/01/00	06/02/00	06/05/00	06/06/00	06/09/00	06/12/00	06/13/00	06/15/00	06/16/00
Sulfite (ug/L)	1	-	5,000 U	-	-	-	-	-	-	-	5,000 U	-	-	5,000 U	-	-	-
	6	-	5,000 U	-	-	-	5,000 U	-	5,000 U	-	5,000 U	-	-	5,000 U	-	-	-
	22	-	5,000 U	-	-	-	-	-	5,000 U	-	5,000 U	-	-	5,000 U	-	-	-
Sulfur (ug/L)	1	-	6,420	-	-	-	-	-	-	-	6,040	-	-	5,840	-	-	-
	6	-	6,350	-	-	-	6,110	-	6,110	-	6,010	-	-	5,960	-	-	-
	22	-	6,110	-	-	-	-	-	6,110	-	6,020	-	-	5,980	-	-	-
Total hardness (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UV absorbance at 254 nm (cm -1)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	06/19/00	06/20/00	06/22/00	06/23/00	06/27/00	06/30/00	07/07/00	07/11/00	07/13/00	07/14/00	07/18/00	07/20/00	07/21/00	07/25/00	07/27/00	07/28/00
Sulfite (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	5,000 U	-	5,000 U	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	5,000 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	5,960	-	6,010	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	6,240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total hardness (ug/L)	1	-	-	-	-	-	-	-	-	122,000	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	116,000	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	112,000	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	111,000	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	106,000	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	111,000	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	125,000	-	-	-	-	-	-	-
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	111,000	-	-	-	-	-	-	-
UV absorbance at 254 nm (cm -1)	1	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	0.009 U	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	0.009 U	-
	9	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	0.009 U	-
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	0.009 U	-
	16	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	0.009 U	-
	102	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	0.009 U	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00	10/18/00	10/26/00	11/01/00	11/06/00	11/08/00
Sulfite (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total hardness (ug/L)	1	-	122,000	-	120,000	-	114,000	-	120,000	-	111,000	-	120,000	-	120,000	-	-
	6	-	119,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	120,000	-	-	-	-	-	120,000	-	-	-	-	-	-	-	-
	16	-	120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	115,000	-	120,000	-	117,000	-	120,000	-	117,000	-	120,000	-	112,000	-	-
	102	-	120,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103	-	117,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	119,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UV absorbance at 254 nm (cm -1)	1	-	0.009 U	-	0.009 U	-	0.009 U	-	0.009 U	-	-	-	-	-	-	-	-
	2	-	-	-	0.009 U	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	0.009 U	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	0.009 U	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	0.009 U	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	0.009 U	-	0.009 U	-	0.01	-	0.009 U	-	-	-	-	-	-	-	-
	9	-	0.009 U	-	0.009 U	-	0.009 U	-	0.009 U	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-
	11	-	0.009 U	-	0.009 U	-	0.01	-	0.009 U	-	-	-	-	-	-	-	-
	16	-	0.009 U	-	0.009 U	-	0.009 U	-	0.009 U	-	-	-	-	-	-	-	-
	22	-	0.009 U	-	0.009 U	-	0.009 U	-	0.009 U	-	-	-	-	-	-	-	-
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

Parameter	SITE	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Sulfite (ug/L)	1	-	-	-	-	-
	6	-	-	-	-	-
	22	-	-	-	-	-
Sulfur (ug/L)	1	-	-	-	-	-
	6	-	-	-	-	-
	22	-	-	-	-	-
Total hardness (ug/L)	1	120,000	-	118,000	-	120,000
	6	-	-	-	-	-
	9	-	-	-	-	-
	11	-	-	-	-	-
	16	-	-	-	-	-
	22	120,000	-	117,000	-	-
	102	-	-	-	-	-
	103	-	-	-	-	-
	104	-	-	-	-	-
UV absorbance at 254 nm (cm -1)	1	-	-	-	-	-
	2	-	-	-	-	-
	3	-	-	-	-	-
	4	-	-	-	-	-
	5	-	-	-	-	-
	6	-	-	0.007 J	-	-
	9	-	-	-	-	-
	10	-	-	-	-	-
	11	-	-	0.005 J	-	-
	16	-	-	0.003 J	-	-
	22	-	-	-	-	-
	102	-	-	-	-	-
	104	-	-	-	-	-

Table A4 Analytical Data
General Parameters and Inorganic Parameters

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Acetaldehyde (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	2.0	4.0	4.0	-	5.0	-	-	3.0	4.0	3.0	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0	7.0	8.0	-	9.0	-	-	8.0	8.0	5.0	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	4.0	6.0	6.0	-	3.0	-	-	4.0	7.0	4.0	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10	1.0 U	1.0	1.0 U	1.0
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.1	6.3	5.0 U	3.0	3.0	3.0	7.0	3.0	3.0	1.0 U	7.0	15	4.0	15
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	3.0	4.0	10	-	-	38	11	2.0	-
Benzaldehyde (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-
Butanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
Acetaldehyde (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	2.0	-	3.0	-	4.0	-	4.0	-	8.0	-	4.0	-	4.0	-	1.0 U	-
	3	5.0	-	8.0	-	7.0	-	1.0 U	-	1.0 U	-	6.0	-	1.0	-	1.0	-
	4	4.0	-	4.0	-	5.0	-	1.0	-	1.0	-	5.0	-	1.0 U	-	1.0 U	-
	5	3.0	-	1.0 U	-	3.0	-	2.0	-	1.0 U	-	2.0	-	1.0	-	2.0	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0	1.0 U	1.0 U	1.0	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0	1.0 U	1.0 U	1.0 U	1.0	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	3.0	3.0	2.0	29	14	4.0	6.0	5.0	6.0	2.0	4.0	5.0	7.0	4.0	4.0	3.0
	16	-	-	-	-	-	1.0	1.0 U	2.0	1.0 U	1.0	1.0	1.0 U	2.0	1.0 U	1.0	1.0
	22	1.0 U	-	4.0	10	48	2.0	8.0	4.0	1.0	1.0	5.0	2.0	2.0	4.0	1.0	2.0
Benzaldehyde (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butanal (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Acetaldehyde (ug/L)	1	1.0 U	-	0.90 J	-	1.0	-	0.40 J	-	0.70 J
	2	1.0 U	-	6.0	-	7.0	-	16	-	7.0
	3	1.0 U	-	5.0	-	2.0	-	4.0	-	2.0
	4	1.0 U	-	0.80 J	-	1.0	-	4.0	-	1.0
	5	1.0	-	1.0	-	1.0	-	2.0	-	1.0
	6	1.0 U	1.0	2.0	1.0	2.0	1.0	2.0	2.0	1.0
	9	1.0 U	1.0	0.90 J	0.80 J	0.90 J	1.0 U	0.90 J	0.70 J	0.30 J
	10	1.0	1.0 U	0.80 J	0.80 J	1.0	1.0	0.70 J	0.90 J	1.0
	11	4.0	6.0	3.0	5.0	3.0	3.0	4.0	3.0	3.0
	16	1.0 U	1.0 U	1.0 U	0.60 J	0.60 J	1.0 U	0.70 J	1.0	0.30 J
	22	2.0	6.0	1.0	2.0	2.0	2.0	2.0	12	1.0
Benzaldehyde (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
Butanal (ug/L)	1	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	2	1.0 U	-	0.30 J	-	1.0 U	-	0.70 J	-	1.0 U
	3	1.0 U	-	0.40 J	-	1.0 U	-	0.60 J	-	1.0 U
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	5	1.0 U	-	0.60 J	-	2.0	-	1.0	-	1.0 U
	6	1.0 U	1.0 U	1.0	0.40 J	2.0	1.0	2.0 J	2.0	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.40 J	1.0 U	1.0 U
	10	1.0 U	1.0 U	1.0 U	1.0 U	0.80 J	1.0 U	1.0 U	0.40 J	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.60 J	1.0 U
	16	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.50 J	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	0.50 J	1.0 U	1.0 U	0.60 J	1.0 U

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
trans-2-Butenal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-
Cyclohexanone (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-
Decanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
trans-2-Butenal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexanone (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decanal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
trans-2-Butenal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
Cyclohexanone (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
Decanal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Formaldehyde (ug/L)	1	5.0 U	5.0 U	-	-	-	-	5.0	-	-	5.0 U	-	-	-	5.0 U	5.0 U	-
	2	5.0	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-
	3	12	5.0	5.4	6.9	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-
	4	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-
	5	23	5.0 U	-	5.1	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	-	-	5.0 U	5.0 U	5.0 U	-
	6	5.0 U	5.0 U	8.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	9	-	5.5	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	8.0	5.0 U	5.0 U	36	5.0 U	5.0 U	5.0 U	5.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	7.8	12	15	7.2	24	18	18	28	24	26	5.0 U	30	30	25	35
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	8.2	-	5.0	9.0	47	5.0 U	-	-	5.0 U	5.0 U	10	-
Glyoxal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.1	5.0 U	5.0	4.0	5.0	4.0	3.0	4.0	1.0 U	4.0	4.0	5.0	5.0
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	4.0	-
Heptanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
Formaldehyde (ug/L)	1	-	-	5.0 U	-	-	-	5.0 U	-	5.0	-	5.0 U	-	5.0 U	-	5.0 U	-
	2	5.0 U	-	5.0 U	-	6.0	-	5.0 U	-	6.0	-	5.0 U	-	5.0 U	-	5.0 U	-
	3	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0	-	5.0 U	-
	4	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-
	5	5.0 U	-	5.0 U	-	5.0	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-	5.0 U	-
	6	5.0 U	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0	5.0 U	6.0	7.0	5.0 U	5.0 U	5.0 U	5.0
	9	5.0 U	5.0	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
	11	40	37	33	44	35	33	30	36	30	25	29	41	30	27	23	30
	16	-	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	8.0	6.0	5.0 U	5.0 U	5.0 U	7.0
	22	9.0	-	9.0	6.0	6.0	15	5.0 U	8.0	22	22	11	7.0	6.0	9.0	5.0 U	17
Glyoxal (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	5.0	5.0	4.0	4.0	5.0	5.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	4.0	2.0	2.0
	16	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0	3.0	3.0	4.0	2.0	1.0
	22	3.0	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	3.0	1.0 U	1.0 U	3.0	3.0	3.0	3.0	2.0	1.0 U
Heptanal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Formaldehyde (ug/L)	1	5.0 U	-	1.9 J	-	4.0 J	-	4.0 J	-	4.0 BJ
	2	5.0 U	-	3.9 J	-	3.0 J	-	3.0 J	-	5.0
	3	5.0 U	-	5.0 U	-	2.0 J	-	3.0 J	-	4.0 BJ
	4	5.0 U	-	3.2 J	-	2.0 J	-	3.0 J	-	4.0 BJ
	5	5.0 U	-	3.2 J	-	3.0 J	-	3.0 J	-	4.0 BJ
	6	5.0 U	5.0 U	3.9 J	2.0 J	4.0 J	5.0 U	4.0 J	5.0	4.0 BJ
	9	5.0 U	5.0 U	2.8 J	2.0 J	2.0 J	5.0 U	2.0 J	3.0 J	1.0 BJ
	10	5.0 U	5.0 U	2.5 J	2.0 J	4.0 J	5.0 U	2.0 J	4.0 J	3.0 BJ
	11	21	23	23	26	19	22	21	26	21
	16	5.0 U	5.0 U	3.2 J	2.0 J	1.0 J	8.0	3.0 J	4.0 J	5.0
	22	5.0	11	6.0	12	16	13	9.0	16	14
Glyoxal (ug/L)	1	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	5	1.0 U	-	1.0 U	-	1.0 U	-	0.30 J	-	1.0 U
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.20 J	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.20 J	1.0 U
	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.20 J	1.0 U
	11	2.0	2.0	2.0	2.0	1.0	1.0	1.0	2.0	1.0
	16	1.0 U	1.0 U	0.40 J	0.30 J	0.20 J	1.0 U	0.40 J	0.40 J	0.30 J
	22	1.0	1.0 U	0.40 J	0.30 J	0.40 J	1.0 U	0.30 J	0.70 J	0.50 J
Heptanal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Hexanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-
Methyl glyoxal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	1.0	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U	1.0 U	1.0
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
Nonanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
Hexanal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl glyoxal (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U	1.0	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Nonanal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Hexanal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
Methyl glyoxal (ug/L)	1	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	0.30 J	0.60 J	0.60 J	1.0 U	0.60 J	0.80 J	0.70 J
	16	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Nonanal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Octanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	9	-	5.0 U	-	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	-	-	-	-	-	-	-	-	-	-
Pentanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
Propanal (ug/L)	1	5.0 U	5.0 U	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-
	2	5.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	5	5.0 U	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-
	6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	-	5.0 U	-	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	5.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
Octanal (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentanal (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Propanal (ug/L)	1	-	-	1.0 U	-	-	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	2	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	5	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	16	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Octanal (ug/L)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
Pentanal (ug/L)	1	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	2	1.0 U	-	1.0 U	-	0.90 J	-	1.0 U	-	1.0 U
	3	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	4	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U	-	1.0 U
	5	1.0 U	-	1.0 U	-	0.90 J	-	1.0 U	-	1.0 U
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	0.30 J	1.0 U	1.0 U	1.0 U	1.0 U
	16	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	0.30 J	1.0 U	1.0 U	1.0 U	1.0 U
Propanal (ug/L)	1	1.0 U	-	0.20 J	-	0.50 J	-	1.0 U	-	1.0 U
	2	1.0 U	-	0.30 J	-	0.30 J	-	0.50 J	-	0.20 J
	3	1.0 U	-	0.60 J	-	0.30 J	-	0.30 J	-	1.0 U
	4	1.0 U	-	1.0 U	-	0.50 J	-	0.30 J	-	1.0 U
	5	1.0 U	-	0.60 J	-	1.0	-	0.90 J	-	0.20 J
	6	1.0 U	1.0 U	0.90 J	0.40 J	2.0	1.0	1.0	2.0	0.30 J
	9	1.0 U	1.0 U	1.0 U	0.20 J	0.30 J	1.0 U	0.30 J	0.30 J	1.0 U
	10	1.0 U	1.0 U	1.0 U	0.20 J	0.60 J	1.0 U	0.20 J	0.30 J	0.20 J
	11	1.0 U	1.0 U	1.0 U	0.30 J	0.30 J	1.0 U	0.20 J	0.60 J	0.20 J
	16	1.0 U	1.0 U	1.0 U	0.20 J	0.20 J	1.0 U	0.30 J	0.40 J	1.0 U
	22	1.0 U	1.0 U	0.30 J	1.0 U	0.50 J	1.0 U	0.30 J	0.40 J	1.0 U

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
Decafluorobiphenyl (%)	1	-	-	-	-	-	-	102	-	-	101	-	-	-	104	100	-
	2	-	-	-	-	-	102	100	98	-	102	-	-	89	102	98	-
	3	-	-	-	-	-	99	101	100	-	102	-	-	92	103	99	-
	4	-	-	-	-	-	100	103	100	-	102	-	-	88	103	100	-
	5	-	-	-	-	-	100	104	99	-	99	-	-	96	103	98	-
	6	-	-	-	-	-	100	104	101	103	103	97	97	95	103	99	100
	9	-	-	-	-	-	102	106	102	101	107	99	107	93	102	98	103
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	102	104	103	106	106	107	89	99	108	103	112
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	106	125	90	127	-	-	94	105	100	-
1,2-Dibromopropane (%)	1	-	-	-	-	-	-	100	-	-	101	-	-	-	102	100	-
	2	-	-	-	-	-	101	99	98	-	100	-	-	91	101	100	-
	3	-	-	-	-	-	100	99	100	-	101	-	-	97	102	102	-
	4	-	-	-	-	-	101	100	100	-	102	-	-	93	101	101	-
	5	-	-	-	-	-	100	101	99	-	103	-	-	95	102	101	-
	6	-	-	-	-	-	101	101	100	101	101	100	97	96	100	99	100
	9	-	-	-	-	-	102	102	101	99	102	100	96	94	101	101	102
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	102	101	100	99	100	100	92	96	99	100	104
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	101	99	95	100	-	-	94	102	100	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
Decafluorobiphenyl (%)	1	-	-	98	-	-	-	98	-	96	-	100	-	102	-	101	-
	2	101	-	101	-	98	-	100	-	97	-	95	-	103	-	102	-
	3	100	-	95	-	100	-	98	-	96	-	101	-	101	-	103	-
	4	102	-	99	-	100	-	99	-	96	-	103	-	97	-	105	-
	5	102	-	99	-	101	-	100	-	98	-	100	-	103	-	102	-
	6	103	99	99	100	100	100	100	104	97	97	100	100	103	104	102	103
	9	102	100	99	100	100	100	-	102	102	99	102	99	101	100	104	104
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100
	11	108	104	107	111	109	112	107	113	105	105	101	108	107	106	108	110
	16	-	-	-	-	-	99	97	101	111	99	96	104	106	105	105	109
	22	130	-	116	102	102	93	97	120	95	96	106	102	101	98	112	98
1,2-Dibromopropane (%)	1	-	-	100	-	-	-	100	-	100	-	98	-	100	-	100	-
	2	98	-	100	-	101	-	100	-	100	-	91	-	100	-	100	-
	3	95	-	99	-	100	-	99	-	100	-	100	-	99	-	101	-
	4	98	-	99	-	100	-	100	-	100	-	99	-	98	-	103	-
	5	100	-	99	-	101	-	100	-	100	-	98	-	101	-	101	-
	6	102	99	99	98	100	100	99	100	99	101	99	98	99	102	101	101
	9	100	100	99	99	101	100	-	101	99	100	99	98	100	98	100	102
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100
	11	99	100	98	98	101	99	100	100	99	99	98	98	100	102	101	100
	16	-	-	-	-	-	99	98	101	99	99	96	97	100	102	100	101
	22	100	-	99	98	101	98	97	100	99	99	98	98	98	99	101	101

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
Decafluorobiphenyl (%)	1	100	-	97	-	99	-	103	-	107
	2	98	-	98	-	106	-	103	-	104
	3	97	-	98	-	99	-	104	-	105
	4	98	-	100	-	97	-	104	-	108
	5	98	-	98	-	98	-	101	-	109
	6	98	103	100	100	100	101	102	102	107
	9	97	100	95	100	97	98	100	102	110
	10	98	103	96	98	101	96	101	103	108
	11	101	102	100	103	99	104	105	110	103
	16	117	124	130	122	108	104	99	101	111
	22	104	98	113	118	92	105	95	112	121
1,2-Dibromopropane (%)	1	99	-	98	-	99	-	99	-	99
	2	102	-	100	-	103	-	99	-	96
	3	96	-	102	-	98	-	99	-	97
	4	98	-	101	-	97	-	99	-	98
	5	99	-	100	-	98	-	99	-	100
	6	97	101	100	100	98	97	98	100	99
	9	97	99	96	98	95	94	98	101	99
	10	97	102	97	96	98	93	98	101	99
	11	97	100	100	98	94	96	98	101	94
	16	98	101	99	98	97	103	99	101	100
	22	96	100	99	97	95	104	98	99	100

Table A5 Analytical Data
Aldehydes

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/08/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00
2,3,5,6-Tetrafluorobenzaldehyd (%)	1	-	-	-	-	-	-	101	-	-	104	-	-	-	105	104	-
	2	-	-	-	-	-	99	102	102	-	104	-	-	98	98	102	-
	3	-	-	-	-	-	103	106	105	-	106	-	-	104	103	106	-
	4	-	-	-	-	-	106	103	106	-	108	-	-	96	100	103	-
	5	-	-	-	-	-	101	104	104	-	106	-	-	100	96	108	-
	6	-	-	-	-	-	104	107	106	108	106	98	99	99	104	107	105
	9	-	-	-	-	-	106	100	106	101	104	100	100	100	98	108	109
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	106	103	103	97	102	106	87	99	97	103	106
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	104	107	122	110	-	-	101	105	114	-
2,4,5-Trifluoroacetophenone (%)	1	119	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	116	-	72	66	73	-	-	-	-	-	-	-	-	-	-	-
	3	111	77	68	78	74	-	-	-	-	-	-	-	-	-	-	-
	4	112	73	84	64	65	-	-	-	-	-	-	-	-	-	-	-
	5	114	72	-	66	70	-	-	-	-	-	-	-	-	-	-	-
	6	105	76	80	74	73	-	-	-	-	-	-	-	-	-	-	-
	9	-	73	-	67	66	-	-	-	-	-	-	-	-	-	-	-
	11	-	73	78	63	70	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	73	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	06/19/00	06/22/00	07/13/00	07/20/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00	10/11/00
2,3,5,6-Tetrafluorobenzaldehyd (%)	1	-	-	112	-	-	-	102	-	105	-	105	-	98	-	111	-
	2	103	-	108	-	-	-	101	-	104	-	97	-	99	-	107	-
	3	104	-	110	-	-	-	106	-	106	-	110	-	102	-	104	-
	4	106	-	110	-	-	-	99	-	104	-	107	-	93	-	112	-
	5	109	-	106	-	110	-	106	-	103	-	104	-	101	-	112	-
	6	108	108	107	116	-	113	109	112	99	108	101	108	104	102	111	111
	9	104	111	111	106	110	109	-	111	96	100	106	102	96	109	102	106
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110
	11	105	107	111	108	110	109	107	110	102	107	106	111	98	109	104	106
	16	-	-	-	-	-	109	106	113	105	100	105	106	102	103	105	111
	22	109	-	116	108	112	146	110	115	119	115	106	108	99	116	111	127
2,4,5-Trifluoroacetophenone (%)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

Parameter	SITE	10/18/00	10/26/00	11/01/00	11/08/00	11/15/00	11/20/00	11/29/00	12/06/00	12/13/00
2,3,5,6-Tetrafluorobenzaldehyd (%)	1	105	-	101	-	102	-	104	-	111
	2	102	-	106	-	107	-	105	-	108
	3	104	-	107	-	107	-	105	-	111
	4	106	-	106	-	104	-	105	-	111
	5	108	-	108	-	107	-	106	-	114
	6	105	110	110	107	106	101	104	105	112
	9	105	106	104	110	102	98	102	99	113
	10	107	108	106	110	106	98	105	105	115
	11	100	111	106	101	94	96	102	101	110
	16	104	107	107	109	105	106	105	97	117
	22	100	113	110	125	117	119	111	106	124
2,4,5-Trifluoroacetophenone (%)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-

Table A5 Analytical Data
Aldehydes

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.
BJ - Estimated Value between the mtheod detection limit and the method reporting limit and blank contamination

Table A6 Analytical Data
Bacteriological

Parameter	SITE	04/24/00	04/27/00	05/03/00	07/20/00	08/09/00	09/07/00	11/01/00	11/29/00	12/13/00
Coliphage-Male Specific (PFU/100 L)	1	46 U	-	-	-	-	-	-	-	-
	6	71	-	-	-	-	-	-	-	-
Coliphage-Somatic (PFU/100 L)	1	46 U	-	-	-	-	-	-	-	-
	6	24 U	-	-	-	-	-	-	-	-
Cryptosporidium Oocysts (org/L)	1	0.10 U	-	-	0.10 U	-	-	-	-	-
	6	0.10 U	-	-	0.10 U	-	-	-	-	-
	9	-	-	0.10 U	0.10 U	-	-	-	-	-
	11	-	-	-	0.10 U	-	-	-	-	-
	12	-	-	0.10 U	-	-	-	-	-	-
	16	-	-	-	0.10 U	-	-	-	-	-
	22	-	-	-	0.10 U	-	-	-	-	-
Escherichia coli (present/absent)	1	-	-	-	Absent	-	-	-	-	-
	6	-	-	-	Absent	-	-	-	-	-
	9	-	-	-	Absent	-	-	-	-	-
	11	-	-	-	Absent	-	-	-	-	-
	16	-	-	-	Absent	-	-	-	-	-
	22	-	-	-	Absent	-	-	-	-	-
Fecal coliform (MPN/100 ML)	1	2.0 U	1.1 U	-	-	-	2.0 U	2.0 U	2.0 U	-
	6	2.0 U	1.1 U	-	-	-	2.0 U	2.0 U	2.0	-
	9	-	1.1 U	-	-	-	2.0 U	2.0 U	2.0 U	-
	11	-	1.1 U	-	-	-	2.0 U	2.0 U	2.0 U	-
	16	-	-	-	-	-	2.0 U	2.0 U	2.0 U	-
	22	-	-	-	-	-	2.0 U	2.0 U	-	-
Giardia Species Cysts (org/L)	1	0.10 U	-	-	0.10 U	-	-	-	-	-
	6	0.10 U	-	-	0.10 U	-	-	-	-	-
	9	-	-	0.10 U	0.10 U	-	-	-	-	-
	11	-	-	-	0.10 U	-	-	-	-	-
	12	-	-	0.10 U	-	-	-	-	-	-
	16	-	-	-	0.10 U	-	-	-	-	-
	22	-	-	-	0.10 U	-	-	-	-	-

Table A6 Analytical Data
Bacteriological

Parameter	SITE	04/24/00	04/27/00	05/03/00	07/20/00	08/09/00	09/07/00	11/01/00	11/29/00	12/13/00
Heterotrophic Plate Count (CFU/ml)	1	25	-	-	40	1,200	100	9,000	75	-
	6	5,600,000	-	-	300,000	57,000	15,000	850	1,800	-
	9	-	-	-	93,000	14,000	5,400	46	5,000	-
	11	-	-	-	150	290	12	260	22	-
	16	-	-	-	1,200	18,000	4,700	18	690	-
	22	-	-	-	80	12	-	100	-	-
Total coliform (MPN/100 ML)	1	13	1.1 U	-	-	2.0 U	2.0 U	2.0 U	2.0 U	-
	6	21	1.1 U	-	-	2.0 U	2.0 U	2.0 U	2.0	-
	9	-	1.1 U	-	-	2.0 U	2.0 U	2.0 U	2.0 U	-
	11	-	1.1 U	-	-	2.0 U	2.0 U	2.0 U	2.0 U	-
	16	-	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	-
	22	-	-	-	-	2.0 U	2.0 U	2.0 U	-	2.0 U
Total coliform (present/absent)	1	-	-	-	Absent	-	-	-	-	-
	6	-	-	-	Absent	-	-	-	-	-
	9	-	-	-	Present	-	-	-	-	-
	11	-	-	-	Absent	-	-	-	-	-
	16	-	-	-	Present	-	-	-	-	-
	22	-	-	-	Absent	-	-	-	-	-
Total Culturable Virus (MPN/100 ML)	1	1.0 U	-	-	-	-	-	-	-	-
	6	1.0 U	-	-	-	-	-	-	-	-
	9	-	-	1.0 U	-	-	-	-	-	-
	12	-	-	1.0 U	-	-	-	-	-	-

Table A6 Analytical Data
Bacteriological

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	06/12/00	06/15/00	06/19/00	06/22/00	07/13/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00
Bromodichloromethane (ug/L)	1	1.8	-	-	-	-	1.6	-	2.7	-	2.0	-	1.7	-	1.6	-	1.7
	6	18	18	19	16	2.5	14	19	19	15	4.8	12	18	16	10	16	16
	7	19	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	4.1	3.5	4.1	4.3	4.5	2.8	4.9	2.8	2.8	3.4	6.0	3.6
	10	7.0	6.3	4.5	18	-	-	-	-	-	-	-	-	-	-	-	-
	11	7.2	10	5.2	8.8	6.0	5.4	7.9	6.2	5.8	5.8	7.8	10	5.0	5.0	7.6	5.5
	13	7.6	5.1	3.1	6.9	-	-	-	-	-	-	-	-	-	-	-	-
	14	4.1	4.0	2.3	5.4	-	-	-	-	-	-	-	-	-	-	-	-
	15	5.1	3.2	2.0	5.9	-	-	-	-	-	-	-	-	-	-	-	-
	16	3.7	3.2	1.7	4.8	2.6	3.2	3.1	-	3.0	2.4	2.9	1.8	1.4	2.9	4.6	2.3
	17	4.1	3.3	1.8	7.3	2.1	-	-	-	-	-	-	-	-	-	-	-
	18	5.2	4.4	1.8	5.8	2.2	-	-	-	-	-	-	-	-	-	-	-
	19	4.5	5.2	2.3	5.7	2.3	-	-	-	-	-	-	-	-	-	-	-
	20	5.2	4.2	2.0	6.0	2.1	-	-	-	-	-	-	-	-	-	-	-
	21	4.6	4.0	2.3	6.3	2.3	-	-	-	-	-	-	-	-	-	-	-
	22	4.3	4.1	1.7	6.4	2.4	2.2	3.8	4.1	1.2	3.5	4.2	1.9	1.7	2.7	5.4	2.4
Bromoform (ug/L)	1	0.70	-	-	-	-	0.50 U	-	0.50 U	-	0.50 U	-	0.50 U	-	0.50 U	-	0.70
	6	1.1	0.70	0.50 U	0.50 U	0.80	0.50 U	0.70	0.80	0.70	0.80	1.4	1.3	1.4	1.7	0.60	1.1
	7	1.1	-	0.50 U	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	0.60	0.50	1.0	1.4	0.50 U	0.70	0.80	0.80	0.60	0.50 U	1.6	1.0
	10	0.70	0.50 U	0.50 U	0.70	-	-	-	-	-	-	-	-	-	-	-	-
	11	0.50 U	0.70	0.50 U	0.50 U	0.50 U	0.50 U	0.70	1.0 U	2.5	1.1	0.70	0.90	0.50 U	0.50	2.5	0.50 U
	13	1.4	1.1	0.50 U	1.7	-	-	-	-	-	-	-	-	-	-	-	-
	14	0.60	0.70	0.50 U	1.2	-	-	-	-	-	-	-	-	-	-	-	-
	15	0.90	0.70	0.50 U	1.1	-	-	-	-	-	-	-	-	-	-	-	-
	16	1.7	0.50	0.50 U	0.90	0.50 U	0.50 U	0.50 U	-	0.50 U	0.50	0.60	0.50 U	0.50 U	1.0	0.50 U	0.70
	17	0.80	1.1	1.2	1.2	1.7	-	-	-	-	-	-	-	-	-	-	-
	18	0.80	2.1	0.80	0.90	1.8	-	-	-	-	-	-	-	-	-	-	-
	19	0.80	2.6	1.3	0.80	1.9	-	-	-	-	-	-	-	-	-	-	-
	20	0.90	1.9	0.80	0.60	1.7	-	-	-	-	-	-	-	-	-	-	-
	21	0.80	1.7	1.3	0.50	1.6	-	-	-	-	-	-	-	-	-	-	-
	22	0.80	1.6	0.50 U	0.50	1.5	0.90	0.50 U	1.0	0.50 U	0.80	1.2	0.50 U	0.90	2.0	2.3	0.60

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	10/11/00	10/18/00	10/26/00	11/01/00	11/08/00	11/20/00	11/29/00	12/06/00	12/13/00
Bromodichloromethane (ug/L)	1	-	1.6	-	1.7	-	-	2.0	-	1.1
	6	14	12	8.4	12	12	14	10	-	3.1
	7	-	-	-	-	-	-	-	-	-
	9	3.6	3.6	2.9	2.8	3.1	3.6	2.9	3.4	3.6
	10	-	-	-	-	-	-	-	-	-
	11	5.0	3.8	3.9	3.7	4.4	4.7	5.3	16	5.9
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	2.5	2.4	2.1	2.0	2.3	3.1	2.7	2.6	2.8
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	1.7	3.3	2.5	1.5	2.7	2.4	2.9	2.6	2.8
Bromoform (ug/L)	1	-	0.50 U	-	0.40 J	-	-	0.50 U	-	0.50 U
	6	1.4	0.90	0.90	0.80	1.0	0.50 U	1.2	-	0.50 U
	7	-	-	-	-	-	-	-	-	-
	9	0.90	0.50 U	0.50 U	0.30 J	0.50	0.50 U	0.60	0.50 U	0.50 U
	10	-	-	-	-	-	-	-	-	-
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50	0.50 U	0.50 U	0.60	0.50 U
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	0.70	0.50 U	0.50 U	0.20 J	0.40 J	0.50 U	0.50 U	0.50	0.70
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	0.80	2.9	1.1	1.3	0.90	0.50 U	0.90	1.4	0.60

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	06/12/00	06/15/00	06/19/00	06/22/00	07/13/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00
Chlorine Dose (ug/L)	1	2,000	-	-	-	-	4,000	-	2,000	-	2,000	-	2,000	-	2,000	-	2,000
	6	5,000	10,000	10,000	10,000	2,000	5,000	5,000	5,000	5,000	2,000	2,000	2,000	5,000	2,000	5,000	5,000
	7	5,000	-	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	5,000	5,000	5,000	2,000	5,000	2,000	2,000	2,000	5,000	5,000	2,000	5,000
	10	30,000	40,000	40,000	30,000	-	-	-	-	-	-	-	-	-	-	-	-
	11	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	20,000	2,000	10,000	20,000	30,000	10,000	40,000	30,000
	13	5,000	5,000	5,000	5,000	-	-	-	-	-	-	-	-	-	-	-	-
	14	2,000	5,000	5,000	5,000	-	-	-	-	-	-	-	-	-	-	-	-
	15	5,000	5,000	10,000	5,000	-	-	-	-	-	-	-	-	-	-	-	-
	16	2,000	5,000	5,000	5,000	5,000	5,000	5,000	-	5,000	2,000	2,000	5,000	5,000	2,000	5,000	5,000
	17	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-
	18	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-
	19	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-
	20	0	0	0	0	2,000	-	-	-	-	-	-	-	-	-	-	-
	21	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-
	22	0	0	0	0	0	2,000	0	0	0	0	0	2,000	5,000	2,000	0	5,000
Chlorine Residual (ug/L)	1	2,000	-	-	-	-	1,200	-	1,600	-	1,500	-	1,600	-	1,900	-	1,500
	6	1,100	5,600	1,800	3,100	500	2,000	1,300	1,400	1,700	1,300	1,200	1,000	2,000	1,100	3,900	1,800
	7	1,500	-	1,300	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	1,600	800	500	500	2,000	1,000	1,600	800	1,700	3,900	800	1,200
	10	3,600	8,300	10,000	2,900	-	-	-	-	-	-	-	-	-	-	-	-
	11	10,000	3,100	11,000	8,200	4,900	4,900	2,000	6,600	800	800	3,300	1,400	6,000	1,900	500	4,400
	13	1,300	1,800	1,700	800	-	-	-	-	-	-	-	-	-	-	-	-
	14	800	2,700	2,700	1,300	-	-	-	-	-	-	-	-	-	-	-	-
	15	3,000	2,100	5,600	1,600	-	-	-	-	-	-	-	-	-	-	-	-
	16	900	2,100	2,800	1,600	2,300	1,400	1,200	-	1,900	1,900	1,800	4,000	1,600	1,100	3,000	1,500
	17	2,600	1,600	800	1,900	700	-	-	-	-	-	-	-	-	-	-	-
	18	2,800	1,200	900	2,000	500	-	-	-	-	-	-	-	-	-	-	-
	19	2,700	1,000	800	2,900	700	-	-	-	-	-	-	-	-	-	-	-
	20	2,600	1,100	1,000	4,200	2,300	-	-	-	-	-	-	-	-	-	-	-
	21	2,900	1,100	900	6,200	500	-	-	-	-	-	-	-	-	-	-	-
	22	2,800	1,200	1,100	6,400	700	600	4,000	1,000	1,200	2,500	2,200	1,900	2,600	1,900	600	2,300

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	10/11/00	10/18/00	10/26/00	11/01/00	11/08/00	11/20/00	11/29/00	12/06/00	12/13/00
Chlorine Dose (ug/L)	1	-	2,000	-	2,000	-	-	5,000	-	2,000
	6	5,000	5,000	5,000	5,000	5,000	5,000	5,000	-	5,000
	7	-	-	-	-	-	-	-	-	-
	9	5,000	5,000	5,000	5,000	3,000	5,000	5,000	5,000	5,000
	10	-	-	-	-	-	-	-	-	-
	11	40,000	30,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	5,000	5,000	5,000	5,000	5,000	2,000	5,000	2,000	2,000
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	0	2,000	0	2,000	10,000	0	0	0	0
Chlorine Residual (ug/L)	1	-	1,200	-	1,000	-	-	1,000	-	1,000
	6	1,200	2,200	2,300	1,400	1,600	2,000	1,400	-	1,500
	7	-	-	-	-	-	-	-	-	-
	9	1,600	1,800	1,400	1,800	1,900	1,900	1,400	2,600	1,700
	10	-	-	-	-	-	-	-	-	-
	11	6,000	4,000	3,000	2,700	1,900	4,800	4,000	4,300	2,300
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	1,800	1,500	1,900	2,100	2,200	900	2,100	1,000	900
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	3,100	1,400	2,000	800	2,800	2,200	1,700	600	1,700

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	06/12/00	06/15/00	06/19/00	06/22/00	07/13/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00
Chloroform (ug/L)	1	85	-	-	-	-	78	-	83	-	58	-	60	-	69	-	68
	6	44	36	60	45	82	27	33	37	32	15	24	28	31	25	46	45
	7	40	-	47	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	16	14	14	17	17	14	17	11	16	16	21	27
	10	21	22	18	37	-	-	-	-	-	-	-	-	-	-	-	-
	11	24	20	18	26	21	20	18	24	16	14	20	19	25	14	19	8.4
	13	4.6	5.5	5.6	11	-	-	-	-	-	-	-	-	-	-	-	-
	14	3.7	3.4	2.0	5.5	-	-	-	-	-	-	-	-	-	-	-	-
	15	4.0	2.6	1.9	5.0	-	-	-	-	-	-	-	-	-	-	-	-
	16	2.3	3.7	1.1	4.7	6.7	11	12	-	14	14	14	2.3	1.0	2.2	4.6	2.1
	17	3.3	3.3	0.60	6.7	5.3	-	-	-	-	-	-	-	-	-	-	-
	18	4.0	3.7	0.70	5.3	5.3	-	-	-	-	-	-	-	-	-	-	-
	19	3.7	4.1	1.0	6.1	5.3	-	-	-	-	-	-	-	-	-	-	-
	20	4.1	3.5	0.80	7.1	5.2	-	-	-	-	-	-	-	-	-	-	-
	21	3.8	3.5	1.0	8.7	5.5	-	-	-	-	-	-	-	-	-	-	-
	22	3.6	3.5	0.60	9.1	5.3	9.3	16	14	14	14	16	2.0	1.5	2.3	3.4	2.7
Dibromochloromethane (ug/L)	1	1.9	-	-	-	-	1.3	-	2.0	-	1.7	-	1.0	-	1.5	-	1.8
	6	8.1	6.0	6.4	6.1	2.2	7.9	7.7	8.4	7.2	3.8	7.0	6.0	5.8	7.0	6.5	6.7
	7	8.3	-	6.6	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	3.0	3.5	4.1	4.8	2.9	2.6	3.8	2.0	1.9	2.7	5.7	3.6
	10	4.1	3.1	1.8	5.4	-	-	-	-	-	-	-	-	-	-	-	-
	11	2.7	8.0	1.8	3.2	2.3	1.5	4.7	1.6	5.3	4.3	3.8	3.7	1.7	4.1	6.8	2.4
	13	5.6	3.9	2.3	6.1	-	-	-	-	-	-	-	-	-	-	-	-
	14	2.3	3.1	1.4	4.6	-	-	-	-	-	-	-	-	-	-	-	-
	15	3.8	2.7	0.90	4.8	-	-	-	-	-	-	-	-	-	-	-	-
	16	3.8	2.2	0.90	4.0	1.9	3.4	2.2	-	2.2	2.2	2.4	0.60	0.80	3.9	3.6	2.6
	17	2.6	3.1	2.5	6.7	3.3	-	-	-	-	-	-	-	-	-	-	-
	18	3.0	5.1	1.9	4.3	3.4	-	-	-	-	-	-	-	-	-	-	-
	19	2.8	6.4	3.1	4.4	3.7	-	-	-	-	-	-	-	-	-	-	-
	20	2.3	4.6	2.1	3.8	3.4	-	-	-	-	-	-	-	-	-	-	-
	21	2.8	4.0	3.3	3.6	3.5	-	-	-	-	-	-	-	-	-	-	-
	22	2.7	4.0	1.7	3.4	3.4	3.0	1.5	4.6	1.6	3.2	5.0	0.90	1.1	3.8	6.3	2.3

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	10/11/00	10/18/00	10/26/00	11/01/00	11/08/00	11/20/00	11/29/00	12/06/00	12/13/00
Chloroform (ug/L)	1	-	88	-	61	-	-	77	-	70
	6	39	44	30	37	39	47	42	-	5.7
	7	-	-	-	-	-	-	-	-	-
	9	25	33	22	22	25	31	28	29	31
	10	-	-	-	-	-	-	-	-	-
	11	15	11	7.6	6.4	4.9	7.1	7.1	46	6.1
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	2.8	4.3	3.6	3.4	3.1	3.6	3.6	2.8	2.8
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	2.4	4.5	3.6	2.4	3.5	3.6	3.5	2.6	2.7
Dibromochloromethane (ug/L)	1	-	1.6	-	1.6	-	-	1.7	-	1.4
	6	7.1	6.2	5.4	6.3	5.6	5.6	6.5	-	1.7
	7	-	-	-	-	-	-	-	-	-
	9	3.3	3.2	2.5	2.5	2.3	2.6	2.7	1.9	2.2
	10	-	-	-	-	-	-	-	-	-
	11	1.9	1.5	2.4	2.4	2.4	2.2	1.5	5.5	2.3
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	2.6	2.5	2.0	2.0	1.9	1.2	2.4	2.3	2.7
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	2.2	5.4	3.5	2.6	2.7	2.5	3.1	3.3	2.7

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	06/12/00	06/15/00	06/19/00	06/22/00	07/13/00	07/27/00	08/03/00	08/09/00	08/16/00	08/23/00	08/30/00	09/07/00	09/13/00	09/20/00	09/27/00	10/04/00
Trihalo methanes (ug/L)	1	89	-	-	-	-	81	-	88	-	62	-	63	-	72	-	72
	6	71	61	85	67	88	49	60	65	55	24	44	53	54	44	69	69
	7	68	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	24	22	23	28	24	20	26	17	21	22	34	35
	10	33	31	24	61	-	-	-	-	-	-	-	-	-	-	-	-
	11	34	39	25	38	29	27	31	32	30	25	32	34	32	24	36	16
	13	19	16	11	26	-	-	-	-	-	-	-	-	-	-	-	-
	14	11	11	5.7	17	-	-	-	-	-	-	-	-	-	-	-	-
	15	14	9.2	4.8	17	-	-	-	-	-	-	-	-	-	-	-	-
	16	12	9.6	3.7	14	11	18	17	-	19	19	20	4.7	3.2	10	13	7.7
	17	11	11	6.1	22	12	-	-	-	-	-	-	-	-	-	-	-
	18	13	15	5.2	16	13	-	-	-	-	-	-	-	-	-	-	-
	19	12	18	7.7	17	13	-	-	-	-	-	-	-	-	-	-	-
	20	12	14	5.7	18	12	-	-	-	-	-	-	-	-	-	-	-
	21	12	13	7.9	19	13	-	-	-	-	-	-	-	-	-	-	-
	22	11	13	4.0	19	13	15	21	24	17	22	26	5.8	5.2	11	17	8.0
1,2-Dibromopropane (%)	1	107	-	-	-	-	123	-	116	-	114	-	104	-	117	-	125
	6	127	116	130	124	129	125	130	116	108	116	113	120	124	118	114	111
	7	118	-	124	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	127	130	130	112	115	118	114	94	121	118	113	114
	10	100	110	120	123	-	-	-	-	-	-	-	-	-	-	-	-
	11	107	106	118	122	118	127	116	123	114	117	114	126	111	109	110	115
	13	143	114	125	122	-	-	-	-	-	-	-	-	-	-	-	-
	14	115	110	129	118	-	-	-	-	-	-	-	-	-	-	-	-
	15	122	102	129	129	-	-	-	-	-	-	-	-	-	-	-	-
	16	112	118	126	122	124	125	125	-	121	119	117	113	98	114	118	107
	17	118	111	124	119	124	-	-	-	-	-	-	-	-	-	-	-
	18	114	125	125	116	120	-	-	-	-	-	-	-	-	-	-	-
	19	123	119	124	118	121	-	-	-	-	-	-	-	-	-	-	-
	20	123	113	124	117	124	-	-	-	-	-	-	-	-	-	-	-
	21	122	116	120	125	121	-	-	-	-	-	-	-	-	-	-	-
	22	121	121	118	122	120	123	128	116	126	116	114	110	120	108	103	110

Table A7 Analytical Data
Total Potential Trihalo Methane

Parameter	SITE	10/11/00	10/18/00	10/26/00	11/01/00	11/08/00	11/20/00	11/29/00	12/06/00	12/13/00
Trihalo methanes (ug/L)	1	-	91	-	64	-	-	81	-	73
	6	61	63	45	56	58	67	60	-	10
	7	-	-	-	-	-	-	-	-	-
	9	33	40	27	27	31	37	34	34	37
	10	-	-	-	-	-	-	-	-	-
	11	22	16	14	13	12	14	14	68	14
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	8.6	9.2	7.7	7.4	7.7	7.9	8.7	8.2	9.0
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	7.1	16	11	7.8	9.8	8.5	10	9.9	8.8

Parameter	SITE	10/11/00	10/18/00	10/26/00	11/01/00	11/08/00	11/20/00	11/29/00	12/06/00	12/13/00
1,2-Dibromopropane (%)	1	-	94	-	118	-	-	100	-	100
	6	119	92	115	121	109	98	100	-	104
	7	-	-	-	-	-	-	-	-	-
	9	124	92	121	116	105	104	104	110	107
	10	-	-	-	-	-	-	-	-	-
	11	118	117	124	119	102	93	103	108	104
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	130	96	122	115	105	100	99	104	105
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	122	100	117	120	104	98	98	105	99

Table A7 Analytical Data
Total Potential Trihalo Methane

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J - Estimated Value between the method detection limit and the method reporting limit.

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
Bromochloroacetic acid (ug/L)	1	1.0 U	1.0 U	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
Bromochloroacetonitrile (ug/L)	1	0.50 U	0.50 U	-	-	-	0.50 U	-	-	0.50 U	-	-	-	0.50 U	0.50 U	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
Bromodichloroacetic acid (ug/L)	1	-	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
Bromodichloromethane (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
Bromochloroacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U
Bromochloroacetonitrile (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
Bromodichloroacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.40 J	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	0.10 J
Bromodichloromethane (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.40 J
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	0.60 J

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
Bromoform (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroacetic acid (ug/L)	1	2.0 U	2.0 U	-	-	-	2.0 U	-	-	2.0 U	-	-	-	2.0 U	2.0 U	-	-
	2	2.0 U	2.0 U	2.0 U	2.0 U	7.2	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	3	2.0 U	2.0 U	2.0 U	2.0 U	2.2	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	4	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	6	2.0 U	2.0 U	2.0 U	2.0 U	5.4	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	3.1	2.0 U	2.0 U	2.0 U	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
Chlorodibromoacetic acid (ug/L)	1	-	-	-	-	-	2.0 U	-	-	2.0 U	-	-	-	2.0 U	2.0 U	-	-
	2	-	-	-	-	-	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	3	-	-	-	-	-	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	4	-	-	-	-	-	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	5	-	-	-	-	-	2.0 U	2.0 U	-	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
	6	-	-	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	-	-	2.0 U	2.0 U	2.0 U	-	-
Chloroform (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A8 Analytical Data
DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
Bromoform (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U
Chloroacetic acid (ug/L)	1	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	2	2.0 U	-	-	-	-	-	-	-	-	-
	3	2.0 U	-	-	-	-	-	-	-	-	-
	4	2.0 U	-	-	-	-	-	-	-	-	-
	5	2.0 U	-	-	-	-	-	-	-	-	-
	6	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	11	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	22	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	-	2.0 U
Chlorodibromoacetic acid (ug/L)	1	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	2	2.0 U	-	-	-	-	-	-	-	-	-
	3	2.0 U	-	-	-	-	-	-	-	-	-
	4	2.0 U	-	-	-	-	-	-	-	-	-
	5	2.0 U	-	-	-	-	-	-	-	-	-
	6	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	11	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	22	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	-	0.10 J
Chloroform (ug/L)	1	99	100	89	81	65	72	75	75	84	86
	2	43	-	-	-	-	-	-	-	-	-
	3	30	-	-	-	-	-	-	-	-	-
	4	29	-	-	-	-	-	-	-	-	-
	5	20	-	-	-	-	-	-	-	-	-
	6	14	11	17	17	16	22	28	25	36	35
	11	13	15	14	16	12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	4.6	11	16	1.0 U	1.0 U	1.0 U	1.4	2.1	-	1.5

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
Chloropicrin (ug/L)	1	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	-	-	-	-	-	-	-	-	-	-	-
D/DBP Haloacetic Acids (HAA5) (ug/L)	1	-	-	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	-	-	-	-	-	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	-	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	1.0 U	2.8	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
Dibromoacetic acid (ug/L)	1	1.0 U	1.0 U	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
Chloropicrin (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
D/DBP Haloacetic Acids (HAA5) (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U
Dibromoacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U

Table A8 Analytical Data
DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
Dibromoacetonitrile (ug/L)	1	0.50 U	0.50 U	-	-	-	0.50 U	-	-	0.50 U	-	-	-	0.50 U	0.50 U	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
Dibromochloromethane (ug/L)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloro-2-propanone (ug/L)	1	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	-	-	-	-	-	-	-	-	-	-	-
Dichloroacetic acid (ug/L)	1	1.0 U	1.0 U	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.9	1.0 U	1.5	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
Dibromoacetonitrile (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
Dibromochloromethane (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	0.50 J
1,1-Dichloro-2-propanone (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
Dichloroacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
Dichloroacetonitrile (ug/L)	1	0.50 U	0.50 U	-	-	-	0.50 U	-	-	0.50 U	-	-	-	0.50 U	0.50 U	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
Monobromoacetic acid (ug/L)	1	1.0 U	1.0 U	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.0 U	1.0 U	1.3	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
pH - laboratory (no unit)	1	-	-	-	-	-	5.2	-	-	5.5	-	-	-	5.5	5.5	-	-
	2	-	-	-	-	-	5.2	5.5	-	5.5	-	-	5.5	5.5	5.5	-	-
	3	-	-	-	-	-	5.2	5.5	-	5.5	-	-	5.5	5.5	5.5	-	-
	4	-	-	-	-	-	5.2	5.5	-	5.5	-	-	5.5	5.5	5.5	-	-
	5	-	-	-	-	-	5.2	5.5	-	5.5	-	-	5.5	5.5	5.5	-	-
	6	-	-	-	-	-	5.2	5.5	5.5	5.5	5.2	5.2	5.5	5.5	5.5	5.5	5.5
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	5.2	5.5	5.5	5.5	-	-	5.5	5.5	5.5	-	-
Tribromoacetic acid (ug/L)	1	-	-	-	-	-	4.0 U	-	-	4.0 U	-	-	-	4.0 U	4.0 U	-	-
	2	-	-	-	-	-	4.0 U	4.0 U	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	-
	3	-	-	-	-	-	4.0 U	4.0 U	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	-
	4	-	-	-	-	-	4.0 U	4.0 U	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	-
	5	-	-	-	-	-	4.0 U	4.0 U	-	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	-
	6	-	-	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	4.0 U	4.0 U	4.0 U	4.0 U	-	-	4.0 U	4.0 U	4.0 U	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
Dichloroacetonitrile (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.10 J
Monobromoacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U
pH - laboratory (no unit)	1	5.5	5.5	5.2	5.2	5.5	5.2	5.2	7.0	5.2	5.2
	2	5.5	-	-	-	-	-	-	-	-	-
	3	5.5	-	-	-	-	-	-	-	-	-
	4	5.5	-	-	-	-	-	-	-	-	-
	5	5.5	-	-	-	-	-	-	-	-	-
	6	5.5	6.1	5.2	5.2	5.5	5.2	5.2	7.0	4.9	5.2
	11	5.5	6.1	5.2	5.2	5.5	5.2	5.2	7.0	4.9	5.2
	22	5.5	6.1	5.2	5.2	5.5	5.2	5.2	7.0	-	5.2
Tribromoacetic acid (ug/L)	1	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	2	4.0 U	-	-	-	-	-	-	-	-	-
	3	4.0 U	-	-	-	-	-	-	-	-	-
	4	4.0 U	-	-	-	-	-	-	-	-	-
	5	4.0 U	-	-	-	-	-	-	-	-	-
	6	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	11	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	22	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	-	4.0 U

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
1,1,1-Trichloro-2-propanone (ug/L)	1	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid (ug/L)	1	1.0 U	1.0 U	-	-	-	1.0 U	-	-	1.0 U	-	-	-	1.0 U	1.0 U	-	-
	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.6	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	-	-
Trichloroacetonitrile (ug/L)	1	0.50 U	0.50 U	-	-	-	0.50 U	-	-	0.50 U	-	-	-	0.50 U	0.50 U	-	-
	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	3	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	4	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	0.50 U	0.50 U	0.50 U	-	-
4-Bromofluorobenzene (%)	1	-	-	-	-	-	121	-	-	113	-	-	-	108	108	-	-
	2	-	-	-	-	-	118	113	-	117	-	-	125	104	89	-	-
	3	-	-	-	-	-	106	115	-	126	-	-	115	104	103	-	-
	4	-	-	-	-	-	108	105	-	104	-	-	107	100	104	-	-
	5	-	-	-	-	-	126	106	-	109	-	-	110	97	72	-	-
	6	-	-	-	-	-	111	102	115	104	105	96	111	104	129	93	100
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	101	105	122	104	-	-	97	112	100	-	-

Table A8 Analytical Data
DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
1,1,1-Trichloro-2-propanone (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
Trichloroacetic acid (ug/L)	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2	1.0 U	-	-	-	-	-	-	-	-	-
	3	1.0 U	-	-	-	-	-	-	-	-	-
	4	1.0 U	-	-	-	-	-	-	-	-	-
	5	1.0 U	-	-	-	-	-	-	-	-	-
	6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	22	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	1.0 U
Trichloroacetonitrile (ug/L)	1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2	0.50 U	-	-	-	-	-	-	-	-	-
	3	0.50 U	-	-	-	-	-	-	-	-	-
	4	0.50 U	-	-	-	-	-	-	-	-	-
	5	0.50 U	-	-	-	-	-	-	-	-	-
	6	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	11	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	22	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	0.50 U
4-Bromofluorobenzene (%)	1	108	119	110	98	83	92	101	106	97	115
	2	108	-	-	-	-	-	-	-	-	-
	3	113	-	-	-	-	-	-	-	-	-
	4	115	-	-	-	-	-	-	-	-	-
	5	107	-	-	-	-	-	-	-	-	-
	6	105	120	102	99	83	96	103	115	104	116
	11	103	104	114	99	97	125	105	104	105	109
	22	120	118	121	101	76	93	108	106	-	106

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
4-Bromofluorobenzene (ug/L)	2	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromopropane (%)	1	84	85	-	-	-	123	-	-	122	-	-	-	130	120	-	-
	2	88	93	89	107	126	128	112	-	130	-	-	121	127	125	-	-
	3	92	88	92	110	123	129	114	-	127	-	-	120	128	121	-	-
	4	93	94	88	108	123	120	112	-	123	-	-	122	125	118	-	-
	5	92	91	90	110	120	126	107	-	128	-	-	117	122	100	-	-
	6	95	95	77	111	115	127	109	124	127	126	125	118	124	122	123	122
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	120	126	103	122	126	-	-	123	125	125	-	-
2,3-Dibromopropionic acid (%)	1	-	-	-	-	-	108	-	-	105	-	-	-	96	102	-	-
	2	-	-	-	-	-	103	109	-	103	-	-	102	97	100	-	-
	3	-	-	-	-	-	102	108	-	100	-	-	97	92	100	-	-
	4	-	-	-	-	-	100	110	-	103	-	-	97	98	101	-	-
	5	-	-	-	-	-	102	108	-	101	-	-	105	95	98	-	-
	6	-	-	-	-	-	100	109	100	104	98	102	99	96	98	100	100
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	103	111	105	106	-	-	101	93	107	-	-
SS-2-Bromopropionic acid (%)	1	106	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	101	113	114	111	97	-	-	-	-	-	-	-	-	-	-	-
	3	98	109	109	113	105	-	-	-	-	-	-	-	-	-	-	-
	4	99	112	114	113	94	-	-	-	-	-	-	-	-	-	-	-
	5	100	112	110	105	99	-	-	-	-	-	-	-	-	-	-	-
	6	99	109	113	108	105	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	94	-	-	-	-	-	-	-	-	-	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
4-Bromofluorobenzene (ug/L)	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-
1,2-Dibromopropane (%)	1	125	146	118	106	102	110	117	119	106	100
	2	126	-	-	-	-	-	-	-	-	-
	3	121	-	-	-	-	-	-	-	-	-
	4	120	-	-	-	-	-	-	-	-	-
	5	124	-	-	-	-	-	-	-	-	-
	6	130	123	116	107	107	115	119	117	102	104
	11	124	148	118	106	127	103	121	125	104	105
	22	111	128	113	105	102	110	118	122	-	107
2,3-Dibromopropionic acid (%)	1	126	104	104	96	105	101	108	100	104	111
	2	126	-	-	-	-	-	-	-	-	-
	3	124	-	-	-	-	-	-	-	-	-
	4	101	-	-	-	-	-	-	-	-	-
	5	118	-	-	-	-	-	-	-	-	-
	6	113	107	111	93	103	106	103	97	101	102
	11	109	102	106	94	104	100	96	101	104	113
	22	119	110	109	94	104	106	97	106	-	103
SS-2-Bromopropionic acid (%)	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-	-

Table A8 Analytical Data

DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	04/19/00	04/26/00	04/28/00	05/01/00	05/04/00	05/10/00	05/15/00	05/18/00	05/23/00	05/25/00	05/30/00	06/01/00	06/05/00	06/12/00	06/15/00	06/22/00
1,2,3-Trichloropropane (%)	1	-	-	-	-	-	104	-	-	101	-	-	-	103	102	-	-
	2	-	-	-	-	-	104	101	-	101	-	-	102	101	103	-	-
	3	-	-	-	-	-	104	101	-	101	-	-	102	102	104	-	-
	4	-	-	-	-	-	102	100	-	102	-	-	101	101	102	-	-
	5	-	-	-	-	-	102	101	-	102	-	-	103	101	103	-	-
	6	-	-	-	-	-	103	101	103	102	101	102	101	101	103	103	95
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	103	101	102	104	-	-	103	104	108	-	-

Table A8 Analytical Data
DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

Parameter	SITE	07/13/00	08/09/00	08/23/00	09/07/00	09/20/00	10/04/00	10/18/00	11/01/00	11/29/00	12/13/00
1,2,3-Trichloropropane (%)	1	95	103	106	102	102	99	103	100	92	102
	2	94	-	-	-	-	-	-	-	-	-
	3	94	-	-	-	-	-	-	-	-	-
	4	80	-	-	-	-	-	-	-	-	-
	5	94	-	-	-	-	-	-	-	-	-
	6	92	100	99	103	101	98	103	100	93	103
	11	100	106	102	96	103	92	111	102	93	93
	22	96	107	104	100	102	99	108	100	-	102

Table A8 Analytical Data
DBP - Disinfection by-products, DBP - Haloacetic Acids, DBP - Haloacetonitriles

U - The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Volatile Organic Compounds						
Acetone (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	10	400
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	10	1000
Tert-amyl methyl ether (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
Benzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Bromobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Bromochloromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Bromodichloromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Bromoform (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Bromomethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
2-Butanone (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	5	200
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
n-Butylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
sec-Butylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
tert-Butylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Carbon Disulfide (ug/L)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
Carbon Tetrachloride (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Chlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date		Reporting Limit	
			Minimun	Maximum	Minimun	Maximum
Volatile Organic Compounds						
Chloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
2-Chloroethyl vinyl ether (ug/L)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
Chloroform (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Chloromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
2-Chlorotoluene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
4-Chlorotoluene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2-Dibromo-3-chloropropane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	2	80
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	1	100
Dibromochloromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2-Dibromoethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Dibromomethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2-Dichlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,3-Dichlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,4-Dichlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Dichlorodifluoromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1-Dichloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Volatile Organic Compounds						
1,2-Dichloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1-Dichloroethene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
cis-1,2-Dichloroethene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
trans-1,2-Dichloroethene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2-Dichloropropane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,3-Dichloropropane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
2,2-Dichloropropane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1-Dichloropropene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
cis-1,3-Dichloropropene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
trans-1,3-Dichloropropene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Ethyl tert-butyl ether (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
Ethylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Hexachlorobutadiene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
2-Hexanone (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	5	200
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
Isopropylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Volatile Organic Compounds						
4-Isopropyltoluene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Methyl tert-butyl ether (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
4-Methyl-2-Pentanone (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	5	200
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
Methylene Chloride (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Naphthalene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
n-Propylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Styrene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1,1,2-Tetrachloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1,2,2-Tetrachloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Tetrachloroethene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Toluene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Total organic halogens (ug/L)	EPA 9020B	North Creek Analytical - Bothell	07/13/2000	11/29/2000	0.02	1
Freon 113 (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2,3-Trichlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2,4-Trichlorobenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Volatile Organic Compounds						
1,1,1-Trichloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,1,2-Trichloroethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Trichloroethene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Trichlorofluoromethane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2,3-Trichloropropane (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,2,4-Trimethylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
1,3,5-Trimethylbenzene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
Vinyl Acetate (ug/L)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	5	500
Vinyl Chloride (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
o-Xylene (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
m,p-Xylenes (ug/L)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000	0.5	20
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	12/14/2000	0.5	50
4-Bromofluorobenzene (%)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000		
	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	09/20/2000		
Dibromofluoromethane (%)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	09/20/2000		
1,2-Dichloroethane-d4 (%)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	09/20/2000		
1,2-Dibromopropane (%)	EPA 551/551.1	Montgomery Watson	07/13/2000	12/13/2000	0	0
1,2-Dichlorobenzene-d4 (%)	EPA 524.2	Sequoia Analytical - Petaluma	09/13/2000	09/13/2000		
Toluene-d8 (%)	EPA 8260B	Sequoia Analytical - Petaluma	04/19/2000	09/20/2000		

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Semi-volatile Organic Compounds						
1,4-Dioxane (ug/L)	8270C	Montgomery Watson	06/12/2000	12/13/2000	3	3
n-Nitrosodimethylamine (ug/L)	EPA 1625 MOD	Montgomery Watson	08/09/2000	12/13/2000	2	2
	EPA 625MOD	Montgomery Watson	07/13/2000	11/01/2000	2	2
	PAL-EA-0036	Aerojet Lab	07/20/2000	12/13/2000	0.0075	0.02
	UM31	Data Chem	04/19/2000	06/15/2000	33	33
2-Fluorobiphenyl (%)	8270C	Montgomery Watson	06/12/2000	12/13/2000		
Nitrobenzene-d5 (%)	8270C	Montgomery Watson	06/12/2000	12/13/2000		
N-Nitrosodimethylamine-d6 (%)	EPA 1625 MOD	Montgomery Watson	07/13/2000	12/13/2000	0	0
	EPA 625MOD	Montgomery Watson	07/13/2000	12/13/2000		
Terphenyl-d14 (%)	8270C	Montgomery Watson	06/12/2000	12/13/2000		

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
General Parameters and Inorganic Parameters						
Alkalinity (ug/L)	EPA 310.1	Sequoia Analytical - Sacramento	07/13/2000	11/29/2000	1	20
	EPA 310.1	Aerojet Lab	07/27/2000	07/27/2000		
	SM 2340B	Aerojet Lab	08/23/2000	12/13/2000	2	2
Ammonia as NH3 (ug/L)	EPA 350.3	Aerojet Lab	04/20/2000	07/28/2000	0.121	0.121
	EPA 350.3	Sequoia Analytical - Sacramento	04/19/2000	12/14/2000	0.0997	0.1
Bromate by IC (ug/L)	EPA 300.1B	Montgomery Watson	07/13/2000	12/13/2000	5	5
Bromide (ug/L)	EPA 300.0	Montgomery Watson	07/13/2000	08/23/2000	0.02	0.4
	EPA 300.0	Sequoia Analytical - Petaluma	11/01/2000	11/01/2000	1	5
	EPA 300.0	Sequoia Analytical - Sacramento	07/13/2000	12/14/2000	0.1	1
Chlorate (ug/L)	EPA 300.0	EHL	04/19/2000	05/04/2000	10	50
	EPA 300.1B	Montgomery Watson	05/08/2000	12/13/2000	10	100
Chlorite (ug/L)	EPA 300.0	EHL	04/19/2000	05/04/2000	10	20
	EPA 300.1B	Montgomery Watson	05/08/2000	12/06/2000	10	20
Nitrate as N (ug/L)	EPA 300.0	Aerojet Lab	04/20/2000	12/13/2000	0.011	0.011
	EPA 300.0	Sequoia Analytical - Petaluma	11/01/2000	11/06/2000	1	1
	EPA 300.0	Sequoia Analytical - Sacramento	04/19/2000	11/29/2000	0.0226	0.2257
	EPA 300.0	Sequoia Analytical - Walnut Creek	09/07/2000	09/07/2000	0.2257	0.2257
Nitrite as N (ug/L)	EPA 300.0	Sequoia Analytical - Walnut Creek	09/07/2000	09/07/2000	0.303	0.303
	EPA 300.0	Sequoia Analytical - Sacramento	04/19/2000	11/29/2000	0.0303	0.303
	EPA 300.0	Sequoia Analytical - Petaluma	11/01/2000	11/01/2000	1	1
	EPA 300.0	Aerojet Lab	04/20/2000	07/28/2000	0.015	0.015
Perchlorate (ug/L)	EPA 300.0 MOD.-inorg	Del Mar Analytical, Irvine	04/19/2000	11/29/2000	4	400
	PAL-EA-0040	Aerojet Lab	04/20/2000	12/13/2000	0.004	2
Phosphate as P (ug/L)	EPA 300.0	Aerojet Lab	04/20/2000	07/28/2000	0.03	0.03
Phosphorus (ug/L)	EPA 300.0	Aerojet Lab	07/20/2000	12/13/2000	0.03	0.032
	EPA 365.2	Sequoia Analytical - Petaluma	09/07/2000	09/07/2000	0.05	0.05
	EPA 365.3	Sequoia Analytical - Sacramento	04/19/2000	11/29/2000	0.01	0.02

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
General Parameters and Inorganic Parameters						
Sulfate (ug/L)	EPA 300.0	Sequoia Analytical - Petaluma	11/01/2000	11/01/2000	5	5
	EPA 300.0	Sequoia Analytical - Sacramento	04/19/2000	11/29/2000	0.2	2
	EPA 300.0	Aerojet Lab	04/20/2000	07/28/2000	0.05	0.05
	EPA 300.0	Sequoia Analytical - Walnut Creek	09/07/2000	09/07/2000	1	1
Sulfide (ug/L)	EPA 376.1	Sequoia Analytical - Petaluma	06/01/2000	12/13/2000	0.5	2
Sulfite (ug/L)	EPA 377.1	Sequoia Analytical - Petaluma	04/19/2000	06/22/2000	5	5
Sulfur (ug/L)	6010B	Sequoia Analytical - Petaluma	04/19/2000	06/22/2000	500	500
Total hardness (ug/L)	EPA 200.7	Sequoia Analytical - Sacramento	07/13/2000	11/29/2000	1	1
	EPA 310.1	Aerojet Lab	08/23/2000	12/13/2000	0.23	0.23
UV absorbance at 254 nm (cm -1)	SM 5910	Montgomery Watson	07/13/2000	11/30/2000	0.009	0.009

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Organic Parameters						
Assimilable Organic Carbon (ug/L)	9217 B	Montgomery Watson	05/08/2000	07/27/2000	1	1
	9217 B	EHL	04/19/2000	05/04/2000	10	10
Biodegradeable Organic Carbon (ug/L)	Allgeier, 1996	Montgomery Watson	05/08/2000	10/11/2000	0	0.5
	SM 9217 mod	Montgomery Watson	09/20/2000	09/20/2000	0.5	0.5
	WQTC Proceeding	EHL	04/19/2000	05/04/2000	0.5	0.5
Biological oxygen demand (ug/L)	EPA 405.1	Aerojet Lab	07/27/2000	07/27/2000	1	1
	EPA 405.1	Sequoia Analytical - Sacramento	04/19/2000	07/13/2000	1	3
Chemical Oxygen Demand (ug/L)	EPA 410.4	Sequoia Analytical - Sacramento	04/19/2000	06/05/2000	20	20
Dissolved org. carbon - final (ug/L)	SM 9217	Montgomery Watson	05/08/2000	10/11/2000	0.5	0.5
	SM 9217 mod	Montgomery Watson	09/13/2000	09/13/2000	0.5	0.5
Dissolved org. carbon - initial (ug/L)	SM 9217 mod	Montgomery Watson	05/08/2000	10/11/2000	0.5	0.5
Dissolved organic carbon (ug/L)	EPA 415.1	Sequoia Analytical - Sacramento	07/20/2000	07/27/2000	1	1
	EPA 415.1	Aerojet Lab	08/03/2000	12/13/2000	0.1	0.1
	SM 5310C	Montgomery Watson	11/29/2000	11/30/2000	0.5	0.5
	SW 9060	Montgomery Watson	08/09/2000	11/06/2000	0.5	0.5
Ethanol (ug/L)	EPA 8015M	Sequoia Analytical - Morgan Hill	04/19/2000	12/13/2000	1	5
Isobutyl alcohol / Isobutanol (ug/L)	EPA 8015M	Sequoia Analytical - Morgan Hill	05/01/2000	09/20/2000	1	1
Methanol (ug/L)	EPA 8015M	Sequoia Analytical - Morgan Hill	04/19/2000	12/13/2000	1	1
2-Propanol (ug/L)	EPA 8015M	Sequoia Analytical - Morgan Hill	05/01/2000	05/01/2000	1	1
Total organic carbon (ug/L)	EPA 415.1	Sequoia Analytical - Sacramento	07/13/2000	07/13/2000	1	1
	EPA 415.1	Aerojet Lab	04/20/2000	12/13/2000	0.1	0.1
	SM 5310C	Sequoia Analytical - Morgan Hill	05/18/2000	05/25/2000	1	1
	SM 5310C	Montgomery Watson	07/13/2000	11/30/2000	0.5	0.5
Total Suspended Solids (mg/L)	EPA 160.2	Sequoia Analytical - Sacramento	04/19/2000	12/13/2000	0.5	5
Total volatile solids (mg/L)	EPA 160.4	Sequoia Analytical - Morgan Hill	09/07/2000	09/20/2000	10	10
1-pentanol (%)	EPA 8015M	Sequoia Analytical - Morgan Hill	09/07/2000	09/20/2000		
1-pentanol (dbwax) (%)	EPA 8015M	Sequoia Analytical - Morgan Hill	09/07/2000	09/20/2000		

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Aldehydes						
Acetaldehyde (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	10
Benzaldehyde (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Butanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	1
trans-2-Butenal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Cyclohexanone (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Decanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Formaldehyde (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	5	25
Glyoxal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	1
Heptanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Hexanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Methyl glyoxal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	1
Nonanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Octanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
Pentanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	1
Propanal (ug/L)	556	EHL	04/19/2000	05/04/2000	5	5
	SM 6252	Montgomery Watson	05/08/2000	12/13/2000	1	1
Decafluorobiphenyl (%)	SM 6252	Montgomery Watson	05/08/2000	12/13/2000		
1,2-Dibromopropane (%)	SM 6252	Montgomery Watson	05/08/2000	12/13/2000		
2,3,5,6-Tetrafluorobenzaldehyd (%)	SM 6252	Montgomery Watson	05/08/2000	12/13/2000		
2,4,5-Trifluoroacetophenone (%)	556	EHL	04/19/2000	05/04/2000	5	5

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Bacteriological						
Coliphage-Male Specific (PFU/100 L)	EPA/600/R-95/178 Mod	Unknown	04/24/2000	04/24/2000	24	46
Coliphage-Somatic (PFU/100 L)	EPA/600/R-95/178 Mod	Unknown	04/24/2000	04/24/2000	24	46
Cryptosporidium Oocysts (org/L)	EPA 821-R-97-023	Unknown	04/24/2000	07/20/2000	0.1	0.1
Escherichia coli (present/absent)	9221D	Unknown	07/20/2000	07/20/2000		
Fecal coliform (MPN/100 ML)	SM 9221	Sequoia Analytical - Walnut Creek	09/07/2000	11/29/2000	2	2
	SM 9221B&E	Unknown	04/24/2000	04/27/2000	1.1	2
Giardia Species Cysts (org/L)	EPA 821-R-97-023	Unknown	04/24/2000	07/20/2000	0.1	0.1
Heterotrophic Plate Count (CFU/ml)	SM 9215	Sequoia Analytical - Walnut Creek	08/09/2000	11/29/2000	1	1
	SM 9215B	Sequoia Analytical - Walnut Creek	09/07/2000	11/01/2000	1	1
	SM 9216A	Unknown	04/24/2000	07/20/2000		
Total coliform (MPN/100 ML)	SM 9221B	Sequoia Analytical - Walnut Creek	08/09/2000	12/13/2000	2	2
	SM 9221B&E	Unknown	04/24/2000	04/27/2000	1.1	1.1
Total coliform (present/absent)	SM 9221B&E mod	Unknown	07/20/2000	07/20/2000		
Total Culturable Virus (MPN/100 ML)	EPA ICR 600/R-95/178	Unknown	04/24/2000	05/03/2000	1	1

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Disinfection by-products						
Bromochloroacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	1	1
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Bromochloroacetonitrile (ug/L)	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
	551.1	Montgomery Watson	05/10/2000	12/13/2000	0.5	0.5
Bromodichloroacetic acid (ug/L)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Bromodichloromethane (ug/L)	551.1	Montgomery Watson	07/13/2000	12/13/2000	1	1
Bromoform (ug/L)	551.1	Montgomery Watson	07/13/2000	12/13/2000	1	1
Chloroacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	2	2
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	2	2
Chlorodibromoacetic acid (ug/L)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	2	2
Chloroform (ug/L)	551.1	Montgomery Watson	07/13/2000	12/13/2000	1	5
Chloropicrin (ug/L)	551.1	Montgomery Watson	07/13/2000	12/13/2000	0.5	0.5
	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
D/DBP Haloacetic Acids (HAA5) (ug/L)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Dibromoacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	1	1
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Dibromoacetonitrile (ug/L)	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
	551.1	Montgomery Watson	05/10/2000	12/13/2000	0.5	0.5
Dibromochloromethane (ug/L)	551.1	Montgomery Watson	07/13/2000	12/13/2000	1	1
1,1-Dichloro-2-propanone (ug/L)	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
	551.1	Montgomery Watson	07/13/2000	12/13/2000	0.5	0.5
Dichloroacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	1	1
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Dichloroacetonitrile (ug/L)	551.1	Montgomery Watson	05/10/2000	12/13/2000	0.5	0.5
	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
Monobromoacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	1	1
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
pH - laboratory (no unit)	551.1	Montgomery Watson	05/10/2000	12/13/2000	0.1	0.1

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date Minimun	Sample Date Maximum	Reporting Limit Minimun	Reporting Limit Maximum
Disinfection by-products						
Tribromoacetic acid (ug/L)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	4	4
1,1,1-Trichloro-2-propanone (ug/L)	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
	551.1	Montgomery Watson	07/13/2000	12/13/2000	0.5	0.5
Trichloroacetic acid (ug/L)	552.2	EHL	04/19/2000	05/04/2000	1	1
	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000	1	1
Trichloroacetonitrile (ug/L)	551.1	EHL	04/19/2000	05/04/2000	0.5	0.5
	551.1	Montgomery Watson	05/10/2000	12/13/2000	0.5	0.5
4-Bromofluorobenzene (%)	551.1	Montgomery Watson	05/10/2000	12/13/2000		
4-Bromofluorobenzene (ug/L)	551.1	EHL	05/04/2000	05/04/2000		
1,2-Dibromopropane (%)	551.1	EHL	04/19/2000	05/04/2000		
	551.1	Montgomery Watson	05/10/2000	12/13/2000	0	0
2,3-Dibromopropionic acid (%)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000		
SS-2-Bromopropionic acid (%)	552.2	EHL	04/19/2000	05/04/2000		
1,2,3-Trichloropropane (%)	SM 6251B	Montgomery Watson	05/10/2000	12/13/2000		
TPTHM						
Bromodichloromethane (ug/L)	EPA 551	Montgomery Watson	06/12/2000	12/13/2000	0.5	1
	SM 5710	Montgomery Watson	06/19/2000	09/07/2000	0.5	0.5
Bromoform (ug/L)	EPA 551	Montgomery Watson	06/12/2000	12/13/2000	0.5	1
Chlorine Dose (ug/L)	SM 2350	Montgomery Watson	06/12/2000	12/13/2000	0	1
Chlorine Residual (ug/L)	S 4500CL-G	Montgomery Watson	06/12/2000	12/13/2000	0.1	1
Chloroform (ug/L)	EPA 551	Montgomery Watson	06/12/2000	12/13/2000	0.5	1
Dibromochloromethane (ug/L)	EPA 551	Montgomery Watson	06/12/2000	12/13/2000	0.5	1
Trihalo methanes (ug/L)	EPA 551	Montgomery Watson	06/12/2000	12/13/2000	0.5	0.5
	SM 5710	Montgomery Watson	06/19/2000	06/19/2000	0.5	0.5
1,2-Dibromopropane (%)	SM 5710	Montgomery Watson	06/12/2000	12/13/2000		

Table A9
Analytical Methods

Parameter	Method	Lab Name	Sample Date		Reporting Limit	
			Minimun	Maximum	Minimun	Maximum

Notes

CFU/ml	colony forming units per milliliter
cm-1	centimeters -1
mg/L	milligrams per liter
MPN/100 ML	most probable Number per 100 milliliters
org/L	organisms per liter
%	percentage
PFU/100 L	plaque forming units per 100 liters
ug/L	micrograms per liter

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	Forward Flow Rate (gpm)	Recycle Flow Rate (gpm)	Total Flow Rate (gpm)	Ethanol Flow Rate (ml/min)	*Ethanol Dose (mg/l)	*Theoretical Ethanol Dose (mg/l)	Percent Ethanol Overdose	**Equivalent TOC Dose (mg/l)	Nutrient Flow Rate (ml/min)	*Phosphorous Dose (mg/l as P)	*Organic Nitrogen Dose (mg/l as N)	Bed Height (ft)	pH			ORP (mV)			Temperature (°C)		
													SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
10/1/99	240	1600	1840	15.6	13.7	8.7	58%	0.9	60.0	1.0	14.3	12.96	7.12	7.14	7.07	104	2	-15	19.2	19.5	19.5
10/4/99	237	1583	1820	13.9	12.4	7.4	68%	0.8	48.0	0.8	11.6	13.08	7.33	7.34	7.35	37	-10	-29	19.0	19.2	19.1
10/5/99	240	1595	1835	13.6	12.0	7.8	53%	0.8	48.0	0.8	11.4	13.08	7.32	7.09	7.15	-14	2	-14	19.0	19.2	19.1
10/6/99	238	1592	1830	13.5	12.0	7.3	65%	0.8	48.0	0.8	11.5	13.13	7.03	7.11	7.19	28	15	-17	19.0	19.2	19.2
10/7/99	242	1573	1815	16.0	14.0	7.3	91%	1.0	23.7	0.4	5.6	13.08	7.13	7.00	-	32	21	1	18.9	19.1	19.1
10/8/99	240	1565	1805	16.0	14.1	7.8	81%	1.0	25.5	0.4	6.1	13.13	7.38	7.26	7.13	40	1	-1	19.0	19.2	19.2
10/11/99	243	1567	1810	13.0	11.3	7.9	43%	0.8	25.5	0.4	6.0	13.17	7.48	7.46	7.40	39	-33	-10	19.0	19.2	19.3
10/12/99	240	1575	1815	15.8	13.9	8.1	72%	1.0	26.5	0.4	6.3	13.25	7.37	7.25	7.04	31	-37	-37	19.1	19.3	19.3
10/13/99	238	1572	1810	13.1	11.6	7.8	49%	0.8	26.5	0.4	6.4	13.25	7.32	7.23	6.99	36	24	16	19.0	19.3	19.3
10/14/99	240	1585	1825	15.9	14.0	7.8	78%	1.0	23.7	0.4	5.6	12.17	7.18	7.00	7.06	81	7	2	19.1	19.3	19.3
10/15/99	230	1594	1824	16.2	14.9	8.0	86%	1.0	24.0	0.4	6.0	12.21	7.30	6.97	7.02	20	-1	-5	18.9	19.1	19.1
10/18/99	233	1637	1870	16.4	14.9	9.7	54%	1.0	24.7	0.4	6.0	12.29	7.25	7.07	7.02	52	-11	-18	19.1	19.3	19.3
10/19/99	235	1615	1850	16.2	14.5	8.3	75%	1.0	24.7	0.4	6.0	12.29	7.25	7.10	7.08	22	-15	-	19.1	19.3	19.3
10/20/99	300	1510	1810	18.0	12.7	7.9	60%	1.1	28.7	0.4	5.5	12.29	7.31	7.05	6.91	24	1	-12	19.1	19.3	19.3
10/21/99	300	1530	1830	17.7	12.5	8.7	43%	1.1	28.5	0.4	5.4	12.33	7.34	6.91	7.00	33	-4	-6	19.1	19.3	19.3
10/22/99	395	1445	1840	25.0	13.4	8.8	53%	1.5	38.0	0.4	5.5	12.33	7.27	7.17	6.86	23	0	-65	19.1	19.2	19.1
10/25/99	400	1435	1835	24.0	12.7	9.4	35%	1.4	37.7	0.4	5.4	12.50	7.41	7.30	7.30	11	-16	-54	19.1	19.3	19.2
10/26/99	400	1440	1840	25.2	13.3	8.3	60%	1.5	38.3	0.4	5.5	12.50	7.30	7.30	7.24	5	-47	-50	19.1	19.2	19.2
10/27/99	400	1425	1825	24.0	12.7	8.6	48%	1.4	38.2	0.4	5.4	12.54	7.38	7.27	6.98	4	-63	-63	19.1	19.3	19.3
10/28/99	500	1330	1830	27.0	11.4	8.6	33%	1.6	46.8	0.4	5.3	12.54	7.32	6.98	7.08	-45	-73	-79	19.0	19.2	19.1
10/29/99	500	1340	1840	28.5	12.0	8.0	51%	1.7	46.5	0.4	5.3	12.58	7.51	7.16	7.27	-42	-85	-88	19.0	19.1	18.8
11/1/99	495	1335	1830	27.0	11.5	8.3	38%	1.6	46.2	0.4	5.3	12.67	7.24	7.23	7.24	99	-57	-105	19.1	19.2	19.3
11/2/99	500	1320	1820	28.0	11.8	8.1	45%	1.7	46.0	0.3	5.2	12.71	7.43	7.17	7.15	54	-72	-120	19.0	19.2	19.2
11/3/99	600	1215	1815	34.5	12.2	7.9	54%	2.1	57.5	0.4	5.5	12.67	7.27	7.16	7.12	48	-34	-74	965.0	19.1	19.3
11/4/99	600	1210	1810	31.0	10.9	7.9	39%	1.9	55.0	0.3	5.2	12.71	7.33	7.29	7.23	67	-18	-95	18.9	19.0	19.0
11/5/99	600	1210	1810	31.0	10.9	8.2	33%	1.9	55.3	0.4	5.3	12.75	7.34	7.24	7.17	85	-13	-77	18.9	19.0	19.0
11/8/99	600	1200	1800	30.0	10.6	7.8	35%	1.8	55.0	0.3	5.2	12.71	7.35	7.33	7.26	43	-8	-87	18.9	18.9	18.8
11/9/99	750	1070	1820	39.0	11.0	7.6	44%	2.4	69.0	0.3	5.2	12.75	7.38	7.08	7.14	65	-21	-86	18.8	18.9	18.8
11/10/99	750	1060	1810	39.0	11.0	7.8	42%	2.4	69.0	0.3	5.2	12.75	7.33	7.32	7.29	73	-27	-79	18.9	18.9	18.9
11/11/99	750	1060	1810	40.0	11.3	7.6	49%	2.4	69.0	0.3	5.2	12.75	7.28	7.18	7.19	33	-17	-82	18.9	18.9	18.9
11/12/99	750	1045	1795	38.8	10.9	7.7	41%	2.4	68.8	0.3	5.2	12.71	7.40	7.33	7.31	72	-38	-89	18.8	18.8	18.7
11/15/99	490	1280	1770	26.5	11.0	8.9	23%	1.6	45.0	0.3	5.2	12.79	7.30	7.32	7.24	45	-45	-98	18.9	19.0	19.0
11/16/99	750	1065	1815	37.0	10.4	7.9	32%	2.2	69.5	0.4	5.3	12.79	6.87	6.92	6.94	62	-41	-104	18.8	18.9	18.9
11/17/99	685	1140	1825	34.0	10.5	7.8	34%	2.0	63.3	0.4	5.3	12.92	7.30	7.31	7.25	60	-52	-99	18.8	18.9	18.7
11/18/99	825	990	1815	40.0	10.2	7.8	31%	2.4	76.2	0.4	5.3	12.88	7.16	7.07	6.84	52	-52	-96	18.8	18.9	18.7
11/19/99	290	1525	1815	15.0	10.9	8.6	27%	0.9	27.0	0.4	5.3	13.00	7.24	7.23	7.10	81	-48	-99	18.7	18.7	18.3
11/22/99	750	1070	1820	36.6	10.3	7.9	31%	2.2	69.0	0.3	5.2	13.00	7.40	7.48	7.46	46	-64	-117	18.8	18.8	18.6
11/23/99	850	976	1826	42.0	10.4	8.0	31%	2.5	79.0	0.4	5.3	13.00	7.33	7.45	7.34	62	-56	-97	18.7	18.8	18.6
11/24/99	755	1050	1805	37.0	10.4	7.9	31%	2.3	70.0	0.4	5.3	13.00	7.15	7.40	7.25	53	-49	-133	18.7	18.8	18.6
11/26/99	852	964	1816	41.0	10.2	7.9	28%	2.5	77.5	0.3	5.2	13.08	-	-	-	-	-	-	-	-	-
11/27/99	849	967	1816	41.0	10.2	7.9	29%	2.5	77.5	0.3	5.2	13.08	-	-	-	-	-	-	-	-	-
11/28/99	853	963	1816	41.0	10.2	7.9	28%	2.5	77.5	0.3	5.2	13.00	-	-	-	-	-	-	-	-	-
11/29/99	845	970	1815	41.0	10.3	7.7	32%	2.5	78.5	0.4	5.3	13.13	7.45	7.53	7.78	57	-79	-136	18.7	18.8	18.6
11/30/99	845	975	1820	41.0	10.3	7.8	32%	2.5	78.4	0.4	5.3	13.25	7.26	7.52	7.16	68	-81	-141	18.7	18.8	18.7
12/1/99	850	950	1800	42.0	10.4	7.7	35%	2.6	78.5	0.4	5.3	13.17	-	-	-	62	-71	-133	18.7	18.8	18.7
12/2/99	850	940	1790	42.0	10.4	7.6	37%	2.6	79.0	0.4	5.3	13.00	-	-	-	75	-87	-153	18.7	18.7	18.6
12/3/99	800	990	1790	39.5	10.4	7.6	38%	2.4	74.5	0.4	5.3	13.00	-	-	-	47	-94	-162	18.6	18.6	18.4
12/4/99	809	982	1791	38.5	10.1	7.6	33%	2.4	72.7	0.3	5.1	13.00									
12/5/99	807	984	1791	38.5	10.1	7.6	33%	2.4	72.7	0.3	5.1	13.00									
12/6/99	800	995	1795	39.0	10.3	7.6	35%	2.4	74.0	0.4	5.3	13.25	7.17	7.30	7.43	65	-97	-165	18.7	18.8	18.5
12/7/99	800	985	1785	39.5	10.4	7.8	34%	2.4	74.0	0.4	5.3	13.25	7.63	7.90	7.94	48	-102	-169	18.7	18.8	18.5
12/8/99	875	915	1790	43.0	10.4	7.8	33%	2.6	80.0	0.3	5.2	13.38	7.47	7.80	7.66	66	-96	-173	18.7	18.8	18.6
12/9/99	860	925	1785	42.1	10.3	7.6	36%	2.6	81.0	0.4	5.4	13.42	7.33	7.84	7.86	65	-93	-171	18.7	18.7	18.4
12/10/99	870	950	1820	42.4	10.3	7.8	32%	2.6	80.6	0.4	5.3	13.42	7.73	7.87	7.93	80	-95		18.6	18.7	18.3
12/11/99	868	942	1810	41.5	10.1	7.8	30%	2.5	78.5	0.3	5.2	13.50									
12/12/99	866	944	1810	41.5	10.1	7.8	30%	2.5	78.5	0.3	5.2	13.50									

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	Forward Flow Rate (gpm)	Recycle Flow Rate (gpm)	Total Flow Rate (gpm)	Ethanol Flow Rate (ml/min)	*Ethanol Dose (mg/l)	*Theoretical Ethanol Dose (mg/l)	Percent Ethanol Overdose	**Equivalent TOC Dose (mg/l)	Nutrient Flow Rate (ml/min)	*Phosphorous Dose (mg/l as P)	*Organic Nitrogen Dose (mg/l as N)	Bed Height (ft)	pH			ORP (mV)			Temperature (°C)		
													SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
12/13/99	865	945	1810	42.0	10.3	7.9	29%	2.5	80.0	0.4	5.3	13.79	7.47	7.30	7.27				18.7	18.7	18.5
12/14/99	870	910	1780	43.0	10.4	7.7	35%	2.7	81.0	0.4	5.3	13.75	7.27	7.25	7.30	120.00	-75.00	-171.00	18.70	18.70	18.60
12/15/99	875	925	1800	43.0	10.4	7.7	34%	2.6	81.0	0.4	5.3	13.75	7.32	7.47	7.45	60.00	-70.00	-158.00	18.70	18.70	18.50
12/16/99	885	915	1800	43.5	10.4	7.6	36%	2.7	82.0	0.4	5.3	13.83	7.70	7.62	7.77	53.00	-78.00	-167.00	18.70	18.70	18.40
12/17/99	880	920	1800	43.5	10.4	7.7	36%	2.7	81.7	0.4	5.3	13.75	7.50	7.80	7.87	75.00	-79.00	-163.00	18.70	18.70	18.50
12/18/99	879	933	1812	42.3	10.2	7.7	32%	2.6	80.0	0.3	5.2	13.83	-	-	-	-	-	-	-	-	-
12/19/99	879	933	1812	42.3	10.2	7.7	32%	2.6	80.0	0.3	5.2	13.92	-	-	-	-	-	-	-	-	-
12/20/99	880	935	1815	43.0	10.3	7.6	35%	2.6	81.0	0.4	5.3	14.00	7.34	7.47	7.54	125.00	-85.00	-148.00	18.70	18.70	18.50
12/21/99	882	928	1810	43.2	10.4	7.6	36%	2.6	82.0	0.4	5.3	14.13	7.65	7.68	7.67	108.00	-71.00	-134.00	18.70	18.80	18.60
12/22/99	883	913	1796	43.1	10.3	7.4	40%	2.6	81.5	0.4	5.3	14.04	7.47	7.65	7.60	123.00	-77.00	-135.00	18.70	18.70	18.50
12/23/99	878	922	1800	43.0	10.3	7.4	39%	2.6	81.5	0.4	5.3	14.08	7.40	7.58	7.58	120.00	-78.00	-143.00	18.70	18.70	18.60
12/24/99	886	922	1808	42.2	10.1	7.4	36%	2.6	79.9	0.3	5.1	14.13	-	-	-	-	-	-	-	-	-
12/25/99	883	925	1808	42.2	10.1	7.4	36%	2.6	79.9	0.3	5.2	14.21	-	-	-	-	-	-	-	-	-
12/26/99	877	931	1808	42.2	10.2	7.4	37%	2.6	79.9	0.3	5.2	14.29	-	-	-	-	-	-	-	-	-
12/27/99	875	934	1809	43.0	10.4	7.4	40%	2.6	81.3	0.4	5.3	14.42	7.35	7.49	7.52	82.00	-85.00	-144.00	18.70	18.70	18.60
12/28/99	876	926	1802	42.2	10.2	7.4	37%		79.8	0.3	5.2	14.54	-	-	-	-	-	-	-	-	-
12/29/99	874	921	1795	42.7	10.3	7.4	39%		80.6	0.4	5.3	14.6	-	-	-	103.00	-65.00	-121.00	18.70	18.70	18.50
12/30/99	867	918	1785	42.4	10.3	7.4	40%		80.5	0.4	5.3	14.7	7.27	7.48	7.58	120.00	-61.00	-123.00	18.70	18.70	18.60
12/31/99	878	924	1802	42.3	10.2	7.4	38%		79.9	0.3	5.2		-	-	-	-	-	-	-	-	-
1/1/00	878	924	1802	42.3	10.2	7.4	38%		79.9	0.3	5.2	14.9	-	-	-	-	-	-	-	-	-
1/2/00	878	924	1802	42.3	10.2	7.4	38%		79.9	0.3	5.2		-	-	-	-	-	-	-	-	-
1/3/00	874	930	1804	42.8	10.3	7.4	33%	2.6	80.8	0.4	5.3	14.92	7.34	7.30	7.30	98	-43	-93	18.7	18.7	18.5
1/4/00	875	925	1800	43.0	10.4	7.8	32%	2.6	81.0	0.4	5.3	15.00	7.35	7.41	7.44	57	-49	-125	18.6	18.7	18.5
1/5/00	885	915	1800	43.3	10.3	7.9	32%	2.6	81.5	0.4	5.3	15.00	7.37	7.46	7.44	100	-64	-144	18.6	18.6	18.4
1/6/00	880	920	1800	43.5	10.4	7.9	34%	2.7	82.0	0.4	5.3	15.17	7.48	7.43	7.41	78	-60	-137	18.6	18.7	18.5
1/7/00	885	925	1810	43.4	10.4	7.8	32%	2.6	82.5	0.4	5.3	15.21	7.34	7.33	7.34	85	-54	-172	18.6	18.7	18.4
1/8/00	880	930	1810	42.4	10.2	7.8	30%	2.6	80.1	0.3	5.2	15.08									
1/9/00	880	930	1810	42.4	10.2	7.8	29%	2.6	80.1	0.3	5.2	15.21									
1/10/00	880	930	1810	43.0	10.3	7.9	29%	2.6	81.5	0.4	5.3	15.58	7.32	7.37	7.37	100	-21	-89	18.6	18.7	18.5
1/11/00	880	920	1800	43.5	10.4	8.0	30%	2.7	81.5	0.4	5.3	15.79	7.33	7.41	7.41	85	-26	-103	18.6	18.6	18.3
1/12/00	880	890	1770	43.0	10.3	8.1	31%	2.7	82.0	0.4	5.3	15.83	7.39	7.56	7.52	92	-2	-46	18.6	18.7	18.5
1/13/00	875	915	1790	43.0	10.4	7.9	28%	2.6	81.5	0.4	5.3	16.00	7.09	7.35	7.40	98	-13	-100	18.6	18.7	18.5
1/14/00	875	915	1790			8.1						16.00	7.44	7.53	7.46	82	-41	-79	18.7	18.7	18.5
1/15/00	551	1249	1800			8.1						16.33									
1/16/00	550	1250	1800			8.1						15.04									
1/17/00	550	1250	1800			8.3						15.00	7.40	7.40		67	-151		18.7		
1/17/00	400	1400	1800			8.1						14.83					-150				
1/18/00	400	1405	1805	20.0	10.6	8.0	33%	1.2	37.0	0.4	5.3	14.83				85	-24	-100	18.7	18.7	18.5
1/19/00	450	1350	1800	22.5	10.6	7.9	36%	1.4	41.5	0.4	5.3	14.92	7.15	7.41	7.61	105	-26	-104	18.8	18.9	18.7
1/20/00	400	1420	1820	19.6	10.4	7.8	30%	1.2	37.0	0.4	5.3	15.04				76	-41	-97	18.7	18.8	18.5
1/21/00	500	1310	1810			7.9						15.08				76	-35	-104			
1/22/00	675	1135	1810			7.9						15.21									
1/23/00	675	1135	1810			7.9						15.42									
1/24/00	675	1135	1810			7.8						15.38				83	-27	-99			
1/25/00	674	1093	1767	32.0	10.0	7.7	30%	2.0	62.5	0.4	5.3	14.25				99	-39		18.7	18.7	18.6
1/26/00	675	1115	1790	32.0	10.0	7.7	30%	2.0	63.0	0.4	5.3	14.33				91	-23	-85	18.7	18.8	18.6
1/27/00	680	1115	1795	33.5	10.4	7.7	34%	2.1	63.0	0.4	5.3	14.58				83	-14	-62	18.7	18.8	18.5
1/28/00	682	1120	1802	33.0	10.2	7.8	34%	2.0	62.8	0.3	5.2	14.81				83	-15	-82	18.7	18.7	18.4
1/29/00	679	1127	1806	31.9	9.9	7.8	30%	1.9	60.8	0.3	5.1	15.08									
1/30/00	679	1127	1806	31.9	9.9	7.8	30%	1.9	60.6	0.3	5.1	15.33									
1/31/00	620	1200	1820	30.0	10.2	7.6	32%	1.8	57.0	0.3	5.2	15.21				81	-1	-71	18.7	18.7	18.6
2/1/00	620	1180	1800	30.0	10.2	7.7	31%	1.8	57.5	0.4	5.3	15.50	7.20	7.23	7.33	91	0	-66	18.7	18.8	18.7
2/2/00	630	1185	1815	30.0	10.1	7.8	26%	1.8	58.0	0.4	5.3	14.25	6.94	7.17	7.29	76	14	-42	18.7	18.8	18.6
2/3/00	630	1160	1790	30.0	10.1	8.0	25%	1.8	58.0	0.4	5.3	14.33	7.20	7.02	7.21	103	5	-77	18.7	18.8	18.7
2/4/00	625	1165	1790	30.0	10.1	8.0	26%	1.8	56.0	0.3	5.1	14.63	7.25	7.22	7.23	107	20	-43	18.7	18.8	18.7
2/5/00	625	1165	1790			8.0						14.96									

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	Forward Flow Rate (gpm)	Recycle Flow Rate (gpm)	Total Flow Rate (gpm)	Ethanol Flow Rate (ml/min)	*Ethanol Dose (mg/l)	*Theoretical Ethanol Dose (mg/l)	Percent Ethanol Overdose	**Equivalent TOC Dose (mg/l)	Nutrient Flow Rate (ml/min)	*Phosphorous Dose (mg/l as P)	*Organic Nitrogen Dose (mg/l as N)	Bed Height (ft)	pH			ORP (mV)			Temperature (°C)		
													SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
2/6/00	508	1292	1800			8.0						15.17									
2/7/00	610	1220	1830	30.0	10.4	7.9	28%	1.8	70.0	0.4	6.5	15.63	7.20	7.04	7.00	64	14	-96	18.6	18.6	18.7
2/8/00	620	1150	1770	30.0	10.2	8.1	29%	1.9	55.5	0.3	5.1	13.79	7.25	7.17	7.20	93	24	-57	18.7	18.7	
2/9/00	620	1180	1800	30.0	10.2	7.9	29%	1.8	56.0	0.3	5.2	14.13	7.30	7.22	7.28	124	-5	-72	18.7	18.8	18.7
2/10/00	616	1174	1790	29.0	9.9	7.9	25%	1.8	54.3	0.3	5.0	14.46	7.37	7.37	7.45	150	-17	-67	18.7	18.7	18.4
2/11/00	621	1169	1790	29.5	10.0	7.9	29%	1.8	55.6	0.3	6.1	14.96	7.15	7.11	7.16	119	14	-74	18.6	18.7	18.5
2/12/00	621	1169	1790			7.9						15.13									
2/13/00	621	1169	1790			7.9						15.67									
2/14/00	635	1230	1865	30.0	10.0	7.8	26%	1.8	57.0	0.3	5.1	13.58	7.02	7.15	7.30	183	-12	-75	18.6	18.6	18.5
2/15/00	634	1183	1817	31.0	10.3	7.9	31%	1.9	38.0	0.2	3.4	14.00	6.93	7.00	7.05	175	-29	-80	18.8	18.8	18.9
2/16/00	630	1165	1795	30.3	10.2	7.9	27%	1.9	38.0	0.2	3.4	14.54	7.00	7.10	7.07	144	-45	-72	18.6	18.7	18.5
2/17/00	450	1380	1830	22.0	10.3	8.0	30%	1.3	27.0	0.2	3.4	15.04	7.21	7.07	7.00	151	-17	-81	18.7	18.7	18.7
2/18/00	450	1387	1837	21.0	9.9	7.9	24%	1.3	20.0	0.2	2.5	15.17	7.25	7.08	6.90	146	45	-13	18.7	18.8	18.6
2/19/00	450	1383	1833			7.9						15.17									
2/20/00	450	1383	1833			7.9						15.50									
2/21/00	450	1383	1833			7.9						13.50									
2/22/00	450	1390	1840	22.0	10.3	7.8	33%	1.3	20.0	0.2	2.5	13.46	7.25	7.13	7.10	86	-42	-157	18.7	18.7	18.5
2/23/00	450	1320	1770	22.0	10.3	7.8	34%	1.4	20.0	0.2	2.5	13.42	7.43	7.32	7.31	126	-58	-105	18.7	18.8	18.6
2/24/00	450	1380	1830	21.0	9.9	7.7	28%	1.3	20.0	0.2	2.5	13.71	7.38	7.36	7.34	149	-43	-102	18.6	18.6	18.3
2/25/00	450	1330	1780	22.0	10.3	7.7	34%	1.4	21.0	0.2	2.7	13.88	7.70	7.22	7.63	103	-50	-115	18.6	18.7	18.6
2/26/00	450	1330	1780	22.0	10.3	7.7	34%	1.4	21.0	0.2	2.7	14.00									
2/27/00	450	1330	1780	22.0	10.3	7.7	32%	1.4	21.0	0.2	2.7										
2/28/00	450	1325	1775	22.0	10.3	7.9	31%	1.4	20.0	0.2	2.5		7.53	6.57	6.24	112	-30	-89	18.6	18.7	18.6
2/29/00	450	1360	1810	21.5	10.1	7.9	30%	1.3	20.0	0.2	2.5	14.75				135	-8	-72	18.7	18.8	18.6
3/3/00	450	1410	1860	21.0	9.9	8.1	19%	1.2	20.0	0.2	2.5	13.54	7.20	7.05	7.03	153	-48	-98	18.6	18.7	18.5
3/4/00	600	1228	1828			8.1						13.33									
3/5/00	600	1228	1828			8.1						13.38									
3/6/00	600	1215	1815	29.0	10.2	8.0	23%	1.8	27.0	0.2	2.6	13.58				95	-58	-133	18.7	18.7	18.4
3/7/00	600	1225	1825	28.0	9.9	8.3	24%	1.7	27.0	0.2	2.6	13.63	7.17	7.12	7.10	121	-26	-93	18.8	18.8	18.6
3/8/00	915	930	1845	44.4	10.3	8.0	25%	2.6	41.2	0.2	2.6	13.98				121			18.8		
3/9/00	814	1008	1822	38.4	10.0	8.2	24%	2.3	35.7	0.2	2.5	14.00	7.33	7.40	7.23	127	1	-34	18.7	18.7	18.6
3/10/00	685	1115	1800	33.0	10.2	8.0	27%	2.0	31.0	0.2	2.6	14.13				99	-7	-110	18.8	18.8	
3/11/00	681	1125	1806			8.0						14.17									
3/12/00	681	1125	1806			8.0						14.33									
3/13/00	685	1125	1810	33.0	10.2	7.8	30%	2.0	31.0	0.2	2.6	14.58	7.32	7.08	7.10	92	-49	-76	18.8	18.8	18.8
3/14/00	680	1130	1810	32.6	10.1	7.9	31%	2.0	30.5	0.2	2.6	13.50	7.50	7.19	7.17	91	-3	-77	18.8	18.8	18.9
3/15/00	680	1150	1830	35.0	10.9	7.7	41%	2.1	32.0	0.2	2.7	13.50	7.06	7.51	7.53	94	-62	-118	18.8	18.9	18.9
3/16/00	700	1130	1830	33.0	10.0	7.7	27%	2.0	31.0	0.2	2.5	13.60	7.43	7.33	7.36	66	-24	-85	18.9	19.0	19.0
3/17/00	710	1105	1815	34.0	10.1	7.9	29%	2.1	32.0	0.2	2.8	13.54	7.57	7.42	7.01	124	-15	-79	18.8	18.9	18.9
3/18/00	699	1093	1792		0.0	7.9						13.54									
3/19/00	699	1093	1792		0.0	7.9						13.67									
3/20/00	705	1100	1805	34.0	10.2	7.6	32%	2.1	31.0	0.2	2.5	13.83	7.36	7.52	7.60	157	-44	-91	18.8	18.8	18.7
3/21/00	700	1120	1820	33.0	10.0	7.7	28%	2.0	31.2	0.2	2.5	14.08	7.23	7.09	7.31	135	-33	-119	18.9	19.0	19.0
3/22/00	695	1120	1815	33.0	10.0	7.8	29%	2.0	31.0	0.2	2.5	14.29	7.41	7.26	7.23	150	-13	-70	18.9	19.0	19.0
3/23/00	700	1125	1825	33.0	10.0	7.8	28%	2.0	31.0	0.2	2.5	14.50	7.41	7.08	7.04	100	-7	-71	18.9	18.9	18.8
3/24/00	700	1130	1830	33.0	10.0	7.8	26%	2.0	15.0	0.5	0.0	14.54	7.43	7.32	7.34	144	7	-69	18.9	18.9	18.8
3/25/00	694	1123	1817		0.0	7.8						14.50									
3/26/00	694	1123	1817		0.0	7.8						14.75									
3/27/00	700	1125	1825	33.5	10.1	7.7	26%	2.0	15.0	0.5	0.0	15.08	7.35	7.19	7.24	76	25	-68	18.8	18.8	18.6
3/28/00	700	1125	1825	33.5	10.1	8.1	27%	2.0	15.0	0.5	0.0	15.38	7.43	7.15	6.99	81	19	-53	18.8	18.9	18.8
3/29/00	700	1145	1845	33.0	10.0	8.0	33%	2.0	15.0	0.5	0.0	14.25	7.29	7.30	7.15	97	2	-60	18.9	19.0	18.9
3/30/00	695	1145	1840	33.0	10.0	7.5	31%	2.0	15.0	0.5	0.0	13.50	7.22	7.01	6.30	112	-13	-51	18.8	18.9	18.8
3/31/00	690	1150	1840	33.0	10.1	7.6	32%	2.0	15.0	0.5	0.0	13.17	7.15	6.84	6.81	138	10	-57	18.9	19.0	19.1
4/1/00	685	1132	1817		0.0	7.6						12.79									
4/2/00	685	1132	1817		0.0	7.6						12.96									
4/3/00	685	1135	1820	33.0	10.2	7.7	30%	2.0	15.0	0.5	0.0	13.21	7.37	7.45	7.00	106	-3	-73	18.9	19.1	19.2

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	Forward Flow Rate (gpm)	Recycle Flow Rate (gpm)	Total Flow Rate (gpm)	Ethanol Flow Rate (ml/min)	*Ethanol Dose (mg/l)	*Theoretical Ethanol Dose (mg/l)	Percent Ethanol Overdose	**Equivalent TOC Dose (mg/l)	Nutrient Flow Rate (ml/min)	*Phosphorous Dose (mg/l as P)	*Organic Nitrogen Dose (mg/l as N)	Bed Height (ft)	pH			ORP (mV)			Temperature (°C)		
													SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
4/4/00	690	1130	1820	33.0	10.1	7.8	33%	2.0	15.0	0.5	0.0	13.38	7.61	7.35	7.16	150	32	-54	18.9	19.0	19.0
4/5/00	686	1124	1810	33.0	10.2	7.6	34%	2.0	15.0	0.5	0.0	13.42	7.44	7.10	6.91	137	26	-58	18.9	19.0	18.8
4/6/00	690	1115	1805	33.0	10.1	7.6	31%	2.0	15.0	0.5	0.0	13.67	7.28	7.06	7.10	135	12	-56	19.0	19.0	18.9
4/7/00	690	1110	1800	33.0	10.1	7.7	31%	2.0	15.0	0.5	0.0	13.92	7.49	6.95	6.92	151	20	-50	18.9	19.0	19.0
4/8/00	681	1124	1805		0.0	7.7						13.96									
4/9/00	681	1124	1805		0.0	7.7						14.17									
4/10/00	680	1130	1810	33.0	10.3	7.9	30%	2.0	15.0	0.5	0.0	14.58	7.64	7.42	7.20	92	10	-77	18.9	19.0	19.0
4/11/00	675	1125	1800	33.0	10.3	7.9	30%	2.0	16.0	0.5	0.0	14.71	7.39	7.46	7.02	116	38	-66	19.0	19.1	19.2
4/12/00	675	1125	1800	32.0	10.0	7.9	29%	2.0	15.0	0.5	0.0	14.85	7.61	7.29	7.19	145	43	-42	19.0	19.1	19.4
4/13/00	680	1120	1800	33.0	10.3	7.8	30%	2.0	15.0	0.5	0.0	15.00	7.33	7.25	7.13	126	30	-43	19.0	19.1	19.1
4/14/00	690	1130	1820	33.0	10.1	7.9	29%	2.0	16.0	0.5	0.0	14.00	7.36	7.11	6.98	167	44	-48	18.9	19.0	19.0
4/15/00	683	1123	1806		0.0	7.9						13.75									
4/16/00	683	1123	1806		0.0	7.9						13.96									
4/17/00	685	1125	1810	33.0	10.2	7.9	29%	2.0	15.0	0.5	0.0	14.21	7.28	7.05	6.79	147	44	-61	18.8	18.8	18.4
4/18/00	690	1125	1815		0.0	7.9						14.29									

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	DO (mg/l)			Nitrate-N (mg/l)			Perchlorate (mg/l)			Phosphate (mg/l)			Nitrite-N (mg/l)			Ammonia-N (mg/l)			Sulfate (mg/l)			TOC (mg/l)		
	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
10/1/99	5.53	0.72	0.04	1.60	0.28	0.068	4.5	6.80	6.00	0.34	3.57	3.37	<0.015	<0.015	<0.015	<0.1	8.3	9.8	30.4	32.8	34.8	0.26	1.90	0.64
10/4/99	4.50	0.68	0.08	1.50	0.22	<0.011	3.5	5.10	5.20	0.31	3.13	3.07	<0.015	<0.015	<0.015	<0.1	6.8	7.7	20.9	21.9	22.2	0.10	1.60	0.40
10/5/99	5.30	0.72	0.06	1.50	0.22	<0.011	3.3	4.20	4.20	0.31	3.15	3.11	<0.015	<0.015	<0.015	<0.1	6.9	8.2	18.9	20.7	21.0	0.26	1.50	0.30
10/6/99	4.61	0.66	0.09	1.50	0.20	<0.011	3.1	3.50	3.40	0.27	2.98	2.89	<0.015	<0.015	<0.015	<0.1	7.0	8.3	19.7	21.5	21.9	0.1	1.50	0.34
10/7/99	4.50	0.66	0.08	1.50	0.20	<0.011	3.4	2.30	1.90	0.25	2.03	2.03	<0.015	<0.015	<0.015	<0.1	4.5	4.9	16.9	17.7	17.6	0.14	1.20	0.36
10/8/99	4.84	0.74	0.09	1.50	0.21	<0.011	3.9	1.70	1.20	0.29	1.61	1.59	<0.015	<0.015	<0.015	<0.1	3.7	4.3	18.1	17.9	17.9	0.28	1.60	0.45
10/11/99	4.95	0.78	0.10	1.50	0.21	<0.011	4.1	1.20	0.78	0.34	1.68	1.58	<0.015	<0.015	<0.015	<0.1	3.8	4.6	18.0	17.9	18.0	0.18	1.30	0.62
10/12/99	4.56	0.66	0.10	1.50	0.21	<0.011	5.1	1.00	0.31	0.28	1.61	1.52	<0.015	<0.015	<0.015	<0.1	3.8	4.6	19.5	19.0	18.9	0.24	1.50	0.65
10/13/99	4.60	0.70	0.09	1.50	0.22	<0.011	4.3	0.68	0.074	0.27	1.57	1.55	<0.015	0.2	<0.015	<0.1	3.4	4.4	19.1	18.9	18.8	0.11	1.30	0.55
10/14/99	4.69	0.66	0.06	1.50	0.21	<0.011	4.3	0.62	<0.004	0.29	1.52	1.55	<0.015	0.2	<0.015	<0.1	3.3	3.7	19.3	19.0	19.0	0.1	1.50	0.70
10/15/99	6.25	0.87	0.04	1.60	0.22	<0.011	2.2	0.31	<0.004	0.27	1.47	1.37	<0.015	0.2	<0.015	<0.1	2.8	3.2	11.6	12.2	12.3			
10/18/99	6.17	0.91	0.07	1.60	0.22	<0.011	5.7	0.76	<0.004	0.45	1.81	1.73	<0.015	<0.015	<0.015	<0.10	3.8	4.0	20.2	20.5	20.5			
10/19/99	4.24	0.61	0.05	1.60	0.28	<0.011	5.6	1.10	<0.004	0.40	1.68	1.64	<0.015	<0.015.	<0.015	<0.10	3.4	3.8	20.3	20.5	20.5			
10/20/99	4.06	0.75	0.05	1.50	-	-	5.5	0.97	<0.004	0.40	-	-	<0.015	-	-	<0.10	3.3	3.7	19.6	-	-			
10/21/99	4.76	0.84	0.06	1.50	0.26	<0.011	6.2	1.10	<0.004	0.38	1.58	1.57	<0.015	<0.015	<0.015	<0.10	3.1	3.6	19.6	19.78	19.71			
10/22/99	4.85	1.12	0.03	1.50	0.35	<0.011	6.1	1.40	<0.004	0.39	1.57	1.50	<0.015	<0.015	<0.015	<0.10	2.7	3.4	19.7	19.9	19.8			
10/25/99	5.88	1.41	0.06	1.50	0.36	<0.011	6.0	1.60	<0.004	0.37	1.54	1.47	<0.015	<0.015	<0.015	<0.10	3.1	3.3	20.5	20.2	20.2			
10/26/99	4.25	0.92	0.03	1.60	0.38	<0.023	6.0	1.40	<0.004	0.33	0.50	0.51	<0.015	<0.015	<0.015	<0.1	2.9	3.8	20.1	20.1	20.3			
10/27/99	4.75	1.08	0.08	1.50	0.47	<0.023	5.9	1.80	<0.004	0.37	1.50	1.49	<0.015	<0.015	<0.015	<0.1	2.7	3.6	20.3	20.4	20.3			
10/28/99	4.92	1.43	0.05	1.50	0.33	<0.023	5.6	1.60	<0.004	0.35	1.46	1.44	<0.015	<0.015	<0.015	<0.1	2.9	3.8	18.1	18.2	18.2			
10/29/99	4.26	1.26	0.01	1.50	0.43	<0.023	5.3	1.60	<0.004	0.34	1.52	1.46	<0.015	<0.015	<0.015	<0.1	2.1	2.9	18.2	18.2	18.3			
11/1/99	4.69	1.31	0.08	1.60	0.43	<0.023	5.4	1.60	<0.004	0.31	1.50	1.36	<0.015	<0.015	<0.015	-	-	-	18.5	18.5	18.5			
11/2/99	4.42	1.19	0.05	1.50	0.43	<0.023	5.4	1.60	<0.004	0.33	1.49	1.42	<0.015	<0.015	<0.015	<0.1	2.7	3.4	18.4	18.4	18.4	0.1	2.30	0.25
11/3/99	4.56	1.60	0.06	1.50	0.46	<0.011	4.6	1.60	<0.004	0.31	1.42	1.42	<0.015	<0.015	<0.015	<0.1	2.6	3.9	17.7	17.6	17.6	0.1	2.90	0.31
11/4/99	4.60	1.62	0.07	1.50	0.53	<0.011	4.5	1.70	<0.004	0.32	1.49	1.43	<0.015	<0.015	<0.015	<0.1	2.7	3.9	17.8	17.8	17.8	0.1	2.50	0.23
11/5/99	4.93	1.68	0.05	1.50	0.52	<0.011	4.7	1.60	<0.004	0.32	1.46	1.42	<0.015	<0.015	<0.015	<0.1	2.8	3.5	17.5	17.6	17.6	0.1	2.50	0.28
11/8/99	4.45	1.55	0.05	1.50	0.40	<0.011	4.6	1.40	<0.004	0.32	1.38	1.44	<0.015	<0.015	<0.015	<0.1	2.5	3.5	17.8	17.4	17.5	0.1	2.90	0.27
11/9/99	4.60	2.00	0.06	1.50	0.66	<0.011	4.0	1.80	<0.004	0.32	1.46	1.36	<0.015	<0.015	<0.015	<0.1	2.1	3.3	16.8	16.7	16.6	0.1	3.10	0.42
11/10/99	4.76	2.05	0.03	1.50	0.02	<0.011	4.0	1.20	<0.004	0.30	1.33	1.42	<0.015	0.13	<0.015	<0.1	2.3	3.7	16.7	16.5	16.5	0.1	3.80	0.56
11/11/99	4.63	2.09	0.04	1.50	<0.011	<0.011	3.8	2.08	<0.004	0.30	1.40	1.36	<0.015	<0.015	<0.015	<0.1	3.5	3.4	16.7	16.5	16.6			
11/12/99	4.72	2.01	0.04	1.50	0.65	<0.011	4.0	1.80	<0.004	0.30	1.44	3.34	<0.015	<0.015	<0.015	<0.1	2.3	4.1	16.8	16.8	16.6			
11/15/99	4.87	2.12	0.07	1.50	0.41	<0.011	6.5	1.90	<0.004	0.32	1.29	1.33	<0.015	<0.015	<0.015	<0.1	2.8	3.3	19.6	19.2	19.3	0.12	2.80	0.87
11/16/99	4.49	2.00	0.06	1.50	0.64	<0.011	4.7	2.00	<0.004	0.24	1.50	1.31	<0.015	<0.015	<0.015	<0.1	2.4	3.6	16.7	16.7	16.6	0.22	3.50	0.62
11/17/99	4.75	1.78	0.04	1.50	0.47	<0.011	4.2	1.70	<0.004	0.28	1.33	1.38	<0.015	<0.015	<0.015	<0.1	2.7	3.6	16.9	16.9	16.8	0.11	3.00	0.69
11/18/99	4.95	2.34	0.05	1.60	0.46	<0.011	3.5	1.70	<0.004	0.28	1.31	1.36	<0.015	<0.015	<0.015	<0.1	2.4	3.6	16.8	16.7	16.5	0.1	3.60	0.49
11/19/99	4.55	2.26	0.00	1.60	0.26	<0.011	5.9	1.00	<0.004	0.33	1.93	1.91	<0.015	<0.015	<0.015				19.8	18.5	18.7	0.1	1.90	0.82
11/22/99	4.78	2.06	0.03	1.60	0.67	<0.011	3.8	1.70	<0.004	0.29	1.58	1.45	<0.015	<0.015	<0.015				16.6	16.5	16.4	0.26	3.20	0.43
11/23/99	4.95	2.33	0.04	1.60	0.78	<0.011	3.8	2.00	<0.004	0.29	1.44	1.46	<0.015	<0.015	<0.015				16.7	16.7	16.5	0.1	4.00	0.38
11/24/99	4.88	2.12	0.04	1.60	0.77	<0.011				0.19	1.57	1.46		<0.015	<0.015				16.7	16.5	16.5	0.13	3.50	0.47
11/26/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
11/27/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
11/28/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
11/29/99	5.19	2.55	0.03	1.50	0.72	<0.011	3.3	1.60	<0.004	0.26	1.35	1.38	<0.015	<0.015	<0.015				15.9	15.8	15.8	0.13	3.73	0.59
11/30/99	5.07	2.41	0.07	1.50	0.59	<0.011	3.6	1.70	<0.004	0.30	1.32	1.41	<0.015	<0.015	<0.015				16.0	.15.8	15.7	0.22	3.86	0.52
12/1/99	4.96	2.41	0.05	1.50	0.73	<0.011	3.6	1.80	<0.004	0.27	1.39	1.37	<0.015	<0.015	<0.015				16.1	15.9	15.8	0.15	3.79	0.62
12/2/99	5.07	2.56	0.03	1.50	0.74	<0.011	3.2	1.60	<0.004	0.28	1.49	1.36	<0.015	<0.015	<0.015				16.1	15.8	15.6	0.1	3.80	0.51
12/3/99	4.98	2.18	0.02	1.50	0.70	<0.011	3.3	1.60	<0.004	0.28	1.52	1.39	<0.015	<0.015	<0.015				16.2	16.0	15.7	0.14	3.30	0.46
12/4/99																								
12/5/99																								
12/6/99	4.95	2.34	0.05	1.50	0.73	<0.011	3.4	1.50	<0.004	0.28	1.55	1.39				<0.1	2.4	3.7	16.2	16.0	15.6	0.1	3.70	0.53
12/7/99	5.07	2.39	0.04	1.50	0.73	<0.011	3.6	1.70	<0.004	0.25	1.44	1.38				<0.1	2.4	3.5	16.4	16.4	16.2	0.22	3.60	0.54
12/8/99	5.44	2.60	0.08	1.50	0.79	<0.011	3.0	1.80	<0.004	0.26	1.41	1.38				<0.1	1.9	3.4	16.2	16.2	16.1	0.1	3.70	0.45
12/9/99	5.21	2.53	0.03	1.50	0.78	<0.011	3.0	1.50	<0.004	0.29	1.44	1.35				<0.1	2.1	3.8	16.1	16.0	15.7	0.11	3.70	0.45
12/10/99	5.24	2.47	0.01	1.60	0.78	<0.011	2.9	1.80	<0.004	0.32	1.50	1.45				<0.1	2.1	3.6	16.2	15.7	15.5	0.1	3.60	0.54
12/11/99																								
12/12/99																								

Table A10

FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	DO (mg/l)			Nitrate-N (mg/l)			Perchlorate (mg/l)			Phosphate (mg/l)			Nitrite-N (mg/l)			Ammonia-N (mg/l)			Sulfate (mg/l)			TOC (mg/l)		
	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
12/13/99	5.34	2.58	0.05	1.50	0.59	<0.011	3.5	1.40	<0.004	0.25	1.41	1.38				<0.1	2.6	3.7	16.5	16.1	16.1	0.1	3.00	0.55
12/14/99	5.39	2.59	0.04	1.50	0.78	<0.011	3.00	1.60	<0.004	0.24	1.48	1.37	<0.015	<0.015	<0.015	<0.1	2.10	3.90	15.79	15.48	15.22			
12/15/99	5.37	2.77	0.03	1.50	0.76	<0.011	3.00	1.50	<0.004	0.26	1.27	1.31	<0.015	<0.015	<0.015	<0.1	2.70	3.60	15.88	15.66	15.49			
12/16/99	5.44	2.80	0.03	1.50	0.79	<0.011	2.70	1.50	<0.004	0.25	1.24	1.31	<0.015	<0.015	<0.015	<0.1	2.00	3.20	15.48	15.38	15.15	0.22	3.80	0.55
12/17/99	5.46	2.56	0.03	1.50	0.78	<0.011	2.80	1.50	<0.004	0.28	1.51	1.34	<0.015	<0.015	<0.015	<0.1	2.00	3.60	15.51	15.22	14.93	0.16	3.20	0.54
12/18/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/19/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/20/99	5.36	2.70	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/21/99	5.35	2.77	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/22/99	5.22	2.64	0.04	1.43	0.71	<0.1	2.70	-	<0.004	<0.5	1.30	1.25	<0.03	<0.03	0.04	-	-	-	15.10	15.10	15.20			
12/23/99	5.30	2.67	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/24/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/25/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/26/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/27/99	5.30	2.66	0.05	1.40	0.38	<0.23	2.80	1.30	<0.004	<5	<5	<5	<0.3	0.38	<0.3	-	-	-	15.20	15.00	15.10			
12/28/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/29/99	5.33	2.64	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12/30/99	5.41	2.71	0.05	-	-	-	2.60	1.40	<0.004	-	-	-	-	-	-	-	-	-	-	-	-			
12/31/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1/1/00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1/2/00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1/3/00	5.39	2.70	0.08																					
1/4/00	5.52	2.65	0.06	1.50	0.76	0.011	2.9	1.60	0.001	0.25	1.30	1.29	<0.015	<0.015	<0.015				15.5	15.4	15.4	0.19	4.30	0.50
1/5/00	5.55	2.74	0.04	1.50	0.77	0.011	3.0	1.60	0.001	0.26	1.26	1.38	<0.015	<0.015	<0.015				15.5	15.4	15.5	0.13	3.40	0.62
1/6/00	5.55	2.81	0.04	1.50	0.78	0.011	3.0	1.60	0.001	0.25	1.47	1.37	<0.015	<0.015	<0.015				15.5	15.4	15.4	0.1	3.80	0.37
1/7/00	5.50	2.85	0.01	1.50	0.76	0.011	3.0	1.50	0.001													0.19	3.60	0.46
1/8/00																								
1/9/00																								
1/10/00	5.60	2.85	0.04	1.50	0.79	0.011	3.0	1.50	0.001													0.1	4.30	0.45
1/11/00	5.54	2.70	0.04	1.60	0.81	0.011	3.0	1.50	0.001													0.12	3.90	0.56
1/12/00	5.57	2.77	0.05	1.60	0.79	0.011	3.0	1.50	0.001													0.1	3.95	1.12
1/13/00	5.61	2.88	0.05	1.50	0.80	0.011	2.9	1.40	0.001													0.11	3.86	0.44
1/14/00	5.72	1.53	0.04	1.60	0.42	0.011																0.1	2.22	0.73
1/15/00																								
1/16/00																								
1/17/00	6.00																							
1/17/00				1.50			2.8																	
1/18/00	6.17	1.39	0.00		0.36	0.011	2.4	0.61	0.001													0.67	2.00	0.66
1/19/00	5.41	1.39	0.07	1.50	0.41	0.011	3.4	0.88	0.001													0.26	2.10	0.65
1/20/00	5.41	1.20	0.02	1.50	0.36	0.011	3.0	0.72	0.001													0.1	1.90	0.44
1/21/00	5.41	1.52	0.05	1.60	0.61	0.011																0.25	2.90	0.34
1/22/00																								
1/23/00																								
1/24/00	5.27	2.11	0.03	1.60	0.61	0.011																0.16	3.10	0.72
1/25/00	5.37	2.18	0.04	1.50	0.61	0.011																0.1	3.20	0.39
1/26/00	5.37	1.98	0.04	1.50	0.60	0.011																0.1	3.30	0.35
1/27/00	5.35	1.94	0.06	1.50	0.61	0.011																0.15	2.90	0.31
1/28/00	5.46	2.13	0.06	1.50	0.60	0.011																0.1	2.60	0.33
1/29/00																								
1/30/00																								
1/31/00	5.37	1.81	0.04	1.50	0.54	0.011	2.8	1.10	0.001	0.25	1.35	1.32	<0.015	<0.015	<0.015							0.1	2.70	0.40
2/1/00	5.48	1.81	0.07	1.50	0.64	0.011				0.25	1.46	1.34	<0.015	<0.015	<0.015				16.1	16.1	16.0	0.1	2.80	1.20
2/2/00	5.35	2.00	0.14	1.60	0.57	0.011																0.24	2.80	0.42
2/3/00	5.58	1.90	0.09	1.60	0.56	0.011	2.8	1.10	0.001	0.24	1.33	1.25	<0.015	<0.015	<0.015	<0.1	2.8	4.1	16.7	16.7	16.6	0.1	2.60	0.30
2/4/00	5.62	1.84	0.08	1.60	0.55	0.011	2.9	1.10	0.001	0.26	1.15	0.98	<0.015	<0.015	<0.015	<0.1	2.2	3.4	16.7	16.6	16.6	0.1	2.30	0.38
2/5/00																								

Table A10
FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	DO (mg/l)			Nitrate-N (mg/l)			Perchlorate (mg/l)			Phosphate (mg/l)			Nitrite-N (mg/l)			Ammonia-N (mg/l)			Sulfate (mg/l)			TOC (mg/l)		
	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
2/6/00																								
2/7/00	5.39	1.79		1.60	0.55	0.011	2.9	1.10	0.001	0.23	1.32	1.27	<0.015	<0.015	<0.015	<0.1	3.8	4.2	17.3	17.3	17.5	0.1	2.60	0.85
2/8/00	5.95	2.20		1.60	0.56	0.011	2.5	0.86	0.001	0.23	1.37	1.22	<0.015	<0.015	<0.015				15.7	15.6	15.6	0.37	2.40	0.41
2/9/00	5.77	2.13	0.10	1.60	0.56	0.011	2.4	0.90	0.001	0.20	1.32	1.27	<0.015	<0.015	<0.015				15.5	15.2	15.3	0.1	2.40	0.33
2/10/00	5.74	2.05	0.08																					
2/11/00	5.78	1.98	0.07																					
2/12/00																								
2/13/00																								
2/14/00	5.87	2.15	0.12	1.50	0.56	0.011	2.4	0.92	0.001	0.26	1.07	0.91	<0.015	<0.015	<0.015				15.5	15.3	15.3	0.1	2.20	0.33
2/15/00	5.96	2.12	0.17	1.50	0.55	0.011	2.5	0.90	0.001	0.20	0.78	0.80	<0.015	<0.015	<0.015	<0.1	1.8	2.4	15.5	15.4	15.5			
2/16/00	5.92	2.03	0.09	1.50			2.5			0.22			<0.015			<0.1			15.1					
2/17/00	5.78	1.34	0.10	1.60	0.40	0.011	2.5	0.63	0.001	0.24	0.91	0.85	<0.015	<0.015	<0.015				15.6	15.5	15.5			
2/18/00	5.73	1.50	0.17																			0.1	1.70	0.44
2/19/00																								
2/20/00																								
2/21/00																								
2/22/00	5.82	1.38	0.14	1.50	0.39	0.011	2.4	0.63	0.001	0.22	0.53	0.60	<0.015	<0.015	<0.015	<0.1	1.5	1.6	15.7	15.8	15.7	0.1	1.70	0.30
2/23/00	5.83	1.68	0.01																					
2/24/00	5.83	1.64	0.09	1.50	0.39	0.011	2.3	0.61	0.001	0.23	0.65	0.61	<0.015	<0.015	<0.015				16.3	16.2	16.2			
2/25/00	5.78	1.42	0.06																					
2/26/00																								
2/27/00																								
2/28/00	5.60	1.57	0.07	1.60	0.40	0.011	2.5	0.67	0.001	0.20	0.65	0.60	<0.015	<0.015	<0.015	<0.1	1.7	1.7	16.1	16.0	16.0	0.18	1.60	0.23
2/29/00	5.66	1.48	0.13																					
3/3/00	6.02	1.49	0.00																					
3/4/00																								
3/5/00																								
3/6/00	5.75	2.05	0.06																					
3/7/00	5.92	2.00	0.06				3.0	1.10	0.001							<0.1	1.3	1.5				0.1	2.30	0.43
3/8/00	5.48																							
3/9/00	5.82	2.61	0.09	1.61	0.71	0.011	2.9	1.40	0.006	0.25	0.50	0.49	<0.015	<0.015	<0.015				16.5	16.1	16.1	0.1	2.90	0.37
3/10/00	5.85	2.42		1.59	0.60	0.011	2.5	0.99	0.001	0.17	0.57	0.57	<0.015	<0.015	<0.015	<0.1	0.8	1.5	15.6	15.6	15.6	0.1	2.20	0.32
3/11/00																								
3/12/00																								
3/13/00	5.76	2.35	0.07	1.50	0.58	0.011	2.5	0.97	0.001	0.22	0.51	0.52	<0.015	<0.015	<0.015				15.5	15.4	15.4	0.1	3.00	0.92
3/14/00	5.88	2.30	0.07																					
3/15/00	5.71	2.20	0.08																			0.39		
3/16/00	5.69	2.40	0.10																			0.20	2.60	0.44
3/17/00	5.87	2.36	0.07																			0.1	2.20	0.40
3/18/00																								
3/19/00																								
3/20/00	5.52	2.35	0.06																			0.1	2.50	0.57
3/21/00	5.71	2.19	0.09																					
3/22/00	5.78	2.41	0.10	1.50						0.19			<0.015			<0.1			17.1			0.1		
3/23/00	5.76	2.20	0.11	1.50		0.011				0.21		<0.1	<0.015		<0.015	<0.1			17.8		17.4	0.1		
3/24/00	5.76	2.25	0.12																					
3/25/00																								
3/26/00																								
3/27/00	5.63	2.16	0.09																					
3/28/00	5.83	2.27	0.09	1.60	0.48	0.011	2.6	1.00	0.001	0.24	2.02	1.84	<0.015	<0.015	<0.015				18.2	17.9	17.7	0.1	2.50	1.10
3/29/00	5.73	2.13	0.08																					
3/30/00	5.67	2.06	0.08	1.50	0.48	0.011	2.0	0.86	0.001	0.25	1.81	1.77	<0.015	<0.015	<0.015				16.6	16.7	16.8	0.11	2.30	0.49
3/31/00	5.89	2.32	0.08																					
4/1/00																								
4/2/00																								
4/3/00	5.64	2.30	0.09	1.50	0.40	0.011	2.4	0.99	0.001	0.40	1.19	1.07	<0.015	<0.015	<0.015	<0.1	<0.1	<0.1	16.4	16.3	16.4	0.22	1.90	0.26

Table A10

FBR-4 Data Prior to April 19, 2000

DATE SAMPLED	DO (mg/l)			Nitrate-N (mg/l)			Perchlorate (mg/l)			Phosphate (mg/l)			Nitrite-N (mg/l)			Ammonia-N (mg/l)			Sulfate (mg/l)			TOC (mg/l)		
	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6	SP-1	SP-2	SP-6
4/4/00	5.89	2.29	0.09																					
4/5/00	5.53	2.11	0.07																					
4/6/00	5.52	2.16	0.10																					
4/7/00	5.80	2.13	0.05	1.56	0.57	0.011	2.5	1.00	0.001	0.20	1.17	1.14	<0.015	<0.015	<0.015	<0.1	<0.1	<0.1	17.2	17.2	17.0	0.1	1.90	0.35
4/8/00																								
4/9/00																								
4/10/00	5.62	2.18	0.06	1.56	0.51	0.011	2.7	1.00	0.001	0.17	0.94	0.93	<0.015	<0.015	<0.015	<0.1	<0.1	<0.1	16.8	16.9	16.7	0.1	1.90	0.30
4/11/00	5.63	2.17	0.07																					
4/12/00	5.69	2.27	0.07																					
4/13/00	5.65	2.16	0.05	1.51	0.43	0.011	2.6	1.00	0.001	0.25	0.78	0.59	<0.015	<0.015	<0.015	<0.1	<0.1	<0.1	16.7	16.7	16.7	0.1	1.90	0.77
4/14/00	5.79	2.16	0.05																					
4/15/00																								
4/16/00																								
4/17/00	5.58	2.19	0.02	1.60	0.40	0.011	2.6	1.00	0.001	0.32	1.40	1.31	<0.015	<0.015	<0.015	<0.1	<0.1	<0.1	17.0	17.0	16.8			
4/18/00																								

Table A11
Operation and Field Data

Date (2000)		4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
FBR-4 Forward Flow (gpm)		695	685	680	680	680	675	674	662	664	680	672	672	675	665	670	668	666	680	680	690	685
FBR-4 Recycle Flow (gpm)		1125	1130	1125	1125	1125	1135	1136	1123	1131	1140	1135	1135	1140	1140	1140	1142	1139	1126	1126	1120	1135
FBR-4 Total Flow (gpm)		1820	1815	1805	1805	1805	1810	1810	1785	1795	1820	1807	1807	1815	1805	1810	1810	1805	1806	1806	1810	1820
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	On	On	On	On	On	On	On	Off	Off
Ethanol Flow Rate (ml/min)		30.5	30.0	29.0	29.0	29.0	29.0	29.0	27.9	29.0	30.0	30.3	30.3	31.0	30.5	30.5	30.0	31.0	30.7	30.7	31.5	31.0
*Ethanol Dose (mg/l)		9.3	9.3	9.0	9.0	9.0	9.1	9.1	8.9	9.2	9.3	9.5	9.5	9.7	9.7	9.6	9.5	9.8	9.5	9.5	9.6	9.6
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	10.0	10.0	10.3	10.3	9.6	9.2	10.0	10.0	10.0	9.9	10.0	9.9	9.9	10.4	10.4	10.4	9.8	10.1
Percent Ethanol Overdose		-7%	-8%	-10%	-10%	-10%	-12%	-12%	-7%	0%	-7%	-5%	-5%	-2%	-3%	-3%	-4%	-5%	-8%	-8%	-1%	-5%
**Equivalent TOC Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9
Nutrient Flow Rate (ml/min)		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	11.4	11.4	11.4	11.4	11.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.42	0.41	0.41	0.41	0.41	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
Bed Level (ft)		14.21	14.44	14.56	14.56	14.56	14.79	14.90	14.96	15.13	13.67	13.63	13.58	13.79	13.75	13.71	13.67	13.60	13.50	13.38	13.54	13.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		11.7	10.3	9.2	9.9	9.8	11	9.8	4.8	5.4	4.5	9.0	8.5	11.5	12.3	13.7	13.6	14	15.0	14.8	13.4	13.1
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		18.36	17.88	23.20	26.10	26.58	23.68	25.13	33.83	29.00						5.32	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.4	3.4	3.4	3.4	3.4	3.4	3.6								4.5	4.6	4.6	4.6	4.6	4.8	4.6
Clarifier Flow (gpm)		25	32	40	42	41	42	42	36	46	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		16	20	22	24	22	24	22	38	53	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																						
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D.O.	SP-1	5.64							5.28	4.92	5.80			5.62	5.52	5.43	5.38	5.96			5.31	5.73
	SP-2	2.35							2.27	2.25	2.28			2.38	2.28	2.16	2.20	2.28			2.16	2.18
	SP-3																					
	SP-4																					
	SP-5																					
	SP-6	0.19							0.16	0.15	0.24			0.19	0.22	0.18	0.19	0.16			0.16	0.20
	SP-6A																					
	SP-7								6.13	6.53	6.20			6.45	6.89	6.87	6.65	5.49			5.18	5.10
	SP-8									6.74	6.30			6.37			6.45	5.54			5.17	
	SP-9								5.62	6.28	5.65			5.57	6.16	5.30	5.26	4.42			3.91	3.77
	SP-10								5.60	6.12	5.24			5.30	5.65	5.17	5.40	4.00			3.74	3.55
	SP-11								5.77		6.14			6.20	6.60	5.86	5.37	5.03			4.87	4.61
	SP-12									7.08				7.23	7.80	7.08	7.30	6.48			6.04	6.32
	SP-13														9.63	8.14	8.84				7.86	
	SP-14														9.06	8.12	8.85				7.93	
	SP-15														8.92	7.71	8.52				7.14	
	SP-16								5.95	6.20	7.85			8.54	8.54	7.38	8.43	7.34			7.28	7.37
	SP-17																8.51				7.47	
	SP-18																					
	SP-19																					
	SP-20																				7.63	
	SP-21																					
	SP-22								6.03	6.10	7.75			8.36	8.32	8.26	8.53	7.80			7.53	7.58
Conductivity	SP-1								0.25	0.30	0.25			0.23	0.28	0.30	0.28	0.26			0.30	0.30
	SP-2								0.27	0.30	0.25			0.25	0.30	0.30	0.30	0.29			0.26	0.27
	SP-3																					
	SP-4																					
	SP-5																					
	SP-6								0.29	0.30	0.25			0.30	0.28	0.30	0.29	0.27			0.27	0.29
	SP-6A																					
	SP-7							0.30	0.30	0.30	0.30			0.30	0.30	0.30	0.30	0.30			0.30	0.29
	SP-8						0.22	0.27		0.28	0.25			0.29				0.26			0.30	
	SP-9						0.30	0.29	0.30	0.30	0.27			0.30	0.30	0.30	0.30	0.30			0.30	0.29
	SP-10						0.29	0.30	0.30	0.30	0.30			0.30	0.30	0.30	0.30	0.30			0.30	0.29
	SP-11						0.30	0.25	0.20					0.27	0.29	0.20	0.17	0.22			0.29	0.18
	SP-12							0.28	0.30	0.30	0.29			0.30	0.30	0.30	0.30	0.30			0.30	0.30
	SP-13								0.30		0.25			0.30								
	SP-14								0.25		0.30			0.30								
	SP-15								0.30		0.30			0.30								
	SP-16						0.30	0.28	0.30	0.30	0.30			0.29	0.30	0.30	0.30	0.30			0.30	0.30
	SP-17																	0.31			0.28	
	SP-18																	0.30			0.30	
	SP-19																	0.26			0.31	
	SP-20																	0.29			0.31	
	SP-21																	0.31			0.31	
	SP-22						0.28	0.29	0.28	0.30	0.30			0.25	0.30	0.30	0.32	0.31			0.31	0.31

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31
FBR-4 Forward Flow (gpm)		695	695	675	677	677	675	680	677	680	690			655	690	650	655	655				675	680
FBR-4 Recycle Flow (gpm)		1130	1130	1150	1142	1142	1150	1150	1148	1140	1125			1170	1170	1170	1175	1175				1160	1155
FBR-4 Total Flow (gpm)		1825	1825	1825	1819	1819	1825	1830	1825	1820	1815			1825	1860	1820	1830	1830				1835	1835
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		31.0	32.0	31.0	30.5	30.5	31	31	32	31	36			30	30	30	30.5	30				30	32
*Ethanol Dose (mg/l)		9.4	9.7	9.7	9.5	9.5	9.7	9.6	10.0	9.6	11.0			9.7	9.2	9.8	9.8	9.7				9.4	9.9
*Theoretical Ethanol Dose (mg/l)		9.8	9.5	10.0	10.0	10.0	10.0	10.0	10.0	9.9	10.4	10.4	10.4	10.4	9.7	10.3	10.0	10.5	10.5	10.5	10.5	10.3	10.4
Percent Ethanol Overdose		-4%	3%	-3%	-5%	-5%	-3%	-4%	-1%	-3%	6%			-7%	-5%	-5%	-1%	-8%				-9%	-4%
**Equivalent TOC Dose (mg/l)		1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.2			1.8	1.8	1.8	1.8	1.8				1.8	1.9
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	3.8	3.8	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0				5.0	5.0
*Phosphourous Dose (mg/l)		0.20	0.20	0.20	0.14	0.14	0.18	0.18	0.18	0.18	0.18			0.19	0.18	0.19	0.19	0.19				0.18	0.18
Bed Level (ft)		13.46	13.38	13.38	13.29	13.17	13.38	13.33	13.25	13.25	13.17			13.19	13.21	13.19	13.19	13.17				13.21	13.25
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		12.5	12.1	11.4	10.9	10.5	10.3	10.1	9.4	9.0	8.8	8.9	8.6	8.3	7.6	9.0	8.2	14.9	6.4	10.2	11.0	7.5	9.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	6.77	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	9.67	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.6	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.3	4.3	4.4	4.5	4.5	4.5	4.4	4.5	4.5	4.4	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D.O.	SP-1	5.34	4.99	5.63			5.58	5.59	5.60	5.46	5.99				5.32	5.90	5.54	6.07				5.83	5.80
	SP-2	2.04	2.10	2.24			2.24	2.05	2.15	2.49	2.25				1.98	2.11	2.07	2.07				2.26	2.14
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	0.14	0.09	0.13			0.15	0.15	0.13	0.16	0.16				0.06	0.05	0.05	0.05				0.06	0.04
	SP-6A																						
	SP-7	4.98	4.36	4.77			4.47	4.39	4.64	4.87	5.23				4.48	3.86	4.72	4.71				4.76	4.84
	SP-8																						
	SP-9	3.86	3.50	3.79			3.38	3.53	3.66	3.85	4.04				4.40	3.69	3.42	4.35				4.25	4.39
	SP-10	3.49	3.34	3.47			3.22	3.20	3.45	3.63	3.92				3.74	3.35	3.24	4.00				4.05	4.02
	SP-11	4.51	4.39	5.17			4.25	4.29	5.23	4.86	5.73				5.25	4.81	5.02	5.35				5.38	5.60
	SP-12	5.91	5.84	6.64			5.40	5.43	6.30	6.61	6.66				6.27	6.57	6.65	6.81				6.89	7.06
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	7.15	7.01	7.82			6.67	6.49	9.13	9.59	10.64				8.65	8.23	10.26	10.50				8.34	9.60
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	7.15	6.89	8.16			6.66	6.84	9.39	9.59	10.70				7.69	8.29	9.54	10.66				9.27	10.69
Conductivity	SP-1	0.25	0.25	0.25			0.25	0.30	0.25	0.25	0.27					0.28	0.30	0.24				0.30	0.23
	SP-2	0.28	0.30	0.27			0.26	0.25	0.30	0.30	0.29					0.22	0.27	0.27				0.27	0.24
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	0.30	0.29	0.26			0.26	0.27	0.28	0.30	0.30					0.30	0.30	0.30				0.30	0.28
	SP-6A																						
	SP-7	0.30	0.30	0.30			0.30	0.30	0.26	0.30	0.30					0.30	0.30	0.28				0.30	0.29
	SP-8																						
	SP-9	0.30	0.30	0.30			0.30	0.30	0.30	0.30	0.30					0.30	0.30	0.30				0.29	0.30
	SP-10	0.30	0.30	0.29			0.30	0.30	0.30	0.30	0.30					0.30	0.30	0.30				0.30	0.30
	SP-11	0.29	0.29	0.29			0.27	0.25	0.29	0.28	0.27					0.22	0.28	0.29				0.29	0.27
	SP-12	0.30	0.30	0.30			0.30	0.30	0.30	0.30	0.30					0.30	0.30	0.30				0.29	0.30
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.30	0.30	0.30			0.30	0.30	0.30	0.29	0.30					0.29	0.29	0.25				0.30	0.30
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	0.27	0.31	0.30			0.31	0.30	0.30	0.25	0.33					0.26	0.27	0.31				0.28	0.26

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22
FBR-4 Forward Flow (gpm)		660	660			719	715	720	725	725			765	800	730	725	730	720	720	715	720	705	730
FBR-4 Recycle Flow (gpm)		1145	1140			1081	1085	1090	1085	1085			1030	990	1070	1060	1095	1101	1101	1110	1105	1105	1138
FBR-4 Total Flow (gpm)		1805	1800			1800	1800	1810	1810	1810			1795	1790	1800	1785	1825	1821	1821	1825	1825	1810	1868
FBR-4 Eductor		Off	Off	Off	On	On	On	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On
Ethanol Flow Rate (ml/min)		31	31			35	35	36	36	36			38	40	36	36.5	37	37	37	36	36	35	36.5
*Ethanol Dose (mg/l)		9.9	9.9			10.3	10.3	10.6	10.5	10.5			10.5	10.6	10.4	10.6	10.7	10.9	10.9	10.6	10.6	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.2	10.1	10.1	10.1	9.9	10.1	10.2	10.2	10.1	10.1	10.1	9.7	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.3	10.4	10.4
Percent Ethanol Overdose		-3%	-2%			3%	2%	4%	3%	4%			9%	6%	4%	7%	7%	9%	9%	6%	3%	1%	2%
**Equivalent TOC Dose (mg/l)		1.9	1.9			2.1	2.1	2.2	2.2	2.2			2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Nutrient Flow Rate (ml/min)		5.0	5.0			5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.18	0.18			0.17	0.17	0.17	0.17	0.17			0.16	0.15	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.19
Bed Level (ft)		13.15	13.17	13.13	13.21	13.29	13.33	13.33	13.31	13.38	13.25	13.25	13.46	13.54	13.54	13.58	13.71	13.63	13.63	13.73	13.79	13.79	14.00
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.1	4.4	4.0	4.0	6.2	11.0	11.8	10.2	11.2	12.1	11.0	9.2	8.4	9.5	8.4	6.7	7.5	4.2	4.7	4.7	4.3	3.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	12.08	13.53
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.4	4.4	4.4	4.4	4.5	4.5	3.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4
Clarifier Flow (gpm)		0	50	50	49	49	0	0	48	48	48	47	47	47	47	47	36	60	37	34	34	34	34
Coagulant Dose (mg/l)		0	28	28	28	26	0	0	26	26	26	26	0	0	0	0	0	0	6	12	18	38	73
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	5.0	20.0	20.0	20.0	20.0
D.O.	SP-1	5.65	5.54			5.65	5.56	5.65		5.67			5.75		5.56	5.48	5.51			5.48	5.47		5.68
	SP-2	2.10	2.28			2.28	2.31	2.27		2.29			2.60		2.37	2.42	2.29			2.13	2.21		1.63
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	0.05	0.04			0.05	0.07	0.05		0.04			0.10		0.15	0.16	0.15			0.14	0.14		0.11
	SP-6A																						
	SP-7	5.08	4.45			5.29	4.96	4.60		4.51			4.82		4.71	4.85	4.68			5.03	4.63		4.40
	SP-8																						
	SP-9	4.16	4.32			4.73	4.34	4.78		3.90			3.30		3.61	3.72	3.55			4.33	4.10		4.00
	SP-10	3.84	4.31			4.66	3.95	4.58		3.89			4.48		3.50	3.31	3.15			4.01			
	SP-11	6.12	6.40			5.93	5.41	5.91		5.36			6.81		4.69	4.90	4.45			5.76			
	SP-12	6.67	7.39			6.75	6.64	7.38		6.62			6.84		6.46	6.19	5.91			7.38			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	9.62	10.45			10.50	10.00	10.60		9.66			9.75		9.84	8.95	9.65			10.00			
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	10.85	10.59			10.41	10.18	10.70		10.19			9.58		9.80	9.85	10.03			9.67			
Conductivity	SP-1	0.26	0.20			0.26	0.29	0.29		0.30			0.25	0.30	0.28	0.25	0.25			0.22	0.26		0.20
	SP-2	0.30	0.25			0.25	0.29	0.29		0.25			0.30	0.29	0.25	0.27	0.29			0.24	0.22		0.24
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	0.26	0.30			0.25	0.29	0.24		0.29			0.30	0.29	0.27	0.30	0.29			0.24	0.23		0.29
	SP-6A																						
	SP-7	0.30	0.30			0.30	0.29	0.28		0.28			0.29	0.29	0.29	0.29	0.29			0.24	0.28		0.27
	SP-8																						
	SP-9	0.30	0.30			0.30	0.29	0.29		0.29			0.29	0.29	0.29	0.29	0.29			0.26	0.28		0.23
	SP-10	0.30	0.30			0.30	0.29	0.29		0.29			0.29	0.29	0.29	0.29	0.29			0.29			
	SP-11	0.24	0.28			0.28	0.21	0.25		0.27			0.16	0.20	0.26	0.26	0.28			0.25			
	SP-12	0.30	0.29			0.30	0.29	0.29		0.29			0.28	0.29	0.29	0.28	0.29			0.25			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.30	0.30			0.30	0.29	0.28		0.27			0.29	0.26	0.29	0.29	0.29			0.25			
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	0.25	0.27			0.31	0.25	0.30		0.27			0.26	0.27	0.30	0.26	0.30			0.21			

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
FBR-4 Forward Flow (gpm)		714	671	671	675	675	675	750	745			735		745	666	662			647	767	765	765	780
FBR-4 Recycle Flow (gpm)		1126	1157	1157	1165	1160	1160	1090	1095			1100		1095	1169	1174			1220	1100	1075	1070	1040
FBR-4 Total Flow (gpm)		1840	1828	1828	1840	1835	1835	1840	1840			1835		1840	1835	1836			1867	1867	1840	1835	1820
FBR-4 Eductor		On	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	ON	On	Off	Off	On	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		36	33	33	34	33	33.5	37.5	37			36		36.5	33	33			32	38	38	38	39
*Ethanol Dose (mg/l)		10.7	10.4	10.4	10.6	10.3	10.5	10.6	10.5			10.4		10.4	10.5	10.5			10.5	10.5	10.5	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.3	10.3	9.6	9.5	9.5	9.9	10.3	10.3	10.2	10.5	10.3	10.3	10.1	10.1	10.1	10.1	9.8	9.8	9.7	10.3
Percent Ethanol Overdose		3%	1%	1%	4%	7%	11%	12%	6%			2%		0%	2%	4%			4%	7%	7%	8%	2%
**Equivalent TOC Dose (mg/l)		2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2			2.2		2.2	2.0	2.0			1.9	2.2	2.3	2.3	2.4
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	5.7	5.7	5.7	6.0	6.0			6.0		6.0	5.7	2.5			2.5	2.5	2.5	2.5	2.5
*Phosphourous Dose (mg/l)		0.19	0.21	0.21	0.20	0.20	0.20	0.19	0.20			0.20		0.20	0.21	0.09			0.09	0.08	0.08	0.08	0.08
Bed Level (ft)		13.92	13.75	13.92	14.06	14.17	14.23	14.19	14.33	14.25	14.42	14.60		14.73	14.75	14.71			14.67	14.81	14.71	14.85	14.67
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		9.2	9.4	10.3	7.3	9.0	10.2	8.1	8.2	8.2	5.4	8.3	8.0	7.6	7.7			7.28	8.33	9.42	6.75	6.33	8.28
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		34	35	35	26	25	27	25	25	24	25	25	26	25	25	25	26	26	26	25	25	24	23
Coagulant Dose (mg/l)		49	57	42	34	32	32	30	29	30	27	27	29	27	27	29	29	29	29	22	18	22	24
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D.O.	SP-1	5.82			5.74			5.34	5.15			5.60		5.41	5.75	5.57			5.56	5.36	5.39	5.50	5.81
	SP-2	2.08			2.31			2.30	2.24			2.25		2.35	2.14	2.09			2.05	2.39	2.41	2.36	2.58
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	0.13			0.16			0.06	0.06			0.05		0.04	0.04	0.04			0.04	0.04	0.03	0.04	0.04
	SP-6A																						
	SP-7	4.38			4.31			4.30	4.61			3.95		4.14	4.68	4.77			4.56	4.74	5.11	4.93	5.00
	SP-8																						
	SP-9	4.44			4.29			3.64	3.92			3.72		3.40	4.00	4.31			3.71	3.92	4.07	4.19	3.96
	SP-10	4.30			4.13			3.38	3.58			3.41		4.14	3.74	4.09			3.56	3.72	3.82	3.81	3.69
	SP-11	5.56			5.60			5.08	4.89			5.15		5.91	5.12	5.46			5.09	5.14	5.11	5.10	5.07
	SP-12	6.92			6.79			6.82	6.86			6.56		6.93	6.75	7.19			6.06	6.32	6.27	6.81	6.17
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	9.33			9.69			8.80	9.59			9.15		9.60	10.19	9.00			9.14	9.36	9.82	9.60	10.24
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	9.24			9.82			9.77	9.63			9.90		9.45	9.90	9.48			9.85	9.42	10.09	10.10	10.12
Conductivity	SP-1	0.22			0.30	0.29		0.23	0.24			0.23		0.21	0.29	0.20			0.21	0.20	0.22	0.22	0.22
	SP-2	0.24			0.29	0.28		0.26	0.22			0.22		0.21	0.28	0.18			0.16	0.20	0.21	0.22	0.25
	SP-3																					0.17	
	SP-4																					0.27	
	SP-5																					0.28	
	SP-6	0.26			0.25	0.26		0.20	0.25			0.25		0.24	0.19	0.18			0.19	0.22	0.21	0.28	0.24
	SP-6A																						
	SP-7	0.25			0.30	0.29		0.28	0.29			0.29		0.28	0.29	0.27			0.29	0.20	0.29	0.29	0.24
	SP-8																						
	SP-9	0.26			0.30	0.27		0.29	0.29			0.29		0.29	0.24	0.29			0.21	0.27	0.21	0.24	0.28
	SP-10	0.29			0.20	0.29		0.29	0.29			0.29		0.29	0.29	0.29			0.29	0.29	0.29	0.29	0.29
	SP-11	0.15			0.20	0.28		0.21	0.19			0.20		0.16	0.28	0.19			0.20	0.21	0.26	0.28	0.26
	SP-12	0.22			0.29	0.26		0.26	0.29			0.29		0.24	0.29	0.21			0.15	0.21	0.22	0.27	0.28
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.25			0.30	0.27		0.29	0.30			0.29		0.27	0.22	0.19			0.25	0.23	0.25	0.24	0.21
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	0.23			0.27	0.26		0.28	0.25			0.24		0.26	0.24	0.25			0.22	0.25	0.28	0.22	0.24

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
FBR-4 Forward Flow (gpm)				775	771	765	760	766			760	765	835	835	834				828	829	845	845	
FBR-4 Recycle Flow (gpm)				1055	1064	1058	1060	1054			1060	1050	985	989	972				987	987	978	968	
FBR-4 Total Flow (gpm)				1830	1835	1823	1820	1820			1820	1815	1820	1824	1806				1815	1816	1823	1813	
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On	Data not available							
Ethanol Flow Rate (ml/min)				39	38	38	37.8	38			38	38	40.5	41	40.5				40.5	40.5	40.5	42	
*Ethanol Dose (mg/l)				10.6	10.4	10.5	10.5	10.5			10.6	10.5	10.2	10.4	10.3				10.3	10.3	10.1	10.5	
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.4	10.3	10.2	10.3	10.2	10.2	10.2	10.3	10.2	9.9	10.0	10.1	10.1	10.1	10.1	10.0	10.0	9.4	9.9	9.9
Percent Ethanol Overdose				3%	1%	3%	2%	3%			3%	3%	3%	4%	2%				4%	4%	8%	6%	
**Equivalent TOC Dose (mg/l)				2.3	2.3	2.3	2.3	2.3			2.3	2.3	2.4	2.5	2.5				2.5	2.5	2.4	2.5	
Nutrient Flow Rate (ml/min)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				2.5	2.5	2.5	3.2	
*Phosphourous Dose (mg/l)				0.08	0.08	0.08	0.08	0.08			0.08	0.08	0.07	0.07	0.07								
Bed Level (ft)		14.67	14.67	14.94	13.79	13.92	14.00	14.21			14.83	14.00	14.21	14.44	14.67				14.21	14.44	14.48	14.48	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Filter Run Time (hours)		7.94	8.50	5.10	12.00	13.58	12.75	12.00	11.50	10.67	5.67	11.25	10.58	10.17	9.58	8.72	5.50	9.17	9.44	11.92	9.50	9.89	4.87
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	7.25	10.15	10.15	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4.4	4.5	3.0	4.4	4.5	4.3
Clarifier Flow (gpm)		23	23	23	26	26	27	26	26	26	26	24	26	24	24	24	24	24	24	24	24	29	30
Coagulant Dose (mg/l)		24	24	24	25	29	27	32	32	32	31	30	32	30		24	26	32	26	8	16	15	23
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D.O.	SP-1			5.85	5.74	5.59	5.72	5.85			5.97	5.92	5.59	5.65	5.80				5.72	5.70	5.04	5.66	
	SP-2			2.40	2.47	2.56	2.53	2.62			2.56	2.54	2.72	2.72	2.72				2.86	2.62	2.62	2.57	
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6			0.02	0.05	0.05	0.04	0.05			0.04	0.04	0.07	0.06	0.07				0.09	0.08	0.07	0.03	
	SP-6A																						
	SP-7			4.59	4.61	4.73	4.42	4.66			4.27	4.73	4.91	4.92	4.03			4.83	4.95	4.89	4.49	4.68	
	SP-8																						
	SP-9			3.31	4.81	3.88	3.91	3.68			3.81	4.14	3.92	3.62	3.57			3.80	4.00	3.85	3.28	3.65	
	SP-10			3.99	3.46	3.49	3.64	3.52			3.37	3.91	3.73	3.74	3.52			3.60	3.67	3.45	3.30	3.49	
	SP-11			5.12	6.60	4.84	4.73	5.40			4.75	5.40	4.91	5.75	5.15			5.53	5.35	5.58	4.80	4.75	
	SP-12			7.01	7.15	6.09	6.25	6.58			6.19	6.41		6.28	6.58			6.40	6.67	6.35	5.87	6.44	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			9.10	9.47	9.70	9.89	8.76			9.39	9.40	9.40	8.45	9.76			9.65	9.20	9.15	9.48	5.70	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22			10.30	9.10	10.31	9.88	9.70			9.96	9.75	9.61	9.69	9.70			9.61	9.68	9.00	9.27	9.32	
Conductivity	SP-1			0.20	0.29	0.29	0.27	0.29			0.29	0.27	0.20	0.23	0.28				0.22	0.18	0.28	0.19	
	SP-2			0.29	0.28	0.25	0.20	0.22			0.20	0.20	0.20	0.24	0.20				0.29	0.24	0.22	0.24	
	SP-3													0.23									
	SP-4													0.29									
	SP-5													0.29									
	SP-6			0.12	0.25	0.22	0.29	0.24			0.20	0.18	0.23	0.19	0.21				0.29	0.22	0.23	0.20	
	SP-6A																						
	SP-7			0.14	0.22	0.22	0.29	0.22			0.29	0.26	0.26	0.29	0.19			0.24	0.22	0.28	0.29	0.28	
	SP-8																						
	SP-9			0.28	0.28	0.23	0.24	0.24			0.27	0.29	0.22	0.29	0.28			0.28	0.29	0.26	0.24	0.25	
	SP-10			0.29	0.29	0.29	0.28	0.29			0.29	0.29	0.29	0.29	0.28			0.29	0.29	0.29	0.28	0.29	
	SP-11			0.28	0.17	0.28	0.26	0.20			0.29	0.17	0.18	0.29	0.19			0.26	0.21	0.28	0.24	0.18	
	SP-12			0.23	0.29	0.23	0.24	0.24			0.29	0.29		0.27	0.28			0.26	0.29	0.29	0.27	0.28	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			0.24	0.22	0.24	0.22	0.22			0.24	0.20	0.28	0.22	0.27			0.29	0.29	0.29	0.28	0.23	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22			0.27	0.23	0.25	0.22	0.24			0.25	0.22	0.25	0.27	0.31			0.25	0.30	0.25	0.29	0.21	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27
FBR-4 Forward Flow (gpm)			832		847		764			762		1000		1000			996		1000		1250		
FBR-4 Recycle Flow (gpm)			978		966		1061			1056		806		808			802		801		553		
FBR-4 Total Flow (gpm)			1810		1813		1825			1818		1806		1808			1798		1801		1803		
FBR-4 Eductor																							
Ethanol Flow Rate (ml/min)			40.5		41		37			37		48.3		47.1			46.8		47.3		61.4		
*Ethanol Dose (mg/l)			10.3		10.2		10.2			10.3		10.2		10.0			9.9		10.0		10.4		
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.5	9.5	9.5	9.7	9.7	9.5	9.5	9.6	9.6	9.6
Percent Ethanol Overdose			3%		4%		3%			2%		3%		5%			3%		5%		8%		
**Equivalent TOC Dose (mg/l)			2.5		2.5		2.2			2.2		2.9		2.9			2.9		2.9		3.7		
Nutrient Flow Rate (ml/min)			2.8		3.2		2.5			2.5		2.1		2.2			7.0		7.0		8.0		
*Phosphourous Dose (mg/l)																							
Bed Level (ft)			14.21		14.54		15.00			14.46		14.60		14.52			14.33		14.08		14.33		
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)																							
Filter Run Time (hours)		9.58	9.17	8.28	8.11	7.72	4.13	12.17	10.94	7.72	7.56	7.06	6.25	11.33	7.13	8.75	6.50	8.28	9.33	9.50	9.50	10.83	9.17
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	3.38	16.91	29.96	30.45	18.85	9.67	9.67	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.5	4.4	4.4	4.5	4.4	4.5	4.5	4.4	4.4	4.4	3.0	3.0	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5	4.4
Clarifier Flow (gpm)		29	26	26	26	26	26	26	26	26	26	26	26	25	25	30	30	30	27	30	31	30	29
Coagulant Dose (mg/l)		22	22	22	22	23	13			14	25	22	23	27	25	18	25	25	19	17	18	17	20
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1		5.69		5.54		5.71			5.79		5.62		5.19			5.35		5.18		5.32		
	SP-2		2.74		2.64		2.48			2.95		3.29		3.26			2.96		2.96		3.92		
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6		0.07		0.04		0.04			0.09		0.09		0.05			0.10		0.06		0.11		
	SP-6A																						
	SP-7		4.68		4.40		4.08			3.15		4.47		5.07			4.68		4.68		4.46		
	SP-8																						
	SP-9		3.38		3.57		2.80			3.32		3.70		3.62			3.87		3.46		3.52		
	SP-10		3.42		3.37		3.13			3.28		3.74					3.42		3.50		3.15		
	SP-11		4.80		4.89		6.36			4.79		4.61					3.43		4.88		4.74		
	SP-12		6.45		6.21		5.96			5.94		5.94		6.45			7.36		6.24		6.06		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		9.53		9.73		5.87			8.69		8.96		13.88			19.91		6.92		8.66		
	SP-17											8.86		12.71			18.12				7.80		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22		9.88		9.44		9.39			7.24		8.78		10.67			18.15		7.38		8.21		
Conductivity	SP-1		0.24		0.22		0.26			0.29		0.28		0.24			0.29		0.26		0.17		
	SP-2		0.19		0.22		0.23			0.20		0.29		0.21			0.29		0.24		0.18		
	SP-3				0.22														0.25				
	SP-4				0.28														0.25				
	SP-5				0.27														0.25				
	SP-6		0.17		0.27		0.25			0.18		0.29		0.24			0.29		0.21		0.22		
	SP-6A																						
	SP-7		0.23		0.20		0.21			0.16		0.27		0.29			0.27		0.22		0.21		
	SP-8																						
	SP-9		0.20		0.21		0.28			0.29		0.29		0.26			0.29		0.20		0.29		
	SP-10		0.29		0.27		0.29			0.29		0.29		0.29			0.29		0.29		0.22		
	SP-11		0.28		0.28		0.25			0.23		0.18		0.24			0.21		0.14		0.21		
	SP-12		0.21		0.22		0.28			0.15		0.25		0.25			0.29		0.23		0.21		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		0.25		0.23		0.24			0.14		0.29		0.26			0.25		0.20		0.15		
	SP-17											0.27		0.21			0.26				0.22		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22		0.22		0.26		0.25			0.31		0.25		0.23			0.30		0.22		0.22		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15
FBR-4 Forward Flow (gpm)		1250		1254	1251	1250					1249		1251	1247	1250	1247		1441		1441
FBR-4 Recycle Flow (gpm)		566		560	563	565					542		546			543		335		333
FBR-4 Total Flow (gpm)		1816		1814	1814	1815					1791		1797			1790		1776		1774
FBR-4 Eductor																				
Ethanol Flow Rate (ml/min)		62		62	61.6	62.7					61.5		62			62.5		71		70.5
*Ethanol Dose (mg/l)		10.5		10.4	10.4	10.6					10.4		10.5			10.6		10.4		10.3
*Theoretical Ethanol Dose (mg/l)		9.7	9.7	9.7	9.7	10.0	10.0	10.0	10.0	10.0	9.6	10.1	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.1
Percent Ethanol Overdose		9%		8%	7%	6%					8%		2%			3%		1%		2%
**Equivalent TOC Dose (mg/l)		3.8		3.8	3.7	3.8					3.8		3.8			3.8		4.4		4.4
Nutrient Flow Rate (ml/min)		8.0		8.0	8.0	8.0					8.0		8.0			2.5				
*Phosphourous Dose (mg/l)						0.16					0.16		0.15			0.05				
Bed Level (ft)		14.48		14.27		14.52					14.33		14.56	14.25	14.33	14.56		14.29		14.42
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.42	9.44	8.83	8.67	8.28	9.72	8.50	14.17	13.67	9.83	8.44	7.22	9.08	10.00	7.92	9.33	10.33	11.83	11.92
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.67	9.18	9.67	5.32	5.80	9.67	9.67	9.67	9.18	6.77	14.98	19.33	19.33	19.81	19.33	18.85	19.33	19.81	19.81
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.1	4.3	3.0	3.0	4.4	4.3	4.4	4.1	3.0	4.3	4.3	4.3	4.4	4.3	4.1	4.3	4.4	4.4
Clarifier Flow (gpm)		29	30	30	30	28	28	30	30	26	26	26	26	26	24	25	25	25	25	24
Coagulant Dose (mg/l)		20	18	20	17	19	19	17	9	9	20	22	25	23	22	22	22	18	16	18
(Alum unless triangle in box, then FeCl3)																				
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1	5.35		5.41		5.69					5.34	5.50	5.69			5.64		5.65		5.46
	SP-2	4.01		3.85		3.94					3.95	4.07	4.10			4.11		4.54		4.89
	SP-3																			
	SP-4																			
	SP-5																			
	SP-6	1.63		0.04		0.03					0.05	0.08	0.05			0.04		-		0.13
	SP-6A																			
	SP-7	4.64		4.41		4.73					4.10	4.91	4.02			4.18		4.10		4.22
	SP-8																			
	SP-9	2.50		3.28		3.35					2.89	3.49	3.02			2.79		2.64		2.76
	SP-10	3.05		3.11		3.39					2.83	3.45	2.68			2.70		2.60		3.45
	SP-11	4.76		4.95		4.76					4.40	5.43	5.20			5.10		3.79		5.89
	SP-12	5.48		5.81		6.28					5.43	6.66	6.25			6.28		4.47		7.41
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	8.20		8.16		7.03					7.16	14.04	9.33			14.27		4.34		15.15
	SP-17											13.64								14.09
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			
	SP-22	8.73		7.24		8.21					7.40	12.97	11.80			12.21		4.35		13.26
Conductivity	SP-1	0.29		0.29		0.22					0.29	0.29	0.25			0.25		0.25		0.29
	SP-2	0.23		0.29		0.29					0.29	0.29	0.29			0.22		0.27		0.29
	SP-3			0.29																
	SP-4			0.29																
	SP-5			0.29																
	SP-6	0.22		0.29		0.28					0.29	0.22	0.24			0.22		0.27		0.29
	SP-6A																			
	SP-7	0.26		0.29		0.29					0.29	0.29	0.23			0.25		0.29		0.29
	SP-8																			
	SP-9	0.27		0.28		0.26					0.29	0.29	0.29			0.29		0.29		0.29
	SP-10	0.17		0.29		0.29					0.29	0.29	0.29			0.29		0.29		0.29
	SP-11	0.09		0.26		0.26					0.29	0.29	0.28			0.29		0.28		0.29
	SP-12	0.26		0.29		0.29					0.29	0.29	0.26			0.29		0.29		0.29
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	0.25		0.29		0.29					0.29	0.29	0.29			0.24		0.29		0.29
	SP-17											0.30								0.30
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			
	SP-22	0.30		0.30		0.28					0.27	0.30	0.28			0.30		0.30		0.30

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
FBR-4 Forward Flow (gpm)				1439		1438		1441			1443		1445		1440			1440	
FBR-4 Recycle Flow (gpm)				368		386		397			388		407		428			428	
FBR-4 Total Flow (gpm)				1807		1824		1838			1831		1852		1868			1868	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)				71.3		70.9		70.7			70.6		71		71.1			71.3	
*Ethanol Dose (mg/l)				10.5		10.4		10.4			10.3		10.4		10.4			10.5	
*Theoretical Ethanol Dose (mg/l)		10.1	10.1	9.9	9.9	10.0	10.0	9.8	9.8	9.8	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0
Percent Ethanol Overdose				5%		4%		6%			2%		2%		4%			4%	
**Equivalent TOC Dose (mg/l)				4.3		4.3		4.2			4.2		4.2		4.2			4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)				14.46		14.46		14.50			14.46		14.79		14.83	14.50		13.50	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		14.75	11.50	10.58	13.25	11.92	13.17	125.00	13.00	14.42	19.67	17.50	8.56	14.50	8.67	9.08	13.17	19.50	15.75
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		19.33	19.81	19.33	16.43	9.67	9.67	9.67	9.67	9.67	9.67	9.67	7.73	6.28	9.18	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.3	4.3	4.3	4.4	4.3	4.3	4.3	4.4	4.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clarifier Flow (gpm)		23	23	25	24	25	24	24	24	24	25	26	26	25	27	27	27	27	27
Coagulant Dose (mg/l)		14	20	14	10	11	12	12	6	0	5	5	16	7	14	17	10	7	7
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1			5.28		5.38		5.11			5.56		5.61		5.42			5.40	
	SP-2			4.32		4.37		4.32			4.52		4.49		4.34			4.36	
	SP-3																		
	SP-4																		
	SP-5																		
	SP-6			0.16		0.08		0.03			0.04		0.01		0.01			0.05	
	SP-6A																		
	SP-7			4.65		4.50		4.21			4.82		4.83		4.31			4.78	
	SP-8																		
	SP-9			2.97		2.70		2.36			3.22		3.16		3.64			3.20	
	SP-10			2.99		2.76		2.24			3.08		3.13		2.88			3.13	
	SP-11			6.18		5.55		3.76			4.52		4.78		5.90			4.98	
	SP-12			6.36		5.51		4.95			5.63		5.79		6.18			6.06	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			13.11		7.87		7.01			6.86		5.91		6.23			8.04	
	SP-17			14.07															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22			12.81		7.27		5.19			5.67		2.94		6.20			6.17	
Conductivity	SP-1			0.29		0.22		0.26			0.29		0.29		0.29			0.29	
	SP-2			0.29		0.29		0.23			0.29		0.29		0.25			0.29	
	SP-3					0.29													
	SP-4					0.29													
	SP-5					0.29													
	SP-6			0.29		0.29		0.24			0.29		0.29		0.22			0.29	
	SP-6A																		
	SP-7			0.29		0.29		0.29			0.29		0.29		0.29			0.29	
	SP-8																		
	SP-9			0.29		0.29		0.29			0.29		0.29		0.29			0.29	
	SP-10			0.29		0.29		0.29			0.29		0.29		0.29			0.29	
	SP-11			0.27		0.29		0.27			0.28		0.29		0.27			0.28	
	SP-12			0.29		0.29		0.28			0.29		0.29		0.29			0.29	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			0.29		0.29		0.28			0.29		0.29		0.24			0.29	
	SP-17			0.30															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22			0.30		0.28		0.30			0.30		0.44		0.30			0.32	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
FBR-4 Forward Flow (gpm)		1443		1431	1443	1437	1443		D		1440	1440		1442		1440		1444	
FBR-4 Recycle Flow (gpm)		425		437			425		354		362			343		356		423	
FBR-4 Total Flow (gpm)		1868		1868			1868				1802			1785		1796		1867	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		72.2		72			71.8		71.5		71.4			71		71.4		71.4	
*Ethanol Dose (mg/l)		10.6		10.6			10.5				10.5			10.4		10.5		10.4	
*Theoretical Ethanol Dose (mg/l)		9.8	9.8	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.5	10.5	10.6	10.6
Percent Ethanol Overdose		8%		6%			5%				6%			4%		0%		-1%	
**Equivalent TOC Dose (mg/l)		4.2		4.2			4.2				4.4			4.4		4.4		4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.58		14.63	14.79	14.58	14.54	14.00	14.29		14.46	14.42		14.46		14.63		14.42	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.50	16.67	7.72	13.08	13.00	15.92	19.67	16.17	14.67	15.25	11.70	14.33	14.17	10.67	11.08	8.00	9.83	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.18	9.67	7.25	9.67	9.67	9.67	6.77	9.67	9.67	9.67	9.67	9.67	9.18	9.67	8.70	6.77	4.83	3.38
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.0	4.1	3.0	4.1	4.1	4.3	3.0	4.3	4.1	4.1	4.1	4.1	4.0	4.1	3.9	4.1	4.1	3.0
Clarifier Flow (gpm)		27	27	27	26	26	26	26	26	26	26	26	25	25	25	25	25	25	27
Coagulant Dose (mg/l)		17	5	19	13	13	5	11	7	13	5	13	13	11	14	13	18	14	10
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1	5.35		5.62			5.57		5.45		5.43			5.55		6.08		6.17	
	SP-2	4.23		3.43			4.43		4.55		4.54			4.45		4.89		4.43	
	SP-3																		
	SP-4																		
	SP-5																		
	SP-6	0.01		0.02			0.00		0.03		0.04			0.01		0.02		0.01	
	SP-6A																		
	SP-7	3.94		4.38			4.04		4.06		4.35			3.96		5.36		4.44	
	SP-8																		
	SP-9	2.29		2.60			3.00		2.35		2.69			2.69		3.67		2.87	
	SP-10	9.35		2.56			9.31		9.13		9.79			10.06		10.14		10.41	
	SP-11	9.87		5.21			9.43		10.40		10.35			10.44		11.29		10.88	
	SP-12	9.69		6.03			10.64		10.41		10.95			11.14		11.63		11.44	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	11.60		4.74			13.80		14.00		14.66			14.62		15.19		12.26	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	11.26		6.05			13.95		14.27		13.60			13.88		15.29		12.75	
Conductivity	SP-1	0.28		0.22			0.29		0.29		0.27			0.29		0.29		0.22	
	SP-2	0.29		0.24			0.29		0.29		0.25			0.29		0.24		0.24	
	SP-3	0.29														0.29			
	SP-4	0.29														0.29			
	SP-5	0.29														0.29			
	SP-6	0.28		0.25			0.29		0.29		0.29			0.25		0.29		0.28	
	SP-6A																		
	SP-7	0.29		0.28			0.29		0.28		0.29			0.29		0.29		0.29	
	SP-8																		
	SP-9	0.29		0.29			0.27		0.29		0.29			0.29		0.29		0.29	
	SP-10	0.29		0.29			0.29		0.29		0.29			0.29		0.29		0.27	
	SP-11	0.27		0.27			0.27		0.19		0.22			0.21		0.21		0.26	
	SP-12	0.29		0.28			0.29		0.28		0.29			0.29		0.29		0.26	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	0.29		0.27			0.29		0.28		0.29			0.29		0.28		0.29	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	0.30		0.27			0.30		0.26		0.31			0.30		0.31		0.30	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8
FBR-4 Forward Flow (gpm)			1443		1445		1444	1442	1437	1441		1439		1447	1442	1437	1436		1440
FBR-4 Recycle Flow (gpm)			424		422		423			426		427		421			432		428
FBR-4 Total Flow (gpm)			1867		1867		1867			1867		1866		1868			1868		1868
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			70.5		70.8		71.1			70.2		71.2		71.5			70.9		70.9
*Ethanol Dose (mg/l)			10.3		10.4		10.4			10.3		10.5		10.4			10.4		10.4
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.6	9.9	10.2	9.5	9.5	9.5	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.0	10.0	10.7
Percent Ethanol Overdose			-2%		5%		10%			0%		1%		2%			5%		-3%
**Equivalent TOC Dose (mg/l)			4.1		4.2		4.2			4.1		4.2		4.2			4.2		4.2
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.63		14.50		14.92	14.17	14.42	14.50		14.38		14.83	14.50	14.54	14.75		14.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		20.00	18.83	11.00	13.83	16.00	30.67	15.83	13.25	11.28	9.17	12.17	11.50	8.67	11.72	11.67	11.75	10.83	10.33
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		0.00	2.90	4.83	4.83	3.38	0.00	4.35	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.0	3.0	4.3	4.3	3.0	3.0	4.0	4.3	4.1	4.3	4.3	4.1	4.3	4.3	4.3	4.3	4.1	4.1
Clarifier Flow (gpm)		27	26	26	26	26	26	26	26	26	25	25	25	26	26	27	26	26	26
Coagulant Dose (mg/l)		0	16	14	5	0	0	0	0	0	5	11	13	18	11	12	13	13	14
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1				5.37	5.81	4.98			5.81		5.71		5.67			5.55		6.35
	SP-2				4.13	4.03	4.33			4.49		4.85		4.41			3.78		5.03
	SP-3																		
	SP-4											1.36							
	SP-5																		
	SP-6				0.05	0.02	1.42			0.08		0.15		0.00			0.03		0.02
	SP-6A																		
	SP-7				4.34	3.94	4.34			4.72		4.44		4.07			4.35		5.44
	SP-8																		
	SP-9				2.82	2.51	3.07			2.66		5.65		3.07			3.35		4.09
	SP-10				9.64	9.57	9.61			9.94		10.35		9.28			9.37		10.54
	SP-11				9.78	9.80	9.25			10.17		10.61		9.61			9.40		10.64
	SP-12				9.82	10.10	9.34			10.57		10.76		9.94			10.11		11.85
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				10.81	10.96	10.21			11.76		11.86		10.80			11.02		12.87
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22				10.96	11.00	10.08			11.32		11.93		10.90			10.74		12.59
Conductivity	SP-1				0.29	0.28	0.29			0.29		0.28		0.28			0.25		0.29
	SP-2				0.29	0.24	0.29			0.29		0.25		0.24			0.24		0.29
	SP-3											0.29							
	SP-4											0.27							
	SP-5											0.24							
	SP-6				0.25	0.27	0.29			0.24		0.24		0.29			0.29		0.29
	SP-6A																		
	SP-7				0.29	0.29	0.29			0.29		0.29		0.29			0.29		0.29
	SP-8																		
	SP-9				0.29	0.29	0.29			0.29		0.29		0.29			0.29		0.29
	SP-10				0.29	0.29	0.29			0.29		0.29		0.29			0.29		0.25
	SP-11				0.17	0.26	0.28			0.26		0.16		0.22			0.19		0.20
	SP-12				0.25	0.29	0.29			0.29		0.29		0.29			0.29		0.29
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				0.29	0.29	0.29			0.29		0.29		0.29			0.29		0.29
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22				0.29	0.32	0.31			0.29		0.30		0.29			0.29		0.31

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26
FBR-4 Forward Flow (gpm)			1440	1447	1439	1438		1438		1441			1441		1440		1441	1440	1444
FBR-4 Recycle Flow (gpm)			426			429		428		427			427		427				
FBR-4 Total Flow (gpm)			1866			1867		1866		1868			1868		1867				
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			71.2			71.1		71.2		70.6			71.2		71.0				
*Ethanol Dose (mg/l)			10.4			10.4		10.5		10.4			10.4		10.4				
*Theoretical Ethanol Dose (mg/l)		10.7	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.4	10.4	10.4	10.4	10.4
Percent Ethanol Overdose			3%			3%		2%		3%			3%		0%				
**Equivalent TOC Dose (mg/l)			4.2			4.2		4.2		4.2			4.2		4.2				
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.50	14.42	14.50	14.58		14.71		14.58			14.50		14.50	14.83	14.58	14.63	14.38
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.71	10.17	13.42	12.25	9.75	11.75	9.61	7.50	10.22	8.33	8.44	9.50	9.39	11.50	13.50	11.50	11.42	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.8	3.4	3.5	3.5	3.5	3.5	3.5
Clarifier Flow (gpm)		25	25	25	25	25	25	25	25	25	24	24	24	26	27	27	27	27	27
Coagulant Dose (mg/l)		18	14	11	11	13	11	18	18	13	20	20	14	18	12	12	12	12	8
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1		5.73				5.77	5.86		5.68			5.74		6.03				
	SP-2		4.38				4.49	4.66		4.40			4.40		4.88				
	SP-3																		
	SP-4																		
	SP-5																		
	SP-6		0.04				0.00	0.00		0.03			0.04		0.02				
	SP-6A																		
	SP-7		4.64				4.45	4.06		4.60			4.30		4.90				
	SP-8																		
	SP-9		3.51				3.01	2.71		3.02			3.10		3.67				
	SP-10		9.46				9.51	9.65		7.40			9.57		10.27				
	SP-11		9.49				9.69	9.86		9.92			9.88		9.63				
	SP-12		10.34				10.44	10.16		10.71			10.15		11.33				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		11.43				11.45	11.47		11.70			11.28		12.53				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22		11.48				11.71	11.07		11.66			11.33		12.14				
Conductivity	SP-1		0.25				0.29	0.29		0.29			0.29		0.29				
	SP-2		0.29				0.24	0.29		0.29			0.29		0.29				
	SP-3							0.12											
	SP-4							0.17											
	SP-5							0.18											
	SP-6		0.29				0.29	0.29		0.22			0.28		0.29				
	SP-6A																		
	SP-7		0.29				0.29	0.29		0.29			0.29		0.29				
	SP-8																		
	SP-9		0.29				0.29	0.29		0.29			0.29		0.29				
	SP-10		0.29				0.29	0.29		0.29			0.29		0.29				
	SP-11		0.24				0.26	0.28		0.26			0.23		0.24				
	SP-12		0.29				0.29	0.29		0.29			0.29		0.29				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		0.29				0.29	0.29		0.29			0.29		0.29				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22		0.31				0.29	0.30		0.30			0.30		0.30				

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
FBR-4 Forward Flow (gpm)		1442		1447		1434	1439	1452	1441		1437.00		1438	1442	1447	1440		1435	
FBR-4 Recycle Flow (gpm)		425		419		432	427	414	427		430.00		371	367	362	378		370	
FBR-4 Total Flow (gpm)		1867		1866		1866	1866	1866	1868		1867.00		1809	1809	1809	1818		1805	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		70.7		71.5		71.1	71.0	71.0	71.6		71.4		70.8	71.1	71.1	71.1		70.6	
*Ethanol Dose (mg/l)		10.4		10.4		10.5	10.4	10.3	10.5		10.5		10.4	10.4	10.4	10.4		10.4	
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.3	9.9	10.0	10.0	10.0	9.9	9.9	10.2	10.2	9.5	9.5	9.5	10.0	10.0	9.9	9.9
Percent Ethanol Overdose		-3%		1%		5%	4%	3%	7%		2%		10%	10%	9%	5%		5%	
**Equivalent TOC Dose (mg/l)		4.2		4.2		4.2	4.2	4.2	4.2		4.2		4.3	4.3	4.3	4.3		4.3	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.67		14.83		15.08	14.75	14.54	14.88		14.92		15.25	15.21	15.42	15.71	15.67	15.33	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350.00	350.00	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		10.75	11.42	15.58	13.00	11.83	8.67	10.92	8.94	11.00	13.83	12.83	11.25	12.17	11.67	12.11	11.00	10.08	
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100.00	100.00	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	3.38	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	12.08	
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10.00	10.00	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.5	3.4	3.5	3.5	3.5	3.4	3.5	3.0	3.40	3.40	3.4	3.4	3.4	3.4	3.0	3.0	3.8	0.0
Clarifier Flow (gpm)		27	26	26	20	25	25	26	23	18	18	18	18	13	11	12	13	15	
Coagulant Dose (mg/l)		14	16	9	28	23	32	23	14	14	28	16	14	25	18	18	18	54	
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
D.O.	SP-1	6.31		6.04	5.60	5.67			5.50		5.93		5.09			5.63		5.50	
	SP-2	4.67		4.83	4.47	4.51			4.37		4.38		4.15			4.48		4.74	
	SP-3				1.38														
	SP-4				0.45														
	SP-5				0.01														
	SP-6	0.02		0.95	0.05	0.05			0.02		0.00		0.02			0.02	0.10	0.01	
	SP-6A																		
	SP-7	4.76		4.98		3.54			4.62		4.57		4.14			4.46		4.34	
	SP-8																		
	SP-9	3.28		3.57		2.44			3.55		3.51		3.46			3.57		3.13	
	SP-10	10.19		10.53		9.81			9.75		9.94		9.28			9.41		9.55	
	SP-11	10.81		10.99		9.61			9.91		10.53		9.65			9.70		10.04	
	SP-12	11.10		11.28		10.52			10.35		10.44		10.25			10.35			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	12.14		11.36		11.79			10.90		11.42		11.37			11.40		11.18	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	12.52	12.17	11.75		11.35			9.15		11.45		10.99			11.40		11.14	
Conductivity	SP-1	0.29		0.29		5.67			0.29		0.28		0.25			0.29	0.29	0.29	
	SP-2	0.28		0.29		4.51			0.28		0.24		0.29			0.29		0.28	
	SP-3			0.28														0.14	
	SP-4			0.26														0.28	
	SP-5			0.27														0.19	
	SP-6	0.24		0.25		0.05			0.29		0.24		0.29			0.27	0.29	0.29	
	SP-6A																		
	SP-7	0.29		0.29		3.54			0.29		0.29		0.29			0.29		0.29	
	SP-8																		
	SP-9	0.29		0.29		2.44			0.29		0.29		0.29			0.29		0.29	
	SP-10	0.29		0.29		9.81			0.29		0.29		0.29			0.29		0.29	
	SP-11	0.27		0.27		9.61			0.20		0.27		0.28			0.27		0.29	
	SP-12	0.29		0.29		10.52			0.29		0.29		0.29			0.29			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	0.29		0.29		11.79			0.29		0.29		0.29			0.28		0.29	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	0.25	0.29	0.25		11.35			0.29		0.29		0.29			0.29	0.29	0.27	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		12/15	Ave
FBR-4 Forward Flow (gpm)			1003
FBR-4 Recycle Flow (gpm)			860
FBR-4 Total Flow (gpm)			1826
FBR-4 Eductor			
Ethanol Flow Rate (ml/min)			46.9
*Ethanol Dose (mg/l)			10.2
*Theoretical Ethanol Dose (mg/l)			
Percent Ethanol Overdose			0.0
**Equivalent TOC Dose (mg/l)			2.8
Nutrient Flow Rate (ml/min)			5.76
*Phosphourous Dose (mg/l)			0.21
Bed Level (ft)			14.21
Filter Flow (gpm)			350
Filter Polymer Dose (mg/l)			0.00
Filter Run Time (hours)			10.89
UVOX/LPGAC Flow (gpm)			100
Peroxide Dose (mg/l)			9.59
Disinfection Flow (gpm)			10
Chlorine Dose (mg/l)			4.11
Clarifier Flow (gpm)			23.5
Coagulant Dose (mg/l)			15.9
(Alum unless triangle in box, then FeCl3)			
Clarifier Polymer Dose (mg/l)			2.1
D.O.	SP-1		5.60
	SP-2		3.17
	SP-3		1.38
	SP-4		0.91
	SP-5		0.01
	SP-6		0.10
	SP-6A		
	SP-7		4.68
	SP-8		6.10
	SP-9		3.68
	SP-10		5.17
	SP-11		6.42
	SP-12		7.44
	SP-13		8.62
	SP-14		8.49
	SP-15		8.07
	SP-16		9.76
	SP-17		11.70
	SP-18		
	SP-19		
	SP-20		7.63
	SP-21		
	SP-22		9.79
Conductivity	SP-1		0.31
	SP-2		0.29
	SP-3		0.24
	SP-4		0.27
	SP-5		0.26
	SP-6		0.26
	SP-6A		
	SP-7		0.30
	SP-8		0.27
	SP-9		0.30
	SP-10		0.37
	SP-11		0.32
	SP-12		0.36
	SP-13		0.28
	SP-14		0.28
	SP-15		0.30
	SP-16		0.37
	SP-17		0.27
	SP-18		0.30
	SP-19		0.29
	SP-20		0.30
	SP-21		0.31
	SP-22		0.37

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
FBR-4 Forward Flow (gpm)		695	685	680	680	680	675	674	662	664	680	672	672	675	665	670	668	666	680	680	690	685
FBR-4 Recycle Flow (gpm)		1125	1130	1125	1125	1125	1135	1136	1123	1131	1140	1135	1135	1140	1140	1140	1142	1139	1126	1126	1120	1135
FBR-4 Total Flow (gpm)		1820	1815	1805	1805	1805	1810	1810	1785	1795	1820	1807	1807	1815	1805	1810	1810	1805	1806	1806	1810	1820
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	On	On	On	On	On	On	On	Off	Off
Ethanol Flow Rate (ml/min)		30.5	30.0	29.0	29.0	29.0	29.0	29.0	27.9	29.0	30.0	30.3	30.3	31.0	30.5	30.5	30.0	31.0	30.7	30.7	31.5	31.0
*Ethanol Dose (mg/l)		9.3	9.3	9.0	9.0	9.0	9.1	9.1	8.9	9.2	9.3	9.5	9.5	9.7	9.7	9.6	9.5	9.8	9.5	9.5	9.6	9.6
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	10.0	10.0	10.3	10.3	9.6	9.2	10.0	10.0	10.0	9.9	10.0	9.9	9.9	10.4	10.4	10.4	9.8	10.1
Percent Ethanol Overdose		-7%	-8%	-10%	-10%	-10%	-12%	-12%	-7%	0%	-7%	-5%	-5%	-2%	-3%	-3%	-4%	-5%	-8%	-8%	-1%	-5%
**Equivalent TOC Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9
Nutrient Flow Rate (ml/min)		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	11.4	11.4	11.4	11.4	11.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.42	0.41	0.41	0.41	0.41	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
Bed Level (ft)		14.21	14.44	14.56	14.56	14.56	14.79	14.90	14.96	15.13	13.67	13.63	13.58	13.79	13.75	13.71	13.67	13.60	13.50	13.38	13.54	13.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		11.7	10.3	9.2	9.9	9.8	11	9.8	4.8	5.4	4.5	9.0	8.5	11.5	12.3	13.7	13.6	14	15.0	14.8	13.4	13.1
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		18.36	17.88	23.20	26.10	26.58	23.68	25.13	33.83	29.00						5.32	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.4	3.4	3.4	3.4	3.4	3.4	3.6								4.5	4.6	4.6	4.6	4.6	4.8	4.6
Clarifier Flow (gpm)		25	32	40	42	41	42	42	36	46	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		16	20	22	24	22	24	22	38	53	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																						
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
pH	SP-1	7.42		7.21					7.26	7.05	7.25			7.23	7.04	6.96	6.95	6.97			7.02	7.12
	SP-2	7.19		6.96					7.14	6.83	7.03			6.71	6.86	6.85	6.81	6.79			6.84	6.87
	SP-3	7.26																				
	SP-4	7.24																				
	SP-5	7.08																				
	SP-6	7.20		7.08					7.09	6.80	6.98			6.66	6.82	6.81	6.76	6.76			6.81	6.82
	SP-6A																					
	SP-7			7.19				7.07	7.17	6.89	7.05			6.75	6.90	6.87	6.85	6.78			6.85	6.85
	SP-8							7.06		6.89	7.05			6.75				6.78			6.84	
	SP-9			7.24			6.99	7.04	7.14	6.88	7.04			6.70	6.88	6.81	6.81	6.75			6.79	6.82
	SP-10			7.26			7.02	7.05	7.15	6.86	7.04			6.72	6.90	6.86	6.81	6.77			6.81	6.83
	SP-11			7.23			7.00	7.03	7.14					6.71	6.91	6.85	6.80	6.76			6.80	6.83
	SP-12							7.08	7.20	6.93	7.06			6.73	6.94	6.88	6.84	6.80			6.83	6.88
	SP-13								7.20		7.09			6.72								
	SP-14								7.20		7.07			6.72								
	SP-15								7.18		7.06			6.73								
	SP-16			7.20			6.97	7.01	7.17	6.97	7.05			6.71	6.91	6.85	6.81	6.79			6.80	6.85
	SP-17																	6.79			6.78	
	SP-18																	6.80			6.82	
	SP-19																	6.79			6.83	
	SP-20																	6.79			6.83	
	SP-21																	6.79			6.83	
	SP-22			7.22			6.96	6.99	7.17	6.95	7.05			6.71	6.90	6.85	6.78	6.79			6.83	6.86
Temperature	SP-1	19.0							19.3	19.1	19.2			19.3	19.3	19.2	19.4	19.3			19.1	19.2
	SP-2	19.1							19.3	19.2	19.2			19.4	19.3	19.3	19.4	19.3			19.2	19.3
	SP-3																					
	SP-4																					
	SP-5																					
	SP-6	19.1							19.3	19.3	19.4			19.8	19.5	19.4	19.9	19.5			19.2	19.3
	SP-6A																					
	SP-7							19.4	19.5	19.7	19.5			19.6	19.5	19.5	19.7	19.6			19.4	19.5
	SP-8						19.4	19.5		19.9	19.6			19.8				19.7			19.4	
	SP-9						19.6	19.6	19.5	19.8	19.5			19.7	19.7	19.9	19.8	19.7			19.4	19.6
	SP-10						19.5	19.6	19.5	20.0	19.6			19.9	19.8	19.8	20.0	19.8			19.5	19.7
	SP-11						19.7	20.0	19.7					20.3	20.1	20.1	20.3	20.1			19.6	19.9
	SP-12							20.0	19.8	20.3	20.0			20.2	20.1	20.0	20.2	20.0			19.7	19.9
	SP-13								19.9		20.2			20.4								
	SP-14								19.9		20.1			20.4								
	SP-15								19.9		20.1			20.5								
	SP-16						20.0	20.1	20.0	20.4	20.1			20.4	20.2	20.1	20.4	20.2			19.8	20.0
	SP-17																	20.2			19.9	
	SP-18																	20.4			20.0	
	SP-19																	20.5			20.0	
	SP-20																	20.6			20.2	
	SP-21																	20.8			20.3	
	SP-22						20.6	20.8	20.5	20.9	20.7			21.4	21.1	20.9	21.3	21.0			20.4	20.7

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20
FBR-4 Forward Flow (gpm)		695	695	675	677	677	675	680	677	680	690	
FBR-4 Recycle Flow (gpm)		1130	1130	1150	1142	1142	1150	1150	1148	1140	1125	
FBR-4 Total Flow (gpm)		1825	1825	1825	1819	1819	1825	1830	1825	1820	1815	
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		31.0	32.0	31.0	30.5	30.5	31	31	32	31	36	
*Ethanol Dose (mg/l)		9.4	9.7	9.7	9.5	9.5	9.7	9.6	10.0	9.6	11.0	
*Theoretical Ethanol Dose (mg/l)		9.8	9.5	10.0	10.0	10.0	10.0	10.0	10.0	9.9	10.4	10.4
Percent Ethanol Overdose		-4%	3%	-3%	-5%	-5%	-3%	-4%	-1%	-3%	6%	
**Equivalent TOC Dose (mg/l)		1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.2	
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	3.8	3.8	5.0	5.0	5.0	5.0	5.0	
*Phosphourous Dose (mg/l)		0.20	0.20	0.20	0.14	0.14	0.18	0.18	0.18	0.18	0.18	
Bed Level (ft)		13.46	13.38	13.38	13.29	13.17	13.38	13.33	13.25	13.25	13.17	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		12.5	12.1	11.4	10.9	10.5	10.3	10.1	9.4	9.0	8.8	8.9
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	6.77	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.6	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.3	4.3	4.4
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)												
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
pH	SP-1	7.27	7.27	7.23			7.20	7.30	7.18	7.24	7.30	
	SP-2	7.03	7.10	7.11			7.08	7.11	7.05	7.01	7.09	
	SP-3											
	SP-4											
	SP-5											
	SP-6	6.96	7.01	7.05			7.00	7.06	6.98	7.03	7.06	
	SP-6A											
	SP-7	7.00	7.01	7.07			7.03	7.06	6.96	7.04	7.07	
	SP-8											
	SP-9	6.99	6.98	7.03			7.01	7.02	6.94	6.99	7.02	
	SP-10	6.93	6.97	7.04			6.99	7.02	6.96	7.01	7.03	
	SP-11	6.92	6.96	7.04			6.98	7.02	6.95	7.01	6.99	
	SP-12	6.98	7.00	7.07			7.01	7.06	7.03	7.06	7.06	
	SP-13											
	SP-14											
	SP-15											
	SP-16	6.98	6.97	7.04			6.99	7.04	7.01	7.00	7.02	
	SP-17											
	SP-18											
	SP-19											
	SP-20											
	SP-21											
	SP-22	6.96	6.97	7.05			6.95	7.03	6.97	7.02	7.02	
Temperature	SP-1	19.1	19.0	19.2			19.0	19.0	19.1	19.2	19.2	
	SP-2	19.4	19.0	19.3			19.1	19.1	19.2	19.2	19.4	
	SP-3											
	SP-4											
	SP-5											
	SP-6	19.3	18.8	19.4			18.7	19.0	19.2	19.3	19.6	
	SP-6A											
	SP-7	19.5	19.2	19.5			19.0	19.3	19.5	19.5	19.6	
	SP-8											
	SP-9	19.4	19.2	19.6			19.1	19.3	19.5	19.6	19.7	
	SP-10	19.6	19.3	19.7			19.0	19.3	19.5	19.7	19.9	
	SP-11	19.8	19.4	20.0			19.0	19.3	19.7	19.8	20.4	
	SP-12	19.9	19.5	20.0			19.2	19.4	19.8	19.9	20.2	
	SP-13											
	SP-14											
	SP-15											
	SP-16	19.9	19.4	20.2			19.2	19.4	19.9	20.1	20.4	
	SP-17											
	SP-18											
	SP-19											
	SP-20											
	SP-21											
	SP-22	20.2	19.4	21.0			18.8	19.4	20.1	20.7	21.4	

Date (2000)		5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31
FBR-4 Forward Flow (gpm)			655	690	650	655	655				675	680
FBR-4 Recycle Flow (gpm)			1170	1170	1170	1175	1175				1160	1155
FBR-4 Total Flow (gpm)			1825	1860	1820	1830	1830				1835	1835
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)			30	30	30	30.5	30				30	32
*Ethanol Dose (mg/l)			9.7	9.2	9.8	9.8	9.7				9.4	9.9
*Theoretical Ethanol Dose (mg/l)		10.4	10.4	9.7	10.3	10.0	10.5	10.5	10.5	10.5	10.3	10.4
Percent Ethanol Overdose			-7%	-5%	-5%	-1%	-8%				-9%	-4%
**Equivalent TOC Dose (mg/l)			1.8	1.8	1.8	1.8	1.8				1.8	1.9
Nutrient Flow Rate (ml/min)			5.0	5.0	5.0	5.0	5.0				5.0	5.0
*Phosphourous Dose (mg/l)			0.19	0.18	0.19	0.19	0.19				0.18	0.18
Bed Level (ft)			13.19	13.21	13.19	13.19	13.17				13.21	13.25
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.6	8.3	7.6	9.0	8.2	14.9	6.4	10.2	11.0	7.5	9.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	9.67	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.4	4.5	4.5	4.4	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)												
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
pH	SP-1				7.27	7.29	7.34				7.45	7.27
	SP-2				7.13	7.13	7.18				7.21	7.11
	SP-3											
	SP-4											
	SP-5											
	SP-6				6.99	7.05	7.12				7.09	7.09
	SP-6A											
	SP-7				7.03	7.10	7.10				7.14	7.12
	SP-8											
	SP-9				7.05	7.05	7.05				7.13	7.09
	SP-10				7.07	7.06	7.07				7.13	7.10
	SP-11				7.10	7.05	7.05				7.11	7.08
	SP-12				7.06	7.10	7.06				7.15	7.14
	SP-13											
	SP-14											
	SP-15											
	SP-16				7.04	7.09	7.04				7.09	7.09
	SP-17											
	SP-18											
	SP-19											
	SP-20											
	SP-21											
	SP-22				7.04	7.06	7.07				7.04	7.09
Temperature	SP-1				19.8	19.3	19.3				19.3	19.2
	SP-2				19.6	19.4	19.4				19.3	19.4
	SP-3											
	SP-4											
	SP-5											
	SP-6				20.2	20.0	20.3				20.0	19.6
	SP-6A											
	SP-7				19.9	19.7	19.7				19.5	19.6
	SP-8											
	SP-9				20.0	19.9	19.8				19.7	19.7
	SP-10				20.3	20.0	20.0				19.9	19.9
	SP-11				20.8	20.4	20.3				20.2	20.3
	SP-12				20.6	20.3	20.3				20.2	20.2
	SP-13											
	SP-14											
	SP-15											
	SP-16				20.9	20.5	20.5				21.6	20.4
	SP-17											
	SP-18											
	SP-19											
	SP-20											
	SP-21											
	SP-22				21.9	21.5	21.5				22.2	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22
FBR-4 Forward Flow (gpm)		660	660			719	715	720	725	725			765	800	730	725	730	720	720	715	720	705	730
FBR-4 Recycle Flow (gpm)		1145	1140			1081	1085	1090	1085	1085			1030	990	1070	1060	1095	1101	1101	1110	1105	1105	1138
FBR-4 Total Flow (gpm)		1805	1800			1800	1800	1810	1810	1810			1795	1790	1800	1785	1825	1821	1821	1825	1825	1810	1868
FBR-4 Eductor		Off	Off	Off	On	On	On	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On
Ethanol Flow Rate (ml/min)		31	31			35	35	36	36	36			38	40	36	36.5	37	37	37	36	36	35	36.5
*Ethanol Dose (mg/l)		9.9	9.9			10.3	10.3	10.6	10.5	10.5			10.5	10.6	10.4	10.6	10.7	10.9	10.9	10.6	10.6	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.2	10.1	10.1	10.1	9.9	10.1	10.2	10.2	10.1	10.1	10.1	9.7	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.3	10.4	10.4
Percent Ethanol Overdose		-3%	-2%			3%	2%	4%	3%	4%			9%	6%	4%	7%	7%	9%	9%	6%	3%	1%	2%
**Equivalent TOC Dose (mg/l)		1.9	1.9			2.1	2.1	2.2	2.2	2.2			2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Nutrient Flow Rate (ml/min)		5.0	5.0			5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.18	0.18			0.17	0.17	0.17	0.17	0.17			0.16	0.15	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.19
Bed Level (ft)		13.15	13.17	13.13	13.21	13.29	13.33	13.33	13.31	13.38	13.25	13.25	13.46	13.54	13.54	13.58	13.71	13.63	13.63	13.73	13.79	13.79	14.00
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.1	4.4	4.0	4.0	6.2	11.0	11.8	10.2	11.2	12.1	11.0	9.2	8.4	9.5	8.4	6.7	7.5	4.2	4.7	4.7	4.3	3.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	12.08	13.53
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.4	4.4	4.4	4.4	4.5	4.5	3.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4
Clarifier Flow (gpm)		0	50	50	49	49	0	0	48	48	48	47	47	47	47	47	36	60	37	34	34	34	34
Coagulant Dose (mg/l)		0	28	28	28	26	0	0	26	26	26	26	0	0	0	0	0	0	6	12	18	38	73
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	5.0	20.0	20.0	20.0	20.0
pH	SP-1	7.26	7.45			7.35	7.19	7.28		7.38			7.30	7.35	7.34	7.33	7.25			7.30	7.25		7.20
	SP-2	7.09	7.15			7.16	7.10	7.13		7.15			7.16	7.17	7.17	7.16	7.09			7.08	7.09		7.07
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	7.04	7.12			7.12	7.04	7.11		7.09			7.09	7.10	7.13	7.12	7.06			7.04	7.04		7.01
	SP-6A																						
	SP-7	7.05	7.17			7.19	7.09	7.11		7.15			7.08	7.10	7.17	7.10	7.09			7.13	7.06		7.03
	SP-8																						
	SP-9	6.99	7.13			7.18	7.07	7.07		7.12			7.04	7.10	7.14	7.06	7.06			7.13	7.05		7.03
	SP-10	7.00	7.11			7.16	7.09	7.08		7.12			7.02	7.11	7.17	7.10	7.06			7.10			
	SP-11	6.97	7.11			7.14	7.08	7.05		7.10			6.96	7.10	7.16	7.11	7.06			7.08			
	SP-12	7.02	7.15			7.21	7.11	7.12		7.14			7.01	7.14	7.17	7.14	7.09			7.14			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	6.99	7.10			7.19	7.05	7.10		7.22			7.00	7.14	7.13	7.14	7.08			7.12			
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	7.00	7.08			7.19	7.03	7.06		7.22			6.94	7.15	7.15	7.15	7.09			7.06			
Temperature	SP-1	19.3	19.3			19.1	19.4	19.3		19.1			19.2	19.5	19.2	19.3	19.5			19.2	19.7		19.2
	SP-2	19.4	19.4			19.2	19.4	19.3		19.2			19.3	19.6	19.4	19.5	19.6			19.3	19.5		19.3
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	19.7	19.7			19.1	19.7	19.4		19.3			19.6	20.3	19.8	20.2	20.4			19.5	20.1		19.6
	SP-6A																						
	SP-7	19.7	20.0			19.6	19.6	19.6		19.5			19.7	20.0	19.8	19.9	19.9			19.9	70.3		19.8
	SP-8																						
	SP-9	19.8	20.1			19.6	19.7	19.6		19.5			19.8	20.6	19.9	30.0	20.1			19.9	20.4		20.0
	SP-10	20.1	20.4			19.7	19.7	19.7		19.6			19.9	20.6	20.1	20.3	20.4			20.0			
	SP-11	20.7	20.7			20.1	20.2	20.1		19.9			20.5	21.2	20.7	20.9	20.9			20.4			
	SP-12	20.3	20.6			20.0	20.1	20.0		19.9			20.4	21.1	20.4	20.6	20.7			20.4			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	20.6	20.8			20.2	20.3	20.2		20.0			20.5	21.4	20.8	21.7	21.0			20.5			
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	21.6	21.7			20.9	21.3	20.9		20.6			21.5	22.8	22.1	23.3	22.3			21.4			

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
FBR-4 Forward Flow (gpm)		714	671	671	675	675	675	750	745			735		745	666	662			647	767	765	765	780
FBR-4 Recycle Flow (gpm)		1126	1157	1157	1165	1160	1160	1090	1095			1100		1095	1169	1174			1220	1100	1075	1070	1040
FBR-4 Total Flow (gpm)		1840	1828	1828	1840	1835	1835	1840	1840			1835		1840	1835	1836			1867	1867	1840	1835	1820
FBR-4 Eductor		On	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	ON	On	Off	Off	On	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		36	33	33	34	33	33.5	37.5	37			36		36.5	33	33			32	38	38	38	39
*Ethanol Dose (mg/l)		10.7	10.4	10.4	10.6	10.3	10.5	10.6	10.5			10.4		10.4	10.5	10.5			10.5	10.5	10.5	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.3	10.3	9.6	9.5	9.5	9.9	10.3	10.3	10.2	10.5	10.3	10.3	10.1	10.1	10.1	10.1	9.8	9.8	9.7	10.3
Percent Ethanol Overdose		3%	1%	1%	4%	7%	11%	12%	6%			2%		0%	2%	4%			4%	7%	7%	8%	2%
**Equivalent TOC Dose (mg/l)		2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2			2.2		2.2	2.0	2.0			1.9	2.2	2.3	2.3	2.4
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	5.7	5.7	5.7	6.0	6.0			6.0		6.0	5.7	2.5			2.5	2.5	2.5	2.5	2.5
*Phosphourous Dose (mg/l)		0.19	0.21	0.21	0.20	0.20	0.20	0.19	0.20			0.20		0.20	0.21	0.09			0.09	0.08	0.08	0.08	0.08
Bed Level (ft)		13.92	13.75	13.92	14.06	14.17	14.23	14.19	14.33	14.25	14.42	14.60		14.73	14.75	14.71			14.67	14.81	14.71	14.85	14.67
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		9.2	9.4	10.3	7.3	9.0	10.2	8.1	8.2	8.2	5.4	8.3	8.0	7.6	7.7			7.28	8.33	9.42	6.75	6.33	8.28
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		34	35	35	26	25	27	25	25	24	25	25	26	25	25	25	26	26	26	25	25	24	23
Coagulant Dose (mg/l)		49	57	42	34	32	32	30	29	30	27	27	29	27	27	29	29	29	29	22	18	22	24
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
pH	SP-1	7.28			7.32	7.38		7.28	7.13			7.19		7.24	7.11	7.31			7.52	7.51	7.18	7.08	7.18
	SP-2	7.14			7.15	7.19		7.07	6.84			7.02		7.00	6.84	7.14			7.23	7.20	7.00	6.70	7.14
	SP-3																					7.03	
	SP-4																					6.95	
	SP-5																					6.88	
	SP-6	7.05			7.07	7.10		7.02	6.34			6.97		6.92	6.73	6.92			7.18	7.17	7.15	7.09	7.08
	SP-6A																						
	SP-7	7.10			6.99	7.01		6.88	6.48			6.93		6.94	6.84	6.94			6.95	7.01	6.81	6.88	6.98
	SP-8																						
	SP-9	7.08			7.11	7.02		6.85	6.39			6.90		6.98	6.90	6.90			6.94	6.98	6.66	6.85	6.96
	SP-10	7.05			7.09	7.04		6.93	6.34			6.91		6.95	6.91	6.85			6.94	6.90	6.66	6.89	6.90
	SP-11	7.04			6.95	7.00		6.78	6.27			6.93		6.91	6.85	6.82			6.90	6.84	6.53	6.77	6.86
	SP-12	7.09			7.12	7.14		6.85	6.28			6.95		6.95	6.98	6.97			6.98	6.99	6.47	6.91	6.90
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	7.04			7.00	7.01		6.81	6.23			6.91		6.90	6.84	6.88			6.84	6.89	6.39	6.74	6.89
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	7.04			6.93	6.94		6.91	6.42			6.91		6.88	6.84	6.86			6.95	6.89	6.36	6.77	6.89
Temperature	SP-1	19.3			19.2	19.4		19.2	19.3			19.3		19.1	19.1	19.3			19.1	19.3	19.1	19.3	19.5
	SP-2	19.5			19.4	19.5		19.3	19.4			19.4		19.2	19.3	19.3			19.3	19.4	19.2	19.4	19.6
	SP-3																					22.5	
	SP-4																					21.2	
	SP-5																					21.6	
	SP-6	19.9			19.7	19.9		19.6	19.8			19.4		19.3	19.3	19.5			19.3	19.8	19.0	19.4	20.1
	SP-6A																						
	SP-7	19.8			19.9	20.1		19.5	19.9			19.8		19.4	19.7	19.7			19.6	19.9	19.4	19.8	20.1
	SP-8																						
	SP-9	19.9			20.0	20.1		19.6	20.0			19.9		19.8	19.8	19.8			19.7	20.1	19.6	19.8	20.3
	SP-10	20.2			20.2	20.3		19.6	20.2			19.9		19.7	19.8	20.0			19.7	20.2	19.5	19.9	20.4
	SP-11	20.6			20.7	20.8		20.0	20.5			20.1		19.9	20.1	20.3			20.0	20.5	19.7	20.2	20.8
	SP-12	20.5			20.6	20.8		20.3	20.5			20.2		20.0	20.2	20.3			20.2	20.5	20.0	20.2	20.9
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	21.1			20.8	21.1		20.1	20.7			20.4		20.1	20.4	20.5			20.3	20.7	20.0	20.5	21.1
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	21.9			22.0	22.4		20.7	21.8			21.1		20.4	21.2	21.3			20.8	21.8	20	21.3	22.3

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
FBR-4 Forward Flow (gpm)				775	771	765	760	766			760	765	835	835	834				828	829	845	845	
FBR-4 Recycle Flow (gpm)				1055	1064	1058	1060	1054			1060	1050	985	989	972				987	987	978	968	
FBR-4 Total Flow (gpm)				1830	1835	1823	1820	1820			1820	1815	1820	1824	1806				1815	1816	1823	1813	
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On	Data not available							
Ethanol Flow Rate (ml/min)				39	38	38	37.8	38			38	38	40.5	41	40.5				40.5	40.5	40.5	42	
*Ethanol Dose (mg/l)				10.6	10.4	10.5	10.5	10.5			10.6	10.5	10.2	10.4	10.3				10.3	10.3	10.1	10.5	
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.4	10.3	10.2	10.3	10.2	10.2	10.2	10.3	10.2	9.9	10.0	10.1	10.1	10.1	10.1	10.0	10.0	9.4	9.9	9.9
Percent Ethanol Overdose				3%	1%	3%	2%	3%			3%	3%	3%	4%	2%				4%	4%	8%	6%	
**Equivalent TOC Dose (mg/l)				2.3	2.3	2.3	2.3	2.3			2.3	2.3	2.4	2.5	2.5				2.5	2.5	2.4	2.5	
Nutrient Flow Rate (ml/min)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				2.5	2.5	2.5	3.2	
*Phosphourous Dose (mg/l)				0.08	0.08	0.08	0.08	0.08			0.08	0.08	0.07	0.07	0.07								
Bed Level (ft)		14.67	14.67	14.94	13.79	13.92	14.00	14.21			14.83	14.00	14.21	14.44	14.67				14.21	14.44	14.48	14.48	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Filter Run Time (hours)		7.94	8.50	5.10	12.00	13.58	12.75	12.00	11.50	10.67	5.67	11.25	10.58	10.17	9.58	8.72	5.50	9.17	9.44	11.92	9.50	9.89	4.87
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	7.25	10.15	10.15	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4.4	4.5	3.0	4.4	4.5	4.3
Clarifier Flow (gpm)		23	23	23	26	26	27	26	26	26	26	24	26	24	24	24	24	24	24	24	24	29	30
Coagulant Dose (mg/l)		24	24	24	25	29	27	32	32	32	31	30	32	30		24	26	32	26	8	16	15	23
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
pH	SP-1			7.09	7.18	7.04	7.10	7.06			7.07	7.02	7.07	7.09	7.34				7.22	7.05	7.22	7.14	
	SP-2			7.05	7.11	6.98	7.13	7.06			7.12	7.90	7.07	6.99	7.29				7.27	6.93	7.13	7.02	
	SP-3													6.60									
	SP-4													6.57									
	SP-5													6.58									
	SP-6			7.13	7.20	6.98	7.04	7.15			7.03	7.05	7.27	7.05	7.26				7.14	6.85	7.08	7.01	
	SP-6A																						
	SP-7			6.93	7.09	6.82	6.88	6.97			6.92	6.94	6.88	6.78	7.25			7.01	7.02	7.02	7.08	6.97	
	SP-8																						
	SP-9			6.84	7.09	6.87	6.90	6.95			7.00	6.90	6.84	6.78	7.19			6.98	7.04	7.02	7.08	6.98	
	SP-10			6.91	7.07	6.88	6.92	6.95			7.01	6.89	6.91	6.87	7.19			6.96	7.04	7.03	7.06	6.96	
	SP-11			6.86	7.01	6.72	6.85	6.94			6.97	6.87	6.87	6.79	7.15			6.95	7.00	7.01	7.02	6.92	
	SP-12			7.03	6.98	6.88	6.97	7.07			6.99	6.98		6.73	7.19			6.96	7.06	7.02	7.05	6.98	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			6.90	6.92	6.72	6.81	6.94			6.87	6.92	6.85	6.81	7.14			6.92	6.98	6.97	7.01	6.93	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22			6.91	6.95	6.66	6.86	6.96			6.88	6.87	6.86	6.81	7.10			6.91	6.99	6.98	7.02	6.91	
Temperature	SP-1			19.2	19.4	19.3	19.3	19.3			19.3	19.5	19.3	19.2	19.3				19.6	19.5	19.2	19.2	
	SP-2			19.3	19.5	19.4	19.3	19.4			19.4	19.6	19.3	19.3	19.4				19.5	19.5	19.3	19.3	
	SP-3													20.0									
	SP-4													20.0									
	SP-5													20.0									
	SP-6			19.1	19.6	19.4	19.2	19.5			19.6	20.1	19.4	19.2	19.4				20.2	19.9	19.6	19.2	
	SP-6A																						
	SP-7			19.7	19.8	19.7	20.1	19.8			19.8	19.9	19.5	19.6	19.9			19.9	20.0	19.8	19.3	19.7	
	SP-8																						
	SP-9			19.7	19.9	19.8	20.0	19.9			20.0	20.1	19.7	19.7	19.9			19.8	20.3	19.9	19.4	19.8	
	SP-10			20.5	20.1	19.8	20.0	20.0			20.0	20.2	19.6	19.7	20.0			19.9	20.4	20.1	19.4	19.9	
	SP-11			20.7	20.4	20.3	20.6	20.4			20.4	20.6	19.9	20.0	20.3			20.1	20.9	20.6	19.6	20.4	
	SP-12			20.4	20.7	20.2	20.3	20.4			20.8	21.0		20.2	20.5			20.2	0.2	20.5	19.7	20.3	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			20.6	21.0	20.4	20.6	20.6			21.0	21.2	20.0	20.1	20.6			20.3	20.9	20.6	19.8	20.5	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22			21.3	22.3	21.4	21.8	21.5			22.3	22.6	20.5	20.7	21.6			20.8	22.1	21.5	20.3	21.4	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27
FBR-4 Forward Flow (gpm)			832		847		764			762		1000		1000			996		1000		1250		
FBR-4 Recycle Flow (gpm)			978		966		1061			1056		806		808			802		801		553		
FBR-4 Total Flow (gpm)			1810		1813		1825			1818		1806		1808			1798		1801		1803		
FBR-4 Eductor																							
Ethanol Flow Rate (ml/min)			40.5		41		37			37		48.3		47.1			46.8		47.3		61.4		
*Ethanol Dose (mg/l)			10.3		10.2		10.2			10.3		10.2		10.0			9.9		10.0		10.4		
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.5	9.5	9.5	9.7	9.7	9.5	9.5	9.6	9.6	9.6
Percent Ethanol Overdose			3%		4%		3%			2%		3%		5%			3%		5%		8%		
**Equivalent TOC Dose (mg/l)			2.5		2.5		2.2			2.2		2.9		2.9			2.9		2.9		3.7		
Nutrient Flow Rate (ml/min)			2.8		3.2		2.5			2.5		2.1		2.2			7.0		7.0		8.0		
*Phosphourous Dose (mg/l)																							
Bed Level (ft)			14.21		14.54		15.00			14.46		14.60		14.52			14.33		14.08		14.33		
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)																							
Filter Run Time (hours)		9.58	9.17	8.28	8.11	7.72	4.13	12.17	10.94	7.72	7.56	7.06	6.25	11.33	7.13	8.75	6.50	8.28	9.33	9.50	9.50	10.83	9.17
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	3.38	16.91	29.96	30.45	18.85	9.67	9.67	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.5	4.4	4.4	4.5	4.4	4.5	4.5	4.4	4.4	4.4	3.0	3.0	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5	4.4
Clarifier Flow (gpm)		29	26	26	26	26	26	26	26	26	26	26	26	25	25	30	30	30	27	30	31	30	29
Coagulant Dose (mg/l)		22	22	22	22	23	13			14	25	22	23	27	25	18	25	25	19	17	18	17	20
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1		7.09		7.07		7.16			7.07		7.33		7.21			7.32		7.25		7.25		
	SP-2		7.05		7.00		7.06			7.11		7.11		7.18			7.26		7.14		7.22		
	SP-3				7.00														7.14				
	SP-4				6.98														7.14				
	SP-5				6.98														7.14				
	SP-6		7.00		6.95		7.07			7.19		7.03		7.12			7.20		7.12		7.12		
	SP-6A																						
	SP-7		6.97		6.94		6.94			6.99		7.11		7.02			7.08		7.15		6.44		
	SP-8																						
	SP-9		6.97		6.94		6.96			6.89		7.09		6.83			6.98		7.16		6.33		
	SP-10		6.95		6.93		6.89			6.92		7.10		7.09			7.16		7.11		7.11		
	SP-11		6.93		6.90		6.93			6.89		7.08		7.06			7.12		7.07		7.02		
	SP-12		6.98		6.95		6.95			6.98		7.12		7.15			7.14		7.16		7.08		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		6.94		6.89		6.88			6.95		7.01		7.09			7.10		7.12		6.36		
	SP-17											6.98		7.05			7.03				9.34		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22		6.93		6.89		6.87			6.87		7.00		6.97			7.06		7.03		6.42		
Temperature	SP-1		19.4		19.2		19.1			19.3		19.6		19.3			19.7		19.4		19.5		
	SP-2		19.4		19.2		19.2			19.4		19.6		19.4			19.6		19.6		19.5		
	SP-3				20.7														20.9				
	SP-4				20.7														20.9				
	SP-5				20.8														21.1				
	SP-6		19.5		19.0		19.0			19.3		20.3		19.6			19.5		20.2		20.2		
	SP-6A																						
	SP-7		19.7		19.6		19.4			19.8		20.0		19.7			19.8		20.2		19.7		
	SP-8																						
	SP-9		19.9		19.6		20.3			19.8		20.7		19.8			19.7		20.1		19.8		
	SP-10		20.0		19.6		19.5			19.8		20.7		20.0			20.0		20.1		19.8		
	SP-11		20.4		19.8		20.2			20.1		21.3		20.3			20.3		20.7		20.3		
	SP-12		20.4		20.0		20.4			20.2		21.4		20.7			20.3		20.6		20.2		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		20.5		20.0		20.3			20.3		21.5		20.8			20.3		20.6		20.4		
	SP-17											21.7		20.9			20.4				20.4		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22		21.7		20.4		20.9			21.4		22.4		20.4			21.0		21.4		20.6		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15
FBR-4 Forward Flow (gpm)		1250		1254	1251	1250					1249		1251	1247	1250	1247		1441		1441
FBR-4 Recycle Flow (gpm)		566		560	563	565					542		546			543		335		333
FBR-4 Total Flow (gpm)		1816		1814	1814	1815					1791		1797			1790		1776		1774
FBR-4 Eductor																				
Ethanol Flow Rate (ml/min)		62		62	61.6	62.7					61.5		62			62.5		71		70.5
*Ethanol Dose (mg/l)		10.5		10.4	10.4	10.6					10.4		10.5			10.6		10.4		10.3
*Theoretical Ethanol Dose (mg/l)		9.7	9.7	9.7	9.7	10.0	10.0	10.0	10.0	10.0	9.6	10.1	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.1
Percent Ethanol Overdose		9%		8%	7%	6%					8%		2%			3%		1%		2%
**Equivalent TOC Dose (mg/l)		3.8		3.8	3.7	3.8					3.8		3.8			3.8		4.4		4.4
Nutrient Flow Rate (ml/min)		8.0		8.0	8.0	8.0					8.0		8.0			2.5				
*Phosphourous Dose (mg/l)						0.16					0.16		0.15			0.05				
Bed Level (ft)		14.48		14.27		14.52					14.33		14.56	14.25	14.33	14.56		14.29		14.42
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.42	9.44	8.83	8.67	8.28	9.72	8.50	14.17	13.67	9.83	8.44	7.22	9.08	10.00	7.92	9.33	10.33	11.83	11.92
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.67	9.18	9.67	5.32	5.80	9.67	9.67	9.67	9.18	6.77	14.98	19.33	19.33	19.81	19.33	18.85	19.33	19.81	19.81
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.1	4.3	3.0	3.0	4.4	4.3	4.4	4.1	3.0	4.3	4.3	4.3	4.4	4.3	4.1	4.3	4.4	4.4
Clarifier Flow (gpm)		29	30	30	30	28	28	30	30	26	26	26	26	26	24	25	25	25	25	24
Coagulant Dose (mg/l)		20	18	20	17	19	19	17	9	9	20	22	25	23	22	22	22	18	16	18
(Alum unless triangle in box, then FeCl3)																				
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1	7.18		7.08		7.21					7.11	7.05	7.15			7.12		7.12		6.95
	SP-2	6.95		7.05		7.14					7.08	6.99	7.10			7.09		7.09		6.91
	SP-3			6.96																
	SP-4			6.96																
	SP-5			6.96																
	SP-6	6.96		6.93		7.03					7.01	6.95	7.00			6.98		6.98		6.95
	SP-6A																			
	SP-7	7.01		6.93		7.04					7.02	6.73	6.94			6.88		6.99		6.78
	SP-8																			
	SP-9	6.93		6.93		7.01					6.96	6.67	6.92			6.85		6.93		6.54
	SP-10	7.02		6.93		6.99					6.93	6.84	6.92			6.89		6.93		6.94
	SP-11	6.95		6.87		6.93					6.88	6.82	6.86			6.90		6.93		6.94
	SP-12	6.99		6.92		7.03					6.91	6.87	6.87			6.84		6.94		6.92
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	6.96		6.86		6.85					6.83	6.89	6.90			6.58		6.94		6.90
	SP-17											6.85								6.73
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			
	SP-22	6.94		6.83		6.75					6.83	6.79	6.92			6.98		6.94		6.72
Temperature	SP-1	19.4		19.0		19.0					19.0	19.2	18.9			19.1		19.1		19.4
	SP-2	19.3		19.1		19.1					19.1	19.3	19.0			19.2		19.1		19.2
	SP-3			18.9																
	SP-4			18.9																
	SP-5			18.8																
	SP-6	20.2		19.0		19.0					18.9	19.9	18.8			19.1		19.3		19.5
	SP-6A																			
	SP-7	19.5		19.1		19.1					19.0	20.3	19.1			19.4		19.2		19.4
	SP-8																			
	SP-9	19.6		19.2		19.2					19.0	20.1	19.2			19.3		19.3		19.3
	SP-10	19.5		19.2		19.2					19.0	20.7	19.2			19.2		19.3		19.5
	SP-11	19.7		19.2		19.5					19.0	20.7	19.4			19.3		19.5		20.5
	SP-12	19.9		19.4		20.2					19.2	20.6	19.6			19.3		19.6		19.9
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	19.9		19.4		20.2					19.1	20.6	19.6			19.3		19.6		19.9
	SP-17											21.4								19.7
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			
	SP-22	20.3		19.3		21.1					18.8	22.1	19.0			19.0		19.6		19.6

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
FBR-4 Forward Flow (gpm)				1439		1438		1441			1443		1445		1440			1440	
FBR-4 Recycle Flow (gpm)				368		386		397			388		407		428			428	
FBR-4 Total Flow (gpm)				1807		1824		1838			1831		1852		1868			1868	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)				71.3		70.9		70.7			70.6		71		71.1			71.3	
*Ethanol Dose (mg/l)				10.5		10.4		10.4			10.3		10.4		10.4			10.5	
*Theoretical Ethanol Dose (mg/l)		10.1	10.1	9.9	9.9	10.0	10.0	9.8	9.8	9.8	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0
Percent Ethanol Overdose				5%		4%		6%			2%		2%		4%			4%	
**Equivalent TOC Dose (mg/l)				4.3		4.3		4.2			4.2		4.2		4.2			4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)				14.46		14.46		14.50			14.46		14.79		14.83	14.50		13.50	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		14.75	11.50	10.58	13.25	11.92	13.17	125.00	13.00	14.42	19.67	17.50	8.56	14.50	8.67	9.08	13.17	19.50	15.75
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		19.33	19.81	19.33	16.43	9.67	9.67	9.67	9.67	9.67	9.67	9.67	7.73	6.28	9.18	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.3	4.3	4.3	4.4	4.3	4.3	4.3	4.4	4.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clarifier Flow (gpm)		23	23	25	24	25	24	24	24	24	25	26	26	25	27	27	27	27	27
Coagulant Dose (mg/l)		14	20	14	10	11	12	12	6	0	5	5	16	7	14	17	10	7	7
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1			7.06		6.90		6.74			7.03		6.76		7.04			7.05	
	SP-2			7.01		7.15		7.00			6.72		6.99		7.02			7.01	
	SP-3					7.06													
	SP-4					7.06													
	SP-5					7.04													
	SP-6			6.92		7.04		6.90			6.60		6.87		6.91			6.91	
	SP-6A																		
	SP-7			6.90		7.05		6.98			6.91		6.67		6.93			6.92	
	SP-8																		
	SP-9			6.80		6.98		6.91			6.85		6.51		6.89			6.89	
	SP-10			6.87		7.02		6.90			6.58		6.53		6.76			6.88	
	SP-11			6.83		6.87		6.85			6.82		6.49		6.74			6.86	
	SP-12			6.82		7.00		6.86			6.83		6.52		6.88			6.88	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			6.80		6.84		6.86			6.54		6.55		6.60			6.51	
	SP-17			6.79															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22			6.83		6.70		6.86			6.82		6.22		6.88			6.40	
Temperature	SP-1			19.4		19.1		19.1			19.1		19.0		19.2			19.2	
	SP-2			19.3		19.2		19.1			19.1		19.0		19.2			19.2	
	SP-3					20.8													
	SP-4					20.8													
	SP-5					20.8													
	SP-6			20.2		19.2		19.2			19.0		18.9		19.1			19.4	
	SP-6A																		
	SP-7			19.7		19.5		19.2			19.0		19.1		19.1			18.8	
	SP-8																		
	SP-9			19.7		19.6		19.3			19.0		19.1		19.2			18.9	
	SP-10			19.8		19.6		19.3			19.1		19.1		19.1			18.8	
	SP-11			20.3		19.8		19.4			19.2		19.2		19.3			19.4	
	SP-12			20.1		20.0		19.5			19.3		19.3		19.4			19.6	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			20.2		20.1		19.5			19.4		19.3		19.4			19.7	
	SP-17			20.4															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22			20.6		21.0		19.6			18.9		21.6		19.3			20.9	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
FBR-4 Forward Flow (gpm)		1443		1431	1443	1437	1443		D		1440	1440		1442		1440		1444	
FBR-4 Recycle Flow (gpm)		425		437			425		354		362			343		356		423	
FBR-4 Total Flow (gpm)		1868		1868			1868				1802			1785		1796		1867	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		72.2		72			71.8		71.5		71.4			71		71.4		71.4	
*Ethanol Dose (mg/l)		10.6		10.6			10.5				10.5			10.4		10.5		10.4	
*Theoretical Ethanol Dose (mg/l)		9.8	9.8	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.5	10.5	10.6	10.6
Percent Ethanol Overdose		8%		6%			5%				6%			4%		0%		-1%	
**Equivalent TOC Dose (mg/l)		4.2		4.2			4.2				4.4			4.4		4.4		4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.58		14.63	14.79	14.58	14.54	14.00	14.29		14.46	14.42		14.46		14.63		14.42	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.50	16.67	7.72	13.08	13.00	15.92	19.67	16.17	14.67	15.25	11.70	14.33	14.17	10.67	11.08	8.00	9.83	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.18	9.67	7.25	9.67	9.67	9.67	6.77	9.67	9.67	9.67	9.67	9.67	9.18	9.67	8.70	6.77	4.83	3.38
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.0	4.1	3.0	4.1	4.1	4.3	3.0	4.3	4.1	4.1	4.1	4.1	4.0	4.1	3.9	4.1	4.1	3.0
Clarifier Flow (gpm)		27	27	27	26	26	26	26	26	26	26	26	25	25	25	25	25	25	27
Coagulant Dose (mg/l)		17	5	19	13	13	5	11	7	13	5	13	13	11	14	13	18	14	10
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1	7.12		7.04			6.98		7.00		7.32			7.22		6.94		7.15	
	SP-2	7.08		6.99			6.96		6.98		7.32			7.19		6.94		7.14	
	SP-3	6.79														6.74			
	SP-4	6.77														6.73			
	SP-5	6.98														6.68			
	SP-6	6.96		6.81			6.85		6.85		7.32			7.08		6.80		7.05	
	SP-6A																		
	SP-7	6.96		6.88			6.85		6.86		6.16			6.96		6.74		6.93	
	SP-8																		
	SP-9	6.90		6.38			6.80		6.80		7.23			6.93		6.67		6.88	
	SP-10	8.02		6.58			8.01		7.96		7.23			8.05		7.89		8.01	
	SP-11	7.13		6.57			7.94		7.91		8.33			8.04		7.81		7.96	
	SP-12	7.24		6.59			7.96		7.73		8.33			8.08		7.87		8.05	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	6.91		6.60			7.87		7.62		8.11			8.04		7.69		7.97	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	6.91		6.61			7.87		7.84		8.18			8.05		7.69		8.00	
Temperature	SP-1	18.9		19.0			18.9		18.8		19.1			18.8		19.0		18.8	
	SP-2	18.9		19.0			19.0		18.9		19.1			18.8		19.0		18.8	
	SP-3	19.1														19.1			
	SP-4	19.0														19.2			
	SP-5	19.0														19.1			
	SP-6	18.8		18.9			18.8		18.3		19.1			18.6		19.1		18.7	
	SP-6A																		
	SP-7	18.9		18.9			18.9		18.9		18.4			18.8		19.6		18.9	
	SP-8																		
	SP-9	18.9		18.9			19.0		18.9		19.4			18.8		19.8		18.9	
	SP-10	18.7		18.9			19.0		18.6		19.3			18.0		19.6		18.4	
	SP-11	18.7		19.0			19.0		18.6		19.4			18.2		19.8		18.4	
	SP-12	18.9		19.2			19.2		18.7		19.2			18.4		20.0		18.5	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	18.9		19.2			19.3		18.6		19.7			18.3		20.1		18.5	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	18.5		19.0			19.4		18.4		19.8			17.9		21.0		18.1	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8
FBR-4 Forward Flow (gpm)			1443		1445		1444	1442	1437	1441		1439		1447	1442	1437	1436		1440
FBR-4 Recycle Flow (gpm)			424		422		423			426		427		421			432		428
FBR-4 Total Flow (gpm)			1867		1867		1867			1867		1866		1868			1868		1868
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			70.5		70.8		71.1			70.2		71.2		71.5			70.9		70.9
*Ethanol Dose (mg/l)			10.3		10.4		10.4			10.3		10.5		10.4			10.4		10.4
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.6	9.9	10.2	9.5	9.5	9.5	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.0	10.0	10.7
Percent Ethanol Overdose			-2%		5%		10%			0%		1%		2%			5%		-3%
**Equivalent TOC Dose (mg/l)			4.1		4.2		4.2			4.1		4.2		4.2			4.2		4.2
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.63		14.50		14.92	14.17	14.42	14.50		14.38		14.83	14.50	14.54	14.75		14.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		20.00	18.83	11.00	13.83	16.00	30.67	15.83	13.25	11.28	9.17	12.17	11.50	8.67	11.72	11.67	11.75	10.83	10.33
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		0.00	2.90	4.83	4.83	3.38	0.00	4.35	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.0	3.0	4.3	4.3	3.0	3.0	4.0	4.3	4.1	4.3	4.3	4.1	4.3	4.3	4.3	4.3	4.1	4.1
Clarifier Flow (gpm)		27	26	26	26	26	26	26	26	26	25	25	25	26	26	27	26	26	26
Coagulant Dose (mg/l)		0	16	14	5	0	0	0	0	0	5	11	13	18	11	12	13	13	14
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1				7.06	7.58	7.30			7.12		7.23		7.21			7.23		7.30
	SP-2				7.01	7.34	7.34			7.21		7.19		7.17			7.20		7.26
	SP-3											7.08							
	SP-4											7.11							
	SP-5											7.08							
	SP-6				6.93	7.23	7.26			7.07		7.05		7.06			7.10		7.17
	SP-6A																		
	SP-7				6.90	7.26	7.02			7.13		7.14		7.09			7.08		7.10
	SP-8																		
	SP-9				6.85	7.17	7.09			7.10		7.05		7.02			7.03		7.01
	SP-10				7.93	8.26	8.41			8.15		8.15		8.12			8.12		8.18
	SP-11				7.92	8.18	8.36			8.22		8.17		8.12			8.15		8.19
	SP-12				8.03	8.27	8.32			8.19		8.15		8.12			8.13		8.19
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				7.92	8.17	8.05			8.10		8.05		7.99			8.05		8.02
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22				7.90	8.29	7.85			8.14		8.07		8.02			8.09		8.06
Temperature	SP-1				18.8	18.8	18.9			18.8		18.7		18.7			18.8		18.9
	SP-2				18.9	18.8	19.0			18.9		18.8		18.8			18.8		18.9
	SP-3											19.0							
	SP-4											18.8							
	SP-5											18.8							
	SP-6				18.7	18.6	19.2			18.7		18.4		18.5			18.5		18.9
	SP-6A																		
	SP-7				18.9	18.9	19.0			19.0		18.8		18.6			18.7		19.1
	SP-8																		
	SP-9				18.9	18.9	19.0			18.9		18.8		18.6			18.6		19.1
	SP-10				18.4	18.6	18.7			18.7		18.0		17.9			18.0		18.4
	SP-11				18.5	18.6	18.8			18.7		17.6		17.8			17.9		19.2
	SP-12				18.7	18.9	18.9			18.9		17.8		18.0			18.1		19.4
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				18.7	18.7	18.9			18.8		17.7		17.9			18.1		19.5
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22				18.3	18.3	19.1			18.5		17.4		17.4			17.5		19.7

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26
FBR-4 Forward Flow (gpm)			1440	1447	1439	1438		1438		1441			1441		1440		1441	1440	1444
FBR-4 Recycle Flow (gpm)			426			429		428		427			427		427				
FBR-4 Total Flow (gpm)			1866			1867		1866		1868			1868		1867				
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			71.2			71.1		71.2		70.6			71.2		71.0				
*Ethanol Dose (mg/l)			10.4			10.4		10.5		10.4			10.4		10.4				
*Theoretical Ethanol Dose (mg/l)		10.7	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.4	10.4	10.4	10.4	10.4
Percent Ethanol Overdose			3%			3%		2%		3%			3%		0%				
**Equivalent TOC Dose (mg/l)			4.2			4.2		4.2		4.2			4.2		4.2				
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.50	14.42	14.50	14.58		14.71		14.58			14.50		14.50	14.83	14.58	14.63	14.38
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.71	10.17	13.42	12.25	9.75	11.75	9.61	7.50	10.22	8.33	8.44	9.50	9.39	11.50	13.50	11.50	11.42	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.8	3.4	3.5	3.5	3.5	3.5	3.5
Clarifier Flow (gpm)		25	25	25	25	25	25	25	25	25	24	24	24	26	27	27	27	27	27
Coagulant Dose (mg/l)		18	14	11	11	13	11	18	18	13	20	20	14	18	12	12	12	12	8
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1		7.28				7.27	7.26		7.30			7.26		7.31				
	SP-2		7.21				7.24	7.24		7.29			7.25		7.27				
	SP-3							7.17											
	SP-4							7.20											
	SP-5							7.21											
	SP-6		7.12				7.13	7.12		7.17			7.13		7.18				
	SP-6A																		
	SP-7		7.11				7.11	7.14		7.17			7.13		7.22				
	SP-8																		
	SP-9		7.13				7.05	7.10		7.12			7.08		7.18				
	SP-10		8.23				8.03	8.05		6.82			6.81		6.87				
	SP-11		8.22				7.74	7.94		6.79			6.83		6.92				
	SP-12		8.27				7.88	7.94		6.82			6.81		6.91				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		7.77				7.51	7.77		6.79			6.79		6.86				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22		7.84				7.56	7.79		6.82			6.83		6.92				
Temperature	SP-1		18.7				18.8	18.7		18.7			18.7		18.7				
	SP-2		18.8				18.8	18.8		18.7			18.8		18.7				
	SP-3							18.4											
	SP-4							18.3											
	SP-5							18.4											
	SP-6		18.7				18.6	18.4		18.1			18.3		18.6				
	SP-6A																		
	SP-7		18.8				18.7	18.6		18.7			18.4		18.8				
	SP-8																		
	SP-9		18.7				18.8	18.6		18.4			18.3		18.7				
	SP-10		18.5				18.3	17.8		17.8			17.4		18.5				
	SP-11		18.8				18.2	17.7		17.6			17.2		18.8				
	SP-12		18.7				18.4	17.9		17.8			17.5		18.7				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		18.7				18.5	17.8		17.8			17.4		18.8				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22		18.5				18.4	17.2		17.8			16.8		18.1				

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
FBR-4 Forward Flow (gpm)		1442		1447		1434	1439	1452	1441		1437.00		1438	1442	1447	1440		1435	
FBR-4 Recycle Flow (gpm)		425		419		432	427	414	427		430.00		371	367	362	378		370	
FBR-4 Total Flow (gpm)		1867		1866		1866	1866	1866	1868		1867.00		1809	1809	1809	1818		1805	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		70.7		71.5		71.1	71.0	71.0	71.6		71.4		70.8	71.1	71.1	71.1		70.6	
*Ethanol Dose (mg/l)		10.4		10.4		10.5	10.4	10.3	10.5		10.5		10.4	10.4	10.4	10.4		10.4	
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.3	9.9	10.0	10.0	10.0	9.9	9.9	10.2	10.2	9.5	9.5	9.5	10.0	10.0	9.9	9.9
Percent Ethanol Overdose		-3%		1%		5%	4%	3%	7%		2%		10%	10%	9%	5%		5%	
**Equivalent TOC Dose (mg/l)		4.2		4.2		4.2	4.2	4.2	4.2		4.2		4.3	4.3	4.3	4.3		4.3	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.67		14.83		15.08	14.75	14.54	14.88		14.92		15.25	15.21	15.42	15.71	15.67	15.33	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350.00	350.00	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		10.75	11.42	15.58	13.00	11.83	8.67	10.92	8.94	11.00	13.83	12.83	11.25	12.17	11.67	12.11	11.00	10.08	
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100.00	100.00	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	3.38	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	12.08	
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10.00	10.00	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.5	3.4	3.5	3.5	3.5	3.4	3.5	3.0	3.40	3.40	3.4	3.4	3.4	3.4	3.0	3.0	3.8	0.0
Clarifier Flow (gpm)		27	26	26	20	25	25	26	23	18	18	18	18	13	11	12	13	15	
Coagulant Dose (mg/l)		14	16	9	28	23	32	23	14	14	28	16	14	25	18	18	18	54	
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
pH	SP-1	7.41		7.44		7.30			7.35		7.34		7.39			7.38	7.52	7.41	
	SP-2	7.40		7.40		7.28			7.34		7.32		7.38			7.36		7.39	
	SP-3			7.34														7.45	
	SP-4			7.39														7.39	
	SP-5			7.38														7.44	
	SP-6	7.28		7.28		7.18			7.21		7.21		7.24			7.25	7.25	7.28	
	SP-6A																		
	SP-7	7.27		7.29		7.06			7.21		7.23		7.29			7.25		7.42	
	SP-8																		
	SP-9	7.25		7.23		7.19			7.15		7.15		7.23			7.22		6.90	
	SP-10	8.32		7.09		7.12			7.07		7.02		7.07			8.26		6.89	
	SP-11	8.35		7.08		7.03			7.05		7.00		7.06			8.32		6.92	
	SP-12	8.34		7.10		6.99			6.98		7.02		7.10			8.24			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	8.16		7.09		6.96			6.83		7.01		7.02			7.29		6.90	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	8.17	6.98	7.11		6.94			6.81		7.01		7.04			7.26	6.86	6.90	
Temperature	SP-1	18.7		18.7		18.7			18.7		18.70		18.8			18.7	18.7	18.7	
	SP-2	18.7		18.7		18.8			18.7		18.70		18.8			18.8		18.7	
	SP-3			17.8														17.5	
	SP-4			17.5														18.7	
	SP-5			17.4														17.2	
	SP-6	18.4		18.5		18.4			18.4		18.40		18.6			18.3	18.4	18.4	
	SP-6A																		
	SP-7	18.8		18.8		18.5			18.4		18.50		18.6			18.8		18.5	
	SP-8																		
	SP-9	18.7		18.8		18.6			18.4		18.50		18.5			18.6		17.9	
	SP-10	18.0		18.5		17.8			17.8		17.80		18.0			18.1		17.8	
	SP-11	18.1		18.5		17.5			17.6		17.70		18.0			18.2		18.0	
	SP-12	18.3		18.6		17.7			17.8		17.80		18.2			18.2			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	18.2		18.6		17.6			17.8		17.80		18.3			18.1		18.0	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	17.8	17.7	18.2		16.9			17.4		17.20		18.3			17.8	17.7	17.5	

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		12/15	Ave
FBR-4 Forward Flow (gpm)			1003
FBR-4 Recycle Flow (gpm)			860
FBR-4 Total Flow (gpm)			1826
FBR-4 Eductor			
Ethanol Flow Rate (ml/min)			46.9
*Ethanol Dose (mg/l)			10.2
*Theoretical Ethanol Dose (mg/l)			
Percent Ethanol Overdose			0.0
**Equivalent TOC Dose (mg/l)			2.8
Nutrient Flow Rate (ml/min)			5.76
*Phosphourous Dose (mg/l)			0.21
Bed Level (ft)			14.21
Filter Flow (gpm)			350
Filter Polymer Dose (mg/l)			0.00
Filter Run Time (hours)			10.89
UVOX/LPGAC Flow (gpm)			100
Peroxide Dose (mg/l)			9.59
Disinfection Flow (gpm)			10
Chlorine Dose (mg/l)			4.11
Clarifier Flow (gpm)			23.5
Coagulant Dose (mg/l)			15.9
(Alum unless triangle in box, then FeCl3)			
Clarifier Polymer Dose (mg/l)			2.1
pH	SP-1		7.20
	SP-2		7.11
	SP-3		7.05
	SP-4		7.04
	SP-5		7.03
	SP-6		7.04
	SP-6A		
	SP-7		7.00
	SP-8		6.90
	SP-9		6.97
	SP-10		7.14
	SP-11		7.12
	SP-12		7.16
	SP-13		7.00
	SP-14		7.00
	SP-15		6.99
	SP-16		7.07
	SP-17		7.15
	SP-18		6.81
	SP-19		6.81
	SP-20		6.81
	SP-21		6.81
	SP-22		7.07
Temperature	SP-1		19.1
	SP-2		19.2
	SP-3		19.6
	SP-4		19.5
	SP-5		19.4
	SP-6		19.3
	SP-6A		
	SP-7		19.8
	SP-8		19.6
	SP-9		19.6
	SP-10		19.4
	SP-11		19.7
	SP-12		19.6
	SP-13		20.2
	SP-14		20.1
	SP-15		20.2
	SP-16		19.9
	SP-17		20.6
	SP-18		20.2
	SP-19		20.3
	SP-20		20.4
	SP-21		20.6
	SP-22		20.3

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
FBR-4 Forward Flow (gpm)		695	685	680	680	680	675	674	662	664	680	672	672	675	665	670	668	666	680	680	690	685
FBR-4 Recycle Flow (gpm)		1125	1130	1125	1125	1125	1135	1136	1123	1131	1140	1135	1135	1140	1140	1140	1142	1139	1126	1126	1120	1135
FBR-4 Total Flow (gpm)		1820	1815	1805	1805	1805	1810	1810	1785	1795	1820	1807	1807	1815	1805	1810	1810	1805	1806	1806	1810	1820
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	On	On	On	On	On	On	On	Off	Off
Ethanol Flow Rate (ml/min)		30.5	30.0	29.0	29.0	29.0	29.0	29.0	27.9	29.0	30.0	30.3	30.3	31.0	30.5	30.5	30.0	31.0	30.7	30.7	31.5	31.0
*Ethanol Dose (mg/l)		9.3	9.3	9.0	9.0	9.0	9.1	9.1	8.9	9.2	9.3	9.5	9.5	9.7	9.7	9.6	9.5	9.8	9.5	9.5	9.6	9.6
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	10.0	10.0	10.3	10.3	9.6	9.2	10.0	10.0	10.0	9.9	10.0	9.9	9.9	10.4	10.4	10.4	9.8	10.1
Percent Ethanol Overdose		-7%	-8%	-10%	-10%	-10%	-12%	-12%	-7%	0%	-7%	-5%	-5%	-2%	-3%	-3%	-4%	-5%	-8%	-8%	-1%	-5%
**Equivalent TOC Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9
Nutrient Flow Rate (ml/min)		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	11.4	11.4	11.4	11.4	11.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.42	0.41	0.41	0.41	0.41	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
Bed Level (ft)		14.21	14.44	14.56	14.56	14.56	14.79	14.90	14.96	15.13	13.67	13.63	13.58	13.79	13.75	13.71	13.67	13.60	13.50	13.38	13.54	13.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		11.7	10.3	9.2	9.9	9.8	11	9.8	4.8	5.4	4.5	9.0	8.5	11.5	12.3	13.7	13.6	14	15.0	14.8	13.4	13.1
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		18.36	17.88	23.20	26.10	26.58	23.68	25.13	33.83	29.00						5.32	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.4	3.4	3.4	3.4	3.4	3.4	3.6								4.5	4.6	4.6	4.6	4.6	4.8	4.6
Clarifier Flow (gpm)		25	32	40	42	41	42	42	36	46	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		16	20	22	24	22	24	22	38	53	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																						
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORP	SP-1	100		85					118	146	116			88	127	97	117	154			212	200
	SP-2	83		-46					107	66	59			32	51	55	59	60			100	161
	SP-3	65																				
	SP-4	64																				
	SP-5	70																				
	SP-6	9		-46					-8	-43	4			-37	-58	-84	-55	-57			-68	-23
	SP-6A																					
	SP-7			72				76	40	21	32			71	36	49	47	48			135	162
	SP-8						49	79		36	38			76				73			161	
	SP-9			72			55	83	57	63	50			82	43	125	60	88			174	181
	SP-10			109			70	148	68	62	95			99	77	95	93	132			273	272
	SP-11			149			77	164	68					103	84	104	102	142			275	281
	SP-12							171	71	65	96			107	88	114	116	149			276	286
	SP-13								74		94			104								
	SP-14								73		92			102								
	SP-15								73		91			101								
	SP-16			128			77	159	73	71	93			101	84	110	120	139			249	263
	SP-17																	693			640	
	SP-18																	698			635	
	SP-19																	722			624	
	SP-20																	724			617	
	SP-21																	731			607	
	SP-22			102			78	149	80	77	93			101	84	108	733	729			598	712
Turbidity (NTU)	SP-1																0.07	0.13			0.08	
	SP-2																0.77	1.00			0.83	
	SP-3																					
	SP-4																					
	SP-5																					
	SP-6																1.17	1.35			1.30	
	SP-6A																					
	SP-7																	1.26				1.46
	SP-8																1.53	1.53			1.32	
	SP-8 (on line measurements)																					
	SP-9																0.16	0.08			0.17	0.11
	SP-9 (on line measurements)																					
	SP-10																	0.20			0.21	0.15
	SP-11																0.16	0.15			0.05	0.07
	SP-12																					0.14
	SP-13																					
	SP-14																					
	SP-15																					
	SP-16																0.18	0.14			0.08	0.06
	SP-17																					
	SP-18																					
	SP-19																					
	SP-20																					
	SP-21																					

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31
FBR-4 Forward Flow (gpm)		695	695	675	677	677	675	680	677	680	690			655	690	650	655	655				675	680
FBR-4 Recycle Flow (gpm)		1130	1130	1150	1142	1142	1150	1150	1148	1140	1125			1170	1170	1170	1175	1175				1160	1155
FBR-4 Total Flow (gpm)		1825	1825	1825	1819	1819	1825	1830	1825	1820	1815			1825	1860	1820	1830	1830				1835	1835
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		31.0	32.0	31.0	30.5	30.5	31	31	32	31	36			30	30	30	30.5	30				30	32
*Ethanol Dose (mg/l)		9.4	9.7	9.7	9.5	9.5	9.7	9.6	10.0	9.6	11.0			9.7	9.2	9.8	9.8	9.7				9.4	9.9
*Theoretical Ethanol Dose (mg/l)		9.8	9.5	10.0	10.0	10.0	10.0	10.0	10.0	9.9	10.4	10.4	10.4	10.4	9.7	10.3	10.0	10.5	10.5	10.5	10.5	10.3	10.4
Percent Ethanol Overdose		-4%	3%	-3%	-5%	-5%	-3%	-4%	-1%	-3%	6%			-7%	-5%	-5%	-1%	-8%				-9%	-4%
**Equivalent TOC Dose (mg/l)		1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.2			1.8	1.8	1.8	1.8	1.8				1.8	1.9
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	3.8	3.8	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0				5.0	5.0
*Phosphourous Dose (mg/l)		0.20	0.20	0.20	0.14	0.14	0.18	0.18	0.18	0.18	0.18			0.19	0.18	0.19	0.19	0.19				0.18	0.18
Bed Level (ft)		13.46	13.38	13.38	13.29	13.17	13.38	13.33	13.25	13.25	13.17			13.19	13.21	13.19	13.19	13.17				13.21	13.25
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		12.5	12.1	11.4	10.9	10.5	10.3	10.1	9.4	9.0	8.8	8.9	8.6	8.3	7.6	9.0	8.2	14.9	6.4	10.2	11.0	7.5	9.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	6.77	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	9.67	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.6	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.3	4.3	4.4	4.5	4.5	4.5	4.4	4.5	4.5	4.4	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORP	SP-1	226	194	201			168	202	206	201	174					212	169	214				121	194
	SP-2	174	129	125			98	138	139	145	67					180	149	187				55	160
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	-10	-31	-28			-54	-23	-23	-31	-38					-11	-11	-96				-72	90
	SP-6A																						
	SP-7	20	153	134			108	163	159	125	116					165	126	170				69	167
	SP-8																						
	SP-9	215	182	146			130	181	172	146	128					184	145	181				82	177
	SP-10	286	277	253			240	261	298	287	295					299	252	288				213	301
	SP-11	283	285	266			248	275	295	298	294					291	267	292				213	302
	SP-12	285	288	275			258	279	296	301	297					294	272	298				218	303
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	277	275	250			240	255	275	271	277					249	242	280				166	285
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	627	568	512			678	570	477	268	746					311	684	602				711	624
Turbidity (NTU)	SP-1	0.02		0.03			0.12	0.07	0.05	0.08	0.10					0.24	0.21	0.11				0.10	0.06
	SP-2	0.87		0.77			0.90	0.91	0.96	0.85	0.89					0.86	0.94	1.57				0.75	0.82
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	1.40		1.23			1.40	1.55	1.29	1.34	1.40					1.54	1.25	2.22				1.57	1.33
	SP-6A																						
	SP-7	1.37		1.18			1.40	1.34	1.36	1.41	1.39					1.25	1.31	1.16				0.87	1.86
	SP-8			1.14			1.30	1.07	1.18	1.31	2.09					1.57	1.29	1.45				1.53	1.48
	SP-8 (on																						
	SP-9	0.08		0.04			0.15	0.17	0.18	0.19	0.23					0.19	0.45	0.25				0.33	0.31
	SP-9 (on																						
	SP-10	0.03		0.17			0.15	0.28		0.20	0.19					0.28	0.19	0.10				0.38	0.36
	SP-11	0.11		0.15			0.13	0.12	0.16	0.12	0.16					0.27	0.14	0.35				0.25	0.48
	SP-12	0.07		0.12			0.18	0.13	0.14	0.27	0.22					0.38	0.30	0.02				0.72	0.25
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.06		0.10			0.12	0.06	0.04	0.24	0.10					0.11	0.29	0.19				0.24	0.11
	SP-17			0.18																			
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22
FBR-4 Forward Flow (gpm)		660	660			719	715	720	725	725			765	800	730	725	730	720	720	715	720	705	730
FBR-4 Recycle Flow (gpm)		1145	1140			1081	1085	1090	1085	1085			1030	990	1070	1060	1095	1101	1101	1110	1105	1105	1138
FBR-4 Total Flow (gpm)		1805	1800			1800	1800	1810	1810	1810			1795	1790	1800	1785	1825	1821	1821	1825	1825	1810	1868
FBR-4 Eductor		Off	Off	Off	On	On	On	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On
Ethanol Flow Rate (ml/min)		31	31			35	35	36	36	36			38	40	36	36.5	37	37	37	36	36	35	36.5
*Ethanol Dose (mg/l)		9.9	9.9			10.3	10.3	10.6	10.5	10.5			10.5	10.6	10.4	10.6	10.7	10.9	10.9	10.6	10.6	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.2	10.1	10.1	10.1	9.9	10.1	10.2	10.2	10.1	10.1	10.1	9.7	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.3	10.4	10.4
Percent Ethanol Overdose		-3%	-2%			3%	2%	4%	3%	4%			9%	6%	4%	7%	7%	9%	9%	6%	3%	1%	2%
**Equivalent TOC Dose (mg/l)		1.9	1.9			2.1	2.1	2.2	2.2	2.2			2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Nutrient Flow Rate (ml/min)		5.0	5.0			5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.18	0.18			0.17	0.17	0.17	0.17	0.17			0.16	0.15	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.19
Bed Level (ft)		13.15	13.17	13.13	13.21	13.29	13.33	13.33	13.31	13.38	13.25	13.25	13.46	13.54	13.54	13.58	13.71	13.63	13.63	13.73	13.79	13.79	14.00
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.1	4.4	4.0	4.0	6.2	11.0	11.8	10.2	11.2	12.1	11.0	9.2	8.4	9.5	8.4	6.7	7.5	4.2	4.7	4.7	4.3	3.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	12.08	13.53
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.4	4.4	4.4	4.4	4.5	4.5	3.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4
Clarifier Flow (gpm)		0	50	50	49	49	0	0	48	48	48	47	47	47	47	47	36	60	37	34	34	34	34
Coagulant Dose (mg/l)		0	28	28	28	26	0	0	26	26	26	26	0	0	0	0	0	0	6	12	18	38	73
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	5.0	20.0	20.0	20.0	20.0
ORP	SP-1	194	145			160	170	112		160			153	181	169	164	180			168	169		154
	SP-2	171	98			81	137	115		56			119	140	118	118	120			132	97		130
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	-29	-4			-21	93	-2		-8			-17	-26	-12	-20	-10			11	19		-51
	SP-6A																						
	SP-7	158	107			139	163	137		112			92	155	109	108	98			59	66		67
	SP-8																						
	SP-9	171	120			144	163	148		118			110	161	131	123	109			82	82		96
	SP-10	306	278			280	223	273		234			248	285	277	265	247			170			
	SP-11	309	275			279	248	283		249			254	294	281	267	262			185			
	SP-12	313	278			283	276	285		255			255	295	290	275	266			200			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	301	249			257	228	242		212			187	264	226	210	242			192			
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	427	666			295	600	570		199			744	605	500	652	578			525			
Turbidity (NTU)	SP-1	0.15	0.29			0.05	0.05	0.05		0.05			0.44	0.08	0.43	0.15	0.15				3.77		0.97
	SP-2	1.19	1.11			0.73	0.72	0.79		0.46			1.10	1.16	1.09	0.83	1.05				4.37		1.95
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	1.38	1.48			1.38	1.24	1.35		1.39			1.74	1.51	1.31	1.35	1.55				4.56		2.22
	SP-6A																						
	SP-7	1.34	1.53			1.57	1.21	1.52		1.31			1.39	1.32	1.51	1.24	1.39				4.56		2.20
	SP-8	1.16	1.64			1.56	1.19	1.34		1.50			1.51	1.46	1.56	1.61	1.38				4.51		2.27
	SP-8 (on																						
	SP-9	0.42	0.23			0.44	0.37	0.38		0.51			0.27	0.21	0.27	0.19	0.18				0.30		0.32
	SP-9 (on																						
	SP-10	0.21	0.18			0.19	0.38	0.33		0.27			0.29	0.23	0.23	0.29	0.25						
	SP-11	0.14	0.19			0.40	0.38	0.28		0.31			0.23	0.22	0.39	0.16	0.22						
	SP-12	0.18	0.16			0.24	0.40	0.39		0.28			0.26	0.26	0.23	0.18	0.20						
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.16	0.08			0.11	0.09	0.08		0.21			0.19	0.31	0.19	0.23	0.16						
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
FBR-4 Forward Flow (gpm)		714	671	671	675	675	675	750	745			735		745	666	662			647	767	765	765	780
FBR-4 Recycle Flow (gpm)		1126	1157	1157	1165	1160	1160	1090	1095			1100		1095	1169	1174			1220	1100	1075	1070	1040
FBR-4 Total Flow (gpm)		1840	1828	1828	1840	1835	1835	1840	1840			1835		1840	1835	1836			1867	1867	1840	1835	1820
FBR-4 Eductor		On	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	ON	On	Off	Off	On	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		36	33	33	34	33	33.5	37.5	37			36		36.5	33	33			32	38	38	38	39
*Ethanol Dose (mg/l)		10.7	10.4	10.4	10.6	10.3	10.5	10.6	10.5			10.4		10.4	10.5	10.5			10.5	10.5	10.5	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.3	10.3	9.6	9.5	9.5	9.9	10.3	10.3	10.2	10.5	10.3	10.3	10.1	10.1	10.1	10.1	9.8	9.8	9.7	10.3
Percent Ethanol Overdose		3%	1%	1%	4%	7%	11%	12%	6%			2%		0%	2%	4%			4%	7%	7%	8%	2%
**Equivalent TOC Dose (mg/l)		2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2			2.2		2.2	2.0	2.0			1.9	2.2	2.3	2.3	2.4
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	5.7	5.7	5.7	6.0	6.0			6.0		6.0	5.7	2.5			2.5	2.5	2.5	2.5	2.5
*Phosphourous Dose (mg/l)		0.19	0.21	0.21	0.20	0.20	0.20	0.19	0.20			0.20		0.20	0.21	0.09			0.09	0.08	0.08	0.08	0.08
Bed Level (ft)		13.92	13.75	13.92	14.06	14.17	14.23	14.19	14.33	14.25	14.42	14.60		14.73	14.75	14.71			14.67	14.81	14.71	14.85	14.67
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		9.2	9.4	10.3	7.3	9.0	10.2	8.1	8.2	8.2	5.4	8.3	8.0	7.6	7.7			7.28	8.33	9.42	6.75	6.33	8.28
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		34	35	35	26	25	27	25	25	24	25	25	26	25	25	25	26	26	26	25	25	24	23
Coagulant Dose (mg/l)		49	57	42	34	32	32	30	29	30	27	27	29	27	27	29	29	29	29	22	18	22	24
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
ORP	SP-1	250			192	170		191	173			162		183						236	166.0	179	147
	SP-2	210			133	130		158	126			65		121						157	143.0	146	95
	SP-3																					218	
	SP-4																					205	
	SP-5																					147	
	SP-6	64			37	55		127	56			38		49						102	77.0	71	14
	SP-6A																						
	SP-7	146			131	123		148	123			110		103						186	162.0	160	126
	SP-8												ORP probe defect		ORP probe defect - will be replaced on 7/11								
	SP-9	164			172	138		159	136			117		152						214	160.0	189	157
	SP-10	286			278	236		255	202			206		200						303	298.0	297	294
	SP-11	289			277	240		251	212			212		224						304	299.0	295	294
	SP-12	290			278	244		242	214			215		229						302	295.0	297	293
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	254			223	222		203	193			180		210						274	252.0	268	240
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22	530			230	691		233	266			623		289						410	571	337	705
Turbidity (NTU)	SP-1	0.68			0.58	0.40		0.08	0.10			0.10		0.11	0.09	0.06			0.09	0.04	0.11	0.15	0.15
	SP-2	1.73			1.40	1.09		1.39	0.86			1.00		1.07	1.04	1.16			1.11	0.75	1.01	1.93	1.10
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6	2.57			1.80	1.35		1.69	1.70			1.37		1.65	1.56	1.84			1.67	1.45	1.40	1.47	1.52
	SP-6A																						
	SP-7	1.88			2.06	1.92		1.44	1.38			1.43		1.61	1.65	2.00			1.42	1.31	1.35	1.45	1.80
	SP-8	2.10			2.36	1.62		1.32	1.23			1.35		1.51	1.71	1.34			1.46	1.28	1.28	1.28	1.65
	SP-8 (on																						
	SP-9	0.79			0.82	0.22		0.35	0.24			0.17		0.28	0.27	0.24			0.20	0.18	0.23	0.18	0.25
	SP-9 (on																						
	SP-10	0.88			0.89	0.52		0.12	0.32			0.23		0.19	0.48	0.21			0.20	0.16	0.20	0.67	0.34
	SP-11	0.94			0.62	0.34		0.23	0.32			0.16		0.24	0.21	0.34			0.26	0.19	0.23	0.51	0.32
	SP-12	0.49			0.52	0.27		0.35	0.37			0.22		0.23	0.36	0.28			0.23	0.20	0.24	0.25	0.49
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16	0.74			0.61	0.09		0.14	0.14			0.24		0.13	0.12	0.14			0.21	0.23	0.10	0.15	0.18
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
FBR-4 Forward Flow (gpm)				775	771	765	760	766			760	765	835	835	834				828	829	845	845	
FBR-4 Recycle Flow (gpm)				1055	1064	1058	1060	1054			1060	1050	985	989	972				987	987	978	968	
FBR-4 Total Flow (gpm)				1830	1835	1823	1820	1820			1820	1815	1820	1824	1806				1815	1816	1823	1813	
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On	Data not available							
Ethanol Flow Rate (ml/min)				39	38	38	37.8	38			38	38	40.5	41	40.5				40.5	40.5	40.5	42	
*Ethanol Dose (mg/l)				10.6	10.4	10.5	10.5	10.5			10.6	10.5	10.2	10.4	10.3				10.3	10.3	10.1	10.5	
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.4	10.3	10.2	10.3	10.2	10.2	10.2	10.3	10.2	9.9	10.0	10.1	10.1	10.1	10.1	10.0	10.0	9.4	9.9	9.9
Percent Ethanol Overdose				3%	1%	3%	2%	3%			3%	3%	3%	4%	2%				4%	4%	8%	6%	
**Equivalent TOC Dose (mg/l)				2.3	2.3	2.3	2.3	2.3			2.3	2.3	2.4	2.5	2.5				2.5	2.5	2.4	2.5	
Nutrient Flow Rate (ml/min)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				2.5	2.5	2.5	3.2	
*Phosphourous Dose (mg/l)				0.08	0.08	0.08	0.08	0.08			0.08	0.08	0.07	0.07	0.07								
Bed Level (ft)		14.67	14.67	14.94	13.79	13.92	14.00	14.21			14.83	14.00	14.21	14.44	14.67				14.21	14.44	14.48	14.48	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Filter Run Time (hours)		7.94	8.50	5.10	12.00	13.58	12.75	12.00	11.50	10.67	5.67	11.25	10.58	10.17	9.58	8.72	5.50	9.17	9.44	11.92	9.50	9.89	4.87
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	7.25	10.15	10.15	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4.4	4.5	3.0	4.4	4.5	4.3
Clarifier Flow (gpm)		23	23	23	26	26	27	26	26	26	26	24	26	24	24	24	24	24	24	24	24	29	30
Coagulant Dose (mg/l)		24	24	24	25	29	27	32	32	32	31	30	32	30		24	26	32	26	8	16	15	23
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
ORP	SP-1			218	143	168	157	126			92	55	62	33	74				97	66	81	80	
	SP-2			163	112	120	125	89			80	62	65	33	22				55	63	48	54	
	SP-3													96									
	SP-4													101									
	SP-5													117									
	SP-6			118	-16	-3	-4	-29			-19	-10	-4	-3	-45				-6	-22	-3	-16	
	SP-6A																						
	SP-7			195	133	140	118	92			69	59	54	52	47			100	56	59	90	36	
	SP-8																						
	SP-9			189	166	179	161	126			101	76	61	69	88			118	108	87	101	72	
	SP-10			290	292	293	285	283			275	244	219	237	218			265	249	249	249	248	
	SP-11			291	291	293	287	285			276	251	250	242	248			266	246	209	260	218	
	SP-12			291	288	291	285	285			276	261		214	244			268	262	251	260	247	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			268	251	235	242	224			174	229	172	196	173			197	183	167	180	144	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22			433	685	679	655	346			169	328	435	215	588			234	332	257	278	321	
Turbidity (NTU)	SP-1			0.20	0.10	0.15	0.21	0.18			0.20	0.22	0.21	0.20	0.22				0.13	0.08	0.10	0.14	
	SP-2			5.29	0.91	1.17	0.68	0.91			5.46	0.94	1.74	0.99	0.74				0.81	1.13	0.56	1.22	
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6			8.69	1.35	1.29	1.55	0.90			8.84	1.60	1.26	1.46	1.34				1.21	1.36	1.78	1.33	
	SP-6A																						
	SP-7			8.54	1.47	1.51	1.38	1.44			8.72	1.49	1.58	1.48	1.39			1.38	1.23	1.19	1.28	1.39	
	SP-8			8.56	1.36	1.30	1.40	1.34			8.23	1.29	1.25	1.35	1.41			1.35	1.21	1.39	1.12	1.24	
	SP-8 (on																						
	SP-9			0.48	0.22	0.22	0.27	0.24			0.77	0.37	0.30	0.38	0.25			0.23	0.11	0.07	0.11	0.24	
	SP-9 (on																						
	SP-10			0.51	0.36	0.36	0.27	0.36			0.88	0.26	0.39	0.39	0.28			0.58	0.21	0.34	0.18	0.55	
	SP-11			0.45	0.24	0.27	0.23	0.29			0.54	0.39	0.35	0.34	0.28			0.12	0.12	0.12	0.14	0.10	
	SP-12			0.55	0.28	0.31	0.31	0.39			0.54	0.43		0.29	0.28			0.14	0.26	0.24	0.19	0.12	
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16			0.18	0.15	0.14	0.20	0.22			0.14	0.21	0.46	0.23	0.22			0.15	0.09	0.10	0.15	0.22	
	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27
FBR-4 Forward Flow (gpm)			832		847		764			762		1000		1000			996		1000		1250		
FBR-4 Recycle Flow (gpm)			978		966		1061			1056		806		808			802		801		553		
FBR-4 Total Flow (gpm)			1810		1813		1825			1818		1806		1808			1798		1801		1803		
FBR-4 Eductor																							
Ethanol Flow Rate (ml/min)			40.5		41		37			37		48.3		47.1			46.8		47.3		61.4		
*Ethanol Dose (mg/l)			10.3		10.2		10.2			10.3		10.2		10.0			9.9		10.0		10.4		
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.5	9.5	9.5	9.7	9.7	9.5	9.5	9.6	9.6	9.6
Percent Ethanol Overdose			3%		4%		3%			2%		3%		5%			3%		5%		8%		
**Equivalent TOC Dose (mg/l)			2.5		2.5		2.2			2.2		2.9		2.9			2.9		2.9		3.7		
Nutrient Flow Rate (ml/min)			2.8		3.2		2.5			2.5		2.1		2.2			7.0		7.0		8.0		
*Phosphourous Dose (mg/l)																							
Bed Level (ft)			14.21		14.54		15.00			14.46		14.60		14.52			14.33		14.08		14.33		
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)																							
Filter Run Time (hours)		9.58	9.17	8.28	8.11	7.72	4.13	12.17	10.94	7.72	7.56	7.06	6.25	11.33	7.13	8.75	6.50	8.28	9.33	9.50	9.50	10.83	9.17
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	3.38	16.91	29.96	30.45	18.85	9.67	9.67	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.5	4.4	4.4	4.5	4.4	4.5	4.5	4.4	4.4	4.4	3.0	3.0	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5	4.4
Clarifier Flow (gpm)		29	26	26	26	26	26	26	26	26	26	26	26	25	25	30	30	30	27	30	31	30	29
Coagulant Dose (mg/l)		22	22	22	22	23	13			14	25	22	23	27	25	18	25	25	19	17	18	17	20
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1		62		80		75			67		118		263			192		126		198		
	SP-2		49		51		51			34		86		26			168		94		178		
	SP-3				41														111				
	SP-4				34														116				
	SP-5				24														116				
	SP-6		-18		-23		-16			-18		-17		43			32		30		111		
	SP-6A																						
	SP-7		47		54		72			49		64		154			116		122		113		
	SP-8																						
	SP-9		75		82		92			58		72		135			97		136		117		
	SP-10		242		244		238			251		216		293			295		236		274		
	SP-11		238		244		237			249		223		289			294		236		272		
	SP-12		248		213		221			236		232		285			300		233		274		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		138		162		190			151		160		261			239		192		386		
	SP-17											690		506			265				609		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22		167		159		342			724		714		447			244		678		574		
Turbidity (NTU)	SP-1		0.32		0.07		0.05			0.12		0.07		0.29			0.08		0.16		0.13		
	SP-2		0.82		0.77		4.53			0.80		0.83		2.78			0.54		0.52		0.37		
	SP-3																						
	SP-4																						
	SP-5																						
	SP-6		1.31		1.54		8.95			1.53		1.36		5.62			1.21		1.51		0.96		
	SP-6A																						
	SP-7		1.53		1.18		8.18			1.07		1.13		1.06			1.59		1.09		1.28		
	SP-8		2.01		1.34		7.82			1.17		1.08		1.46			1.48		1.07		1.60		
	SP-8 (on																						
	SP-9		0.25		0.21		0.42			0.10		0.12		0.19			0.11		0.11		0.17		
	SP-9 (on																						
	SP-10		0.67		0.44		0.98			0.40		0.15		1.46			0.14		0.21		0.29		
	SP-11		0.48		0.11		0.49			0.10		0.07		0.36			0.12		0.13		0.20		
	SP-12		0.42		0.15		0.19			0.08		0.14		0.30			0.12		0.12		0.20		
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16		0.25		0.37		0.21			0.09		0.08		0.08			0.05	0.07			0.10		
	SP-17											0.05		0.21			0.06				0.07		
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15
FBR-4 Forward Flow (gpm)		1250		1254	1251	1250					1249		1251	1247	1250	1247		1441		1441
FBR-4 Recycle Flow (gpm)		566		560	563	565					542		546			543		335		333
FBR-4 Total Flow (gpm)		1816		1814	1814	1815					1791		1797			1790		1776		1774
FBR-4 Eductor																				
Ethanol Flow Rate (ml/min)		62		62	61.6	62.7					61.5		62			62.5		71		70.5
*Ethanol Dose (mg/l)		10.5		10.4	10.4	10.6					10.4		10.5			10.6		10.4		10.3
*Theoretical Ethanol Dose (mg/l)		9.7	9.7	9.7	9.7	10.0	10.0	10.0	10.0	10.0	9.6	10.1	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.1
Percent Ethanol Overdose		9%		8%	7%	6%					8%		2%			3%		1%		2%
**Equivalent TOC Dose (mg/l)		3.8		3.8	3.7	3.8					3.8		3.8			3.8		4.4		4.4
Nutrient Flow Rate (ml/min)		8.0		8.0	8.0	8.0					8.0		8.0			2.5				
*Phosphourous Dose (mg/l)						0.16					0.16		0.15			0.05				
Bed Level (ft)		14.48		14.27		14.52					14.33		14.56	14.25	14.33	14.56		14.29		14.42
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.42	9.44	8.83	8.67	8.28	9.72	8.50	14.17	13.67	9.83	8.44	7.22	9.08	10.00	7.92	9.33	10.33	11.83	11.92
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.67	9.18	9.67	5.32	5.80	9.67	9.67	9.67	9.18	6.77	14.98	19.33	19.33	19.81	19.33	18.85	19.33	19.81	19.81
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.1	4.3	3.0	3.0	4.4	4.3	4.4	4.1	3.0	4.3	4.3	4.3	4.4	4.3	4.1	4.3	4.4	4.4
Clarifier Flow (gpm)		29	30	30	30	28	28	30	30	26	26	26	26	26	24	25	25	25	25	24
Coagulant Dose (mg/l)		20	18	20	17	19	19	17	9	9	20	22	25	23	22	22	22	18	16	18
(Alum unless triangle in box, then FeCl3)																				
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1	250		49		80					97	107	101			60		58		177
	SP-2	212		-18		-30					-5	82	11			-32		-45		138
	SP-3			-86																
	SP-4			-97																
	SP-5			-93																
	SP-6	79		-91		-144					-121	-85	-102			-128		-176		-114
	SP-6A																			
	SP-7	136		-63		-42					13	17	-35			-30		-27		-32
	SP-8																			
	SP-9	161		49		50					138	83	71			119		115		88
	SP-10	282		176		240					246	256	251			194		119		262
	SP-11	282		178		210					232	246	244			182		131		252
	SP-12	283		184		214					242	248	243			192		146		258
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	219		129		142					166	181	150			143		156		221
	SP-17											349								543
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			
	SP-22	599		620		640					252	329	298			242		239		383
Turbidity (NTU)	SP-1	0.09		0.08		0.09					0.13	0.17	0.07			0.12		0.09		0.11
	SP-2	0.48		0.43		0.91					0.75	0.44	0.59			1.25		0.29		0.30
	SP-3																			
	SP-4																			
	SP-5																			
	SP-6	1.04		1.30		1.28					1.49	1.36	1.54			1.47		1.67		1.33
	SP-6A																			
	SP-7	1.16		1.48		1.25					1.45	1.68	1.73			1.49		1.74		1.74
	SP-8	1.11		1.26		1.39					1.49	1.66	1.61			1.66		1.65		1.88
	SP-8 (on																			
	SP-9	0.15		0.14		0.20					0.19	0.07	0.15			0.13		0.17		0.13
	SP-9 (on																			
	SP-10	0.22		0.17		0.06					0.35	0.21	0.24			0.33		0.32		0.29
	SP-11	0.12		0.15		0.14					0.33	0.21	0.12			0.19		0.16		0.26
	SP-12	0.14		0.16		0.15					0.22	0.18	0.21			0.22		0.18		0.20
	SP-13																			
	SP-14																			
	SP-15																			
	SP-16	0.19		0.21		0.12					0.27	0.14	0.15			0.20		0.16		0.21
	SP-17											0.15								0.29
	SP-18																			
	SP-19																			
	SP-20																			
	SP-21																			

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
FBR-4 Forward Flow (gpm)				1439		1438		1441			1443		1445		1440			1440	
FBR-4 Recycle Flow (gpm)				368		386		397			388		407		428			428	
FBR-4 Total Flow (gpm)				1807		1824		1838			1831		1852		1868			1868	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)				71.3		70.9		70.7			70.6		71		71.1			71.3	
*Ethanol Dose (mg/l)				10.5		10.4		10.4			10.3		10.4		10.4			10.5	
*Theoretical Ethanol Dose (mg/l)		10.1	10.1	9.9	9.9	10.0	10.0	9.8	9.8	9.8	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0
Percent Ethanol Overdose				5%		4%		6%			2%		2%		4%			4%	
**Equivalent TOC Dose (mg/l)				4.3		4.3		4.2			4.2		4.2		4.2			4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)				14.46		14.46		14.50			14.46		14.79		14.83	14.50		13.50	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		14.75	11.50	10.58	13.25	11.92	13.17	125.00	13.00	14.42	19.67	17.50	8.56	14.50	8.67	9.08	13.17	19.50	15.75
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		19.33	19.81	19.33	16.43	9.67	9.67	9.67	9.67	9.67	9.67	9.67	7.73	6.28	9.18	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.3	4.3	4.3	4.4	4.3	4.3	4.3	4.4	4.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clarifier Flow (gpm)		23	23	25	24	25	24	24	24	24	25	26	26	25	27	27	27	27	27
Coagulant Dose (mg/l)		14	20	14	10	11	12	12	6	0	5	5	16	7	14	17	10	7	7
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1			128		59		118			104		129		77			173	
	SP-2			59		-27		50			56		41		50			145	
	SP-3					38													
	SP-4					25													
	SP-5					55													
	SP-6			-89		-193		-106			-78		-48		-75			-70	
	SP-6A																		
	SP-7			-46		4		38			9		27		21			-33	
	SP-8																		
	SP-9			74		40		74			82		80		57			82	
	SP-10			257		172		220			253		236		193			160	
	SP-11			237		168		234			233		239		192			191	
	SP-12			248		169		243			237		246		198			195	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			178		120		249			261		250		222			144	
	SP-17			329															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22			301		734		344			260		473		300			468	
Turbidity (NTU)	SP-1			0.13		0.10		0.13			1.14		0.27		0.07			0.11	
	SP-2			0.32		0.39		0.84			0.50		0.52		1.50			0.31	
	SP-3																		
	SP-4																		
	SP-5																		
	SP-6			1.52		1.51		1.74			1.36		1.54		6.81			1.48	
	SP-6A																		
	SP-7			1.69		2.03		2.46			1.69		1.66		1.41			1.49	
	SP-8			2.39		1.63		2.47			1.59		1.58		1.49			1.32	
	SP-8 (on																		
	SP-9			0.17		0.30		0.28			0.23		0.27		0.18			0.15	
	SP-9 (on																		
	SP-10			0.25		0.53		0.73			0.94		0.40		0.33			0.19	
	SP-11			0.24		0.17		0.27			0.25		0.29		0.19			0.17	
	SP-12			0.24		0.28		0.29			0.24		0.34		0.14			0.17	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16			0.23		0.20		0.26			0.25		0.32		0.12			0.13	
	SP-17			0.23															
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
FBR-4 Forward Flow (gpm)		1443		1431	1443	1437	1443		D		1440	1440		1442		1440		1444	
FBR-4 Recycle Flow (gpm)		425		437			425		354		362			343		356		423	
FBR-4 Total Flow (gpm)		1868		1868			1868				1802			1785		1796		1867	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		72.2		72			71.8		71.5		71.4			71		71.4		71.4	
*Ethanol Dose (mg/l)		10.6		10.6			10.5				10.5			10.4		10.5		10.4	
*Theoretical Ethanol Dose (mg/l)		9.8	9.8	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.5	10.5	10.6	10.6
Percent Ethanol Overdose		8%		6%			5%				6%			4%		0%		-1%	
**Equivalent TOC Dose (mg/l)		4.2		4.2			4.2				4.4			4.4		4.4		4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.58		14.63	14.79	14.58	14.54	14.00	14.29		14.46	14.42		14.46		14.63		14.42	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.50	16.67	7.72	13.08	13.00	15.92	19.67	16.17	14.67	15.25	11.70	14.33	14.17	10.67	11.08	8.00	9.83	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.18	9.67	7.25	9.67	9.67	9.67	6.77	9.67	9.67	9.67	9.67	9.67	9.18	9.67	8.70	6.77	4.83	3.38
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.0	4.1	3.0	4.1	4.1	4.3	3.0	4.3	4.1	4.1	4.1	4.1	4.0	4.1	3.9	4.1	4.1	3.0
Clarifier Flow (gpm)		27	27	27	26	26	26	26	26	26	26	26	25	25	25	25	25	25	27
Coagulant Dose (mg/l)		17	5	19	13	13	5	11	7	13	5	13	13	11	14	13	18	14	10
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1	57		61			53		92		165			252		203		286	
	SP-2	17		-1			27		32		100			77		131		75	
	SP-3	-55														9			
	SP-4	-52														-20			
	SP-5	-43														-57			
	SP-6	-75		-81			-89		-90		-69			-102		-94		-177	
	SP-6A																		
	SP-7	-12		14			-16		42		14			28		164		66	
	SP-8																		
	SP-9	20		44			24		104		74			117		165		172	
	SP-10	150		64			28		73		52			95		249		157	
	SP-11	187		187			140		197		190			236		244		201	
	SP-12	191		198			154		215		202			240		245		217	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	157		204			94		131		159			164		344		187	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	342		339			592		121		723			323		629		370	
Turbidity (NTU)	SP-1	0.26		0.08			0.08		0.08		0.13			0.03		0.15		0.16	
	SP-2	0.46		0.54			0.46		0.56		0.19			0.33		0.35		0.55	
	SP-3	1.78																	
	SP-4	1.25																	
	SP-5	1.41																	
	SP-6	1.40		1.58			2.39		1.28		1.61			1.64		1.43		1.69	
	SP-6A																		
	SP-7	1.48		1.52			1.67		1.59		2.92			1.97		1.42		1.57	
	SP-8	1.48		1.69			1.49		1.71		2.36			1.79		2.12		1.43	
	SP-8 (on																		
	SP-9	0.14		0.15			0.22		0.20		0.15			0.14		0.14		0.16	
	SP-9 (on																		
	SP-10	0.26		0.09			0.21		0.21		0.31			0.17		0.19		0.17	
	SP-11	0.57		0.15			0.18		0.21		0.11			0.16		0.14		0.16	
	SP-12	0.31		0.17			0.16		0.31		0.27			0.16		0.18		0.16	
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	0.20		0.21			0.26		0.24		0.19			0.18		0.17		0.17	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8
FBR-4 Forward Flow (gpm)			1443		1445		1444	1442	1437	1441		1439		1447	1442	1437	1436		1440
FBR-4 Recycle Flow (gpm)			424		422		423			426		427		421			432		428
FBR-4 Total Flow (gpm)			1867		1867		1867			1867		1866		1868			1868		1868
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			70.5		70.8		71.1			70.2		71.2		71.5			70.9		70.9
*Ethanol Dose (mg/l)			10.3		10.4		10.4			10.3		10.5		10.4			10.4		10.4
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.6	9.9	10.2	9.5	9.5	9.5	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.0	10.0	10.7
Percent Ethanol Overdose			-2%		5%		10%			0%		1%		2%			5%		-3%
**Equivalent TOC Dose (mg/l)			4.1		4.2		4.2			4.1		4.2		4.2			4.2		4.2
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.63		14.50		14.92	14.17	14.42	14.50		14.38		14.83	14.50	14.54	14.75		14.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		20.00	18.83	11.00	13.83	16.00	30.67	15.83	13.25	11.28	9.17	12.17	11.50	8.67	11.72	11.67	11.75	10.83	10.33
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		0.00	2.90	4.83	4.83	3.38	0.00	4.35	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.0	3.0	4.3	4.3	3.0	3.0	4.0	4.3	4.1	4.3	4.3	4.1	4.3	4.3	4.3	4.3	4.1	4.1
Clarifier Flow (gpm)		27	26	26	26	26	26	26	26	26	25	25	25	26	26	27	26	26	26
Coagulant Dose (mg/l)		0	16	14	5	0	0	0	0	0	5	11	13	18	11	12	13	13	14
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1				70	159	150			138		91		106			88		295
	SP-2				-62	-50	80			-19		0		-58			-42		62
	SP-3											-152							
	SP-4											-98							
	SP-5											-132							
	SP-6				-153	-195	-200			-200		-155		-164			-185		-166
	SP-6A																		
	SP-7				-97	-100	-30			-115		-88		-117			-94		-115
	SP-8																		
	SP-9				64	67	73			56		48		46			74		146
	SP-10				46	70	248			40		61		57			63		248
	SP-11				157	175	235			148		205		154			141		240
	SP-12				170	187	239			166		215		179			169		241
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				130	154	334			95		179		134			133		338
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22				121	687	662			510		514		564			567		668
Turbidity (NTU)	SP-1				0.15	0.20	0.22			0.11		0.17		0.15			0.26		0.20
	SP-2				0.39	0.49	1.63			0.55		0.36		0.64			0.53		0.45
	SP-3											1.75							
	SP-4											1.33							
	SP-5											1.23							
	SP-6				1.44	1.36	9.27			1.54		1.23		1.20			1.56		1.92
	SP-6A																		
	SP-7				1.45	1.73	2.37			1.81		1.44		1.86			1.71		2.06
	SP-8				1.43	1.43	2.74			1.69		1.41		3.64			1.82		1.81
	SP-8 (on																		
	SP-9				0.37	0.22	0.15			0.26		0.21		0.16			0.22		0.11
	SP-9 (on																		
	SP-10				0.37	0.23	0.17			0.31		0.18		0.20			0.22		0.20
	SP-11				0.35	0.26	0.18			0.22		0.20		0.16			0.31		0.18
	SP-12				0.24	0.27	0.17			0.25		0.18		0.23			0.25		0.16
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16				0.16	0.16	0.13			0.16		0.13		0.17			0.21		0.08
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26
FBR-4 Forward Flow (gpm)			1440	1447	1439	1438		1438		1441			1441		1440		1441	1440	1444
FBR-4 Recycle Flow (gpm)			426			429		428		427			427		427				
FBR-4 Total Flow (gpm)			1866			1867		1866		1868			1868		1867				
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			71.2			71.1		71.2		70.6			71.2		71.0				
*Ethanol Dose (mg/l)			10.4			10.4		10.5		10.4			10.4		10.4				
*Theoretical Ethanol Dose (mg/l)		10.7	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.4	10.4	10.4	10.4	10.4
Percent Ethanol Overdose			3%			3%		2%		3%			3%		0%				
**Equivalent TOC Dose (mg/l)			4.2			4.2		4.2		4.2			4.2		4.2				
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.50	14.42	14.50	14.58		14.71		14.58			14.50		14.50	14.83	14.58	14.63	14.38
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.71	10.17	13.42	12.25	9.75	11.75	9.61	7.50	10.22	8.33	8.44	9.50	9.39	11.50	13.50	11.50	11.42	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.8	3.4	3.5	3.5	3.5	3.5	3.5
Clarifier Flow (gpm)		25	25	25	25	25	25	25	25	25	24	24	24	26	27	27	27	27	27
Coagulant Dose (mg/l)		18	14	11	11	13	11	18	18	13	20	20	14	18	12	12	12	12	8
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1		304				19	94		41			108		179				
	SP-2		111				19	15		-39			17		83				
	SP-3							-40											
	SP-4							-35											
	SP-5							-35											
	SP-6		-159				19	-67		-113			-80		-94				
	SP-6A																		
	SP-7		-104				19	-66		-44			-8		-18				
	SP-8																		
	SP-9		144				19	44		53			70		87				
	SP-10		246				18	52		95			128		278				
	SP-11		231				18	141		164			190		281				
	SP-12		229				18	154		180			216		284				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		376				19	126		148			179		324				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22		709				18	635		736			667		691				
Turbidity (NTU)	SP-1		0.16				0.26	0.20		0.30			0.31		0.17				
	SP-2		0.49				0.64	0.55		0.78			0.53		0.54				
	SP-3							2.31											
	SP-4							1.60											
	SP-5							2.61											
	SP-6		1.64				2.12	1.32		1.35			1.75		1.74				
	SP-6A																		
	SP-7		1.97				2.13	1.98		2.17			2.48		2.12				
	SP-8		2.43				0.96	2.14		1.96					2.78				
	SP-8 (on																		
	SP-9		0.10				0.24	0.25		0.30			0.26		0.22				
	SP-9 (on																		
	SP-10		0.12				0.27	0.24		0.21			0.29		0.29				
	SP-11		0.01				0.23	0.22		0.24			0.27		0.24				
	SP-12		0.09				0.37	0.27		0.27			0.32		0.19				
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16		0.14				0.21	0.22		0.23			0.24		0.09				
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
FBR-4 Forward Flow (gpm)		1442		1447		1434	1439	1452	1441		1437.00		1438	1442	1447	1440		1435	
FBR-4 Recycle Flow (gpm)		425		419		432	427	414	427		430.00		371	367	362	378		370	
FBR-4 Total Flow (gpm)		1867		1866		1866	1866	1866	1868		1867.00		1809	1809	1809	1818		1805	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		70.7		71.5		71.1	71.0	71.0	71.6		71.4		70.8	71.1	71.1	71.1		70.6	
*Ethanol Dose (mg/l)		10.4		10.4		10.5	10.4	10.3	10.5		10.5		10.4	10.4	10.4	10.4		10.4	
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.3	9.9	10.0	10.0	10.0	9.9	9.9	10.2	10.2	9.5	9.5	9.5	10.0	10.0	9.9	9.9
Percent Ethanol Overdose		-3%		1%		5%	4%	3%	7%		2%		10%	10%	9%	5%		5%	
**Equivalent TOC Dose (mg/l)		4.2		4.2		4.2	4.2	4.2	4.2		4.2		4.3	4.3	4.3	4.3		4.3	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.67		14.83		15.08	14.75	14.54	14.88		14.92		15.25	15.21	15.42	15.71	15.67	15.33	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350.00	350.00	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		10.75	11.42	15.58	13.00	11.83	8.67	10.92	8.94	11.00	13.83	12.83	11.25	12.17	11.67	12.11	11.00	10.08	
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100.00	100.00	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	3.38	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	12.08	
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10.00	10.00	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.5	3.4	3.5	3.5	3.5	3.4	3.5	3.0	3.40	3.40	3.4	3.4	3.4	3.4	3.0	3.0	3.8	0.0
Clarifier Flow (gpm)		27	26	26	20	25	25	26	23	18	18	18	18	13	11	12	13	15	
Coagulant Dose (mg/l)		14	16	9	28	23	32	23	14	14	28	16	14	25	18	18	18	54	
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
ORP	SP-1	79		256		245			245		255.00		288			212	300	299	
	SP-2	20		187		157			158		168.00		262			193		277	
	SP-3			106														258	
	SP-4			116														277	
	SP-5			120														232	
	SP-6	-55		-8		-65			-15		-30.00		5			-19	8	-26	
	SP-6A																		
	SP-7	9		75		141			60		123.00		116			142		175	
	SP-8																		
	SP-9	55		141		256			136		177.00		145			224		284	
	SP-10	48		199		280			200		237.00		199			194		333	
	SP-11	135		296		288			306		314.00		314			265		327	
	SP-12	166		303		291			309		314.00		309			267			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	138		264		315			264		294.00		243			283		322	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22	581	757	744		716			688		721.00		715			673	678	637	
Turbidity (NTU)	SP-1	0.20		0.26		0.25			0.26		0.09		0.11			0.16		0.52	
	SP-2	0.65		0.54		0.46			0.66		0.58		0.31			0.46		0.57	
	SP-3			1.62														1.93	
	SP-4			2.11														1.60	
	SP-5			3.67														5.81	
	SP-6	2.90		1.61		2.03			1.17		1.57		1.13			1.28		2.73	
	SP-6A																		
	SP-7	2.04		2.07		2.25			2.47		1.98		2.74			2.00		3.01	
	SP-8	2.07				2.15			2.45		2.03		2.08			2.04		3.11	
	SP-8 (on																		
	SP-9	0.25		0.25		0.26			0.28		0.14		0.10			0.23		0.17	
	SP-9 (on																		
	SP-10	0.27		0.21		0.24			0.31		0.19		0.14			0.21		0.14	
	SP-11	0.26		0.24		0.22			0.29		0.11		0.11			0.20		0.14	
	SP-12	0.26		0.35		0.20			0.38		0.12		0.15			0.14			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	0.22		0.24		0.19			0.27		0.11		0.07			0.13		0.14	
	SP-17																		
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		12/15	Ave
FBR-4 Forward Flow (gpm)			1003
FBR-4 Recycle Flow (gpm)			860
FBR-4 Total Flow (gpm)			1826
FBR-4 Eductor			
Ethanol Flow Rate (ml/min)			46.9
*Ethanol Dose (mg/l)			10.2
*Theoretical Ethanol Dose (mg/l)			
Percent Ethanol Overdose			0.0
**Equivalent TOC Dose (mg/l)			2.8
Nutrient Flow Rate (ml/min)			5.76
*Phosphourous Dose (mg/l)			0.21
Bed Level (ft)			14.21
Filter Flow (gpm)			350
Filter Polymer Dose (mg/l)			0.00
Filter Run Time (hours)			10.89
UVOX/LPGAC Flow (gpm)			100
Peroxide Dose (mg/l)			9.59
Disinfection Flow (gpm)			10
Chlorine Dose (mg/l)			4.11
Clarifier Flow (gpm)			23.5
Coagulant Dose (mg/l)			15.9
(Alum unless triangle in box, then FeCl3)			
Clarifier Polymer Dose (mg/l)			2.1
ORP	SP-1		150
	SP-2		85
	SP-3		47
	SP-4		49
	SP-5		40
	SP-6		-38
	SP-6A		
	SP-7		65
	SP-8		73
	SP-9		114
	SP-10		210
	SP-11		232
	SP-12		236
	SP-13		91
	SP-14		89
	SP-15		88
	SP-16		205
	SP-17		514
	SP-18		667
	SP-19		673
	SP-20		671
	SP-21		669
	SP-22		470
Turbidity (NTU)	SP-1		0.21
	SP-2		0.97
	SP-3		1.88
	SP-4		1.58
	SP-5		2.95
	SP-6		1.89
	SP-6A		
	SP-7		1.83
	SP-8		1.83
	SP-8 (on		
	SP-9		0.23
	SP-9 (on		
	SP-10		0.31
	SP-11		0.24
	SP-12		0.25
	SP-13		
	SP-14		
	SP-15		
	SP-16		0.18
	SP-17		0.16
	SP-18		
	SP-19		
	SP-20		
	SP-21		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
FBR-4 Forward Flow (gpm)		695	685	680	680	680	675	674	662	664	680	672	672	675	665	670	668	666	680	680	690	685
FBR-4 Recycle Flow (gpm)		1125	1130	1125	1125	1125	1135	1136	1123	1131	1140	1135	1135	1140	1140	1140	1142	1139	1126	1126	1120	1135
FBR-4 Total Flow (gpm)		1820	1815	1805	1805	1805	1810	1810	1785	1795	1820	1807	1807	1815	1805	1810	1810	1805	1806	1806	1810	1820
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	On	On	On	On	On	On	On	Off	Off
Ethanol Flow Rate (ml/min)		30.5	30.0	29.0	29.0	29.0	29.0	29.0	27.9	29.0	30.0	30.3	30.3	31.0	30.5	30.5	30.0	31.0	30.7	30.7	31.5	31.0
*Ethanol Dose (mg/l)		9.3	9.3	9.0	9.0	9.0	9.1	9.1	8.9	9.2	9.3	9.5	9.5	9.7	9.7	9.6	9.5	9.8	9.5	9.5	9.6	9.6
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	10.0	10.0	10.3	10.3	9.6	9.2	10.0	10.0	10.0	9.9	10.0	9.9	9.9	10.4	10.4	10.4	9.8	10.1
Percent Ethanol Overdose		-7%	-8%	-10%	-10%	-10%	-12%	-12%	-7%	0%	-7%	-5%	-5%	-2%	-3%	-3%	-4%	-5%	-8%	-8%	-1%	-5%
**Equivalent TOC Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9
Nutrient Flow Rate (ml/min)		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	11.4	11.4	11.4	11.4	11.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.42	0.41	0.41	0.41	0.41	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
Bed Level (ft)		14.21	14.44	14.56	14.56	14.56	14.79	14.90	14.96	15.13	13.67	13.63	13.58	13.79	13.75	13.71	13.67	13.60	13.50	13.38	13.54	13.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		11.7	10.3	9.2	9.9	9.8	11	9.8	4.8	5.4	4.5	9.0	8.5	11.5	12.3	13.7	13.6	14	15.0	14.8	13.4	13.1
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		18.36	17.88	23.20	26.10	26.58	23.68	25.13	33.83	29.00						5.32	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.4	3.4	3.4	3.4	3.4	3.4	3.6								4.5	4.6	4.6	4.6	4.6	4.8	4.6
Clarifier Flow (gpm)		25	32	40	42	41	42	42	36	46	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		16	20	22	24	22	24	22	38	53	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																						
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SP-22																0.14	0.14			0.11	0.04
Hydrogen Peroxide (mg/l) measured	SP-10																					
	SP-11																					
	SP-13																					
	SP-14																					
	SP-15																					
	SP-16																					
Free Chlorine (mg/l) measured	SP-17																					
	SP-18																					
	SP-19																					
	SP-20																					
	SP-21																					
	SP-22																					
	30 min.																					
	60 min.																					
Total Chlorine (mg/l) measured	SP-17																					
	SP-18																					
	SP-19																					
	SP-20																					
	SP-21																					
	SP-22																					
	30 min.																					
	60 min.																					
Particle Counts 2-5 um (cts/ml)	SP-1																					
	SP-8	2433	2451	2515	2583	2643	2512	2056	2421	1694	2564	2855	2616	1892	2233	2530	2483	2384	2420	2359	2257	2289
	SP-9	1600	1222	1568	1372	1108	1023	975	699	575	865	679	667	824	727	651	551	547	654	707	687	722
	SP-10																					
	SP-11																					
	SP-16																					
	SP-22																					
Particle Counts 5-10 um (cts/ml)	SP-1																					
	SP-8	1400	1538	1610	1625	1627	2555	1097	1618	1615	2459	1524	1222	674	674	1315	1399	1557	1771	1795	1643	1603
	SP-9	172	142	143	171	162	374	361	261	178	93	70	70	68	85	133	76	111	126	116	122	146
	SP-10																					
	SP-11																					
	SP-16																					
	SP-22																					
Particle Counts 10-15 um (cts/ml)	SP-1																					
	SP-8	330.1	428.3	470.5	472.3	441.1	354.8	287.5	416.9	593.5	739.0	369.1	318.1	190.0	187.7	326.6	358.2	412.0	471.1	484.3	453.4	437.1
	SP-9	62.6	41.1	47.9	36.9	48.8	49.6	56.8	30.5	17.2	10.0	11.5	5.8	14.2	14.3	17.5	18.4	20.8	16.5	14.3	14.9	11.1
	SP-10																					
	SP-11																					
	SP-16																					
	SP-22																					
Particle Counts 15-20 um (cts/ml)	SP-1																					
	SP-8	109.4	149.9	162.2	153.3	138.0	104.4	87.3	143.5	276.3	274.7	111.8	107.2	60.7	56.1	130.7	136.5	148.8	165.3	169.0	155.9	149.2
	SP-9	20.6	12.3	7.4	4.2	2.9	2.6	4.2	6.0	5.7	9.4	16.0	26.4	23.2	44.6	69.8	38.8	35.6	41.7	21.9	12.6	8.6

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31
FBR-4 Forward Flow (gpm)		695	695	675	677	677	675	680	677	680	690			655	690	650	655	655				675	680
FBR-4 Recycle Flow (gpm)		1130	1130	1150	1142	1142	1150	1150	1148	1140	1125			1170	1170	1170	1175	1175				1160	1155
FBR-4 Total Flow (gpm)		1825	1825	1825	1819	1819	1825	1830	1825	1820	1815			1825	1860	1820	1830	1830				1835	1835
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		31.0	32.0	31.0	30.5	30.5	31	31	32	31	36			30	30	30	30.5	30				30	32
*Ethanol Dose (mg/l)		9.4	9.7	9.7	9.5	9.5	9.7	9.6	10.0	9.6	11.0			9.7	9.2	9.8	9.8	9.7				9.4	9.9
*Theoretical Ethanol Dose (mg/l)		9.8	9.5	10.0	10.0	10.0	10.0	10.0	10.0	9.9	10.4	10.4	10.4	10.4	9.7	10.3	10.0	10.5	10.5	10.5	10.5	10.3	10.4
Percent Ethanol Overdose		-4%	3%	-3%	-5%	-5%	-3%	-4%	-1%	-3%	6%			-7%	-5%	-5%	-1%	-8%				-9%	-4%
**Equivalent TOC Dose (mg/l)		1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.2			1.8	1.8	1.8	1.8	1.8				1.8	1.9
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	3.8	3.8	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0				5.0	5.0
*Phosphourous Dose (mg/l)		0.20	0.20	0.20	0.14	0.14	0.18	0.18	0.18	0.18	0.18			0.19	0.18	0.19	0.19	0.19				0.18	0.18
Bed Level (ft)		13.46	13.38	13.38	13.29	13.17	13.38	13.33	13.25	13.25	13.17			13.19	13.21	13.19	13.19	13.17				13.21	13.25
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		12.5	12.1	11.4	10.9	10.5	10.3	10.1	9.4	9.0	8.8	8.9	8.6	8.3	7.6	9.0	8.2	14.9	6.4	10.2	11.0	7.5	9.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	6.77	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	9.67	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.6	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.3	4.3	4.4	4.5	4.5	4.5	4.4	4.5	4.5	4.4	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SP-22	0.09		0.09			0.13	0.08	0.07	0.08	0.07					0.11	0.13	0.38				0.04	0.05
Hydrogen Peroxide (mg/l) measured	SP-10																						
	SP-11																						
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16																						
Free Chlorine (mg/l) measured	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22																						
	30 min.																						
	60 min.																						
Total Chlorine (mg/l) measured	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22																						
	30 min.																						
	60 min.																						
Particle Counts 2-5 um (cts/ml)	SP-1			218.0																			
	SP-8	2443	2397	1945	2302	2300	2225	2160	2097	1424	1183	1195	1206	966	935	1311	2027	2006	1869	1594	1487	2000	2496
	SP-9	800	750	709	727	801	870	824	864	938	934	939	921	1006	1030	1180	1112	1121	929	1324	1617	1757	1416
	SP-10			415																			
	SP-11			512																			
	SP-16			306																			
	SP-22			441																			
Particle Counts 5-10 um (cts/ml)	SP-1			58																			
	SP-8	1548	1487	772	1545	1475	1413	1423	1185	478	186	154	171	51	164	281	956	742	551	467	382	859	1416
	SP-9	168	191	164	197	220	279	311	327	353	229	251	223	244	247	428	346	338	223	261	235	349	336
	SP-10			22.0																			
	SP-11			184.0																			
	SP-16			548.0																			
	SP-22			459.0																			
Particle Counts 10-15 um (cts/ml)	SP-1			7.0																			
	SP-8	412.8	389.3	219.7	418.8	389.9	373.6	379.6	333.6	162.8	69.8	58.5	64.7	26.1	46.0	91.9	280.4	206.1	132.3	145.1	118.8	231.7	340.9
	SP-9	12.4	16.1	16.9	17.1	19.5	20.0	22.4	23.3	26.1	19.3	28.1	26.4	27.4	26.5	34.4	27.7	26.7	18.1	7.8	7.8	14.0	10.5
	SP-10			5.0																			
	SP-11			31.0																			
	SP-16			31.0																			
	SP-22			23.0																			
Particle Counts 15-20 um (cts/ml)	SP-1			2.0																			
	SP-8	141.1	133.5	65.3	147.2	136.6	131.9	128.8	111.4	53.7	17.8	10.3	13.0	3.5	36.7	18.8	82.2	73.1	39.9	31.3	24.0	64.5	101.4
	SP-9	8.9	10.9	7.7	7.6	7.1	8.4	8.5	7.5	8.2	7.9	5.0	4.9	5.2	5.6	11.6	7.5	6.8	12.1	0.4	0.6	2.4	2.8

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22
FBR-4 Forward Flow (gpm)		660	660			719	715	720	725	725			765	800	730	725	730	720	720	715	720	705	730
FBR-4 Recycle Flow (gpm)		1145	1140			1081	1085	1090	1085	1085			1030	990	1070	1060	1095	1101	1101	1110	1105	1105	1138
FBR-4 Total Flow (gpm)		1805	1800			1800	1800	1810	1810	1810			1795	1790	1800	1785	1825	1821	1821	1825	1825	1810	1868
FBR-4 Eductor		Off	Off	Off	On	On	On	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On
Ethanol Flow Rate (ml/min)		31	31			35	35	36	36	36			38	40	36	36.5	37	37	37	36	36	35	36.5
*Ethanol Dose (mg/l)		9.9	9.9			10.3	10.3	10.6	10.5	10.5			10.5	10.6	10.4	10.6	10.7	10.9	10.9	10.6	10.6	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.2	10.1	10.1	10.1	9.9	10.1	10.2	10.2	10.1	10.1	10.1	9.7	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.3	10.4	10.4
Percent Ethanol Overdose		-3%	-2%			3%	2%	4%	3%	4%			9%	6%	4%	7%	7%	9%	9%	6%	3%	1%	2%
**Equivalent TOC Dose (mg/l)		1.9	1.9			2.1	2.1	2.2	2.2	2.2			2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Nutrient Flow Rate (ml/min)		5.0	5.0			5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.18	0.18			0.17	0.17	0.17	0.17	0.17			0.16	0.15	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.19
Bed Level (ft)		13.15	13.17	13.13	13.21	13.29	13.33	13.33	13.31	13.38	13.25	13.25	13.46	13.54	13.54	13.58	13.71	13.63	13.63	13.73	13.79	13.79	14.00
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.1	4.4	4.0	4.0	6.2	11.0	11.8	10.2	11.2	12.1	11.0	9.2	8.4	9.5	8.4	6.7	7.5	4.2	4.7	4.7	4.3	3.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	12.08	13.53
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.4	4.4	4.4	4.4	4.5	4.5	3.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4
Clarifier Flow (gpm)		0	50	50	49	49	0	0	48	48	48	47	47	47	47	47	36	60	37	34	34	34	34
Coagulant Dose (mg/l)		0	28	28	28	26	0	0	26	26	26	26	0	0	0	0	0	0	6	12	18	38	73
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	5.0	20.0	20.0	20.0	20.0
	SP-22	0.11	0.11			0.14	0.07	0.08		0.09			0.17	0.09	0.07	0.02	0.17						
Hydrogen Peroxide (mg/l) measured	SP-10																			10.00			6.00
	SP-11																			7.50			3.00
	SP-13																			2.00			0.00
	SP-14																			0.50			0.00
	SP-15																			<0.5			0.00
	SP-16																			<0.5			0.00
Free Chlorine (mg/l) measured	SP-17																			3.00			3.50
	SP-18																			2.25			2.50
	SP-19																			1.50			2.50
	SP-20																			1.75			2.50
	SP-21																			1.75			2.50
	SP-22																			1.75			3.00
	30 min.																						
	60 min.																						
Total Chlorine (mg/l) measured	SP-17																						
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22																						
	30 min.																						
	60 min.																						
Particle Counts 2-5 um (cts/ml)	SP-1																						
	SP-8	1650	1340	940	848	1533	2209	2145	2157	1619	1321	671	601	664	282	866	1237	945	888	1200	1536	1213	1816
	SP-9	949	588	130	492	791	865	1319	1830	1265	1502	1660	1003	1688	1936	1846	1621	1436	1332	224	254	219	182
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 5-10 um (cts/ml)	SP-1																						
	SP-8	574	302	120	68	688	1486	1125	860	551	240	44	68	81	No data	332	265	118	36	485	343	216	1161
	SP-9	371	221	52	265	272	176	212	204	117	94	115	140	339	486	453	410	290	290	20	18	32	56
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 10-15 um (cts/ml)	SP-1																						
	SP-8	171.6	108.6	59.2	35.4	212.4	428.9	306.7	189.4	169.1	76.0	15.8	21.1	23.8	No data	116.8	91.6	40.2	16.3	146.5	95.7	70.0	336.3
	SP-9	27.4	16.2	15.0	22.1	13.9	16.3	22.4	22.2	7.5	5.8	11.0	12.0	31.7	56.6	52.9	43.7	31.1	50.2	6.4	5.8	5.8	8.9
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 15-20 um (cts/ml)	SP-1																						
	SP-8	42.0	26.8	17.9	9.2	112.2	139.4	78.1	45.5	39.4	17.3	53.8	5.8	29.4	No data	20.3	13.6	6.9	2.2	37.6	17.3	13.3	113.8
	SP-9	6.1	2.9	2.5	3.4	1.6	1.2	8.5	19.8	17.3	12.6	7.6	7.1	10.4	15.4	20.0	18.9	12.2	15.1	2.6	1.1	0.9	0.6

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
FBR-4 Forward Flow (gpm)		714	671	671	675	675	675	750	745			735		745	666	662			647	767	765	765	780
FBR-4 Recycle Flow (gpm)		1126	1157	1157	1165	1160	1160	1090	1095			1100		1095	1169	1174			1220	1100	1075	1070	1040
FBR-4 Total Flow (gpm)		1840	1828	1828	1840	1835	1835	1840	1840			1835		1840	1835	1836			1867	1867	1840	1835	1820
FBR-4 Eductor		On	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	ON	On	Off	Off	On	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		36	33	33	34	33	33.5	37.5	37			36		36.5	33	33			32	38	38	38	39
*Ethanol Dose (mg/l)		10.7	10.4	10.4	10.6	10.3	10.5	10.6	10.5			10.4		10.4	10.5	10.5			10.5	10.5	10.5	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.3	10.3	9.6	9.5	9.5	9.9	10.3	10.3	10.2	10.5	10.3	10.3	10.1	10.1	10.1	10.1	9.8	9.8	9.7	10.3
Percent Ethanol Overdose		3%	1%	1%	4%	7%	11%	12%	6%			2%		0%	2%	4%			4%	7%	7%	8%	2%
**Equivalent TOC Dose (mg/l)		2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2			2.2		2.2	2.0	2.0			1.9	2.2	2.3	2.3	2.4
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	5.7	5.7	5.7	6.0	6.0			6.0		6.0	5.7	2.5			2.5	2.5	2.5	2.5	2.5
*Phosphourous Dose (mg/l)		0.19	0.21	0.21	0.20	0.20	0.20	0.19	0.20			0.20		0.20	0.21	0.09			0.09	0.08	0.08	0.08	0.08
Bed Level (ft)		13.92	13.75	13.92	14.06	14.17	14.23	14.19	14.33	14.25	14.42	14.60		14.73	14.75	14.71			14.67	14.81	14.71	14.85	14.67
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		9.2	9.4	10.3	7.3	9.0	10.2	8.1	8.2	8.2	5.4	8.3	8.0	7.6	7.7			7.28	8.33	9.42	6.75	6.33	8.28
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		34	35	35	26	25	27	25	25	24	25	25	26	25	25	25	26	26	26	25	25	24	23
Coagulant Dose (mg/l)		49	57	42	34	32	32	30	29	30	27	27	29	27	27	29	29	29	29	22	18	22	24
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	SP-22	0.73			0.60	0.16		0.10	0.16			0.12		0.12	0.14	0.13			0.09	0.12	0.13	0.14	0.21
Hydrogen Peroxide (mg/l) measured	SP-10							10.00												7.50			
	SP-11							7.00												5.00			
	SP-13																						
	SP-14																						
	SP-15																						
	SP-16																						
Free Chlorine (mg/l) measured	SP-17							4.25												1.25			
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22							0.35												0.25			
	30 min.																						
	60 min.																						
Total Chlorine (mg/l) measured	SP-17							4.25												1.25			
	SP-18																						
	SP-19																						
	SP-20																						
	SP-21																						
	SP-22							0.60												1.25			
	30 min.																						
	60 min.																						
Particle Counts 2-5 um (cts/ml)	SP-1																						
	SP-8	2661	2715	2897	2773	2610	2667	2067	2316	2453	2404	2301	2343	2354	2222	2294	2362	2041	2084	2263	2191	1586	1765
	SP-9	301	780	933	1107	1111	1314	838	236	1601	1329	1269	947	1056	1007	970	449	373	423	458	412	261	410
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 5-10 um (cts/ml)	SP-1																						
	SP-8	2145	2037	1867	1758	1568	1697	1228	1595	1513	1088	1232	1418	1646	1619	1683	1387	1138	1044	1278	1211	630	699
	SP-9	70	107	74	82	78	67	55	1	172	134	152	82	84	78	83	58	24	24	24	29	16	20
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 10-15 um (cts/ml)	SP-1																						
	SP-8	527.9	479.1	412	385	364	399	286	372	343	233	294	333	392	411	400	319	281	248	305	293	180	180
	SP-9	7.2	6.9	5.0	5.8	5.1	5.9	7.1	0.3	10.1	7.9	10.4	7.0	7.8	7.4	6.0	7.1	2.9	2.4	2.7	3.3	1.9	2.5
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 15-20 um (cts/ml)	SP-1																						
	SP-8	171.8	150.7	121	114	114	139	88	120	110	68	95	111	131	138	129	96	85	73	101	96	50	53
	SP-9	0.1	0.1	0.2	0.2	0.2	1.6	0.5	0.0	1.6	1.6	4.0	2.7	3.6	3.6	4.0	5.3	0.6	0.9	0.7	1.2	0.2	1.4

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
FBR-4 Forward Flow (gpm)				775	771	765	760	766			760	765	835	835	834				828	829	845	845	
FBR-4 Recycle Flow (gpm)				1055	1064	1058	1060	1054			1060	1050	985	989	972				987	987	978	968	
FBR-4 Total Flow (gpm)				1830	1835	1823	1820	1820			1820	1815	1820	1824	1806				1815	1816	1823	1813	
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On	Data not available							
Ethanol Flow Rate (ml/min)				39	38	38	37.8	38			38	38	40.5	41	40.5				40.5	40.5	40.5	42	
*Ethanol Dose (mg/l)				10.6	10.4	10.5	10.5	10.5			10.6	10.5	10.2	10.4	10.3				10.3	10.3	10.1	10.5	
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.4	10.3	10.2	10.3	10.2	10.2	10.2	10.3	10.2	9.9	10.0	10.1	10.1	10.1	10.1	10.0	10.0	9.4	9.9	9.9
Percent Ethanol Overdose				3%	1%	3%	2%	3%			3%	3%	3%	4%	2%				4%	4%	8%	6%	
**Equivalent TOC Dose (mg/l)				2.3	2.3	2.3	2.3	2.3			2.3	2.3	2.4	2.5	2.5				2.5	2.5	2.4	2.5	
Nutrient Flow Rate (ml/min)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				2.5	2.5	2.5	3.2	
*Phosphourous Dose (mg/l)				0.08	0.08	0.08	0.08	0.08			0.08	0.08	0.07	0.07	0.07								
Bed Level (ft)		14.67	14.67	14.94	13.79	13.92	14.00	14.21			14.83	14.00	14.21	14.44	14.67				14.21	14.44	14.48	14.48	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Filter Run Time (hours)		7.94	8.50	5.10	12.00	13.58	12.75	12.00	11.50	10.67	5.67	11.25	10.58	10.17	9.58	8.72	5.50	9.17	9.44	11.92	9.50	9.89	4.87
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	7.25	10.15	10.15	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4.4	4.5	3.0	4.4	4.5	4.3
Clarifier Flow (gpm)		23	23	23	26	26	27	26	26	26	26	24	26	24	24	24	24	24	24	24	24	29	30
Coagulant Dose (mg/l)		24	24	24	25	29	27	32	32	32	31	30	32	30		24	26	32	26	8	16	15	23
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	SP-22			0.19	0.16	0.13	0.23	0.23			0.27	0.24	0.27	0.21	0.25			0.15	0.16	0.15	0.12	0.12	
Hydrogen Peroxide (mg/l) measured	SP-10				7.50		10.00							7.50							10.00		
	SP-11				4.00		7.50							5.00							7.50		
	SP-13						0.00							0.00									
	SP-14						0.00							0.00									
	SP-15						0.00							0.00									
	SP-16						0.00							0.00							0.00		
Free Chlorine (mg/l) measured	SP-17				1.25		1.00	2.50						1.50							1.25		
	SP-18						0.80							1.25							0.25		
	SP-19						0.40							1.25							0.30		
	SP-20						0.35							1.25							0.25		
	SP-21						0.30							1.00							0.15		
	SP-22				0.40		0.30	0.10						1.00							0.15		
	30 min.																						
	60 min.																						
Total Chlorine (mg/l) measured	SP-17				1.25		1.00	2.50						1.75							2.00		
	SP-18						0.80							1.25							1.50		
	SP-19						1.00							1.25							2.00		
	SP-20						0.60							1.25							1.75		
	SP-21						0.60							1.00							1.50		
	SP-22				0.40		0.60	0.30						1.00							1.75		
	30 min.																						
	60 min.																						
Particle Counts 2-5 um (cts/ml)	SP-1																						
	SP-8	2452	1952	1867	2782	2831	2914	2128	2853	2970	2405	2916	2650	2453	2310	2670	2279	2438	2437	2850	2657	2594	2370
	SP-9	438	447	507	547	656	596	501	379	304	438	459	438	329	272	204	156	209	299	503	528	329	408
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 5-10 um (cts/ml)	SP-1																						
	SP-8	1366	877	1888	1654	1297	1103	844	1237	1148	1651	1252	1238	1389	1259	1181	2279	1110	1238	1406	1171	1193	1515
	SP-9	26	21	21	31	31	27	21	7	4	13	35	25	14	11	0	1	8	17	30	17	20	22
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 10-15 um (cts/ml)	SP-1																						
	SP-8	320	208	669	349	277	245	205	287	263	536	282	278	321	308	262	449	241	288	315	261	287	453
	SP-9	3.7	2.3	2.8	3.2	3.0	2.8	2.4	1.2	1.5	2.1	4.0	3.4	2.5	1.7	0.3	0.2	1.5	2.0	3.6	3.4	6.6	5.8
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 15-20 um (cts/ml)	SP-1																						
	SP-8	99	73	284	83	70	66	61	82	74	201	63	69	91	95	74	166	67	88	100	69	88	173
	SP-9	1.6	1.5	2.2	1.8	1.3	0.9	0.6	0.1	0.2	0.8	1.2	1.3	0.7	0.5	0.1	0.0	0.8	1.2	3.0	1.0	1.1	0.8

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27
FBR-4 Forward Flow (gpm)			832		847		764			762		1000		1000			996		1000		1250		
FBR-4 Recycle Flow (gpm)			978		966		1061			1056		806		808			802		801		553		
FBR-4 Total Flow (gpm)			1810		1813		1825			1818		1806		1808			1798		1801		1803		
FBR-4 Eductor																							
Ethanol Flow Rate (ml/min)			40.5		41		37			37		48.3		47.1			46.8		47.3		61.4		
*Ethanol Dose (mg/l)			10.3		10.2		10.2			10.3		10.2		10.0			9.9		10.0		10.4		
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.5	9.5	9.5	9.7	9.7	9.5	9.5	9.6	9.6	9.6
Percent Ethanol Overdose			3%		4%		3%			2%		3%		5%			3%		5%		8%		
**Equivalent TOC Dose (mg/l)			2.5		2.5		2.2			2.2		2.9		2.9			2.9		2.9		3.7		
Nutrient Flow Rate (ml/min)			2.8		3.2		2.5			2.5		2.1		2.2			7.0		7.0		8.0		
*Phosphourous Dose (mg/l)																							
Bed Level (ft)			14.21		14.54		15.00			14.46		14.60		14.52			14.33		14.08		14.33		
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)																							
Filter Run Time (hours)		9.58	9.17	8.28	8.11	7.72	4.13	12.17	10.94	7.72	7.56	7.06	6.25	11.33	7.13	8.75	6.50	8.28	9.33	9.50	9.50	10.83	9.17
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	3.38	16.91	29.96	30.45	18.85	9.67	9.67	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.5	4.4	4.4	4.5	4.4	4.5	4.5	4.4	4.4	4.4	3.0	3.0	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5	4.4
Clarifier Flow (gpm)		29	26	26	26	26	26	26	26	26	26	26	26	25	25	30	30	30	27	30	31	30	29
Coagulant Dose (mg/l)		22	22	22	22	23	13			14	25	22	23	27	25	18	25	25	19	17	18	17	20
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22		0.62		0.12		0.15			0.21		0.18		0.15			0.05		0.16		0.07		
Hydrogen Peroxide (mg/l) measured	SP-10				8.75							7.50							8.50				
	SP-11				5.00							5.00							5.00				
	SP-13																						
	SP-14											0.00							0.00				
	SP-15											0.00							0.00				
	SP-16				0.00							0.00							0.00				
Free Chlorine (mg/l) measured	SP-17				2.75							1.75						0.90	4.10		0.66		
	SP-18											1.75						0.96	4.60		0.66		
	SP-19											1.75						0.90			0.66		
	SP-20											1.75						0.86			0.66		
	SP-21											1.50						0.86			0.66		
	SP-22											1.50						0.86	3.70		0.66		
	30 min.																						
	60 min.																						
Total Chlorine (mg/l) measured	SP-17				2.75							1.75						0.86	4.10		0.66		
	SP-18											1.75						0.90	4.60		0.66		
	SP-19											1.75						0.90			0.66		
	SP-20											1.75						0.86			0.66		
	SP-21											1.50						0.86			0.69		
	SP-22											1.50						0.86	3.70		0.71		
	30 min.																						
	60 min.																						
Particle Counts 2-5 um (cts/ml)	SP-1																						
	SP-8	2314	2084	2502	2677	2607	2017	2443	601	1604	2585	2617	2414	2526	2552	2336	793	particle counter malfunction; data not available					
	SP-9	257	297	226	229	248	particle counter malfunction; data not available											331	307	158	78	291	344
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 5-10 um (cts/ml)	SP-1																						
	SP-8	576	594	878	797	836	1498	1020	225	894	1340	1273	1320	1188	1263	744	211	particle counter malfunction; data not available					
	SP-9	17	11	13	13	12	particle counter malfunction; data not available											113	99	76	18	114	115
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 10-15 um (cts/ml)	SP-1																						
	SP-8	121	128	211	185	205	525	218	47	254	360	338	384	311	359	178	39	particle counter malfunction; data not available					
	SP-9	4.9	3.1	2.9	2.5	1.6	particle counter malfunction; data not available											2	2	4	2	3	3
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						
Particle Counts 15-20 um (cts/ml)	SP-1																						
	SP-8	36	27	56	50	51	212	52	10	86	113	104	137	92	118	42	7	particle counter malfunction; data not available					
	SP-9	0.3	0.4	0.5	0.5	0.1	particle counter malfunction; data not available											0	0	2	1	0	0

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15
FBR-4 Forward Flow (gpm)		1250		1254	1251	1250					1249		1251	1247	1250	1247		1441		1441
FBR-4 Recycle Flow (gpm)		566		560	563	565					542		546			543		335		333
FBR-4 Total Flow (gpm)		1816		1814	1814	1815					1791		1797			1790		1776		1774
FBR-4 Eductor																				
Ethanol Flow Rate (ml/min)		62		62	61.6	62.7					61.5		62			62.5		71		70.5
*Ethanol Dose (mg/l)		10.5		10.4	10.4	10.6					10.4		10.5			10.6		10.4		10.3
*Theoretical Ethanol Dose (mg/l)		9.7	9.7	9.7	9.7	10.0	10.0	10.0	10.0	10.0	9.6	10.1	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.1
Percent Ethanol Overdose		9%		8%	7%	6%					8%		2%			3%		1%		2%
**Equivalent TOC Dose (mg/l)		3.8		3.8	3.7	3.8					3.8		3.8			3.8		4.4		4.4
Nutrient Flow Rate (ml/min)		8.0		8.0	8.0	8.0					8.0		8.0			2.5				
*Phosphourous Dose (mg/l)						0.16					0.16		0.15			0.05				
Bed Level (ft)		14.48		14.27		14.52					14.33		14.56	14.25	14.33	14.56		14.29		14.42
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.42	9.44	8.83	8.67	8.28	9.72	8.50	14.17	13.67	9.83	8.44	7.22	9.08	10.00	7.92	9.33	10.33	11.83	11.92
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.67	9.18	9.67	5.32	5.80	9.67	9.67	9.67	9.18	6.77	14.98	19.33	19.33	19.81	19.33	18.85	19.33	19.81	19.81
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.1	4.3	3.0	3.0	4.4	4.3	4.4	4.1	3.0	4.3	4.3	4.3	4.4	4.3	4.1	4.3	4.4	4.4
Clarifier Flow (gpm)		29	30	30	30	28	28	30	30	26	26	26	26	26	24	25	25	25	25	24
Coagulant Dose (mg/l)		20	18	20	17	19	19	17	9	9	20	22	25	23	22	22	22	18	16	18
(Alum unless triangle in box, then FeCl3)																				
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22	0.06		0.15		0.12					0.10	0.14	0.10			0.18		0.19		0.24
Hydrogen Peroxide (mg/l) measured	SP-10			10.00								17.50						17.50		
	SP-11			5.00								10.00						12.50		
	SP-13			0.00																
	SP-14																			
	SP-15																			
	SP-16											0.00								
Free Chlorine (mg/l) measured	SP-17	4.60	1.29	3.90								1.51						0.40		
	SP-18			3.90								1.13								
	SP-19			3.50								0.90						0.20		
	SP-20			3.70								0.74						0.10		
	SP-21	4.90		3.50								0.83								
	SP-22		1.29	3.50								0.83						0.10		
	30 min.		0.77																	
	60 min.		0.54																	
Total Chlorine (mg/l) measured	SP-17	4.60	1.38	3.90								2.95						1.50		
	SP-18			3.70								1.78								
	SP-19			3.50								1.20						1.25		
	SP-20			3.70								0.90						1.25		
	SP-21	4.30		3.70								0.90								
	SP-22		1.29	3.70								0.86						0.60		
	30 min.		1.02																	
	60 min.		0.90																	
Particle Counts 2-5 um (cts/ml)	SP-1																			
	SP-8					380	444	499	606	476	458	423	282	308	445	553	711	549	287	271
	SP-9	410	299	329	363															
	SP-10																			
	SP-11																			
	SP-16																			
	SP-22																			
Particle Counts 5-10 um (cts/ml)	SP-1																			
	SP-8					164	153	158	145	108	97	113	25	41	75	97	155	369	41	37
	SP-9	143	140	163	158															
	SP-10																			
	SP-11																			
	SP-16																			
	SP-22																			
Particle Counts 10-15 um (cts/ml)	SP-1																			
	SP-8																			
	SP-9	3	3	3	3	2	3	4	5	6	6	10	3	5	15	22	33	75	6	3
	SP-10																			
	SP-11																			
	SP-16																			
	SP-22																			
Particle Counts 15-20 um (cts/ml)	SP-1																			
	SP-8																			
	SP-9	0	0	0	0	0.2	0.5	0.3	0.2	0.5	1.1	5.8	0.9	0.7	1.0	2.3	3.8	26.5	27.5	1.4

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
FBR-4 Forward Flow (gpm)				1439		1438		1441			1443		1445		1440			1440	
FBR-4 Recycle Flow (gpm)				368		386		397			388		407		428			428	
FBR-4 Total Flow (gpm)				1807		1824		1838			1831		1852		1868			1868	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)				71.3		70.9		70.7			70.6		71		71.1			71.3	
*Ethanol Dose (mg/l)				10.5		10.4		10.4			10.3		10.4		10.4			10.5	
*Theoretical Ethanol Dose (mg/l)		10.1	10.1	9.9	9.9	10.0	10.0	9.8	9.8	9.8	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0
Percent Ethanol Overdose				5%		4%		6%			2%		2%		4%			4%	
**Equivalent TOC Dose (mg/l)				4.3		4.3		4.2			4.2		4.2		4.2			4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)				14.46		14.46		14.50			14.46		14.79		14.83	14.50		13.50	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		14.75	11.50	10.58	13.25	11.92	13.17	125.00	13.00	14.42	19.67	17.50	8.56	14.50	8.67	9.08	13.17	19.50	15.75
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		19.33	19.81	19.33	16.43	9.67	9.67	9.67	9.67	9.67	9.67	9.67	7.73	6.28	9.18	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.3	4.3	4.3	4.4	4.3	4.3	4.3	4.4	4.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clarifier Flow (gpm)		23	23	25	24	25	24	24	24	24	25	26	26	25	27	27	27	27	27
Coagulant Dose (mg/l)		14	20	14	10	11	12	12	6	0	5	5	16	7	14	17	10	7	7
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22			0.25		0.26		0.36			0.27				0.14			0.23	
Hydrogen Peroxide (mg/l) measured	SP-10					10.00													
	SP-11					6.00													
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16																		
Free Chlorine (mg/l) measured	SP-17					0.38													
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22					0.18													
	30 min.																		
	60 min.																		
Total Chlorine (mg/l) measured	SP-17					1.10													
	SP-18																		
	SP-19																		
	SP-20																		
	SP-21																		
	SP-22					1.10													
	30 min.																		
	60 min.																		
Particle Counts 2-5 um (cts/ml)	SP-1																		
	SP-8	330	423	394	528	432	584	412	521	539	418	385	305	378	292	352	547	900	469
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 5-10 um (cts/ml)	SP-1																		
	SP-8	64	50	59	112	115	133	53	82	116	153	183	202	237	52	62	126	250	146
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 10-15 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	7	13	15	34	43	56	12	22	48	68	61	55	47	9	11	25	38	28
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 15-20 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	0.8	3.0	1.4	4.9	8.9	15.9	0.9	3.9	8.7	13.8	11.2	8.8	9.9	0.5	0.7	1.0	5.7	4.1

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
FBR-4 Forward Flow (gpm)		1443		1431	1443	1437	1443		D		1440	1440		1442		1440		1444	
FBR-4 Recycle Flow (gpm)		425		437			425		354		362			343		356		423	
FBR-4 Total Flow (gpm)		1868		1868			1868				1802			1785		1796		1867	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		72.2		72			71.8		71.5		71.4			71		71.4		71.4	
*Ethanol Dose (mg/l)		10.6		10.6			10.5				10.5			10.4		10.5		10.4	
*Theoretical Ethanol Dose (mg/l)		9.8	9.8	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.5	10.5	10.6	10.6
Percent Ethanol Overdose		8%		6%			5%				6%			4%		0%		-1%	
**Equivalent TOC Dose (mg/l)		4.2		4.2			4.2				4.4			4.4		4.4		4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.58		14.63	14.79	14.58	14.54	14.00	14.29		14.46	14.42		14.46		14.63		14.42	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.50	16.67	7.72	13.08	13.00	15.92	19.67	16.17	14.67	15.25	11.70	14.33	14.17	10.67	11.08	8.00	9.83	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.18	9.67	7.25	9.67	9.67	9.67	6.77	9.67	9.67	9.67	9.67	9.67	9.18	9.67	8.70	6.77	4.83	3.38
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.0	4.1	3.0	4.1	4.1	4.3	3.0	4.3	4.1	4.1	4.1	4.1	4.0	4.1	3.9	4.1	4.1	3.0
Clarifier Flow (gpm)		27	27	27	26	26	26	26	26	26	26	26	25	25	25	25	25	25	27
Coagulant Dose (mg/l)		17	5	19	13	13	5	11	7	13	5	13	13	11	14	13	18	14	10
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22	0.18		0.13			0.17		0.20		0.01			0.15		0.16		0.14	
Hydrogen Peroxide (mg/l) measured	SP-10	10.00							10.00							10.00			
	SP-11	7.50							6.25							7.50			
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16	0.00							0.00							0.00			
Free Chlorine (mg/l) measured	SP-17	0.90							1.42							2.19			
	SP-18	0.69							1.46							2.35			
	SP-19	0.90							1.78							1.84			
	SP-20								1.51							1.66			
	SP-21	0.83							1.72							1.66			
	SP-22	0.71							1.72							1.66			
	30 min.																		
	60 min.																		
Total Chlorine (mg/l) measured	SP-17	1.66							1.78							2.60			
	SP-18	1.46							1.72							2.35			
	SP-19	1.46							1.72							1.84			
	SP-20								1.61							1.66			
	SP-21	1.51							1.66							1.66			
	SP-22	1.46							1.66							1.66			
	30 min.																		
	60 min.																		
Particle Counts 2-5 um (cts/ml)	SP-1																		
	SP-8	537	519	376	585	660	493	641	448	487	539	385	438	506	417	465	1426	246	388
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 5-10 um (cts/ml)	SP-1																		
	SP-8	85	83	68	72	152	82	117	133	254	87	31	44	59	70	81	1400	11	23
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 10-15 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	18	14	14	16	38	25	34	49	84	14	8	15	21	30	31	154	3	5
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 15-20 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	2.8	14.6	0.7	0.8	3.7	2.2	3.4	4.5	12.9	14.0	0.3	0.7	1.3	1.5	2.7	125.6	0.2	4.7

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8
FBR-4 Forward Flow (gpm)			1443		1445		1444	1442	1437	1441		1439		1447	1442	1437	1436		1440
FBR-4 Recycle Flow (gpm)			424		422		423			426		427		421			432		428
FBR-4 Total Flow (gpm)			1867		1867		1867			1867		1866		1868			1868		1868
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			70.5		70.8		71.1			70.2		71.2		71.5			70.9		70.9
*Ethanol Dose (mg/l)			10.3		10.4		10.4			10.3		10.5		10.4			10.4		10.4
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.6	9.9	10.2	9.5	9.5	9.5	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.0	10.0	10.7
Percent Ethanol Overdose			-2%		5%		10%			0%		1%		2%			5%		-3%
**Equivalent TOC Dose (mg/l)			4.1		4.2		4.2			4.1		4.2		4.2			4.2		4.2
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.63		14.50		14.92	14.17	14.42	14.50		14.38		14.83	14.50	14.54	14.75		14.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		20.00	18.83	11.00	13.83	16.00	30.67	15.83	13.25	11.28	9.17	12.17	11.50	8.67	11.72	11.67	11.75	10.83	10.33
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		0.00	2.90	4.83	4.83	3.38	0.00	4.35	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.0	3.0	4.3	4.3	3.0	3.0	4.0	4.3	4.1	4.3	4.3	4.1	4.3	4.3	4.3	4.3	4.1	4.1
Clarifier Flow (gpm)		27	26	26	26	26	26	26	26	26	25	25	25	26	26	27	26	26	26
Coagulant Dose (mg/l)		0	16	14	5	0	0	0	0	0	5	11	13	18	11	12	13	13	14
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22				0.21	0.30	0.16			0.16		0.12		0.13			0.23		0.14
Hydrogen Peroxide (mg/l) measured	SP-10					5.00						5.00							5.00
	SP-11					3.25						2.50							2.50
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16					0.00						0.00							0.00
Free Chlorine (mg/l) measured	SP-17					0.93						0.31							1.38
	SP-18					1.13						0.24							1.29
	SP-19					0.86						0.18							1.42
	SP-20					0.99						0.18							1.24
	SP-21					0.90						0.16							1.38
	SP-22					0.86						0.16							1.46
	30 min.																		
	60 min.																		
Total Chlorine (mg/l) measured	SP-17					1.17						0.42							1.34
	SP-18					1.17						0.27							1.29
	SP-19					1.10						0.20							1.34
	SP-20					1.02						0.18							1.29
	SP-21					0.90						0.16							1.38
	SP-22					0.90						0.16							1.46
	30 min.																		
	60 min.																		
Particle Counts 2-5 um (cts/ml)	SP-1																		
	SP-8	667	528	74	19	376	920	988	816	827	688	541	433	427	496	504	520	482	433
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 5-10 um (cts/ml)	SP-1																		
	SP-8	67	78	2															
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 10-15 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	13	37	0															
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 15-20 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9	1.3	0.4																

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26
FBR-4 Forward Flow (gpm)			1440	1447	1439	1438		1438		1441			1441		1440		1441	1440	1444
FBR-4 Recycle Flow (gpm)			426			429		428		427			427		427				
FBR-4 Total Flow (gpm)			1866			1867		1866		1868			1868		1867				
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			71.2			71.1		71.2		70.6			71.2		71.0				
*Ethanol Dose (mg/l)			10.4			10.4		10.5		10.4			10.4		10.4				
*Theoretical Ethanol Dose (mg/l)		10.7	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.4	10.4	10.4	10.4	10.4
Percent Ethanol Overdose			3%			3%		2%		3%			3%		0%				
**Equivalent TOC Dose (mg/l)			4.2			4.2		4.2		4.2			4.2		4.2				
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.50	14.42	14.50	14.58		14.71		14.58			14.50		14.50	14.83	14.58	14.63	14.38
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.71	10.17	13.42	12.25	9.75	11.75	9.61	7.50	10.22	8.33	8.44	9.50	9.39	11.50	13.50	11.50	11.42	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.8	3.4	3.5	3.5	3.5	3.5	3.5
Clarifier Flow (gpm)		25	25	25	25	25	25	25	25	25	24	24	24	26	27	27	27	27	27
Coagulant Dose (mg/l)		18	14	11	11	13	11	18	18	13	20	20	14	18	12	12	12	12	8
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22		0.14				0.22	0.21		0.20			0.23		0.03				
Hydrogen Peroxide (mg/l) measured	SP-10							5.00					5.00						
	SP-11							2.50					2.50						
	SP-13																		
	SP-14																		
	SP-15																		
	SP-16							0.00					0.00						
Free Chlorine (mg/l) measured	SP-17							3.10					2.12						
	SP-18							2.85					2.70						
	SP-19							2.95					2.70						
	SP-20							2.95					2.40						
	SP-21							2.70					2.60						
	SP-22							2.85					2.70						
	30 min.																		
	60 min.																		
Total Chlorine (mg/l) measured	SP-17							3.10					2.12						
	SP-18							2.85					2.70						
	SP-19							2.95					2.70						
	SP-20							2.95					2.40						
	SP-21							2.70					2.60						
	SP-22							2.85					2.70						
	30 min.																		
	60 min.																		
Particle Counts 2-5 um (cts/ml)	SP-1																		
	SP-8	133	411	426	465	460	463	353	352	195	144	139	174	209	316	464	462	476	474
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 5-10 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 10-15 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 15-20 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
FBR-4 Forward Flow (gpm)		1442		1447		1434	1439	1452	1441		1437.00		1438	1442	1447	1440		1435	
FBR-4 Recycle Flow (gpm)		425		419		432	427	414	427		430.00		371	367	362	378		370	
FBR-4 Total Flow (gpm)		1867		1866		1866	1866	1866	1868		1867.00		1809	1809	1809	1818		1805	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		70.7		71.5		71.1	71.0	71.0	71.6		71.4		70.8	71.1	71.1	71.1		70.6	
*Ethanol Dose (mg/l)		10.4		10.4		10.5	10.4	10.3	10.5		10.5		10.4	10.4	10.4	10.4		10.4	
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.3	9.9	10.0	10.0	10.0	9.9	9.9	10.2	10.2	9.5	9.5	9.5	10.0	10.0	9.9	9.9
Percent Ethanol Overdose		-3%		1%		5%	4%	3%	7%		2%		10%	10%	9%	5%		5%	
**Equivalent TOC Dose (mg/l)		4.2		4.2		4.2	4.2	4.2	4.2		4.2		4.3	4.3	4.3	4.3		4.3	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.67		14.83		15.08	14.75	14.54	14.88		14.92		15.25	15.21	15.42	15.71	15.67	15.33	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350.00	350.00	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		10.75	11.42	15.58	13.00	11.83	8.67	10.92	8.94	11.00	13.83	12.83	11.25	12.17	11.67	12.11	11.00	10.08	
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100.00	100.00	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	3.38	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	12.08	
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10.00	10.00	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.5	3.4	3.5	3.5	3.5	3.4	3.5	3.0	3.40	3.40	3.4	3.4	3.4	3.4	3.0	3.0	3.8	0.0
Clarifier Flow (gpm)		27	26	26	20	25	25	26	23	18	18	18	18	13	11	12	13	15	
Coagulant Dose (mg/l)		14	16	9	28	23	32	23	14	14	28	16	14	25	18	18	18	54	
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-22	0.24	0.20	0.24		0.24			0.29		0.11		0.10			0.11	0.12	0.14	
Hydrogen Peroxide (mg/l) measured	SP-10		5.00	5.00							5.00						7.00	5.00	
	SP-11		2.50	2.50							2.50						2.50	3.00	
	SP-13										0.00								
	SP-14																		
	SP-15																		
	SP-16		0.00	0.00															
Free Chlorine (mg/l) measured	SP-17		2.40	1.10					0.18	0.31	1.06	2.19	1.17				1.24	2.85	
	SP-18		2.70	1.29							1.10								
	SP-19		2.60	1.34															
	SP-20		2.85	1.29															
	SP-21		2.95	1.34								2.19							
	SP-22		2.85	1.34					0.16	0.33	1.10		1.10				1.29	2.19	
	30 min.																		
	60 min.																		
Total Chlorine (mg/l) measured	SP-17		2.85	1.20					0.74	0.42	1.10	2.27	1.17				1.24	2.85	
	SP-18		2.70	1.29							1.10								
	SP-19		2.60	1.24															
	SP-20		2.85	1.20															
	SP-21		2.95	1.29								2.19							
	SP-22		2.85	1.34					0.74	0.42	1.10		1.13				1.34	2.19	
	30 min.																		
	60 min.																		
Particle Counts 2-5 um (cts/ml)	SP-1																		
	SP-8	398	527	559	512	413	363												
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 5-10 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 10-15 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		
Particle Counts 15-20 um (cts/ml)	SP-1																		
	SP-8																		
	SP-9																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		12/15	Ave
FBR-4 Forward Flow (gpm)			1003
FBR-4 Recycle Flow (gpm)			860
FBR-4 Total Flow (gpm)			1826
FBR-4 Eductor			
Ethanol Flow Rate (ml/min)			46.9
*Ethanol Dose (mg/l)			10.2
*Theoretical Ethanol Dose (mg/l)			
Percent Ethanol Overdose			0.0
**Equivalent TOC Dose (mg/l)			2.8
Nutrient Flow Rate (ml/min)			5.76
*Phosphourous Dose (mg/l)			0.21
Bed Level (ft)			14.21
Filter Flow (gpm)			350
Filter Polymer Dose (mg/l)			0.00
Filter Run Time (hours)			10.89
UVOX/LPGAC Flow (gpm)			100
Peroxide Dose (mg/l)			9.59
Disinfection Flow (gpm)			10
Chlorine Dose (mg/l)			4.11
Clarifier Flow (gpm)			23.5
Coagulant Dose (mg/l)			15.9
(Alum unless triangle in box, then FeCl3)			
Clarifier Polymer Dose (mg/l)			2.1
	SP-22		0.17
Hydrogen Peroxide (mg/l) measured	SP-10		8.22
	SP-11		5.09
	SP-13		0.33
	SP-14		0.08
	SP-15		0.00
	SP-16		0.00
Free Chlorine (mg/l) measured	SP-17		1.80
	SP-18		1.72
	SP-19		1.45
	SP-20		1.45
	SP-21		1.65
	SP-22		1.25
	30 min.		0.77
	60 min.		0.54
Total Chlorine (mg/l) measured	SP-17		1.93
	SP-18		1.79
	SP-19		1.61
	SP-20		1.55
	SP-21		1.70
	SP-22		1.38
	30 min.		1.02
	60 min.		0.90
Particle Counts 2-5 um (cts/ml)	SP-1		218
	SP-8		1387
	SP-9		765
	SP-10		415
	SP-11		512
	SP-16		306
	SP-22		441
Particle Counts 5-10 um (cts/ml)	SP-1		58
	SP-8		795
	SP-9		136
	SP-10		22
	SP-11		184
	SP-16		548
	SP-22		459
Particle Counts 10-15 um (cts/ml)	SP-1		7.0
	SP-8		278.8
	SP-9		17.6
	SP-10		5.0
	SP-11		31.0
	SP-16		31.0
	SP-22		23.0
Particle Counts 15-20 um (cts/ml)	SP-1		2.0
	SP-8		90.2
	SP-9		6.7

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
FBR-4 Forward Flow (gpm)		695	685	680	680	680	675	674	662	664	680	672	672	675	665	670	668	666	680	680	690	685
FBR-4 Recycle Flow (gpm)		1125	1130	1125	1125	1125	1135	1136	1123	1131	1140	1135	1135	1140	1140	1140	1142	1139	1126	1126	1120	1135
FBR-4 Total Flow (gpm)		1820	1815	1805	1805	1805	1810	1810	1785	1795	1820	1807	1807	1815	1805	1810	1810	1805	1806	1806	1810	1820
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	On	On	On	On	On	On	On	Off	Off
Ethanol Flow Rate (ml/min)		30.5	30.0	29.0	29.0	29.0	29.0	29.0	27.9	29.0	30.0	30.3	30.3	31.0	30.5	30.5	30.0	31.0	30.7	30.7	31.5	31.0
*Ethanol Dose (mg/l)		9.3	9.3	9.0	9.0	9.0	9.1	9.1	8.9	9.2	9.3	9.5	9.5	9.7	9.7	9.6	9.5	9.8	9.5	9.5	9.6	9.6
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	10.0	10.0	10.3	10.3	9.6	9.2	10.0	10.0	10.0	9.9	10.0	9.9	9.9	10.4	10.4	10.4	9.8	10.1
Percent Ethanol Overdose		-7%	-8%	-10%	-10%	-10%	-12%	-12%	-7%	0%	-7%	-5%	-5%	-2%	-3%	-3%	-4%	-5%	-8%	-8%	-1%	-5%
**Equivalent TOC Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9
Nutrient Flow Rate (ml/min)		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	11.4	11.4	11.4	11.4	11.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.52	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.42	0.41	0.41	0.41	0.41	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
Bed Level (ft)		14.21	14.44	14.56	14.56	14.56	14.79	14.90	14.96	15.13	13.67	13.63	13.58	13.79	13.75	13.71	13.67	13.60	13.50	13.38	13.54	13.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		11.7	10.3	9.2	9.9	9.8	11	9.8	4.8	5.4	4.5	9.0	8.5	11.5	12.3	13.7	13.6	14	15.0	14.8	13.4	13.1
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		18.36	17.88	23.20	26.10	26.58	23.68	25.13	33.83	29.00						5.32	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.4	3.4	3.4	3.4	3.4	3.4	3.6								4.5	4.6	4.6	4.6	4.6	4.8	4.6
Clarifier Flow (gpm)		25	32	40	42	41	42	42	36	46	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		16	20	22	24	22	24	22	38	53	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																						
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SP-10																					
	SP-11																					
	SP-16																					
	SP-22																					

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31
FBR-4 Forward Flow (gpm)		695	695	675	677	677	675	680	677	680	690			655	690	650	655	655				675	680
FBR-4 Recycle Flow (gpm)		1130	1130	1150	1142	1142	1150	1150	1148	1140	1125			1170	1170	1170	1175	1175				1160	1155
FBR-4 Total Flow (gpm)		1825	1825	1825	1819	1819	1825	1830	1825	1820	1815			1825	1860	1820	1830	1830				1835	1835
FBR-4 Eductor		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		31.0	32.0	31.0	30.5	30.5	31	31	32	31	36			30	30	30	30.5	30				30	32
*Ethanol Dose (mg/l)		9.4	9.7	9.7	9.5	9.5	9.7	9.6	10.0	9.6	11.0			9.7	9.2	9.8	9.8	9.7				9.4	9.9
*Theoretical Ethanol Dose (mg/l)		9.8	9.5	10.0	10.0	10.0	10.0	10.0	10.0	9.9	10.4	10.4	10.4	10.4	9.7	10.3	10.0	10.5	10.5	10.5	10.5	10.3	10.4
Percent Ethanol Overdose		-4%	3%	-3%	-5%	-5%	-3%	-4%	-1%	-3%	6%			-7%	-5%	-5%	-1%	-8%				-9%	-4%
**Equivalent TOC Dose (mg/l)		1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.2			1.8	1.8	1.8	1.8	1.8				1.8	1.9
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	3.8	3.8	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0				5.0	5.0
*Phosphourous Dose (mg/l)		0.20	0.20	0.20	0.14	0.14	0.18	0.18	0.18	0.18	0.18			0.19	0.18	0.19	0.19	0.19				0.18	0.18
Bed Level (ft)		13.46	13.38	13.38	13.29	13.17	13.38	13.33	13.25	13.25	13.17			13.19	13.21	13.19	13.19	13.17				13.21	13.25
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		12.5	12.1	11.4	10.9	10.5	10.3	10.1	9.4	9.0	8.8	8.9	8.6	8.3	7.6	9.0	8.2	14.9	6.4	10.2	11.0	7.5	9.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	6.77	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	9.67	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.6	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.3	4.3	4.4	4.5	4.5	4.5	4.4	4.5	4.5	4.4	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coagulant Dose (mg/l)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SP-10			0.0																			
	SP-11			3.0																			
	SP-16			3.0																			
	SP-22			4.0																			

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22
FBR-4 Forward Flow (gpm)		660	660			719	715	720	725	725			765	800	730	725	730	720	720	715	720	705	730
FBR-4 Recycle Flow (gpm)		1145	1140			1081	1085	1090	1085	1085			1030	990	1070	1060	1095	1101	1101	1110	1105	1105	1138
FBR-4 Total Flow (gpm)		1805	1800			1800	1800	1810	1810	1810			1795	1790	1800	1785	1825	1821	1821	1825	1825	1810	1868
FBR-4 Eductor		Off	Off	Off	On	On	On	Off	Off	Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On
Ethanol Flow Rate (ml/min)		31	31			35	35	36	36	36			38	40	36	36.5	37	37	37	36	36	35	36.5
*Ethanol Dose (mg/l)		9.9	9.9			10.3	10.3	10.6	10.5	10.5			10.5	10.6	10.4	10.6	10.7	10.9	10.9	10.6	10.6	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.2	10.1	10.1	10.1	9.9	10.1	10.2	10.2	10.1	10.1	10.1	9.7	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.3	10.4	10.4
Percent Ethanol Overdose		-3%	-2%			3%	2%	4%	3%	4%			9%	6%	4%	7%	7%	9%	9%	6%	3%	1%	2%
**Equivalent TOC Dose (mg/l)		1.9	1.9			2.1	2.1	2.2	2.2	2.2			2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Nutrient Flow Rate (ml/min)		5.0	5.0			5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
*Phosphourous Dose (mg/l)		0.18	0.18			0.17	0.17	0.17	0.17	0.17			0.16	0.15	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.19
Bed Level (ft)		13.15	13.17	13.13	13.21	13.29	13.33	13.33	13.31	13.38	13.25	13.25	13.46	13.54	13.54	13.58	13.71	13.63	13.63	13.73	13.79	13.79	14.00
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.1	4.4	4.0	4.0	6.2	11.0	11.8	10.2	11.2	12.1	11.0	9.2	8.4	9.5	8.4	6.7	7.5	4.2	4.7	4.7	4.3	3.8
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	12.08	13.53
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.4	4.4	4.4	4.4	4.5	4.5	3.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4
Clarifier Flow (gpm)		0	50	50	49	49	0	0	48	48	48	47	47	47	47	47	36	60	37	34	34	34	34
Coagulant Dose (mg/l)		0	28	28	28	26	0	0	26	26	26	26	0	0	0	0	0	0	6	12	18	38	73
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	5.0	20.0	20.0	20.0	20.0
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
FBR-4 Forward Flow (gpm)		714	671	671	675	675	675	750	745			735		745	666	662			647	767	765	765	780
FBR-4 Recycle Flow (gpm)		1126	1157	1157	1165	1160	1160	1090	1095			1100		1095	1169	1174			1220	1100	1075	1070	1040
FBR-4 Total Flow (gpm)		1840	1828	1828	1840	1835	1835	1840	1840			1835		1840	1835	1836			1867	1867	1840	1835	1820
FBR-4 Eductor		On	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	ON	On	Off	Off	On	Off	Off	Off	Off
Ethanol Flow Rate (ml/min)		36	33	33	34	33	33.5	37.5	37			36		36.5	33	33			32	38	38	38	39
*Ethanol Dose (mg/l)		10.7	10.4	10.4	10.6	10.3	10.5	10.6	10.5			10.4		10.4	10.5	10.5			10.5	10.5	10.5	10.5	10.6
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.3	10.3	9.6	9.5	9.5	9.9	10.3	10.3	10.2	10.5	10.3	10.3	10.1	10.1	10.1	10.1	9.8	9.8	9.7	10.3
Percent Ethanol Overdose		3%	1%	1%	4%	7%	11%	12%	6%			2%		0%	2%	4%			4%	7%	7%	8%	2%
**Equivalent TOC Dose (mg/l)		2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2			2.2		2.2	2.0	2.0			1.9	2.2	2.3	2.3	2.4
Nutrient Flow Rate (ml/min)		5.7	5.7	5.7	5.7	5.7	5.7	6.0	6.0			6.0		6.0	5.7	2.5			2.5	2.5	2.5	2.5	2.5
*Phosphourous Dose (mg/l)		0.19	0.21	0.21	0.20	0.20	0.20	0.19	0.20			0.20		0.20	0.21	0.09			0.09	0.08	0.08	0.08	0.08
Bed Level (ft)		13.92	13.75	13.92	14.06	14.17	14.23	14.19	14.33	14.25	14.42	14.60		14.73	14.75	14.71			14.67	14.81	14.71	14.85	14.67
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		9.2	9.4	10.3	7.3	9.0	10.2	8.1	8.2	8.2	5.4	8.3	8.0	7.6	7.7			7.28	8.33	9.42	6.75	6.33	8.28
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.5	4.5	4.5	4.5
Clarifier Flow (gpm)		34	35	35	26	25	27	25	25	24	25	25	26	25	25	25	26	26	26	25	25	24	23
Coagulant Dose (mg/l)		49	57	42	34	32	32	30	29	30	27	27	29	27	27	29	29	29	29	22	18	22	24
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		0.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
FBR-4 Forward Flow (gpm)				775	771	765	760	766			760	765	835	835	834				828	829	845	845	
FBR-4 Recycle Flow (gpm)				1055	1064	1058	1060	1054			1060	1050	985	989	972				987	987	978	968	
FBR-4 Total Flow (gpm)				1830	1835	1823	1820	1820			1820	1815	1820	1824	1806				1815	1816	1823	1813	
FBR-4 Eductor		Off	Off	On	On	On	Off	Off	Off	Off	On	Off	Off	Off	On	Data not available							
Ethanol Flow Rate (ml/min)				39	38	38	37.8	38			38	38	40.5	41	40.5				40.5	40.5	40.5	42	
*Ethanol Dose (mg/l)				10.6	10.4	10.5	10.5	10.5			10.6	10.5	10.2	10.4	10.3				10.3	10.3	10.1	10.5	
*Theoretical Ethanol Dose (mg/l)		10.3	10.3	10.4	10.3	10.2	10.3	10.2	10.2	10.2	10.3	10.2	9.9	10.0	10.1	10.1	10.1	10.1	10.0	10.0	9.4	9.9	9.9
Percent Ethanol Overdose				3%	1%	3%	2%	3%			3%	3%	3%	4%	2%				4%	4%	8%	6%	
**Equivalent TOC Dose (mg/l)				2.3	2.3	2.3	2.3	2.3			2.3	2.3	2.4	2.5	2.5				2.5	2.5	2.4	2.5	
Nutrient Flow Rate (ml/min)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				2.5	2.5	2.5	3.2	
*Phosphourous Dose (mg/l)				0.08	0.08	0.08	0.08	0.08			0.08	0.08	0.07	0.07	0.07								
Bed Level (ft)		14.67	14.67	14.94	13.79	13.92	14.00	14.21			14.83	14.00	14.21	14.44	14.67				14.21	14.44	14.48	14.48	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Filter Run Time (hours)		7.94	8.50	5.10	12.00	13.58	12.75	12.00	11.50	10.67	5.67	11.25	10.58	10.17	9.58	8.72	5.50	9.17	9.44	11.92	9.50	9.89	4.87
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	7.25	10.15	10.15	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	4.4	4.5	3.0	4.4	4.5	4.3
Clarifier Flow (gpm)		23	23	23	26	26	27	26	26	26	26	24	26	24	24	24	24	24	24	24	24	29	30
Coagulant Dose (mg/l)		24	24	24	25	29	27	32	32	32	31	30	32	30		24	26	32	26	8	16	15	23
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27
FBR-4 Forward Flow (gpm)			832		847		764			762		1000		1000			996		1000		1250		
FBR-4 Recycle Flow (gpm)			978		966		1061			1056		806		808			802		801		553		
FBR-4 Total Flow (gpm)			1810		1813		1825			1818		1806		1808			1798		1801		1803		
FBR-4 Eductor																							
Ethanol Flow Rate (ml/min)			40.5		41		37			37		48.3		47.1			46.8		47.3		61.4		
*Ethanol Dose (mg/l)			10.3		10.2		10.2			10.3		10.2		10.0			9.9		10.0		10.4		
*Theoretical Ethanol Dose (mg/l)		9.9	10.0	10.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.5	9.5	9.5	9.7	9.7	9.5	9.5	9.6	9.6	9.6
Percent Ethanol Overdose			3%		4%		3%			2%		3%		5%			3%		5%		8%		
**Equivalent TOC Dose (mg/l)			2.5		2.5		2.2			2.2		2.9		2.9			2.9		2.9		3.7		
Nutrient Flow Rate (ml/min)			2.8		3.2		2.5			2.5		2.1		2.2			7.0		7.0		8.0		
*Phosphourous Dose (mg/l)																							
Bed Level (ft)			14.21		14.54		15.00			14.46		14.60		14.52			14.33		14.08		14.33		
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)																							
Filter Run Time (hours)		9.58	9.17	8.28	8.11	7.72	4.13	12.17	10.94	7.72	7.56	7.06	6.25	11.33	7.13	8.75	6.50	8.28	9.33	9.50	9.50	10.83	9.17
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		10.15	10.15	10.15	10.15	10.15	9.67	10.15	10.15	10.15	10.15	10.15	3.38	16.91	29.96	30.45	18.85	9.67	9.67	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.5	4.4	4.4	4.5	4.4	4.5	4.5	4.4	4.4	4.4	3.0	3.0	4.4	4.5	4.4	4.4	4.4	4.5	4.4	4.5	4.4
Clarifier Flow (gpm)		29	26	26	26	26	26	26	26	26	26	26	26	25	25	30	30	30	27	30	31	30	29
Coagulant Dose (mg/l)		22	22	22	22	23	13			14	25	22	23	27	25	18	25	25	19	17	18	17	20
(Alum unless triangle in box, then FeCl3)																							
Clarifier Polymer Dose (mg/l)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																						
	SP-11																						
	SP-16																						
	SP-22																						

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15
FBR-4 Forward Flow (gpm)		1250		1254	1251	1250					1249		1251	1247	1250	1247		1441		1441
FBR-4 Recycle Flow (gpm)		566		560	563	565					542		546			543		335		333
FBR-4 Total Flow (gpm)		1816		1814	1814	1815					1791		1797			1790		1776		1774
FBR-4 Eductor																				
Ethanol Flow Rate (ml/min)		62		62	61.6	62.7					61.5		62			62.5		71		70.5
*Ethanol Dose (mg/l)		10.5		10.4	10.4	10.6					10.4		10.5			10.6		10.4		10.3
*Theoretical Ethanol Dose (mg/l)		9.7	9.7	9.7	9.7	10.0	10.0	10.0	10.0	10.0	9.6	10.1	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.1
Percent Ethanol Overdose		9%		8%	7%	6%					8%		2%			3%		1%		2%
**Equivalent TOC Dose (mg/l)		3.8		3.8	3.7	3.8					3.8		3.8			3.8		4.4		4.4
Nutrient Flow Rate (ml/min)		8.0		8.0	8.0	8.0					8.0		8.0			2.5				
*Phosphourous Dose (mg/l)						0.16					0.16		0.15			0.05				
Bed Level (ft)		14.48		14.27		14.52					14.33		14.56	14.25	14.33	14.56		14.29		14.42
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.42	9.44	8.83	8.67	8.28	9.72	8.50	14.17	13.67	9.83	8.44	7.22	9.08	10.00	7.92	9.33	10.33	11.83	11.92
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.67	9.18	9.67	5.32	5.80	9.67	9.67	9.67	9.18	6.77	14.98	19.33	19.33	19.81	19.33	18.85	19.33	19.81	19.81
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.4	4.1	4.3	3.0	3.0	4.4	4.3	4.4	4.1	3.0	4.3	4.3	4.3	4.4	4.3	4.1	4.3	4.4	4.4
Clarifier Flow (gpm)		29	30	30	30	28	28	30	30	26	26	26	26	26	24	25	25	25	25	24
Coagulant Dose (mg/l)		20	18	20	17	19	19	17	9	9	20	22	25	23	22	22	22	18	16	18
(Alum unless triangle in box, then FeCl3)																				
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																			
	SP-11																			
	SP-16																			
	SP-22																			

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
FBR-4 Forward Flow (gpm)				1439		1438		1441			1443		1445		1440			1440	
FBR-4 Recycle Flow (gpm)				368		386		397			388		407		428			428	
FBR-4 Total Flow (gpm)				1807		1824		1838			1831		1852		1868			1868	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)				71.3		70.9		70.7			70.6		71		71.1			71.3	
*Ethanol Dose (mg/l)				10.5		10.4		10.4			10.3		10.4		10.4			10.5	
*Theoretical Ethanol Dose (mg/l)		10.1	10.1	9.9	9.9	10.0	10.0	9.8	9.8	9.8	10.2	10.2	10.2	10.2	10.1	10.1	10.1	10.0	10.0
Percent Ethanol Overdose				5%		4%		6%			2%		2%		4%			4%	
**Equivalent TOC Dose (mg/l)				4.3		4.3		4.2			4.2		4.2		4.2			4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)				14.46		14.46		14.50			14.46		14.79		14.83	14.50		13.50	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		14.75	11.50	10.58	13.25	11.92	13.17	125.00	13.00	14.42	19.67	17.50	8.56	14.50	8.67	9.08	13.17	19.50	15.75
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		19.33	19.81	19.33	16.43	9.67	9.67	9.67	9.67	9.67	9.67	9.67	7.73	6.28	9.18	9.67	9.67	9.67	9.67
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.3	4.3	4.3	4.4	4.3	4.3	4.3	4.4	4.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clarifier Flow (gpm)		23	23	25	24	25	24	24	24	24	25	26	26	25	27	27	27	27	27
Coagulant Dose (mg/l)		14	20	14	10	11	12	12	6	0	5	5	16	7	14	17	10	7	7
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
FBR-4 Forward Flow (gpm)		1443		1431	1443	1437	1443		D		1440	1440		1442		1440		1444	
FBR-4 Recycle Flow (gpm)		425		437			425		354		362			343		356		423	
FBR-4 Total Flow (gpm)		1868		1868			1868				1802			1785		1796		1867	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		72.2		72			71.8		71.5		71.4			71		71.4		71.4	
*Ethanol Dose (mg/l)		10.6		10.6			10.5				10.5			10.4		10.5		10.4	
*Theoretical Ethanol Dose (mg/l)		9.8	9.8	10.1	10.1	10.1	10.0	10.0	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.5	10.5	10.6	10.6
Percent Ethanol Overdose		8%		6%			5%				6%			4%		0%		-1%	
**Equivalent TOC Dose (mg/l)		4.2		4.2			4.2				4.4			4.4		4.4		4.2	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.58		14.63	14.79	14.58	14.54	14.00	14.29		14.46	14.42		14.46		14.63		14.42	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		8.50	16.67	7.72	13.08	13.00	15.92	19.67	16.17	14.67	15.25	11.70	14.33	14.17	10.67	11.08	8.00	9.83	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		9.18	9.67	7.25	9.67	9.67	9.67	6.77	9.67	9.67	9.67	9.67	9.67	9.18	9.67	8.70	6.77	4.83	3.38
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.0	4.1	3.0	4.1	4.1	4.3	3.0	4.3	4.1	4.1	4.1	4.1	4.0	4.1	3.9	4.1	4.1	3.0
Clarifier Flow (gpm)		27	27	27	26	26	26	26	26	26	26	26	25	25	25	25	25	25	27
Coagulant Dose (mg/l)		17	5	19	13	13	5	11	7	13	5	13	13	11	14	13	18	14	10
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8
FBR-4 Forward Flow (gpm)			1443		1445		1444	1442	1437	1441		1439		1447	1442	1437	1436		1440
FBR-4 Recycle Flow (gpm)			424		422		423			426		427		421			432		428
FBR-4 Total Flow (gpm)			1867		1867		1867			1867		1866		1868			1868		1868
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			70.5		70.8		71.1			70.2		71.2		71.5			70.9		70.9
*Ethanol Dose (mg/l)			10.3		10.4		10.4			10.3		10.5		10.4			10.4		10.4
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.6	9.9	10.2	9.5	9.5	9.5	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.0	10.0	10.7
Percent Ethanol Overdose			-2%		5%		10%			0%		1%		2%			5%		-3%
**Equivalent TOC Dose (mg/l)			4.1		4.2		4.2			4.1		4.2		4.2			4.2		4.2
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.63		14.50		14.92	14.17	14.42	14.50		14.38		14.83	14.50	14.54	14.75		14.50
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		20.00	18.83	11.00	13.83	16.00	30.67	15.83	13.25	11.28	9.17	12.17	11.50	8.67	11.72	11.67	11.75	10.83	10.33
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		0.00	2.90	4.83	4.83	3.38	0.00	4.35	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.0	3.0	4.3	4.3	3.0	3.0	4.0	4.3	4.1	4.3	4.3	4.1	4.3	4.3	4.3	4.3	4.1	4.1
Clarifier Flow (gpm)		27	26	26	26	26	26	26	26	26	25	25	25	26	26	27	26	26	26
Coagulant Dose (mg/l)		0	16	14	5	0	0	0	0	0	5	11	13	18	11	12	13	13	14
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26
FBR-4 Forward Flow (gpm)			1440	1447	1439	1438		1438		1441			1441		1440		1441	1440	1444
FBR-4 Recycle Flow (gpm)			426			429		428		427			427		427				
FBR-4 Total Flow (gpm)			1866			1867		1866		1868			1868		1867				
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)			71.2			71.1		71.2		70.6			71.2		71.0				
*Ethanol Dose (mg/l)			10.4			10.4		10.5		10.4			10.4		10.4				
*Theoretical Ethanol Dose (mg/l)		10.7	10.1	10.1	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.4	10.4	10.4	10.4	10.4
Percent Ethanol Overdose			3%			3%		2%		3%			3%		0%				
**Equivalent TOC Dose (mg/l)			4.2			4.2		4.2		4.2			4.2		4.2				
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)			14.50	14.42	14.50	14.58		14.71		14.58			14.50		14.50	14.83	14.58	14.63	14.38
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		7.71	10.17	13.42	12.25	9.75	11.75	9.61	7.50	10.22	8.33	8.44	9.50	9.39	11.50	13.50	11.50	11.42	15.67
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		4.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	3.8	3.4	3.5	3.5	3.5	3.5	3.5
Clarifier Flow (gpm)		25	25	25	25	25	25	25	25	25	24	24	24	26	27	27	27	27	27
Coagulant Dose (mg/l)		18	14	11	11	13	11	18	18	13	20	20	14	18	12	12	12	12	8
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
FBR-4 Forward Flow (gpm)		1442		1447		1434	1439	1452	1441		1437.00		1438	1442	1447	1440		1435	
FBR-4 Recycle Flow (gpm)		425		419		432	427	414	427		430.00		371	367	362	378		370	
FBR-4 Total Flow (gpm)		1867		1866		1866	1866	1866	1868		1867.00		1809	1809	1809	1818		1805	
FBR-4 Eductor																			
Ethanol Flow Rate (ml/min)		70.7		71.5		71.1	71.0	71.0	71.6		71.4		70.8	71.1	71.1	71.1		70.6	
*Ethanol Dose (mg/l)		10.4		10.4		10.5	10.4	10.3	10.5		10.5		10.4	10.4	10.4	10.4		10.4	
*Theoretical Ethanol Dose (mg/l)		10.6	10.6	10.3	9.9	10.0	10.0	10.0	9.9	9.9	10.2	10.2	9.5	9.5	9.5	10.0	10.0	9.9	9.9
Percent Ethanol Overdose		-3%		1%		5%	4%	3%	7%		2%		10%	10%	9%	5%		5%	
**Equivalent TOC Dose (mg/l)		4.2		4.2		4.2	4.2	4.2	4.2		4.2		4.3	4.3	4.3	4.3		4.3	
Nutrient Flow Rate (ml/min)																			
*Phosphourous Dose (mg/l)																			
Bed Level (ft)		14.67		14.83		15.08	14.75	14.54	14.88		14.92		15.25	15.21	15.42	15.71	15.67	15.33	
Filter Flow (gpm)		350	350	350	350	350	350	350	350	350.00	350.00	350	350	350	350	350	350	350	350
Filter Polymer Dose (mg/l)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filter Run Time (hours)		10.75	11.42	15.58	13.00	11.83	8.67	10.92	8.94	11.00	13.83	12.83	11.25	12.17	11.67	12.11	11.00	10.08	
UVOX/LPGAC Flow (gpm)		100	100	100	100	100	100	100	100	100.00	100.00	100	100	100	100	100	100	100	100
Peroxide Dose (mg/l)		4.83	4.83	4.83	4.83	4.83	4.83	4.83	3.38	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	12.08	
Disinfection Flow (gpm)		10	10	10	10	10	10	10	10	10.00	10.00	10	10	10	10	10	10	10	10
Chlorine Dose (mg/l)		3.5	3.4	3.5	3.5	3.5	3.4	3.5	3.0	3.40	3.40	3.4	3.4	3.4	3.4	3.0	3.0	3.8	0.0
Clarifier Flow (gpm)		27	26	26	20	25	25	26	23	18	18	18	18	13	11	12	13	15	
Coagulant Dose (mg/l)		14	16	9	28	23	32	23	14	14	28	16	14	25	18	18	18	54	
(Alum unless triangle in box, then FeCl3)																			
Clarifier Polymer Dose (mg/l)		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	SP-10																		
	SP-11																		
	SP-16																		
	SP-22																		

*Based on Forward Flow
**Based on Total Flow

Table A11
Operation and Field Data

Date (2000)		12/15	Ave
FBR-4 Forward Flow (gpm)			1003
FBR-4 Recycle Flow (gpm)			860
FBR-4 Total Flow (gpm)			1826
FBR-4 Eductor			
Ethanol Flow Rate (ml/min)			46.9
*Ethanol Dose (mg/l)			10.2
*Theoretical Ethanol Dose (mg/l)			
Percent Ethanol Overdose			0.0
**Equivalent TOC Dose (mg/l)			2.8
Nutrient Flow Rate (ml/min)			5.76
*Phosphourous Dose (mg/l)			0.21
Bed Level (ft)			14.21
Filter Flow (gpm)			350
Filter Polymer Dose (mg/l)			0.00
Filter Run Time (hours)			10.89
UVOX/LPGAC Flow (gpm)			100
Peroxide Dose (mg/l)			9.59
Disinfection Flow (gpm)			10
Chlorine Dose (mg/l)			4.11
Clarifier Flow (gpm)			23.5
Coagulant Dose (mg/l)			15.9
(Alum unless triangle in box, then FeCl3)			
Clarifier Polymer Dose (mg/l)			2.1
	SP-10		0.0
	SP-11		3.0
	SP-16		3.0
	SP-22		4.0

*Based on Forward Flow
**Based on Total Flow

Appendix B

DESCRIPTION OF PROCESS ANALYTICAL LIQUID CHROMATOGRAPHY

DIONEX

RECEIVED
JUN 19 2001
Richard P. Arber Associates, Inc.
DENVER, CO

Dionex Corporation
1228 Titan Way
P.O. Box 3603
Sunnyvale, CA 94088-3603
408 737 0700
Fax 408 730 9403

Travis E. Meyer, P.E.
Richard P. Arber Associates
1128 Grant Street
Denver, CO 80203

June 18, 2001

Dear Travis,

In response to the questions posed in your Email message of May 21, the system configurations, approximate costs, method requirements and limitations to perform the on-line liquid chromatographic analysis of perchlorate, nitrate, and ethanol are given below.

SYSTEM CONFIGURATIONS AND APPROXIMATE COST

The DX-800 IC and HPLC instruments provide real-time monitoring of up to 21 sample streams in the production environment. The DX-800 offers efficient, unattended operation with sample preparation, automated calibration, built-in error-checking, and alarm actions.

Perchlorate System	Price
DX-800 with CC80, LC80, SP80, LM80, PeakNet PA software, GP50-PA pump, CD25-PA conductivity detector and DS3 cell, IonPac AG16 and AS16 column set, ASRS suppressor	105,000
1 Year Warranty	10,315
Field Installation	4,500
DX-800 Spare Parts/Maintenance Kit	3,900

Nitrate System	Price
DX-800 with CC80, LC80, SP80, LM80, GP50-PA pump, CD25A-PA conductivity detector and DS3 cell, IonPac AG14A and AS14A column set, AAES suppressor	85,000
1 Year Warranty	10,315
Field Installation	4,500
DX-800 Spare Parts/Maintenance Kit	3,900

Ethanol System	Price
DX-800 with CC80, LC80, SP80, LM80, GP50-PA pump, ED50-PA electrochemical detector and cell (Pt electrode), IonPac ICE-AG6 and AS6 column set	87,000
1 Year Warranty	10,315
Field Installation	4,500
DX-800 Spare Parts/Maintenance Kit	3,900

The above prices are approximate only and are not intended as a formal quotation. Note that additional channels of the DX-800 are around 20K less than the first channel as the software needs to only be purchased once.

METHOD PERFORMANCE AND LIMITATIONS
The method performance obtained from the DX-800 on-line analyzer is typically equivalent (or better) than that obtained from a benchtop DX-500 IC, which is based on essentially similar components.

PERCHLORATE METHOD:
IonPac AG16 and AS16 column set, 50 mM Sodium hydroxide at 1.5 mL/min, 1000 μL injection, ASRS suppressor in external water mode (U.S. EPA Method 314.0)
Run time: 10 min (could be reduced to 8 min).
MDL: 0.5 μg/L, MRL: 2.5 μg/L.
Interferences: Inorganic anions, e.g., chloride, carbonate, and sulfate at levels > 600 mg/L.
Other possible analytes: None.

NITRATE METHOD:
IonPac AG14A and AS14A column set, 8 mM Sodium carbonate / 1 mM Sodium bicarbonate at 0.5 mL/min, 50 μL injection, AAES suppressor in recycle water mode (U.S. EPA Method 300.0).
Run time: 10 min (could be reduced to 8 min).
MDL: 3.5 μg/L, MRL: 10 μg/L.
Interferences: Inorganic anions, e.g., chloride, carbonate, and sulfate at levels > 100 mg/L.
Other possible analytes: Chloride, bromide, phosphate, sulfate.

ETHANOL METHOD:
IonPac ICE-AG6 and AS66 column set, 100 mM Perchloric acid at 2.0 mL/min, 10 μL injection, pulsed amperometry at Pt working electrode.
Run time: 12 min
MDL: 50 μg/L, MRL: 100 μg/L.
Interferences: Hydroxylated compounds with similar retention times.
Other possible analytes: Glycerol.

Note that other types of on-line analyzers are commercially available for both nitrate and ethanol, although ion chromatography represents the only viable means to analyze perchlorate at the desired levels. In addition, the possibility exists that an IonPac AS11 column set will permit the simultaneous analysis of common anions and perchlorate. A gradient separation of 0 - 38 mM hydroxide will separate the common anions, then a step up to 100 mM will elute the perchlorate. The runtime for this approach would be approximately 25 min, although further development is required to test this approach. Most likely, sample filtration will be required on the influent streams, and perhaps the effluent streams. Sample throughput may well be an issue, e.g., three on-line analyzers will not provide the capability to analyze three analytes in 10 streams every 10 minutes.

I trust that this letter answers your initial questions. Please feel free to contact Nathan Miller or myself should you have any further questions.

Best regards,

Peter E. Jackson, Ph.D
Environmental Market Manager

DIONEX

Application Note 134

Determination of Low Concentrations of Perchlorate in Drinking and Ground Waters Using Ion Chromatography

INTRODUCTION

Ammonium perchlorate is a key ingredient in solid rocket propellants. Perchlorate has recently been found in drinking water wells in regions of the U.S. where aerospace material, munitions, or fireworks were developed, tested, or manufactured.[1] Perchlorate poses a human health concern because it can interfere with the thyroid gland's ability to utilize iodine to produce thyroid hormones. Current data suggest that 4 to 18 µg/L (ppb) is an acceptable exposure level.[1] The State of California requires remedial action for drinking water sources containing more than 18 µg/L perchlorate.

The determination of perchlorate at trace levels is a difficult analytical task and ion chromatography represents the only viable means for the quantification of such low concentrations of perchlorate. In 1997, the California Department of Health Services (CDHS) developed an IC method to support the California action level of 18 µg/L.[2] The CDHS method uses an IonPac® AS5 column and an eluent of 120 mM sodium hydroxide containing 2 mM p-cyanophenol, which is added to minimize hydrophobic interactions with the resin.[3] In 1998, Dionex developed an updated method for determining low perchlorate concentrations using an IonPac AS11 column with an eluent of 100 mM sodium hydroxide and suppressed conductivity detection.[4,5]

This Application Note describes an improved method to quantify low levels of perchlorate. This method uses an IonPac AS16 column to separate perchlorate from the other anions typically found in drinking and ground waters. The IonPac AS16 is a high-capacity, very hydrophilic, hydroxide-selective column designed for the fast separation of polarizable anions (e.g., thiosulfate, iodide, and perchlorate). Compared to other anion-exchange columns, the polarizable anions are eluted with higher efficiency and improved peak shape, without the addition of organic solvents. The IonPac AS16 column is the column specified in U.S. EPA Method 314.0, which is the analytical method to be prescribed for the analysis of perchlorate in the assessment phase of the Unregulated Contaminant Monitoring Rule.[6]

Because perchlorate is well separated from other inorganic anions using the IonPac AS16 column at a lower hydroxide eluent concentration than needed for the IonPac AS11, the EG40 Eluent Generator can be used. This Application Note shows that perchlorate can be quantified at the 2-µg/L level using an IonPac AS16 column, EG40-generated hydroxide eluents, a large-loop injection, and suppressed conductivity detection.

EQUIPMENT

Dionex DX-500 IC system consisting of:
- GP50 Gradient Pump
- CD20 Conductivity Detector
- AS40 Automated Sampler
- LC30 Chromatography Oven
- EG40 Eluent Generator with an EluGen® Hydroxide Cartridge

Two 4-L plastic bottle assemblies (for external water mode suppression)

PeakNet™ Chromatography Workstation

REAGENTS AND STANDARDS

Deionized water (DI H_2O), Type I reagent grade, 18 M -cm resistance or better

Sodium perchlorate, 99% ACS reagent grade or better (Aldrich)

ACS reagent grade sodium salts (Fisher, Aldrich, Sigma, Fluka, EM Science) were used to make standards of other anions for interference studies

CONDITIONS

Columns:	IonPac AS16 Analytical 4 x 250 mm (P/N 055376) IonPac AG16 Guard 4 x 250 mm (P/N 055377)
Eluent:	65 mM potassium hydroxide
Eluent Source:	EG40
Flow Rate:	1.2 mL/min
Temperature:	30 °C
Sample Volume:	1000 µL
Detection:	Suppressed conductivity, ASRS®-ULTRA (4 mm), Autosuppression® external water mode. Power setting—300 mA
System Backpressure:	2600 psi
Background Conductance:	1–4 µS
Run Time:	12 min

PREPARATION OF SOLUTIONS AND REAGENTS

Stock Perchlorate Standard Solution

Dissolve 1.4120 g of sodium perchlorate monohy drate in 1000 mL of deionized water to prepare a 1000-mg/L standard solution. This standard is stable for at least one month when stored at 4 °C.

Working Standard Solutions

Appropriate dilutions of the 1000-mg/L perchlorate standard solution were made for studies of method linearity and the method detection limit (MDL). Method linearity was determined by diluting 2, 10, 20, 50, and 100 µL of the 1000-mg/L perchlorate standard to 1 L to prepare working standard solutions at 2, 10, 20, 50, and 100 µg/L and making two injections of each working standard. Seven injections of the 2-µg/L standard were made for the MDL study.

INTERFERENCE STUDIES

To determine if other anions interfere with perchlorate determinations, 1-mL samples containing 100 ppb of the chosen anion and 20 ppb of perchlorate were injected. Arsenate, arsenite, bromate, bromide, carbonate, chlorate, chloride, chromate, cyanide, humic acid, iodate, iodide, molybdate, nitrate, nitrite, phosphate, phthalate, selenate, sulfate, sulfite, thiocyanate, and thiosulfate were tested as possible interferences.

To ascertain the effect of high levels of common anions on perchlorate recovery, solutions containing 50-, 200-, 600-, and 1000-mg/L carbonate, chloride, or sulfate and 20-µg/L perchlorate were prepared. The effect of sulfate on perchlorate recovery was further investigated by preparing solutions containing 50-, 200-, 600-, and 1000-mg/L sulfate and either 2- or 200-µg/L perchlorate. One-milliliter aliquots of each of these samples were analyzed. To determine the effect of very high chloride concentrations, a sample was prepared that contained 10,000-mg/L chloride and 100-µg/L perchlorate. An aliquot of this sample was treated with an OnGuard® Ag cartridge (P/N 39637) followed by an OnGuard H cartridge (P/N 39596). Prepare the OnGuard cartridges by passing 10 mL of deionized water though them at 2 mL/min. (For details on cartridge preparation, refer to the OnGuard cartridge manual, P/N 032943.) After the cartridges have been prepared, pass 5 mL of the undiluted sample through the cartridge. Discard the first 3 mL and collect the remainder for injection.

SYSTEM PREPARATION AND SETUP

For determinations of target anions at trace concentrations, it is essential to have low baseline noise. To ensure a quiet baseline, the following steps must be taken during the system setup. The ASRS-ULTRA is operated in the external water mode rather than the recycle mode. A 1000 psi backpressure coil must be added to the degas module on the eluent generator. Refer to the EG40 manual (P/N 031373) for details on adding backpressure to the degas module. The final system backpressure should be in the range of 2400 to 2600 psi when using the EG40 Eluent Generator. Prior to sample analysis, determine a system blank by analyzing 1 mL of deionized water using the method described above. An equilibrated system has a background conductance between 1–4 µS with the peak-to-peak noise typically 9–10 nS, and no peaks eluting with the same retention time as perchlorate (9.6 ± 0.2 min).

RESULTS AND DISCUSSIONS

Figure 1 shows a chromatogram of a 20-µg/L perchlorate standard. Perchlorate elutes at 9.6 min. The method linearity range was determined to ensure accurate quantification of perchlorate. Figure 2 shows that the method is linear from 2- to 100-µg/L, a concentration range appropriate for this application. This method is also linear in a larger concentration range (2 ppb–100 ppm, r^2= 0.9999). The excellent linearity over a wide concentration range is a result of the high capacity for perchlorate and its symmetrical peak shape using the IonPac AS16 column. The method detection limit was established by making seven replicate injections of a 2-µg/L perchlorate standard. Table 1 shows the results of this study. The MDL calculated using the method described in U.S. EPA Method 300.0 is 151.4 ng/L.[7] Figure 3 shows a chromatogram of a 2-µg/L perchlorate standard.

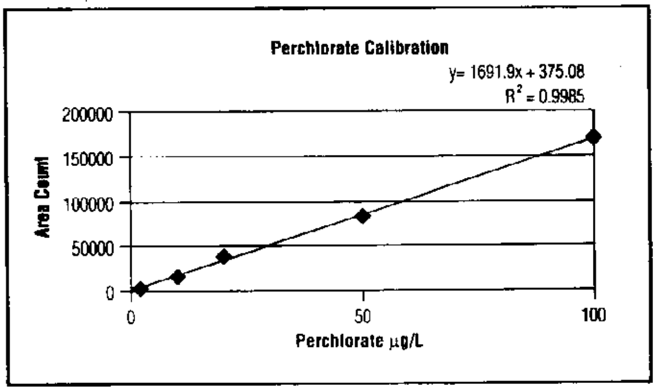


Figure 2. Perchlorate calibration.

Table 1 Determination of the Method Detection Limit for Perchlorate

Injection #	Peak Area	Retention Time (min)
1	2416	9.82
2	2314	9.82
3	2313	9.83
4	2323	9.85
5	2414	9.73
6	2317	9.82
7	2384	9.72
Average	2354	9.80
SD	48.22	0.05
RSD	2.05	0.53
MDL*	151.4 ng/L	

MDL = SD$t_{s,99}$ where $t_{s,99}$ = 3.14 for n=7

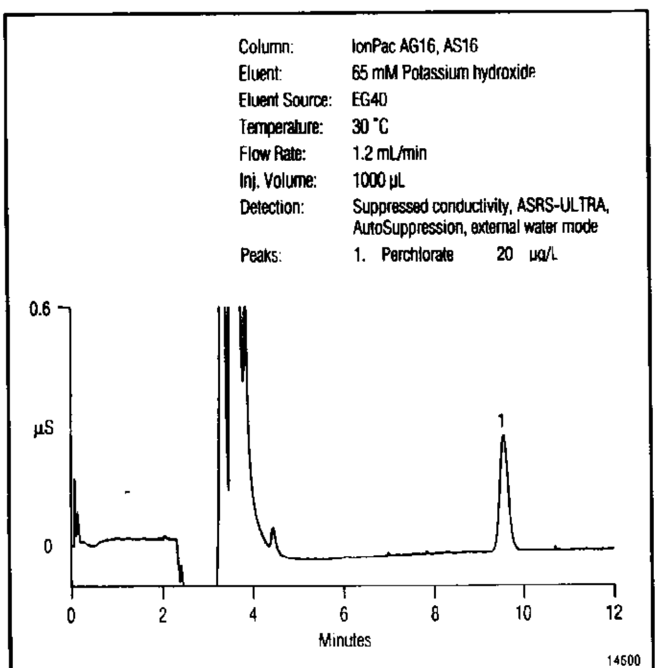


Figure 1. Perchlorate standard at 20 µg/L.

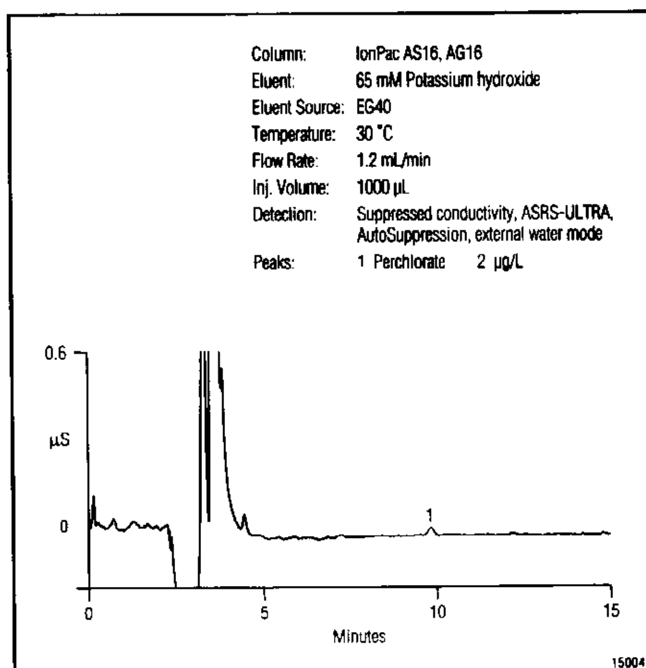


Figure 3. Perchlorate standard at 2 µg/L.

INTERFERENCE STUDIES

Common Anions

Twenty-two anions were injected using the conditions described in this Application Note to study whether they interfere with the determination of perchlorate. Included in these 22 anions were polarizable anions that are typically well retained on anion-exchange columns. The results of this study are shown in Table 2. All 22 anions elute well before perchlorate, most in less than 4 minutes, and therefore do not interfere with the determination of perchlorate.

Groundwater samples may contain high concentrations of common anions, particularly carbonate, chloride, or sulfate. The method outlined in this Application Note can be used to determine low concentrations of perchlorate in the presence of high concentrations of these common anions. The effect of mg/L levels of these anions on perchlorate recovery was investigated by injecting solutions of 20-µg/L perchlorate in the presence of 50-, 200-, 600-, and 1000-mg/L carbonate, chloride, or sulfate. Quantitative recoveries were obtained for perchlorate at the 20-µg/L level in all cases, as shown in Table 3.

Because sulfate is the most likely interference in groundwaters, the effect of sulfate on perchlorate recovery was further investigated. Perchlorate (200-µg/L) was determined in the presence of 50-, 200-, 600-, and 1000-mg/L sulfate. The recovery of perchlorate from these samples was 78, 89, 77, and 90%, respectively. The same study was also done with 2-µg/L perchlorate. For that experiment the recoveries were 115, 107, 109, and 110%, respectively. Figure 4 shows an overlay of chromatograms of 200-µg/L perchlorate in the presence of 50- to 1000-mg/L sulfate, demonstrating that high concentrations of sulfate do not significantly affect the retention time or peak shape for perchlorate.

Extreme Chloride Matrices

Low concentrations of perchlorate are sometimes found in matrices containing a very high chloride concentration, e.g., brines. The sample used for this study had a chloride concentration of 10,000-mg/L and a perchlorate concentration of 100-µg/L. One approach for determining perchlorate in an extreme chloride

Table 2 Comparison of the Retention Times of 22 Anions and Perchlorate on the IonPac AS16 Column (1000 µL injected)*

Anion	Anion Retention Time (minutes)	Perchlorate Retention Time (minutes)
Arsenate	< 4	9.78
Arsenite	< 4	9.75
Bromate	< 4	9.72
Bromide	< 4	9.73
Carbonate	< 4	9.72
Chlorate	< 4	9.72
Chloride	< 4	9.68
Chromate	< 4	9.68
Cyanide	< 4	9.65
Humic acid	< 4	9.67
Iodate	< 4	9.65
Iodide	5.28	9.65
Molybdate	< 4	9.63
Nitrate	< 4	9.65
Nitrite	< 4	9.63
Phosphate	< 4	9.63
Phthalate	< 4	9.62
Selenate	< 4	9.60
Sulfate	< 4	9.60
Sulfite	< 4	9.60
Thiocyanate	7.72	9.60
Thiosulfate	< 4	9.58

* An eluent of 50 mM hydroxide at 1.5 mL/min was used for this study.

Table 3 Effect of mg/L Levels of Common Anions on Perchlorate Recovery (20 µg/L) on the IonPac AS16 Column (1000 µL injected)*

Anion	Anion Concentration (mg/L)	Perchlorate Recovery
Carbonate	50	97.6%
Carbonate	200	94.4%
Carbonate	600	95.4%
Carbonate	1000	93.5%
Chloride	50	96.1%
Chloride	200	96.7%
Chloride	600	109.6%
Chloride	1000	97.4%
Sulfate	50	94.4%
Sulfate	200	96.3%
Sulfate	600	94.7%
Sulfate	1000	95.5%

* An eluent of 50 mM hydroxide at 1.5 mL/min was used for this study.

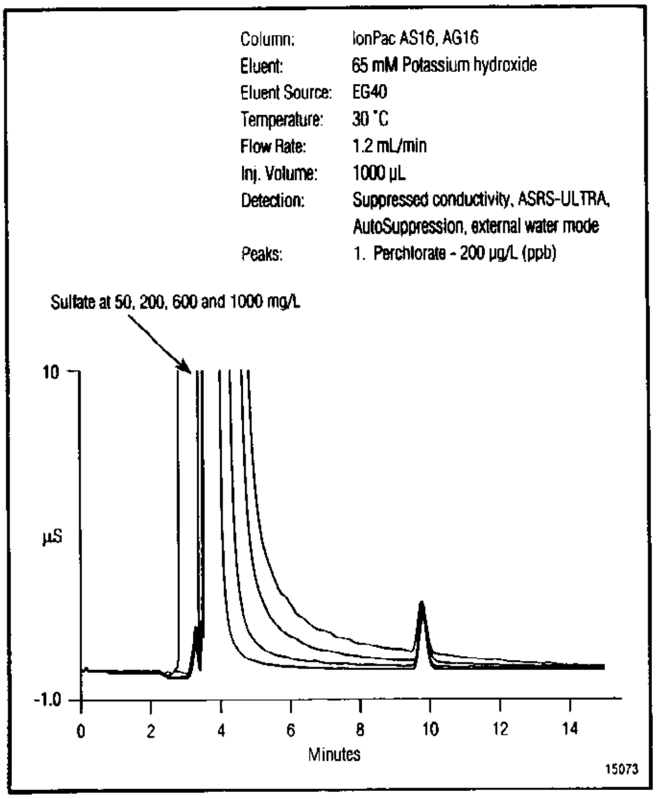


***Figure 4.** Effect of sulfate on perchlorate recovery on the IonPac AS16 column.*

matrix is to reduce the sample's chloride concentration. This can be achieved by pre-treating the sample with an OnGuard Ag cartridge. The cartridge packing is a high capacity, strong acid, cation-exchange resin in the Ag^+ form that is designed to remove chloride from the sample by precipitating it as silver chloride. Figure 5B shows an analysis of the sample (10,000 mg/L chloride and 100 µg/L perchlorate) after treatment with an OnGuard Ag cartridge. This treatment allows perchlorate to be quantified with good recovery (92.6%). Analysis of the untreated sample is shown in Figure 5A.

Another approach for determining perchlorate in an extreme chloride matrix is to dilute the sample and/or reduce the eluent concentration. The same sample containing chloride at 10,000 mg/L and perchlorate at 100 µg/L was diluted 10-fold and the diluted solution was analyzed using two different eluent strengths, 35 mM and 65 mM KOH. Figure 6A shows that when using 65 mM KOH, perchlorate is difficult to quantify because it elutes on the tail of the large chloride peak. When the weaker eluent (35 mM KOH) is used, perchlorate elutes at 14 min and is easier to quantify (Figure 6B).

When choosing an approach for analyzing perchlorate in samples containing high concentrations of chloride, the perchlorate concentration must be considered. For a sample containing low levels of perchlorate (< 40 µg/L), use the OnGuard Ag cartridge. In samples where the concentration of perchlorate is higher, sample dilution and a 35 mM KOH eluent is recommended.

SUMMARY

The method described in this Application Note can be used to determine low-µg/L concentrations of perchlorate in drinking and ground waters. The use of IC with the AS5 or AS11 columns has previously been shown to provide an interference-free method for the analysis of perchlorate in modest ionic strength drinking water and groundwater samples[8]; the AS16 column provides similar results. The AS16 also is compatible with the EG40 and its higher capacity makes it most appropriate for the analysis of perchlorate in higher ionic strength samples.

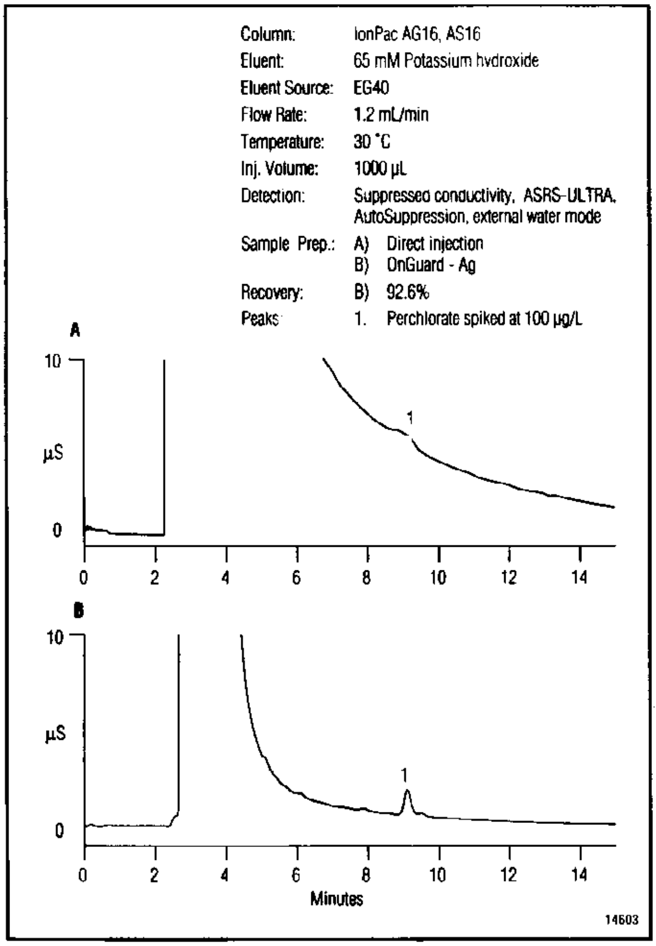


Figure 5. Determination of Perchlorate in High Chloride (10,000 mg/L) Matrices.

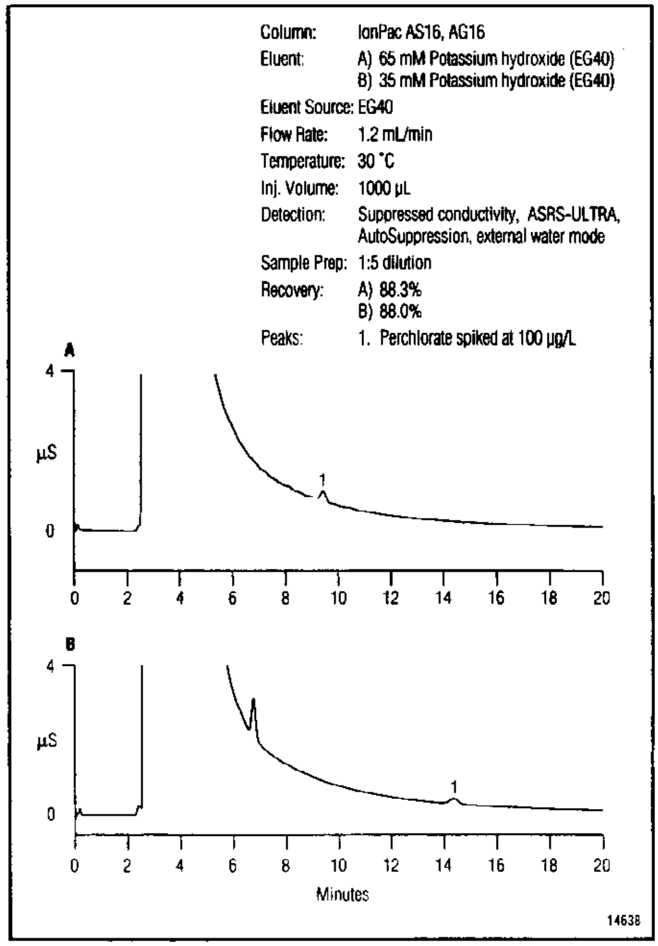


Figure 6. Determination of Perchlorate in High Chloride (10,000 mg/L) Matrices.

REFERENCES

1. "Perchlorate in California Drinking Water" Update; California Department of Health Services, September 1999.
2. California Department of Health Services, Determination of Perchlorate by Ion Chromatography, June, 1997.
3. Okamoto, H. S., Rishi, D. K., Steeber, W. R., Baumann, F. J., and Perera, S. K. *J. of American Water Works Assoc.* **1999** *91(10)*, 73–84.
4. Application Note 121, "Analysis of Low Concentrations of Perchlorate in Drinking Water and Ground Water by Ion Chromatography", Dionex Corporation, Sunnyvale CA.
5. Jackson, P. E., Laikhtman, M., and Rohrer, J. S. *J. of Chromatography A* **1999** *850*, 131–135.
6. *Federal Register*, September 17, 1999, Vol. 64, No. 180, 50555–50620.
7. U.S. EPA Method 300.0. "The Determination of Inorganic Anions in Water by Ion Chromatography"; August 1993; U. S. Environmental Protection Agency.
8. Chaudhuri, S., Okamoto, H. S., Pia, S. and Tsui, D. Inter-Agency Perchlorate Steering Committee Analytical Subcommittee Report 1999.

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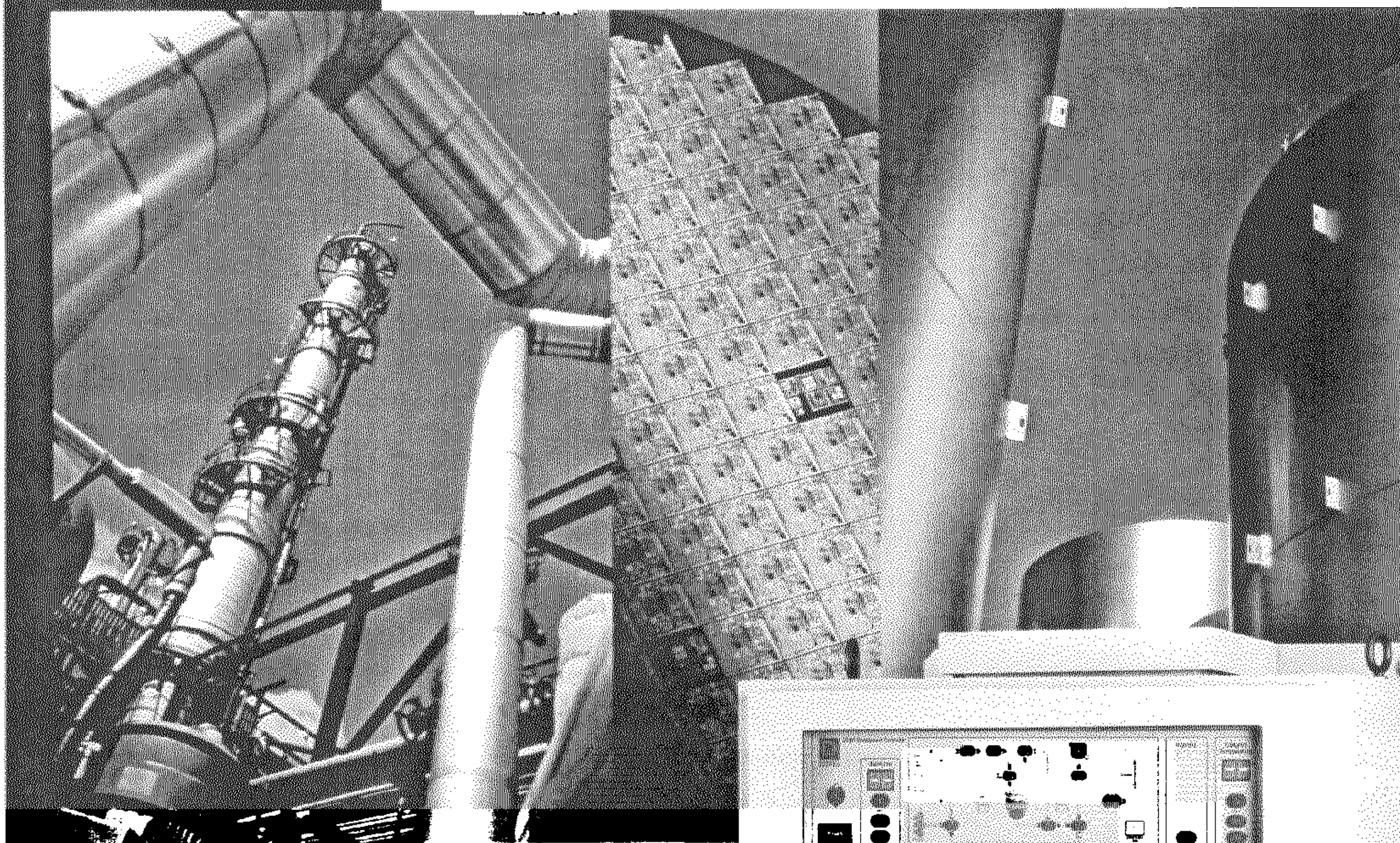
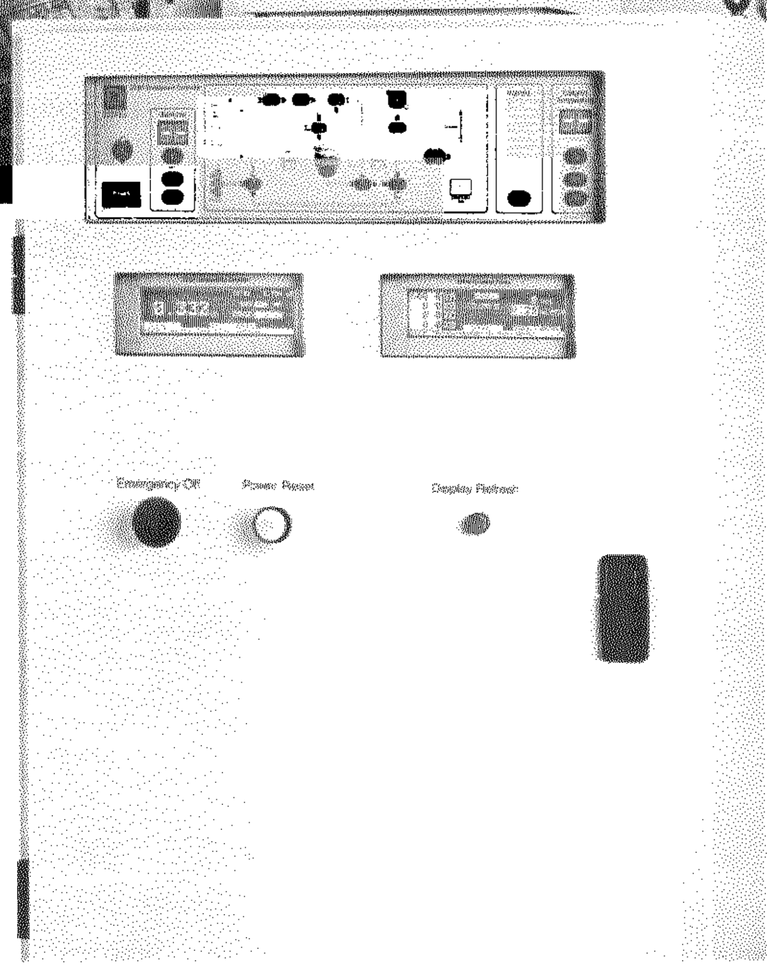
DX-800 Process Analyzer





Process
Analytical
Liquid
Chromatography

DIONEX
Process Analytical

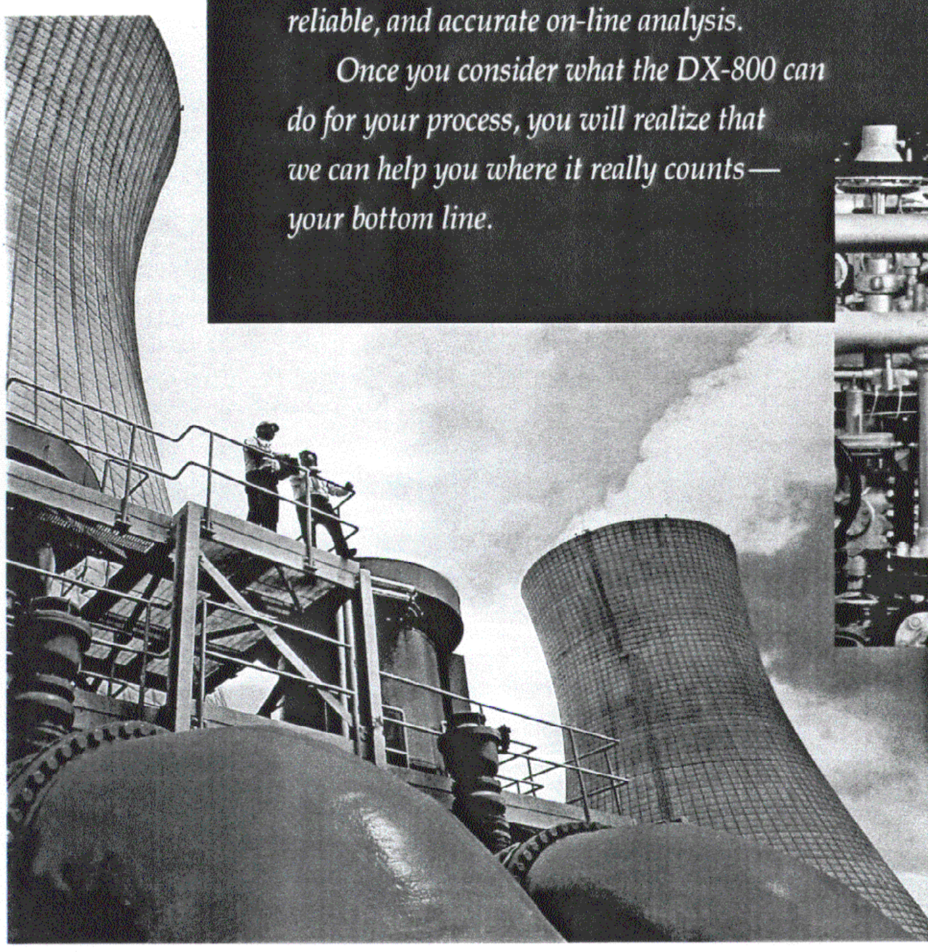
IMPROVE YOUR

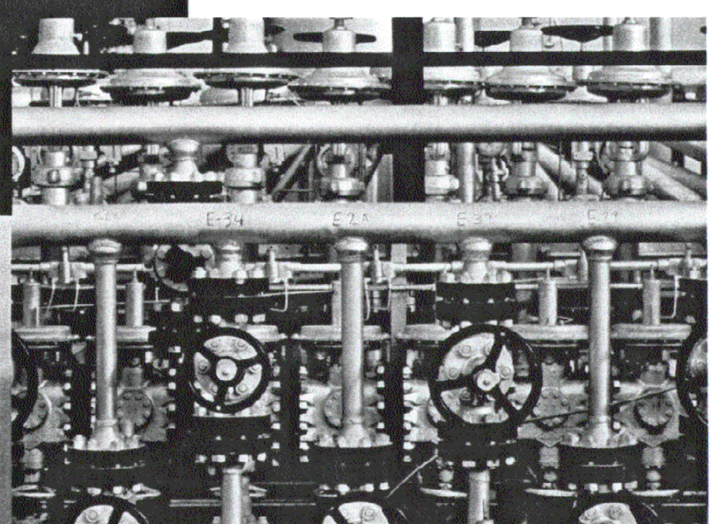
With process analytical liquid chromatography, you can manage your process better. The fact is, without continuous process monitoring, you are missing variations in the process that are costing you time and money.

Continuous monitoring ensures that variations are detected early—before costly plant shutdowns become necessary and before yield is affected. Improved monitoring capabilities help you fine-tune the chemistry to maximize process efficiency and reduce plant operating costs. The result—increased returns on investment and improved profitability.

The Dionex DX-800 Process Analyzer incorporates over 10 years' experience in process analytical liquid chromatography to provide continuous, reliable, and accurate on-line analysis.

Once you consider what the DX-800 can do for your process, you will realize that we can help you where it really counts—your bottom line.





Whether you're producing ultrapure water for a semiconductor fab, manufacturing pharmaceutical products, maintaining power plant cooling waters, or monitoring chemical plant processes or effluents, all industrial processes have a common need—a reliable, accurate, and efficient means of analyzing samples from a continuously running process.

Process Analytical Liquid Chromatography

Liquid chromatographic techniques such as ion chromatography (IC) and high-performance liquid chromatography (HPLC) are superior to many typical analysis methods.

MONITORING, IMPROVE YOUR PROCESS

- **Complete characterization with multicomponent analysis** provides more information than single component or bulk property measurements.
- **Multiple sampling points** save sample collection time and labor costs.
- **Precise and accurate results** are characteristic of chromatographic techniques.
- **Unique detection capabilities** provide unparalleled detection limits.

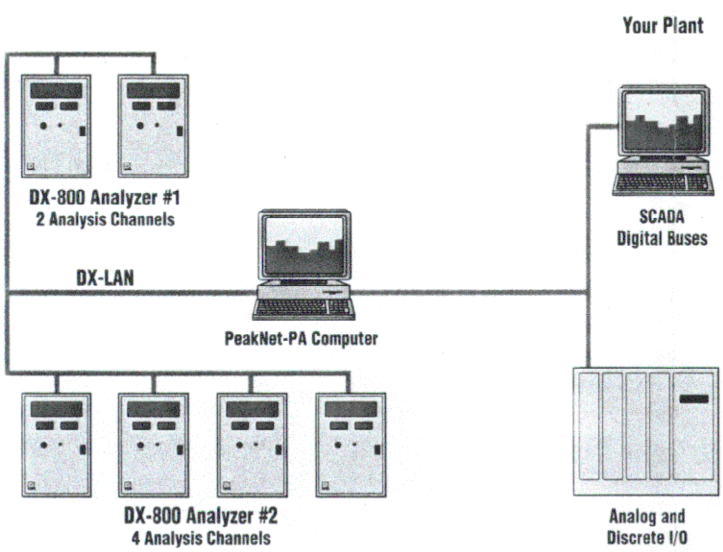
With process analytical chromatography, a variety of analytes can be determined:

- Contaminant ions in ultrapure water used in semiconductor manufacturing
- Organic acids and amines in chemical production facilities
- Corrosive ions and additives in power plant water
- Metals and organics in plant waste water
- Reaction intermediates and catalysts in pharmaceutical production lines
- Components, additives, and contaminants in plating baths
- Metabolites and nutrients in fermentation broths
- Natural products and additives in foods and beverages

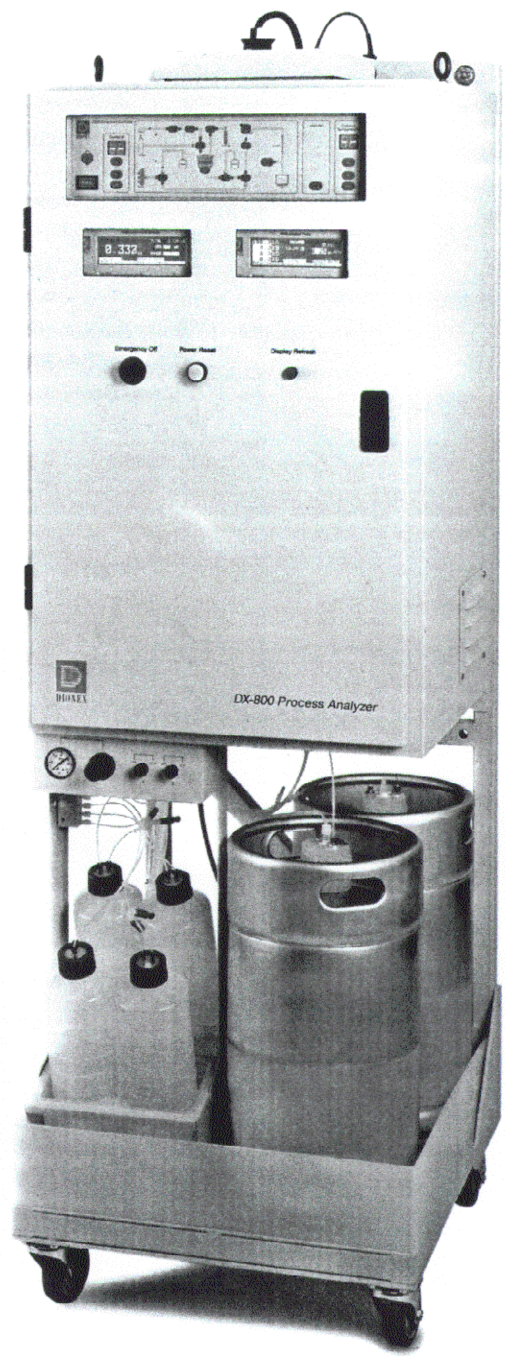
The DX-800 Process Analyzer

Improved monitoring is provided by a system designed for practical use and efficient operation. Advantages of the DX-800 include:

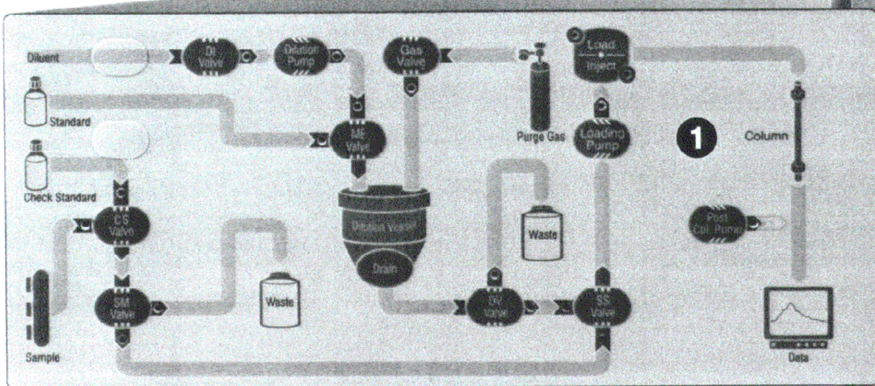
- **Historical trend data** and real-time data acquisition provide the ability to see process variations
- **Efficient, unattended operation** with sample preparation, automated calibration, built-in error checking, and alarm actions
- **Rugged packaging and design** for continuous and reliable operation in industrial environments
- **Low operating costs** result from low reagent consumption and low waste generation
- **Method versatility** with laboratory methods being easily adapted for process monitoring

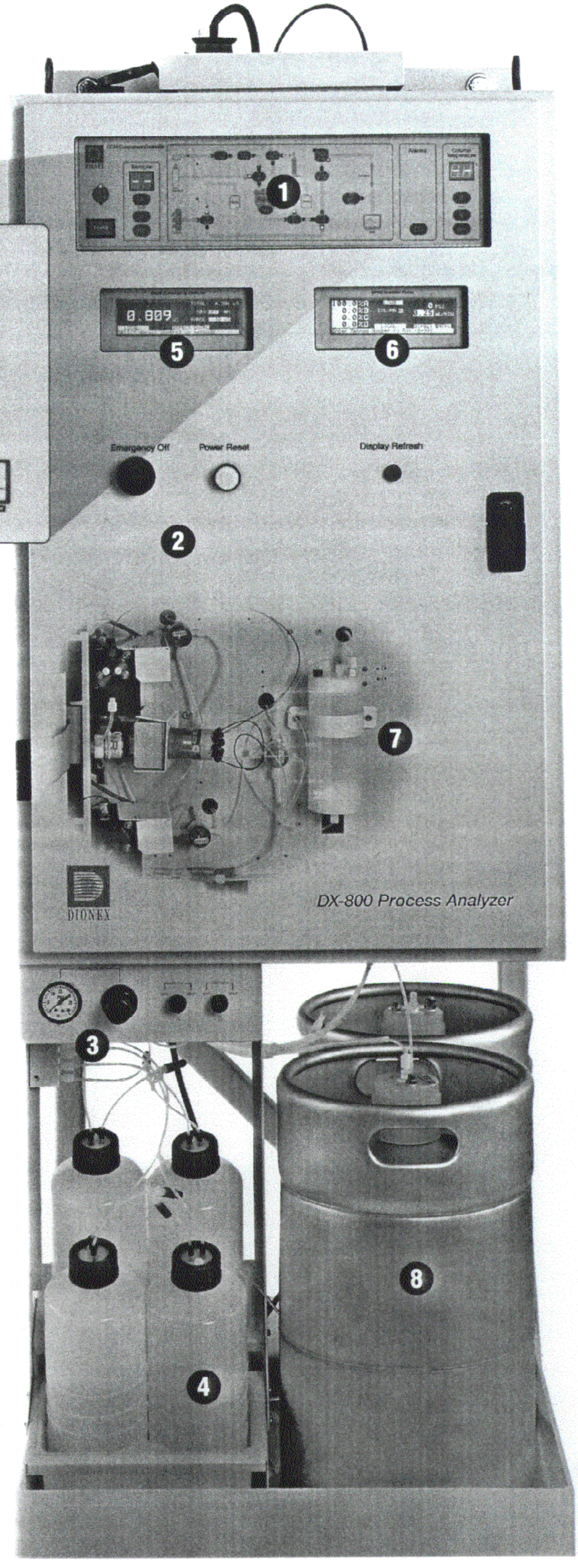


Complete connectivity and seamless integration between the DX-800 and your information system.



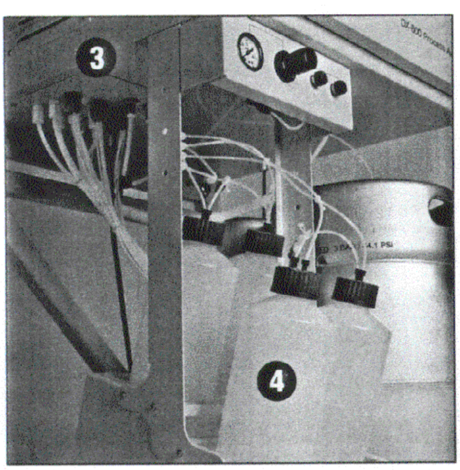
Smooth Integration Into





1 CC80 — Component Controller
Provides direct control and status of all system modules and functions. Flow path diagram displays a visual guide to system operation.

2 LC80 — Liquid Chromatography Panel
Organizes necessary components to perform all types of chromatographic analyses. Specific components are tailored to individual needs. All are mounted on the inside of the door for easy access, and may include: an injection valve; up to two analytical column sets; a column heater; and a membrane suppressor and detector cell for conductivity applications.



3 I/O Panel
Organizes all of the liquid and gas I/O in one location for easy hook-up to plant facilities.

4 LM80 — Liquids Manager
Stores and controls reagent delivery to the analyzer. External location permits reagent servicing without subjecting equipment to a potentially unfriendly environment.

ANY PROCESS ENVIRONMENT

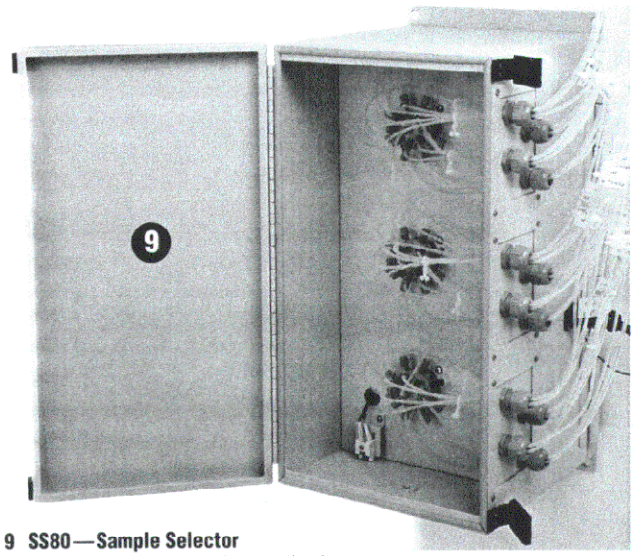
Compact, Integrated Design for Reliable, Easy Operation

Either wall-mounted or attached to an optional stand, the DX-800 is sized to fit into space-limited production facilities. Key features include:

- Front access to the internal components minimizes the space required for installation, operation, and maintenance.
- Segregation of electronic and liquid systems ensures safe, long-term operation. Emergency off circuit is accessible from the front door.
- Status of all components is displayed at the analyzer.
- Liquid and gas I/O design allows easy compliance with various safety guidelines.
- Electrical components meet CE standards.

Rugged Construction Handles Harsh Process Environments

The DX-800 is housed in a NEMA 12, 4, or 4X enclosure, ensuring optimal protection of internal components from the environment. Optional air conditioning option permits operation in hot plant environments. Optional purge and pressurization allows use in Class I, Division II hazardous locations.



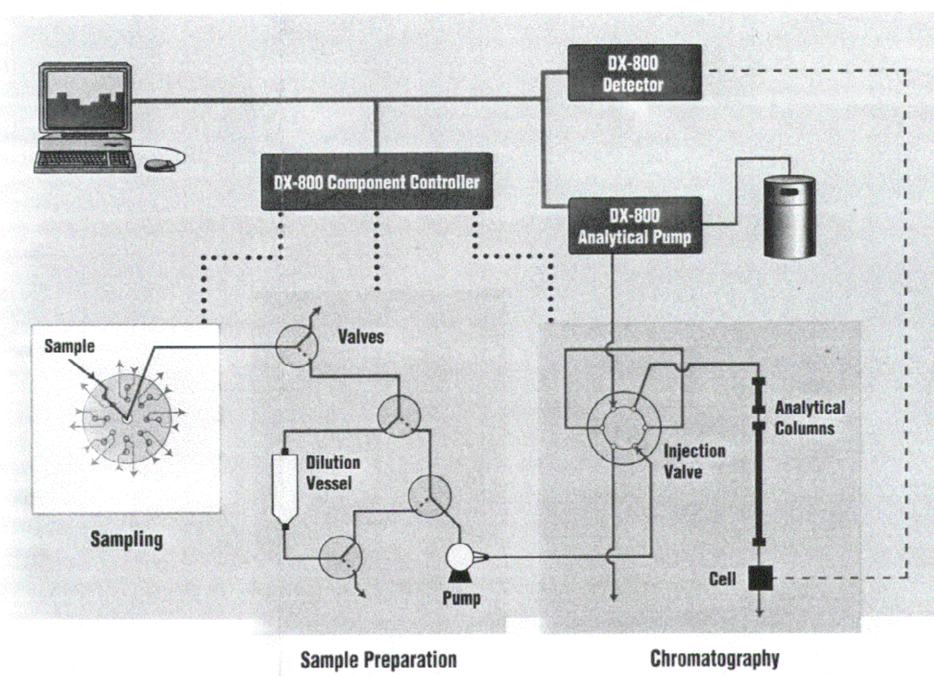
9 SS80—Sample Selector
Stand-alone module permits sampling from multiple sources while isolating bulk liquid sample flow from the analyzer. Reliable multiport rotary valves select from up to 21 different sources. The SS80 can be located up to 25 feet from the analyzer, optimizing the placement of the sampling panel and analyzer.

5 Detector
A selection of detectors provide proven sensitivity and reproducible results for a variety of different analyses.

6 Pump
A selection of pumps deliver a consistent stream of eluents and mobile phase to the analytical columns. Microbore (2-mm i.d.) chromatography provides low mobile phase consumption and minimizes waste generation.

7 SP80—Sample Preparation Panel
Electrically-actuated valves and precision displacement pumps (PDP) can be configured for different sample preparation methods: concentration, dilution, and reagent addition. Calibration standards are automatically prepared and subsequently analyzed. Swing-out panel permits easy access to back panel components and the I/O panel.

8 Large Volume Reservoirs
Allows sufficient reagent supply for one month of continuous operation.



The analyzer consists of a sample selection module, a sample/standard preparation module, and various analytical components.

AUTOMATED CONTROL,

PeakNet-PA, a Windows NT®-based software package, combines the power of Dionex PeakNet for instrument control, data acquisition, and data reporting, with the flexibility of Wonderware's InTouch® graphical human-machine interface (HMI) for viewing analyzer status and results, handling alarms, and interfacing with the plant computing and control systems environment.

Complete Control from Sampling to Data Output

A key feature of the DX-800 is its ability to easily fit into your existing process environment. PeakNet-PA facilitates this through its reliable, precise, and smooth control of the entire sampling and analysis process.

Instrument control capabilities include:

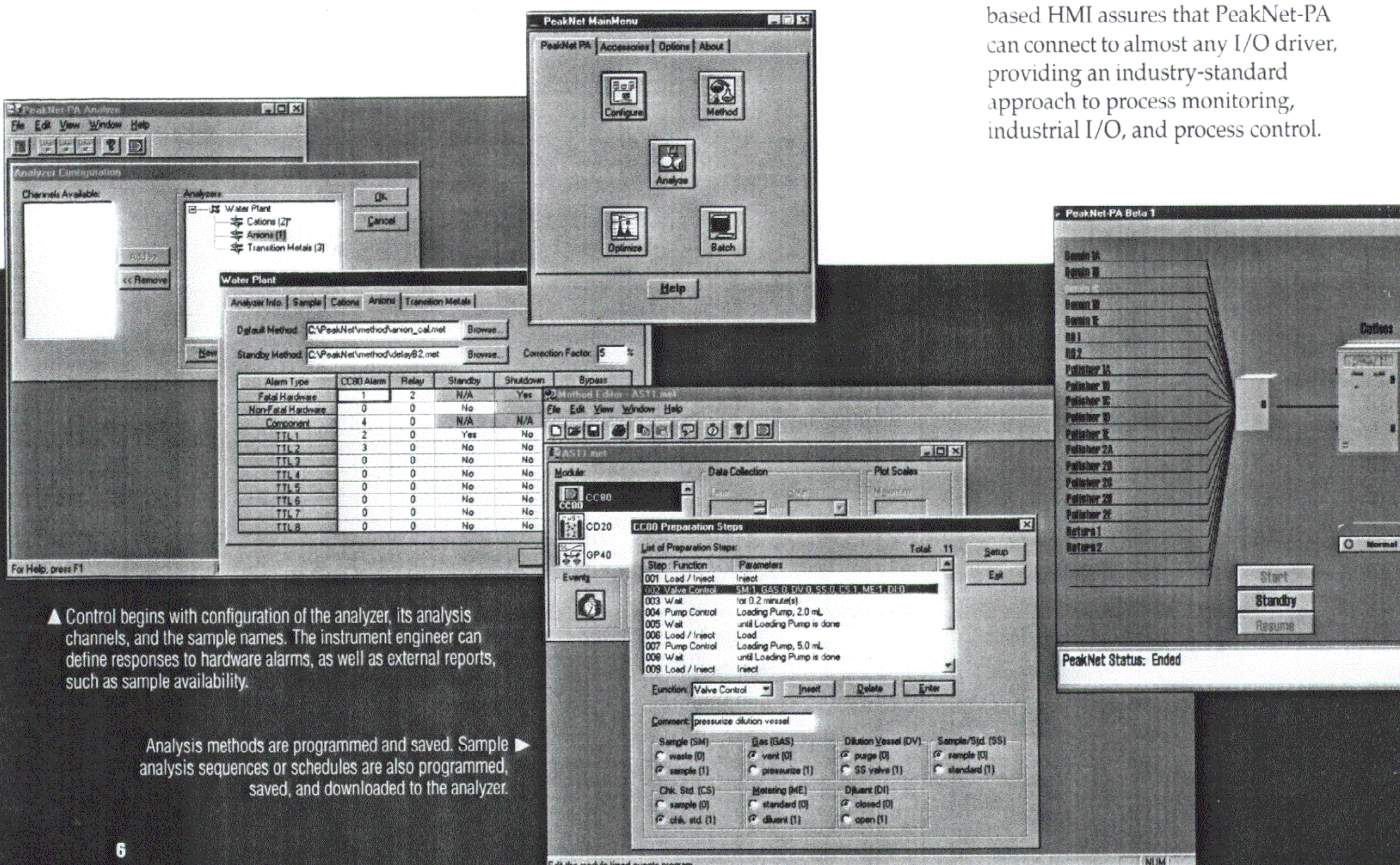
- Programmed sample selection and analysis frequency
- Complete control and status of all analyzer components
- Automatic alarm handling using preprogrammed conditional responses
- Multiple analyzer control from one computer
- Automatic scheduling of check standards and calibration to ensure accuracy of analytical results

Easy Information Retrieval and Connectivity

Wonderware® InTouch works within PeakNet-PA to provide both global and detailed information:

- Real-time display of analyzer status on a single screen for quick instrument status profiling
- Notification of alarm conditions for the samples and the analyzer
- Historical trending of data from ODBC-compliant databases
- Straightforward data transfer from PeakNet-PA to industry-standard databases and information buses

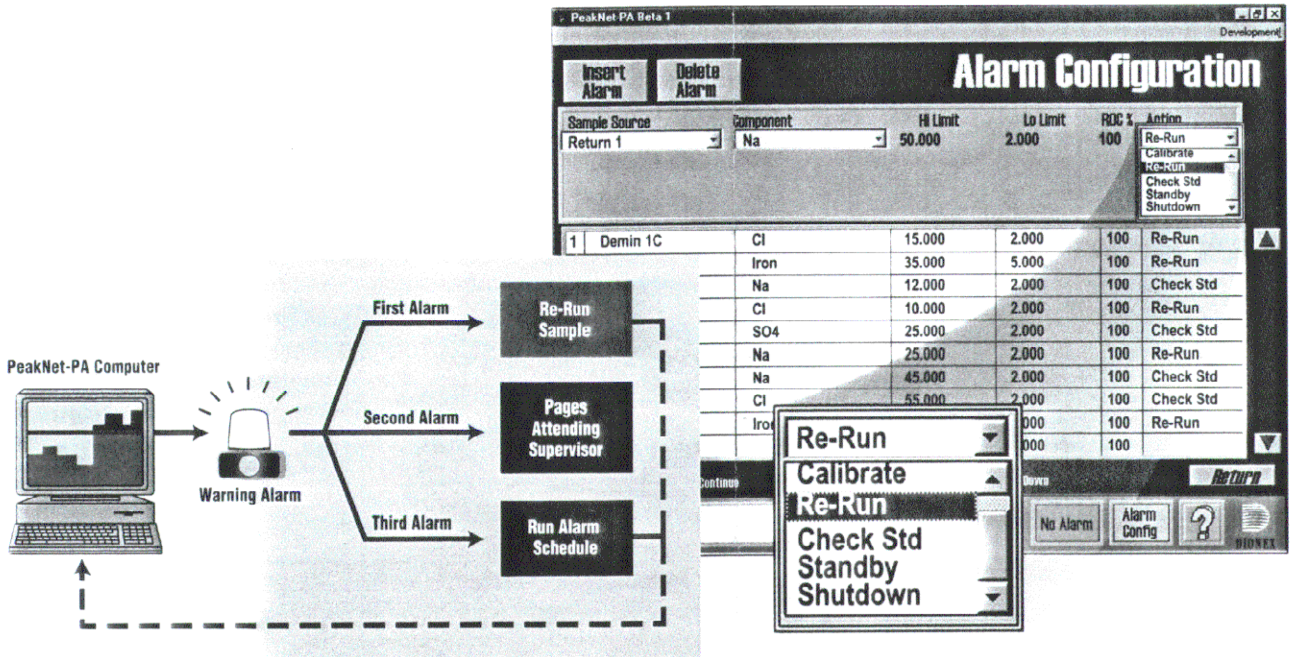
The Wonderware InTouch-based HMI assures that PeakNet-PA can connect to almost any I/O driver, providing an industry-standard approach to process monitoring, industrial I/O, and process control.

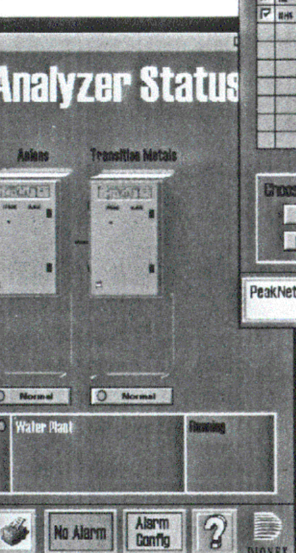


▲ Control begins with configuration of the analyzer, its analysis channels, and the sample names. The instrument engineer can define responses to hardware alarms, as well as external reports, such as sample availability.

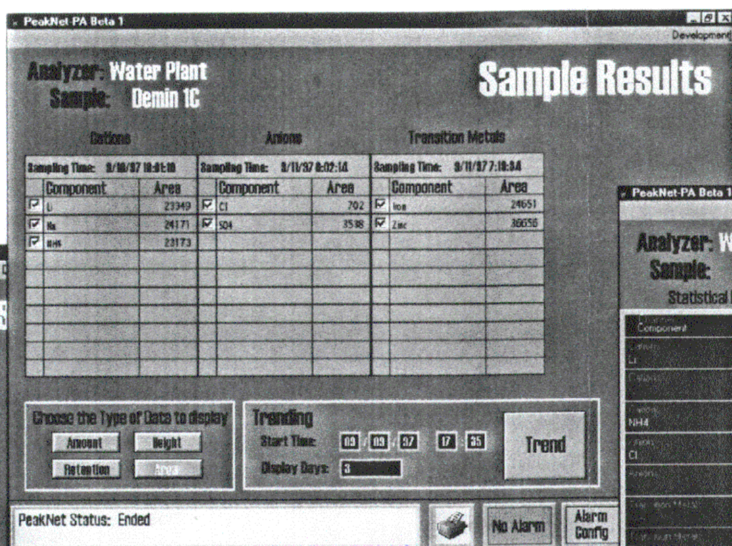
Analysis methods are programmed and saved. Sample analysis sequences or schedules are also programmed, saved, and downloaded to the analyzer. ▶

Effortless Connectivity

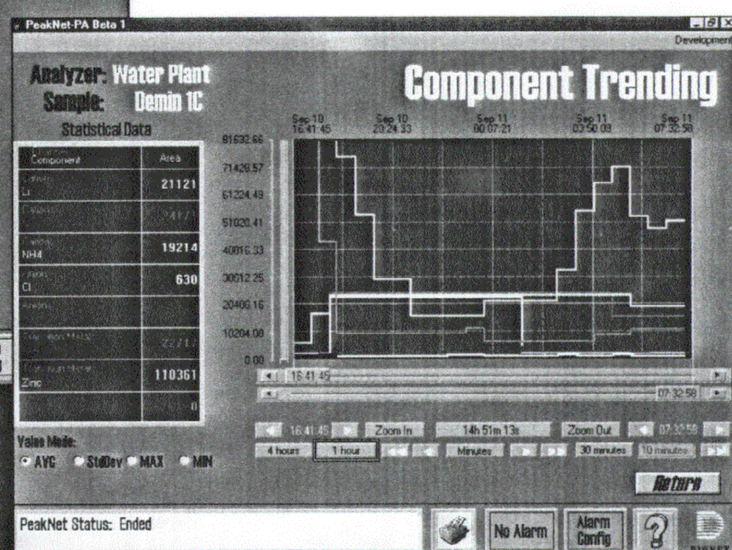




▲ General status is available at a glance. Each analyzer and its samples are displayed on individual pages. The sample being analyzed and individual channel operational status are indicated. Any alarm conditions, either sample analyte or hardware-related, are instantly communicated.



▲ Specific sample analysis results are available by clicking on one of the sample names. The results screen provides the latest analysis information as well as an intuitive path to observe historical data. The user can select up to eight analytes to trend together over any desired time span.



▲ Component trending provides the ability to see upsets or shifts in analyte results. The trend is updated automatically with the latest results. Results can be printed at predefined times and frequencies, and can also be exported to external databases.

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Appendix C

TEST REPORT OF
SOLIDS LIQUID SEPARATION

Appendix C

Test Report
of
Solids Liquid Separation

Test Report

of

Solids Liquid Separation

for

Aerojet (Phase II)

By

NETZSCH

Filtration System Division

Engineered

By

Harding Lawson Associates

January 22, 2001

NETZSCH

Project: HLA/Aerojet (Phase II)

Table of Contents:

I. ABSTRACT

The following is a summary of test results and observations from Resistance Meter Filtration experiments. The experiments were part of a pressure filtration feasibility study conducted by Netzsch Incorporated for Harding Lawson Associates (HLA) on behalf of Aerojet (Phase II). Dewatering pilot evaluation was performed during in September and October, 2000 at the Netzsch Filtration Laboratory.

This effort was made to assist in the identification of fundamental dewatering criteria, and thus, the selection of appropriate dewatering equipment.

The tests resulted in a partial completion of the objectives, but we recommend that further Resistance Tests and Pilot Filter Press Tests be made prior to any full scale operation.

II. OBJECTIVES

The objectives of testing were:

1. *To concentrate the solids phase of the slurry through hydrodynamic dewatering methods.*

2. *If required to determine a conditioning scheme that will yield consistent solids throughput.*

3. *To determine the optimum filter cakes solids content and filtrate quality.*

4. *To determine the proper filter media for this application.*

5. *To obtain data on filtration times.*

6. *To determine the optimum filter cake thickness.*

7. *To determine the optimum filtration pressure.*

8. *To obtain volume reduction and filter press sizing data.*

III. EQUIPMENT SPECIFICATIONS

Two (2) primary pieces of equipment were used in this testing. They were;

1.) **Venture Innovations Model I Capillary Suction Timer (CST).** *The CST is a broad screening device for quickly testing small (≈10 mls.) samples for their basic filtration rating. The device is a small stainless steel cylinder that rests on filter paper that is sandwiched in between two (2) layers of plastic that has a conductive electrical circuit. It measures the time it takes filtrate to travel 1.3 centimeters in a filter paper. When filtrate drawn into the filter paper reaches the first conduction ring it starts and electronic timer. When it reaches the second ring it stops the timer and the reading is recorded.*

2.) **Netzsch Series 275 Sludge Filtration Rate Index Resistance Meter.** *The Netzsch Model 275 Sludge Resistance Meter is a stainless steel vessel which directs 225 psig of pressure, with nitrogen, on the top of a 250 ml sludge sample. The pressure forces the filtrate through the solids which are retained by a filter cloth.*

IV. TEST PROCEDURE

A sample of the slurry was delivered by HLA in September to the Netzsch laboratory for analysis. A bench test study was conducted to determine the selection of the filter cloth, conditioning scheme and filterability of the slurry.

The Netzsch standard filter press screening test procedure is comprised of three (3) segments: (A) Sludge Characterization, (B) CST Screening Tests and (C) Resistance Meter Tests. The characterization tests consist of general sample analysis (percent dry solids, pH, and specific gravity).

The first step of the characterization tests was to determine the total solids content of the raw sludge. The Total Solids (TS) content was determined by baking a known weight of sludge for 24 hours at 104°C and calculating the ratio of the dry weight after baking to the wet weight before baking. Next the Total Suspended Solids (TSS) was measured by filtering the sludge by vacuum filtration through a Gelman AE filter paper and then baking the sample for 24 hours at 104°C and calculating the ratio of the dry weight after baking to the wet weight of sludge prior to filtration and baking. The pH was then measured using a pre-calibrated pH meter. Finally, the sludge was visually described and tested for specific gravity by measuring the weight of a given volume of sludge and dividing the weight by the volume.

The second step is to test the sample for filtration characteristics (example: filtrate clarity, cake release, cake consistency, filtration quality etc.). The order in which the tests were conducted was: (1) Capillary Suction Timer Test, (2) Sludge Filtration Resistance Index Test, (if 1 & 2 not satisfactory) then (3) chemical/physical conditioning, (4) return to #1. The filtration tests of #1 & #2 are explained in detail in the following paragraphs.

The CST measures the time the filtrate from a 10 ml sludge sample being pulled through the solids by capillary suction. The CST exhibits the filtration quality of the sample. It is also used to determine the optimum chemical/physical conditioning dose. Generally, a CST time of 20 seconds or less generally denotes good dewaterability.

The Netzsch Model 275 Sludge Resistance Meter is a stainless steel vessel which directs 225 psig of pressure, with nitrogen, on the top of a 250 ml sludge sample. The pressure forces the filtrate through the solids which are retained by a filter cloth. The filtrate's cumulative volume vs. time is measured. The Sludge Filtration Resistance Index (SFRI) is a dimensionless number calculated by using the samples: percent dry solids, temperature, and the filtrate's cumulative volume vs. time ratio. Generally a SFRI of 2 or less is a positive test result. The time that the nitrogen takes to displace the liquid in the sludge sample is called the run time.

A run time of 15 minutes or less is usually acceptable. The cake formed in the SFRI test is evaluated for consistency and release quality from the filter media. The SFRI of the raw sludge was Too Slow To Measure (TSTM). Further results of the screening tests are indicated below.

A total of twenty-five (25) CST tests and including nine (9) Resistance Tests were conducted at the Netzsch Laboratory on the first sample received, in order to determine the conditioning scheme for utilizing the proper filter press technologies, we measured, feed pressures and filtration times, chemical dosage levels and general filtration observations. No satisfactory results were obtained in the first sample and due to the age and lack of sample volume no more tests were made.

Another sample was sent by HLA in October and twelve (12) CST tests and one (1) Resistance Meter Test were made on sludge.

Tests on both of the sludge samples received were conducted after settling the sludge and decanting the supernatant to increase the thickness of the raw sludge. The sludge was then re-characterized.

The fundamental goal of the study was to ascertain performance of a Filter Press System in terms of cake solids and the filtrate quality.

V. Test Data

A. Slurry Characteristics:

Sample Designation:	Non-Thickened First Sample
Type of Solids:	Alum Sludge
Raw Total Suspended Solids:	0.37%
Raw Total Solids:	0.37%
Specific Gravity:	1.008
pH:	7.02
Color:	Black
Odor:	Slight Bio
Other Comments:	Settles moderately quickly with clear supernatant

A. Slurry Characteristics:

Sample Designation:	Thickened First Sample
Type of Solids:	Alum Sludge
Raw Total Suspended Solids:	0.75%
Raw Total Solids:	0.80%
Specific Gravity:	1.008
pH:	7.02
Color:	Black
Odor:	Slight Bio
Other Comments:	Settles very little

A. Slurry Characteristics:

Sample Designation:	Non-Thickened Second Sample
Type of Solids:	Alum Sludge
Raw Total Suspended Solids:	0.245%
Raw Total Solids:	0.27%
Specific Gravity:	1.007
pH:	7.03
Color:	Black
Odor:	Slight Bio
Other Comments:	Settles moderately quickly with clear supernatant

A. Slurry Characteristics:

Sample Designation:	Thickened Second Sample
Type of Solids:	Alum Sludge
Raw Total Suspended Solids:	0.61%
Raw Total Solids:	0.65%
Specific Gravity:	1.007
pH:	7.03
Color:	Black
Odor:	Slight Bio
Other Comments:	Settles very little

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II
DATE: 09/27/00
RESISTANCE METER SIZE: 250 mls.

PILOT RUN NO.: 1
TESTED BY: PJY
FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING: None

FILTER MEDIA:

Fiber: Polypropylene
Weave: Sateen

Type: Mono/Multifilament
Porosity: 0.5-1.0 cfm

FILTRATION TIME:

Total Cycle Time*, :minutes: >60.0

Filtration Time, minutes: >30.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Not Measured

Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Spongy (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 220.8 mls.
Average Suspended Solids: Not Measured – Excessive Bleed

Filtrate pH: 7.02
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II
PILOT RUN NO.: 2
DATE: 09/27/00
TESTED BY: PJY
RESISTANCE METER SIZE: 250 mls.
FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80
pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$

* - By dry weight of Sludge Feed Solids.

Dose*: 5% @ 30.0% Solution
Conditioned CST: 21.5 seconds

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill
Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 54.0
Filtration Time, minutes: 24.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Not Measured
Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Non-Cohesive (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 232.5 mls.
Average Suspended Solids: Not Measured – Clear
Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 3

DATE: 09/27/00

TESTED BY: PJY

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) Polymer: K144L Cationic High Charge/High M.W.

Dose*: 2.5 mls./L @ 30.0% Solution
Conditioned CST: 18.9 seconds

* - Per Liter of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 65.0

Filtration Time, minutes: 35.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Not Measured

Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Smeary (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 227.6 mls.
Average Suspended Solids: Not Measured – Mostly Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II
PILOT RUN NO.: 4
DATE: 09/28/00
TESTED BY: PJY
RESISTANCE METER SIZE: 250 mls.
FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge -- First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$

Dose*: 5% @ 30.0% Solution

* - By dry weight of Sludge Feed Solids.

b.) Polymer: K144L Cationic High Charge/High M.W.

Dose*: 2.5 mls./L @ 0.25% Solution
Conditioned CST: 18.9 seconds

* - Per Liter of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 55.0

Filtration Time, minutes: 25.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Not Measured

Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Smeary (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 231.4 mls.
Average Suspended Solids: Not Measured – Mostly Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 5

DATE: 09/28/00

TESTED BY: PJY

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$

Dose*: 5% @ 30.0% Solution

b.) Hydrated Lime: High Calcium

Dose*: 30.0 CaO @ 10.0% $Ca(OH)_2$ Solution
Conditioned CST: 21.8 seconds

* - By dry weight of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 62.0

Filtration Time, minutes: 32.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Fair

Resulting Cake Thickness: 6mm
Average Dry Solids: Not Measured
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 220.1 mls.
Average Suspended Solids: Not Measured –Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 6

DATE: 09/28/00

TESTED BY: PJY

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$

Dose*: 5% @ 30.0% Solution

* - By dry weight of Sludge Feed Solids.

b.) Polymer: 1592RS Cationic High Charge/High M.W.

Dose*: 20.0 mls./L @ 0.25% Solution
Conditioned CST: 28.5 seconds

* - Per Liter of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 55.0

Filtration Time, minutes: 25.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Poor

Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Mushy (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 215.5 mls.
Average Suspended Solids: Not Measured –Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 7

DATE: 09/29/00

TESTED BY: PJY

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) Polymer: 8180 Emulsion Breaker

Dose*: 1.0 mls./L @ 0.25% Solution
Conditioned CST: 33.4 seconds

* - Per Liter of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 52.0

Filtration Time, minutes: 22.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Poor

Resulting Cake Thickness: Not Measured
Average Dry Solids: Soft & Mushy (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 217.8 mls.
Average Suspended Solids: Not Measured –Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

NETZSCH

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II
PILOT RUN NO.: 8
DATE: 09/29/00
TESTED BY: PJY
RESISTANCE METER SIZE: 250 mls.
FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge -- First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80
pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$

Dose*: 5% @ 30.0% Solution

b.) Body Feed: Perlite

Dose*: 25.0%

Conditioned CST: 21.8 seconds

* - By dry weight of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill
Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 45.0
Filtration Time, minutes: 15.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 100 mls.
Average Specific Gravity: Not Measured
Cake Release: Poor
Resulting Cake Thickness: 1mm
Average Dry Solids: Not Measured
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 90.2 mls.
Average Suspended Solids: Not Measured –Clear
Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 9

DATE: 09/29/00

TESTED BY: PJY

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 100 psig

UNCONDITIONED SLUDGE: Alum Sludge – First Thickened Sample

Specific Gravity: 1.008
% Suspended Solids: 0.75
% Total Solids: 0.80

pH: 7.02
Temperature: Ambient
Raw CST: 125.2 seconds

SLUDGE CONDITIONING:

a.) $FeCl_3$ — Dose*: 15% @ 30.0% Solution

b.) Hydrated Lime: High Calcium — Dose*: 45.0 CaO @ 10.0% $Ca(OH)_2$ Solution

Conditioned CST: 18.2 seconds

* - By dry weight of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Special Twill

Type: Multifilament
Porosity: 0.15

FILTRATION TIME:

Total Cycle Time*, :minutes: 34.0

Filtration Time, minutes: 4.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

Volume of Slurry Processed: 250 mls.
Average Specific Gravity: Not Measured
Cake Release: Good

Resulting Cake Thickness: 1.5mm
Average Dry Solids: Soft & Cohesive (NM)
Average Density: Not Measured

FILTRATE:

Cumulative Volume: 92.1 mls.
Average Suspended Solids: Not Measured –Clear

Filtrate pH: Not Measured
Total Solids: Not Measured

B. RESISTANCE METER TEST DATA

PROJECT: HLA/Aerojet Phase II

PILOT RUN NO.: 10

DATE: 10/19/00

TESTED BY: MAM

RESISTANCE METER SIZE: 250 mls.

FILTRATION PRESSURE: 225 psig

UNCONDITIONED SLUDGE: Alum Sludge – Second Thickened Sample

Specific Gravity: 1.007
% Suspended Solids: 0.61
% Total Solids: 0.65

pH: 7.03
Temperature: Ambient
Raw CST: 127.1 seconds

SLUDGE CONDITIONING:

a.) Body Feed: EnviroGuard Maxflo

Dose*: 100.0%

Conditioned CST: 15.8 seconds

* - By dry weight of Sludge Feed Solids.

FILTER MEDIA:

Fiber: Polypropylene
Weave: Sateen

Type: Mono/Multifilament
Porosity: 0.5-1.0

FILTRATION TIME:

Total Cycle Time*, :minutes: 35.0

Filtration Time, minutes: 5.0

***Total Cycle Time includes 30 Min. for plate shifting & maintenance.**

CAKE:

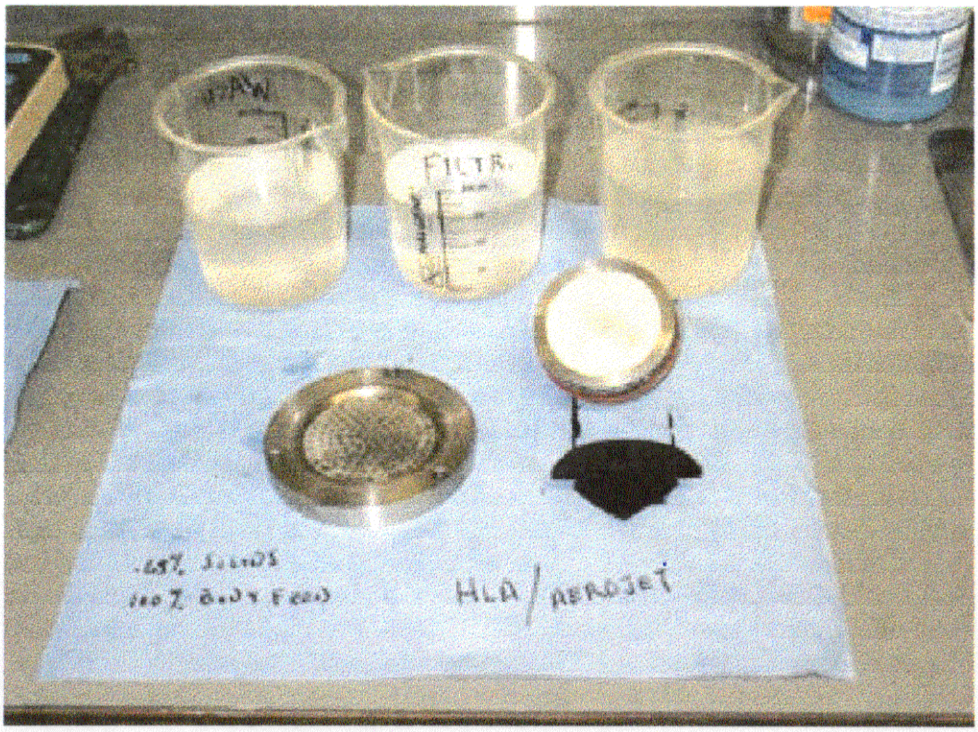
Volume of Slurry Processed: 250 mls.
Average Specific Gravity: 1.23
Cake Release: Very Good

Resulting Cake Thickness: 6.5mm
Average Dry Solids: 45.5%
Average Density: 76.5 lbs./ft^3

FILTRATE:

Cumulative Volume: 90.2 mls.
Average Suspended Solids: Not Measured – Clear

Filtrate pH: 7.25
Total Solids: Not Measured



Resistance Test #10 – Filter Cake, Filtrate and Filter Cloth

VI. DISCUSSION OF RESULTS

General Discussion:

The laboratory test program was partially successful in dewatering the slurry. The test data is still insufficient to provide quantitative information in establishing the parameters for the Filter Press Dewatering System. Only one (1) Resistance Test produced fully acceptable results in regards to cake solids and cake release, filtrate quality and filtration cycle time. Several of the Test Runs produced acceptable filtrate quality or filtration times, but none produced acceptable results regarding all the criteria.

A. Cake Solids & Cake Release:

The sample slurry was successfully dewatered utilizing 100% body feed using a recessed chamber plate with terminal sludge dewatering pressures of 225 psig. Cake release from this test was acceptable.

B. Conditioning Scheme:

Only the 100% body feed produced acceptable conditioning results. This conditioning scheme produced very acceptable cake solids (over 45%), but may not be the only choice for conditioning this sludge or the dosage rate may be able to be reduced. Further testing is required.

C. Filtrate Quality:

The quality of the filtrate from the only fully acceptable Test Run (#10) of the bench test runs was judged excellent. Filtrates were clear for many of the tests.

D. Filtration Cycle Times:

The filtration cycle time is a function of feed solids. As the feed solids increase, the filtration cycle will decrease. Based upon the sample conditioned as in Test #10 with 0.61% TSS, the Projected Filter Press Cycle Time would be approximately 120 minutes. Total cycle time includes the time to complete the filtration cycle including, core-blow and thirty (30) minutes to allow for discharging the cake into the roll-off bin.

VII. CONCLUSIONS & RECOMMENDATIONS

Based upon the data presented in this Report and our observations we can conclude and recommend the following:

1.) ***The sludge as shipped to Netzsch Incorporated is very hard to dewater. In particular, the first sample was harder to dewater than the second.***

2.) ***The sludge needs to be thickened to at least 1% prior to filtration.***

3.) ***The only currently acceptable conditioning scheme is body feed. This type of conditioning should produce a filter cake with at least 30% dry cake solids, good filter cake release, excellent filtrate clarity and a cycle time of approximately 120 minutes.***

4.) ***A dewatering pressure of 225 psig with a Recessed Chamber Filter Press should be sufficient to produce acceptable results, though Membrane (Diaphragm) Technology would produce better results, possibly with reduced operational chemical costs, though at a higher initial capital cost (usually 30-40% higher).***

5.) ***Further testing should be done to minimize the dosage rate for body feed and/or find another acceptable conditioning scheme.***

If you have any questions or require further information please feel free to contact this office directly. We look forward to supplying your dewatering need for this Project.

Very Truly Yours,

Mark A. Mikula

Mark A. Mikula for H. Alex Yaz
Regional Sales Manager
Filtration System Division

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Please visit us on the web at netzschusa.com.