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FINAL REPORT

DOT PROJECT NUMBER 250/GTI PROJECT NUMBER 20736

Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion

FINAL REPORTS: TASKS 1, 2, 3 and 4

Reporting Period:
July 1, 2008 through October 30, 2009

Report Issued:
December 31, 2009

Prepared For:
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Task 1 Report - Laboratory Testing and Analysis of Biogas

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Executive Summary

The Gas Technology Institute (GTI) executed a sampling and analysis program focused on the comparative analysis of "raw" biogas and biomethane ("cleaned biogas") from landfill and wastewater treatment sites in the United States and Canada. The objective of the project was to execute a program aimed at identifying Tier I and Tier II chemical constituents and biological agents (bacteria and spores) contained in raw biogas and the corresponding biomethane product from the selected sites. Natural gas samples were collected and analyzed as well.

Landfill and wastewater treatment sites which were producing a high quality methane product (biomethane) potentially suitable for introduction with existing supplies in natural gas pipeline networks were chosen for analysis. Four landfill sites and two wastewater treatment sites in the United States and Canada were sampled. Additionally, three natural gas samples from separate locations in Canada were collected. Samples retrieved included "raw" biogas and biomethane ; a total of nineteen biogas samples, twenty one biomethane samples and six natural gas samples were retrieved. Two landfill sites were sampled twice over the testing period; one landfill was tested three times. Therefore, a total of 46 samples were retrieved for this program.

Samples were collected according to rigorous sampling procedures established by GTI through a similar collaborative industry project focused on dairy waste biogas and biomethane. Qualified laboratory personnel teams from GTI utilized designated sampling equipment devoted to this project and established quality control/quality assurance procedures for all sampling efforts. Sample retrieval was executed over a period of 12 months (October, 2008 to September, 2009). The scope of this project was sample collection and sample analysis for: 1) chemical constituents (Tier I and Tier II testing), and, 2) biological constituents (total bacteria, live and dead bacteria, number and type of microbial inducing corrosion (MIC) bacteria, total spores and preliminary pathogen screening).

Results of all tests were compiled and tabulated by GTI; this Task 1 report compiles all results with analysis and interpretation. The resulting database from this study may be limited by number of samples per sampling event, number of sampling events per site, number of sites total, number of sites per discrete location in North America, number and types of materials being digested at each site, range of time over which the samples were taken (limited seasonal variation), range of weather conditions under which samples were retrieved, differences between cleanup systems, differences between the specific analytical requirements for the biomethane, and other considerations which may have provided supportive data beyond results represented in this study. The sum total of data from this study may not supply sufficient information to draw strong Guidance statements (Task 2 of this total project). Raw data from this sampling and analysis program may be found in the Appendices attached to this report.

Introduction

Overall Project Objective

The objective of this project was to develop Guidance on analytical criteria necessary for the introduction of biomethane from wastewater treatment and landfills facilities into existing natural gas pipeline networks. The Guidance Document was developed through laboratory testing of raw (before cleanup) and post-cleanup biogas from wastewater sludge and landfills in order to assess similarities and differences with existing natural gas supplies. Major differences may affect pipeline delivery infrastructure in the long run, as well as create health and environmental issues and end-use problems.

The objective of Task 1 was to conduct a laboratory testing program to evaluate raw and cleaned wastewater and landfill biogas to determine the chemical and biological constituents present within this renewable energy source.

Purpose of the Report

The purpose of this report is to present project methodology and the analytical testing results from all Tier I and Tier II chemical testing and biological analyses. This report capture specifics pertaining to sample collection, data analysis and data reporting. This report compiles all data in raw form and tabulated results of testing. Discrete comparative analysis or conclusions outside of data results are not included in this Task 1 Report. The intent of this Task 1 Report is to compile results of all sampling and analytical testing. A limited number of natural gas samples were also collected and analyzed. Fate and use of tested biomethane is not discussed within this report.

This report also includes sections pertinent to the topic of biogas and biomethane, including background materials particular to natural gas constituents, potential contaminants of concern in biogas, sampling design, methods, results, discussion references and terminology and definitions.

The work captured in this Report represents a limited study, as pertaining to a survey and analysis of renewable natural gas from landfills and wastewater treatment plants. A clear data need resulting from this work is the necessity to increase the sample number, variety and seasonal representations of landfills and wastewater treatment facilities in order to more accurately assess variations and similarities between source materials. Doubtlessly, the data set represented here is limited. Therefore, firm conclusions most likely require more sampling and analysis.

Constituents Found in Natural Gas

Natural gas is typically composed of methane, but also includes other light hydrocarbons such as ethane, propane, butane and pentane. It additionally contains other components such as diluents gases, which include carbon dioxide, nitrogen, oxygen and helium. Natural gas can also contain other contaminants such as hydrogen sulfide, mercaptans, and various toxic and corrosive chemical compounds that are composed of combinations of sulfur, carbon, hydrogen and oxygen. The quality of natural gas is typically addressed by the Federal Energy Regulatory Commission (FERC). FERC regulates the interstate transmission of electricity, natural gas, and oil and requires natural gas transmission companies to file tariffs. Although FERC has no generic quality policy[1] it has the authority under section 5 of the Natural Gas Act to require a pipeline company to include "just and reasonable gas quality and interchangeability standards" in their tariffs[2]. In Report No. 4A, the American Gas Association's Transmission Measurement Committee reported on variations in natural gas pipeline tariffs. Table 1 presents their findings of the threshold and typical values of gas properties specified in tariffs. **However, AGA Report 4A is currently being updated and a 2009 version is expected to be released, therefore the values and parameters reported in Table 1 are subject to change.** The components typically addressed in pipeline tariffs were included in this project, as well as other potential compounds of concern (discussed in the following section) that may be present in biogas. It should be noted that caution needs to be exercised when using tariff value ranges suggested within AGA Report 4A, as local requirements may vary. Specific tariff requirements for individual natural gas companies should be consulted for the purpose of constructing a suitable contract for biomethane delivery.

[1] United States. Federal Energy Regulatory Commission.Natural Gas Interchangeability Docket No. PL04-3-000. INGAA, 2006.
[2] United States. Federal Energy Regulatory Commission.Opinion No. 495. FERC, 2007.

Table 1. Constituents and Properties of Natural Gas as Reported in AGA Report 4A (2001)[3]

Gas Property	Contract Limits	Typical Values
Water Concentration	7lb./MMscf, Maximum	2 – 7 lb./MMscf
Heat Concentration (dry)	967 – 1120 Btu/scf	1010 – 1060 Btu/scf
Temperature	32 – 120 °F	40 - 60°F
Hydrocarbon Dew Point - °F	15°F Maximum at Pipeline Pressures	0 - 15°F at 550 psig
Sulfur Compounds – Hydrogen Sulfide (H_2S)	¼ - 0.3 grains per 100 scf, Maximum [4]	0 – 2 grains per 100 scf
Mercaptans (RSH)	No Specification	Highly Variable 0 – 40ppm[5]
Total Sulfur Compounds, as sulfur	5 – 20 grains per 100 scf – Maximum	0 – 1 grains per 100 scf
Diluent Gases Total	4 – 5% Maximum	0.5 – 3%
Oxygen (O_2)	0.2% Maximum[6] 0.001% Desirable	0 – 0.001%
Helium (He)	0.2% Maximum	0 – 0.1%
Nitrogen (N_2)[7]	3% Maximum [8]	0 – 2%
Carbon Dioxide (CO_2)	2 – 3% Maximum[9]	0 – 2%
Mercury (Hg)	No Specification	0 – 1ppb[10]
Solid Particles	3 – 15 microns, Maximum	3 – 15 microns

[3] American Gas Association. Transmission Measurement Committee. AGA Report No. 4A, Natural Gas Contract Measurement and Quality Clauses. Washington, DC: American Gas Association, 2001
[4]NFPA 54-1999, ANSI Z223.1, Natural Fuel Gas Code, section 2.6 lists pipe material restrictions if more than 0.3 gr. H_2S/100 scf. Where H_2S cannot be limited to 0.3 gr. /100 scf or less, notify end-users, LDCs, and/or state agencies, which can affect the use of appropriate pipe materials for high H_2S gas.
[5] Parts per million (10^{-6}), molar basis
[6]To limit pipeline corrosion effects, the desirable O_2 contract limit is 0.001% but the maximum contract limit may be specified up to 0.2% in dry or processed gas with no H_2O present in liquid form.
[7]This is free, gaseous nitrogen, nitrogen compounds are not known to occur in most gas.
[8]The carbon dioxide and nitrogen are sometimes limited to combined maximum concentration of 3%.
[9]The carbon dioxide and nitrogen are sometimes limited to combined maximum concentration of 3%.
[10]Parts per billion (10^{-9}), molar basis

Chemicals in Biogas and Biomethane

Depending upon biomass mix in the landfill, methane yields are typically 40-60% methane, with the remainder being mostly carbon dioxide (CO_2). Landfill and wastewater treatment biogas also contain other chemicals - most of which are known as "non-methane organic compounds" or NMOCs. Heavy metals, acid gas forming compounds (HCl, NO_x, SO_x), and even tritium (radioactive hydrogen), have been found in landfill gas, as well as anthropogenic compounds, such as siloxanes. The EPA identified 94 NMOCs in their 1991 report, Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines [3]. Some are toxic [2,3]; and at least 41 are halogenated.

Table 2 lists six categories of NMOC+ compounds that could be problematic to gas utilities.

Table 2: General Categories of NMOC and Other Compounds in Landfill Gas

Chemicals that are hazardous to human health
Chemicals that form residues and gums and potential fouling within the system
Chemicals that are corrosive
Chemicals that become corrosive under chemical or microbiological activation
Chemicals with offensive odors
Chemicals that form excessive smoke or soot when burned in residential or commercial furnaces, boilers, ranges, dryers or other appliances

Depending upon the biomass source or season of the year, biogas characteristics and quality may vary. Cleanup of biogas to remove onerous or hazardous constituents may be necessary for safe transport through pipelines.

Carryover of pathogenic or corrosion-causing bacteria may also be of concern. Previous GTI testing of “clean” biogas samples showed carry-over of live bacteria known to cause pipeline corrosion (microbially-induced corrosion, MIC). There is also concern for carry-over of spores/pathogens which may be hazardous to human health. However, it must be noted that bacteria which cause corrosion are naturally occurring in the environment and may be present in natural gas supplies as well.

GTI had previously been engaged in a biogas/biomethane testing program and protocols, procedures and testing methods developed under these projects were incorporated in the work for this project. GTI designed a sample collection and analysis program for this project which includes chemical and biological testing. The chemical tests were grouped into two ***Tiers***:

1) The ***First Tier*** chemical tests included the analysis of compounds typically defined in pipeline tariffs for natural gas, in addition to other specific compounds of interest (siloxanes, heavy metals, etc.). Target compounds for the First Tier chemical tests are presented in Table 4. The target compounds are grouped based on the analytical methods used for detection and quantification. Seven different analytical methods were used in the First Tier chemical tests: major components analysis, sulfur analysis, extended hydrocarbon analysis, halocarbon analysis, siloxanes analysis, metals analysis and mercury analysis (mercury was analyzed separately from the

other target metals because the detection and quantification requires a separate analytical instrument).

2) The ***Second Tier*** chemical tests (presented in Table 5) include target compounds such as chlorinated compounds, pesticides, aldehydes and ketones. These compounds were identified as candidate compounds of concern potentially present in biogas/biomethane. However, these constituents are not routinely monitored in natural gas. Similar to the First Tier chemical tests, the target compounds in the Second Tier chemical tests were grouped based on the analytical methods used for detection and quantification. Four different types of analytical methods were used: volatile/semivolatile organic compounds analysis, pesticides analysis, polychlorinated biphenyls (PCB) analysis and aldehydes and ketones analysis.

Biologicals in Biogas and Biomethane

Microbially-induced corrosion (MIC) is one of the leading causes of pipe failure in the natural gas industry. This corrosion is caused by bacteria that produced acids which cause pitting in the pipes. Few environments are "sterile" and naturally-occurring bacteria which induce corrosion in pipeline networks are recognized by industry. This is especially prevalent in gas lines in which moisture has collected, or in wet gas systems. Bacteria associated with MIC can be difficult to enumerate and identify. Traditionally, corrosion-causing bacteria are detected and quantified through simple bacterial growth tests that incorporate different enrichment media. In these tests, samples are collected and provided with growth medium (food and nutrients) on which the bacteria grow. However, there are several problems with these types of tests: 1) the bacteria may not grow on the selected medium, 2) the bacteria may be very slow to grow and are therefore not counted, and, 3) the conditions (temperature, etc) are not correct for the growth of the target bacteria. Bacteria which cause MIC are difficult to grow and, using the plate growth method, are often overlooked or misrepresented in the final enumeration of bacteria. Also, given the conditions of biomethane production and cleanup, bacteria may be present in the cleaned gas stream *but may not be alive*. Traditional plate tests, commonly used in the natural gas industry, *cannot account for the presence of dead bacteria*.

One of the most traditional growth methods is called the Most Probable Number test or MPN test. It relies on liquid samples containing live bacteria, and takes up to 4 weeks to obtain the results. Unfortunately, as numerous researchers have shown, only 0.1% to 10% of total live bacteria can actually grow in an artificial medium such as that used in the MPN tests and a significant portion of bacteria growing in the media are actually not the target bacteria. Therefore, this growth test is unable to accurately quantify the target bacteria in the samples.

New methods have been developed to more accurately assess microbial populations. Common and widely used molecular biology techniques can be deployed to assay for live and dead bacteria (16s rRNA analysis). GTI, for instance, has developed and patented a procedure based upon a common and referenced molecular biology technique to test specifically for the bacteria which cause MIC in pipelines, to overcome the problems with the MPN testing. The technique allows for direct detection and quantification, without prior growth, of corrosion-causing microorganisms typically found in pipes and other equipment used by the natural gas, petroleum, chemical, water, and wastewater industries. This test allows for quantification and identification of *live and dead bacteria* because it does not involve bacterial growth. This test specifically targets functional genes (segments of DNA) associated with bacteria that cause corrosion. In other words, it looks specifically for the DNA sequences within the dead or live bacteria, which are associated with MIC-corrosion capabilities. The testing technique is far more accurate than traditional microbial growth tests with an accuracy of ± 10%, and can analyze almost any type of samples (liquid, biofilms, or solid samples), including dried solid samples, which only contain dead bacteria. It is also rapid; genetic tests can be completed in 24 to 48 hours. This testing is called qPCR (Quantitative Polymerase Chain Reaction). The test of qPCR is a common molecular biology technique and has been used in many types of microbial testing programs, but GTI has developed the test specific to MIC testing and identification. Other qPCR, protein or nucleic acids tests may also be useful.

Another consideration of transmission of bacteria into the natural gas system is the introduction of pathogens to gas supplies. Identifying bacterial strains which may be pathogenic is achieved through Genbank analysis. Consideration of the transmission of pathogenic microbes and spores has been mentioned in research documents generated in Europe.

Description of MIC Bacteria/Microbes

Corrosion producing bacteria can be arranged into five basic groups:

- Sulfate-reducing bacteria (SRB)
    - Acid-producing bacteria (APB)
    - Acetic-acid producing bacteria (total group)

- Butyric-acid producing bacteria (total group)

- Iron-oxidizing bacteria (IOB)
    - Leptothrix and Sphaerotilus genus
    - Gallionella genus

- Denitrifying bacteria (DNB)

- Methanogens – microbes in the Archaea domain that produce methane

Of the set listed above, SRB, APB and IOB are widely considered the most aggressive corrosion-causing bacteria, even though SRB are often not the most abundant microbes in pipeline samples. The DNB and methanogens are frequently retrieved from pipeline samples, and also cause corrosion. Methanogens do not belong to Bacteria Domain; they are a very primitive organism, and belong to Archaea domain.

Description of Spores

A bacterial spore is a hard protective coating that encases the key parts of the bacterium, produced by the bacterium when conditions for growth are adverse. Bacterial spores are approximately 0.8 to 1.2 microns in size and consist of protective membrane layers, wrapping essential genetic elements necessary for bacterial survival in the future. They can be spherical and ellipsoidal. Within these membranes and the hard coating, the dormant bacterium is able to survive for weeks, even years, through drought, heat and radiation. When conditions become more favorable again (more water or food available), the bacterium "comes to life" again, transforming from a spore back into a cell. Some bacterial spores have possibly been revived after they lay underground for thousands of years.

Specific types of bacteria in the environment readily produce spores. Some bacteria which convert biomass to methane or perform accessory degradative processes within anaerobic digesters are among the groups that produce spores. Bacteria that produce spores are found among aerobes (require air for growth) and anaerobes (grow without air). Spores can be collected, enumerated and identified.

Sampling Design

As part of the sampling and analysis performed during the course of this project, a Quality Assurance Project Plan (QAPP) was prepared and submitted to DOT/PHMSA. Procedure and methods detailed in the QAPP for this project were applied to all activities involving gas sampling and analysis, with specific focus on biogas samples. The QAPP for this project included sections that detail the procedures used to sample and analyze landfill gas (LFG), wastewater treatment plant (WWTP) gas, biomethane (cleaned biogas) and natural gas. The QAPP has been attached to this Task 1 Report in the Appendix.

Through the kind support of a "North American Natural Gas Company", GTI was able to obtain access to four landfills, two wastewater treatment plants, and three natural gas sites. Collaborating with this natural gas company enabled GTI to expand the sample set for this project to include natural gas samples *(which was not originally included in the proposal).* However it should be noted that GTI did not have direct communication with the sampling sites and was provided limited information about the landfills and wastewater treatment plants such as, specific details about the gas clean up systems used or other site characteristics and operational parameters that may influence the resulting product biogas and biomethane. A summary of the sites and samples collected for this project is presented in Table 3. Table 3 reveals that with the exception of the sampling event to WWTP2, duplicate samples were collected during each sampling trip. Site WWTP2 was not producing a fully cleaned biomethane product (was intentionally producing a "partially cleaned" biogas for alternative purposes). The table also indicates that multiple sampling trips were made to a few of the sites, specifically Landfills 1 – 3 therefore allowing for comparison between data sets for samples collected during different months. Due to budget constraints, location, and scheduling conflicts, multiple sampling trips were not conducted for WWTP1 therefore four biogas samples and four biomethane samples were collected during one sampling event over the span of two days.

The sites and samples collected for this project will remain confidential. The following sampling identification code was used:

LF – landfill
WWTP – wastewater treatment plant
NG – natural gas
BG – biogas
BM – biomethane
XXXX01 and 02 – samples collected during first sampling trip to the host site
XXXX03 and 04 – samples collected during second sampling trip to the host site

For example, a biogas sample collected from landfill 1 during the first sampling trip to landfill 1 is indicated as: LF1BG01.

It should be noted that due to the efficient use of sampling funds, GTI was able to conduct a third sampling trip to LF3 to collect four additional biomethane samples. Therefore, a total of three sampling trips and four biogas and eight biomethane samples were collected from LF3. The

third sampling trip was conducted in September 2009 and DOT PHMSA granted GTI an extension to the schedule for Task 1 to accommodate the collection of these samples and ***limited*** (not the full suite of chemical and biological analyses that was conducted on the previous 42 samples collected from October 2008 through March 2009) analytical testing of these samples. These four additional biomethane samples were analyzed for the following: major components, sulfur, volatile metals, siloxanes, VOCs/SVOCs, pesticides, MPN, qPCR, and spore enumeration. The analyses that were *excluded* were extended hydrocarbons, halocarbons, aldehydes/ketones, PCBs and bacteria and spore identification for this sample set only.

Table 3. Description of Samples Collected

Site ID	Site Type	Location	Cleanup Technology	Customer	Number of Sampling Events	Date of Sampling Events	Biogas Samples	Biomethane Samples	Natural Gas Samples
LF1	Landfill	Eastern U.S.	Pressure Swing Adsorption	Electric and Gas Distribution Company	2	10/20/08 And 2/5/09	4	4	0
LF2	Landfill	Eastern U.S.	Membrane Technology	Interstate Pipeline	2	10/22/08 And 11/18/08	4	4	0
LF3	Landfill	Eastern U.S.	Air liquid membrane, Pressure Swing Adsorption, Carbon pretreatment, Hydrogen Sulfide Removal	Injected into a transmission pipeline and sold to an Electric Generating Company	3	10/23/08, 11/17/08 And 9/09/09	4	8	0
LF4	Landfill	Eastern Canada	NA	NA	1	12/10/08	2	0	0
WWTP1	Wastewater Treatment Plant	Western U.S.	Iron and Carbon Filters	Natural Gas Fired Power Plant	1	11/5/08 – 11/6/08	4	4	0
WWTP2	Wastewater Treatment Plant	Eastern Canada	NA	NA	1	12/9/08	1	1[11]	0
1NG	Natural Gas	Eastern	NA	NA	1	12/8/08	0	0	2

[11] Wastewater Treatment Plant 2 indicated that this sample was subjected to partial cleanup but not with the intention to produce pipeline quality biomethane

		Canada							
2NG	Natural Gas	Eastern Canada	NA	NA	1	12/10/08 – 12/11/08	0	0	2
3NG	Natural Gas	Western Canada	NA	NA	1	3/18/08	0	0	2
Total							**19**	**21**	**6**

Methods

Sampling Methods

Sampling Methods for First Tier Chemicals

The First Tier chemical testing sampling methods includes collecting gas samples using Tedlar bags as well as sorbent trap methods. Samples subjected for the Second Tier chemical testing were collected using only sorbent trap methods. The third set of analytical tests performed is the biological testing which uses a filtration sampling method. All of the sampling methods used for this project are presented in Appendix A.

Tedlar Bags for Major Components, Extended Hydrocarbons, Sulfur, Halocarbons, and Siloxanes Sampling

Clean Tedlar bags were used to collect samples for major components analysis, extended hydrocarbons, siloxanes, halocarbons and sulfur analysis. In the event that the line pressure was too low, a SKC Vac-U-Chamber™ connected to a sampling pump downstream was used to create a negative pressure to collect the sample. The sampling line was purged and a piece of silicon tubing connected the line directly to the Tedlar bag (Figure 2) or to the SKC Vac-U-Chamber™ as shown in Figure **2**. (The vacuum chamber was closed for actual sample collection.)

Figure 1. Tedlar Bag Sample Collection

Figure 2. Tedlar Bag Sample Collection with Opened SKC Vac-U-Chamber™

Liquid Sorbent Method for Metals Sampling

A slightly-modified EPA Method 29 was used in sampling for volatile metals. Based on previous experience, the sampling train (shown in Figure 3) consists of two 250-ml liquid spargers ("bubblers") in series each fitted with a coarse frit. Each sparger contains 100-ml of a 5% HNO^3 / 10% H_2O_2 solution. This mixture allows the capture of many volatile metals by absorbing them into the solution. A third empty sparger serves as a spray trap. The detection limits for the metal compounds were dependent on the volume of gas sampled; a 4-hour sampling period should result in a detection limit of 1.0 $\mu g/m^3$. Prior to use, each sparger was cleaned by soaking in dilute nitric acid and by rinsing several times using pure nitric acid and double-deionized water. Similarly, a dry test meter was placed at the end of the assembly to monitor the sample volume.

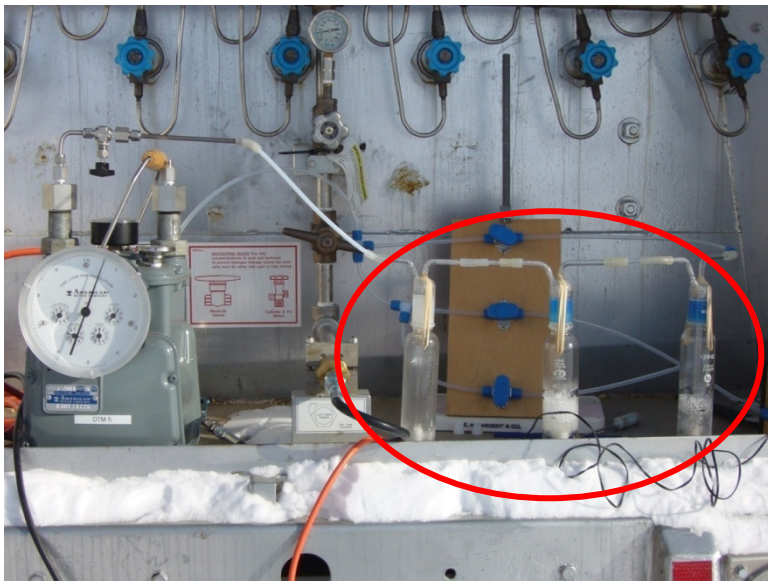

Figure 3. Volatile Metals (Impingers) Sample Collection

Sorbent Tubes for Mercury Sampling

Mercury samples were collected using gold plated beads packed in a glass tube. A calibrated dry test meter was placed at the end of the assembly to monitor the sample volume. After sampling, the tubes were capped and protected from breakage. For mercury and volatile metals sampling, the flow rate was set at 1.0 – 2.0 L/min and approximately 200 – 500L of sample was collected.

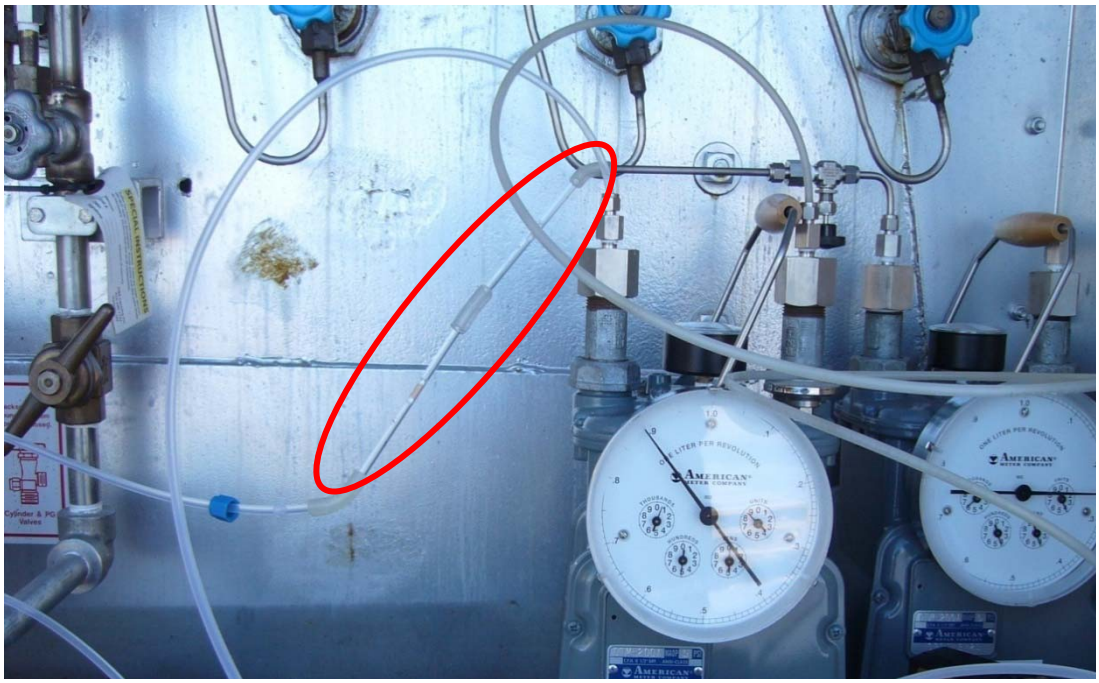

Figure 4. Mercury Sample Collection

Sampling Methods for Second Tier Chemicals

The Second Tier chemicals sampling methods used solid adsorbent traps coupled with sampling pumps to collect samples for the following types of analyses: semi-volatile/volatile organic compounds (SVOCs and VOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and aldehydes/ketones. Because of the wide range of target chemicals and expected concentrations in the biogas, several different trap/pump arrangements were used to ensure that a sufficient amount of sample was collected for each type of analysis.

Sorbent Tubes for VOC/SVOCs, PAHs, PCBs, Pesticides, and Aldehydes/Ketones Sampling

XAD-2 resin packed in glass sample tubes were used to collect samples subjected to VOC/SVOCs, PAHs, PCBs, and pesticides analysis. These samples were collected using two XAD-2 sorbent tubes attached in series connected to a personal air pump capable of sampling up to 5 L/min which were set at a flow rate of 2.0L/min for 4 hours to collect a total volume of approximately 480L (see Figure 5). DNPH coated sorbent media packed in glass sample tubes were used to collect samples for the analysis of aldehydes and ketones. These samples were collected using two sorbent tubes attached in series connected to a personal air pump capable of sampling up to 5 L/min which was set at a flow rate of 1.0L/min for 4 hours to collect a total volume of approximately 240L (see Figure 5).

The sampling pumps used with the sorbent tubes were calibrated prior to each use. The pumps were calibrated using two representative sorbent tubes attached in series and connected to the pump. The pump was calibrated to provide the required flow based on the parameters to be sampled. The calibrated flow for the pump and start time was noted. At the end of the sampling event, the pump flow was checked and recorded in the same manner in which the pump was calibrated. The total volume of the samples was calculated to determine the average flow of the pump used to collect the sample and the sampling duration. During sampling the sorbent tubes were covered with aluminum foil to prevent photodegradation. At the completion of the sampling event, the sorbent tubes were capped to prevent any sorption of contaminants from ambient air during transportation and storage.

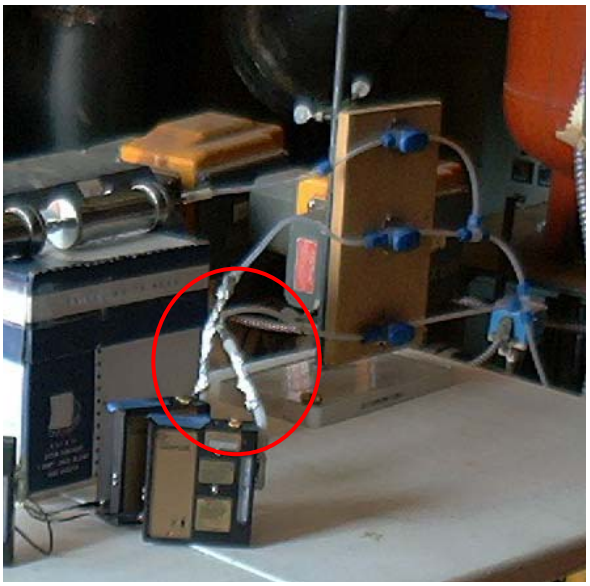

Figure 5. DNPH Coated Sorbent Media Tubes & XAD-2 Sorbent Tubes Sample Collection

Sampling Method for Biological Testing

The biological samples were collected using a stainless steel pressure filtration funnel. A 0.2 µm pore size PTFE gas filter were placed inside of the funnel. Approximately 150 L of gas sample was allowed to pass through the 0.2 µm pore size filter (see Figure 57). After sampling, using tweezers, sterilized with ethanol, the filter was folded in half with the sample side inward and placed inside a clean and separate plastic zip-lock bag. Between sampling, the filtration funnel was rinsed with ethanol and air dried on a clean surface.

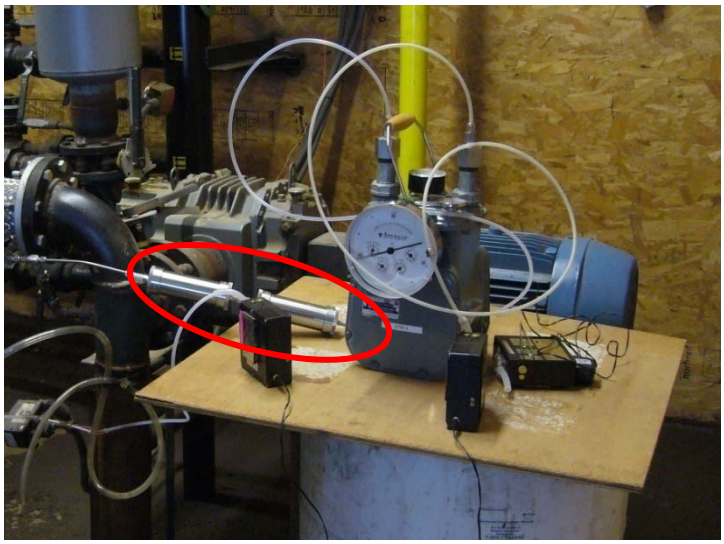

Figure 6. Biological Sample Collection

Sample Handling and Custody

The First Tier chemical samples that were sampled in Tedlar bags or stainless steel cylinders were shipped overnight to GTI using proper hazardous materials packaging. The remaining First Tier chemical samples were shipped to GTI or hand carried to the laboratory. The Second Tier chemical samples and the biological samples were packed on ice and shipped to GTI or hand carried to the laboratory. All samples were shipped under proper chain of custody (COC) documentation.

Analytical Methods

Two types of analyses were performed on the samples, chemical and biological. The chemical tests are grouped into two tiers. The First Tier chemical tests include the following types of analyses:

- Major Components via ASTM D1945/1946 Standard Test Method for Analysis of Natural Gas by Gas Chromatography / Standard Practice for Analysis of Reformed Gas by Gas Chromatography
- Ammonia via Gas Chromatography / Nitrogen Chemiluminescence Detection
- Expanded Hydrocarbons via Gas Chromatography/Flame Ionization Detection
- Sulfur via ASTM D6228 Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection
- Halocarbons via Gas Chromatography/Electrolytic Conductivity Detection
- Siloxanes via Gas Chromatography/Atomic Emission Detection

- Mercury via ASTM D5954 Standard Test Method for Mercury Sampling and Measurement in Natural Gas by Atomic Absorption Spectroscopy
- Metals via EPA Method 29 (modified) Determination of Metals Emissions from Stationary Sources

The Second Tier chemical tests consist of the following analyses:

- Volatile Organic Compounds (VOCs), Semi-volatile organic compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs) via EPA Method 8270C Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry
- Polychlorinated Biphenyls (PCBs) via EPA Method 8082 Polychlorinated Biphenyls by Gas Chromatography
- Pesticides via EPA Method 8081 Organochlorine Pesticides by Gas Chromatography
- Aldehydes and ketones via EPA method TO-11 by High Pressure Liquid Chromatography (HPLC)

Table 4 and Table 5 list the target compounds for the first and second tier chemical tests.

Table 4. Target Compounds for First Tier Chemical Testing

Major Components	Extended Hydrocarbons	Sulfur	Halocarbons	Siloxanes	Metals	Calculated Real Gas Properties
Helium	Cyclopentane	Hydrogen Sulfide	Dichlorodifluoromethane (CFC-12)	1,1,3,3-Tetramethyldisiloxane	Arsenic	Compressibility Factor [z] (Dry)
Hydrogen	Methylcyclopentane	Sulfur Dioxide	1,2-Dichlorotetrafluoroethane (CFC-114)	Pentamethyldisiloxane	Barium	Compressibility Factor [z] (Sat.)
Carbon Dioxide	Cyclohexane	Carbonyl Sulfide	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	Hexamethyldisilane	Beryllium	Specific Gravity
Oxygen/Argon	Methylcyclohexane	Carbon Disulfide	Trichlorofluoromethane (CFC-11)	Hexamethyldisiloxane	Cadmium	Gross HV (Dry) (Btu/ft^3)
Nitrogen	Benzene	Methyl Mercaptan	Chloromethane	Octamethyltrisiloxane	Cobalt	Gross HV (Sat.) (Btu/ft^3)
Carbon Monoxide	Toluene	Ethyl Mercaptan	Dichloromethane (Methylene Chloride)	Octamethylcyclotetrasiloxane	Chromium	Wobbe Index
Methane	Ethylbenzene	i-Propyl Mercaptan	Chloroform	Decamethyltetrasiloxane	Copper	Net HV (Dry) (Btu/ft^3)
Ethane	m,p-Xylene	n-Propyl Mercaptan	Carbon Tetrachloride	Decamethylcyclopentasiloxane	Manganese	Net HV (Sat.) (Btu/ft^3)
Ethene	Styrene	t-Butyl Mercaptan	Chloroethane	Dodecamethylpentasiloxane	Molybdenum	Real Gas Density (lbs/ft^3)
Ethyne	o-Xylene	Dimethyl Sulfide	1,1-Dichloroethane		Nickel	
Propane	C3 Benzenes	Methyl Ethyl Sulfide	1,2-Dichloroethane		Lead	
Propene	Naphthalene	Diethyl Sulfide	1,1,1-Trichloroethane		Antinomy	
Propadiene	C1 Naphthalenes	Di-t-Butyl Sulfide	1,1,2-Trichloroethane		Selenium	
Propyne	C2 Naphthalenes	Dimethyl Disulfide	1,1,2,2-Tetrachloroethane		Strontium	
i-Butane	Hexanes	Methyl Ethyl Disulfide	Chloroethene (Vinyl Chloride)		Thallium	
n-Butane	Heptanes	Methyl i-Propyl Disulfide	1,1-Dichloroethene		Zinc	
1-Butene	2,2,4-Trimethylpentane	Diethyl Disulfide	cis-1,2-Dichloroethene			
i-Butene	Octanes	Methyl n-Propyl Disulfide	Trichloroethene			
trans-2-Butene	Nonanes	Methyl t-Butyl Disulfide	Tetrachloroethene			
cis-2-Butene	Decanes	Ethyl i-Propyl Disulfide	1,2-Dichloropropane			
1,3-Butadiene	Undecanes	Ethyl n-Propyl Disulfide	3-Chloropropene			
i-Pentane	Dodecanes	Ethyl t-Butyl Disulfide	cis-1,3-Dichloropropene			
n-Pentane	Tridecanes	Di-i-Propyl Disulfide	trans-1,3-Dichloropropene			
neo-Pentane	Tetradecanes	i-Propyl n-Propyl Disulfide	Bromomethane			
Pentenes	Pentadecanes	Di-n-Propyl Disulfide	1,2-Dibromoethane			
Hexane Plus	Hexadecanes	i-Propyl t-Butyl	Chlorobenzene			

Ammonia	Heptadecanes Octadecanes Nonadecanes Eicosanes + Total from Cyclopentane and Eicosanes+ (Mol%)	Disulfide n-Propyl t-Butyl Disulfide Di-t-Butyl Disulfide Dimethyl Trisulfide Diethyl Trisulfide Di-t-Butyl Trisulfide Thiophene C1-Thiophenes C2-Thiophenes C3-Thiophenes Benzothiophene C1-Benzothiophenes C2-Benzothiophenes Thiophane Thiophenol Individual Unidentified Sulfur Compounds (all as monosulfides) Total Sulfur (ppm) Total Sulfur (As Grains/100 SCF @ 14.73 psia, 60°F)	1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachloro-1,3-butadiene Total TO-14 Halocarbon Components			

Table 5. Target Compounds for Second Tier Chemical Testing

Semi-volatile/Volatile Organic Compounds				Pesticides	Polychlorinated Biphenyls				Aldehydes/Ketones
1,1,1-Trichloroethane	sec-Butylbenzene	2-Chloronaphthalene	Di-n-octylphthalate	a-BHC	PCB 2	PCB 73	PCB 81	PCB 158	Formaldehyde
1,2-Dichloroethane	Phenol	2-Nitroaniline	Benzo[b]fluoranthene	b-BHC	PCB 3	PCB 49	PCB 87	PCB 129	Acetaldehyde
1,1-Dichloropropene	bis(2-Chloroethyl)ether	1,4-Dinitrobenzene	Benzo[k]fluoranthene	g-BHC	PCB 4	PCB 47	PCB 115	PCB 178	o-Tolualdehyde
Benzene	Aniline	Dimethylphthalate	Benzo[a]pyrene	d-BHC	PCB 10	PCB 48	PCB 85	PCB 175	Acetone
Carbon Tetrachloride	2-Chlorophenol	1,3-Dinitrobenzene	Indeno[1,2,3-cd]pyrene	Heptachlor	PCB 7	PCB 75	PCB 136	PCB 187	Isocaleraldehyde
1,2-Dichloropropane	1,3-Dichlorobenzene	Acenaphthylene	Dibenz[a,h]anthracene	Aldrin	PCB 9	PCB 104	PCB 77	PCB 183	Valeraldehyde
Trichloroethene	1,4-Dichlorobenzene	2,6-dinitrotoluene	Benzo[g,h,i]perylene	Heptachlor epoxide	PCB 6	PCB 35	PCB 110	PCB 128	Butyraldehyde
Dibromomethane	p-Isopropyltoluene	1,2-Dinitrobenzene		g-Chlordane	PCB 8	PCB 44	PCB 154	PCB 167	m-Tolualdehyde
Bromodichloromethane	Benzyl Alcohol	3-Nitroaniline		Endosulfan I	PCB 5	PCB 59	PCB 82	PCB 185	Propionaldehyde
Pyridine	2-Methylphenol (m-cresol)	Acenaphthene		a-Chlordane	PCB 19	PCB 37	PCB 151	PCB 174	Crotonaldehyde
cis-1,3-Dichloropropene	1,2-Dichlorobenzene	2,4-Dinitrophenol		Dieldrin	PCB 12	PCB 42	PCB 135	PCB 177	2,5-Dimethylbenzaldehyde
N-nitrosodimethylamine	3,4-Methylphenol (o,p-cresol)	4-Nitrophenol		4,4'-DDE	PCB 13	PCB 71	PCB 144	PCB 202	Benzaldehyde
Toluene	bis(2-chloroisopropyl)ether	Dibenzofuran		Endrin	PCB 18	PCB 41	PCB 124	PCB 171	p-Tolualdehyde
trans-1,3-Dichloropropene	n-Butylbenzene	2,4-dinitrotoluene		Endosulfan II	PCB 17	PCB 64	PCB 147	PCB 156	Hexanaldehdye
1,1,2-Trichloroethane	N-nitroso-di-n-propylamine	2,3,4,6-Tetrachlorophenol		4,4'-DDD	PCB 15	PCB 40	PCB 107	PCB 173	Methyl ethyl ketone
1,3-Dichloropropane	Hexachloroethane	2,3,5,6-Tetrachlorophenol		Endrin aldehyde	PCB 24	PCB 103	PCB 123	PCB 157	
Dibromochloromethane	1,2-Dibromo-3-Chloropropane	Diethylphthalate		Endosulfan sulfate	PCB 27	PCB 67	PCB 149	PCB 201	
1,2-Dibromoethane	Nitrobenzene	4-Chlorophenyl-phenylether		4,4'-DDT	PCB 16	PCB 100	PCB 118	PCB 172	
Tetrachloroethene	Isophorone	Fluorene		Endrin ketone	PCB 32	PCB 63	PCB 134	PCB 197	
Chlorobenzene	2-Nitrophenol	4-Nitroaniline		Methoxychlor	PCB 34	PCB 74	PCB 114	PCB 180	
1,1,1,2-Tetrachloroethane	2,4-Dimethylphenol	4,6-Dinitro-2-methylphenol			PCB 29	PCB 70	PCB 131	PCB 193	
Ethylbenzene	bis(2-	n-Nitrosodiphenylamine			PCB	PCB 66	PCB	PCB	

	Chloroethoxy)methane			54		122	191	
m/p-Xylenes	1,2,4-Trichlorobenzene	4-Bromophenyl phenyl ether		PCB 26	PCB 93	PCB 165	PCB 200	
Bromoform	Naphthalene	Hexachlorobenzene		PCB 25	PCB 95	PCB 146	PCB 170	
Styrene	2,4-Dichlorophenol	Pentachlorophenol		PCB 31	PCB 91	PCB 188	PCB 190	
o-Xylene	4-Chloroaniline	Phenanthrene		PCB 50	PCB 56	PCB 153	PCB 199	
1,1,2,2-Tetrachloroethane	Hexachlorobutadiene	Anthracene		PCB 28	PCB 60	PCB 132	PCB 196	
1,2,3-Trichloropropane	1,2,3-Trichlorobenzene	Carbazole		PCB 20	PCB 92	PCB 105	PCB 203	
Isopropylbenzene	4-Chloro-3-methylphenol	Di-n-butylphthalate		PCB 33	PCB 84	PCB 141	PCB 189	
Bromobenzene	2-Methylnaphthalene	Bis(2-ethylhexyl) adipate		PCB 53	PCB 90	PCB 179	PCB 208	
2-Chlorotoluene	1-Methylnaphthalene	Fluoranthene		PCB 51	PCB 101	PCB 137	PCB 195	
n-Propylbenzene	Hexachlorocyclopentadiene	Pyrene		PCB 22	PCB 99	PCB 176	PCB 207	
4-Chlorotoluene	2,4,6-Trichlorophenol	Butylbenzylphthalate		PCB 45	PCB 119	PCB 130	PCB 194	
1,3,5-Trimethylbenzene	2,4,5-Trichlorophenol	Benz[a]anthracene		PCB 46	PCB 83	PCB 138	PCB 205	
tert-Butylbenzene	Diphenylamine	Chrysene		PCB 69	PCB 97	PCB 163	PCB 206	
1,2,4-Trimethylbenzene	Azobenzene	bis(2-Ethylhexyl)phthalate		PCB 52	PCB 117	PCB 164		

The biological testing included the following types of analyses:

- Quantitative Polymerase Chain Reaction (qPCR), a genetic technique that allows for the direct detection and quantification of total (live and dead) heterogeneous bacteria and various corrosion-causing bacteria[12]
- Live bacteria enumeration via the Most Probable Number (MPN) determination
- Bacteria identity determination via published genetic methods[13]
- Spores enumeration via modified National Aeronautics and Space Administration (NASA) Protocol for Spore Testing NHB 5340.1D [14,15]
- Spore identity determination via published genetic methods[2]

A description of the biological analytical methods is described below.

The filter sample received is placed in a 50-ml tube with 30 ml of sterile phosphate buffered saline (PBS, pH 7.2 ± 0.1), votexed for 5-10 sec, sonicated for 2 min ± 5 sec in waterbath sonicator filled with fresh aqueous solution of 0.3% vol/vol Tween 80. After sonication, the filter suspension is divided into three parts for MPN tests, spore enumeration, and DNA extraction. MPN test is to determine the number of live heterogeneous bacteria in the filter samples, and spore enumeration is to determine the number of live spore-forming bacteria in the filter samples. MPN tests are performed in thioglycolate medium (TG media) in triplicate with serial dilutions of filter suspension samples. After 7 days incubation at 37 ºC aerobically and anaerobically, the positive culture bottles are scored and the number of heterogeneous bacteria is determined using a statistically derived table (Most Probable Number from Serial Dilution, Bacteriological Analytical Manual, FDA, February, 2006).

The second part of the filter suspension sample is used for Spore Enumeration using Pour Plate Procedure modified from NASA standard assay NHB 5340.1D. The sample suspension is heat-shocked at 80 ± 2 ºC water bath for 15 min to kill vegetative cells, inoculated onto Tryptic Soy Agar (TSA) medium, incubated at 37 ºC aerobically and anaerobically for 3 days before colony counts to determine the number of live spores on filter sample.

DNA extraction is performed from two sample sources, using FastDNA SPIN Kit for Soil (MP Biomedicals LLC; filter suspension samples without prior growth in medium) and spore colonies from TSA plate. DNA from the filter suspension samples are used for bacterial ID and qPCR quantification of total bacteria, total APB, total SRB, and total IOB. DNA from spore colonies was used for spore ID. The detection and quantification of specific groups of bacteria with qPCR

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[12] Zhu, X.Y., et al., *Rapid detection and quantification of microbes related to microbiologically influenced corrosion using quantitative polymerase chain reaction.* Corrosion, 2006. **62**: p. 950-955.
[13] Zhu, X.Y., J. Lubeck, and J.J. Kilbane, II, *Characterization of microbial communities in gas industry pipelines.* Appl Environ Microbiol, 2003. **69**(9): p. 5354-5363.
[14] NASA, *Procedures and Guidelines NPG: 5340.1D NASA standard procedures for the microbial examination of space hardware*.
[15] Yung, P.T., M.J. Kempf, and A. Ponce. *A Rapid Single Spore Enumeration Assay*. in *IEEE Aerospace Conference 2006, IEEEAC paper #1029*. 2006.

assays are achieved by targeting bacterial16S rRNA, ackA and buk, dsrAB, and IOB 16S rRNA genes, respectively, following the instructions of the Rotor-Gene 3000 4 Channel Multiplexing System and QuantiTect PCR kits (Qiagen Inc., Valencia, California).

The ID procedures used for bacteria and spores are identical; however, the starting genetic materials are different. DNA for bacterial ID comes from the original filter suspension without prior growth, therefore the bacteria ID profile represents the dominant bacteria species in original biogas samples. However, DNA for the spore ID comes from the isolated spore colonies after 3 days of incubation, and the spore ID profile represents the spore-forming bacteria species which survived the heat-shock process. The extracted DNA is amplified with PCR using BA8F/UN1492R primer pair by targeting universal bacteria 16S rRNA gene. Purified PCR products (QIAquick PCR Purification Kit) are inserted into pGEM-T Easy Vector System I (Promega Corp., Madison, Wiscosin). The vectors are then transformed into DH5α Subcloning Efficiency Chemically Competent Cells purchased from Invitrogen (Carlsbad, California), and the cells are inoculated onto LB agar medium for screening of white colonies after overnight incubation at 37 ºC. The white colonies are picked and their DNA is prepared for sequencing. The sequences are analyzed with Blast program in GenBank database and ID of bacteria and spores is determined.

Table 6 presents a summary of all the sampling and analytical methods used for this project. Most of the methods used are based on existing American Society for Testing and Materials (ASTM), National Institute for Occupational Safety and Health (NIOSH), or Environmental Protect Agency (EPA) methods. GTI developed and patented biological testing methods, which are based on a common and referenced molecular biological technique, specifically for the quantification of total heterogenous bacteria and various corrosion causing bacteria.

Table 6. Summary of Sampling and Analytical Methods

Analysis	Sampling Method Reference(s)	Sampling Material	Instrument/ Analytical Method	Analytical Lab
Major Components	GTI SOP for Tedlar Bag Sampling	5 L Tedlar bag or Inerted Stainless Steel Cylinder	ASTM D1945/D1946	GTI
Ammonia			GC/NCD	
Extended Hydrocarbons			GC/FID	
Sulfur			ASTM D6228	
Halocarbons			EPA TO-14 GC/ELCD	
Siloxanes			GC/AED	
VOCs/SVOCs/PAHs/alkylPAHs	Mod NIOSH 5515	XAD-2 resin	GC/MS/ Mod EPA Method 8270C	META Environmental
PCBs	Mod NIOSH 5503		GC/ECD or GC/MS Mod EPA Method 8082	
Pesticides	Mod NIOSH 5600/5601		GC/ECD or GC/MS Mod EPA Method 8081A	
Aldehydes/Ketones	EPA method TO-11	DNPH coated sorbent media	HPLC EPA Method TO-11	
Mercury	ASTM D5954	Gold plated silica beads	AAS ASTM D5954	GTI
Metals	EPA Method 29 modified	Nitric acid and Peroxide aqueous solutions	ICP	
Biologicals	GTI SOP	0.2 µm filter	MPN, qPCR, spore enumeration (NHB 5340.1D), spore and bacteria identification	GTI

Quality Control

Internal laboratory quality control checks were used to monitor data integrity. These checks included method blanks, matrix spikes/matrix spike supplicate samples, laboratory control samples, internal standards, surrogate compounds, calibration standards and reference standards where appropriate. Project quality control limits for the quality control elements were adhered to for the analyses completed.

Method Blanks

The method blank is a useful quality control element to identify possible sources of contamination in the analytical procedure. Each analytical batch for every analytical procedure included a method blank which is carried through all aspects of the analytical method. Method blanks were included in the Second Tier chemical testing.

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate (MS/MSD) samples were used to measure the accuracy of analyte recovery from the sample matrices and will be site-specific. MS/MSD samples were included with every batch of samples prepared where appropriate. Matrix spikes were included in the Second Tier chemical testing.

Surrogate Compounds

Surrogates are compounds which are unlikely to occur under natural conditions and have properties that are similar to the analytes of interest. This type of control is primarily used for organic samples and the surrogates are added to the samples prior to the sample preparation. The surrogate spike provides data on the efficiency of an analytical method on a sample-specific basis. If the surrogate spike recoveries exceeded the specified quality control limits, the sample results needed to be evaluated with other quality control elements to determine data usability. Surrogate compounds were included in the Second Tier chemical testing.

Calibration Standards

Calibration standards were used to create a calibration curve and to confirm the instrument calibration before analyzing samples. If the calibration standards exceed the method criteria, the samples analyzed with the standards required reanalysis under acceptable calibration standards. Laboratory instrument calibration standards were used according to the procedures for the specified analytical methods.

Reference Standards/Control Samples

Reference standards are samples of known concentrations and independent in origin from the calibration standards. Reference standards provide data on the analytical proficiency of the method. This quality control checks the calibration standards, sample preparation, instrument stability and quantification. Reference standards/control samples were analyzed at the frequency specified within the analytical methods.

Instrument/Equipment Testing, Inspection and Maintenance Requirements

Field and laboratory instrument and equipment was tested and maintained as outlined in the sampling procedures or as necessary.

Prior to field sampling each piece of equipment was inspected to make sure that it is operational. If the equipment was not operational, servicing was performed or replacement equipment was used. If instrument servicing was required, it was the responsibility of the appropriate field personnel to follow the maintenance schedule and arrange for timely service. Field instruments were maintained according to the manufacturers' instructions.

Instrument Calibration and Frequency

Field and laboratory instruments were calibrated prior to use in the collected or analysis of samples. Records of the instrument calibration were kept in the appropriate field or laboratory logbooks. Instruments that failed calibration checks were recalibrated and, if necessary, had maintenance completed prior to using to collect or analyze samples. Specific calibration frequencies and requirements are included with the individual method SOPs.

Results

The results from the chemical (Tier I and Tier II tests) and biological analyses are presented in this section. Basic statistics were determined for the following sample sets: gas samples from each natural gas site, raw biogas samples from each landfill and corresponding biomethane (cleaned biogas) samples (if paired set was available), and, biogas samples and biomethane samples from each wastewater treatment plant (if paired set was available). To provide an additional perspective of the variability that can exist in the composition of biomethane, basic statistics for several parameters were also determined for the entire set of 16 biomethane landfill samples as well as the entire set of 4 biomethane wastewater treatment plant samples; these data were compared to the entire set of 6 natural gas samples. *The limited sample size suggests that additional data should be collected for a more robust analysis of the composition of biogas and biomethane from landfills and wastewater treatment plants before strong conclusions can be drawn. Each sample set was small; therefore, robust statistical analysis was not possible. Additionally, the samples were collected during fall and winter months only. Therefore, complete seasonal variations to the analytical profiles per landfill were not collected.*

First Tier Chemical Testing Results

The samples collected for this project were analyzed for major components using method ASTM D1945/D1946. The information from this analysis was used to calculate a variety of physical properties such as heating value, Wobbe index, and density. A summary of the results is presented in Table 7. The complete set of results is provided in Appendix B.

Calculated Gas Properties

Natural Gas

Seven natural gas samples were collected from three sites; two from 1NG, two from 2NG, and three from 3NG (see Table 3). However, only six samples are included in this data set because the first sample collected from 2NG had more than 90% air present therefore it was excluded from the sample set. *Of significant note, these natural gas samples cannot be directly compared with landfill and WWT data, as the locations for collection of the NG samples were not within the system into which the specific renewable gas would be introduced. Generally, the RNG product is directly compared with the natural gas within the system into which it will be introduced or comingled. The NG samples in this study were provided as general reference, but direct product comparison cannot be made*.

The average calculated gas properties for 1NG, 2NG and 3NG are presented in Table 7. Sample 3NG had the highest average gross heating value of 1035.5 ± 0.7 Btu/ft^3 followed by 2NG with an average of 1029.7 Btu/ft^3 and subsequently 1NG which had the lowest average of 1028.6 ± 0.3 Btu/ft^3.

3NG also had the highest average Wobbe index of 1367.8 ± 1, followed by 1NG with an average of 1353.2 ± 1.1 and 2NG with the lowest Wobbe index of 1351.9. Both the average heating

values and Wobbe index for each natural gas site are within the range of tariff values as reported in AGA Report 4A (Table 1).

Landfills

Biogas

Table 7 presents the results from the 12 raw biogas samples that were collected from each landfill. Clearly, raw biogas does not fall within AGA Report 4A reported values for natural gas. However, it appears that with conditioning/cleanup of raw biogas, a biomethane product may be produced which meets AGA Report 4A reported typical values for natural gas.

Biomethane

Sixteen landfill biomethane samples (depending upon the site – four to eight samples per site over a period of time) were collected and analyzed via ASTM D1945/D1946 (see Table 3). The average gross heating values (dry) observed from sites LF1, LF2 and LF3 are 988.6 ± 6.1 Btu/ft^3, 981.8 ± 6.6 Btu/ft^3, and 945.2 ± 27.7 Btu/ft^3 respectively. The average heating values observed from LF1 and LF2 are within the range of tariff values as reported in AGA Report 4A (Table 1). Of note, the biomethane produced at LF3 was blended with natural gas prior to injection into the pipeline network and analytical requirements for this biomethane were less stringent (*GTI did not review these specifications for verification*).

The average Wobbe index values observed from sites LF1, LF2, and LF3 are 1314.9 ± 11.7, 1298 ± 10.2, and 1235.6 ± 50.2 respectively and, with the exception of LF3, the average values for each landfill are within the range of tariff values which will be included in the 2009 version of AGA Report 4A[16]. Landfill LF3 was comingling the RNG with natural gas prior to introduction to the pipeline network. However, a further cleanup unit was installed prior to the last sampling event (see data below).

It should also be noted that biomethane samples were collected from LF3 during three separate events over a period of approximately one year. Sampling event 1 occurred in October 2008, event 2 occurred in November 2008 and event 3 occurred in September 2009. DOT PHMSA granted GTI an extension to the schedule for Task 1 to accommodate the collection of the samples collected from the third sampling event (which was an addition to the original scope of the project). ***Limited*** (not the full suite of chemical and biological analyses that was conducted on the previous 42 samples collected from October 2008 through March 2009) analytical testing was conducted on these additional 4 biomethane samples that were collected in September 2009. Raw biogas samples were collected both in October and November, 2008 at LF3; however only biomethane samples were collected during the third sampling event (September 2009) at LF3. Therefore, only biomethane results from LF3 were compared from a *time perspective*. Importantly and significantly, it should also be noted that biomethane samples LF3BM05TB and

[16] The 2009 version of AGA Report 4A has not been publicly released at the time this report was submitted to DOT.

LF3BM06TB (as well as the biomethane samples collected in October and November 2008) were collected *prior to a secondary cleanup process using pressure swing adsorption* and samples LF3BM07TB and LFBM08TB were collected *after the PSA cleanup*. The PSA unit was not installed during the sampling events that took place in October 2008 and November 2008. *Therefore in total six biomethane samples were collected from LF3 prior to PSA clean up and two biomethane samples were collected after PSA clean up.* Figure 7 and Figure 8 demonstrates the variability observed in the gross heating value and Wobbe index of the biomethane samples collected at LF3 pre- and post PSA clean up. The graphs reveal the significant difference in these gas properties between biomethane samples collected pre- and post PSA treatment.

In addition to heating value and Wobbe index, seven other calculated gas properties not typically included in pipeline tariffs or specifically represented in AGA Report 4A were analyzed and compared. The average gas property values of the 16 landfill biomethane samples are compared to those of the average values of the six natural gas samples in Table 8. The data indicates that for five of the calculated gas properties, including heating value and Wobbe index, the average biomethane values for all parameters tested are less than those of natural gas.

Figure 7. Heating Value for LF3 Biomethane Samples

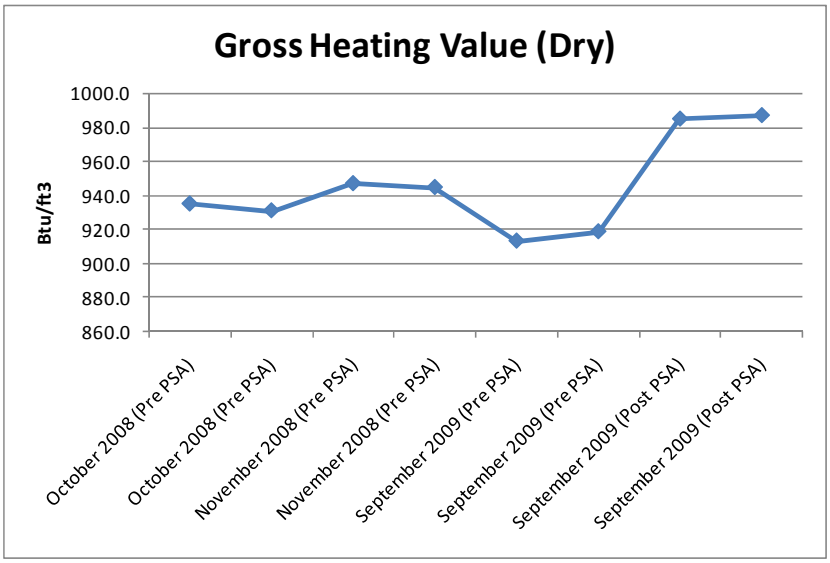


Figure 8. Wobbe Index for LF3 Biomethane Samples

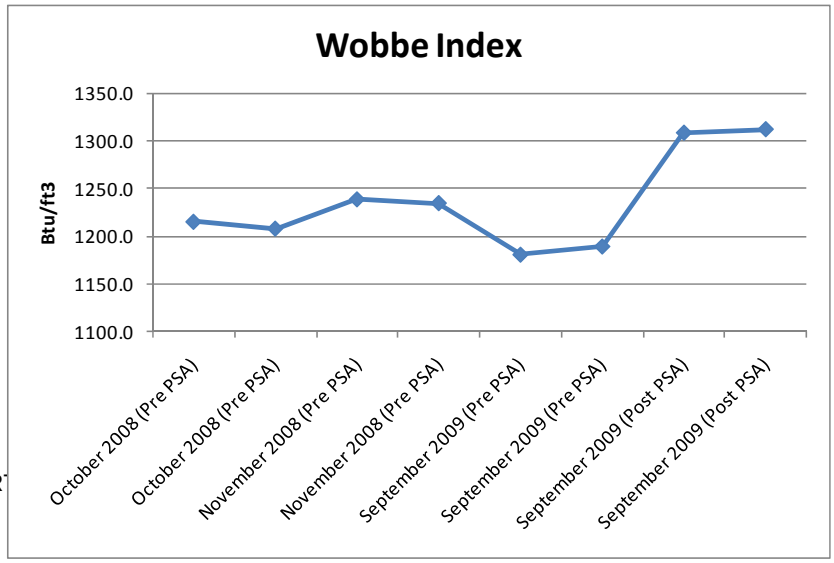


Table 7. Calculated Gas Properties for Landfill, Wastewater Treatment Plant, and Natural Gas Sites

		Compressibility Factor [z] (Dry)	Compressibility Factor [z] (Sat.)	Relative Density (Specific Gravity) (Dry)	Gross HV (Dry) (Btu/ft^3)	Gross HV (Sat.) (Btu/ft^3)	Wobbe Index	Net HV (Dry) (Btu/ft^3)	Net HV (Sat.) (Btu/ft^3)	Real Gas Density (lbs/ft^3)
1NG	N	2	2	2	2	2	2	2	2	2
	Average	0.99787	0.99755	0.5778	1028.6	1011.1	1353.2	927.0	911.1	0.044
	StDev	0.000002	0.000002	0.0006	0.3	0.3	1.1	0.2	0.2	0.000
	Min	0.99787	0.99755	0.5773	1028.4	1010.9	1352.4	926.8	911.0	0.044
	Max	0.99787	0.99755	0.5783	1028.8	1011.3	1354.0	927.1	911.3	0.044
2NG	1 sample	0.99786	0.99754	0.5802	1029.7	1012.1	1351.9	928.0	912.2	0.044
3NG	N	3	3	3	3	3	3	3	3	3
	Average	0.99788	0.99756	0.5731	1035.5	1017.8	1367.8	933.2	917.2	0.044
	StDev	0.00000	0.00000	0.0002	0.7	0.7	1.0	0.6	0.6	0.000
	Min	0.99788	0.99756	0.5730	1034.8	1017.1	1366.7	932.5	916.6	0.044
	Max	0.99788	0.99756	0.5732	1036.1	1018.4	1368.8	933.7	917.8	0.044
LF1BM	N	4	4	4	4	4	4	4	4	4
	Average	0.99804	0.99773	0.5653	988.6	971.7	1314.9	890.0	874.8	0.043
	StDev	0.000014	0.000015	0.0035	6.1	6.0	11.7	5.5	5.4	0.000
	Min	0.99802	0.99771	0.5623	981.1	964.3	1301.9	883.2	868.1	0.043
	Max	0.99805	0.99774	0.5689	995.4	978.4	1327.5	896.2	880.9	0.044
LF2BM	N	4	4	4	4	4	4	4	4	4
	Average	0.99806	0.99775	0.5721	981.8	965.0	1298.0	884.0	868.9	0.044
	StDev	0.000028	0.000030	0.0013	6.6	6.5	10.2	5.9	5.8	0.000
	Min	0.99803	0.99772	0.5708	976.0	959.3	1289.1	878.8	863.8	0.044
	Max	0.99808	0.99777	0.5733	987.7	970.8	1307.3	889.3	874.1	0.044
LF3BM[17]	N	8	8	8	8	8	8	8	8	8
	Average	0.99816	0.99785	0.5857	945.2	929.0	1235.6	851.0	836.5	0.045
	StDev	0.000052	0.000055	0.0129	27.7	27.3	50.2	25.0	24.6	0.001
	Min	0.99808	0.99777	0.5659	913.1	897.5	1180.2	822.2	808.1	0.043
	Max	0.99823	0.99793	0.5986	987.1	970.2	1312.2	888.8	873.6	0.046
WWTP1BM	N	3	3	3	3	3	3	3	3	3
	Average	0.99800	0.99769	0.5606	1008.3	991.1	1346.7	907.9	892.4	0.043
	StDev	0.000003	0.000003	0.0009	0.9	0.9	2.4	0.9	0.8	0.000
	Min	0.99800	0.99769	0.5595	1007.7	990.5	1345.2	907.3	891.8	0.043
	Max	0.99800	0.99769	0.5612	1009.4	992.2	1349.4	908.9	893.3	0.043
WTTP2BGP[18]	1 sample	0.99677	0.99640	0.9374	615.6	605.1	635.8	554.3	544.9	0.072
LF1BG	N	4	4	4	4	4	4	4	4	4
	Average	0.99687	0.99650	0.9137	638.1	627.3	667.7	574.6	564.8	0.070
	StDev	0.000030	0.000031	0.0086	9.6	9.4	13.1	8.6	8.5	0.001
	Min	0.99682	0.99645	0.9064	624.3	613.6	648.7	562.1	552.5	0.069

[17] The biomethane that is produced from LF3 is blended with natural gas before injection into the accepting transmission pipeline. The biomethane samples collected for this project were collected prior to the blending process.

[18] Wastewater Treatment Plant 2 indicated that this sample was subjected to partial cleanup but not with the intention to produce pipeline quality biomethane

	Max	0.99689	0.99652	0.9262	646.0	635.0	678.6	581.7	571.8	0.071
LF2BG	**N**	4	4	4	4	4	4	4	4	4
	Average	0.99684	0.99647	0.9217	631.1	620.4	657.5	568.3	558.6	0.071
	StDev	0.000066	0.000068	0.0157	15.2	14.9	21.3	13.7	13.5	0.001
	Min	0.99675	0.99637	0.9079	609.2	598.8	626.9	548.6	539.2	0.069
	Max	0.99690	0.99654	0.9442	643.9	632.9	675.7	579.7	569.9	0.072
LF3BG	**N**	4	4	4	4	4	4	4	4	4
	Average	0.99698	0.99662	0.9110	628.3	617.6	658.8	565.8	556.1	0.070
	StDev	0.000036	0.000037	0.0254	33.8	33.3	44.6	30.5	29.9	0.002
	Min	0.99695	0.99658	0.8888	596.6	586.4	616.9	537.2	528.0	0.068
	Max	0.99703	0.99667	0.9353	659.2	647.9	698.9	593.5	583.4	0.072
LF4BG	**N**	2	2	2	2	2	2	2	2	2
	Average	0.99674	0.99637	0.9480	603.8	593.5	620.1	543.7	534.4	0.073
	StDev	0.000019	0.000019	0.0025	1.0	1.0	1.8	0.9	0.9	0.000
	Min	0.99673	0.99636	0.9463	603.1	592.8	618.9	543.1	533.8	0.072
	Max	0.99675	0.99638	0.9497	604.5	594.2	621.4	544.3	535.0	0.073
WWTP1BG	**N**	4	4	4	4	4	4	4	4	4
	Average	0.99687	0.99650	0.9111	642.7	631.8	673.4	578.7	568.9	0.070
	StDev	0.000006	0.000006	0.0017	1.7	1.7	2.4	1.6	1.5	0.000
	Min	0.99686	0.99650	0.9092	640.9	630.0	670.8	577.1	567.3	0.070
	Max	0.99688	0.99651	0.9128	644.7	633.7	676.1	580.5	570.6	0.070
WTTP2BG	**1 sample**	0.99694	0.99658	0.8902	664.7	653.3	704.4	598.5	588.3	0.068

Table 8. Comparison of Average Gas Properties for Sixteen Landfill Biomethane Samples vs. Six Sampled Natural Gas Samples

	Landfill Biomethane					Natural Gas				
	N	Average	STDEV	Min	Max	N	Average	STDEV	Min	Max
Compressibility Factor [z] (Dry)	16	0.99810	0.00007	0.99802	0.99823	6	0.99787	0.00001	0.99786	0.99788
Compressibility Factor [z] (Sat.)	16	0.99780	0.00007	0.99771	0.99793	6	0.99755	0.00001	0.99754	0.99756
Relative Density (Specific Gravity) (Dry)	16	0.5772	0.0128	0.5623	0.5986	6	0.5759	0.0031	0.5730	0.5802
Gross HV (Dry) (Btu/ft^3)	16	965.2	28.4	913.1	995.4	6	1032.2	3.6	1028.4	1036.1
Gross HV (Sat.) (Btu/ft^3)	16	948.7	27.9	897.5	978.4	6	1014.6	3.5	1010.9	1018.4
Wobbe Index	16	1271.0	51.0	1180.2	1327.5	6	1360.3	8.3	1351.9	1368.8
Net HV (Dry) (Btu/ft^3)	16	869.0	25.6	822.2	896.2	6	930.2	3.2	926.8	933.7
Net HV (Sat.) (Btu/ft^3)	16	854.2	25.1	808.1	880.9	6	914.3	3.2	911.0	917.8
Real Gas Density (lbs/ft^3)	16	0.044	0.0010	0.043	0.046	6	0.044	0.0002	0.044	0.044

Wastewater Treatment Plants

Biogas

For comparison, Table 7 also presents the results from the raw biogas samples collected from each wastewater treatment plant. Only one raw biogas sample and one partially cleaned biogas sample was collected from WWTP2. It is clear that raw or partially cleaned biogas would need further cleanup/conditioning to meet reported tariff values found in AGA Report 4A for natural gas.

Biomethane

Four biomethane samples were collected from WWTP1. However, only three samples are included in this data set because one sample had more than 90% air present and resulting values are not representative. The average gross heating value (dry) and the average Wobbe index for WWTP1 are 1008.3 ± 0.9 Btu/ft^3 and 1346.7 ± 2.4 respectively; both values fall within the range of tariff values which will be included in the 2009 version of AGA Report 4A[19].

In addition to heating value and Wobbe index, seven other calculated gas properties not typically included in pipeline tariffs or specifically represented in AGA Report 4A were analyzed and compared. The average gas property values of the collected WWTP1 biomethane samples are compared to those of the six natural gas samples collected as part of this study, as shown in Table 9. The data indicates that for seven of the calculated gas properties, including heating value and Wobbe index, the average WWT biomethane value is less than that of natural gas.

[19] The 2009 version of AGA Report 4A has not been publicly released at the time this report was submitted to DOT.

Table 9. Comparison of Average Gas Properties for Three Wastewater Treatment Biomethane Samples vs. Six Natural Gas Samples

	WWTP1					Natural Gas				
	N	**Average**	**STDEV**	**Min**	**Max**	**N**	**Average**	**STDEV**	Min	Max
Compressibility Factor [z] (Dry)	3	0.99800	0.000003	0.99800	0.99800	6	0.99787	0.00001	0.99786	0.99788
Compressibility Factor [z] (Sat.)	3	0.99769	0.000003	0.99769	0.99769	6	0.99755	0.00001	0.99754	0.99756
Relative Density (Specific Gravity) (Dry)	3	0.5606	0.0009	0.5595	0.5612	6	0.5759	0.0031	0.5730	0.5802
Gross HV (Dry) (Btu/ft^3)	3	1008.3	0.9	1007.7	1009.4	6	1032.2	3.6	1028.4	1036.1
Gross HV (Sat.) (Btu/ft^3)	3	991.1	0.9	990.5	992.2	6	1014.6	3.5	1010.9	1018.4
Wobbe Index	3	1346.7	2.4	1345.2	1349.4	6	1360.3	8.3	1351.9	1368.8
Net HV (Dry) (Btu/ft^3)	3	907.9	0.9	907.3	908.9	6	930.2	3.2	926.8	933.7
Net HV (Sat.) (Btu/ft^3)	3	892.4	0.8	891.8	893.3	6	914.3	3.2	911.0	917.8
Real Gas Density (lbs/ft^3)	3	0.043	0.0001	0.043	0.043	6	0.044	0.0002	0.044	0.044

Major Components Analysis

All 46 samples collected for this project were analyzed for 27 major components using method ASTM D1945/D1946. Major components, as pertaining to natural gas analysis, include % methane, carbon dioxide, nitrogen and shorter-chained hydrocarbons, such as ethane, propane, butane, etc. These constituents are typically present in natural gas and are therefore routinely monitored. A summary of the results is presented in Table 10. The complete set of results is provided in Appendix B.

Natural Gas

Six natural gas samples collected and subjected to major components analysis; two samples from 1NG, one sample from 2NG and three samples from 3NG. Site 3NG had the highest average methane concentration of 97.39% ± 0.04% followed by 1NG with an average of 96.5% ± 0.105% and 2NG with the lowest average of 96.03%. The same trend is observed for other components such as propane and hexanes plus. The next largest component detected in natural gas after methane was ethane, with 2NG having the highest average ethane concentration of 2.49%, followed by 1NG with an average of 2.24% ± 0.029% and 3NG with the lowest average of 1.65% ± 0.006%. After ethane the next largest components present within the natural gas samples were carbon dioxide, propane, butanes, hexanes plus, pentanes, and propene. In addition, the average values observed from each natural gas site for oxygen, helium, nitrogen, and carbon dioxide are within the tariff values as reported in AGA Report 4A (Table 1).

Landfills

Biogas

Table 10 also presents the results from the raw biogas samples collected from each landfill. In these samples, methane concentrations are well below values found in tariff language for natural gas and other gases, such as carbon dioxide, are higher. In general, raw biogas requires cleanup to meet tariffs compiled in AGA Report 4A.

Biomethane

Sixteen biomethane landfill samples from three landfill sites were analyzed for major components using method ASTM D1945/D1946. The four biomethane samples collected from each of two landfills (LF1 and LF2) and up to 8 biomethane samples were collected from one landfill (LF3). For the most part, samples were retrieved during the fall and winter months. One landfill (LF3) was sampled in the fall of 2008 and again in the fall of 2009. Therefore, a limited time study could be performed (overall gas quality over a period of time). However, this database was limited and all sampling was conducted during cooler fall months.

Results indicated that all samples retrieved from LF1, LF2 and LF3 contained methane, carbon dioxide, nitrogen, and propane. Hexane plus was also detected in each biomethane sample

collected from LF2, 4 out of 8 samples from LF3 and only 2 out of 4 biomethane samples from LF1.

The average methane concentration for LF1, LF2, and LF3 were 97.2% ± 0.64%, 96.8% ± 0.64, and 93.2% ± 2.73% respectively. The average carbon dioxide values followed the same trend as methane, with the highest average carbon dioxide concentration observed in LF1samples and the lowest average concentration from LF3. In contrast, the average nitrogen concentration was the highest in LF3[20] and the lowest in LF1. The average values for oxygen, helium, nitrogen, and carbon dioxide for LF1, LF2, and LF3 are within the tariff values as reported in AGA Report 4A (Table 1), with the exception of the average nitrogen concentration for LF3. However, the trend with LF3 changed dramatically after installation of the PSA system for further cleanup, as shown in Figures 7 and 8.

The average propane concentration for all three landfills was less than 0.0034%. Hexane plus was detected in both biomethane samples, at a concentration of 0.0001%, that were collected during the second sampling event at LF1 but was not detected in the first sampling event. LF2 and LF3 had an average hexane plus concentration of 0.0005% ± 0.0003% and 0.0007% ± 0.0007% respectively.

The major components of the 16 landfill biomethane samples are compared to those of the six natural gas samples as shown in Table 11. On average and expectedly, methane concentrations in landfill biomethane are somewhat lower than natural gas, with accompanied higher concentration of nitrogen, carbon dioxide and hydrogen. Similarly, shorter chain hydrocarbons are, for the most part, absent in landfill biomethane samples.

GTI was also able to examine the biomethane composition from LF3 over a period of approximately 1 year. Therefore, in addition to comparing the landfill samples at LF3 to the natural gas samples collected, there were a few differences in the chemical composition based on a time perspective. Importantly and significantly, it should also be noted that samples LF3BM05TB and LF3BM06TB were collected prior to a secondary cleanup process using pressure swing adsorption and samples LF3BM07TB and LFBM08TB were collected after the PSA. This secondary unit was not installed during the sampling events that took place in October 2008 and November 2008. Consequently there is a noticeable difference in the chemical composition, specifically in methane content. Figure 9 demonstrates the variability in the methane content of the 8 biomethane samples collected from LF3 during October 2008, November 2008 and September 2009. Similarly Figure 10 demonstrates the variability in the carbon dioxide and nitrogen content of the same sample set. The post- PSA samples from LF3 only contained methane and nitrogen, as compared with the pre- PSA biomethane samples collected in September 2009, which contained methane, nitrogen and carbon dioxide. The four pre-PSA biomethane samples collected in 2008 contained methane, nitrogen, carbon dioxide, propane and hexanes.

[20] The biomethane produced from LF3 is blended with natural gas in a booster compressor station before injection into a transmission pipeline.

Figure 9. Methane Content of LF3 Biomethane Samples

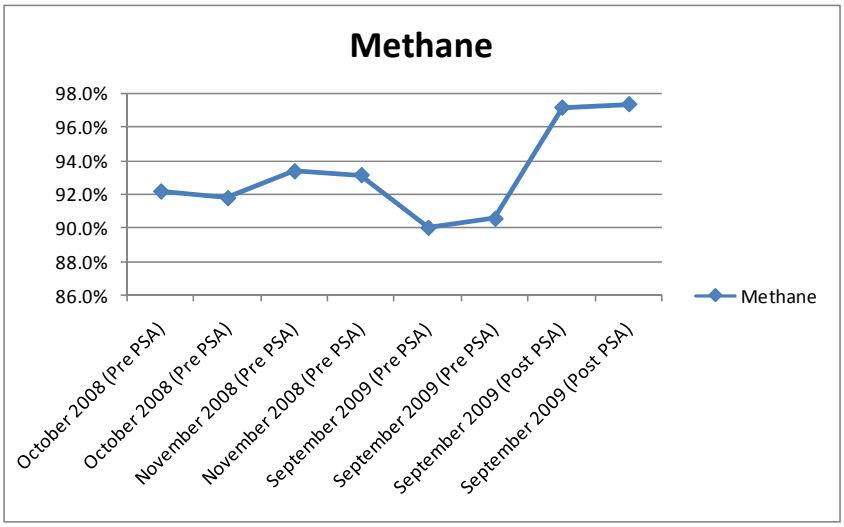


Figure 10. Carbon Dioxide and Nitrogen Content of LF3 Biomethane Samples

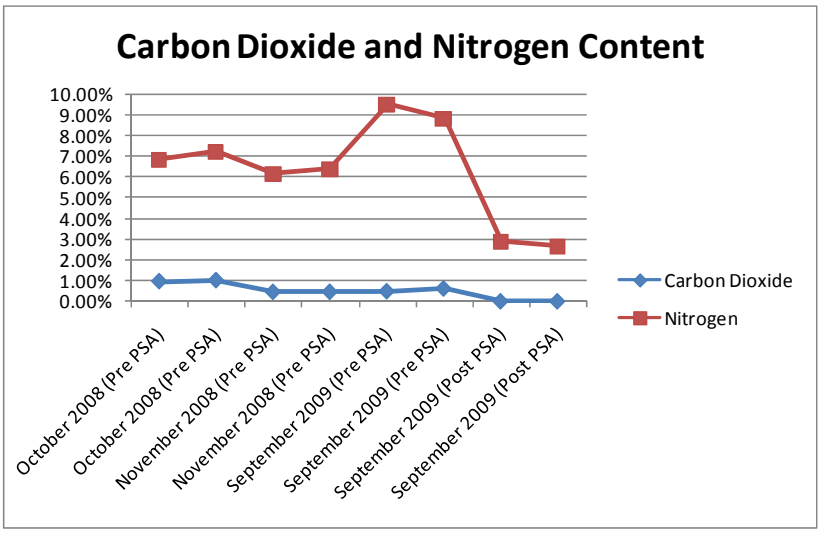


Table 10. Major Components for Sampled Landfill, Wastewater Treatment Plant Biomethane and Biogas and Natural Gas Samples

		Hydrogen	Carbon Dioxide	Nitrogen	Methane	Ethane	Ethene	Propane	Propene	i-Butane	n-Butane	i-Pentane	n-Pentane	Hexane Plus
1NG	N	NA	2	2	2	2	2	2	2	2	2	2	2	2
	Average	NA	0.75%	0.16%	96.499%	2.239%	0.013%	0.223%	0.005%	0.032%	0.036%	0.012%	0.007%	0.0170%
	StDev	NA	0.02%	0.05%	0.105%	0.029%	0.001%	0.001%	0.001%	0.002%	0.003%	0.001%	0.001%	0.0013%
	Min	NA	0.74%	0.12%	96.425%	2.219%	0.013%	0.223%	0.005%	0.030%	0.034%	0.011%	0.007%	0.0161%
	Max	NA	0.76%	0.20%	96.573%	2.260%	0.014%	0.224%	0.006%	0.033%	0.038%	0.012%	0.008%	0.0179%
2NG	1 sample	NA	0.72%	0.37%	96.029%	2.488%	0.010%	0.238%	0.004%	0.033%	0.078%	0.011%	0.007%	0.0126%
3NG	N	NA	3	3	3	3	NA	3	NA	3	3	3	3	3
	Average	NA	0.20%	0.14%	97.393%	1.645%	NA	0.400%	NA	0.056%	0.074%	0.024%	0.018%	0.0424%
	StDev	NA	0.00%	0.05%	0.045%	0.006%	NA	0.003%	NA	0.001%	0.001%	0.000%	0.000%	0.0007%
	Min	NA	0.20%	0.09%	97.353%	1.639%	NA	0.397%	NA	0.055%	0.074%	0.023%	0.018%	0.0416%
	Max	NA	0.20%	0.19%	97.442%	1.649%	NA	0.402%	NA	0.056%	0.075%	0.024%	0.018%	0.0428%
LF1BM	N	4	4	4	4	NA	NA	4	2	NA	NA	NA	NA	2
	Average	0.8%	1.10%	0.90%	97.199%	NA	NA	0.003%	0.002%	NA	NA	NA	NA	0.0001%
	StDev	0.2%	0.29%	0.32%	0.641%	NA	NA	0.000%	0.000%	NA	NA	NA	NA	0.0000%
	Min	0.6%	0.84%	0.55%	96.389%	NA	NA	0.002%	0.002%	NA	NA	NA	NA	0.0001%
	Max	1.0%	1.42%	1.32%	97.918%	NA	NA	0.003%	0.002%	NA	NA	NA	NA	0.0001%
LF2BM	N	NA	4	4	4	NA	NA	4	NA	NA	NA	NA	NA	4
	Average	NA	0.72%	2.50%	96.784%	NA	NA	0.003%	NA	NA	NA	NA	NA	0.0005%
	StDev	NA	0.24%	0.88%	0.643%	NA	NA	0.000%	NA	NA	NA	NA	NA	0.0003%
	Min	NA	0.51%	1.72%	96.219%	NA	NA	0.003%	NA	NA	NA	NA	NA	0.0002%
	Max	NA	0.94%	3.27%	97.362%	NA	NA	0.004%	NA	NA	NA	NA	NA	0.0008%
LF3BM	N	NA	6	8	8	NA	NA	NA	NA	NA	NA	NA	NA	4
	Average	NA	0.65%	6.32%	93.19%	NA	NA	NA	NA	NA	NA	NA	NA	0.0007%
	StDev	NA	0.26%	2.46%	2.73%	NA	NA	NA	NA	NA	NA	NA	NA	0.0007%
	Min	NA	0.45%	2.68%	90.03%	NA	NA	NA	NA	NA	NA	NA	NA	0.0001%
	Max	NA	1.00%	9.49%	97.32%	NA	NA	NA	NA	NA	NA	NA	NA	0.0014%
WWTP1BM	N	NA	3	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	0.60%	NA	99.405%	NA	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	0.09%	NA	0.094%	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Min	NA	0.49%	NA	99.344%	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Max	NA	0.66%	NA	99.512%	NA	NA	NA	NA	NA	NA	NA	NA	NA
WTTP2BM [21]	**1 sample**	NA	39.40%	NA	60.574%	NA	NA	NA	NA	NA	NA	NA	NA	0.0052%
LF1BG	**N**	4	4	NA	4	NA	NA	4	2	2	NA	3	NA	4
	Average	0.3%	37.06%	NA	62.644%	NA	NA	0.003%	0.002%	0.002%	NA	0.002%	NA	0.0172%
	StDev	0.1%	0.91%	NA	0.971%	NA	NA	0.000%	0.000%	0.000%	NA	0.000%	NA	0.0017%
	Min	0.2%	36.30%	NA	61.241%	NA	NA	0.003%	0.002%	0.002%	NA	0.002%	NA	0.0150%
	Max	0.3%	38.39%	NA	63.458%	NA	NA	0.003%	0.002%	0.002%	NA	0.003%	NA	0.0187%
LF2BG	**N**	NA	4	3	4	NA	NA	4	NA	NA	NA	NA	NA	4
	Average	NA	37.68%	0.30%	62.072%	NA	NA	0.002%	NA	NA	NA	NA	NA	0.0123%
	StDev	NA	1.68%	0.22%	1.510%	NA	NA	0.001%	NA	NA	NA	NA	NA	0.0014%
	Min	NA	36.14%	0.06%	59.893%	NA	NA	0.002%	NA	NA	NA	NA	NA	0.0108%
	Max	NA	40.08%	0.50%	63.338%	NA	NA	0.003%	NA	NA	NA	NA	NA	0.0139%
LF3BG	**N**	NA	4	4	4	NA	NA	4	NA	NA	NA	NA	NA	4
	Average	NA	35.59%	2.56%	61.820%	NA	NA	0.002%	NA	NA	NA	NA	NA	0.0091%
	StDev	NA	2.08%	1.29%	3.339%	NA	NA	0.000%	NA	NA	NA	NA	NA	0.0021%
	Min	NA	33.64%	1.15%	58.678%	NA	NA	0.002%	NA	NA	NA	NA	NA	0.0071%
	Max	NA	37.61%	3.69%	64.852%	NA	NA	0.002%	NA	NA	NA	NA	NA	0.0117%
LF4BG	**N**	1	2	1	2	NA	NA	1	NA	1	NA	1	NA	2
	Average	0.1%	40.45%	0.26%	59.340%	NA	NA	0.002%	NA	0.002%		0.002%	NA	0.0150%
	StDev	NA	0.31%	NA	0.031%	NA	NA	NA	NA	NA	NA	NA	NA	0.0053%
	Min	NA	40.23%	0.26%	59.318%	NA	NA	0.002%	NA	0.002%	NA	0.002%	NA	0.0112%
	Max	NA	40.67%	0.26%	59.362%	NA	NA	0.002%	NA	0.002%	NA	0.002%	NA	0.0187%
WWTP1BG	**N**	NA	4	NA	4	NA	NA	NA	NA	NA	NA	NA	NA	4
	Average	NA	36.70%	NA	63.269%	NA	NA	NA	NA	NA	NA	NA	NA	0.0012%
	StDev	NA	0.17%	NA	0.171%	NA	NA	NA	NA	NA	NA	NA	NA	0.0006%
	Min	NA	36.51%	NA	63.089%	NA	NA	NA	NA	NA	NA	NA	NA	0.0007%
	Max	NA	36.88%	NA	63.460%	NA	NA	NA	NA	NA	NA	NA	NA	0.0020%
WTTP2BG	**1 sample**	NA	34.56%	NA	65.427%	NA	NA	NA	NA	NA	NA	NA	NA	0.0045%

NA – no statistics were determined because the concentrations were below the detection limit

[21] This raw biogas sample was collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Table 11. Comparison of Major Components for Averaged Landfill Biomethane Samples vs. Averaged Samples of Natural Gas

	Landfill Biomethane					Natural Gas				
	N	Average	STDEV	Min	Max	N	Average	STDEV	Min	Max
Hydrogen	4	0.8%	0.2%	0.6%	1.0%	NA	NA	NA	NA	NA
Carbon Dioxide	14	0.8%	0.3%	0.4%	1.4%	6	0.47%	0.30%	0.20%	0.76%
Nitrogen	16	4.0%	3.0%	0.6%	9.5%	6	0.19%	0.10%	0.09%	0.37%
Methane	16	95.1%	2.7%	90.0%	97.9%	6	96.868%	0.603%	96.029%	97.442%
Ethane	NA	NA	NA	NA	NA	6	1.984%	0.382%	1.639%	2.488%
Ethene	NA	NA	NA	NA	NA	3	0.012%	0.002%	0.010%	0.014%
Propane	12	0.003%	0.0004%	0.002%	0.004%	6	0.314%	0.094%	0.223%	0.402%
Propene	2	0.002%	0.0002%	0.002%	0.002%	3	0.005%	0.001%	0.004%	0.006%
i-Butane	NA	NA	NA	NA	NA	6	0.044%	0.013%	0.030%	0.056%
n-Butane	NA	NA	NA	NA	NA	6	0.062%	0.020%	0.034%	0.078%
i-Pentane	NA	NA	NA	NA	NA	6	0.018%	0.007%	0.011%	0.024%
n-Pentane	NA	NA	NA	NA	NA	6	0.013%	0.006%	0.007%	0.018%
Hexane Plus	10	0.0005%	0.0005%	0.0001%	0.0014%	6	0.0290%	0.0148%	0.0126%	0.0428%

NA – no statistics were determined because the concentrations were below the detection limit

Wastewater Treatment Plants

Biogas

Table 10 also presents the results from the raw biogas samples collected from WWTP1. The data reveals that upgrade of the raw biogas product can produce a biomethane product with a high level of methane content. One raw biogas sample was also collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Biomethane

Four biomethane samples were collected from WWTP1. However, only three samples are included in this data set because one sample had more than 90% air present (sampling error). Therefore, this sample was excluded from the sample set. The remaining three samples had only two components present above the detection limit, carbon dioxide and methane with average values of 0.6% ± 0.09% and 99.4% ± 0.094% respectively.

Extended Hydrocarbons

Forty two of the 46 samples collected for this project were analyzed for 30 extended hydrocarbons using gas chromatography flame ionization detection. The four remaining samples that were not analyzed for extended hydrocarbons are those that were collected from LF3 in September 2009; these samples were subjected to limited analytical testing due to budget constraints. A summary of the results is presented in Table 12 and Table 13. The complete set of results is provided in Appendix C.

Natural Gas

The results from the extended hydrocarbons analysis for the six natural gas samples collected are presented in Table 12 and Table 13. Cyclopentane, methylcyclopentane, cyclohexane, methylcyclohexane, benzene, toluene, m,p-Xylene, C3-benzenes, hexanes, heptanes 2,2,4-trimethylpentane, octanes, nonanes, and decanes were detected at all three natural gas sites. In addition ethylbenzene and o-xylene were detected in 1NG. Site 3NG had the highest average total extended hydrocarbons concentration of 0.0424% ± 0.0007% followed by 1NG with an average concentration of 0.0170% ± 0.0013% and 2NG with the lowest average concentration of 0.0126%.

Landfills

Biogas

Table 12 and Table 13 also present the results from the 12 raw biogas samples collected from each landfill. Eighteen of the 30 target components in the extended hydrocarbon analysis were detected in the raw biogas samples from LF1 but only one component, decane, was detected in the corresponding biomethane samples. Similarly 17 components were detected in the raw biogas samples from LF2 but only four components were detected in the corresponding biomethane samples. Similar to LF1, 18 components were detected in the raw biogas samples from LF3 but only seven components were detected in the corresponding biomethane samples and more specifically only one component, hexanes, was detected in the biomethane sample collected during the second sampling trip to LF3 (11/17/08). Raw biogas samples were also collected from LF4, which contained 18 of the 30 components. The biogas from LF4 is not subjected to any cleanup process therefore no biomethane samples were collected from this site.

Biomethane

Sixteen biomethane samples were collected from three landfills and 12 were analyzed for extended hydrocarbons. Four additional samples of biomethane only were collected from LF3 in September 2009. These samples were subjected to limited analyses due to budget constraints. Collection of these samples was beyond and additional to the original scope of work for this project. The first two samples collected from LF1 on October 20, 2008 did not contain any extended hydrocarbons above the detection limit, however, the two biomethane samples that were collected during the second sampling event (February 5, 2009) to the same site both contained 0.0001% decanes. The biomethane samples collected from LF2 and LF3 contained

cyclopentane, methylcylopentane, cyclohexane and hexanes. In addition LF3 also contained methylcyclohexane, hexanes, and heptanes. The average values for each landfill are presented in Table 12 and Table 13. The average total extended hydrocarbons concentration for the biomethane samples collected from LF1, LF2, and LF3 are 0.0001%, 0.0005% ± 0.0003% and 0.0007% ± 0.0007% respectively.

The extended hydrocarbon profiles are noticeably different between the first (10/20/08) and second (2/5/09) sampling trip to LF3. The biomethane samples collected from the first sampling trip contained cyclopentane, methylcylopentane, cyclohexane, hexanes, methylcyclohexane, benzene, hexanes, and heptanes while those from the second trip contained only hexanes. While this represents only a small dataset (4 samples), these results demonstrate the variability that can exist in a biomethane product from a single landfill site. The samples collected from the third sampling trip (September 2009) from LF3 were not subjected to extended hydrocarbon analysis therefore no comparisons can be made for pre PSA biomethane and post PSA biomethane from LF3.

The average total extended hydrocarbons concentration for the 12 landfill biomethane samples are compared to those of the six natural gas samples collected as shown in Table 14. The data indicates that the following compounds were detected in *both sample sets*: cyclopentane, methylcyclopentane, cyclohexane, methylcyclohexane, benzene, hexanes, heptanes, and decanes. However, the concentrations for each of these compounds were greater in the collected natural gas samples than in the biomethane samples.

The data from LF1, LF2, and LF3 suggests that the biogas clean up technologies used at each landfill can decrease the concentrations of various hydrocarbons to amounts less than those detected in the natural gas samples. The data indicates that the extended hydrocarbon variability in biomethane is greatest in the samples collected from LF3, followed by LF2, and subsequently LF1. This study did not cover the variations in landfill construction, biomass materials or other characterization of the sampled landfills, therefore there is no comment regarding reasons for landfill variations and resulting gas quality.

Table 12. Extended Hydrocarbons for Samples Collected From Landfills, Wastewater Treatment Plants, and Natural Gas Sites – Part 1

		Cyclopentane	Methylcyclopentane	Cyclohexane	Methylcyclohexane	Benzene	Toluene	Ethylbenzene	m,p-Xylene
1NG	N	2	2	2	2	2	2	1	2
	Average	0.0011%	0.0009%	0.0008%	0.0008%	0.0005%	0.0006%	0.0001%	0.0002%
	StDev	0.0001%	0.0001%	0.0001%	0.0001%	0.0001%	0.0001%	NA	0.0000%
	Min	0.0010%	0.0008%	0.0007%	0.0007%	0.0004%	0.0005%	0.0001%	0.0002%
	Max	0.0011%	0.0009%	0.0008%	0.0008%	0.0005%	0.0006%	0.0001%	0.0002%
2NG	1 sample	0.0009%	0.0008%	0.0006%		0.0003%	0.0003%	NA	0.0001%
3NG	N	3	3	3	3	3	3	NA	3
	Average	0.0024%	0.0017%	0.0018%	0.0025%	0.0007%	0.0006%	NA	0.0002%
	StDev	0.0001%	0.0000%	0.0001%	0.0001%	0.0000%	0.0000%	NA	0.0000%
	Min	0.0023%	0.0017%	0.0017%	0.0024%	0.0007%	0.0006%	NA	0.0002%
	Max	0.0024%	0.0017%	0.0018%	0.0025%	0.0007%	0.0006%	NA	0.0002%
LF1BM	N	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	NA	NA	NA	NA	NA
	Max	NA	NA	NA	NA	NA	NA	NA	NA
LF2BM	N	4	2	2	NA	NA	NA	NA	NA
	Average	0.0002%	0.0001%	0.0001%	NA	NA	NA	NA	NA
	StDev	0.0000%	0.0000%	0.0000%	NA	NA	NA	NA	NA
	Min	0.0002%	0.0001%	0.0001%	NA	NA	NA	NA	NA
	Max	0.0002%	0.0001%	0.0001%	NA	NA	NA	NA	NA
LF3BM	N	2	2	2	2	1	NA	NA	NA
	Average	0.0001%	0.0001%	0.0001%	0.0001%	0.0001%	NA	NA	NA
	StDev	0.0000%	0.0000%	0.0000%	0.0000%	NA	NA	NA	NA
	Min	0.0001%	0.0001%	0.0001%	0.0001%	0.0001%	NA	NA	NA
	Max	0.0001%	0.0001%	0.0001%	0.0001%	0.0001%	NA	NA	NA
WWTP1BM	N	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	NA	NA	NA	NA	NA
	Max	NA	NA	NA	NA	NA	NA	NA	NA

WTTP2BM[22]	1 sample	NA	NA	NA	NA	NA	0.0031%	NA	NA
LF1BG	N	4	4	4	4	4	4	4	4
	Average	0.0003%	0.0002%	0.0005%	0.0003%	0.0003%	0.0019%	0.0004%	0.0005%
	StDev	0.0001%	0.0000%	0.0001%	0.0001%	0.0001%	0.0004%	0.0001%	0.0001%
	Min	0.0003%	0.0002%	0.0004%	0.0002%	0.0002%	0.0015%	0.0003%	0.0003%
	Max	0.0004%	0.0002%	0.0006%	0.0003%	0.0003%	0.0023%	0.0005%	0.0006%
LF2BG	N	4	4	4	4	4	4	4	4
	Average	0.0002%	0.0001%	0.0001%	0.0002%	0.0001%	0.0008%	0.0005%	0.0008%
	StDev	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0001%	0.0001%	0.0001%
	Min	0.0002%	0.0001%	0.0001%	0.0002%	0.0001%	0.0006%	0.0004%	0.0006%
	Max	0.0002%	0.0001%	0.0001%	0.0002%	0.0001%	0.0008%	0.0005%	0.0009%
LF3BG	N	4	4	4	NA	4	4	4	4
	Average	0.0001%	0.0001%	0.0001%	NA	0.0001%	0.0008%	0.0002%	0.0003%
	StDev	0.0000%	0.0000%	0.0000%	NA	0.0001%	0.0002%	0.0001%	0.0001%
	Min	0.0001%	0.0001%	0.0001%	NA	0.0001%	0.0006%	0.0002%	0.0002%
	Max	0.0001%	0.0001%	0.0001%	NA	0.0002%	0.0010%	0.0003%	0.0004%
LF4BG	N	1	2	2	2	2	2	2	2
	Average	0.0004%	0.0002%	0.0002%	0.0003%	0.0002%	0.0025%	0.0007%	0.0015%
	StDev	NA	0.0001%	0.0001%	0.0001%	0.0001%	0.0012%	0.0001%	0.0002%
	Min	0.0004%	0.0001%	0.0001%	0.0002%	0.0001%	0.0016%	0.0006%	0.0013%
	Max	0.0004%	0.0002%	0.0002%	0.0003%	0.0002%	0.0033%	0.0007%	0.0016%
WWTP1BG	N	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	NA	NA	NA	NA	NA
	Max	NA	NA	NA	NA	NA	NA	NA	NA
WTTP2BG	1 sample	NA	NA	NA	NA	NA	0.0026%	NA	NA

NA – no statistics were determined because the concentrations were below the detection limit

[22] This raw biogas sample was collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Table 13. Extended Hydrocarbons for Samples Collected From Landfills, Wastewater Treatment Plants, and Natural Gas Sites – Part 2

		o-Xylene	C3 Benzenes	Hexanes	Heptanes	2,2,4-Trimethylpentane	Octanes	Nonanes	Decanes	Undecanes	Dodecanes	Total from Cyclopentane to Eicosanes +
1NG	N	2	2	2	2	2	2	2	2	NA	NA	2
	Average	0.0001%	0.0001%	0.0074%	0.0027%	0.0001%	0.0014%	0.0005%	0.0001%	NA	NA	0.0170%
	StDev	0.0000%	0.0000%	0.0004%	0.0001%	0.0000%	0.0001%	0.0001%	0.0000%	NA	NA	0.0013%
	Min	0.0001%	0.0001%	0.0071%	0.0026%	0.0001%	0.0013%	0.0004%	0.0001%	NA	NA	0.0161%
	Max	0.0001%	0.0001%	0.0077%	0.0028%	0.0001%	0.0014%	0.0006%	0.0001%	NA	NA	0.0179%
2NG	1 sample	NA	NA	0.0058%	0.0019%	0.0001%	0.0009%	0.0003%		NA	NA	0.0126%
3NG	N	NA	1	3	3	3	3	3	3	NA	NA	3
	Average	NA	0.0001%	0.0184%	0.0085%	0.0004%	0.0039%	0.0011%	0.0002%	NA	NA	0.0424%
	StDev	NA	NA	0.0002%	0.0002%	0.0000%	0.0001%	0.0000%	0.0000%	NA	NA	0.0007%
	Min	NA	0.0001%	0.0182%	0.0083%	0.0004%	0.0038%	0.0011%	0.0002%	NA	NA	0.0416%
	Max	NA	0.0001%	0.0185%	0.0086%	0.0004%	0.0040%	0.0011%	0.0002%	NA	NA	0.0428%
LF1BM	N	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	2
	Average	NA	NA	NA	NA	NA	NA	NA	0.0001%	NA	NA	0.0001%
	StDev	NA	NA	NA	NA	NA	NA	NA	0.0000%	NA	NA	0.0000%
	Min	NA	NA	NA	NA	NA	NA	NA	0.0001%	NA	NA	0.0001%
	Max	NA	NA	NA	NA	NA	NA	NA	0.0001%	NA	NA	0.0001%
LF2BM	N	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	4
	Average	NA	NA	0.0003%	NA	NA	NA	NA	NA	NA	NA	0.0005%
	StDev	NA	NA	0.0002%	NA	NA	NA	NA	NA	NA	NA	0.0003%
	Min	NA	NA	0.0001%	NA	NA	NA	NA	NA	NA	NA	0.0002%
	Max	NA	NA	0.0004%	NA	NA	NA	NA	NA	NA	NA	0.0008%
LF3BM	N	NA	NA	4	2	NA	NA	NA	NA	NA	NA	4
	Average	NA	NA	0.0004%	0.0001%	NA	NA	NA	NA	NA	NA	0.0007%
	StDev	NA	NA	0.0004%	0.0000%	NA	NA	NA	NA	NA	NA	0.0007%
	Min	NA	NA	0.0001%	0.0001%	NA	NA	NA	NA	NA	NA	0.0001%
	Max	NA	NA	0.0008%	0.0001%	NA	NA	NA	NA	NA	NA	0.0014%
WWTP1BM	N	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Max	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WTTP2BM[23]	1 sample	NA	0.0003%	NA	NA	NA	NA	0.0001%	0.0009%	0.0006%	0.0002%	0.0052%
LF1BG	N	4	4	4	4	4	4	4	4	4	2	4
	Average	0.0001%	0.0003%	0.0039%	0.0026%	0.0002%	0.0016%	0.0014%	0.0025%	0.0004%	0.0001%	0.0172%
	StDev	0.0000%	0.0001%	0.0006%	0.0004%	0.0000%	0.0003%	0.0002%	0.0011%	0.0002%	0.0000%	0.0017%
	Min	0.0001%	0.0002%	0.0033%	0.0023%	0.0002%	0.0014%	0.0011%	0.0013%	0.0002%	0.0001%	0.0150%
	Max	0.0001%	0.0003%	0.0047%	0.0031%	0.0002%	0.0020%	0.0016%	0.0036%	0.0006%	0.0001%	0.0187%
LF2BG	N	4	4	4	4	NA	4	4	4	4	4	4
	Average	0.0002%	0.0006%	0.0005%	0.0005%	NA	0.0007%	0.0015%	0.0036%	0.0018%	0.0002%	0.0123%
	StDev	0.0000%	0.0002%	0.0001%	0.0001%	NA	0.0001%	0.0002%	0.0006%	0.0004%	0.0001%	0.0014%
	Min	0.0002%	0.0004%	0.0004%	0.0004%	NA	0.0006%	0.0013%	0.0028%	0.0014%	0.0001%	0.0108%
	Max	0.0002%	0.0008%	0.0006%	0.0006%	NA	0.0007%	0.0017%	0.0043%	0.0023%	0.0003%	0.0139%
LF3BG	N	4	4	4	4	4	4	4	4	4	4	4
	Average	0.0001%	0.0003%	0.0014%	0.0010%	0.0001%	0.0007%	0.0009%	0.0018%	0.0009%	0.0001%	0.0091%
	StDev	0.0000%	0.0001%	0.0002%	0.0002%	0.0000%	0.0002%	0.0002%	0.0005%	0.0004%	0.0001%	0.0021%
	Min	0.0001%	0.0002%	0.0011%	0.0008%	0.0001%	0.0005%	0.0007%	0.0013%	0.0006%	0.0001%	0.0071%
	Max	0.0001%	0.0004%	0.0015%	0.0011%	0.0001%	0.0008%	0.0012%	0.0025%	0.0014%	0.0002%	0.0117%
LF4BG	N	2	2	2	2	2	2	2	2	2	1	2
	Average	0.0003%	0.0005%	0.0014%	0.0012%	0.0001%	0.0012%	0.0011%	0.0024%	0.0014%	0.0001%	0.0150%
	StDev	0.0000%	0.0000%	0.0013%	0.0011%	0.0000%	0.0008%	0.0002%	0.0000%	0.0002%	#DIV/0!	0.0053%
	Min	0.0003%	0.0005%	0.0005%	0.0004%	0.0001%	0.0006%	0.0009%	0.0024%	0.0012%	0.0001%	0.0112%
	Max	0.0003%	0.0005%	0.0023%	0.0020%	0.0001%	0.0017%	0.0012%	0.0024%	0.0015%	0.0001%	0.0187%
WWTP1BG	N	NA	4	NA	NA	NA	NA	NA	4	4	4	4
	Average	NA	0.0001%	NA	NA	NA	NA	NA	0.0003%	0.0006%	0.0002%	0.0012%
	StDev	NA	0.0001%	NA	NA	NA	NA	NA	0.0001%	0.0003%	0.0001%	0.0006%
	Min	NA	0.0001%	NA	NA	NA	NA	NA	0.0002%	0.0003%	0.0001%	0.0007%
	Max	NA	0.0002%	NA	NA	NA	NA	NA	0.0005%	0.0010%	0.0003%	0.0020%
WTTP2BG	1 sample	NA	0.0002%	NA	NA	NA	NA	0.0001%	0.0011%	0.0005%	NA	0.0045%

NA – no statistics were determined because the concentrations were below the detection limit

[23] This raw biogas sample was collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Table 14. Comparison of Total Extended Hydrocarbons for Landfill Biomethane Samples vs. Natural Gas Samples

	Landfill Biomethane					Natural Gas				
	N	Average	STDEV	Min	Max	N	Average	STDEV	Min	Max
Component Name										
Cyclopentane	6	0.0002%	0.0001%	0.0001%	0.0002%	6	0.0017%	0.0008%	0.0009%	0.0024%
Methylcyclopentane	4	0.0001%	0.0000%	0.0001%	0.0001%	6	0.0013%	0.0005%	0.0008%	0.0017%
Cyclohexane	4	0.0001%	0.0000%	0.0001%	0.0001%	6	0.0012%	0.0006%	0.0006%	0.0018%
Methylcyclohexane	2	0.0001%	0.0000%	0.0001%	0.0001%	6	0.0016%	0.0010%	0.0006%	0.0025%
Benzene	1	0.0001%	NA	0.0001%	0.0001%	6	0.0006%	0.0002%	0.0003%	0.0007%
Toluene	NA	NA	NA	NA	NA	6	0.0005%	0.0001%	0.0003%	0.0006%
m,p-Xylene	NA	NA	NA	NA	NA	6	0.0002%	0.0000%	0.0001%	0.0002%
C3 Benzenes	NA	NA	NA	NA	NA	3	0.0001%	0.0000%	0.0001%	0.0001%
Hexanes	7	0.0004%	0.0003%	0.0001%	0.0008%	6	0.0126%	0.0063%	0.0058%	0.0185%
Heptanes	2	0.0001%	0.0000%	0.0001%	0.0001%	6	0.0055%	0.0033%	0.0019%	0.0086%
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA	6	0.0003%	0.0002%	0.0001%	0.0004%
Octanes	NA	NA	NA	NA	NA	6	0.0026%	0.0015%	0.0009%	0.0040%
Nonanes	NA	NA	NA	NA	NA	6	0.0008%	0.0004%	0.0003%	0.0011%
Decanes	2	0.0001%	0.0000%	0.0001%	0.0001%	5	0.0002%	0.0001%	0.0001%	0.0002%
Total	10	0.0005%	0.0005%	0.0001%	0.0014%	6	0.0290%	0.0148%	0.0126%	0.0428%

NA – no statistics were determined because the concentrations were below the detection limit

Wastewater Treatment Plants

Biogas

Four biomethane samples were collected from WWTP1 however only three samples are included in this data set because one sample contained more than 90% air and therefore was excluded from the sample set. The remaining three samples did not contain any extended hydrocarbons above the detection limit of (0.0001 mol% or 1 ppmv).

Biomethane

One raw biogas sample was also collected from WWTP2 however the raw biogas at this site is subjected to only partial clean up and is not intended to produce a pipeline quality product gas. A summary of the results is presented in Table 12 and Table 13. These tables also include the results from the four raw biogas samples collected from WWTP1. The raw biogas contained C3-benzenes, decanes, undecanes, and dodecanes and an average total extended hydrocarbons concentration of 0.0012% ± 0.0006%. Although only a limited dataset was collected, it appears that perhaps the extended hydrocarbon variability in biogas from wastewater treatment plants is less than in raw landfill gas. *These results require further verification and the database for wastewater treatment facilities should be expanded for a more accurate interpretation of results.*

Sulfur Compounds

The 46 samples collected for this project were analyzed for 41 sulfur components using method ASTM D6228. A summary of the results is presented in Table 15 and Table 16. The complete set of results is provided in Appendix D.

Natural Gas

Five natural gas samples were analyzed for 41 sulfur components. Two samples were collected from 1NG and 3NG. Two samples were also collected from 2NG however 1 sample contained greater than 90% air therefore it excluded from the data set. Each natural gas site had a different sulfur profile; 2NG contained 2 components above the detection limit which were carbonyl sulfide and dimethyl disulfide, 1NG and 3NG both contained hydrogen sulfide, carbonyl sulfide, methyl mercaptan, and dimethyl sulfide. The samples collected from 1NG also contained dimethyl disulfide while those from 3NG also contained ethyl mercaptan, t-butyl mercaptan, and thiophene. The average total sulfur concentration (in grains per 100 scf) for 1NG, 2NG and 3NG are 0.060 ± 0.005, 0.018, and 1.09 ± 0.03 respectively and all are within the tariff values as reported in AGA Report 4A (Table 1).

Landfills

Biogas

Table 15 and Table 16 presents the results from the raw biogas samples collected from each landfill. Twelve of the 41 components in the sulfur analysis were detected in the raw biogas samples from LF1 but only one component, sulfur dioxide, was detected in the corresponding biomethane samples. Similarly, 12 components were detected in the raw biogas samples from LF2 but only three components were detected in the corresponding biomethane samples. Fifteen components were detected in the raw biogas samples from LF3 but only four components were detected in the corresponding biomethane samples. Raw biogas samples were also collected from LF4, which contained 10 of the 41 components. The biogas from LF4 is not subjected to any cleanup process therefore no biomethane samples were collected from this site.

The data from LF1, LF2, and LF3 suggests that the biogas clean up technologies used at each landfill can decrease the total sulfur concentration in the raw biogas to average concentrations that are within the tariff values reported in Report 4A (Table 1). The data also reveals that the variability in the average total sulfur concentration in the raw biogas for LF1 is smaller than that of LF2, LF3, and LF4.

Biomethane

Sixteen landfill biomethane samples were analyzed for 41 sulfur components and the results are presented in Table 15 and Table 16. LF1 contained only one component above the detection limit (sulfur dioxide) and it was detected only in the samples that were collected during the second sampling trip to LF1 (2/5/09). LF2 contained hydrogen sulfide, carbonyl sulfide, and dimethyl sulfide while the first six samples collected from LF3 contained sulfur dioxide, carbonyl sulfide, dimethyl sulfide, and dimethyl disulfide. Biomethane samples LF3BM05TB

and LF3BM06TB collected on 9/9/09 (pre-PSA cleanup) only contained carbonyl sulfide and dimenthyl sulfide. ***Samples LF3BM07TB and LF3BM08TB (collected on 9/9/09 from LF3 post-PSA clean up) did not contain any sulfur compounds above the detection limit (0.05 ppmv S).*** These results suggest that the PSA cleanup used at LF3 can remove all sulfur compounds to concentrations below 0.05 ppmv (analytical detection limit).

The average total sulfur concentration (grains per 100 scf) for LF1, LF2, and LF3 were 0.005 ± 0.001, 0.061 ± 0.020, and 0.10 ± 0.03 respectively and all are within the tariff values reported in Report 4A (Table 1).

The average sulfur concentration of the 12 landfill biomethane samples are compared to those of the six natural gas samples as shown in Table 17. The data reveals that the average total sulfur concentration in the landfill biomethane samples is lower than that of the natural gas samples.

Table 15. Sulfur Components (ppmv) for Samples Collected From Landfills, Wastewater Treatment Plants, and Natural Gas Sites – Part 1

		Hydrogen Sulfide	Sulfur Dioxide	Carbonyl Sulfide	Carbon Disulfide	Methyl Mercaptan	Ethyl Mercaptan	i-Propyl Mercaptan	n-Propyl Mercaptan	t-Butyl Mercaptan	Dimethyl Sulfide
1NG	N	2	NA	2	NA	2	NA	NA	NA	NA	2
	Average	0.12	NA	0.13	NA	0.12	NA	NA	NA	NA	0.17
	StDev	0.01	NA	0.01	NA	0.01	NA	NA	NA	NA	0.05
	Min	0.11	NA	0.12	NA	0.11	NA	NA	NA	NA	0.13
	Max	0.13	NA	0.14	NA	0.13	NA	NA	NA	NA	0.20
2NG	1 sample	NA	NA	0.24	NA	NA	NA	NA	NA	NA	NA
3NG	N	3	NA	3	NA	3	3	3	NA	3	3
	Average	0.47	NA	7.83	NA	5.31	1.49	0.45	NA	1.44	0.18
	StDev	0.04	NA	0.12	NA	0.06	0.13	0.04	NA	0.08	0.01
	Min	0.43	NA	7.71	NA	5.27	1.38	0.42	NA	1.38	0.17
	Max	0.50	NA	7.94	NA	5.38	1.63	0.49	NA	1.53	0.19
LF1BM	N	NA	2	NA	NA	NA	NA	NA	NA	NA	NA
	Average	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA
	Max	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA
LF2BM	N	4	NA	4	NA	NA	NA	NA	NA	NA	2
	Average	0.45	NA	0.54	NA	NA	NA	NA	NA	NA	0.06
	StDev	0.11	NA	0.38	NA	NA	NA	NA	NA	NA	0.00
	Min	0.30	NA	0.20	NA	NA	NA	NA	NA	NA	0.06
	Max	0.53	NA	0.88	NA	NA	NA	NA	NA	NA	0.06
LF3BM	N	NA	1	6	NA	NA	NA	NA	NA	NA	6
	Average	NA	0.06	0.14	NA	NA	NA	NA	NA	NA	1.35
	StDev	NA	NA	0.04	NA	NA	NA	NA	NA	NA	0.40
	Min	NA	0.06	0.08	NA	NA	NA	NA	NA	NA	0.88
	Max	NA	0.06	0.19	NA	NA	NA	NA	NA	NA	1.88
WWTP1BM	N	2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Average	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA
	StDev	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Min	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Max	0.16	NA	NA	NA	NA	NA	NA	NA	NA	NA
WTTP2BM[24]	1 sample	187	NA	NA	NA	0.82	NA	NA	0.33	NA	0.16
LF1BG	N	4	2	4	4	4	2	2		4	4
	Average	29.6	0.19	0.20	0.15	1.73	0.10	0.23	NA	0.11	17.4
	StDev	1.4	0.01	0.02	0.07	1.07	0.03	0.02	NA	0.07	2.5
	Min	27.9	0.18	0.17	0.09	0.77	0.08	0.21	NA	0.05	14.5
	Max	31.2	0.19	0.22	0.22	2.78	0.12	0.24	NA	0.18	19.6
LF2BG	N	4	2	4	NA	4	4	4	NA	4	4
	Average	91.7	0.20	0.19	NA	0.61	0.11	0.31	NA	0.21	0.24
	StDev	26.3	0.01	0.03	NA	0.30	0.03	0.11	NA	0.07	0.08
	Min	77.6	0.19	0.15	NA	0.37	0.07	0.18	NA	0.14	0.17
	Max	131.1	0.21	0.23	NA	1.00	0.15	0.44	NA	0.31	0.36
LF3BG	N	4	NA	4	4	4	4	4	4	4	4
	Average	137	NA	0.61	0.07	2.50	0.16	2.14	0.10	0.15	1.75
	StDev	25	NA	0.16	0.03	1.09	0.01	0.11	0.03	0.01	0.49
	Min	100	NA	0.49	0.05	1.75	0.15	1.97	0.07	0.15	1.33
	Max	152	NA	0.84	0.11	4.10	0.17	2.21	0.13	0.16	2.42
LF4BG	N	2	NA	2	1	2	NA	2	NA	2	2
	Average	45.4	NA	0.22	0.16	0.56	NA	0.17	NA	0.17	1.77
	StDev	13.4	NA	NA	NA	0.18	NA	0.01	NA	0.06	2.17
	Min	36.0	NA	NA	0.16	0.43	NA	0.16	NA	0.13	0.23
	Max	54.9	NA	NA	0.16	0.69	NA	0.18	NA	0.21	3.30
WWTP2BG	N	4	NA	4	NA	4	3	NA	4	4	NA
	Average	283	NA	0.17	NA	0.29	0.09	NA	0.15	0.09	NA
	StDev	19	NA	0.12	NA	0.05	0.02	NA	0.06	0.02	NA
	Min	259	NA	0.07	NA	0.23	0.07	NA	0.06	0.06	NA
	Max	300	NA	0.31	NA	0.35	0.10	NA	0.19	0.10	NA
WTTP2BG	1 sample	64.6	NA	0.05	NA	0.27	0.09	0.07	0.32	0.10	NA

NA – no statistics were determined because the concentrations were below the detection limit

[24] This raw biogas sample was collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Table 16. Sulfur Components (ppmv) for Samples Collected From Landfills, Wastewater Treatment Plants, and Natural Gas Sites – Part 2

		Methyl Ethyl Sulfide	Dimethyl Disulfide	Dimethyl Trisulfide	Thiophene	C1-Thiophenes	C2-Thiophenes	Thiophenol	Individual Unidentified Sulfur Compounds (all as monosulfides)	Total Sulfur As molar PPM S	Total Sulfur As Grains/100 SCF @ 14.73 psia, 60°F
1NG	N	NA	2	NA	NA	NA	NA	NA	NA	2	2
	Average	NA	0.24	NA	NA	NA	NA	NA	NA	1.01	0.060
	StDev	NA	0.01	NA	NA	NA	NA	NA	NA	0.08	0.005
	Min	NA	0.23	NA	NA	NA	NA	NA	NA	0.95	0.056
	Max	NA	0.24	NA	NA	NA	NA	NA	NA	1.06	0.063
2NG	1 sample	NA	0.03	NA	NA	NA	NA	NA	NA	0.30	0.018
3NG	N	3	NA	NA	3	NA	NA	NA	NA	3	3
	Average	1.14	NA	NA	0.10	NA	NA	NA	NA	18.41	1.09
	StDev	0.08	NA	NA	0.02	NA	NA	NA	NA	0.52	0.03
	Min	1.07	NA	NA	0.08	NA	NA	NA	NA	18.05	1.07
	Max	1.23	NA	NA	0.12	NA	NA	NA	NA	19.01	1.13
LF1BM	N	NA	NA	NA	NA	NA	NA	NA	NA	2	2
	Average	NA	NA	NA	NA	NA	NA	NA	NA	0.08	0.005
	StDev	NA	NA	NA	NA	NA	NA	NA	NA	0.01	0.001
	Min	NA	NA	NA	NA	NA	NA	NA	NA	0.07	0.004
	Max	NA	NA	NA	NA	NA	NA	NA	NA	0.08	0.005
LF2BM	N	NA	NA	NA	NA	NA	NA	NA	NA	4	4
	Average	NA	NA	NA	NA	NA	NA	NA	NA	1.02	0.061
	StDev	NA	NA	NA	NA	NA	NA	NA	NA	0.33	0.020
	Min	NA	NA	NA	NA	NA	NA	NA	NA	0.73	0.043
	Max	NA	NA	NA	NA	NA	NA	NA	NA	1.38	0.082
LF3BM	N	NA	4	NA	NA	NA	NA	NA	NA	6	6
	Average	NA	0.10	NA	NA	NA	NA	NA	NA	1.63	0.10
	StDev	NA	0.06	NA	NA	NA	NA	NA	NA	0.47	0.03
	Min	NA	0.05	NA	NA	NA	NA	NA	NA	1.15	0.07
	Max	NA	0.17	NA	NA	NA	NA	NA	NA	2.27	0.14
WWTP1BM	N	NA	NA	NA	NA	NA	NA	NA	NA	2	2
	Average	NA	NA	NA	NA	NA	NA	NA	NA	0.11	0.007
	StDev	NA	NA	NA	NA	NA	NA	NA	NA	0.07	0.004

	Min	NA	NA	NA	NA	NA	NA	NA	NA	0.06	0.004
	Max	NA	NA	NA	NA	NA	NA	NA	NA	0.16	0.009
WTTP2BM[25]	1 sample	NA	NA	NA	NA	NA	NA	NA	NA	188	11.2
LF1BM	N	2	4	2	3	NA	NA	NA	2	4	4
	Average	0.05	0.11	0.02	0.07	NA	NA	NA	0.07	50.0	2.96
	StDev	0.00	0.09	0.00	0.01	NA	NA	NA	0.02	2.7	0.16
	Min	0.05	0.03	0.02	0.06	NA	NA	NA	0.05	46.5	2.76
	Max	0.05	0.20	0.02	0.08	NA	NA	NA	0.08	52.3	3.10
LF2BG	N	NA	2	NA	4	1	NA	NA	4	4	4
	Average	NA	0.06	NA	0.07	0.10	NA	NA	0.18	93.8	5.56
	StDev	NA	0.01	NA	0.04	NA	NA	NA	0.08	27.1	1.61
	Min	NA	0.05	NA	0.05	0.10	NA	NA	0.07	79.2	4.70
	Max	NA	0.06	NA	0.13	0.10	NA	NA	0.25	134.4	7.97
LF3BG	N	NA	4	NA	4	2	1	NA	4	4	4
	Average	NA	0.18	NA	0.16	0.07	0.06	NA	1.90	147	8.71
	StDev	NA	0.15	NA	0.04	0.01	NA	NA	0.32	25	1.47
	Min	NA	0.04	NA	0.13	0.06	0.06	NA	1.44	110	6.55
	Max	NA	0.38	NA	0.21	0.07	0.06	NA	2.12	165	9.75
LF4BG	N	NA	2	NA	2	NA	NA	NA	2	2	2
	Average	NA	0.23	NA	0.09	NA	NA	NA	0.08	49.1	2.91
	StDev	NA	0.11	NA	0.03	NA	NA	NA	0.01	11.0	0.65
	Min	NA	0.15	NA	0.07	NA	NA	NA	0.07	41.3	2.45
	Max	NA	0.30	NA	0.11	NA	NA	NA	0.09	56.9	3.37
WWTP1BG	N	NA	NA	NA	NA	NA	NA	NA	NA	4	4
	Average	NA	NA	NA	NA	NA	NA	NA	NA	284	16.8
	StDev	NA	NA	NA	NA	NA	NA	NA	NA	19	1.1
	Min	NA	NA	NA	NA	NA	NA	NA	NA	259	15.4
	Max	NA	NA	NA	NA	NA	NA	NA	NA	301	17.8
WTTP2BG	1 sample	NA	0.03	NA	NA	NA	NA	0.05	NA	65.6	3.89

NA – no statistics were determined because the concentrations were below the detection limit

[25] This raw biogas sample was collected from WWTP2, however, the raw biogas at this site was subjected to only partial clean up and was not intended to produce a pipeline quality product gas.

Table 17. Comparison of Sulfur Compounds (ppmv) for 16 Landfill Biomethane Samples vs. 5 Natural Gas Samples

	Landfill Biomethane					Natural Gas				
Component Name	N	Average	STDEV	Min	Max	N	Average	STDEV	Min	Max
Hydrogen Sulfide	4	0.45	0.11	0.30	0.53	5	0.33	0.19	0.11	0.50
Sulfur Dioxide	3	0.07	0.01	0.06	0.08	NA	NA	NA	NA	NA
Carbonyl Sulfide	10	0.30	0.31	0.08	0.88	6	4.00	4.20	0.12	7.94
Methyl Mercaptan	NA	NA	NA	NA	NA	5	3.24	2.84	0.11	5.38
Ethyl Mercaptan	NA	NA	NA	NA	NA	3	1.49	0.13	1.38	1.63
i-Propyl Mercaptan	NA	NA	NA	NA	NA	3	0.45	0.04	0.42	0.49
t-Butyl Mercaptan	NA	NA	NA	NA	NA	3	1.44	0.08	1.38	1.53
Dimethyl Sulfide	8	1.03	0.69	0.06	1.88	5	0.17	0.03	0.13	0.20
Methyl Ethyl Sulfide	NA	NA	NA	NA	NA	3	1.14	0.08	1.07	1.23
Dimethyl Disulfide	4	0.10	0.06	0.05	0.17	3	0.17	0.12	0.03	0.24
Thiophene	NA	NA	NA	NA	NA	3	0.10	0.02	0.08	0.12
Total Sulfur										
As molar PPM S	12	1.17	0.69	0.07	2.27	6	9.59	9.67	0.30	19.01
As mg/m3	12	1.67	0.98	0.10	3.25	6	13.72	13.84	0.43	27.20
As grains/100scf	12	0.07	0.04	0.00	0.14	6	0.57	0.57	0.02	1.13

NA – no statistics were determined because the concentrations were below the detection limit

Wastewater Treatment Plant

Biogas

Table 15 and Table 16 presents the results from the raw biogas samples collected from each WWTP. Six of the 41 components in the sulfur analysis were detected in the raw biogas samples from WWTP1 but only one component, hydrogen sulfide, was detected in the corresponding biomethane samples. Nine components were detected in the raw biogas sample from WWTP1 but only four components were detected in the corresponding partially cleaned biogas sample.

Biomethane

Four WWTP1 biomethane samples and 1 partially cleaned biogas sample from WWTP2 was analyzed for 41 sulfur components. The results are presented in Table 15 and Table 16. Only one component, hydrogen sulfide, was detected in the biomethane samples collected from WWTP1 and four components were detected in the partially cleaned biogas sample from WWTP2. The average total sulfur concentration (grains per 100 scf) for WWTP1 and WWTP2 were 0.007 ± 0.004 and 3.89 respectively with WWTP1 being within the tariff values reported in Report 4A (Table 1).

The average sulfur concentration of the four biomethane samples are compared to those of the six natural gas samples as shown in Table 18. The data reveals that the average total sulfur in the WWTP biomethane samples is lower than that of the natural gas samples.

The data from WWTP1 suggests that the biogas clean up technologies used at this wastewater treatment plant can decrease the average total sulfur concentrations in the raw biogas to concentrations within the tariff values reported in Report 4A (Table 1).

Table 18. Comparison of Sulfur Compounds (ppmv) for WWTP1 Samples Biomethane vs. Natural Gas

	Wastewater Treatment Plant Biomethane					Natural Gas				
Component Name	N	Average	STDEV	Min	Max	N	Average	STDEV	Min	Max
Hydrogen Sulfide	2	0.11	0.07	0.06	0.16	5	0.33	0.19	0.11	0.50
Sulfur Dioxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonyl Sulfide	NA	NA	NA	NA	NA	6	4.00	4.20	0.12	7.94
Methyl Mercaptan	NA	NA	NA	NA	NA	5	3.24	2.84	0.11	5.38
Ethyl Mercaptan	NA	NA	NA	NA	NA	3	1.49	0.13	1.38	1.63
i-Propyl Mercaptan	NA	NA	NA	NA	NA	3	0.45	0.04	0.42	0.49
t-Butyl Mercaptan	NA	NA	NA	NA	NA	3	1.44	0.08	1.38	1.53
Dimethyl Sulfide	NA	NA	NA	NA	NA	5	0.17	0.03	0.13	0.20
Methyl Ethyl Sulfide	NA	NA	NA	NA	NA	3	1.14	0.08	1.07	1.23
Dimethyl Disulfide	NA	NA	NA	NA	NA	3	0.17	0.12	0.03	0.24
Thiophene	NA	NA	NA	NA	NA	3	0.10	0.02	0.08	0.12
Total Sulfur										
As molar PPM S	2	0.11	0.07	0.06	0.16	6	9.59	9.67	0.30	19.01
As mg/m3	2	0.16	0.10	0.09	0.23	6	13.72	13.84	0.43	27.20
As grains/100scf	2	0.007	0.004	0.004	0.009	6	0.57	0.57	0.02	1.13

NA – no statistics were determined because the concentrations were below the detection limit

Halocarbons

Forty-two of the 46 samples collected for this project were analyzed for 31 halocarbons using method EPA TO-14. A summary of the results is presented in Table 19 and Table 20. The complete set of results is provided in Appendix E.

Natural Gas

Six natural gas samples were collected for halocarbons analysis. The samples did not contain any of the target halocarbons above the detection limit of 0.1ppmv.

Landfills

Biogas

The data for the raw biogas samples are presented in Table 19 and Table 20. Eleven of the 31 components in the halocarbons analysis were detected in the raw biogas at LF1 but only one component was detected in the corresponding biomethane. Four components were detected in the raw biogas at LF2 and five components were detected in the corresponding biomethane. The raw biogas at LF3 contained nine components and the corresponding biomethane contained five components. The raw biogas at LF4 contained 11 components however this biogas is not subjected to a gas cleanup process therefore no biomethane samples were collected at this site. The most commonly detected halocarbon from the entire set of raw biogas and biomethane samples was dichlorodifluoromethane (CFC-12), closely followed by vinyl chloride and chloroethane.

Biomethane

Twelve biomethane samples were collected for halocarbon analysis. All four samples from LF1 contained dichlorodifluoromethane (CFC-12) with an average concentration of 2.13 ppmv ± 0.94. LF2 and LF3 both contained dichlorodifluoromethane (CFC-12), 1,2-dichlorotetrafluoroethane (CFC-114), trichlorofluoromethane (CFC-11), chloroethane, and chloroethene (Vinyl Chloride). The average halocarbon concentrations are presented in Table 19 and Table 20. The four additional biomethane samples that were collected from LF3 in September 2009 were not analyzed for halocarbons (due to budget constraints) therefore comparisons between pre-PSA biomethane and post-PSA biomethane cannot be made.

Wastewater Treatment Plants

Four raw biogas and four biomethane samples were collected from WWTP1. All eight samples did not contain halocarbons above the detection limit of 0.1 ppmv. One raw biogas and one partially cleaned biogas sample was collected from WWTP2 and neither of those samples contained halocarbons above the detection limit as well.

Table 19. Halocarbons (ppmv) for Samples Collected From LF1, LF2, LF3, and L4 – Part 1

	Component	Dichlorodifluoromethane (CFC-12)	1,2-Dichlorotetrafluoroethane (CFC-114)	Trichlorofluoromethane (CFC-11)	Chloromethane	Dichloromethane (Methylene Chloride)	Chloroethane
LF1BM	N	4	NA	NA	NA	NA	NA
	Average	**2.13**	NA	NA	NA	NA	NA
	StDev	**0.94**	NA	NA	NA	NA	NA
	Min	**1.35**	NA	NA	NA	NA	NA
	Max	**3.24**	NA	NA	NA	NA	NA
LF2BM	N	4	2	2	NA	NA	4
	Average	**2.43**	**0.11**	**0.16**	NA	NA	**0.52**
	StDev	**0.09**	**0.00**	**0.01**	NA	NA	**0.11**
	Min	**2.34**	**0.11**	**0.15**	NA	NA	**0.41**
	Max	**2.52**	**0.11**	**0.16**	NA	NA	**0.62**
LF3BM	N	4	4	4	NA	NA	4
	Average	**3.26**	**0.15**	**0.18**	NA	NA	**0.61**
	StDev	**0.34**	**0.02**	**0.06**	NA	NA	**0.06**
	Min	**2.96**	**0.12**	**0.13**	NA	NA	**0.55**
	Max	**3.60**	**0.17**	**0.24**	NA	NA	**0.66**
LF1BG	N	4	2	4	NA	4	2
	Average	**1.76**	**0.29**	**0.34**	NA	**1.69**	**0.84**
	StDev	**0.35**	**0.05**	**0.15**	NA	**0.76**	**0.05**
	Min	**1.26**	**0.25**	**0.20**	NA	**0.93**	**0.81**
	Max	**2.05**	**0.33**	**0.51**	NA	**2.48**	**0.88**
LF2BG	N	4	NA	NA	NA	NA	4
	Average	**0.80**	NA	NA	NA	NA	**0.37**
	StDev	**0.12**	NA	NA	NA	NA	**0.04**
	Min	**0.72**	NA	NA	NA	NA	**0.32**
	Max	**0.98**	NA	NA	NA	NA	**0.42**
LF3BG	N	4	1	1	1	1	4
	Average	**0.85**	**0.13**	**0.12**	**0.14**	**0.16**	**0.38**
	StDev	**0.26**	**NA**	**NA**	**NA**	**NA**	**0.06**
	Min	**0.59**	**0.13**	**0.12**	**0.14**	**0.16**	**0.32**
	Max	**1.07**	**0.13**	**0.12**	**0.14**	**0.16**	**0.46**
LF4BG	N	2	1	1	NA	1	2
	Average	**0.49**	**0.52**	**0.59**	NA	**2.08**	**2.51**
	StDev	**0.25**	**NA**	**NA**	NA	**NA**	**2.94**
	Min	**0.31**	**0.52**	**0.59**	NA	**2.08**	**0.43**
	Max	**0.67**	**0.52**	**0.59**	NA	**2.08**	**4.59**

NA – no statistics were determined because the concentrations were below the detection limit

Table 20. Halocarbons (ppmv) for Samples Collected From LF1, LF2, LF3, and L4 – Part 2

	Component	1,1-Dichloroethane	1,2-Dichloroethane	Chloroethene (Vinyl Chloride)	cis-1,2-Dichloroethene	Trichloroethene	Tetrachloroethene	Total TO-14 Halocarbon Components:
LF1BM	N	NA	NA	NA	NA	NA	NA	4
	Average	NA	NA	NA	NA	NA	NA	**2.13**
	StDev	NA	NA	NA	NA	NA	NA	**0.94**
	Min	NA	NA	NA	NA	NA	NA	**1.35**
	Max	NA	NA	NA	NA	NA	NA	**3.24**
LF2BM	N	NA	NA	4	NA	NA	NA	4
	Average	NA	NA	**0.29**	NA	NA	NA	**3.38**
	StDev	NA	NA	**0.05**	NA	NA	NA	**0.41**
	Min	NA	NA	**0.25**	NA	NA	NA	**3.00**
	Max	NA	NA	**0.33**	NA	NA	NA	**3.75**
LF3BM	N	NA	NA	4	NA	NA	NA	4
	Average	NA	NA	**0.19**	NA	NA	NA	**4.39**
	StDev	NA	NA	**0.06**	NA	NA	NA	**0.27**
	Min	NA	NA	**0.13**	NA	NA	NA	**4.14**
	Max	NA	NA	**0.25**	NA	NA	NA	**4.67**
LF1BG	N	4	4	4	4	4	4	4
	Average	**0.16**	**0.18**	**0.41**	**0.36**	**0.32**	**0.23**	**6.01**
	StDev	**0.03**	**0.04**	**0.21**	**0.07**	**0.05**	**0.04**	**0.69**
	Min	**0.13**	**0.14**	**0.21**	**0.28**	**0.26**	**0.20**	**5.09**
	Max	**0.20**	**0.22**	**0.64**	**0.45**	**0.38**	**0.28**	**6.59**
LF2BG	N	NA	NA	4	4	NA	NA	4
	Average	NA	NA	**0.42**	**0.22**	NA	NA	**1.82**
	StDev	NA	NA	**0.05**	**0.06**	NA	NA	**0.25**
	Min	NA	NA	**0.37**	**0.17**	NA	NA	**1.63**
	Max	NA	NA	**0.48**	**0.31**	NA	NA	**2.18**
LF3BG	N	NA	NA	4	4	NA	2	4
	Average	NA	NA	**0.50**	**0.48**	NA	**0.13**	**2.41**
	StDev	NA	NA	**0.07**	**0.05**	NA	**0.04**	**0.42**
	Min	NA	NA	**0.43**	**0.42**	NA	**0.10**	**1.89**
	Max	NA	NA	**0.56**	**0.53**	NA	**0.16**	**2.91**
LF4BG	N	1	1	2	2	2	2	2
	Average	**0.11**	**0.21**	**1.91**	**1.73**	**0.43**	**0.77**	**9.6**
	StDev		**NA**	**0.58**	**0.83**	**0.28**	**0.54**	**6.2**
	Min	**0.11**	**0.21**	**1.50**	**1.14**	**0.23**	**0.39**	**5.2**
	Max	**0.11**	**0.21**	**2.32**	**2.32**	**0.62**	**1.15**	**14.0**

NA – no statistics were determined because the concentrations were below the detection limit

Volatile Metals

Forty-four of the 46 samples collected for this project were analyzed for mercury using method ASTM D5954 and 16 volatile metals via EPA Method 29 mod. No samples were collected from WWTP2 for metals analysis. The complete set of results is provided in Appendix F.

Natural Gas

Six natural gas samples were subjected to metals analysis. Zinc was detected in one sample from 1NG, one sample from 2NG, and 2 samples from 3NG with concentrations of 104 $\mu g/m^3$, 50 $\mu g/m^3$, 48 $\mu g/m^3$, and 42 $\mu g/m^3$ respectively. Copper was also detected in one sample from 3NG with a concentration of 67 $\mu g/m^3$. No other metals were detected in the natural gas samples.

Landfills

Biogas

Four raw biogas samples were collected from LF1. However, the mercury concentration and sample volume for these specific samples was too high and consequently could not be analyzed for mercury. Therefore, there is no mercury data available for the raw biogas samples from LF1.

The raw biogas from LF2 samples contained mercury, arsenic, antimony and zinc with average concentrations of 1.45 $\mu g/m^3 \pm 0.35$, 256 $\mu g/m^3 \pm 67.6$, 327 $\mu g/m^3 \pm 90.8$, and 67 $\mu g/m^3 \pm 25.2$ respectively.

Collectively, the raw biogas samples collected from LF3 contained arsenic, antimony and zinc with average concentrations of 160 $\mu g/m^3 \pm 74$, 197 $\mu g/m^3 \pm 100$, and 55 $\mu g/m^3 \pm 36$ respectively. No biogas samples were retrieved from LF3 during the 9/09/09 sampling event.

Biomethane

The biomethane samples collected from LF1 did not contain mercury above the detection limit of 0.02 $\mu g/m^3$. One sample contained copper with a concentration of 250 $\mu g/m^3$ and three samples contained zinc with an average concentration of 64 $\mu g/m^3$.

Four biomethane samples were collected from LF2 and one biomethane sample collected from LF2 contained 57 $\mu g/m^3$ zinc.

Eight biomethane samples were collected from LF3. The two biomethane samples collected during the first trip to LF3 (10/23/08) contained mercury with an average concentration of 0.21 $\mu g/m^3 \pm 0.10$ however the two samples collected during the second sampling trip (11/17/08) did not contain mercury above the detection limit. Four biomethane samples were collected during the third trip to LF3 (9/09/09) and of the four samples collected, none of the samples contained mercury and two of the samples contained only copper with concentrations of 148 $\mu g/m^3$ and 206 $\mu g/m^3$ respectively.

Wastewater Treatment Plants

Four biomethane samples were collected from WWTP1 the samples did not contain any metals above the detection limit. Four raw biogas samples were collected from WWTP1 and contained mercury and zinc with average concentrations of 0.18 $\mu g/m^3 \pm 0.1$ and 67 $\mu g/m^3 \pm 17$ respectively.

No samples were collected from WWTP2 for metals analysis due to weather and time conditions.

Siloxanes

The 46 samples collected for this project were analyzed for siloxanes using gas chromatography atomic emission detection. The complete set of results is provided in Appendix F.

Natural Gas

Six natural gas samples were collected and none of the samples contained siloxanes above the detection limit of 0.5ppmv of Si.

Landfills

Biogas

All four raw biogas samples collected from LF1 on 10/20/08 and 2/5/09 contained octamethylcyclotetrasiloxane (D4) at an average concentration of 2.8 ppmv ± 0.9. In addition, the two biogas samples collected during the second sampling trip (2/5/09) to LF1 contained hexamethyldisilane with an average concentration of 1.3 ppmv ± 0.9. Furthermore, one sample collected during the second sampling trip also contained an unidentified organic silicone compounds with a concentration of 0.8 ppmv, however it was not detected in the duplicate sample.

All four raw biogas samples collected from LF2 contained octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) with average concentrations of 4.5 ppmv ± 1.01 and 0.8 ppmv ± 0.17 respectively.

All four biogas samples collected from LF3 contained hexamethyldisilane, octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) with average concentrations of 0.8 ppmv ± 0.05, 4.1 ppmv ± 1, and 1.3 ppmv ± 0.4 respectively.

Similar to LF3, two biogas samples were collected from LF4 and both samples contained octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) with average concentrations of 2.4 ppmv ± 0.6 and 1.2 ppmv ±1 respectively and one sample contained 0.5 ppmv of hexamethyldisilane.

Biomethane

Sixteen biomethane samples were collected for siloxanes analysis. ***The biomethane samples collected from LF2 and LF3 did not contain siloxanes above the detection limit.*** The biomethane samples collected from LF1 contained octamethylcyclotetrasiloxane (D4) at an average concentration of 2.6 ppmv ± 2.5.

Wastewater Treatment Plants

Four biomethane samples were collected from WWTP1 and none of the samples contained siloxanes above the detection limit. Raw biogas samples were collected from WWTP1 and all four contained decamethylcyclopentasiloxane (D5) with an average concentration of 1.2 ppmv ± 0.2. One raw biogas sample and one partially cleaned biogas sample was collected from WWTP2 and both contained octamethylcyclotetrasiloxane (D4) with concentrations of 21.8 ppmv and 13.6 ppmv respectively as well as decamethylcyclopentasiloxane (D5) with concentrations of 2.8 ppmv and 3.9 ppmv respectively.

Summary of First Tier Chemical Testing Results

The biomethane that is produced at LF1, LF2, LF3 and WWTP1 is currently injected into existing natural gas pipelines; results of testing of these biomethane samples was compared to the threshold and typical values of gas properties specified in pipeline tariffs, as reported in AGA Report 4A.

Table 21 presents the average values for the parameters typically included in pipeline tariffs and natural gas contracts [1] for 1NG, 2NG, 3NG, LF1, LF2, LF3, and WWTP1. Biomethane samples collected from LF1, LF2 and WWTP1 possessed *average* values for each parameter that were within the threshold and typical values reported in AGA Report 4A. The data also indicates that the parameters of average gross heating value, nitrogen concentration, and total diluents gases for LF3 (prior to PSA cleanup) were not within threshold and typical values reported in AGA Report 4A. Of note, pre-PSA values for methane in samples retrieved in September, 2009 averaged 90.3%; post-PSA values for methane increased to an average of 97.23%. Concurrently, nitrogen concentrations pre-PSA averaged 9.16% while post-PSA values averaged 2.78%. Carbon dioxide was completely removed through PSA treatment. Overall, gross heating value of the post-PSA biomethane was increased to 969.2. Additionally, sulfur concentrations were below detection post-PSA.

A suite of Tier I constituents were detected in both natural gas and biomethane. The constituents presented in Table 22 are those that were:

1. Detected in the biomethane samples but in ***higher concentrations than in the natural gas samples retrieved for this study*** (values are highlighted in red) or
2. The compounds that were detected in the biomethane samples but were ***not present in the natural gas samples retrieved for this study***.

Excluding the major components, 10 compounds were detected in biomethane and not in the natural gas samples, all of which were below Occupational Safety & Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), and American Conference of Governmental Industrial Hygienists (ACGIH) exposure limits. *However, this dataset is limited.*

Table 21. Average Gas Composition of Biomethane and Natural Gas

	Average Values Observed from each Sample Site							AGA Report 4A [1]	
Gas Property	**1NG**	**2NG**	**3NG**	**LF1BM**	**LF2BM**	**LF3BM**	**WWTP1BM**	**Contract Limits**	**Typical Values**
Gross HV (Dry) (Btu/ft^3)	1028.6	1029.7	1035.5	988.6	981.8	945.2	1008.3	967 - 1120 Btu/scf	1010 - 1060 Btu/scf
Wobbe Index	1353.2	1351.9	1367.8	1314.9	1298.0	1235.6	1346.7	Not reported	Not reported
Total Sulfur (grains/100 scf)	0.060	BDL	1.092	0.005	0.061	0.10	0.007	5 - 20 grains per 100 scf - Maximum	0 - 1 grains per 100 scf
Hydrogen Sulfide (grains/100scf)	0.008	BDL	0.03	BDL	0.04	BDL	0.028	¼ - 0.3 grains per 100 scf, Maximum	0 - 2 grains per 100 scf
Mercaptans (ppmv)	0.12	BDL	8.69	BDL	BDL	BDL	BDL	No Specification	Highly Variable 0 - 40ppm
PCBs	BDL	BDL	BDL	BDL	BDL	BDL	BDL	Not reported	Not reported
Mercury	BDL	BDL	BDL	BDL	BDL	0.21	BDL	2 - 3% Maximum	0 - 2%
Hydrogen	BDL	BDL	BDL	0.8%	BDL	BDL	BDL	Not reported	Not reported
Carbon Dioxide	0.75%	0.72%	0.20%	1.10%	0.72%	0.65%	0.60%	2 - 3% Maximum	0 - 2%
Nitrogen	0.16%	0.37%	0.14%	0.90%	2.50%	6.32%	BDL	3% Maximum	0 - 2%
Oxygen	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.2% Maximum; 0.001% Desirable	0 - 0.001%
Diluent Gases	0.91	1.09	0.35	2.8	3.21	6.80%	0.6	4 - 5% Maximum	0.5 - 3%
Helium	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.2% Maximum	0 - 0.1%

Table 22. First Tier Chemicals Detected in Biomethane Samples in Greater Concentrations than in Natural Gas Samples[1]

	LF1BM	LF2BM	LF3BM	WWTP1BM	OSHA	NIOSH
Major Components (mol%)						
Hydrogen	0.80	---	---	---	NA	NA
Carbon Dioxide	1.42	0.94	1.00	---	NA	NA
Nitrogen	1.32	3.27	9.49	---	NA	NA
Methane	97.90	97.30	---	99.50	NA	NA
Sulfur Compounds (ppmv)						
Sulfur Dioxide	0.08	---	0.06	---	TWA 5 ppm (13 mg/m^3)	TWA 2 ppm (5 mg/m^3) ST 5 ppm (13 mg/m^3)
Hydrogen sulfide	---	0.53	---	---	C 20 ppm 50 ppm 10-minute maximum peak	C 10 ppm (15 mg/m3) 10-minute
Dimethyl Sulfide[1]	---	---	1.73	1.88	not established	not established
Volatile Metals (µg/M3)						
Copper	250	---	206	---	TWA 1 mg/m^3	TWA 1 mg/m^3
Mercury	---	---	0.28	0.27	C 0.1 mg/m^3	0.05 mg/m^3 skin
Zinc	11.00	---	---	84	not established	not established
Siloxanes (ppmv as Si)						
Octamethylcyclotetrasiloxane (D4)	2.55	---	---	---	not established	not established
Halocarbons (ppmv)						
Dichlorodifluoromethane (CFC-12)	3.24	2.52	3.60	---	1000 ppm	1000 ppm
1,2-Dichlorotetrafluoroethane (CFC-114)	---	0.11	0.17	---	1000 ppm	1000 ppm
Trichlorofluoromethane (CFC-11)	---	0.16	0.24	---	1000 ppm	1000 ppm
Chloroethane	---	0.62	0.66	---	1000 ppm	not established
Chloroethene (Vinyl Chloride)	---	0.33	0.25	---	TWA 1 ppm C 5 ppm [15-minute]	not established

Second Tier Chemical Testing Results

Thirty nine of the 46 samples collected for this project were analyzed for 118 semi-volatile and volatile organic compounds using EPA 8270C. A summary of the results in presented in Table 23 through Table 30

The complete set of results is provided in Appendix G. Additionally deviations and other observations in the quality control data is presented in Appendix K. Samples that contained carbon tetrachloride and di-n-butylphthalate may have come from the sampling and analysis procedure. Carbon tetrachloride is an artifact from the dichloromethane extraction solvent and di-n-butylphthalate is a plasticizer from unknown origin but may be present in the XAD sampling tubes.

Natural Gas

Table 23 through Table 30 present the average concentrations of the VOC/SVOCs detected in the six natural gas samples that were collected and analyzed. In total, 24 of the 118 target VOC/SVOCs were detected in the set of 6 natural gas samples.

The samples collected from 1NG contained 18 of the 115 target compounds with concentrations ranging from 0.50 ppbv (carbon tetrachloride) to 359 ppbv (1,2,4 - trimethybenzene).

The samples collected from 2NG contained 19 of the target compounds with concentrations ranging from 0.45 ppbv (carbon tetrachloride) to 474 ppbv (1,2,4 - trimethybenzene).

The samples collected from 3NG contained 17 of the target compounds with concentrations ranging from 0.08 ppbv (1-Methylnaphthalene) to 12.14 ppbv (toluene).

Additionally, Table 31 presents the frequency of the VOC/SVOCs that were detected in the natural gas samples. The other target VOC/SVOCs included in the sample analyses but not listed in the table were not present above the detection limit in the natural gas samples. Table 31 reveals that the following compounds: benzene, toluene, ethylbenzene, m/p-xylenes, o-xylene, isopropylbenzene, n-propylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, p-isopropyltoluene, naphthalene and 2-methylnaphthalene were detected in all six natural gas samples that were collected and analyzed.

Landfills

Table 23 –Table 30 present the average concentrations of the VOC/SVOCs detected in the landfill raw biogas samples and corresponding biomethane samples that were collected and analyzed from LF1, LF2, LF3 and LF4.

<u>LF1</u>

The four biomethane samples collected from LF1 contained seven of the target compounds with concentrations ranging from 0.046 pbbv (benzene) to 19.7 ppbv (1,2-dichloropropane). The two biogas samples collected from LF1 contained 34 of the target compounds with concentrations

ranging from 0.15 ppbv (1,2-dichloroethane) to 126 ppbv (benzyl alcohol). Twenty-seven of the 34 VOC/SVOCs (see Table 33) that were detected in the raw biogas from LF1 were not detected in the corresponding biomethane from LF1, indicating that these compounds were removed from the raw biogas during the clean-up process. The average concentrations of an additional 4 compounds (toluene, ethylbenzene, m/p xylenes, and 1,2,4 – trimethylbenzene) were significantly decreased (see Table 34) from the raw biogas as compared to the biomethane. ***Overall, the raw biogas contained almost 4 times as more VOC/SVOCs than the biomethane from LF3.*** These results suggest that the gas clean up technology used at LF1 is effective in removing most VOC/SVOCs from the raw biogas.

One of the two compounds not removed from the raw biogas at LF1 was benzene, however the average benzene concentration in the raw biogas was 1.18 ppbv and the corresponding average benzene concentration in the biomethane was 0.505 ppbv. The other compound not removed from the raw biogas was carbon tetrachloride, although as stated previously this is an artifact from the dichloromethane extraction solvent used during the sample extraction process for the VOC/SVOCs analysis. Additionally 1,2-dichloropropane was detected in the biomethane from LF1 but not in the raw biogas from LF1. It is not clear why this result was observed.

LF2

The four biomethane samples collected from LF2 contained 21 of the target components with concentrations ranging from 0.41 ppbv (1,4-dichlorobenzene) to 20.5 ppbv (p-Isopropyltoluene). The three biogas samples collected from LF2 contained 39 of the target compounds with concentrations ranging from 0.29 (carbon tetrachloride) to 323 ppbv (1,2,4 – trimethybenzene). The twenty-one VOC/SVOCs (see Table 35) that were detected in the raw biogas from LF2 and were not detected in the corresponding biomethane from LF2 indicate that these compounds were removed from the raw biogas during the clean-up process. The concentrations of an additional 14 VOC/SVOCs (see Table 36) were significantly decreased from the raw biogas at LF2 as compared to the biomethane from LF2***. Overall, the raw biogas contained approximately 86% more VOC/SVOCs than the biomethane from LF2.*** These results suggest that the biogas clean up technology used at LF2 is effective in removing many of the VOC/SVOCs present in the raw biogas at LF2.

One of the two compounds not removed was benzene; the average benzene concentration in the raw was 1.05 ppbv and the corresponding average benzene concentration in the biomethane was 2.24 ppbv. The other compound not removed from the raw biogas was carbon tetrachloride, although as stated previously this is an artifact from the dichloromethane extraction solvent. Diethylphthalate and di-n-butylphthalate were also detected in both raw biogas and biomethane from LF 2. Di-n-butylphthalate is a plasticizer from unknown origin but may be present in the XAD sampling tubes.

Additionally 1,2-dichloropropane and trichloroethene (with average concentrations of 0.514 ppbv and 0.602 ppbv correspondingly) were detected in the biomethane from LF2 but not the raw biogas from LF2. It is not clear why this result was observed.

LF3

The eight biomethane samples collected from LF3 contained 12 of the target compounds with concentrations ranging from 0.293 ppbv (carbon tetrachloride) to 16.6 ppbv (toluene). The four biogas samples collected from LF3 contained 39 of the target compounds with concentrations ranging from 0.325 ppbv (carbon tetrachloride) to 760 ppbv (p-Isopropyltoluene). Twenty-eight of the VOC/SVOCs (see Table 37) that were detected in the raw biogas from LF3 were not detected in the corresponding biomethane from LF3 indicating that these compounds were removed from the raw biogas during the clean-up process. The average concentrations of an additional 5 VOC/SVOCs (toluene, tetrachloroethene, p-isopropyltoluene 2-methylnaphthalene and 1-methylnaphthalene) were decreased (see Table 38) from the raw biogas at LF3 as compared to the biomethane from LF3. An additional 4 compounds were found in both the raw biogas and biomethane in similar average concentrations: carbon tetrachloride (0.482 ppbv in raw biogas and 0.490 ppbv in biomethane), diethylphthalate (0.962 ppbv in raw biogas and 0.546 in biomethane), di-n-butylphthalate (0.841 ppbv in raw biogas and 0.759 ppbv in biomethane), and benzene (1.10 ppbv in raw biogas and 6.96 in biomethane). An additional three compounds (dibromochloromethane, 1,2-dichloropropane, trichloroethene with average concentrations of 0.429 ppbv, 0.777 ppbv and 1.37 correspondingly) were detected in the biomethane from LF3 but not the raw biogas from LF3. ***Overall, the raw biogas contained more than 2 times as more VOC/SVOCs than the biomethane from LF3.*** These results suggest that the pre-PSA biogas clean up technology used at LF3 is effective in removing many of the VOC/SVOCs present in the raw biogas at LF3.

Furthermore, the frequency of VOCs/SVOCs detected in the pre-PSA biomethane samples collected from LF3 during September 2009 was 55% lower than those detected in the pre-PSA biomethane samples collected in 2008. Additionally the pre-PSA biomethane samples collected from LF3 during September 2009 contained a lower total concentration of VOCs/SVOCs as compared to those collected during October and November 2008, specifically with respect to benzene and toluene concentrations. As shown in Figure 11, the average total VOCs/SVOCs concentration from the four biomethane (pre-PSA) samples collected during October and November 2008 was 17.9 ppbv compared to that of the two biomethane (also pre-PSA) samples which had an average concentration of 0.71 ppbv; this is a difference of 2 orders of magnitude. ***Furthermore samples LF3BM07TB and LF3BM08TB (samples collected after the secondary cleanup unit, PSA) did not contain any VOCs/SVOCs above the detection limit***, with the exception of methylene chloride (with an average concentration of 0.50 ppbv) which was also detected in the method blank therefore most likely is an artifact from the sample extraction process. ***These results suggest that the secondary PSA clean up unit at LF3 is very effective (almost 100% effective) in removing VOCs/SVOCs from the biogas.***

Overall Frequency of VOC/SVOCs detected in Landfill Biomethane Samples

Table 32 reveals the frequency of the VOC and SVOCs detected in all 16 landfill biomethane samples. With respect to the 16 biomethane samples, benzene was detected in 15 samples, carbon tetrachloride was detected in 11 samples, toluene was detected in 11 samples and di-n-butylphthalate was detected in 11 samples, Carbon tetrachloride is an artifact from the dichloromethane extraction solvent. D-n-butylphthalate is a plasticizer from an unknown origin, but may be present in the XAD tubes.

LF4

The biogas sample collected from LF4 contained 25 of the target compounds with concentrations ranging from 0.317 ppbv (1,2,3-trichlorobenzene) to 768 ppbv (p-Isopropyltoluene). Only raw biogas was collected from LF4.

Wastewater Treatment Plants

Biogas

The four biogas samples collected from WWTP1 contained 23 of the 118 target compounds with concentrations ranging from 0.18 ppbv [Bis(2-ethylhexyl) adipate] to 549 ppbv (p-Isopropyltoluene). The results suggest that the gas clean up technology used at WWTP1 is effective in removing most VOC/SVOCs from the raw biogas.

Biomethane

The three biomethane samples collected from WWTP1 contained only six of the target compounds with concentrations ranging from 0.30 ppbv (carbon tetrachloride) to 6 ppbv [bis (2-ethylhexyl) phthalate]. Specifically, benzene (with an average concentration of 0.703 ppbv) was detected in all 3 samples; 1,1,2,2-Tetrachloroethane (with an average concentration of 0.44 ppbv) and p-Isopropyltoluene (with an average concentration of 0.403 ppbv) were detected in 2 samples and carbon tetrachloride; di-n-butylphthalate, and bis(2-Ethylhexyl)phthalate were detected in 1 sample (with concentrations of 0.309 ppbv, 0.539 ppbv and 6.098 ppbv correspondingly).

Table 23. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 1

		1,2-Dichloroethane	Benzene	Carbon Tetrachloride	1,2-Dichloropropane	Trichloroethene	Toluene	trans-1,3-Dichloropropene
1NG	N	N/A	2	2	N/A	N/A	2	N/A
	Average	N/A	10.4	0.717	N/A	N/A	81.9	N/A
	StDev	N/A	2.47	0.311	N/A	N/A	17.8	N/A
	Min	N/A	8.68	0.497	N/A	N/A	69.3	N/A
	Max	N/A	12.2	0.937	N/A	N/A	94.5	N/A
2NG	N	N/A	2	2	N/A	N/A	2	N/A
	Average	N/A	9.53	0.472	N/A	N/A	103	N/A
	StDev	N/A	5.81	0.0289	N/A	N/A	10.0	N/A
	Min	N/A	5.42	0.452	N/A	N/A	95.5	N/A
	Max	N/A	13.6	0.492	N/A	N/A	110	N/A
3NG	N	N/A	2	N/A	N/A	N/A	2	N/A
	Average	N/A	1.08	N/A	N/A	N/A	11.9	N/A
	StDev	N/A	0.103	N/A	N/A	N/A	0.171	N/A
	Min	N/A	1.00	N/A	N/A	N/A	11.8	N/A
	Max	N/A	1.15	N/A	N/A	N/A	12.1	N/A
LF1BM	N	N/A	3	2	1	N/A	1	N/A
	Average	N/A	0.505	0.434	19.7	N/A	0.537	N/A
	StDev	N/A	0.397	0.087	N/A	N/A	N/A	N/A
	Min	N/A	0.046	0.372	19.7	N/A	0.537	N/A
	Max	N/A	0.737	0.496	19.7	N/A	0.537	N/A
LF2BM	N	N/A	4	2	1	1	3	N/A
	Average	N/A	2.24	0.796	0.514	0.602	1.74	N/A
	StDev	N/A	2.67	0.00709	N/A	N/A	1.67	N/A
	Min	N/A	0.686	0.791	0.514	0.602	0.488	N/A
	Max	N/A	6.24	0.801	0.514	0.602	3.64	N/A
LF3BM	N	N/A	4	3	2	2	5	N/A
	Average	N/A	6.96	0.490	0.777	1.37	6.69	N/A
	StDev	N/A	7.36	0.179	0.0209	0.153	8.87	N/A
	Min	N/A	0.603	0.293	0.762	1.26	0.0637	N/A
	Max	N/A	14.3	0.642	0.792	1.48	16.6	N/A
WWTP1BM	N	N/A	3	1	N/A	N/A	N/A	N/A
	Average	N/A	0.703	0.309	N/A	N/A	N/A	N/A
	StDev	N/A	0.11	N/A	N/A	N/A	N/A	N/A
	Min	N/A	0.611	0.309	N/A	N/A	N/A	N/A
	Max	N/A	0.830	0.309	N/A	N/A	N/A	N/A
LF1BG	N	1	2	1	N/A	1	2	N/A
	Average	0.146	1.18	0.475	N/A	0.315	70.1	N/A
	StDev	N/A	0.945	N/A	N/A	N/A	43.6	N/A
	Min	0.146	0.510	0.475	N/A	0.315	39.3	N/A
	Max	0.146	1.85	0.475	N/A	0.315	101	N/A
LF2BG	N	N/A	3	3	N/A	N/A	3	2
	Average	N/A	1.05	0.435	N/A	N/A	32.7	0.467
	StDev	N/A	0.0827	0.253	N/A	N/A	13.3	0.108
	Min	N/A	0.960	0.286	N/A	N/A	20.2	0.391
	Max	N/A	1.12	0.730	N/A	N/A	46.6	0.543
LF3BG	N	N/A	3	3	N/A	N/A	4	N/A
	Average	N/A	1.10	0.482	N/A	N/A	35.1	N/A
	StDev	N/A	0.247	0.180	N/A	N/A	19.8	N/A
	Min	N/A	0.814	0.325	N/A	N/A	21.6	N/A
	Max	N/A	1.26	0.679	N/A	N/A	64.4	N/A
LF4BG	N	N/A	1	1	N/A	N/A	1	N/A
	Average	N/A	0.876	0.411	N/A	N/A	6.31	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	0.876	0.411	N/A	N/A	6.31	N/A
	Max	N/A	0.876	0.411	N/A	N/A	6.31	N/A
WWTP1BG	N	N/A	4	2	N/A	N/A	4	N/A

	Average	N/A	1.03	0.436	N/A	N/A	2.62	N/A
	StDev	N/A	0.0829	0.0373	N/A	N/A	0.906	N/A
	Min	N/A	0.944	0.410	N/A	N/A	1.43	N/A
	Max	N/A	1.14	0.462	N/A	N/A	3.59	N/A

NA – no statistics were determined because the concentrations were below the detection limit

Table 24. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 2

		Dibromochloromethane	Tetrachloroethene	Chlorobenzene	Ethylbenzene	m/p-Xylenes	Styrene	o-Xylene
1NG	N	2	N/A	N/A	2	2	N/A	2
	Average	1.85	N/A	N/A	36.8	91.5	N/A	75.2
	StDev	0.308	N/A	N/A	8.8	21.2	N/A	19.4
	Min	1.63	N/A	N/A	30.6	76.6	N/A	61.5
	Max	2.06	N/A	N/A	43.1	106	N/A	88.9
2NG	N	2	N/A	N/A	2	2	N/A	2
	Average	1.53	N/A	N/A	59.7	182	N/A	169
	StDev	0.0776	N/A	N/A	3.63	17.3	N/A	17.9
	Min	1.47	N/A	N/A	57.2	170	N/A	156
	Max	1.58	N/A	N/A	62.3	194	N/A	182
3NG	N	N/A	N/A	N/A	2	2	2	2
	Average	N/A	N/A	N/A	1.80	11.1	0.136	4.17
	StDev	N/A	N/A	N/A	0.0482	0.526	0.00129	0.241
	Min	N/A	N/A	N/A	1.77	10.8	0.135	4.00
	Max	N/A	N/A	N/A	1.84	11.5	0.137	4.34
LF1BM	N	N/A	N/A	N/A	1	1	N/A	N/A
	Average	N/A	N/A	N/A	0.348	0.609	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	0.348	0.609	N/A	N/A
	Max	N/A	N/A	N/A	0.348	0.609	N/A	N/A
LF2BM	N	N/A	N/A	N/A	1	1	N/A	1
	Average	N/A	N/A	N/A	1.15	1.42	N/A	1.19
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	1.15	1.42	N/A	1.19
	Max	N/A	N/A	N/A	1.15	1.42	N/A	1.19
LF3BM	N	4	2	N/A	N/A	N/A	N/A	N/A
	Average	0.429	0.475	N/A	N/A	N/A	N/A	N/A
	StDev	0.102	0.00381	N/A	N/A	N/A	N/A	N/A
	Min	0.285	0.473	N/A	N/A	N/A	N/A	N/A
	Max	0.513	0.478	N/A	N/A	N/A	N/A	N/A
WWTP1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF1BG	N	N/A	2	2	2	2	2	2
	Average	N/A	3.29	1.45	63.3	75.6	13.1	50.2
	StDev	N/A	0.981	0.167	4.82	28.8	0.848	21.2
	Min	N/A	2.60	1.33	59.9	55.2	12.5	35.3
	Max	N/A	3.99	1.57	66.7	95.9	13.7	65.2
LF2BG	N	N/A	3	3	2	1	3	2
	Average	N/A	0.540	1.35	78.0	71.7	7.48	67.6
	StDev	N/A	0.164	0.473	25.7	N/A	2.24	22.6
	Min	N/A	0.404	0.882	59.8	71.7	5.11	51.7
	Max	N/A	0.722	1.83	96.1	71.7	9.56	83.6
LF3BG	N	N/A	4	4	4	4	4	4
	Average	N/A	2.16	1.77	56.6	71.4	11.1	48.4
	StDev	N/A	1.19	0.416	14.5	20.2	1.89	9.66
	Min	N/A	1.16	1.44	46.5	56.7	9.55	41.5
	Max	N/A	3.84	2.37	77.9	100	13.5	62.6
LF4BG	N	1	1	1	1	1	1	1
	Average	1.28	0.630	0.555	61.5	98.2	9.53	69.4
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	1.28	0.630	0.555	61.5	98.2	9.53	69.4
	Max	1.28	0.630	0.555	61.5	98.2	9.53	69.4
WWTP1BG	N	N/A	2	N/A	4	4	N/A	4
	Average	N/A	0.598	N/A	1.29	1.53	N/A	1.12

	StDev	N/A	0.190	N/A	0.258	0.446	N/A	0.354
	Min	N/A		N/A			N/A	
	Max	N/A		N/A			N/A	

NA – no statistics were determined because the concentrations were below the detection limit

Table 25. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 3

		1,1,2,2-Tetrachloroethane	Isopropylbenzene	2-Chlorotoluene	n-Propylbenzene	4-Chlorotoluene	1,3,5-Trimethylbenzene	tert-Butylbenzene
1NG	N	N/A	2	N/A	2	N/A	2	N/A
	Average	N/A	9.89	N/A	21.6	N/A	78.5	N/A
	StDev	N/A	2.15	N/A	5.98	N/A	24.1	N/A
	Min	N/A	8.37	N/A	17.4	N/A	61.4	N/A
	Max	N/A	11.4	N/A	25.8	N/A	95.6	N/A
2NG	N	N/A	2	N/A	2	N/A	2	N/A
	Average	N/A	18.0	N/A	33.8	N/A	145	N/A
	StDev	N/A	1.47	N/A	3.51	N/A	18.9	N/A
	Min	N/A	17.0	N/A	31.4	N/A	131	N/A
	Max	N/A	19.1	N/A	36.3	N/A	158	N/A
3NG	N	N/A	2	N/A	2	N/A	2	2
	Average	N/A	0.474	N/A	1.25	N/A	6.05	1.57
	StDev	N/A	0.0298	N/A	0.0720	N/A	0.521	0.152
	Min	N/A	0.453	N/A	1.20	N/A	5.69	1.46
	Max	N/A	0.495	N/A	1.31	N/A	6.42	1.67
LF1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF2BM	N	N/A	1	N/A	1	N/A	1	N/A
	Average	N/A	0.412	N/A	0.490	N/A	1.31	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	0.412	N/A	0.490	N/A	1.31	N/A
	Max	N/A	0.412	N/A	0.490	N/A	1.31	N/A
LF3BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WWTP1BM	N	2	N/A	N/A	N/A	N/A	N/A	N/A
	Average	0.44	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	0.03	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.42	N/A	N/A	N/A	N/A	N/A	N/A
	Max	0.47	N/A	N/A	N/A	N/A	N/A	N/A
LF1BG	N	N/A	2	1	2	N/A	2	2
	Average	N/A	10.2	1.91	11.9	N/A	26.1	7.71
	StDev	N/A	1.43	N/A	6.58	N/A	20.1	5.36
	Min	N/A	9.15	1.91	7.21	N/A	11.9	3.92
	Max	N/A	11.2	1.91	16.5	N/A	40.3	11.5
LF2BG	N	1	3	3	3	N/A	3	1
	Average	0.313	15.7	2.52	20.2	N/A	81.1	12.9
	StDev	N/A	5.54	0.37	4.30	N/A	39.1	N/A
	Min	0.313	10.5	2.28	16.3	N/A	47.0	12.9
	Max	0.313	21.6	2.94	25.0	N/A	123.9	12.9
LF3BG	N	4	4	4	4	1	4	2
	Average	0.473	11.1	4.85	13.9	3.77	46.6	11.3
	StDev	0.128	1.67	0.812	2.14	N/A	7.32	1.13
	Min	0.338	9.94	3.77	12.3	3.77	39.4	10.5
	Max	0.641	13.6	5.50	16.8	3.77	56.6	12.1
LF4BG	N	N/A	1	N/A	1	N/A	1	N/A
	Average	N/A	14.3	N/A	23.9	N/A	77.4	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	14.3	N/A	23.9	N/A	77.4	N/A
	Max	N/A	14.3	N/A	23.9	N/A	77.4	N/A
WWTP1BG	N	1	2	N/A	4	N/A	4	N/A
	Average	0.480	0.900	N/A	1.21	N/A	3.90	N/A

	StDev	N/A	0.041	N/A	0.494	N/A	1.20	N/A
	Min	0.480	0.871	N/A	0.756	N/A	2.77	N/A
	Max	0.480	0.930	N/A	1.65	N/A	5.11	N/A

NA – no statistics were determined because the concentrations were below the detection limit

Table 26. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 4

		1,2,4-Trimethylbenzene	sec-Butylbenzene	Phenol	bis(2-Chloroethyl)ether	1,3-Dichlorobenzene	1,4-Dichlorobenzene	p-Isopropyltoluene
1NG	N	2	2	N/A	N/A	N/A	N/A	2
	Average	311	8.94	N/A	N/A	N/A	N/A	14.1
	StDev	68.3	2.61	N/A	N/A	N/A	N/A	4.21
	Min	263	7.09	N/A	N/A	N/A	N/A	11.2
	Max	359	10.8	N/A	N/A	N/A	N/A	17.1
2NG	N	2	2	N/A	N/A	N/A	N/A	2
	Average	427	11.7	N/A	N/A	N/A	N/A	15.9
	StDev	67.1	1.28	N/A	N/A	N/A	N/A	3.25
	Min	379	10.8	N/A	N/A	N/A	N/A	13.6
	Max	474	12.6	N/A	N/A	N/A	N/A	18.2
3NG	N	2	2	N/A	N/A	N/A	N/A	2
	Average	11.1	0.359	N/A	N/A	N/A	N/A	0.545
	StDev	1.44	0.0574	N/A	N/A	N/A	N/A	0.0942
	Min	10.1	0.316	N/A	N/A	N/A	N/A	0.478
	Max	12.1	0.400	N/A	N/A	N/A	N/A	0.611
LF1BM	N	2	N/A	N/A	N/A	N/A	N/A	N/A
	Average	0.703	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	0.137	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.606	N/A	N/A	N/A	N/A	N/A	N/A
	Max	0.800	N/A	N/A	N/A	N/A	N/A	N/A
LF2BM	N	2	1	N/A	N/A	N/A	2	2
	Average	2.62	0.47	N/A	N/A	N/A	1.19	13.6
	StDev	2.36	N/A	N/A	N/A	N/A	1.11	9.78
	Min	0.954	0.47	N/A	N/A	N/A	0.41	6.66
	Max	4.29	0.47	N/A	N/A	N/A	1.98	20.5
LF3BM	N	N/A	N/A	N/A	N/A	N/A	N/A	1
	Average	N/A	N/A	N/A	N/A	N/A	N/A	0.447
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	0.447
	Max	N/A	N/A	N/A	N/A	N/A	N/A	0.447
WWTP1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	2
	Average	N/A	N/A	N/A	N/A	N/A	N/A	0.403
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	0.00
	Min	N/A	N/A	N/A	N/A	N/A	N/A	0.403
	Max	N/A	N/A	N/A	N/A	N/A	N/A	0.403
LF1BG	N	2	2	1	N/A	1	2	2
	Average	65.8	5.69	1.42	N/A	0.232	21.1	21.1
	StDev	56.2	4.49	N/A	N/A	N/A	18.5	24.4
	Min	26.1	2.51	1.42	N/A	0.232	8.04	10.4
	Max	106	8.87	1.42	N/A	0.232	34.2	44.8
LF2BG	N	3	3	N/A	1	2	3	3
	Average	238	12.1	N/A	0.838	0.368	93.9	242
	StDev	90.2	3.78	N/A	N/A	0.00187	36.2	80.3
	Min	144	8.30	N/A	0.838	0.367	54.3	158
	Max	323	15.85	N/A	0.838	0.370	125	318
LF3BG	N	2	3	2	2	N/A	4	3
	Average	128	10.5	1.46	0.864	N/A	112	661
	StDev	6.24	0.978	0.291	0.172	N/A	31.3	127
	Min	124	9.61	1.25	0.742	N/A	79.5	518
	Max	133	11.6	1.67	0.986	N/A	147	760
LF4BG	N	1	1	N/A	N/A	N/A	N/A	1
	Average	271	15.7	N/A	N/A	N/A	N/A	768
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	271	15.7	N/A	N/A	N/A	N/A	768
	Max	271	15.7	N/A	N/A	N/A	N/A	768
WWTP1BG	N	2	4	N/A	N/A	N/A	4	4
	Average	13.2	0.703	N/A	N/A	N/A	112	240

	StDev	0.428	0.233	N/A	N/A	N/A	75.3	233
	Min	12.9	0.457	N/A	N/A	N/A	38.4	28.4
	Max	13.5	0.970	N/A	N/A	N/A	217	549

NA – no statistics were determined because the concentrations were below the detection limit

Table 27. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 5

		Benzyl Alcohol	1,2-Dichlorobenzene	3,4-Methylphenol (o,p-cresol)	bis(2-chloroisopropyl)ether	n-Butylbenzene	N-nitroso-di-n-propylamine	Nitrobenzene
1NG	N	1	N/A	N/A	N/A	2	N/A	N/A
	Average	0.680	N/A	N/A	N/A	15.6	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	3.87	N/A	N/A
	Min	0.680	N/A	N/A	N/A	12.8	N/A	N/A
	Max	0.680	N/A	N/A	N/A	18.3	N/A	N/A
2NG	N	N/A	N/A	N/A	N/A	1	N/A	1
	Average	N/A	N/A	N/A	N/A	11.9	N/A	8.63
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	11.9	N/A	8.63
	Max	N/A	N/A	N/A	N/A	11.9	N/A	8.63
3NG	N	N/A	N/A	N/A	N/A	2	N/A	N/A
	Average	N/A	N/A	N/A	N/A	0.707	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	0.0416	N/A	N/A
	Min	N/A	N/A	N/A	N/A	0.678	N/A	N/A
	Max	N/A	N/A	N/A	N/A	0.737	N/A	N/A
LF1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF2BM	N	N/A	N/A	N/A	N/A	1	N/A	N/A
	Average	N/A	N/A	N/A	N/A	0.447	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	0.447	N/A	N/A
	Max	N/A	N/A	N/A	N/A	0.447	N/A	N/A
LF3BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WWTP1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF1BG	N	1	2	1	N/A	2	1	N/A
	Average	126	1.31	0.904	N/A	3.20	11.7	N/A
	StDev	N/A	1.30	N/A	N/A	2.94	N/A	N/A
	Min	126	0.387	0.904	N/A	1.12	11.7	N/A
	Max	126	2.23	0.904	N/A	5.27	11.7	N/A
LF2BG	N	1	3	N/A	N/A	3	1	N/A
	Average	148	2.36	N/A	N/A	12.1	6.06	N/A
	StDev	N/A	0.562	N/A	N/A	2.93	N/A	N/A
	Min	148	1.76	N/A	N/A	9.52	6.06	N/A
	Max	148	2.88	N/A	N/A	15.3	6.06	N/A
LF3BG	N	2	4	1	N/A	4	N/A	N/A
	Average	229	1.59	1.23	N/A	9.58	N/A	N/A
	StDev	19.8	0.259	N/A	N/A	1.66	N/A	N/A
	Min	215	1.38	1.23	N/A	8.18	N/A	N/A
	Max	243	1.97	1.23	N/A	11.7	N/A	N/A
LF4BG	N	N/A	1	N/A	N/A	N/A	N/A	N/A
	Average	N/A	2.11	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	2.11	N/A	N/A	N/A	N/A	N/A
	Max	N/A	2.11	N/A	N/A	N/A	N/A	N/A
WWTP1BG	N	N/A	N/A	N/A	N/A	3	N/A	N/A
	Average	N/A	N/A	N/A	N/A	1.41	N/A	N/A

	StDev	N/A	N/A	N/A	N/A	0.349	N/A	N/A
	Min	N/A	N/A	N/A	N/A	1.15	N/A	N/A
	Max	N/A	N/A	N/A	N/A	1.81	N/A	N/A

NA – no statistics were determined because the concentrations were below the detection limit

Table 28. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 6

		2,4-Dimethylphenol	1,2,4-Trichlorobenzene	Naphthalene	4-Chloroaniline	1,2,3-Trichlorobenzene	2-Methylnaphthalene
1NG	N	N/A	N/A	2	N/A	N/A	N/A
	Average	N/A	N/A	7.97	N/A	N/A	N/A
	StDev	N/A	N/A	0.0929	N/A	N/A	N/A
	Min	N/A	N/A	7.90	N/A	N/A	N/A
	Max	N/A	N/A	8.03	N/A	N/A	N/A
2NG	N	N/A	N/A	2	N/A	N/A	2
	Average	N/A	N/A	3.83	N/A	N/A	1.14
	StDev	N/A	N/A	0.991	N/A	N/A	0.260
	Min	N/A	N/A	3.13	N/A	N/A	0.958
	Max	N/A	N/A	4.53	N/A	N/A	1.33
3NG	N	N/A	N/A	2	N/A	N/A	2
	Average	N/A	N/A	0.518	N/A	N/A	0.194
	StDev	N/A	N/A	0.0132	N/A	N/A	0.200
	Min	N/A	N/A	0.509	N/A	N/A	0.180
	Max	N/A	N/A	0.528	N/A	N/A	0.208
LF1BM	N	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A
LF2BM	N	N/A	N/A	2	N/A	N/A	2
	Average	N/A	N/A	5.35	N/A	N/A	0.775
	StDev	N/A	N/A	2.34	N/A	N/A	0.192
	Min	N/A	N/A	3.69	N/A	N/A	0.640
	Max	N/A	N/A	7.00	N/A	N/A	0.911
LF3BM	N	N/A	N/A	N/A	N/A	N/A	2
	Average	N/A	N/A	N/A	N/A	N/A	0.175
	StDev	N/A	N/A	N/A	N/A	N/A	0.0533
	Min	N/A	N/A	N/A	N/A	N/A	0.137
	Max	N/A	N/A	N/A	N/A	N/A	0.212
WWTP1BM	N	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A
LF1BG	N	N/A	2	2	N/A	1	1
	Average	N/A	2.37	12.1	N/A	0.520	2.78
	StDev	N/A	3.05	15.5	N/A	N/A	N/A
	Min	N/A	0.22	1.11	N/A	0.520	2.78
	Max	N/A	4.53	23.1	N/A	0.520	2.78
LF2BG	N	1	3	3	N/A	3	3
	Average	1.27	1.99	151	N/A	0.410	18.9
	StDev	N/A	0.509	11.3	N/A	0.130	10.9
	Min	1.27	1.64	139	N/A	0.326	10.5
	Max	1.27	2.57	161	N/A	0.560	31.2
LF3BG	N	N/A	4	4	1	1	4
	Average	N/A	0.643	146	3.38	0.428	25.7
	StDev	N/A	0.162	71.6	N/A	N/A	9.40
	Min	N/A	0.486	69.2	3.38	0.428	14.1
	Max	N/A	0.807	217	3.38	0.428	33.4
LF4BG	N	N/A	1	1	N/A	1	1
	Average	N/A	1.29	101	N/A	0.317	13.8
	StDev	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	1.29	101	N/A	0.317	13.8
	Max	N/A	1.29	101	N/A	0.317	13.8
WWTP1BG	N	N/A	N/A	4	N/A	N/A	4
	Average	N/A	N/A	2.80	N/A	N/A	2.46

	StDev	N/A	N/A	0.518	N/A	N/A	0.641
	Min	N/A	N/A	2.34	N/A	N/A	1.52
	Max	N/A	N/A	3.48	N/A	N/A	2.91

Table 29. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 7

		1-Methylnaphthalene	Acenaphthene	4-Nitrophenol	Dibenzofuran	Diethylphthalate	Fluorene	Phenanthrene
1NG	N	2	N/A	N/A	N/A	N/A	N/A	N/A
	Average	2.92	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	0.654	N/A	N/A	N/A	N/A	N/A	N/A
	Min	2.46	N/A	N/A	N/A	N/A	N/A	N/A
	Max	3.38	N/A	N/A	N/A	N/A	N/A	N/A
2NG	N	2	N/A	N/A	N/A	N/A	N/A	N/A
	Average	0.643	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	0.173	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.521	N/A	N/A	N/A	N/A	N/A	N/A
	Max	0.766	N/A	N/A	N/A	N/A	N/A	N/A
3NG	N	1	N/A	N/A	N/A	N/A	N/A	N/A
	Average	0.0839	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.0839	N/A	N/A	N/A	N/A	N/A	N/A
	Max	0.0839	N/A	N/A	N/A	N/A	N/A	N/A
LF1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF2BM	N	1	N/A	N/A	N/A	1	N/A	N/A
	Average	0.408	N/A	N/A	N/A	0.500	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.408	N/A	N/A	N/A	0.500	N/A	N/A
	Max	0.408	N/A	N/A	N/A	0.500	N/A	N/A
LF3BM	N	2	N/A	N/A	N/A	1	N/A	N/A
	Average	0.114	N/A	N/A	N/A	0.546	N/A	N/A
	StDev	0.0331	N/A	N/A	N/A	N/A	N/A	N/A
	Min	0.0905	N/A	N/A	N/A	0.546	N/A	N/A
	Max	0.137	N/A	N/A	N/A	N/A	N/A	N/A
WWTP1BM	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Max	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LF1BG	N	1	N/A	1	N/A	N/A	N/A	N/A
	Average	1.58	N/A	1.74	N/A	N/A	N/A	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	1.58	N/A	1.74	N/A	N/A	N/A	N/A
	Max	1.58	N/A	1.74	N/A	N/A	N/A	N/A
LF2BG	N	3	3	3	3	1	2	1
	Average	9.60	2.70	1.90	1.04	0.390	1.10	0.869
	StDev	5.49	1.98	0.0672	0.812	N/A	0.842	N/A
	Min	5.59	1.16	1.82	0.458	0.390	0.508	0.869
	Max	15.9	4.94	1.95	1.97	0.390	1.70	0.869
LF3BG	N	4	4	4	3	1	2	N/A
	Average	12.1	2.10	2.08	1.18	0.962	0.839	N/A
	StDev	3.77	1.44	0.142	0.898	N/A	0.475	N/A
	Min	7.61	0.869	1.98	0.452	0.962	0.503	N/A
	Max	15.8	4.19	2.29	2.19	0.962	1.17	N/A
LF4BG	N	1	1	N/A	1	N/A	1	N/A
	Average	7.27	1.47	N/A	0.582	N/A	0.438	N/A
	StDev	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Min	7.27	1.47	N/A	0.582	N/A	0.438	N/A
	Max	7.27	1.47	N/A	0.582	N/A	0.438	N/A

WWTP1BG	N	4	N/A	4	N/A	N/A	N/A	N/A
	Average	1.27	N/A	2.85	N/A	N/A	N/A	N/A
	StDev	0.345	N/A	0.170	N/A	N/A	N/A	N/A
	Min	0.792	N/A	2.60	N/A	N/A	N/A	N/A
	Max	1.58	N/A	2.97	N/A	N/A	N/A	N/A

NA – no statistics were determined because the concentrations were below the detection limit

Table 30. Comparison of VOCs (ppmv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 8

		Di-n-butylphthalate	Bis(2-ethylhexyl) adipate	bis(2-Ethylhexyl) phthalate
1NG	N	N/A	N/A	N/A
	Average	N/A	N/A	N/A
	StDev	N/A	N/A	N/A
	Min	N/A	N/A	N/A
	Max	N/A	N/A	N/A
2NG	N	2	N/A	N/A
	Average	0.958	N/A	N/A
	StDev	0.0641	N/A	N/A
	Min	0.913	N/A	N/A
	Max	1.00	N/A	N/A
3NG	N	N/A	N/A	N/A
	Average	N/A	N/A	N/A
	StDev	N/A	N/A	N/A
	Min	N/A	N/A	N/A
	Max	N/A	N/A	N/A
LF1BM	N	N/A	N/A	N/A
	Average	N/A	N/A	N/A
	StDev	N/A	N/A	N/A
	Min	N/A	N/A	N/A
	Max	N/A	N/A	N/A
LF2BM	N	3	N/A	N/A
	Average	0.729	N/A	N/A
	StDev	0.339	N/A	N/A
	Min	0.483	N/A	N/A
	Max	1.12	N/A	N/A
LF3BM	N	4	N/A	N/A
	Average	0.759	N/A	N/A
	StDev	0.704	N/A	N/A
	Min	0.364	N/A	N/A
	Max	1.81	N/A	N/A
WWTP1BM	N	1	N/A	1
	Average	0.539	N/A	6.098
	StDev	N/A	N/A	N/A
	Min	0.539	N/A	6.098
	Max	0.539	N/A	6.098
LF1BG	N	N/A	N/A	N/A
	Average	N/A	N/A	N/A
	StDev	N/A	N/A	N/A
	Min	N/A	N/A	N/A
	Max	N/A	N/A	N/A
LF2BG	N	2	N/A	N/A
	Average	0.747	N/A	N/A
	StDev	0.248	N/A	N/A
	Min	0.572	N/A	N/A
	Max	0.923	N/A	N/A
LF3BG	N	4	N/A	N/A
	Average	0.841	N/A	N/A
	StDev	0.674	N/A	N/A
	Min	0.453	N/A	N/A
	Max	1.85	N/A	N/A
LF4BG	N	N/A	N/A	N/A
	Average	N/A	N/A	N/A
	StDev	N/A	N/A	N/A
	Min	N/A	N/A	N/A
	Max	N/A	N/A	N/A
WWTP1BG	N	1	1	4
	Average	0.816	0.183	1.79
	StDev	N/A	N/A	0.967

	Min	0.816	0.183	0.783
	Max	0.816	0.183	3.02

NA – no statistics were determined because the concentrations were below the detection limit

Table 31. Frequency of VOCs/SVOCs detected in 6 Natural Gas Samples

VOCs/SVOCs	Frequency of compound detected in Natural Gas Samples
Benzene	6
Toluene	6
Ethylbenzene	6
m/p-Xylenes	6
o-Xylene	6
Isopropylbenzene	6
n-Propylbenzene	6
1,3,5-Trimethylbenzene	6
1,2,4-Trimethylbenzene	6
sec-Butylbenzene	6
p-Isopropyltoluene	6
Naphthalene	6
2-Methylnaphthalene	6
n-Butylbenzene	5
1-Methylnaphthalene	5
Carbon Tetrachloride	4
Dibromochloromethane	4
Styrene	2
tert-Butylbenzene	2
Benzyl Alcohol	2
Di-n-butylphthalate	2
trans-1,3-Dichloropropene	1
bis(2-chloroisopropyl)ether	1
Nitrobenzene	1

Table 32. Frequency of VOC/SVOCs detected in 16 Landfill Biomethane Samples

VOCs and SVOCs	Frequency of compound detected in landfill biomethane samples
Benzene	15
Carbon Tetrachloride	11
Toluene	11
Di-n-butylphthalate	11
1,2-Dichloropropane	8
1,2,4-Trimethylbenzene	8
Trichloroethene	7
p-Isopropyltoluene	7
Tetrachloroethene	6
Ethylbenzene	6
m/p-Xylenes	6
1,4-Dichlorobenzene	6
Naphthalene	6
2-Methylnaphthalene	6
Diethylphthalate	6
o-Xylene	5
Isopropylbenzene	5
n-Propylbenzene	5
1,3,5-Trimethylbenzene	5
sec-Butylbenzene	5
n-Butylbenzene	5
1-Methylnaphthalene	5
1,1,1-Trichloroethane	4
1,2-Dichloroethane	4

1,1-Dichloropropene	4
Dibromomethane	4
Bromodichloromethane	4
Pyridine	4
cis-1,3-Dichloropropene	4
N-nitrosodimethylamine	4
trans-1,3-Dichloropropene	4
1,1,2-Trichloroethane	4
1,3-Dichloropropane	4
Dibromochloromethane	4
1,2-Dibromoethane	4
Chlorobenzene	4
1,1,1,2-Tetrachloroethane	4
Bromoform	4
Styrene	4
1,1,2,2-Tetrachloroethane	4
1,2,3-Trichloropropane	4
Bromobenzene	4
2-Chlorotoluene	4
4-Chlorotoluene	4
tert-Butylbenzene	4
Phenol	4
bis(2-Chloroethyl)ether	4
Aniline	4
2-Chlorophenol	4
1,3-Dichlorobenzene	4

Benzyl Alcohol	4
2-Methylphenol (m-cresol)	4
1,2-Dichlorobenzene	4
3,4-Methylphenol (o,p-cresol)	4
bis(2-chloroisopropyl)ether	4
N-nitroso-di-n-propylamine	4
Hexachloroethane	4
1,2-Dibromo-3-Chloropropane	4
Nitrobenzene	4
Isophorone	4
2-Nitrophenol	4
2,4-Dimethylphenol	4
bis(2-Chloroethoxy)methane	4
1,2,4-Trichlorobenzene	4
2,4-Dichlorophenol	4
4-Chloroaniline	4
Hexachlorobutadiene	4
1,2,3-Trichlorobenzene	4
4-Chloro-3-methylphenol	4
Hexachlorocyclopentadiene	4
2,4,6-Trichlorophenol	4
2,4,5-Trichlorophenol	4
Diphenylamine	4
Azobenzene	4
2-Chloronaphthalene	4
2-Nitroaniline	4

1,4-Dinitrobenzene	4
Dimethylphthalate	4
1,3-Dinitrobenzene	4
Acenaphthylene	4
2,6-dinitrotoluene	4
1,2-Dinitrobenzene	4
3-Nitroaniline	4
Acenaphthene	4
2,4-Dinitrophenol	4
4-Nitrophenol	4
Dibenzofuran	4
2,4-dinitrotoluene	4
2,3,4,6-Tetrachlorophenol	4
2,3,5,6-Tetrachlorophenol	4
4-Chlorophenyl-phenylether	4
Fluorene	4
4-Nitroaniline	4
4,6-Dinitro-2-methylphenol	4
n-Nitrosodiphenylamine	4
4-Bromophenyl phenyl ether	4
Hexachlorobenzene	4
Pentachlorophenol	4
Phenanthrene	4
Anthracene	4
Carbazole	4
Bis(2-ethylhexyl) adipate	4

Fluoranthene	4
Pyrene	4
Butylbenzylphthalate	4
Benz[a]anthracene	4
Chrysene	4
bis(2-Ethylhexyl)phthalate	4
Di-n-octylphthalate	4
Benzo[b]fluoranthene	4
Benzo[k]fluoranthene	4
Benzo[a]pyrene	4
Indeno[1,2,3-cd]pyrene	4
Dibenz[a,h]anthracene	4
Benzo[g,h,i]perylene	4

Table 33. VOC/SVOCs Detected in Raw Biogas from LF1 but not detected in Biomethane from LF1

VOC/SVOCs
1,2-Dichloroethane
Trichloroethene
Tetrachloroethene
Chlorobenzene
Styrene
o-Xylene
Isopropylbenzene
2-Chlorotoluene
n-Propylbenzene
1,3,5-Trimethylbenzene
tert-Butylbenzene
sec-Butylbenzene
Phenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
p-Isopropyltoluene
Benzyl Alcohol
1,2-Dichlorobenzene
3,4-Methylphenol (o,p-cresol)
n-Butylbenzene
N-nitroso-di-n-propylamine
1,2,4-Trichlorobenzene
Naphthalene
1,2,3-Trichlorobenzene
2-Methylnaphthalene
1-Methylnaphthalene
4-Nitrophenol

Table 34. VOC/SVOCs Detected in Biomethane from LF1 but in lower concentrations than in the Raw Biogas from LF1

VOC/SVOCs	Average Raw Biogas Concentration (ppbv)	Average Biomethane Concentration (ppbv)	OSHA PEL TWA (ppm)	NIOSH REL TWA (ppm)
Toluene	70.1	0.537	200	100
Ethylbenzene	63.3	0.348	100	100
m/p Xylenes	75.6	0.609	100	100
1,2,4 – Trimethylbenzene	65.8	0.703	none	25

Table 35. VOC/SVOCs Detected in Raw Biogas from LF2 but not detected in Biomethane from LF2

VOC/SVOCs
trans-1,3-Dichloropropene
Tetrachloroethene
Chlorobenzene
Styrene
1,1,2,2-Tetrachloroethane
Isopropylbenzene
2-Chlorotoluene
tert-Butylbenzene
bis(2-Chloroethyl)ether
1,3-Dichlorobenzene
Benzyl Alcohol
1,2-Dichlorobenzene
N-nitroso-di-n-propylamine
2,4-Dimethylphenol
1,2,4-Trichlorobenzene
1,2,3-Trichlorobenzene
Acenaphthene
4-Nitrophenol
Dibenzofuran
Fluorene
Phenanthrene

Table 36. VOC/SVOCs Detected in Biomethane from LF2 but in lower concentrations than in the Raw Biogas from LF2

VOC/SVOCs	Average Raw Biogas Concentration (ppbv)	Average Biomethane Concentration (ppbv)	OSHA PEL TWA (ppm)	NIOSH REL TWA (ppm)
Toluene	32.7	1.74	200	100
Ethylbenzene	78	1.15	100	100
m/p-Xylenes	71.7	1.42	100	100
o-Xylene	67.6	1.19	100	100
n-Propylbenzene	20.2	0.490	None	None
1,3,5-Trimethylbenzene	81.1	1.31	None	25
1,2,4-Trimethylbenzene	238	2.62	None	25
sec-Butylbenzene	12.1	0.47	None	None
1,4-Dichlorobenzene	93.9	1.19	75	None
p-Isopropyltoluene	242	13.6	None	None
n-Butylbenzene	12.1	0.447	None	None
Naphthalene	151	5.35	10	10
2-Methylnaphthalene	18.9	0.775	None	None
1-Methylnaphthalene	9.60	0.408	None	None

Table 37. VOC/SVOCs Detected in Raw Biogas from LF3 but not detected in Biomethane from LF3

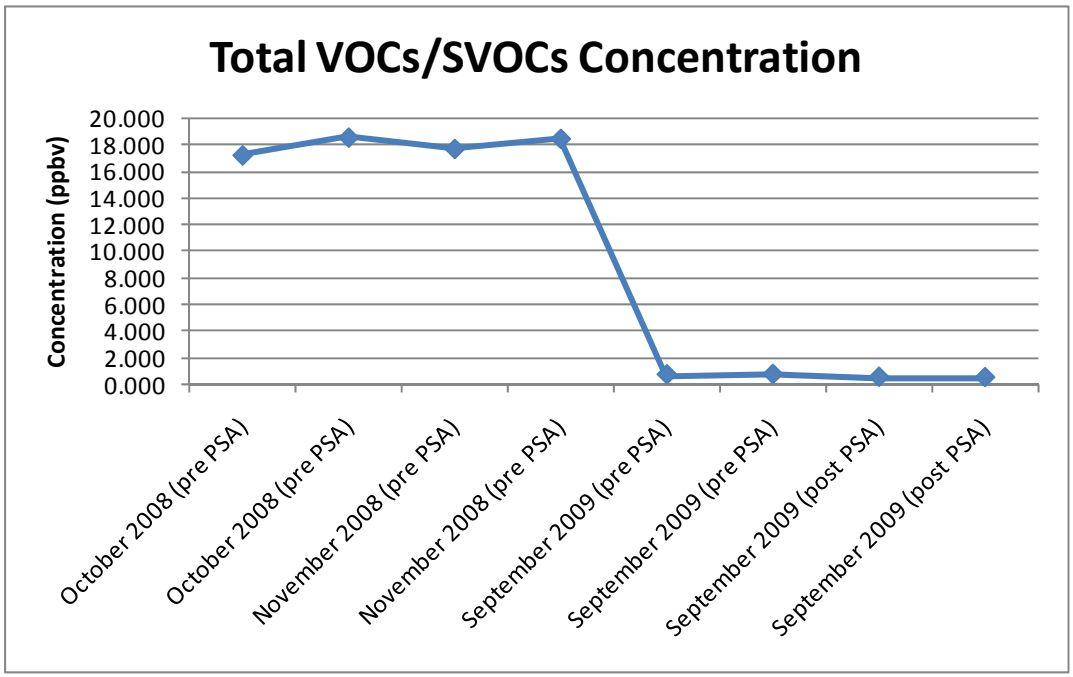
VOC/SVOCs
Chlorobenzene
Ethylbenzene
m/p-Xylenes
Styrene
o-Xylene
1,1,2,2-Tetrachloroethane
Isopropylbenzene
2-Chlorotoluene
n-Propylbenzene
4-Chlorotoluene
1,3,5-Trimethylbenzene
tert-Butylbenzene
1,2,4-Trimethylbenzene
sec-Butylbenzene
Phenol
bis(2-Chloroethyl)ether
1,4-Dichlorobenzene
1,2-Dichlorobenzene
3,4-Methylphenol (o,p-cresol)
n-Butylbenzene
1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
1,2,3-Trichlorobenzene

Acenaphthene
4-Nitrophenol
Dibenzofuran
Fluorene

Table 38. VOC/SVOCs Detected Raw Biogas Versus Biomethane (pre-PSA) in LF3

VOC/SVOCs	Average Raw Biogas Concentration (ppbv)	Average Biomethane Concentration (ppbv)	OSHA PEL TWA (ppm)	NIOSH REL TWA (ppm)
Toluene	35.1	6.69	200	100
Tetrachloroethene	2.16	0.475	100	None
p-Isopropyltoluene	661	0.447	None	None
2-Methylnaphthalene	25.7	0.175	None	None
1-Methylnaphthalene	12.1	0.114	None	None

Figure 11. Total VOC/SVOC Concentrations in LF3 Biomethane Samples Retrieved over the Project Duration (2008- 2009, pre- and post-PSA)



Aldehydes and Ketones

Thirty eight of the 46 samples collected for this project were analyzed for aldehydes and ketones using EPA 8315. A summary of the results in presented in Table 39 and Table 40. The complete set of results is provided in Appendix H.

Natural Gas

Table 39 and Table 40 present the average concentrations of the aldehydes/ketones detected in the six natural gas samples collected and analyzed. In total 11 of the 13 target aldehydes/ketones were detected in the entire set of natural gas samples.

The two samples collected from 1NG contained 6 of the 13 components in the aldehydes and ketones analysis with concentrations ranging from 0.750 ppbv (formaldehyde) to 33 ppbv (acetone).

The two samples collected from 2NG contained eight of the target components with concentrations ranging from 0.50 ppbv (pentanal) to 6.41 ppbv (formaldehyde).

The two samples collected from 3NG contained eight of the target compounds with concentrations ranging from 0.00536 ppbv (formaldehyde) to 0.285 ppbv (acetaldehyde).

Table 42 presents the frequency of aldehydes/ketones that were detected in the natural gas samples. It should be noted that although acetone was detected in the samples, it was also detected in the method blanks. ***Acetone is used actively in the laboratory, and was likely introduced to the blanks from the laboratory air.***

Landfills

Table 39 and Table 40 present the average concentrations of the aldehydes/ketones detected in the 12 landfill raw biogas samples and 16 landfill biomethane samples collected and analyzed. In total 10 of the target 13 aldehydes/ketones were detected in the entire set of landfill biomethane samples.

<u>LF1</u>

The four biomethane samples collected from LF1 contained four components with concentrations ranging from 0.171 ppbv (formaldehyde) to 2.90 ppbv (acetone) and these concentrations were lower than those observed from the natural gas samples. In addition only one compound was detected in LF1 but was not detected in the natural gas samples, acrolein. The two raw biogas samples collected from LF1 contained 12 components with concentrations ranging from 0.44 ppbv (hexanal) to 151 ppbv (acetone). ***The raw biogas contained 3 times more aldehydes/ketones than the biomethane from LF1.*** Nine of the aldehydes/ketones (propionaldehyde, crotonaldehyde, 2-butanone, methacrolein, butanal, benzaldehyde, pentanal, p-tolualdehyde and hexanal) that were detected in the rawbiogas from LF1 were not detected in the biomethane from LF1 indicating that these compounds were removed from the raw biogas during the clean-up process. The following aldehydes/ketones were detected in the raw biogas

from LF1 but were present in significantly lower average concentrations in the corresponding biomethane from LF1: formaldehyde (2.65 ppbv in the raw biogas and 0.798 ppbv in the biomethane), acetaldehyde (46.5 ppbv in the raw biogas and 1.63 ppbv in the biomethane) and acetone (91.1 ppbv in the raw biogas and 1.27 in the biomethane). One compound, acrolein (with an average concentration of 0.500 ppbv), was detected in the biomethane but not in the raw biogas from LF1. The results suggest that the gas clean up technology used at LF1 is effective in removing most aldehydes/ketones from the raw biogas.

LF2

The four biomethane samples collected from LF2 contained nine of the target components. The concentrations of the components detected in the LF2 biomethane samples ranged from 0.117 ppbv (crotonaldehyde) to 109 ppbv (acetone) and five of those components were detected at concentrations greater than those observed in the natural gas samples but below OSHA, NIOSH and ACGIH exposure limits. One component, crotonaldehyde was detected in the biomethane samples from LF2 but was not detected in the retrieved natural gas samples. Ten of the 13 target components were detected in the three LF2 raw biogas samples with concentrations ranging from 0.223 ppbv (propionaldehyde) to 207 ppbv (acetone). Of the 10 aldehydes/ketones detected in the raw biogas, three compounds (pentanal, p-tolualdehyde, hexanal) were not detected in the corresponding biomethane from LF2 indicating that these compounds were removed from the raw biogas during the clean-up process. The following aldehydes/ketones were detected in the raw biogas were present in lower average concentrations in the corresponding biomethane from LF2: formaldehyde (0.647 ppbv in raw biogas and 1.19 ppbv in biomethane), acetaldehyde (6.86 ppbv in raw biogas and 1.31 ppbv in biomethane), acetone (126 ppbv in raw biogas and 41.8 ppbv in biomethane), propionaldehyde (2.45 ppbv in raw biogas and 0.524 ppbv in biomethane), 2-butanone (138 ppbv in raw biogas and 10 ppbv in biomethane) and butanal (3.62 ppbv in raw biogas and 0.865 ppbv in biomethane). Two compounds (crotonaldehyde and methacrolein) were detected in the biomethane (concentrations less than 5 ppbv) from LF2 but not present in the raw biogas from LF2. The results suggest that the gas clean up technology used at LF2 can decrease the concentrations of most aldehydes/ketones that are present in the raw biogas.

LF3

The four biomethane samples collected from LF3 contained six of the target components with concentrations ranging from 0.385 ppbv (formaldehyde) to 314 ppbv (acetone) and four of those components were detected at concentrations greater than those observed in the natural gas samples but below OSHA, NIOSH and ACGIH exposure limits. The four biogas samples contained 11 of the target components with concentrations ranging from 0.213 ppbv (formaldehyde) to 400 ppbv (2-Butanone). ***The raw biogas contained almost 2 times more aldehydes/ketoness than the biomethane from LF3.*** Of the 11 aldehydes/ketones that were detected in the raw biogas from LF3, five (methacrolein, benzaldehyde, pentanal, p-tolualdehyde and hexanal) were not detected in the corresponding biomethane from LF3 indicating that these compounds were removed from the raw biogas during the clean-up process. The following four compounds were detected in the raw biogas were present in lower average concentrations in the corresponding biomethane from LF3: acetaldehyde (20.2 ppbv in raw biogas and 1.31 ppbv in biomethane), propionaldehyde (7.98 ppbv in raw biogas and 7.16 ppbv in biomethane), 2-

butanone (226 ppbv in raw biogas and 183 ppbv in biomethane), and butanal (6.04 ppbv in raw biogas and 4.18 ppbv in biomethane). Two compounds (formaldehyde and acetone) were detected in similar concentrations in the raw biogas and biomethane from LF3. The results suggest that the gas clean up technology used at LF3 can decrease the concentrations or remove most aldehydes/ketones that are present in the raw biogas. It should be noted that the biomethane samples collected from LF3 during September 2009 were not analyzed for aldehydes/ketones due to budget constraints therefore no comparisons can be made between pre-PSA biomethane and post- PSA biomethane.

Table 41 presents the frequency of the aldehydes/ketones that were detected in the landfill biomethane samples.

Wastewater Treatment Plants

Three biomethane samples were collected from WWTP1 and only two components were detected in these samples, acetaldehyde and acetone with average concentrations of 0.279 ppbv and 0.645 ppbv ± 0.106, both less than OSHA, NIOSH and ACGIH exposure limits. Seven components were detected in the WWTP1 raw biogas samples with concentrations ranging from 0.16 ppbv (acetone) to 4.73 ppbv (acetaldehyde).

Table 39. Comparison of Aldehydes and Ketones (ppbv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 1

	Analyte	Formaldehyde	Acetaldehyde	Acetone	Acrolein	Propionaldehyde	Methacrolein
1NG	N	1	2	2	NA	2	NA
	Mean	0.7	26.9	30.90	NA	1.20	NA
	Standard Deviation	NA	1.83	2.988	NA	0.17	NA
	Minimum	0.7	25.6	28.79	NA	1.08	NA
	Maximum	0.7	28.2	33.01	NA	1.32	NA
2NG	N	1	1	1	NA	1	1
	Mean	6.41	6.21	1.26	NA	1.29	0.566
	Standard Deviation	NA	NA	NA	NA	NA	NA
	Minimum	6.41	6.21	1.26	NA	1.29	0.566
	Maximum	6.41	6.21	1.26	NA	1.29	0.566
3NG	N	1	2	2	2	2	NA
	Mean	0.00536	0.271	0.206	0.0409	0.0855	NA
	Standard Deviation	N/A	0.0199	0.0105	0.0000387	0.00671	NA
	Minimum	0.00536	0.256	0.199	0.0409	0.0808	NA
	Maximum	0.00536	0.285	0.214	0.0409	0.0903	NA
LF1BM	N	3	4	4	2	NA	NA
	Mean	0.798	1.63	1.27	0.500	NA	NA
	Standard Deviation	0.606	0.823	1.15	0.361	NA	NA
	Minimum	0.171	0.725	0.228	0.245	NA	NA
	Maximum	1.38	2.60	2.90	0.755	NA	NA
LF2BM	N	2	4	4	NA	3	2
	Mean	1.19	1.31	41.8	NA	0.524	2.2
	Standard Deviation	1.18	0.906	48.3	NA	0.520	2.75
	Minimum	0.356	0.602	5.05	NA	0.217	0.224
	Maximum	2.02	2.55	109	NA	1.12	4.11
LF3BM	N	4	4	4	NA	4	NA
	Mean	1.41	9.31	221	NA	7.16	NA
	Standard Deviation	1.09	6.63	90.2	NA	1.29	NA
	Minimum	0.385	3.56	133	NA	6.14	NA
	Maximum	2.38	17.4	314	NA	9.02	NA
WWTP1BM	N	NA	1	3	NA	NA	NA
	Mean	NA	0.279	0.645	NA	NA	NA
	Standard Deviation	NA	N/A	0.106	NA	NA	NA
	Minimum	NA	0.279	0.523	NA	NA	NA
	Maximum	NA	0.279	0.715	NA	NA	NA
LF1BG	N	2	2	2	NA	2	1
	Mean	2.65	46.5	91.1	NA	14.4	109
	Standard Deviation	0.731	18.8	84.2	NA	1.92	N/A
	Minimum	2.13	33.2	31.6	NA	13.1	109
	Maximum	3.16	59.7	151	NA	15.8	109
LF2BG	N	3	3	3	NA	3	NA
	Mean	0.647	6.86	126	NA	2.45	NA
	Standard Deviation	0.271	5.87	80.0	NA	2.29	NA
	Minimum	0.363	0.762	46.6	NA	0.223	NA
	Maximum	0.901	12.5	207	NA	4.79	NA
LF3BG	N	4	4	4	NA	4	1
	Mean	0.537	20.2	170	NA	7.98	1.45
	Standard	0.393	16.7	91.8	NA	6.04	N/A

	Deviation						
	Minimum	0.213	3.41	44.8	NA	1.38	1.45
	Maximum	1.04	35.3	243	NA	15.1	1.45
LF4BG	on sample	0.74	7.40	368.29	NA	2.67	NA
WWTP1BG	N	1	3	4	NA	NA	NA
	Mean	0.727	2.55	0.609	NA	NA	NA
	Standard Deviation	N/A	2.24	0.476	NA	NA	NA
	Minimum	0.727	0.262	0.157	NA	NA	NA
	Maximum	0.727	4.73	1.237	NA	NA	NA

NA – no statistics were determined because the concentrations were below the detection limit

Table 40. Comparison of Aldehydes and Ketones (ppbv) for Landfill, Wastewater Treatment Plant and Natural Gas Sites – Part 2

	Analyte	Crotonaldehyde	2-Butanone	Butanal	Benzaldehyde	Pentanal	p-Tolualdehyde	Hexanal
1NG	N	NA	2	2.00	NA	NA	NA	NA
	Mean	NA	6.331	0.94	NA	NA	NA	NA
	Standard Deviation	NA	1.022	0.10	NA	NA	NA	NA
	Minimum	NA	5.609	0.87	NA	NA	NA	NA
	Maximum	NA	7.05	1.01	NA	NA	NA	NA
2NG	N	NA	NA	1	1	1	NA	NA
	Mean	NA	NA	0.684	1.72	0.496	NA	NA
	Standard Deviation	NA	NA	N/A	N/A	N/A	NA	NA
	Minimum	NA	NA	0.684	1.72	0.496	NA	NA
	Maximum	NA	NA	0.684	1.72	0.496	NA	NA
3NG	N	2	2	2	NA	NA	NA	NA
	Mean	0.0900	0.0944	0.0475	NA	NA	NA	NA
	Standard Deviation	0.0144	0.0375	0.0109	NA	NA	NA	NA
	Minimum	0.0798	0.0679	0.0398	NA	NA	NA	NA
	Maximum	0.100	0.121	0.0552	NA	NA	NA	NA
LF1BM	N	NA	NA	NA	NA	NA	NA	NA
	Mean	NA	NA	NA	NA	NA	NA	NA
	Standard Deviation	NA	NA	NA	NA	NA	NA	NA
	Minimum	NA	NA	NA	NA	NA	NA	NA
	Maximum	NA	NA	NA	NA	NA	NA	NA
LF2BM	N	2	2	3	2	NA	NA	NA
	Mean	0.37	10.0	0.865	1.29	NA	NA	NA
	Standard Deviation	0.365	12.2	0.663	1.27	NA	NA	NA
	Minimum	0.117	1.40	0.459	0.395	NA	NA	NA
	Maximum	0.633	18.7	1.63	2.19	NA	NA	NA
LF3BM	N	NA	2	4	NA	NA	NA	NA
	Mean	NA	183	4.18	NA	NA	NA	NA
	Standard Deviation	NA	22.1	4.46	NA	NA	NA	NA
	Minimum	NA	167	0.398	NA	NA	NA	NA
	Maximum	NA	198	9.34	NA	NA	NA	NA
WWTP1BM	N	NA	NA	NA	NA	NA	NA	NA
	Mean	NA	NA	NA	NA	NA	NA	NA
	Standard Deviation	NA	NA	NA	NA	NA	NA	NA
	Minimum	NA	NA	NA	NA	NA	NA	NA
	Maximum	NA	NA	NA	NA	NA	NA	NA
LF1BG	N	1	2	2	1	1	1	2
	Mean	18.4	85.1	30.9	10.2	5.04	1.71	3.44
	Standard Deviation	N/A	56.7	8.80	N/A	N/A	N/A	4.24
	Minimum	18.4	45.0	24.7	10.2	5.04	1.71	0.44
	Maximum	18.4	125	37.1	10.2	5.04	1.71	6.43
LF2BG	N	NA	3	3	2	1	1	1
	Mean	NA	138	3.62	10.3	17.4	57.0	0.730
	Standard Deviation	NA	49.1	2.76	0.743	N/A	N/A	N/A
	Minimum	NA	81.6	0.479	9.79	17.4	57.0	0.730
	Maximum	NA	169	5.66	10.84	17.4	57.0	0.730
LF3BG	N	NA	4	4	1	2	2	2
	Mean	NA	226	6.04	19.6	0.415	1.49	0.583

	Standard Deviation	NA	151	4.55	N/A	0.178	1.01	0.0528
	Minimum	NA	86.9	1.28	19.6	0.289	0.775	0.546
	Maximum	NA	400	11.7	19.6	0.54	2.20	0.621
LF4BG	one sample	6.93	344.87	3.95	NA	NA	0.14	NA
WWTP1BG	N	NA	1	NA	2	NA	1	1
	Mean	NA	0.298	NA	3.44	NA	0.411	2.72
	Standard Deviation	NA	N/A	NA	0.698	NA	N/A	N/A
	Minimum	NA	0.298	NA	2.94	NA	0.411	2.72
	Maximum	NA	0.298	NA	3.93	NA	0.411	2.72

NA – no statistics were determined because the concentrations were below the detection limit

Table 41. Frequency of Aldehydes/Ketones detected in 16 Landfill Biomethane Samples

Aldehydes/Ketones	Frequency of compound detected in Landfill Biomethane Samples
Acetaldehyde	12
Acetone	12
Formaldehyde	9
Propionaldehyde	7
Butanal	7
2-Butanone	4
Acrolein	2
Crotonaldehyde	2
Methacrolein	2
Benzaldehyde	2
Pentanal	0
p-Tolualdehyde	0
Hexanal	0

Table 42. Frequency of Aldehydes/Ketones detected in 6 Natural Gas Samples

Aldehydes/Ketones	Frequency of compound detected in Natural Gas Samples
Acetaldehyde	5
Acetone	5
Propionaldehyde	5
Butanal	5
2-Butanone	4
Formaldehyde	3
Acrolein	2
Crotonaldehyde	2
Methacrolein	1
Benzaldehyde	1
Pentanal	1
p-Tolualdehyde	0
Hexanal	0

Pesticides

The samples collected for this project were analyzed for pesticides using EPA 8081A. The complete set of results is provided in Appendix I.

Natural Gas

The samples collected from 1NG, 2NG, and 3NG did not contain any pesticides above the detection limit.

Landfills

The raw biogas and biomethane sample collected from LF1, LF2, and LF4 did not contain pesticides above the detection limit. The four raw biogas samples collected from LF3 also did not contain pesticides above the detection limit. Only one biomethane sample collected from LF3 contained 0.00252 ppbv 4,4'-DDT which was below OSHA and NIOSH levels as shown in Table 43. The other seven biomethane samples (pre and post PSA) from LF3 did not contain any pesticides above the detection limit.

Wastewater Treatment Plant

Two biomethane samples and three biogas samples collected from WWTP1 contained 4,4'-DDT with average concentrations of 0.00486 ppbv ± 0.00206 and 0.00589 ppbv ± 0.00248.

No samples were collected from WWTP2 for pesticides analysis.

Polychlorinated Biphenyls

The samples collected for this project were analyzed for polychlorinated biphenyls using EPA 8082M. The complete set of results is provided in Appendix J.

No PCBs were detected above the detection limit in any of the raw biogas or biomethane samples from LF1, LF2, LF3, LF4 and WWTP1 or the natural gas samples. Samples from WWTP2 were not collected for PCB analysis.

Summary of Second Tier Chemical Testing Results

A suite of compounds were detected in both natural gas and biomethane. The compounds presented in Table 43 are those that were:

1. Detected in the biomethane samples but in ***higher concentrations than in the natural gas samples*** (values are highlighted in red) or
2. The compounds that were ***detected*** in the biomethane samples but were ***not present in the natural gas samples***.

Only seven compounds were detected in biomethane and not detected in the natural gas samples, all of which were below Occupational Safety & Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), and American Conference of Governmental Industrial Hygienists (ACGIH) exposure limits.

Table 43. Second Tier Chemicals Detected in Biomethane Samples in Greater Concentrations[26] than in Natural Gas Samples

	LF1BM (ppbv)	LF2BM (ppbv)	LF3BM (ppbv)	WWTP1BM (ppbv)	OSHA	NIOSH
Aldehydes						
Acetone	---	108.60	314.07	---	1000 ppm	250 ppm
Acrolein	0.76	---	---	---	0.1 ppm	0.1 ppm
Propionaldehyde[27]	---	---	9.02	---	not established	not established
Crotonaldehyde	---	0.63	---	---	2 ppm	2 ppm
2-Butanone	---	18.69	198.18	---	200 ppm	200 ppm
Methacrolein	---	4.11	---	---	not established	not established
Butanal	---	1.63	9.34	---	not established	not established
Benzaldehyde	---	2.19	---	---	not established	not established
VOCs						
Benzene	---	---	14.30	---	1 ppm	0.1ppm
1,2-Dichloropropane	19.68	0.51	0.79	---	75 ppm	
Trichloroethene	---	0.60	1.48	---	100 ppm	
Tetrachloroethene	---	---	0.48	---	100 ppm	
1,1,2,2-Tetrachloroethane	---	---	---	0.47	not established	not established
1,4-Dichlorobenzene	---	1.98	---	---	75 ppm	
p-Isopropyltoluene	---	20.49	---	---	not established	not established
Diethylphthalate	---	0.50	0.55	---	not established	5 mg/m3
Di-n-butylphthalate[28]	---	1.12	1.81	---	5 mg/m3	
bis(2-Ethylhexyl)phthalate	---	---	---	6.10	5 mg/m3	5 mg/m3
Pesticides	---	---	---	---		
4,4'-DDT	---	---	0.003	0.01	1 mg/m3	0.5 mg/m3

[26] The concentrations presented in Table 43 are the maximum observed concentrations from each site (LF1, LF2, LF3 and WWTP1).
[27] ACGIH TWA for propionaldehyde is 20 ppm
[28] Di-n-butylphthalate is a plasticizer from an unknown origin, but may be present in the XAD sampling tubes.

Biological Testing Results

Quantification of Total Bacteria and Corrosion Causing Bacteria

Natural Gas

Six natural samples were collected from three natural gas pipelines, and all contained bacteria ranging from 6.7E+05 to 7.4E+06 per 100 scf. In terms of corrosion-causing bacteria tested, APB and IOB were detected in five samples, ranging from 4.2E+04 to 5.0E+05 per 100 scf and 4.3E+03 to 2.2E+04 per 100 scf, respectively. No SRB was detected in any of these samples.

Landfills

Sixteen biomethane samples from three landfills and one raw landfill gas sample were collected and analyzed for the number of total bacteria and corrosion-causing bacteria. The results from this qPCR analysis are presented in Table 44.

Four biomethane samples were collected from LF1 and the results indicate that the number of bacteria in the product biomethane ranged from 1.7E+06 to 6.7E+06 bacteria per 100 scf. A significant portion of the total bacteria present within these samples was found to be acid-producing bacteria (APB) ranging from 2.9E+03 to 2.8E+04 per 100 scf and iron-oxidizing bacteria (IOB) from 8.3E+02 to 2.1E+04 per 100 scf. Sulfate-reducing bacteria (SRB) were not detected in any LF1 samples.

Four biomethane samples collected from LF2 contained bacteria in wide range, from 3.0E+04 to 1.8E+07 per 100 scf. However, only one type of corrosion-causing bacteria was detected in this set of samples – APB (1.8E+03 to 3.0E+04 per 100 scf). IOB and SRB were not detected. The number of total bacteria and the percentage of APB of total bacteria changed significantly in the second sampling trip (sample LF2BM03BC and LF2BM04BC), which may be an indication of the changes of the anaerobic digestion process such as temperature and biomass.

The samples from LF3 were collected in three separate sampling trips. The samples from the 2nd trip (LF3BM03BC and LF3BM04BC) showed a slightly lower number of total bacteria; no IOB and SRB were detected from this trip; and one of the samples showed a high percentage of APB. Both samples (LF3BM01BC and LF3BM02BC) from trip one contained APB, and one of them also contained IOB. The four samples from the third trip (LF3BM05BC, LF3BM06BC, LF3BM07BC, and LF3BM08BC) seemed to have a higher number of total bacteria. Different from all other biomethane samples, these four samples also contained SRB, indicating that the bacteria population varies among different landfill operations and its profile may change over time depending on temperature, moisture, season, and biomass types, etc.

One raw landfill gas sample was collected from Landfill 4 (LF4) which contained 1.3E+06 total bacteria, 1.9E+04 APB, and 3.3E+03 IOB per 100 scf.

Wastewater Treatment Plant

Four biomethane samples from one wastewater treatment plant (WWTP1) were collected and analyzed for the number of total bacteria and corrosion-causing bacteria. The results from this analysis are presented in Table 44.

The biomethane samples from WWTP1 contained 9.9E+05 to 2.1E+06 of bacteria per 100 scf, and the major corrosion-causing bacteria detected was APB, ranging from 1.4E+04 to 6.5E+04 per 100 scf. IOB was detected in only one sample, and SRB was not detected in any of the four samples.

Table 44. Total Bacteria and Corrosion Causing Bacteria for 23 Samples

Sample ID	Total Bacteria	Total acid-producing bacteria (APB)	Total iron-oxidizing bacteria (IOB)	Total sulfate-reducing bacteria (SRB)
	Bacteria (#/100scf)			
1NG01BC	1.94E+06	6.55E+04	4.29E+03	BDL
1NG02BC	6.68E+05	1.45E+05	9.99E+03	BDL
2NG01BC	3.20E+06	BDL	2.16E+04	BDL
2NG02BC	2.06E+06	4.19E+04	9.49E+03	BDL
3NG01BC	4.86E+06	2.71E+05	BDL	BDL
3NG02BC	7.39E+06	4.99E+05	1.19E+04	BDL
LF1BM01BC	6.70E+06	2.73E+04	8.30E+02	BDL
LF1BM02BC	3.19E+06	2.75E+04	2.10E+04	BDL
LF1BM03BC	2.16E+06	8.50E+03	1.28E+04	BDL
LF1BM04BC	1.68E+06	2.92E+03	1.02E+04	BDL
LF2BM01BC	1.78E+07	2.97E+04	BDL	BDL
LF2BM02BC	3.75E+06	7.86E+03	BDL	BDL
LF2BM03BC	3.62E+04	5.13E+03	BDL	BDL
LF2BM04BC	2.98E+04	1.78E+03	BDL	BDL
LF3BM01BC	1.68E+06	4.66E+04	BDL	BDL
LF3BM02BC	2.22E+07	1.03E+04	1.36E+04	BDL
LF3BM03BC	8.79E+05	4.12E+04	BDL	BDL
LF3BM04BC	2.46E+04	BDL	BDL	BDL
LF3BM05BC	7.96E+06	1.83E+05	2.68E+04	2.87E+04
LF3BM06BC	8.23E+06	BDL	3.94E+04	4.02E+04
LF3BM07BC	4.84E+06	1.23E+05	BDL	2.47E+04
LF3BM08BC	5.29E+06	BDL	BDL	1.76E+04
LF4BG01BC	1.33E+06	1.90E+04	3.25E+03	BDL
WWTP1BM01BC	2.14E+06	2.25E+04	2.97E+03	BDL
WWTP1BM02BC	1.64E+06	6.54E+04	BDL	BDL

WWTP1BM03BC	9.85E+05	1.35E+04	BDL	BDL
WWTP1BM04BC	1.08E+06	1.91E+04	BDL	BDL

Considering the underlying distributions of the raw data, the summary statistics for the landfill biomethane samples were performed on the logarithms (base 10) of the raw data and then back transformed to the number of bacteria/100 scf. This type of recalculation is typically performed on biological data sets when determining the number of bacteria present within a sample. Table 45 presents the back-transformed statistics of the total bacteria and corrosion-causing bacteria results for the landfill samples. These statistics are shown only to provide a perspective on the variability that can exist in biomethane produced from a variety of landfills across the U.S. For example the average bacteria number detected in 16 landfill biomethane samples is 1.75E+06 ± 8.92E+00 per 100 scf with a distribution that is three orders of magnitude in size. The average acid-producing bacteria (APB) number detected in 13 landfill biomethane samples is 1.78E+04 ± 4.0E+00 per 100 scf with a distribution that is two orders of magnitude in size. Iron-oxidizing bacteria was detected in seven samples and contained an average of 1.18E+04 ± 3.53E+00 per 100 scf with a distribution of two orders of magnitude in size. The sulfate-reducing bacteria (SRB) were only detected in one set of samples from one landfill (LF3), averaging 2.66E+04 ± 1.41E+00 per100 scf.

Table 45. Back-Transformed Statistics for 16 Landfill Biomethane Samples

	Total Bacteria	Acid-producing Bacteria	Iron-oxidizing Bacteria	Sulfate-reducing Bacteria
No. of positive samples	16	13	7	4
Average	1.75E+06	1.78E+04	1.18E+04	2.66E+04
STDEV	8.92E+00	4.00E+00	3.53E+00	1.41E+00
Min	2.46E+04	1.78E+03	8.30E+02	1.76E+04
Max	2.22E+07	1.83E+05	3.94E+04	4.02E+04

Detection of Live Bacteria

The MPN technique is a statistical expression used to estimate population sizes of *live* microorganisms in a liquid medium. The methodology for the MPN technique used was dilution and incubation of triplicate cultures across several serial dilution steps. This technique relies on the pattern of positive and negative test results from the series of growth tests described above. The results of live bacteria from natural gas and biogas from landfill and wastewater treatment plant are summarized in Table 46. The results expressed as "less than" indicate that there was no positive growth of bacteria in the growth tests across several dilutions.

Natural Gas

Five of the six natural gas samples contained live bacteria, ranging from 1.1E+02 to 5.5E+05 per 100 scf of natural gas.

Landfills

A total of 16 biomethane samples were collected from 3 landfill sites (LF1, LF2, and LF3) for MPN test; only four of them were found to contain live bacteria (aerobic and/or anaerobic), ranging from 2.4E+02 to 3.0E+03 per 100 scf. The only raw landfill gas sample from LF4 contained 9.0E+01 aerobic bacteria per 100 scf. While all biomethane (16) and biogas (1) samples tested contained bacteria (2.5E+04 to 2.2E+07 per 100 scf) (see Table 44), the fact that only five samples (four biomethane and one raw landfill gas) tested positive for live bacteria indicated that most bacteria: 1) were killed during anaerobic digestion due to adverse environment; 2) were killed during the biogas clean-up processes; and/or 3) could not survive the sampling procedure.

Wastewater Treatment Plant

Live bacteria were found in all four biomethane samples collected from WWTP1, ranging from 5.4E+02 to 1.3E+03 bacteria per 100 scf biomethane (Table 46).

Table 46. Summary of Results from Most Probable Number Analysis

Sample ID	Anaerobic	Aerobic	Total
	Bacteria (#/100 scf)		
1NG01BC	<108*	1.08E+02	1.08E+02
1NG02BC	<170*	<170*	<340*
2NG01BC	4.39E+02	5.85E+03	6.29E+03
2NG02BC	<149*	5.46E+05	5.46E+05
3NG01BC	3.70E+04	5.84E+04	9.55E+04
3NG02BC	1.99E+05	4.19E+04	2.40E+05
LF1BM01BC	<170*	3.96E+02	3.96E+02
LF1BM02BC	<170*	<170*	<340*
LF1BM03BC	<92*	<92*	<184*
LF1BM04BC	<83*	<83*	<166*
LF2BM01BC	<76*	<76*	<152*
LF2BM02BC	<81*	<81*	<162*
LF2BM03BC	<184*	<184*	<368*
LF2BM04BC	<170*	<170*	<340*
LF3BM01BC	<102*	1.53E+03	1.53E+03
LF3BM02BC	<155*	<155*	<310*
LF3BM03BC	<117*	<117*	<234*
LF3BM04BC	<73*	<73*	<146*
LF3BM05BC	2.35E+02	<176*	2.35E+02
LF3BM06BC	2.31E+03	6.47E+02	2.96E+03
LF3BM07BC	<140*	<140*	<280*
LF3BM08BC	<123*	<123*	<246*
LF4BG01BC	<90*	9.00E+01	9.00E+01
WWTP1BM01BC	<74*	1.10E+03	1.10E+03
WWTP1BM02BC	3.98E+02	1.45E+02	5.43E+02

WWTP1BM03BC	<66*	5.52E+02	5.52E+02
WWTP1BM04BC	1.69E+02	1.08E+03	1.25E+03

Bacteria Identification

The data from the bacterial identification in presented in Appendix L.

Natural Gas

In a total of 113 bacteria sequences retrieved from 3 natural gas pipelines, the dominant bacteria profiles in 1NG and 2NG are very similar. In site 1NG, *Bacillus sp.* and *Paenibacillus sp.* accounted for 45.9% and 37.8% of total sequences retrieved from that site, respectively. In site 2NG, the same two species accounted for 47.4% and 36.8%, respectively. However, in 3NG, *Paenibacillus sp.* is more dominant, accounting for 63.2% of total sequences, followed by *Bacillus sp.* (21.1%). *Bacillus sp. and Paenibacillus sp.* are typical environmental isolates.

Landfills

Biomethane samples were collected during two sampling trips to LF1 and LF2 and three sampling trips to LF3. Biomethane from the third sampling event for LF3 was not subjected to biological testing, however. In addition raw biogas was collected from LF4.

For LF1, the dominant bacteria profiles from the two trips are very different. In the first trip (LF1BM01BC and LF1BM02BC), a total of 38 sequences were retrieved and the sequences were mainly related to *Staphylococcus epidermidis* (28.9%) and *Streptococcus salivarius* (13.2%); test results indicate that some of *Staphylococcus* might be still alive (Table 46). In the samples from the 2nd trip, the dominant bacteria carried over from the landfill were *Paenibacillus sp.* (67.5%) and *Bacillus sp.* (29.7%), though none of them may be alive in the biomethane samples (Table 46). The different bacterial profiles between the two sets of samples from LF1 indicate that the microbial population in the landfill may change depending on the degradation of the landfill biomass during a specific time period. Other parameters such as temperature and moisture in a particular gas well may also affect the bacterial profiles.

In LF2, the two sampling trips also showed very different bacteria profiles in the biomethane samples. The sequences from the two samples collected in the 1st trip were closely related to *Staphylococcus epidermidis* (52.8%) and *Bacillus sp.* (11.1%), while the sequences from the 2nd trip were found to be dominated by *Paenibacillus sp* (52.6%) and *Bacillus sp.* (39.5%). However, all of those bacteria might already be dead in the biomethane samples since the MPN tests did not show any bacteria growth in the medium.

The biomethane samples collected from LF3 in the 1st two sampling trips showed a very similar bacteria profile to LF2. *Staphylococcus epidermidis* and *Bacillus sp.* accounted for 44.7% and 10.5% of total sequences retrieved from the 1st trip, and the dominant sequences retrieved from the 2nd trip were *Paenibacillus sp* (52.6%) and *Bacillus sp.* (36.8%). The difference between LF2 and LF3 is that some bacteria identified in the samples from 1st trip of LF3 might be still alive. Bacteria identification was not performed for the samples collected from the 3rd trip to LF3 due to budget constraints.

In one raw biogas sample from LF4, the sequences were mainly related to *Bacillus sp.* (55%) and *Paenibacillus sp* (35%); some of which might be still alive based on MPN test results.

Wastewater Treatment Plants

The bacteria population in WWTP biomethane is more diverse compared to the population in landfill biomethane, though the dominant bacteria species is similar. Of 73 sequences retrieved from 4 WWTP biomethane samples, 47.4% was closed related to *Bacillus sp*., 31.6% to *Paenibacillus sp*., and 5.3% to *Streptococcus salivarius*. Some of those dominant bacteria are probably still alive in the biomethane samples as indicated by the MPN tests.

Specific tests for pathogenesis of identified bacteria species was not performed. However, bacteria such as *Streptococcus salivarius* and *Staphlococcus epidermis* are not typical environmental isolates; rather, they are found associated with the human body. Why these particular genus and species were isolated from biomethane samples from landfill and wastewater treatment plants is not entirely clear. Maybe the contamination of biomass in landfill and wastewater treatment plants with pathogens with human or animal origin play a role in this finding.

Spore Detection and Identification

The results from the spore quantification are presented in
Table 47 and the identification results are presented in Appendix L.

Natural Gas

Six natural gas samples were collected from 3 natural gas sites (two samples per site). Spore-forming bacteria were detected in only one sample from site 1NG which contained 1.8E+03 anaerobic spores per 100 scf. The sequencing results indicated that the spore-forming bacteria in this natural gas sample is closely related to *Paenibacillus glucanolyticus*.

Landfills

No spore-forming bacteria were detected in Landfills 1, 2 and 4. Three of the four samples collected from Landfill 3 in the 1st two sampling trips contained anaerobic spores ranging from 1.7E+02 to 4.9E+02 spores per 100 scf, and the bacteria sequences retrieved from these three samples were closely related to various *Bacillus sp.*, mainly *B. firmus* and *B. licheniformis*. The samples collected from the 3rd trip to LF3 showed aerobic spore-forming bacteria in 2 of 4 samples, and anaerobic spores in 1 sample; however, the sequence identification of spore-forming bacteria was not performed on trip 3 samples.

Wastewater Treatment Plant

Spore-forming bacteria were detected in all four samples collected from WWTP1 ranging from 2.5E+03 to 1.21E+04 spores per 100 scf. The 39 sequences retrieved are all closely related to *Paenibacillus sp*., mainly *P. glucanolyticus.*

Because bacteria and spores are classified as particulate matter under most gas quality tariffs, they can be filtered to acceptable levels in the resulting gas. Preliminary studies performed by GTI suggest that this may be possible, although the filtration method and confirmatory testing procedure are still under development.

Table 47. Summary of Results from Spore Analysis

Sample ID	Aerobic	Anaerobic	Total
	Spores (#/100 scf)		
1NG01BC	*	1.79E+03	1.79E+03
1NG02BC	*	*	*
2NG01BC	*	*	*
2NG02BC	*	*	*
3NG01BC	*	*	*
3NG02BC	*	*	*
LF1BM01BC	*	*	*
LF1BM02BC	*	*	*
LF1BM03BC	*	*	*
LF1BM04BC	*	*	*
LF2BM01BC	*	*	*
LF2BM02BC	*	*	*
LF2BM03BC	*	*	*
LF2BM04BC	*	*	*
LF3BM01BC	*	1.70E+02	1.70E+02
LF3BM02BC	*	*	*
LF3BM03BC	*	1.94E+02	1.94E+02
LF3BM04BC	*	4.87E+02	4.87E+02
LF3BM05BC	2.94E+02	*	2.94E+02
LF3BM06BC	9.24E+02	1.39E+03	2.31E+03
LF3BM07BC	*	*	*
LF3BM08BC	*	*	*
LF4BG01BC	*	*	*
WWTP1BM01BC	2.46E+03	*	2.46E+03
WWTP1BM02BC	3.62E+03	*	3.62E+03
WWTP1BM03BC	6.62E+03	*	6.62E+03
WWTP1BM04BC	*	1.21E+04	1.21E+04

*no spores detected

Conclusions and Recommendations

The results from the analytical testing of biomethane (cleaned biogas) samples collected from LF1, LF2, and WWTP1 indicates that *average* concentrations for Tier I chemical and physical properties were within the range of typically included in natural gas tariffs requirements, as compiled in AGA Report 4A as well as other references. With the exception of nitrogen, heating value content and total diluents, *average* chemical and physical properties for *pre-PSA* treated LF3 biomethane was also within the range of typically included in natural gas tariffs requirements, as compiled in AGA Report 4A as well as other references. However, after subjected to PSA treatment, LF3 biomethane was upgraded to a higher quality biomethane product, typical of natural gas tariff requirements, as compiled in AGA Report 4A as well as other references. Of note, pre-PSA values for methane in samples retrieved in September, 2009 averaged 90.3%; post-PSA values for methane increased to an average of 97.23%. Concurrently, nitrogen concentrations pre-PSA averaged 9.16% while post-PSA values averaged 2.78%. Carbon dioxide was completely removed through PSA treatment. Overall, gross heating value of the post-PSA biomethane was increased to 969.2. Additionally, sulfur concentrations were below detection post-PSA.

The data indicates that composition of each landfill tested produced a biogas of different composition. Some possessed a greater quantity of trace constituents (Tier II), while others possessed lesser quantities. Results of testing of pre-PSA upgraded biomethane from LF3 during the period of fall, 2008 to fall, 2009 showed that biomethane constituent profiles changed over the course of the year. Because corresponding biogas was not collected during the last sampling event (fall, 2009), it is unclear if the change was due to biogas quality or changes in the pre-PSA cleanup system However, it was clear that post-PSA samples of biomethane from LF3 were substantially upgraded from pre-PSA biomethane quality, in terms of Tier I and Tier II profiles. The following target analytes examined in the **Tier I** chemical tests were **detected in some biomethane samples from specific landfill and wastewater treatment plant samples at concentrations *greater than detected in the collected natural gas samples*:** carbon dioxide, nitrogen, hydrogen sulfide, dimethyl sulfide, and zinc. However, some methane concentrations from the landfill and wastewater treatment biomethane were also higher than found in natural gas. The average concentrations are shown in the table below (also refer to following chart, numbers in red for further detail).

Component	NG	LF Biomethane	WWTP Biomethane
Hydrogen	BDL	0.8%	BDL
Carbon Dioxide	0.47%	0.80%	0.60%
Nitrogen	0.19%	4.00%	BDL
Hydrogen sulfide	0.33 ppmv	0.45 ppmv	0.11 ppmv
Dimethly sulfide	0.17 ppmv	1.03 ppmv	BDL
Zinc	61 µg/m3	62 µg/m3	110 µg/m3

Several Tier I target analytes were **detected in selected landfill and wastewater treatment plant biomethane samples that were *not detected in the collected natural gas samples***: hydrogen, sulfur dioxide, carbonyl sulfide, copper, mercury, octamethylcyclotetrasiloxane (D4), dichlorodifluoromethane (CFC-12), 1,2-dichlorotetrafluoroethane (CFC-114), trichlorofluoromethane (CFC-11), chloroethane, and chloroethene (vinyl chloride). The halocarbons detected were in concentrations as much as three orders of magnitude below OHSA exposure limits. These results are summarized in the table below (see numbers in black).

The results from the **Tier II** chemical tests indicate that **ten VOC and SVOC compounds, eight aldehydes/ketone compounds, and one pesticide was detected in selected landfill and wastewater treatment plant biomethane samples at concentrations (less than 1 ppmv) *greater than or equal to the natural gas samples***, however, concentrations of all of these compounds were below (as much as four orders of magnitudes lower) OSHA, NIOSH and ACGIH exposure limits (see table below). Furthermore, only seven compounds (highlighted in yellow) were detected in biomethane and not detected in the natural gas samples, all of which were below OSHA exposure limits. Testing of samples pre and post PSA at LF3 indicated that PSA treatment removed 100% of VOC/SVOC constituents from the biomethane. Conversely, raw biogas from all tested landfills and the wastewater treatment facility possessed up to 4 times as many VOCs/SVOCs as cleaned biomethane and up to 3 times as many aldehydes/ketones as cleaned biomethane. The raw biogas and biomethane sample collected from LF1, LF2, and LF4 did not contain pesticides above the detection limit. The four raw biogas samples collected from LF3 also did not contain pesticides above the detection limit. Only one biomethane sample collected from LF3 contained 0.00252 ppbv 4,4'-DDT which was below OSHA and NIOSH levels as shown in Table 43. The other seven biomethane samples (pre and post PSA) from LF3 did not contain any pesticides above the detection limit. Two biomethane samples and three biogas samples collected from WWTP1 contained 4,4'-DDT with average concentrations of 0.00486 ppbv ± 0.00206 and 0.00589 ppbv ± 0.00248. No PCBs were detected above the detection limit in any of the raw biogas or biomethane samples from LF1, LF2, LF3, LF4 and WWTP1 or the natural gas samples. Samples from WWTP2 were not collected for PCB analysis Biogas and biomethane samples were collected for siloxanes analysis. All biogas samples contained siloxanes, However, siloxane concentrations were substantially decreased in biomethane samples; LF2 and LF3 did not contain siloxanes above the detection limit. The biomethane samples collected from LF1 contained octamethylcyclotetrasiloxane (D4) at an average concentration of 2.6 ppmv ± 2.5.

	LF1BM	LF2BM	LF3BM	WWTP1BM	OSHA	NIOSH
Major Components (mol%)						
Hydrogen	0.80	---	---	---	NA	NA
Carbon Dioxide	1.42	0.94	1.00	---	NA	NA
Nitrogen	1.32	3.27	9.49	---	NA	NA
Methane	97.90	97.30	---	99.50	NA	NA
Sulfur Compounds (ppmv)						
Sulfur Dioxide	0.08	---	0.06	---	TWA 5 ppm (13 mg/m^3)	TWA 2 ppm (5 mg/m^3) ST 5 ppm (13 mg/m^3)
Hydrogen sulfide	---	0.53	---	---	C 20 ppm 50 ppm 10-minute maximum peak	C 10 ppm (15 mg/m3) 10-minute
Dimethyl Sulfide[29]	---	---	1.73	1.88	not established	not established
Volatile Metals (µg/M3)						
Copper	250	---	206	---	TWA 1 mg/m^3	TWA 1 mg/m^3
Mercury	---	---	0.28	0.27	C 0.1 mg/m^3	0.05 mg/m^3 skin
Zinc	11.00	---	---	84	not established	not established
Siloxanes (ppmv as Si)						
Octamethylcyclotetrasiloxane (D4)	2.55	---	---	---	not established	not established
Halocarbons (ppmv)						
Dichlorodifluoromethane (CFC-12)	3.24	2.52	3.60	---	1000 ppm	1000 ppm
1,2-Dichlorotetrafluoroethane (CFC-114)	---	0.11	0.17	---	1000 ppm	1000 ppm
Trichlorofluoromethane (CFC-11)	---	0.16	0.24	---	1000 ppm	1000 ppm
Chloroethane	---	0.62	0.66	---	1000 ppm	not established
Chloroethene (Vinyl Chloride)	---	0.33	0.25	---	TWA 1 ppm C 5 ppm [15-minute]	not established

[29] ACGIH TWA for dimethyl sulfide is 10 ppm

	LF1BM (ppbv)	LF2BM (ppbv)	LF3BM (ppbv)	WWTP1BM (ppbv)	OSHA	NIOSH
Aldehydes						
Acetone	---	108.60	314.07	---	1000 ppm	250 ppm
Acrolein	0.76	---	---	---	0.1 ppm	0.1 ppm
Propionaldehyde[30]	---	---	9.02	---	not established	not established
Crotonaldehyde	---	0.63	---	---	2 ppm	2 ppm
2-Butanone	---	18.69	198.18	---	200 ppm	200 ppm
Methacrolein	---	4.11	---	---	not established	not established
Butanal	---	1.63	9.34	---	not established	not established
Benzaldehyde	---	2.19	---	---	not established	not established
VOCs						
Benzene	---	---	14.30	---	1 ppm	0.1ppm
1,2-Dichloropropane	19.68	0.51	0.79	---	75 ppm	
Trichloroethene	---	0.60	1.48	---	100 ppm	
Tetrachloroethene	---	---	0.48	---	100 ppm	
1,1,2,2-Tetrachloroethane	---	---	---	0.47	not established	not established
1,4-Dichlorobenzene	---	1.98	---	---	75 ppm	
p-Isopropyltoluene	---	20.49	---	---	not established	not established
Diethylphthalate	---	0.50	0.55	---	not established	5 mg/m3
Di-n-butylphthalate[31]	---	1.12	1.81	---	5 mg/m3	
bis(2-Ethylhexyl)phthalate	---	---	---	6.10	5 mg/m3	5 mg/m3
Pesticides	---	---	---	---		
4,4'-DDT	---	---	0.003	0.01	1 mg/m3	0.5 mg/m3

Biological testing of landfill biomethane indicated that bacterial profiles change over time. The results from the biological analyses indicate that the most commonly detected corrosion causing bacteria found in the biomethane samples (landfill and WTTP) and natural gas samples was acid-producing bacteria, *with higher concentrations detected in the natural gas samples than the biomethane samples*. Iron-oxidizing bacteria were also detected in both types of samples

[30] ACGIH TWA for propionaldehyde is 20 ppm
[31] Di-n-butylphthalate is a plasticizer from an unknown origin, but may be present in the XAD sampling tubes.

while sulfate-reducing bacteria were only detected in biomethane samples collected from LF3. Live aerobic and anaerobic bacteria were also detected in the natural gas samples. While all landfill biomethane samples tested contained bacteria (2.5E+04 to 2.2E+07 per 100 scf), the fact that only five samples (four biomethane and one raw landfill gas) tested positive for live bacteria suggest that most bacteria: 1) were killed during anaerobic digestion due to adverse environment; 2) were killed during the biogas clean-up processes; and/or 3) did not survive the sampling procedure. Live bacteria were detected in all four of the WWTP samples. Spores were also detected in several of the biomethane samples but were detected in only one of the natural gas samples. Most of the bacteria and spores detected in the samples were identified as being related to *Bacillus sp*, *Paenibacillus sp and Staphylococcus salivarius* and *Staphlococcus epidermis*. *Bacillus sp. and Paenibacillus sp.* are typical environmental isolates. Bacteria such as *Streptococcus salivarius* and *Staphlococcus epidermis* are not typical environmental isolates; rather, they are found associated with the human body. Why these particular genus and species were isolated from biomethane samples from landfill and wastewater treatment plants is not entirely clear. It is possible that the contamination of biomass in landfill and wastewater treatment plants with pathogens with human or animal origin play a role in this finding.

It is clear from this study that a further and more expanded database is required in order to draw firm conclusions. Of note, the following sample sets should be independently retrieved and analyzed using standard protocols for the parameters listed in this report:

- Samples from one landfill: upgraded biomethane, in triplicate (for statistical purposes) over a period of at least a year, in order to examine biomethane characteristics through a four season period. Concurrent sampling of biogas would be additionally helpful to assess the performance of the upgrading system versus the constituent profile in the landfill gas product
- Samples (triplicate) from a wide variety of landfills upgrading biogas to quality biomethane (expanded study). Samples should be retrieved from all regions of the US (northeast, south, Mid-west and west coast). Samples should be retrieved in triplicate, for statistical purposes. Natural gas samples from the network into which the biomethane is introduced should be collected, for accurate comparison.
- Samples retrieved from a variety of sites which upgrade biogas using different upgrading systems.
- Historical perspective of each landfill, to provide background information and understanding of chemical profile.
- Samples of natural gas across the US, for baseline analysis and comparison

Using this data, a more complete understanding of landfill biomethane, in comparison to natural gas, may be achieved. Without this data, inaccurate conclusions may be drawn and Guidance for landfill biomethane introduction is limited.

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Terminology and Definitions

Anaerobic Digestion (AD) - Anaerobic digestion (AD) is the process in which complex organic matter (source material) is broken down into simpler constituents, directly through the action of microorganisms and in the absence of oxygen.

Biogas - Organic materials that may be converted to gaseous fuel through digestion (breakdown) or high temperature conversion (gasification). These materials may include all organic substances, but some biomass materials possess more caloric value than others, thereby producing more energy. Biomass sources vary widely and include animal wastes, livestock operation residues, forest and mill residues, agricultural crops and wastes, wood and wood wastes, aquatic plants, fast-growing trees and plants, and municipal and industrial wastes.

Biomethane - The portion of biogas which consists primarily of methane. Biomethane is generally extracted from raw biogas through cleanup or "conditioning", to remove "other" gases which impact gas quality. Using effective biogas cleanup (removal of gases which effect overall gas quality), biomethane can be up to 99% methane, with concentrations of "other" gases. However, "raw" biogas may contain only 35 – 65% methane. Biomethane is considered suitable for many end-use applications and may be considered suitable for inclusion in general pipeline systems, depending upon other characteristics of the gas and specific tariff requirements.

Landfill Gas (LFG) – Gases (predominantly methane, carbon dioxide and others) generating from the anaerobic digestion of materials contained in a landfill.

Wastewater Treatment Plant Biogas (WWTP biogas) – Gases (predominantly methane, carbon dioxide and others) generating from the anaerobic digestion of materials contained in an anaerobic digester (wastewater treatment process)

Colony Forming Units (CFU) - a measure of viable bacterial or fungal numbers. Unlike in direct microscopic counts where all cells, dead and living, are counted, CFU measures viable cells. By convenience the results are given as cfu/ml, colony-forming units per milliliter.

Spore - or endospore - is a dormant, tough, and non-reproductive structure produced by bacteria from the Firmicute phylum which forms when a bacterium produces a thick internal wall that encloses its DNA and part of its cytoplasm. Examples include Bacillus and Clostridium.

Total Bacteria - the total amount of bacteria present within a sample based on Quantitative Polymerase Chain Reaction (qPCR), a genetic technique that allows for the direct detection and quantification of total (live and dead) heterogeneous bacteria[32]

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[32] Zhu, X.Y., et al., *Rapid detection and quantification of microbes related to microbiologically influenced corrosion using quantitative polymerase chain reaction.* Corrosion, 2006. **62**: p. 950-955.

Live Bacteria – total live bacteria as detected via the most probable number (MPN) technique which estimates microbial population sizes in a liquid substrate. The MPN method involves the dilution and incubation of replicated cultures across several serial dilutions. This technique relies on the pattern of positive and negative test results following inoculation of a suitable test medium. The results are used to derive a population estimate based on the mathematics of Halvorson and Ziegler[33].

Dead Bacteria – non-viable (living) bacterial bodies

Volatile Organic Compounds (VOC) – organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones, and other light hydrocarbons are VOCs. compounds which volatilize at atmospheric pressure and temperature

Semi-volatile Organic Compounds (SVOC) – compounds with higher vapor pressures than VOCs and therefore are released as gas much more slowly from materials.

Specific Gravity - the ratio of the density of a given solid or liquid substance to the density of water at a specific temperature and pressure, typically at 4 °C (39 °F) and 1 atm (760.00 mmHg) making it a dimensionless quantity

Heating Value - gross heating value, also known as Higher Heating Value (HHV), is defined as the amount of energy transferred as heat from the complete, ideal combustion of the gas with air, at a standard temperature, in which all the water formed by the reaction condenses to liquid.

Wobbe Index – a numerical value that is found by dividing the square root of the relative density (a key orifice flow parameter) into the heat concentration (or Btu per standard cubic foot) of the gas. Basically, the Wobbe Index indicates the relative amount of energy that would flow through small burner orifice jet[34].

Detection Limit - the minimum concentration that can be detected under ideal analytical conditions

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[33] Halvorson, H. D. & Ziegler, N. R., 1933. *Application of statistics to problems in bacteriology. I.A means of determining populations by the dilution method.* Journal of Bacteriology, 25, 101

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Appendices

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Appendix A – Sampling SOPs

ANALYTICAL SAMPLING PROCEDURE

Sampling for Biological Materials, specifically microorganisms and spore.

Two filters will be placed inside of a stainless steel container (length: 6.3 in, diameter: 2.3 in). The filters that will be used are as follows:

Pall Life Sciences Cat#28150-021, TF 200, 0.2 µm, 47 mm
Pall Life Sciences Cat#28139-244, Zefluor, 2 µm, 47 mm

1. In the direction of the gas flow, the O-ring, filter and metal screen should be placed in the MIC sampler container, placing the 2.0 µm filter followed by the 0.2 µm filter in second stainless steel container.
2. Attach the MIC sampling container securely to the sampling line using appropriate connections. At other end of MIC sampler container, attach to dry test meter. Take note of dry test meter reading, ambient temperature and pressure. Downstream from the dry test meter, attach personal sampling pump to flow at fastest rate by turning the screw on the bottom left of the sampling pump completely clockwise.
3. Open the sample line valve fully and check all fittings for leakage. Correct any leaks found. Make note of start time. Allow approximately 400L of samples gas to pass through the container. Turn off personal sampling pump, and then close the sample line shut-off valve. Record stop time and dry test meter reading. Cautiously loosen the tubing connection at the cylinder inlet valve and allow the residual gas in the sampling line to bleed off.

Note: There will still be gas at full system pressure trapped in the interconnecting tubing if MIC sampler container is connected directly to sampling port.

4. Disconnect the tubing from the inlet valve. Remove the filters from the sampling container. The filter will be folded with sample side inward, and placed in a zip-lock bag. The filter sample can be stored temporarily in refrigerator, and should be shipped to GTI as soon as practical with overnight delivery with ice in the package.

ANALYTICAL SAMPLING PROCEDURE

GILDED SILICA SORBENT TUBES FOR MERCURY ANALYSIS

1. Ascertain that the sample can be obtained at a pressure not exceeding 10 psig and a flow of at least 1.0 liter per minute, and that these conditions can be maintained over the entire sampling period. Pressure- and flow-control devices may be required. The sampling pressure should be kept as low as possible at the specified flow rate. A total flow volume measurement device, such as a dry test meter, can be used to record the exact amounts of gas sampled for more accurate sampling.

   Note: Any sampling lines or control devices should be constructed from materials that are inert and non-sorbing to mercury.

2. The distance from the sampling point to the sampler should be minimized because mercury is easily absorbed on tubing lines and sampling equipment. **The entire sampling system must be passivated with the sample gas prior to any sampling, especially if low levels of mercury are expected.** Stainless tubing must be used for connections upstream of the pressure regulator. High density Teflon or stainless steel tubing is preferred for connections downstream of the regulator. Flexible silicone tubing may be used to make short connections to sampling tubes. Any pumps, metering valves, etc. or other flow- and pressure-controlling devices should be located downstream of the sampler. The entire sampling line should be heated to prevent condensation, especially when a pressure reduction device is used to step down the pressure for sampling.

3. Using a calibrated rotameter, determine an approximate flow control setting for a 1.0 liter per minute flow at the applied pressure. This will save time when actually setting up the first sorbent tube, and will start to passivate the sampling system.

4. Please mark all sorbent tubes with an arrow, front to back, on their sides in the direction of flow of the sample gas through the tubes.

5. Attach a short piece of stainless steel tubing to the inlet of the rotameter and place a short piece of white silicone tubing on the bare end of the stainless tube. Configure the sampling point with a short piece of the silicone tubing as well for attaching the sorbent tubes.

6. For each sampling, use two of the packed sorbent tubes in series. Join the two tubes end-to-end with a short piece of silicone tubing.

7. When you are ready to sample, connect the end of one of the sorbent tubes to the silicone tubing on the inlet of the rotameter, then connect the other end of the tubes to the sampling point. The rotameter should be downstream from the sampling tubes so that the sample gas passes through the tubes first. When all connections are secure, carefully open the sampling valve and quickly adjust the flow control (and pressure if necessary) to obtain the requested flowrate. Record the time and flow data (rotameter reading) at the start of sampling.

8. Flow the sample through the sorbent tubes for a specified amount of time periodically verifying the flow rate and making adjustments if necessary.

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continued

ANALYTICAL SAMPLING PROCEDURE

GILDED SILICA SORBENT TUBES FOR MERCURY ANALYSIS

9. At the end of the sampling period, record the time and flow data, disconnect both tubes, and place each tube in its individual packing assembly. Label each of the tubes used for each test, labeling the first tube as "A" and the second tube (connected to the rotameter) as "B". Securely attach a label to the tube, making sure the sample flow direction is clearly marked with an arrow. Also include the actual flow rate, sampling time and any other descriptive information on the label for later identification.

10. Package the tubes securely to guard against breakage in transit and return all tubes, supplied equipment, and sampling data to GTI for analysis.

NOTES: This sampling procedure is provided only as a guide to sampling gas from a sampling port. It assumes a representative sample flow of the source gas can be obtained. It is the sampler's responsibility to ensure a representative sample. Any historical information regarding the sample would aid us in better analyzing your sample. This would include previous results of laboratory or field screening analyses.

It is the sampler's responsibility to ensure sampling is performed in a safe manner. Neither GTI nor any person acting on behalf of GTI assumes any liability with respect to the use of, or for damages resulting from the use of, any information presented in this procedure.

An extra tube is included in the package. It will serve as a field blank and is included in the analysis price.

GTI recommends that duplicate samples be taken at each sample site. Two samplings with different duration can cover a larger mercury concentration range.

SAMPLING PROCEDURE
LIQUID SORBENT FOR TRACE METALS

Equipment Needed:

Gas transfer lines	Gas impingers (gas bubblers) - 3 per sample
Rotameter	5% HNO_3 / 10% H_2O_2 solution, 100 ml per impinger
Dry test meter (optional)	Sample shipping bottles - 2 per sample plus a blank

1) Ascertain that the sample can be obtained at a pressure not exceeding 10 psig and a flow of 1-2 liters per minute, and that these conditions can be maintained over the entire sampling period. Pressure- and flow-control devices may be required. The sampling pressure should be kept as low as possible at the specified flow rate. A total flow volume measurement device, such as a dry test meter, can be used to record the exact amounts of gas sampled for more accurate sampling.

Note: Any sampling lines or control devices should be constructed from materials that are inert and non-sorbing to metals. The distance from the sampling point to the sampler should be minimized.

2) High density Teflon is preferred for connections downstream of the regulator. Flexible silicone tubing may be used to make short connections to sampling tubes. Any pumps, metering valves, etc. or other flow- and pressure-controlling devices should be located downstream of the sampler if possible. The entire sampling line should be heated to prevent condensation, especially where a pressure reduction device is used to step down the pressure for sampling. Leak check connections using methanol or a thermal conductivity leak detector.

3) Prepare a 5% HNO_3 / 10% H_2O_2 solution in deionized water. (50 ml Ultrex grade concentrated nitric acid + 617 ml deionized water + 333 ml Ultrex grade 30% H_2O_2). Add 100 ml to each of two gas impingers. The third will remain empty and act as a spray trap.

4) Connect the inlet of the first impinger to the regulated outlet of the sample gas. Connect the inlet of the second impinger to the outlet of the first, and the inlet of the third (empty) impinger to the outlet of the second, for a series of three impingers.

5) Connect the outlet of the third impinger to the inlet (bottom) of the rotameter. Connect the outlet (top) of the rotameter to the inlet of the dry test meter (if used). Connect the outlet of the dry test meter to a vent line.

6) Record the initial dry test meter setting, and ambient temperature and pressure if available. Flow the sample through the impingers for a specified amount of time periodically checking that the flow is staying close to what it was when you started sampling and adjusting it if necessary.

7) At the end of the sampling period, record the time, flow data, and final dry test meter reading. Transfer each impinger solution to separate bottles using deionized water. Securely attach a label to the bottle, and indicate which sample was first in the series and which was second. Also save 100 ml of unused sparger solution for use as a blank.

8) Package the bottles securely to guard against leakage in transit.

ANALYTICAL SAMPLING PROCEDURE

TEDLAR GAS SAMPLE BAGS

1. Prepare to attach the Tedlar bag securely to the sampling line using appropriate connections. **If necessary,** a stainless steel needle-type metering valve can be connected to the sampling line to accurately control the sampling flow. For sampling at low pressures a metering valve may not be necessary. High sampling pressure or flow may require the use of a metering valve.

   Note: Keep all bags at a normal indoor air temperature until just before sampling in cold weather. Any sampling lines or control devices should be constructed from materials that are inert and non-sorbing. Teflon or 316 stainless steel (if not testing for sulfur) is to be preferred. Plastic or rubber tubing should never be used when sampling for trace level components such as moisture, oxygen, etc. All bags supplied for sampling are empty, and shipped with closed valves.

2. Ensure that all components of the sampling line have been well purged and flushed with sample gas. Close down the metering valve (if used) and open the sample line valve. Open the valve on the Tedlar bag by turning one half to one turn. Attach the outlet from the metering valve (if used) to this valve using a short piece of silicone or Teflon tubing. A hose clamp may also be necessary.

3. Using the metering valve or sample line valve for control, adjust the sample flow until the bag slowly inflates. Just before the bag fills completely, remove it and gently squeeze the bag to empty it of gas. When the bag is nearly empty, reattach it and let it fill again.

   Note: Do not attempt to fill a bag completely; it is best to leave room for expansion.

4. When the bag has filled the second time, and while it is still connected to the sampling line, close the tedlar bag valve until it is snug and remove the silicone tubing.

5. Securely attach a label to the filled bag, indicating the date, time and any other relevant descriptive information for later identification.

6. Repack the bag in an appropriate shipping container, and return it to GTI for analysis.

   Gas Technology Institute
   1700 S. Mt. Prospect Rd.
   Des Plaines, IL 60018
   ATTN: Russell Bora

NOTES: This sampling procedure is provided only as a guide to sampling gas from a sampling port. It assumes a representative sample flow of the source gas can be obtained. It is the sampler's responsibility to ensure a representative sample. Any historical information regarding the sample would aid us in better analyzing your sample. This would include previous results of laboratory or field screening analyses.

It is the sampler's responsibility to ensure sampling is performed in a safe manner. Neither GTI nor any person acting on behalf of GTI assumes any liability with respect to the use of, or for damages resulting from the use of, any information presented in this procedure.

ANALYTICAL SAMPLING PROCEDURE

XAD-2 Resin for PAH, SVOCs, PCBs, Pesticides, and Herbicides Analyses or
Porapak-R for Pharmaceuticals/Animal Care Products Analyses

1. Ascertain that the sample can be obtained at a pressure not exceeding 10 psig and a flow of at least **1.0 liter per minute**, and that these conditions can be maintained over the entire sampling period. Pressure- and flow-control devices may be required. The sampling pressure should be kept as low as possible at the specified flow rate.
2. The distance from the sampling point to the sampler should be minimized because certain chemicals can easily be absorbed on tubing lines and sampling equipment. Stainless tubing must be used for connections upstream of the pressure regulator. High density Teflon or stainless steel tubing is preferred for connections downstream of the regulator. Flexible silicone tubing may be used to make short connections to sampling tubes. Any pumps, metering valves, etc. or other flow- and pressure-controlling devices should be located downstream of the sampler.
3. Please place all sorbent tubes with the arrow in the direction of the flow of the sample gas through the tubes.
4. Attach a short piece of white silicone tubing to the inlet of the pump. Configure the sampling point with a short piece of the silicone tubing and/or Teflon tubing for attaching the sorbent tubes.
5. For each sampling, use two of the packed sorbent tubes in series. Join the two tubes end-to-end with a short piece of silicone tubing.
6. Using a personal passive sampling pump, determine an approximate flow control setting for a **1.0 liter per minute flow for the Proapak-R** sorbent tubes and **2.0 liters per minute flow for the XAD-2 Resin** sorbent tubes at the applied pressure. Calibrate the sampling pumps by attaching sorbent tubes to the sampling pump and placing the outlet tubing in the outlet port of the calibrator. Press and HOLD the READ button. Adjust flow to desired flow rate by turning the screw on the bottom left of the sampling pump. This will save time when actually setting up the first sorbent tube, and will start to passivate the sampling system.
7. When you are ready to sample, connect the end of one of the sorbent tubes to the silicone tubing on the inlet of the pump, then connect the other end of the tubes to the sampling point. Cover the sorbent tubes with foil to prevent photodegradation. The pump should be downstream from the sampling tubes so that the sample gas passes through the tubes first. When all connections are secure, carefully open the sampling valve and quickly adjust the flow control (and pressure if necessary) to obtain the requested flowrate. Record the time and flow data at the start of sampling, as well as the sorbent tube numbers on each sorbent tube.
8. Flow the sample through the sorbent tubes for **4 hours** periodically verifying the flow rate and making adjustments if necessary.

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ANALYTICAL SAMPLING PROCEDURE

XAD-2 Resin for PAH, SVOCs, PCBs, Pesticides, and Herbicides Analyses or
Porapak-R for Pharmaceuticals/Animal Care Products Analyses

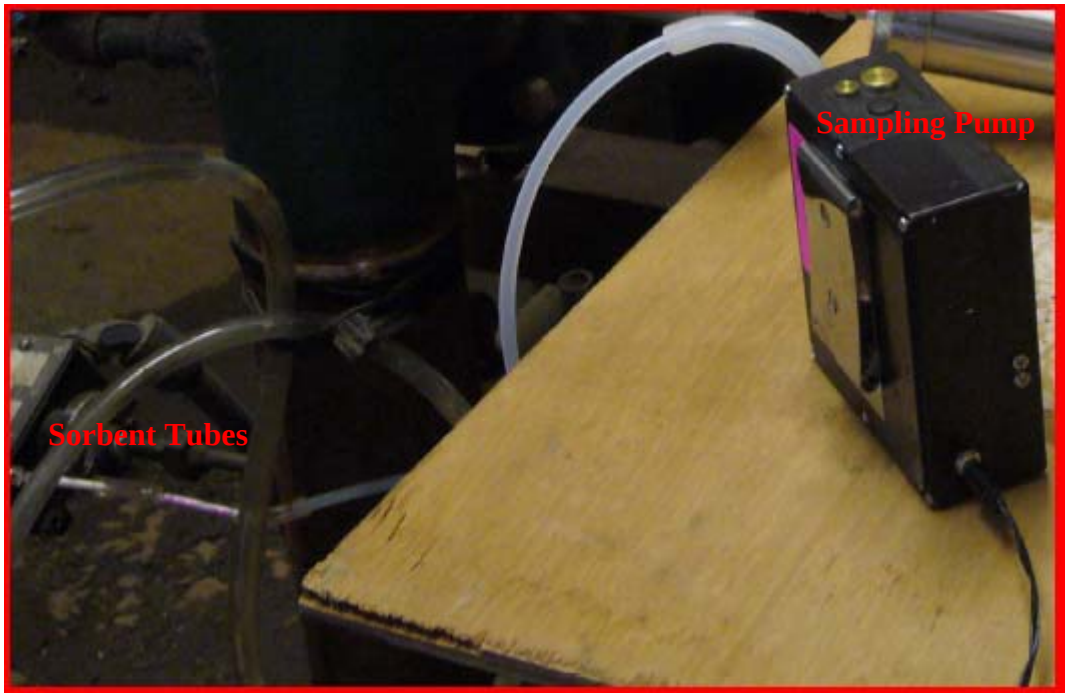
9. At the end of the sampling period, record the time and flow data, disconnect both tubes, and place each tube in its individual packing assembly. Label each of the tubes used for each test, labeling the first tube as "A" and the second tube (connected to the pump) as "B".
10. Package the tubes securely and covered in foil to guard against breakage in transit and return all tubes, supplied equipment, and sampling data to GTI for analysis.

NOTES: This sampling procedure is provided only as a guide to sampling gas from a sampling port. It assumes a representative sample flow of the source gas can be obtained. It is the sampler's responsibility to ensure a representative sample. Any historical information regarding the sample would aid us in better analyzing your sample. This would include previous results of laboratory or field screening analyses.

It is the sampler's responsibility to ensure sampling is performed in a safe manner. Neither GTI nor any person acting on behalf of GTI assumes any liability with respect to the use of, or for damages resulting from the use of, any information presented in this procedure.

An extra tube is included in the package. It will serve as a field blank.

Figure 1.0 Sampling Setup



Appendix B – Major Components Analysis

Major Component Analysis by ASTM D1945

Component	Detection Limit	1NG01TB Mol %	1NG02TB Mol %	2NG02TB Mol %
Helium	0.1%	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.74%**	**0.76%**	**0.72%**
Oxygen/Argon	0.03%	BDL	BDL	BDL
Nitrogen	0.03%	**0.12%**	**0.20%**	**0.37%**
Carbon Monoxide	0.03%	BDL	BDL	BDL
Methane	0.002%	**96.6%**	**96.4%**	**96.0%**
Ethane	0.002%	**2.22%**	**2.26%**	**2.49%**
Ethene	0.002%	**0.014%**	**0.013%**	**0.010%**
Ethyne	0.002%	BDL	BDL	BDL
Propane	0.002%	**0.223%**	**0.224%**	**0.238%**
Propene	0.002%	**0.006%**	**0.005%**	**0.004%**
Propadiene	0.002%	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL
i-Butane	0.002%	**0.030%**	**0.033%**	**0.033%**
n-Butane	0.002%	**0.034%**	**0.038%**	**0.078%**
1-Butene	0.002%	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL
i-Pentane	0.002%	**0.011%**	**0.012%**	**0.011%**
n-Pentane	0.002%	**0.007%**	**0.008%**	**0.007%**
neo-Pentane	0.002%	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0161%**	**0.0179%**	**0.0126%**
Ammonia	0.001%	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**		
Compressibility Factor [z] (Dry)	0.99787	0.99787	0.99786
Compressibility Factor [z] (Sat.)	0.99755	0.99755	0.99754
Relative Density (Specific Gravity) (Dry)	0.5773	0.5783	0.5802
Gross HV (Dry) (Btu/ft^3)	1028.8	1028.4	1029.7
Gross HV (Sat.) (Btu/ft^3)	1011.3	1010.9	1012.1
Wobbe Index	1354.0	1352.4	1351.9
Net HV (Dry) (Btu/ft^3)	927.1	926.8	928.0
Net HV (Sat.) (Btu/ft^3)	911.3	911.0	912.2
Real Gas Density (lbs/ft^3)	0.044	0.044	0.044

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	3NG01TB Mol %	3NG02TB Mol %	3NG03TB Mol %
Helium	0.1%	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.20%**	**0.20%**	**0.20%**
Oxygen/Argon	0.03%	BDL	BDL	BDL
Nitrogen	0.03%	**0.19%**	**0.14%**	**0.09%**
Carbon Monoxide	0.03%	BDL	BDL	BDL
Methane	0.002%	**97.4%**	**97.4%**	**97.4%**
Ethane	0.002%	**1.64%**	**1.65%**	**1.65%**
Ethene	0.002%	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL
Propane	0.002%	**0.397%**	**0.402%**	**0.401%**
Propene	0.002%	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL
i-Butane	0.002%	**0.055%**	**0.056%**	**0.056%**
n-Butane	0.002%	**0.074%**	**0.075%**	**0.075%**
1-Butene	0.002%	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL
i-Pentane	0.002%	**0.023%**	**0.024%**	**0.024%**
n-Pentane	0.002%	**0.018%**	**0.018%**	**0.018%**
neo-Pentane	0.002%	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0416%**	**0.0428%**	**0.0427%**
Ammonia	0.001%	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties			
Compressibility Factor [z] (Dry)	**0.99788**	**0.99788**	**0.99788**
Compressibility Factor [z] (Sat.)	**0.99756**	**0.99756**	**0.99756**
Relative Density (Specific Gravity) (Dry)	**0.5732**	**0.5732**	**0.5730**
Gross HV (Dry) (Btu/ft^3)	**1034.8**	**1035.6**	**1036.1**
Gross HV (Sat.) (Btu/ft^3)	**1017.1**	**1017.9**	**1018.4**
Wobbe Index	**1366.7**	**1367.8**	**1368.8**
Net HV (Dry) (Btu/ft^3)	**932.5**	**933.2**	**933.7**
Net HV (Sat.) (Btu/ft^3)	**916.6**	**917.3**	**917.8**
Real Gas Density (lbs/ft^3)	**0.044**	**0.044**	**0.044**

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF1BG01TB Mol %	LF1BG02TB Mol %	LF1BG03TB Mol %	LF1BG04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	**0.3%**	**0.3%**	**0.2%**	**0.2%**
Carbon Dioxide	0.03%	**38.4%**	**36.8%**	**36.3%**	**36.7%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	BDL	BDL	BDL	BDL
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**61.2%**	**62.8%**	**63.5%**	**63.0%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.003%**	**0.003%**	**0.003%**	**0.003%**
Propene	0.002%	BDL	**0.002%**	**0.002%**	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	**0.002%**	**0.002%**	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	**0.002%**	**0.003%**	BDL	**0.002%**
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0185%**	**0.0167%**	**0.0150%**	**0.0187%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99682	0.99687	0.99689	0.99687
Compressibility Factor [z] (Sat.)	0.99645	0.99651	0.99652	0.99651
Relative Density (Specific Gravity) (Dry)	0.9262	0.9113	0.9064	0.9108
Gross HV (Dry) (Btu/ft^3)	624.3	640.3	646.0	642.0
Gross HV (Sat.) (Btu/ft^3)	613.6	629.4	635.0	631.0
Wobbe Index	648.7	670.7	678.6	672.7
Net HV (Dry) (Btu/ft^3)	562.1	576.5	581.7	578.0
Net HV (Sat.) (Btu/ft^3)	552.5	566.7	571.8	568.2
Real Gas Density (lbs/ft^3)	0.071	0.070	0.069	0.070

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF1BM01TB Mol %	LF1BM02TB Mol %	LF1BM03TB Mol %	LF1BM04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	**1.0%**	**0.6%**	**0.7%**	**0.9%**
Carbon Dioxide	0.03%	**1.28%**	**1.42%**	**0.86%**	**0.84%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**1.32%**	**0.85%**	**0.55%**	**0.87%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**96.4%**	**97.1%**	**97.9%**	**97.4%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.003%**	**0.002%**	**0.003%**	**0.003%**
Propene	0.002%	**0.002%**	**0.002%**	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	BDL	BDL	**0.0001%**	**0.0001%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99805	0.99802	0.99803	0.99805
Compressibility Factor [z] (Sat.)	0.99774	0.99771	0.99772	0.99774
Relative Density (Specific Gravity) (Dry)	0.5678	0.5689	0.5623	0.5623
Gross HV (Dry) (Btu/ft^3)	981.1	986.9	995.4	991.0
Gross HV (Sat.) (Btu/ft^3)	964.3	970.1	978.4	974.0
Wobbe Index	1301.9	1308.5	1327.5	1321.5
Net HV (Dry) (Btu/ft^3)	883.2	888.5	896.2	892.1
Net HV (Sat.) (Btu/ft^3)	868.1	873.3	880.9	876.9
Real Gas Density (lbs/ft^3)	0.043	0.044	0.043	0.043

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NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF2BG01TB Mol %	LF2BG02TB Mol %	LF2BG03TB Mol %	LF2BG04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**37.3%**	**36.1%**	**40.1%**	**37.2%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**0.35%**	**0.50%**	BDL	**0.06%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**62.3%**	**63.3%**	**59.9%**	**62.7%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.002%**	**0.002%**	**0.003%**	**0.002%**
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0115%**	**0.0108%**	**0.0139%**	**0.0129%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99686	0.99690	0.99675	0.99685
Compressibility Factor [z] (Sat.)	0.99649	0.99654	0.99637	0.99648
Relative Density (Specific Gravity) (Dry)	0.9185	0.9079	0.9442	0.9163
Gross HV (Dry) (Btu/ft^3)	633.7	643.9	609.2	637.8
Gross HV (Sat.) (Btu/ft^3)	622.9	632.9	598.8	626.9
Wobbe Index	661.2	675.7	626.9	666.3
Net HV (Dry) (Btu/ft^3)	570.6	579.7	548.6	574.3
Net HV (Sat.) (Btu/ft^3)	560.9	569.9	539.2	564.5
Real Gas Density (lbs/ft^3)	0.070	0.069	0.072	0.070

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF2BM01TB Mol %	LF2BM02TB Mol %	LF2BM03TB Mol %	LF2BM04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.51%**	**0.51%**	**0.91%**	**0.94%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**3.27%**	**3.25%**	**1.72%**	**1.74%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**96.2%**	**96.2%**	**97.4%**	**97.3%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.003%**	**0.003%**	**0.003%**	**0.004%**
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0002%**	**0.0003%**	**0.0007%**	**0.0008%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99808	0.99808	0.99803	0.99803
Compressibility Factor [z] (Sat.)	0.99777	0.99777	0.99772	0.99772
Relative Density (Specific Gravity) (Dry)	0.5733	0.5732	0.5708	0.5711
Gross HV (Dry) (Btu/ft^3)	976.0	976.2	987.7	987.3
Gross HV (Sat.) (Btu/ft^3)	959.3	959.5	970.8	970.4
Wobbe Index	1289.1	1289.4	1307.3	1306.4
Net HV (Dry) (Btu/ft^3)	878.8	879.0	889.3	888.9
Net HV (Sat.) (Btu/ft^3)	863.8	863.9	874.1	873.7
Real Gas Density (lbs/ft^3)	0.044	0.044	0.044	0.044

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF3BG01TB Mol %	LF3BG02TB Mol %	LF3BG03TB Mol %	LF3BG04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**37.2%**	**37.6%**	**34.0%**	**33.6%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**3.62%**	**3.69%**	**1.15%**	**1.78%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**59.2%**	**58.7%**	**64.9%**	**64.6%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.002%**	**0.002%**	**0.002%**	**0.002%**
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0078%**	**0.0117%**	**0.0097%**	**0.0071%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99696	0.99695	0.99700	0.99703
Compressibility Factor [z] (Sat.)	0.99660	0.99658	0.99663	0.99667
Relative Density (Specific Gravity) (Dry)	0.9306	0.9353	0.8894	0.8888
Gross HV (Dry) (Btu/ft^3)	601.6	596.6	659.2	656.0
Gross HV (Sat.) (Btu/ft^3)	591.4	586.4	647.9	644.8
Wobbe Index	623.6	616.9	698.9	695.8
Net HV (Dry) (Btu/ft^3)	541.7	537.2	593.5	590.6
Net HV (Sat.) (Btu/ft^3)	532.5	528.0	583.4	580.6
Real Gas Density (lbs/ft^3)	0.071	0.072	0.068	0.068

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF3BM01TB Mol %	LF3BM02TB Mol %	LF3BM03TB Mol %	LF3BM04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.95%**	**1.00%**	**0.45%**	**0.45%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**6.87%**	**7.22%**	**6.19%**	**6.41%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**92.2%**	**91.8%**	**93.4%**	**93.1%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	**0.003%**	**0.003%**	**0.003%**	**0.003%**
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0012%**	**0.0014%**	**0.0001%**	**0.0001%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99816	0.99816	0.99816	0.99816
Compressibility Factor [z] (Sat.)	0.99785	0.99786	0.99785	0.99786
Relative Density (Specific Gravity) (Dry)	0.5924	0.5943	0.5847	0.5856
Gross HV (Dry) (Btu/ft^3)	935.0	931.0	947.0	944.7
Gross HV (Sat.) (Btu/ft^3)	919.0	915.1	930.8	928.5
Wobbe Index	1214.8	1207.6	1238.5	1234.5
Net HV (Dry) (Btu/ft^3)	841.9	838.3	852.7	850.6
Net HV (Sat.) (Btu/ft^3)	827.5	823.9	838.1	836.1
Real Gas Density (lbs/ft^3)	0.045	0.045	0.045	0.045

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	LF3BM05TB Mol %	LF3BM06TB Mol %	LF3BM07TB Mol %	LF3BM08TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.47%**	**0.61%**	BDL	BDL
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	**9.49%**	**8.82%**	**2.88%**	**2.68%**
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**90.0%**	**90.6%**	**97.116%**	**97.319%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	BDL	BDL	BDL	BDL
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	BDL	BDL	BDL	BDL
Ammonia	0.001%	**not analyzed**	**not analyzed**	**not analyzed**	**not analyzed**
Total					
				per ASTM D3588-98(03), 60°F, 14.73 psia	
Calculated Real Gas Properties		**0.99823**	**0.99821**	**0.99809**	**0.99808**
Compressibility Factor [z] (Dry)		**0.99793**	**0.99791**	**0.99778**	**0.99777**
Compressibility Factor [z] (Sat.)		**0.5986**	**0.5971**	**0.5667**	**0.5659**
Relative Density (Specific Gravity) (Dry)		**913.1**	**918.6**	**985.0**	**987.1**
Gross HV (Dry) (Btu/ft^3)		**897.5**	**902.9**	**968.2**	**970.2**
Gross HV (Sat.) (Btu/ft^3)		**1180.2**	**1188.8**	**1308.5**	**1312.2**
Wobbe Index		**822.2**	**827.1**	**886.9**	**888.8**
Net HV (Dry) (Btu/ft^3)		**808.1**	**813.0**	**871.8**	**873.6**
Net HV (Sat.) (Btu/ft^3)		**0.046**	**0.046**	**0.043**	**0.043**
Real Gas Density (lbs/ft^3)					

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis b

Component	Detection Limit	LF4BG01TB Mol %	LF4BG02TB Mol %
Helium	0.1%	BDL	BDL
Hydrogen	0.1%	BDL	**0.1%**
Carbon Dioxide	0.03%	**40.7%**	**40.2%**
Oxygen/Argon	0.03%	BDL	BDL
Nitrogen	0.03%	BDL	**0.26%**
Carbon Monoxide	0.03%	BDL	BDL
Methane	0.002%	**59.3%**	**59.4%**
Ethane	0.002%	BDL	BDL
Ethene	0.002%	BDL	BDL
Ethyne	0.002%	BDL	BDL
Propane	0.002%	BDL	**0.002%**
Propene	0.002%	BDL	BDL
Propadiene	0.002%	BDL	BDL
Propyne	0.002%	BDL	BDL
i-Butane	0.002%	BDL	**0.002%**
n-Butane	0.002%	BDL	BDL
1-Butene	0.002%	BDL	BDL
i-Butene	0.002%	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL
i-Pentane	0.002%	BDL	**0.002%**
n-Pentane	0.002%	BDL	BDL
neo-Pentane	0.002%	BDL	BDL
Pentenes	0.002%	BDL	BDL
Hexane Plus	0.0001%	**0.0112%**	**0.0187%**
Ammonia	0.001%	BDL	BDL
Total		**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**	
Compressibility Factor [z] (Dry)	0.99673	0.99675
Compressibility Factor [z] (Sat.)	0.99636	0.99638
Relative Density (Specific Gravity) (Dry)	0.9497	0.9463
Gross HV (Dry) (Btu/ft^3)	603.1	604.5
Gross HV (Sat.) (Btu/ft^3)	592.8	594.2
Wobbe Index	618.9	621.4
Net HV (Dry) (Btu/ft^3)	543.1	544.3
Net HV (Sat.) (Btu/ft^3)	533.8	535.0
Real Gas Density (lbs/ft^3)	0.073	0.072

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Major Component Analysis by ASTM D1945 / D1946

Component	Detection Limit	WWTP1BG01TB Mol %	WWTP1BG02TB Mol %	WWTP1BG03TB Mol %	WWTP1BG04TB Mol %
Helium	0.1%	BDL	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL	BDL
Carbon Dioxide	0.03%	**36.5%**	**36.9%**	**36.6%**	**36.8%**
Oxygen/Argon	0.03%	BDL	BDL	BDL	BDL
Nitrogen	0.03%	BDL	BDL	BDL	BDL
Carbon Monoxide	0.03%	BDL	BDL	BDL	BDL
Methane	0.002%	**63.5%**	**63.1%**	**63.4%**	**63.2%**
Ethane	0.002%	BDL	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL	BDL
Propane	0.002%	BDL	BDL	BDL	BDL
Propene	0.002%	BDL	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL	BDL
Hexane Plus	0.0001%	**0.0012%**	**0.0009%**	**0.0007%**	**0.0020%**
Ammonia	0.001%	BDL	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**			
Compressibility Factor [z] (Dry)	0.99688	0.99686	0.99687	0.99687
Compressibility Factor [z] (Sat.)	0.99651	0.99650	0.99651	0.99650
Relative Density (Specific Gravity) (Dry)	0.9092	0.9128	0.9102	0.9121
Gross HV (Dry) (Btu/ft^3)	644.7	640.9	643.6	641.7
Gross HV (Sat.) (Btu/ft^3)	633.7	630.0	632.7	630.8
Wobbe Index	676.1	670.8	674.6	672.0
Net HV (Dry) (Btu/ft^3)	580.5	577.1	579.5	577.8
Net HV (Sat.) (Btu/ft^3)	570.6	567.3	569.7	568.0
Real Gas Density (lbs/ft^3)	0.070	0.070	0.070	0.070

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945

Component	Detection Limit	WWTP1BM02TB Mol %	WWTP1BM03TB Mol %	WWTP1BM04TB Mol %
Helium	0.1%	BDL	BDL	BDL
Hydrogen	0.1%	BDL	BDL	BDL
Carbon Dioxide	0.03%	**0.49%**	**0.64%**	**0.66%**
Oxygen/Argon	0.03%	BDL	BDL	BDL
Nitrogen	0.03%	BDL	BDL	BDL
Carbon Monoxide	0.03%	BDL	BDL	BDL
Methane	0.002%	**99.5%**	**99.4%**	**99.3%**
Ethane	0.002%	BDL	BDL	BDL
Ethene	0.002%	BDL	BDL	BDL
Ethyne	0.002%	BDL	BDL	BDL
Propane	0.002%	BDL	BDL	BDL
Propene	0.002%	BDL	BDL	BDL
Propadiene	0.002%	BDL	BDL	BDL
Propyne	0.002%	BDL	BDL	BDL
i-Butane	0.002%	BDL	BDL	BDL
n-Butane	0.002%	BDL	BDL	BDL
1-Butene	0.002%	BDL	BDL	BDL
i-Butene	0.002%	BDL	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL	BDL
i-Pentane	0.002%	BDL	BDL	BDL
n-Pentane	0.002%	BDL	BDL	BDL
neo-Pentane	0.002%	BDL	BDL	BDL
Pentenes	0.002%	BDL	BDL	BDL
Hexane Plus	0.0001%	BDL	BDL	BDL
Ammonia	0.001%	BDL	BDL	BDL
Total		**100.0%**	**100.0%**	**100.0%**

Calculated Real Gas Properties	**per ASTM D3588-98(03), 60°F, 14.73 psia**		
Compressibility Factor [z] (Dry)	0.99800	0.99800	0.99800
Compressibility Factor [z] (Sat.)	0.99769	0.99769	0.99769
Relative Density (Specific Gravity) (Dry)	0.5595	0.5610	0.5612
Gross HV (Dry) (Btu/ft^3)	1009.4	1007.9	1007.7
Gross HV (Sat.) (Btu/ft^3)	992.2	990.6	990.5
Wobbe Index	1349.4	1345.6	1345.2
Net HV (Dry) (Btu/ft^3)	908.9	907.5	907.3
Net HV (Sat.) (Btu/ft^3)	893.3	892.0	891.8
Real Gas Density (lbs/ft^3)	0.043	0.043	0.043

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Major Component Analysis by ASTM D1945

Component	Detection Limit	WWTP2BG01TB Mol %	WWTP2BM01TB Mol %
Helium	0.1%	BDL	BDL
Hydrogen	0.1%	BDL	BDL
Carbon Dioxide	0.03%	**34.6%**	**39.4%**
Oxygen/Argon	0.03%	BDL	BDL
Nitrogen	0.03%	BDL	BDL
Carbon Monoxide	0.03%	BDL	BDL
Methane	0.002%	**65.4%**	**60.6%**
Ethane	0.002%	BDL	BDL
Ethene	0.002%	BDL	BDL
Ethyne	0.002%	BDL	BDL
Propane	0.002%	BDL	BDL
Propene	0.002%	BDL	BDL
Propadiene	0.002%	BDL	BDL
Propyne	0.002%	BDL	BDL
i-Butane	0.002%	BDL	BDL
n-Butane	0.002%	BDL	BDL
1-Butene	0.002%	BDL	BDL
i-Butene	0.002%	BDL	BDL
trans-2-Butene	0.002%	BDL	BDL
cis-2-Butene	0.002%	BDL	BDL
1,3-Butadiene	0.002%	BDL	BDL
i-Pentane	0.002%	BDL	BDL
n-Pentane	0.002%	BDL	BDL
neo-Pentane	0.002%	BDL	BDL
Pentenes	0.002%	BDL	BDL
Hexane Plus	0.0001%	**0.0045%**	**0.0052%**
Ammonia	0.001%	BDL	BDL
Total		**100.0%**	**100.0%**

Calculated Real Gas Properties	per ASTM D3588-98(03), 60°F, 14.73 psia	
Compressibility Factor [z] (Dry)	0.99694	0.99677
Compressibility Factor [z] (Sat.)	0.99658	0.99640
Relative Density (Specific Gravity) (Dry)	0.8902	0.9374
Gross HV (Dry) (Btu/ft^3)	664.7	615.6
Gross HV (Sat.) (Btu/ft^3)	653.3	605.1
Wobbe Index	704.4	635.8
Net HV (Dry) (Btu/ft^3)	598.5	554.3
Net HV (Sat.) (Btu/ft^3)	588.3	544.9
Real Gas Density (lbs/ft^3)	0.068	0.072

BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Appendix C – Extended Hydrocarbons Analysis

Extended Hydrocarbon Analysis by GC/FID

Component Name	1NG01TB Mol %	1NG02TB Mol %	2NG02TB Mol %
Cycloalkanes			
Cyclopentane	**0.0010%**	**0.0011%**	**0.0009%**
Methylcyclopentane	**0.0008%**	**0.0009%**	**0.0008%**
Cyclohexane	**0.0007%**	**0.0008%**	**0.0006%**
Methylcyclohexane	**0.0007%**	**0.0008%**	**0.0006%**
Aromatics			
Benzene	**0.0004%**	**0.0005%**	**0.0003%**
Toluene	**0.0005%**	**0.0006%**	**0.0003%**
Ethylbenzene	BDL	**0.0001%**	BDL
m,p-Xylene	**0.0002%**	**0.0002%**	**0.0001%**
Styrene	BDL	BDL	BDL
o-Xylene	**0.0001%**	**0.0001%**	BDL
C3 Benzenes	**0.0001%**	**0.0001%**	BDL
Naphthalene	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL
Paraffins			
Hexanes	**0.0071%**	**0.0077%**	**0.0058%**
Heptanes	**0.0026%**	**0.0028%**	**0.0019%**
2,2,4-Trimethylpentane	**0.0001%**	**0.0001%**	**0.0001%**
Octanes	**0.0013%**	**0.0014%**	**0.0009%**
Nonanes	**0.0004%**	**0.0006%**	**0.0003%**
Decanes	**0.0001%**	**0.0001%**	BDL
Undecanes	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0161%**	**0.0179%**	**0.0126%**

Detection Limit = 0.0001 mol% (1 ppmv)
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	3NG01TB Mol %	3NG02TB Mol %	3NG03TB Mol %
Cycloalkanes			
Cyclopentane	**0.0023%**	**0.0024%**	**0.0024%**
Methylcyclopentane	**0.0017%**	**0.0017%**	**0.0017%**
Cyclohexane	**0.0017%**	**0.0018%**	**0.0018%**
Methylcyclohexane	**0.0024%**	**0.0025%**	**0.0025%**
Aromatics			
Benzene	**0.0007%**	**0.0007%**	**0.0007%**
Toluene	**0.0006%**	**0.0006%**	**0.0006%**
Ethylbenzene	BDL	BDL	BDL
m,p-Xylene	**0.0002%**	**0.0002%**	**0.0002%**
Styrene	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL
C3 Benzenes	BDL	**0.0001%**	BDL
Naphthalene	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL
Paraffins			
Hexanes	**0.0182%**	**0.0185%**	**0.0185%**
Heptanes	**0.0083%**	**0.0086%**	**0.0086%**
2,2,4-Trimethylpentane	**0.0004%**	**0.0004%**	**0.0004%**
Octanes	**0.0038%**	**0.0040%**	**0.0040%**
Nonanes	**0.0011%**	**0.0011%**	**0.0011%**
Decanes	**0.0002%**	**0.0002%**	**0.0002%**
Undecanes	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0416%**	**0.0428%**	**0.0427%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF1BG01TB Mol %	LF1BG02TB Mol %	LF1BG03TB Mol %	LF1BG04TB Mol %
Cycloalkanes				
Cyclopentane	**0.0003%**	**0.0003%**	**0.0003%**	**0.0004%**
Methylcyclopentane	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
Cyclohexane	**0.0004%**	**0.0006%**	**0.0004%**	**0.0004%**
Methylcyclohexane	**0.0003%**	**0.0003%**	**0.0002%**	**0.0003%**
Aromatics				
Benzene	**0.0003%**	**0.0003%**	**0.0002%**	**0.0003%**
Toluene	**0.0023%**	**0.0018%**	**0.0015%**	**0.0021%**
Ethylbenzene	**0.0005%**	**0.0003%**	**0.0003%**	**0.0004%**
m,p-Xylene	**0.0006%**	**0.0004%**	**0.0003%**	**0.0005%**
Styrene	BDL	BDL	BDL	BDL
o-Xylene	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
C3 Benzenes	**0.0003%**	**0.0002%**	**0.0002%**	**0.0003%**
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	**0.0033%**	**0.0035%**	**0.0042%**	**0.0047%**
Heptanes	**0.0023%**	**0.0023%**	**0.0026%**	**0.0031%**
2,2,4-Trimethylpentane	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
Octanes	**0.0015%**	**0.0014%**	**0.0016%**	**0.0020%**
Nonanes	**0.0016%**	**0.0014%**	**0.0011%**	**0.0015%**
Decanes	**0.0036%**	**0.0031%**	**0.0013%**	**0.0018%**
Undecanes	**0.0006%**	**0.0002%**	**0.0003%**	**0.0004%**
Dodecanes	**0.0001%**	**0.0001%**	BDL	BDL
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0185%**	**0.0167%**	**0.0150%**	**0.0187%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF1BM01TB Mol %	LF1BM02TB Mol %	LF1BM03TB Mol %	LF1BM04TB Mol %
Cycloalkanes				
Cyclopentane	BDL	BDL	BDL	BDL
Methylcyclopentane	BDL	BDL	BDL	BDL
Cyclohexane	BDL	BDL	BDL	BDL
Methylcyclohexane	BDL	BDL	BDL	BDL
Aromatics				
Benzene	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL
m,p-Xylene	BDL	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL	BDL
C3 Benzenes	BDL	BDL	BDL	BDL
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	BDL	BDL	BDL	BDL
Heptanes	BDL	BDL	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL	BDL	BDL
Octanes	BDL	BDL	BDL	BDL
Nonanes	BDL	BDL	BDL	BDL
Decanes	BDL	BDL	**0.0001%**	**0.0001%**
Undecanes	BDL	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	BDL	BDL	**0.0001%**	**0.0001%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF2BG01TB Mol %	LF2BG02TB Mol %	LF2BG03TB Mol %	LF2BG04TB Mol %
Cycloalkanes				
Cyclopentane	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
Methylcyclopentane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Cyclohexane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Methylcyclohexane	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
Aromatics				
Benzene	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Toluene	**0.0006%**	**0.0008%**	**0.0008%**	**0.0008%**
Ethylbenzene	**0.0004%**	**0.0004%**	**0.0005%**	**0.0005%**
m,p-Xylene	**0.0006%**	**0.0008%**	**0.0009%**	**0.0009%**
Styrene	BDL	BDL	**0.0001%**	BDL
o-Xylene	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
C3 Benzenes	**0.0005%**	**0.0004%**	**0.0008%**	**0.0008%**
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	**0.0005%**	**0.0006%**	**0.0005%**	**0.0004%**
Heptanes	**0.0006%**	**0.0006%**	**0.0005%**	**0.0004%**
2,2,4-Trimethylpentane	BDL	**0.0001%**	**0.0001%**	BDL
Octanes	**0.0007%**	**0.0006%**	**0.0007%**	**0.0006%**
Nonanes	**0.0014%**	**0.0013%**	**0.0017%**	**0.0014%**
Decanes	**0.0035%**	**0.0028%**	**0.0043%**	**0.0036%**
Undecanes	**0.0016%**	**0.0014%**	**0.0019%**	**0.0023%**
Dodecanes	**0.0002%**	**0.0001%**	**0.0002%**	**0.0003%**
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0115%**	**0.0108%**	**0.0139%**	**0.0129%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF2BM01TB Mol %	LF2BM02TB Mol %	LF2BM03TB Mol %	LF2BM04TB Mol %
Cycloalkanes				
Cyclopentane	**0.0002%**	**0.0002%**	**0.0002%**	**0.0002%**
Methylcyclopentane	BDL	BDL	**0.0001%**	**0.0001%**
Cyclohexane	BDL	BDL	**0.0001%**	**0.0001%**
Methylcyclohexane	BDL	BDL	BDL	BDL
Aromatics				
Benzene	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL
m,p-Xylene	BDL	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL	BDL
C3 Benzenes	BDL	BDL	BDL	BDL
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	BDL	**0.0001%**	**0.0003%**	**0.0004%**
Heptanes	BDL	BDL	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL	BDL	BDL
Octanes	BDL	BDL	BDL	BDL
Nonanes	BDL	BDL	BDL	BDL
Decanes	BDL	BDL	BDL	BDL
Undecanes	BDL	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0002%**	**0.0003%**	**0.0007%**	**0.0008%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF3BG01TB Mol %	LF3BG02TB Mol %	LF3BG03TB Mol %	LF3BG04TB Mol %
Cycloalkanes				
Cyclopentane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Methylcyclopentane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Cyclohexane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Methylcyclohexane	**0.0002%**	**0.0003%**	**0.0002%**	**0.0002%**
Aromatics				
Benzene	**0.0001%**	**0.0001%**	**0.0002%**	**0.0001%**
Toluene	**0.0007%**	**0.0010%**	**0.0009%**	**0.0006%**
Ethylbenzene	**0.0002%**	**0.0003%**	**0.0002%**	**0.0002%**
m,p-Xylene	**0.0002%**	**0.0004%**	**0.0003%**	**0.0002%**
Styrene	BDL	BDL	BDL	BDL
o-Xylene	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
C3 Benzenes	**0.0002%**	**0.0004%**	**0.0003%**	**0.0002%**
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	**0.0013%**	**0.0015%**	**0.0015%**	**0.0011%**
Heptanes	**0.0009%**	**0.0011%**	**0.0011%**	**0.0008%**
2,2,4-Trimethylpentane	**0.0001%**	**0.0001%**	**0.0001%**	**0.0001%**
Octanes	**0.0006%**	**0.0008%**	**0.0008%**	**0.0005%**
Nonanes	**0.0008%**	**0.0012%**	**0.0009%**	**0.0007%**
Decanes	**0.0014%**	**0.0025%**	**0.0018%**	**0.0013%**
Undecanes	**0.0006%**	**0.0014%**	**0.0009%**	**0.0006%**
Dodecanes	**0.0001%**	**0.0002%**	**0.0001%**	**0.0001%**
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0078%**	**0.0117%**	**0.0097%**	**0.0071%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF3BM01TB Mol %	LF3BM02TB Mol %	LF3BM03TB Mol %	LF3BM04TB Mol %
Cycloalkanes				
Cyclopentane	**0.0001%**	**0.0001%**	BDL	BDL
Methylcyclopentane	**0.0001%**	**0.0001%**	BDL	BDL
Cyclohexane	**0.0001%**	**0.0001%**	BDL	BDL
Methylcyclohexane	**0.0001%**	**0.0001%**	BDL	BDL
Aromatics				
Benzene	BDL	**0.0001%**	BDL	BDL
Toluene	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL
m,p-Xylene	BDL	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL	BDL
C3 Benzenes	BDL	BDL	BDL	BDL
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	**0.0007%**	**0.0008%**	**0.0001%**	**0.0001%**
Heptanes	**0.0001%**	**0.0001%**	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL	BDL	BDL
Octanes	BDL	BDL	BDL	BDL
Nonanes	BDL	BDL	BDL	BDL
Decanes	BDL	BDL	BDL	BDL
Undecanes	BDL	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0012%**	**0.0014%**	**0.0001%**	**0.0001%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	LF4BG01TB Mol %	LF4BG02TB Mol %
Cycloalkanes		
Cyclopentane	BDL	**0.0004%**
Methylcyclopentane	**0.0001%**	**0.0002%**
Cyclohexane	**0.0001%**	**0.0002%**
Methylcyclohexane	**0.0002%**	**0.0003%**
Aromatics		
Benzene	**0.0001%**	**0.0002%**
Toluene	**0.0016%**	**0.0033%**
Ethylbenzene	**0.0006%**	**0.0007%**
m,p-Xylene	**0.0013%**	**0.0016%**
Styrene	BDL	BDL
o-Xylene	**0.0003%**	**0.0003%**
C3 Benzenes	**0.0005%**	**0.0005%**
Naphthalene	BDL	BDL
C1 Naphthalenes	BDL	BDL
C2 Naphthalenes	BDL	BDL
Paraffins		
Hexanes	**0.0005%**	**0.0023%**
Heptanes	**0.0004%**	**0.0020%**
2,2,4-Trimethylpentane	**0.0001%**	**0.0001%**
Octanes	**0.0006%**	**0.0017%**
Nonanes	**0.0009%**	**0.0012%**
Decanes	**0.0024%**	**0.0024%**
Undecanes	**0.0015%**	**0.0012%**
Dodecanes	BDL	**0.0001%**
Tridecanes	BDL	BDL
Tetradecanes	BDL	BDL
Pentadecanes	BDL	BDL
Hexadecanes	BDL	BDL
Heptadecanes	BDL	BDL
Octadecanes	BDL	BDL
Nonadecanes	BDL	BDL
Eicosanes +	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0112%**	**0.0187%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	WWTP1BG01TB Mol %	WWTP1BG02TB Mol %	WWTP1BG03TB Mol %	WWTP1BG04TB Mol %
Cycloalkanes				
Cyclopentane	BDL	BDL	BDL	BDL
Methylcyclopentane	BDL	BDL	BDL	BDL
Cyclohexane	BDL	BDL	BDL	BDL
Methylcyclohexane	BDL	BDL	BDL	BDL
Aromatics				
Benzene	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL
m,p-Xylene	BDL	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL	BDL
C3 Benzenes	**0.0001%**	**0.0001%**	**0.0001%**	**0.0002%**
Naphthalene	BDL	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL	BDL
Paraffins				
Hexanes	BDL	BDL	BDL	BDL
Heptanes	BDL	BDL	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL	BDL	BDL
Octanes	BDL	BDL	BDL	BDL
Nonanes	BDL	BDL	BDL	BDL
Decanes	**0.0003%**	**0.0002%**	**0.0002%**	**0.0005%**
Undecanes	**0.0006%**	**0.0004%**	**0.0003%**	**0.0010%**
Dodecanes	**0.0002%**	**0.0002%**	**0.0001%**	**0.0003%**
Tridecanes	BDL	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0012%**	**0.0009%**	**0.0007%**	**0.0020%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	WWTP1BM02TB Mol %	WWTP1BM03TB Mol %	WWTP1BM04TB Mol %
Cycloalkanes			
Cyclopentane	BDL	BDL	BDL
Methylcyclopentane	BDL	BDL	BDL
Cyclohexane	BDL	BDL	BDL
Methylcyclohexane	BDL	BDL	BDL
Aromatics			
Benzene	BDL	BDL	BDL
Toluene	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL
m,p-Xylene	BDL	BDL	BDL
Styrene	BDL	BDL	BDL
o-Xylene	BDL	BDL	BDL
C3 Benzenes	BDL	BDL	BDL
Naphthalene	BDL	BDL	BDL
C1 Naphthalenes	BDL	BDL	BDL
C2 Naphthalenes	BDL	BDL	BDL
Paraffins			
Hexanes	BDL	BDL	BDL
Heptanes	BDL	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL	BDL
Octanes	BDL	BDL	BDL
Nonanes	BDL	BDL	BDL
Decanes	BDL	BDL	BDL
Undecanes	BDL	BDL	BDL
Dodecanes	BDL	BDL	BDL
Tridecanes	BDL	BDL	BDL
Tetradecanes	BDL	BDL	BDL
Pentadecanes	BDL	BDL	BDL
Hexadecanes	BDL	BDL	BDL
Heptadecanes	BDL	BDL	BDL
Octadecanes	BDL	BDL	BDL
Nonadecanes	BDL	BDL	BDL
Eicosanes +	BDL	BDL	BDL
Total from Cyclopentane to Eicosanes +	BDL	BDL	BDL

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Extended Hydrocarbon Analysis by GC/FID

Component Name	WWTP2BG01TB Mol %	WWTP2BM01TB Mol %
Cycloalkanes		
Cyclopentane	BDL	BDL
Methylcyclopentane	BDL	BDL
Cyclohexane	BDL	BDL
Methylcyclohexane	BDL	BDL
Aromatics		
Benzene	BDL	BDL
Toluene	**0.0026%**	**0.0031%**
Ethylbenzene	BDL	BDL
m,p-Xylene	BDL	BDL
Styrene	BDL	BDL
o-Xylene	BDL	BDL
C3 Benzenes	**0.0002%**	**0.0003%**
Naphthalene	BDL	BDL
C1 Naphthalenes	BDL	BDL
C2 Naphthalenes	BDL	BDL
Paraffins		
Hexanes	BDL	BDL
Heptanes	BDL	BDL
2,2,4-Trimethylpentane	BDL	BDL
Octanes	BDL	BDL
Nonanes	**0.0001%**	**0.0001%**
Decanes	**0.0011%**	**0.0009%**
Undecanes	**0.0005%**	**0.0006%**
Dodecanes	BDL	**0.0002%**
Tridecanes	BDL	BDL
Tetradecanes	BDL	BDL
Pentadecanes	BDL	BDL
Hexadecanes	BDL	BDL
Heptadecanes	BDL	BDL
Octadecanes	BDL	BDL
Nonadecanes	BDL	BDL
Eicosanes +	BDL	BDL
Total from Cyclopentane to Eicosanes +	**0.0045%**	**0.0052%**

Detection Limit = 0.0001 mol% (1 ppm
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Appendix D – Sulfur Analysis

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	1NG01TB ppmv	1NG02TB ppmv	2NG02TB ppmv
Dichlorodifluoromethane (CFC-12)	BDL	BDL	BDL
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL
	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL
	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL
	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL
	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	BDL	BDL	BDL

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	3NG01TB ppmv	3NG02TB ppmv	3NG03TB ppmv
Dichlorodifluoromethane (CFC-12)	BDL	BDL	BDL
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL
	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL
	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL
	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL
	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	BDL	BDL	BDL

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF1BG01TB ppmv	LF1BG02TB ppmv	LF1BG03TB ppmv	LF1BG04TB ppmv
Dichlorodifluoromethane (CFC-12)	1.85	2.05	1.26	1.90
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	0.25	0.33
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	0.42	0.51	0.20	0.23
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	2.18	2.48	0.93	1.15
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	BDL	BDL	0.81	0.88
1,1-Dichloroethane	0.17	0.20	0.13	0.15
1,2-Dichloroethane	0.22	0.16	0.14	0.20
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	0.21	0.25	0.53	0.64
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	0.28	0.32	0.36	0.45
Trichloroethene	0.31	0.30	0.26	0.38
Tetrachloroethene	0.20	0.21	0.21	0.28
			BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
			BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
			BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
			BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**5.85**	**6.49**	**5.09**	**6.59**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF1BM01TB ppmv	LF1BM02TB ppmv	LF1BM03TB ppmv	LF1BM04TB ppmv
Dichlorodifluoromethane (CFC-12)	**3.24**	**2.59**	**1.35**	**1.36**
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL
			BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
			BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
			BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
			BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**3.24**	**2.59**	**1.35**	**1.36**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Trace Sulfur Analysis by ASTM D6228

Component Name		1NG01TB ppmv	1NG02TB ppmv	2NG02TB ppmv
Hydrogen Sulfide	1.00	**0.13**	**0.11**	BDL
Sulfur Dioxide	1.00	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.12**	**0.14**	**0.24**
Carbon Disulfide	1.00	BDL	BDL	BDL
Methyl Mercaptan	1.00	**0.13**	**0.11**	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL
Dimethyl Sulfide	1.00	**0.20**	**0.13**	BDL
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL
Dimethyl Disulfide	1.00	**0.24**	**0.23**	**0.03**
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL

Calculated Sulfur Content			
Total Sulfur			
As molar PPM S	**1.06**	**0.95**	**0.30**
As mg/m^3	**1.52**	**1.36**	**0.43**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.063**	**0.056**	**0.018**
H2S as mg/m^3	**0.20**	**0.17**	BDL
As Grains/100 SCF @ 14.73 psia, 60°F	**0.008**	**0.007**	BDL

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		3NG01TB ppmv	3NG02TB ppmv	3NG03TB ppmv
Hydrogen Sulfide	1.00	**0.50**	**0.47**	**0.43**
Sulfur Dioxide	1.00	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**7.94**	**7.71**	**7.85**
Carbon Disulfide	1.00	BDL	BDL	BDL
Methyl Mercaptan	1.00	**5.38**	**5.29**	**5.27**
Ethyl Mercaptan	1.00	**1.63**	**1.45**	**1.38**
i-Propyl Mercaptan	1.00	**0.49**	**0.44**	**0.42**
n-Propyl Mercaptan	1.00	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	**1.53**	**1.42**	**1.38**
Dimethyl Sulfide	1.00	**0.19**	**0.17**	**0.17**
Methyl Ethyl Sulfide	1.00	**1.23**	**1.13**	**1.07**
Diethyl Sulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL
Thiophene	1.00	**0.12**	**0.10**	**0.08**
C1-Thiophenes	1.00	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL

Calculated Sulfur Content			
Total Sulfur			
As molar PPM S	**19.0**	**18.2**	**18.1**
As mg/m^3	**27.2**	**26.0**	**25.8**
As Grains/100 SCF @ 14.73 psia, 60°F	**1.13**	**1.08**	**1.07**
H2S as mg/m^3	**0.76**	**0.71**	**0.65**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.03**	**0.03**	**0.03**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF1BG01TB ppmv	LF1BG02TB ppmv	LF1BG03TB ppmv	LF1BG04TB ppmv
Hydrogen Sulfide	1.00	27.9	29.1	30.1	31.2
Sulfur Dioxide	1.00	BDL	BDL	0.18	0.19
Carbonyl Sulfide	1.00	0.19	0.17	0.22	0.22
Carbon Disulfide	1.00	0.22	0.20	0.10	0.09
Methyl Mercaptan	1.00	2.78	2.53	0.77	0.84
Ethyl Mercaptan	1.00	0.12	0.08	BDL	BDL
i-Propyl Mercaptan	1.00	0.24	0.21	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	0.18	0.16	0.05	0.06
Dimethyl Sulfide	1.00	19.6	19.5	14.5	16.0
Methyl Ethyl Sulfide	1.00	0.05	0.05	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	0.03	0.03	0.17	0.20
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	0.02	0.02
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	0.08	0.06	0.06	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	0.08	0.05	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	51.8	52.3	46.5	49.3
As mg/m^3	74.1	74.9	66.5	70.5
As Grains/100 SCF @ 14.73 psia, 60°F	3.07	3.10	2.76	2.92
H2S as mg/m^3	42.5	44.2	45.8	47.5
As Grains/100 SCF @ 14.73 psia, 60°F	1.66	1.73	1.78	1.85

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF1BM01TB ppmv	LF1BM02TB ppmv	LF1BM03TB ppmv	LF1BM04TB ppmv
Hydrogen Sulfide	1.00	BDL	BDL	BDL	BDL
Sulfur Dioxide	1.00	BDL	BDL	**0.08**	**0.07**
Carbonyl Sulfide	1.00	BDL	BDL	BDL	BDL
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Dimethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	BDL	BDL	**0.08**	**0.07**
As mg/m^3	BDL	BDL	**0.11**	**0.10**
As Grains/100 SCF @ 14.73 psia, 60°F	BDL	BDL	**0.005**	**0.004**
H2S as mg/m^3	BDL	BDL	BDL	BDL
As Grains/100 SCF @ 14.73 psia, 60°F	BDL	BDL	BDL	BDL

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF2BG01TB ppmv	LF2BG02TB ppmv	LF2BG03TB ppmv	LF2BG04TB ppmv
Hydrogen Sulfide	1.00	**79.1**	**77.6**	**131**	**78.8**
Sulfur Dioxide	1.00	BDL	BDL	**0.21**	**0.19**
Carbonyl Sulfide	1.00	**0.19**	**0.18**	**0.23**	**0.15**
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	**0.38**	**0.37**	**1.00**	**0.69**
Ethyl Mercaptan	1.00	**0.11**	**0.11**	**0.15**	**0.07**
i-Propyl Mercaptan	1.00	**0.31**	**0.31**	**0.44**	**0.18**
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	**0.20**	**0.19**	**0.31**	**0.14**
Dimethyl Sulfide	1.00	**0.22**	**0.22**	**0.36**	**0.17**
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	**0.06**	**0.05**
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	**0.05**	**0.05**	**0.13**	**0.05**
C1-Thiophenes	1.00	BDL	BDL	**0.10**	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	**0.20**	**0.18**	**0.25**	**0.07**

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**80.8**	**79.2**	**134**	**80.7**
As mg/m^3	**116**	**113**	**192**	**115**
As Grains/100 SCF @ 14.73 psia, 60°F	**4.79**	**4.70**	**7.97**	**4.78**
H2S as mg/m^3	**120**	**118**	**199**	**120**
As Grains/100 SCF @ 14.73 psia, 60°F	**4.69**	**4.60**	**7.77**	**4.67**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF2BM01TB ppmv	LF2BM02TB ppmv	LF2BM03TB ppmv	LF2BM04TB ppmv
Hydrogen Sulfide	1.00	**0.52**	**0.53**	**0.44**	**0.30**
Sulfur Dioxide	1.00	BDL	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.22**	**0.20**	**0.88**	**0.87**
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Dimethyl Sulfide	1.00	BDL	BDL	**0.06**	**0.06**
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**0.74**	**0.73**	**1.38**	**1.23**
As mg/m^3	**1.06**	**1.04**	**1.97**	**1.76**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.044**	**0.043**	**0.082**	**0.073**
H2S as mg/m^3	**0.79**	**0.81**	**0.67**	**0.46**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.031**	**0.031**	**0.078**	**0.018**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF3BG01TB ppmv	LF3BG02TB ppmv	LF3BG03TB ppmv	LF3BG04TB ppmv
Hydrogen Sulfide	1.00	**144**	**151**	**152**	**100**
Sulfur Dioxide	1.00	BDL	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.54**	**0.55**	**0.84**	**0.49**
Carbon Disulfide	1.00	**0.07**	**0.06**	**0.11**	**0.05**
Methyl Mercaptan	1.00	**1.89**	**1.75**	**4.10**	**2.27**
Ethyl Mercaptan	1.00	**0.15**	**0.15**	**0.16**	**0.17**
i-Propyl Mercaptan	1.00	**2.19**	**2.21**	**1.97**	**2.19**
n-Propyl Mercaptan	1.00	**0.07**	**0.07**	**0.13**	**0.13**
t-Butyl Mercaptan	1.00	**0.15**	**0.15**	**0.15**	**0.16**
Dimethyl Sulfide	1.00	**1.45**	**1.33**	**2.42**	**1.78**
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	**0.08**	**0.04**	**0.38**	**0.21**
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	**0.14**	**0.13**	**0.16**	**0.21**
C1-Thiophenes	1.00	BDL	BDL	**0.06**	**0.07**
C2-Thiophenes	1.00	BDL	BDL	**0.06**	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	**0.08**	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	**1.94**	**2.09**	**1.44**	**2.12**

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**153**	**160**	**165**	**110**
As mg/m^3	**219**	**228**	**235**	**158**
As Grains/100 SCF @ 14.73 psia, 60°F	**9.06**	**9.47**	**9.75**	**6.55**
H2S as mg/m^3	**219**	**230**	**231**	**153**
As Grains/100 SCF @ 14.73 psia, 60°F	**8.54**	**8.95**	**9.01**	**5.95**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF3BM01TB ppmv	LF3BM02TB ppmv	LF3BM03TB ppmv	LF3BM04TB ppmv
Hydrogen Sulfide	1.00	BDL	BDL	BDL	BDL
Sulfur Dioxide	1.00	**0.06**	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.19**	**0.17**	**0.15**	**0.08**
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Dimethyl Sulfide	1.00	**0.95**	**0.88**	**1.88**	**1.73**
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	**0.05**	**0.05**	**0.12**	**0.17**
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**1.30**	**1.15**	**2.27**	**2.15**
As mg/m^3	**1.86**	**1.65**	**3.25**	**3.08**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.077**	**0.068**	**0.14**	**0.13**
H2S as mg/m^3	BDL	BDL	BDL	BDL
As Grains/100 SCF @ 14.73 psia, 60°F	BDL	BDL	BDL	BDL

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF3BM05TB ppmv	LF3BM06TB ppmv	LF3BM07TB ppmv	LF3BM08TB ppmv
Hydrogen Sulfide	1.00	BDL	BDL	BDL	BDL
Sulfur Dioxide	1.00	BDL	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.13**	**0.12**	BDL	BDL
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL	BDL
Dimethyl Sulfide	1.00	**1.26**	**1.38**	BDL	BDL
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**1.39**	**1.50**	BDL	BDL
As mg/m^3	**1.99**	**2.150**	BDL	BDL
As Grains/100 SCF @ 14.73 psia, 60°F	**0.082**	**0.089**	BDL	BDL
H2S as mg/m^3	BDL	BDL	BDL	BDL
As Grains/100 SCF @ 14.73 psia, 60°F	BDL	BDL	BDL	BDL

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		LF4BG01TB ppmv	LF4BG02TB ppmv
Hydrogen Sulfide	1.00	**54.9**	**36.0**
Sulfur Dioxide	1.00	BDL	BDL
Carbonyl Sulfide	1.00	**0.22**	**0.22**
Carbon Disulfide	1.00	BDL	**0.16**
Methyl Mercaptan	1.00	**0.43**	**0.69**
Ethyl Mercaptan	1.00	BDL	BDL
i-Propyl Mercaptan	1.00	**0.16**	**0.18**
n-Propyl Mercaptan	1.00	BDL	BDL
t-Butyl Mercaptan	1.00	**0.13**	**0.21**
Dimethyl Sulfide	1.00	**0.23**	**3.30**
Methyl Ethyl Sulfide	1.00	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL
Dimethyl Disulfide	1.00	**0.30**	**0.15**
Methyl Ethyl Disulfide	1.00	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL
Thiophene	1.00	**0.11**	**0.07**
C1-Thiophenes	1.00	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL
Benzothiophene	1.00	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL
Thiophane	1.00	BDL	BDL
Thiophenol	1.00	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	**0.07**	**0.09**

Calculated Sulfur Content		
Total Sulfur		
As molar PPM S	**56.9**	**41.3**
As mg/m^3	**81.3**	**59.1**
As Grains/100 SCF @ 14.73 psia, 60°F	**3.37**	**2.45**
H2S as mg/m^3	**83.5**	**54.7**
As Grains/100 SCF @ 14.73 psia, 60°F	**3.25**	**2.13**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		WWTP1BG01TB ppmv	WWTP1BG02TB ppmv	WWTP1BG03TB ppmv	WWTP1BG04TB ppmv
Hydrogen Sulfide	1.00	**300**	**296**	**259**	**276**
Sulfur Dioxide	1.00	BDL	BDL	BDL	BDL
Carbonyl Sulfide	1.00	**0.22**	**0.31**	**0.07**	**0.08**
Carbon Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Mercaptan	1.00	**0.29**	**0.35**	**0.23**	**0.30**
Ethyl Mercaptan	1.00	**0.09**	**0.10**	BDL	**0.07**
i-Propyl Mercaptan	1.00	BDL	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	**0.19**	**0.18**	**0.06**	**0.16**
t-Butyl Mercaptan	1.00	**0.10**	**0.10**	**0.06**	**0.09**
Dimethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL	BDL

Calculated Sulfur Content				
Total Sulfur				
As molar PPM S	**301**	**297**	**259**	**277**
As mg/m^3	**430**	**425**	**371**	**396**
As Grains/100 SCF @ 14.73 psia, 60°F	**17.8**	**17.6**	**15.4**	**16.4**
H2S as mg/m^3	**456**	**450**	**394**	**420**
As Grains/100 SCF @ 14.73 psia, 60°F	**17.8**	**17.5**	**15.4**	**16.4**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		WWTP1BM02TB ppmv	WWTP1BM03TB ppmv	WWTP1BM04TB ppmv
Hydrogen Sulfide	1.00	BDL	**0.16**	**0.06**
Sulfur Dioxide	1.00	BDL	BDL	BDL
Carbonyl Sulfide	1.00	BDL	BDL	BDL
Carbon Disulfide	1.00	BDL	BDL	BDL
Methyl Mercaptan	1.00	BDL	BDL	BDL
Ethyl Mercaptan	1.00	BDL	BDL	BDL
i-Propyl Mercaptan	1.00	BDL	BDL	BDL
n-Propyl Mercaptan	1.00	BDL	BDL	BDL
t-Butyl Mercaptan	1.00	BDL	BDL	BDL
Dimethyl Sulfide	1.00	BDL	BDL	BDL
Methyl Ethyl Sulfide	1.00	BDL	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL	BDL
Dimethyl Disulfide	1.00	BDL	BDL	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL	BDL
Thiophene	1.00	BDL	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL	BDL
Benzothiophene	1.00	BDL	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL	BDL
Thiophane	1.00	BDL	BDL	BDL
Thiophenol	1.00	BDL	BDL	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL	BDL

Calculated Sulfur Content			
Total Sulfur			
As molar PPM S	BDL	**0.16**	**0.06**
As mg/m^3	BDL	**0.23**	**0.09**
As Grains/100 SCF @ 14.73 psia, 60°F	BDL	**0.009**	**0.004**
H2S as mg/m^3	BDL	**0.24**	**0.09**
As Grains/100 SCF @ 14.73 psia, 60°F	~~**0.046**~~	BDL	**0.009**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Trace Sulfur Analysis by ASTM D6228

Component Name		WWTP2BG01TB ppmv	WWTP2BM01TB ppmv
Hydrogen Sulfide	1.00	**64.6**	**187**
Sulfur Dioxide	1.00	BDL	BDL
Carbonyl Sulfide	1.00	**0.05**	BDL
Carbon Disulfide	1.00	BDL	BDL
Methyl Mercaptan	1.00	**0.27**	**0.82**
Ethyl Mercaptan	1.00	**0.09**	BDL
i-Propyl Mercaptan	1.00	**0.07**	BDL
n-Propyl Mercaptan	1.00	**0.32**	**0.33**
t-Butyl Mercaptan	1.00	**0.10**	BDL
Dimethyl Sulfide	1.00	BDL	**0.16**
Methyl Ethyl Sulfide	1.00	BDL	BDL
Diethyl Sulfide	1.00	BDL	BDL
Di-t-Butyl Sulfide	1.00	BDL	BDL
Dimethyl Disulfide	1.00	**0.03**	BDL
Methyl Ethyl Disulfide	1.00	BDL	BDL
Methyl i-Propyl Disulfide	1.00	BDL	BDL
Diethyl Disulfide	1.00	BDL	BDL
Methyl n-Propyl Disulfide	1.00	BDL	BDL
Methyl t-Butyl Disulfide	1.00	BDL	BDL
Ethyl i-Propyl Disulfide	1.00	BDL	BDL
Ethyl n-Propyl Disulfide	1.00	BDL	BDL
Ethyl t-Butyl Disulfide	1.00	BDL	BDL
Di-i-Propyl Disulfide	1.00	BDL	BDL
i-Propyl n-Propyl Disulfide	1.00	BDL	BDL
Di-n-Propyl Disulfide	1.00	BDL	BDL
i-Propyl t-Butyl Disulfide	1.00	BDL	BDL
n-Propyl t-Butyl Disulfide	1.00	BDL	BDL
Di-t-Butyl Disulfide	1.00	BDL	BDL
Dimethyl Trisulfide	1.00	BDL	BDL
Diethyl Trisulfide	1.00	BDL	BDL
Di-t-Butyl Trisulfide	1.00	BDL	BDL
Thiophene	1.00	BDL	BDL
C1-Thiophenes	1.00	BDL	BDL
C2-Thiophenes	1.00	BDL	BDL
C3-Thiophenes	1.00	BDL	BDL
Benzothiophene	1.00	BDL	BDL
C1-Benzothiophenes	1.00	BDL	BDL
C2-Benzothiophenes	1.00	BDL	BDL
Thiophane	1.00	BDL	BDL
Thiophenol	1.00	**0.05**	BDL
Individual Unidentified Sulfur Compounds (all as monosulfides)	1.00	BDL	BDL

Calculated Sulfur Content		
Total Sulfur		
As molar PPM S	**65.6**	**188**
As mg/m^3	**93.8**	**269**
As Grains/100 SCF @ 14.73 psia, 60°F	**3.89**	**11.2**
H2S as mg/m^3	**98.2**	**284**
As Grains/100 SCF @ 14.73 psia, 60°F	**0.004**	**3.83**

Detection Limit = 0.05 ppmv S
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

The results within this report relate only to the items tested.
Technical Contact: Karen Crippen, x5604

Appendix E – Halocarbons Analysis

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF2BG01TB ppmv	LF2BG02TB ppmv	LF2BG03TB ppmv	LF2BG04TB ppmv
Dichlorodifluoromethane (CFC-12)	**0.78**	**0.74**	**0.98**	**0.72**
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	**0.37**	**0.37**	**0.42**	**0.32**
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	**0.42**	**0.41**	**0.48**	**0.37**
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	**0.17**	**0.19**	**0.31**	**0.22**
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL
			BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
			BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
			BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
			BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**1.74**	**1.72**	**2.18**	**1.63**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF2BM01TB ppmv	LF2BM02TB ppmv	LF2BM03TB ppmv	LF2BM04TB ppmv
Dichlorodifluoromethane (CFC-12)	**2.51**	**2.52**	**2.37**	**2.34**
1,2-Dichlorotetrafluoroethane (CFC-114)	**0.11**	**0.11**	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	**0.15**	**0.16**	BDL	BDL
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	**0.61**	**0.62**	**0.42**	**0.41**
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	**0.33**	**0.33**	**0.25**	**0.25**
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL
			BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
			BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
			BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
			BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**3.71**	**3.75**	**3.04**	**3.00**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF3BG01TB ppmv	LF3BG02TB ppmv	LF3BG03TB ppmv	LF3BG04TB ppmv
Dichlorodifluoromethane (CFC-12)	**1.07**	**1.07**	**0.65**	**0.59**
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	**0.13**	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	**0.12**	BDL
Chloromethane	BDL	BDL	**0.14**	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	**0.16**	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	**0.38**	**0.38**	**0.46**	**0.32**
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	**0.44**	**0.43**	**0.55**	**0.56**
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	**0.46**	**0.51**	**0.53**	**0.42**
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	**0.10**	**0.16**	BDL
				BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**2.35**	**2.49**	**2.91**	**1.89**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF3BM01TB ppmv	LF3BM02TB ppmv	LF3BM03TB ppmv	LF3BM04TB ppmv
Dichlorodifluoromethane (CFC-12)	**3.51**	**3.60**	**2.96**	**2.98**
1,2-Dichlorotetrafluoroethane (CFC-114)	**0.13**	**0.12**	**0.17**	**0.17**
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	**0.13**	**0.13**	**0.23**	**0.24**
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	**0.55**	**0.56**	**0.64**	**0.66**
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	**0.23**	**0.25**	**0.15**	**0.13**
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	**4.56**	**4.67**	**4.14**	**4.18**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	LF4BG01TB ppmv	LF4BG02TB ppmv
Dichlorodifluoromethane (CFC-12)	**0.31**	**0.67**
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	**0.52**
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	**0.59**
Chloromethane	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	**2.08**
Chloroform	BDL	BDL
Carbon Tetrachloride	BDL	BDL
Chloroethane	**0.43**	**4.59**
1,1-Dichloroethane	BDL	**0.11**
1,2-Dichloroethane	BDL	**0.21**
1,1,1-Trichloroethane	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL
Chloroethene (Vinyl Chloride)	**1.50**	**2.32**
1,1-Dichloroethene	BDL	BDL
cis-1,2-Dichloroethene	**2.32**	**1.14**
Trichloroethene	**0.23**	**0.62**
Tetrachloroethene	**0.39**	**1.15**
	BDL	BDL
1,2-Dichloropropane	BDL	BDL
	BDL	BDL
3-Chloropropene	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL
	BDL	BDL
Bromomethane	BDL	BDL
1,2-Dibromoethane	BDL	BDL
	BDL	BDL
Chlorobenzene	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL
Total TO-14 Halocarbon Components:	**5.18**	**14.0**

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	WWTP1BG01TB ppmv	WWTP1BG02TB ppmv	WWTP1BG03TB ppmv	WWTP1BG04TB ppmv
Dichlorodifluoromethane (CFC-12)	BDL	BDL	BDL	BDL
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	BDL	BDL	BDL	BDL

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	WWTP1BM02TB ppmv	WWTP1BM03TB ppmv	WWTP1BM04TB ppmv
Dichlorodifluoromethane (CFC-12)	BDL	BDL	BDL
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL	BDL
Chloromethane	BDL	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL
1,2-Dichloroethane	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL
3-Chloropropene	BDL	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL
1,2-Dibromoethane	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL	BDL
Total TO-14 Halocarbon Components:	BDL	BDL	BDL

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

TO-14 Halocarbon Analysis by Gas Chromatography

Component Name	WWTP2BG01TB ppmv	WWTP2BM01TB ppmv
Dichlorodifluoromethane (CFC-12)	BDL	BDL
1,2-Dichlorotetrafluoroethane (CFC-114)	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	BDL	BDL
Trichlorofluoromethane (CFC-11)	BDL	BDL
Chloromethane	BDL	BDL
Dichloromethane (Methylene Chloride)	BDL	BDL
Chloroform	BDL	BDL
Carbon Tetrachloride	BDL	BDL
Chloroethane	BDL	BDL
1,1-Dichloroethane	BDL	BDL
1,2-Dichloroethane	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL
Chloroethene (Vinyl Chloride)	BDL	BDL
1,1-Dichloroethene	BDL	BDL
cis-1,2-Dichloroethene	BDL	BDL
Trichloroethene	BDL	BDL
Tetrachloroethene	BDL	BDL
	BDL	BDL
1,2-Dichloropropane	BDL	BDL
	BDL	BDL
3-Chloropropene	BDL	BDL
cis-1,3-Dichloropropene	BDL	BDL
trans-1,3-Dichloropropene	BDL	BDL
	BDL	BDL
Bromomethane	BDL	BDL
1,2-Dibromoethane	BDL	BDL
	BDL	BDL
Chlorobenzene	BDL	BDL
1,2-Dichlorobenzene	BDL	BDL
1,3-Dichlorobenzene	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL
1,2,4-Trichlorobenzene	BDL	BDL
Hexachloro-1,3-butadiene	BDL	BDL
Total TO-14 Halocarbon Components:	BDL	BDL

Detection Limit = 0.1 ppmv
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Appendix F – Metals and Siloxanes Analysis

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	1NG01HG µg/M^3	1NG02HG µg/M^3	2NG01HG µg/M^3	2NG02HG µg/M^3
Mercury	**0.02**	BDL	BDL	BDL	BDL

Component	Detection Limit, µg/M^3	1NG01MT µg/M^3	1NG02MT µg/M^3	2NG01MT µg/M^3	2NG02MT µg/M^3
Arsenic	30	BDL	BDL	BDL	BDL
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	BDL	BDL	BDL	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	BDL	BDL	BDL	BDL
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	**104**	BDL	BDL	**50**

Total Organic Silicon, including Siloxanes

	1NG01TB ppmv as Si	1NG02TB ppmv as Si	~~2NG01TB~~ ppmv as Si	2NG02TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	~~BDL~~	BDL
Pentamethyldisiloxane	BDL	BDL	~~BDL~~	BDL
Hexamethyldisilane	BDL	BDL	~~BDL~~	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	~~BDL~~	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	~~BDL~~	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	~~BDL~~	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	~~BDL~~	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	~~BDL~~	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	~~BDL~~	BDL
Unidentified organic silicon compound	BDL	BDL	~~BDL~~	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Bad sample because
> 90% air is present.

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	3NG01HG µg/M^3	3NG02HG µg/M^3	3NG03HG µg/M^3
Mercury	**0.02**	BDL	BDL	not sampled

Component	Detection Limit, µg/M^3	3NG01MT µg/M^3	3NG02MT µg/M^3	3NG03MT µg/M^3
Arsenic	30	BDL	BDL	not sampled
Barium	30	BDL	BDL	
Beryllium	30	BDL	BDL	
Cadmium	30	BDL	BDL	
Cobalt	30	BDL	BDL	
Chromium	30	BDL	BDL	
Copper	30	**67**	BDL	
Manganese	30	BDL	BDL	
Molybdenum	30	BDL	BDL	
Nickel	30	BDL	BDL	
Lead	30	BDL	BDL	
Antimony	30	BDL	BDL	
Selenium	30	BDL	BDL	
Strontium	30	BDL	BDL	
Thallium	30	BDL	BDL	
Zinc	30	**48**	**42**	

Total Organic Silicon, including Siloxanes

	3NG01TB ppmv as Si	3NG02TB ppmv as Si	3NG03TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF1BG01HG µg/M^3	LF1BG02HG µg/M^3	LF1BG03HG µg/M^3	LF1BG04HG µg/M^3
Mercury	**0.02**	raw gas sampled volume too high unable to analyze	raw gas sampled volume too high unable to analyze	raw gas sampled volume too high unable to analyze	raw gas sampled volume too high unable to analyze

Component	Detection Limit, µg/M^3	LF1BG01MT µg/M^3	LF1BG02MT	LF1BG03MT µg/M^3	LF1BG04MT µg/M^3
Arsenic	30	323	not sampled	not sampled	not sampled
Barium	30	BDL			
Beryllium	30	BDL			
Cadmium	30	BDL			
Cobalt	30	BDL			
Chromium	30	BDL			
Copper	30	BDL			
Manganese	30	BDL			
Molybdenum	30	BDL			
Nickel	30	BDL			
Lead	30	BDL			
Antimony	30	352			
Selenium	30	BDL			
Strontium	30	BDL			
Thallium	30	BDL			
Zinc	30	**29**			

Total Organic Silicon, including Siloxanes

	LF1BG01TB ppmv as Si	LF1BG02TB ppmv as Si	LF1BG03TB ppmv as Si	LF1BG04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	**1.9**	**0.6**
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	**BDL**
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**3.1**	**3.2**	**3.4**	**1.4**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	**0.8**	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF1BM01HG µg/M^3	LF1BM02HG µg/M^3	LF1BM03HG µg/M^3	LF1BM04HG µg/M^3
Mercury	**0.02**	BDL	BDL	BDL	BDL

Component	Detection Limit, µg/M^3	LF1BM01MT µg/M^3	LF1BM02MT µg/M^3	LF1BM03MT µg/M^3	LF1BM04MT µg/M^3
Arsenic	30	BDL	BDL	BDL	BDL
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	BDL	BDL	**250**	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	BDL	BDL	BDL	BDL
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	**52**	**28**	**111**	BDL

Total Organic Silicon, including Siloxanes

	LF1BM01TB ppmv as Si	LF1BM02TB ppmv as Si	LF1BM03TB ppmv as Si	LF1BM04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**0.5**	**0.3**	**4.9**	**4.5**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

0.3 is below std DLs reported for comparison only

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF2BG01HG µg/M^3	LF2BG02HG	LF2BG03HG µg/M^3	LF2BG04HG µg/M^3
Mercury	**0.02**	**1.2** (estimated)	not sampled	**1.7** (estimated)	raw gas sampled volume too high unable to analyze

Component	Detection Limit, µg/M^3	LF2BG01MT µg/M^3	LF2BG02MT µg/M^3	LF2BG03MT µg/M^3	LF2BG04MT µg/M^3
Arsenic	30	227	339	275	181
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	BDL	BDL	BDL	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	**280**	**417**	**387**	**223**
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	**96**	**51**	**54**	BDL

Total Organic Silicon, including Siloxanes

	LF2BG01TB ppmv as Si	LF2BG02TB ppmv as Si	LF2BG03TB ppmv as Si	LF2BG04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**4.9**	**4.6**	**5.3**	**3.0**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	**0.8**	**0.7**	**1.0**	**0.6**
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF2BM01HG µg/M^3	LF2BM02HG µg/M^3	LF2BM03HG µg/M^3	LF2BM04HG µg/M^3
Mercury	**0.02**	BDL	BDL	BDL	BDL

Component	Detection Limit, µg/M^3	LF2BM01MT µg/M^3	LF2BM02MT µg/M^3	LF2BM03MT µg/M^3	LF2BM04MT µg/M^3
Arsenic	30	BDL	BDL	BDL	BDL
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	BDL	BDL	BDL	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	BDL	BDL	BDL	BDL
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	**57**	BDL	BDL	BDL

Total Organic Silicon, including Siloxanes

	LF2BM01TB ppmv as Si	LF2BM02TB ppmv as Si	LF2BM03TB ppmv as Si	LF2BM04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF3BG01HG µg/M^3	LF3BG02HG µg/M^3	LF3BG03HG µg/M^3	LF3BG04HG µg/M^3
Mercury	**0.02**	BDL	BDL	**0.05**	**0.07**

Component	Detection Limit, µg/M^3	LF3BG01MT µg/M^3	LF3BG02MT µg/M^3	LF3BG03MT µg/M^3	LF3BG04MT
Arsenic	30	**181**	**222**	**78**	not sampled
Barium	30	BDL	BDL	BDL	
Beryllium	30	BDL	BDL	BDL	
Cadmium	30	BDL	BDL	BDL	
Cobalt	30	BDL	BDL	BDL	
Chromium	30	BDL	BDL	BDL	
Copper	30	BDL	BDL	BDL	
Manganese	30	BDL	BDL	BDL	
Molybdenum	30	BDL	BDL	BDL	
Nickel	30	BDL	BDL	BDL	
Lead	30	BDL	BDL	BDL	
Antimony	30	**228**	**277**	**85**	
Selenium	30	BDL	BDL	BDL	
Strontium	30	BDL	BDL	BDL	
Thallium	30	BDL	BDL	BDL	
Zinc	30	**80**	**29**	BDL	

Total Organic Silicon, including Siloxanes

	LF3BG01TB ppmv as Si	LF3BG02TB ppmv as Si	LF3BG03TB ppmv as Si	LF3BG04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	**0.8**	**0.8**	**0.8**	**0.9**
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**4.1**	**5.5**	**3.1**	**3.7**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	**0.8**	**1.6**	**1.5**	**1.4**
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF3BM01HG µg/M^3	LF3BM02HG µg/M^3	LF3BM03HG µg/M^3	LF3BM04HG µg/M^3
Mercury	**0.02**	**0.14**	0.28	BDL	BDL

Component	Detection Limit, µg/M^3	LF3BM01MT µg/M^3	LF3BM02MT µg/M^3	LF3BM03MT µg/M^3	LF3BM04MT
Arsenic	30	BDL	BDL	BDL	not sampled
Barium	30	BDL	BDL	BDL	
Beryllium	30	BDL	BDL	BDL	
Cadmium	30	BDL	BDL	BDL	
Cobalt	30	BDL	BDL	BDL	
Chromium	30	BDL	BDL	BDL	
Copper	30	BDL	BDL	BDL	
Manganese	30	BDL	BDL	BDL	
Molybdenum	30	BDL	BDL	BDL	
Nickel	30	BDL	BDL	BDL	
Lead	30	BDL	BDL	BDL	
Antimony	30	BDL	BDL	BDL	
Selenium	30	BDL	BDL	BDL	
Strontium	30	BDL	BDL	BDL	
Thallium	30	BDL	BDL	BDL	
Zinc	30	BDL	BDL	BDL	

Total Organic Silicon, including Siloxanes

	LF3BM01TB ppmv as Si	LF3BM02TB ppmv as Si	LF3BM03TB ppmv as Si	LF3BM04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF3BM05HG µg/M^3	LF3BM06HG µg/M^3	LF3BM07HG µg/M^3	LF3BM08HG µg/M^3
Mercury	**0.02**	BDL	BDL	BDL	BDL

Component	Detection Limit, µg/M^3	LF3BM04MT µg/M^3	LF3BM05MT µg/M^3	LF3BM06MT µg/M^3	LF3BM07MT µg/M^3
Arsenic	30	BDL	BDL	BDL	BDL
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	**148**	BDL	**206**	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	BDL	BDL	BDL	BDL
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	BDL	BDL	BDL	BDL

Total Organic Silicon, including Siloxanes

	LF3BM05TB ppmv as Si	LF3BM06TB ppmv as Si	LF3BM07TB ppmv as Si	LF3BM08TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	BDL	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	LF4BG01HG µg/M^3	LF4BG02HG µg/M^3
Mercury	**0.02**	**0.60**	not sampled

Component	Detection Limit, µg/M^3	LF4BG01MT µg/M^3	LF4BG02MT µg/M^3
Arsenic	30	**59**	not sampled
Barium	30	BDL	
Beryllium	30	BDL	
Cadmium	30	BDL	
Cobalt	30	BDL	
Chromium	30	BDL	
Copper	30	BDL	
Manganese	30	BDL	
Molybdenum	30	BDL	
Nickel	30	BDL	
Lead	30	BDL	
Antimony	30	161	
Selenium	30	BDL	
Strontium	30	BDL	
Thallium	30	BDL	
Zinc	30	**62**	

Total Organic Silicon, includir

	LF4BG01TB ppmv as Si	LF4BG02TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL
Pentamethyldisiloxane	BDL	BDL
Hexamethyldisilane	BDL	**0.5**
Hexamethyldisiloxane (L2, MM)	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**2.0**	**2.8**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL
Decamethylcyclopentasiloxane (D5)	**0.5**	**1.9**
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL
Unidentified organic silicon compound	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	WWTP1BG01HG µg/M^3	WWTP1BG02HG µg/M^3	WWTP1BG03HG µg/M^3	WWTP1BG04HG µg/M^3
Mercury	**0.02**	**0.14**	**0.04**	**0.25**	**0.27**

Component	Detection Limit, µg/M^3	WWTP1BG01MT µg/M^3	WWTP1BG02MT µg/M^3	WWTP1BG03MT µg/M^3	WWTP1BG04MT µg/M^3
Arsenic	30	BDL	BDL	BDL	BDL
Barium	30	BDL	BDL	BDL	BDL
Beryllium	30	BDL	BDL	BDL	BDL
Cadmium	30	BDL	BDL	BDL	BDL
Cobalt	30	BDL	BDL	BDL	BDL
Chromium	30	BDL	BDL	BDL	BDL
Copper	30	BDL	BDL	BDL	BDL
Manganese	30	BDL	BDL	BDL	BDL
Molybdenum	30	BDL	BDL	BDL	BDL
Nickel	30	BDL	BDL	BDL	BDL
Lead	30	BDL	BDL	BDL	BDL
Antimony	30	BDL	BDL	BDL	BDL
Selenium	30	BDL	BDL	BDL	BDL
Strontium	30	BDL	BDL	BDL	BDL
Thallium	30	BDL	BDL	BDL	BDL
Zinc	30	**67**	**50**	BDL	**84**

Total Organic Silicon, including Siloxanes

	WWTP1BG01TB ppmv as Si	WWTP1BG02TB ppmv as Si	WWTP1BG03TB ppmv as Si	WWTP1BG04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL	BDL	BDL
Pentamethyldisiloxane	BDL	BDL	BDL	BDL
Hexamethyldisilane	BDL	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	BDL	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	**1.0**	**1.4**	**1.2**	**1.2**
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL	BDL	BDL
Unidentified organic silicon compound	BDL	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	WWTP1BM01HG µg/M^3	WWTP1BM02HG µg/M^3	WWTP1BM03HG µg/M^3	WWTP1BM04HG µg/M^3
Mercury	**0.02**	BDL	BDL	BDL	BDL

Component	Detection Limit, µg/M^3	WWTP1BM01MT µg/M^3	WWTP1BM02MT µg/M^3	WWTP1BM03MT µg/M^3	WWTP1BM04MT
Arsenic	30	BDL	BDL	BDL	not sampled
Barium	30	BDL	BDL	BDL	
Beryllium	30	BDL	BDL	BDL	
Cadmium	30	BDL	BDL	BDL	
Cobalt	30	BDL	BDL	BDL	
Chromium	30	BDL	BDL	BDL	
Copper	30	BDL	BDL	BDL	
Manganese	30	BDL	BDL	BDL	
Molybdenum	30	BDL	BDL	BDL	
Nickel	30	BDL	BDL	BDL	
Lead	30	BDL	BDL	BDL	
Antimony	30	BDL	BDL	BDL	
Selenium	30	BDL	BDL	BDL	
Strontium	30	BDL	BDL	BDL	
Thallium	30	BDL	BDL	BDL	
Zinc	30	**56**	**229**	**45**	

Total Organic Silicon, including Siloxanes

	~~WWTP1BM01TB~~ ppmv as Si	WWTP1BM02TB ppmv as Si	WWTP1BM03TB ppmv as Si	WWTP1BM04TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	~~BDL~~	BDL	BDL	BDL
Pentamethyldisiloxane	~~BDL~~	BDL	BDL	BDL
Hexamethyldisilane	~~BDL~~	BDL	BDL	BDL
Hexamethyldisiloxane (L2, MM)	~~BDL~~	BDL	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	~~BDL~~	BDL	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	~~BDL~~	BDL	BDL	BDL
Decamethyltetrasiloxane (L4, MD2M)	~~BDL~~	BDL	BDL	BDL
Decamethylcyclopentasiloxane (D5)	~~BDL~~	BDL	BDL	BDL
Dodecamethylpentasiloxane (L5, MD3M)	~~BDL~~	BDL	BDL	BDL
Unidentified organic silicon compound	~~BDL~~	BDL	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Bad sample because
> 90% air is present.

Volatile Metals Analysis

Component	Detection Limit, µg/M^3	WWTP2BG01HG µg/M^3	WWTP2BM01HG µg/M^3
Mercury	**0.02**	not sampled	not sampled

Component	Detection Limit, µg/M^3	WWTP2BG01MT µg/M^3	WWTP2BM01MT µg/M^3
Arsenic	30	not sampled	not sampled
Barium	30		
Beryllium	30		
Cadmium	30		
Cobalt	30		
Chromium	30		
Copper	30		
Manganese	30		
Molybdenum	30		
Nickel	30		
Lead	30		
Antimony	30		
Selenium	30		
Strontium	30		
Thallium	30		
Zinc	30		

Total Organic Silicon, includir

	WWTP2BG01TB ppmv as Si	WWTP2BM01TB ppmv as Si
1,1,3,3-Tetramethyldisiloxane	BDL	BDL
Pentamethyldisiloxane	BDL	BDL
Hexamethyldisilane	BDL	BDL
Hexamethyldisiloxane (L2, MM)	BDL	BDL
Octamethyltrisiloxane (L3, MDM)	BDL	BDL
Octamethylcyclotetrasiloxane (D4)	**21.8**	**13.6**
Decamethyltetrasiloxane (L4, MD2M)	BDL	BDL
Decamethylcyclopentasiloxane (D5)	**2.8**	**3.9**
Dodecamethylpentasiloxane (L5, MD3M)	BDL	BDL
Unidentified organic silicon compound	BDL	BDL

Detection Limit = 0.5 ppmv Si
BDL = Below Detection Limit
NA = Not Analyzed (no sample taken)

Appendix G – Semi-volatile and Volatile Organic Compounds Analysis

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.36			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.481		U	0.367
1,2-Dichloroethane		U	0.648		U	0.495
1,1-Dichloropropene		U	0.578		U	0.442
Benzene	12.2	B	0.821	8.68	B	0.627
Carbon Tetrachloride	0.937	B	0.417	0.497	JB	0.319
1,2-Dichloropropane		U	0.567		U	0.434
Trichloroethene		U	0.488		U	0.373
Dibromomethane		U	0.369		U	0.282
Bromodichloromethane		U	0.391		U	0.299
Pyridine		U	0.810		U	0.619
cis-1,3-Dichloropropene		U	0.578		U	0.442
N-nitrosodimethylamine		U	0.865		U	0.661
Toluene	94.5		0.696	69.3		0.532
trans-1,3-Dichloropropene		U	0.578		U	0.442
1,1,2-Trichloroethane		U	0.481		U	0.367
1,3-Dichloropropane		U	0.567		U	0.434
Dibromochloromethane	2.06	B	0.308	1.63	B	0.235
1,2-Dibromoethane		U	0.341		U	0.261
Tetrachloroethene		U	0.387		U	0.296
Chlorobenzene		U	0.569		U	0.435
1,1,1,2-Tetrachloroethane		U	0.382		U	0.292
Ethylbenzene	43.1		0.604	30.6		0.462
m/p-Xylenes	106		0.604	76.6		0.462
Bromoform		U	0.254		U	0.194
Styrene		U	0.615		U	0.470
o-Xylene	88.9		0.604	61.5		0.462
1,1,2,2-Tetrachloroethane		U	0.382		U	0.292
1,2,3-Trichloropropane		U	0.435		U	0.332
Isopropylbenzene	11.4		0.533	8.37		0.408
Bromobenzene		U	0.408		U	0.312
2-Chlorotoluene		U	0.506		U	0.387
n-Propylbenzene	25.8		0.533	17.4		0.408
4-Chlorotoluene		U	0.506		U	0.387
1,3,5-Trimethylbenzene	95.6		0.533	61.4		0.408
tert-Butylbenzene		U	0.478		U	0.365
1,2,4-Trimethylbenzene	359	D	0.533	263	D	0.408
sec-Butylbenzene	10.8		0.478	7.09		0.365
Phenol		U	0.681		U	0.521
bis(2-Chloroethyl)ether		U	0.448		U	0.343
Aniline		U	0.688		U	0.526
2-Chlorophenol		U	0.499		U	0.381
1,3-Dichlorobenzene		U	0.436		U	0.333
1,4-Dichlorobenzene		U	0.436		U	0.333

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.36			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
p-Isopropyltoluene	17.1		0.478	11.2		0.365
Benzyl Alcohol	0.680	J	0.593		U	0.453
2-Methylphenol (m-cresol)		U	0.593		U	0.453
1,2-Dichlorobenzene		U	0.436		U	0.333
3,4-Methylphenol (o,p-cresol)		U	0.593		U	0.453
bis(2-chloroisopropyl)ether		U	0.375		U	0.286
n-Butylbenzene	18.3		0.478	12.8		0.365
N-nitroso-di-n-propylamine		U	0.492		U	0.376
Hexachloroethane		U	0.271		U	0.207
1,2-Dibromo-3-Chloropropane		U	0.271		U	0.207
Nitrobenzene		U	0.521		U	0.398
Isophorone		U	0.464		U	0.355
2-Nitrophenol		U	0.461		U	0.352
2,4-Dimethylphenol		U	0.525		U	0.401
bis(2-Chloroethoxy)methane		U	0.370		U	0.283
1,2,4-Trichlorobenzene		U	0.353		U	0.270
Naphthalene	8.03		0.500	7.9		0.382
2,4-Dichlorophenol		U	0.393		U	0.301
4-Chloroaniline		U	0.502		U	0.384
Hexachlorobutadiene		U	0.246		U	0.188
1,2,3-Trichlorobenzene		U	0.353		U	0.270
4-Chloro-3-methylphenol		U	0.450		U	0.344
2-Methylnaphthalene	3.96		0.451	5.16		0.345
1-Methylnaphthalene	2.46		0.451	3.38		0.345
Hexachlorocyclopentadiene		U	0.235		U	0.180
2,4,6-Trichlorophenol		U	0.325		U	0.248
2,4,5-Trichlorophenol		U	0.325		U	0.248
Diphenylamine		U	0.379		U	0.290
Azobenzene		U	0.352		U	0.269
2-Chloronaphthalene		U	0.394		U	0.301
2-Nitroaniline		U	0.464		U	0.355
1,4-Dinitrobenzene		U	0.381		U	0.291
Dimethylphthalate		U	0.330		U	0.252
1,3-Dinitrobenzene		U	0.381		U	0.291
Acenaphthylene		U	0.421		U	0.322
2,6-dinitrotoluene		U	0.352		U	0.269
1,2-Dinitrobenzene		U	0.381		U	0.291
3-Nitroaniline		U	0.464		U	0.355
Acenaphthene		U	0.416		U	0.318
2,4-Dinitrophenol		U	0.348		U	0.266
4-Nitrophenol		U	0.461		U	0.352
Dibenzofuran		U	0.381		U	0.291
2,4-dinitrotoluene		U	0.352		U	0.269

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.36			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2,3,4,6-Tetrachlorophenol		U	0.276		U	0.211

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.36			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2,3,5,6-Tetrachlorophenol		U	0.276		U	0.211
Diethylphthalate		U	0.288		U	0.220
4-Chlorophenyl-phenylether		U	0.313		U	0.239
Fluorene		U	0.386		U	0.295
4-Nitroaniline		U	0.464		U	0.355
4,6-Dinitro-2-methylphenol		U	0.324		U	0.247
n-Nitrosodiphenylamine		U	0.323		U	0.247
4-Bromophenyl phenyl ether		U	0.257		U	0.197
Hexachlorobenzene		U	0.225		U	0.172
Pentachlorophenol		U	0.241		U	0.184
Phenanthrene		U	0.360		U	0.275
Anthracene		U	0.360		U	0.275
Carbazole		U	0.383		U	0.293
Di-n-butylphthalate		U	0.230		U	0.176
Bis(2-ethylhexyl) adipate		U	0.173		U	0.132
Fluoranthene		U	0.317		U	0.242
Pyrene		U	0.317		U	0.242
Butylbenzylphthalate		U	0.205		U	0.157
Benz[a]anthracene		U	0.281		U	0.215
Chrysene		U	0.281		U	0.215
bis(2-Ethylhexyl)phthalate		U	0.164		U	0.125
Di-n-octylphthalate		U	0.164		U	0.125
Benzo[b]fluoranthene		U	0.254		U	0.194
Benzo[k]fluoranthene		U	0.254		U	0.194
Benzo[a]pyrene		U	0.254		U	0.194
Indeno[1,2,3-cd]pyrene		U	0.232		U	0.177
Dibenz[a,h]anthracene		U	0.230		U	0.176
Benzo[g,h,i]perylene		U	0.232		U	0.177

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.36			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	78	83
4-Bromofluorobenzene	98	104
2-Fluorophenol	99	99
Phenol-d5	117	120
Nitrobenzene-d5	97	97
2-Fluorobiphenyl	94	88
2,4,6-Tribromophenol	86	81
p-Terphenyl-d14	96	96

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m			
Instrument:	Duster			Duster			Duster			
File ID:	D012020.D			D012015.D			D012017.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009			
Sample Volume (m^3):	0.42			0.42			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:										
1,1,1-Trichloroethane		U	0.416		U	0.403	3.88		0.388	20
1,2-Dichloroethane		U	0.561		U	0.543	14.3		0.523	54
1,1-Dichloropropene		U	0.500		U	0.484	5.55		0.466	24
Benzene	0.824	JB	0.711	0.769	J	0.688	17.6	B	0.662	53
Carbon Tetrachloride	0.551	JB	0.361	0.443	J	0.350	2.36	B	0.336	14
1,2-Dichloropropane		U	0.492		U	0.476	16.1		0.458	70
Trichloroethene		U	0.423		U	0.409	7.08		0.394	36
Dibromomethane		U	0.319		U	0.309	9.24		0.298	62
Bromodichloromethane		U	0.339		U	0.328	8.46		0.316	53
Pyridine		U	0.702		U	0.680	27.2		0.654	83
cis-1,3-Dichloropropene		U	0.500		U	0.484	15.9		0.466	68
N-nitrosodimethylamine		U	0.750		U	0.726	34.5		0.699	98
Toluene		U	0.603		U	0.583	25.5		0.562	91
trans-1,3-Dichloropropene		U	0.500		U	0.484	19.0		0.466	81
1,1,2-Trichloroethane		U	0.416		U	0.403	17.1		0.388	88
1,3-Dichloropropane		U	0.492		U	0.476	20.0		0.458	87
Dibromochloromethane	1.43	B	0.267	1.48		0.258				
1,2-Dibromoethane		U	0.296		U	0.286	13.2		0.275	96
Tetrachloroethene		U	0.335		U	0.324	12.7		0.312	81
Chlorobenzene		U	0.493		U	0.478	20.7		0.460	90
1,1,1,2-Tetrachloroethane		U	0.331		U	0.320	14.5		0.308	94
Ethylbenzene		U	0.523		U	0.506	24.1		0.487	98
m/p-Xylenes	0.523	J	0.523		U	0.506	24.7		0.487	101
Bromoform		U	0.220		U	0.213	10.8		0.205	105
Styrene		U	0.533		U	0.516	25.0		0.497	100
o-Xylene		U	0.523		U	0.506				
1,1,2,2-Tetrachloroethane		U	0.331		U	0.320	17.2		0.308	111
1,2,3-Trichloropropane		U	0.377		U	0.365	19.1		0.351	109
Isopropylbenzene		U	0.462		U	0.447	22.0		0.431	102
Bromobenzene		U	0.354		U	0.342	16.4		0.330	99
2-Chlorotoluene		U	0.439		U	0.425	19.6		0.409	96
n-Propylbenzene		U	0.462		U	0.447	20.9		0.431	97
4-Chlorotoluene		U	0.439		U	0.425	20.9		0.409	102
1,3,5-Trimethylbenzene		U	0.462		U	0.447	22.0		0.431	102
tert-Butylbenzene		U	0.414		U	0.401	19.0		0.386	98
1,2,4-Trimethylbenzene	262	U	0.462		U	0.447	21.6		0.431	100
sec-Butylbenzene		U	0.414		U	0.401	20.0		0.386	103
Phenol		U	0.590		U	0.571	27.4		0.550	99
bis(2-Chloroethyl)ether		U	0.388		U	0.376	19.7		0.362	109
Aniline		U	0.596		U	0.577	26.5		0.556	95
2-Chlorophenol		U	0.432		U	0.418	21.6		0.403	107
1,3-Dichlorobenzene		U	0.378		U	0.366	34.1		0.352	97
1,4-Dichlorobenzene		U	0.378		U	0.366	33.8		0.352	96

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m			
Instrument:	Duster			Duster			Duster			
File ID:	D012020.D			D012015.D			D012017.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009			
Sample Volume (m^3):	0.42			0.42			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:										
p-Isopropyltoluene		U	0.414		U	0.401	19.9		0.386	103
Benzyl Alcohol		U	0.514		U	0.497	27.6		0.479	115
2-Methylphenol (m-cresol)		U	0.514		U	0.497	24.7		0.479	103
1,2-Dichlorobenzene		U	0.378		U	0.366	34.3		0.352	97
3,4-Methylphenol (o,p-cresol)		U	0.514		U	0.497	20.9		0.479	87
bis(2-chloroisopropyl)ether		U	0.325		U	0.314	17.2		0.303	113
n-Butylbenzene		U	0.414		U	0.401	19.7		0.386	102
N-nitroso-di-n-propylamine		U	0.427		U	0.413	19.3		0.397	97
Hexachloroethane		U	0.235		U	0.227	9.84		0.219	90
1,2-Dibromo-3-Chloropropane		U	0.235		U	0.227	13.3		0.219	121
Nitrobenzene		U	0.451		U	0.437	24.7		0.420	117
Isophorone		U	0.402		U	0.389	20.1		0.374	107
2-Nitrophenol		U	0.399		U	0.386	21.6		0.372	116
2,4-Dimethylphenol		U	0.455		U	0.440	13.6		0.424	64
bis(2-Chloroethoxy)methane		U	0.321		U	0.311	18.4		0.299	122
1,2,4-Trichlorobenzene		U	0.306		U	0.296	32.6		0.285	114
Naphthalene		U	0.433		U	0.419	43.5		0.404	107
2,4-Dichlorophenol		U	0.341		U	0.330	17.9		0.317	112
4-Chloroaniline		U	0.435		U	0.421	20.7		0.406	102
Hexachlorobutadiene		U	0.213		U	0.206	22.9		0.198	115
1,2,3-Trichlorobenzene		U	0.306		U	0.296	16.5		0.285	116
4-Chloro-3-methylphenol		U	0.390		U	0.377	19.3		0.363	106
2-Methylnaphthalene		U	0.391		U	0.378	19.7		0.364	108
1-Methylnaphthalene		U	0.391		U	0.378	20.0		0.364	109
Hexachlorocyclopentadiene		U	0.204		U	0.197	3.79		0.190	40
2,4,6-Trichlorophenol		U	0.281		U	0.272	14.1		0.262	107
2,4,5-Trichlorophenol		U	0.281		U	0.272	14.9		0.262	113
Diphenylamine		U	0.328		U	0.318	16.5		0.306	108
Azobenzene		U	0.305		U	0.295	16.4		0.284	115
2-Chloronaphthalene		U	0.342		U	0.331	17.4		0.318	109
2-Nitroaniline		U	0.402		U	0.389	21.4		0.375	114
1,4-Dinitrobenzene		U	0.330		U	0.320	17.2		0.308	111
Dimethylphthalate		U	0.286		U	0.277	15.9		0.266	119
1,3-Dinitrobenzene		U	0.330		U	0.320	17.1		0.308	110
Acenaphthylene		U	0.365		U	0.353	18.8		0.340	110
2,6-dinitrotoluene		U	0.305		U	0.295	15.7		0.284	110
1,2-Dinitrobenzene		U	0.330		U	0.320	16.7		0.308	108
3-Nitroaniline		U	0.402		U	0.389	17.8		0.375	95
Acenaphthene		U	0.360		U	0.349	18.6		0.336	110
2,4-Dinitrophenol		U	0.302		U	0.292	9.73		0.281	69
4-Nitrophenol		U	0.399		U	0.386	18.8		0.372	101
Dibenzofuran		U	0.330		U	0.320	17.3		0.308	112
2,4-dinitrotoluene		U	0.305		U	0.295	15.6		0.284	109

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m			
Instrument:	Duster			Duster			Duster			
File ID:	D012020.D			D012015.D			D012017.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009			
Sample Volume (m^3):	0.42			0.42			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:										
2,3,4,6-Tetrachlorophenol		U	0.239		U	0.232	11.6		0.223	103

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m			
Instrument:	Duster			Duster			Duster			
File ID:	D012020.D			D012015.D			D012017.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009			
Sample Volume (m^3):	0.42			0.42			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:										
2,3,5,6-Tetrachlorophenol		U	0.239		U	0.232	11.9		0.223	106
Diethylphthalate		U	0.250		U	0.242	13.4		0.233	115
4-Chlorophenyl-phenylether		U	0.271		U	0.263	14.4		0.253	114
Fluorene		U	0.334		U	0.323	17.8		0.311	114
4-Nitroaniline		U	0.402		U	0.389	18.3		0.375	97
4,6-Dinitro-2-methylphenol		U	0.280		U	0.271	12.7		0.261	97
n-Nitrosodiphenylamine		U	0.280		U	0.271	13.6		0.261	103
4-Bromophenyl phenyl ether		U	0.223		U	0.216	11.2		0.208	108
Hexachlorobenzene		U	0.195		U	0.189	9.68		0.182	106
Pentachlorophenol		U	0.209		U	0.202	8.75		0.194	90
Phenanthrene		U	0.312		U	0.302	15.8		0.290	109
Anthracene		U	0.312		U	0.302	16.1		0.290	110
Carbazole		U	0.332		U	0.322	16.2		0.309	104
Di-n-butylphthalate		U	0.200		U	0.193	11.1		0.186	119
Bis(2-ethylhexyl) adipate		U	0.150		U	0.145	8.04		0.140	115
Fluoranthene		U	0.275		U	0.266	14.3		0.256	111
Pyrene		U	0.275		U	0.266	14.4		0.256	112
Butylbenzylphthalate		U	0.178		U	0.172	9.54		0.166	115
Benz[a]anthracene		U	0.243		U	0.236	12.8		0.227	112
Chrysene		U	0.243		U	0.236	12.9		0.227	113
bis(2-Ethylhexyl)phthalate		U	0.142		U	0.138	7.74		0.132	116
Di-n-octylphthalate		U	0.142		U	0.138	10.3		0.132	155
Benzo[b]fluoranthene		U	0.220		U	0.213	15.6		0.205	152
Benzo[k]fluoranthene		U	0.220		U	0.213	15.0		0.205	146
Benzo[a]pyrene		U	0.220		U	0.213	14.6		0.205	142
Indeno[1,2,3-cd]pyrene		U	0.201		U	0.195	13.5		0.187	144
Dibenz[a,h]anthracene		U	0.200		U	0.193	13.4		0.186	144
Benzo[g,h,i]perylene		U	0.201		U	0.195	13.8		0.187	147

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m			
Instrument:	Duster			Duster			Duster			
File ID:	D012020.D			D012015.D			D012017.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009			
Sample Volume (m^3):	0.42			0.42			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:										
Extraction Surrogate Recoveries (%)										
Toluene-d8	71			65			79			
4-Bromofluorobenzene	97			82			97			
2-Fluorophenol	95			80			99			
Phenol-d5	133			117			126			
Nitrobenzene-d5	107			90			113			
2-Fluorobiphenyl	93			88			102			
2,4,6-Tribromophenol	79			75			97			
p-Terphenyl-d14	91			86			100			

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

1NG
VOC & SVOC
Descriptive Statistics

Natural Gas

Analyte	Mean	Median	Deviation	Range	Minimum	Maximum	Count
Benzene	10.4	10.4	2.47	3.50	8.68	12.2	2
Carbon Tetrachloride	0.717	0.717	0.311	0.440	0.497	0.937	2
Toluene	81.9	81.9	17.8	25.2	69.3	94.5	2
Dibromochloromethane	1.85	1.85	0.308	0.44	1.63	2.06	2
Ethylbenzene	36.8	36.8	8.8	12.4	30.6	43.1	2
m/p-Xylenes	91.5	91.5	21.2	29.9	76.6	106	2
o-Xylene	75.2	75.2	19.4	27.5	61.5	88.9	2
Isopropylbenzene	9.89	9.89	2.15	3.05	8.37	11.4	2
n-Propylbenzene	21.6	21.6	5.98	8.46	17.4	25.8	2
1,3,5-Trimethylbenzene	78.5	78.5	24.1	34.1	61.4	95.6	2
1,2,4-Trimethylbenzene	311	311	68.3	96.6	263	359	2
sec-Butylbenzene	8.94	8.94	2.61	3.69	7.09	10.8	2
p-Isopropyltoluene	14.1	14.1	4.21	5.96	11.2	17.1	2
Benzyl Alcohol	0.680	0.680	N/A	0	0.680	0.680	1
n-Butylbenzene	15.6	15.6	3.87	5.48	12.8	18.3	2
Naphthalene	7.97	7.97	0.0929	0.131	7.90	8.03	2
2-Methylnaphthalene	4.56	4.56	0.850	1.20	3.96	5.16	2
1-Methylnaphthalene	2.92	2.92	0.654	0.924	2.46	3.38	2

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.424		U	0.332
1,2-Dichloroethane		U	0.571		U	0.447
1,1-Dichloropropene		U	0.509		U	0.399
Benzene	5.42	B	0.724	13.6	B	0.567
Carbon Tetrachloride	0.492	JB	0.368	0.452	JB	0.288
1,2-Dichloropropane		U	0.500		U	0.392
Trichloroethene		U	0.430		U	0.337
Dibromomethane		U	0.325		U	0.255
Bromodichloromethane		U	0.345		U	0.270
Pyridine		U	0.715		U	0.560
cis-1,3-Dichloropropene		U	0.509		U	0.399
N-nitrosodimethylamine		U	0.763		U	0.597
Toluene	95.5		0.614	110		0.480
trans-1,3-Dichloropropene		U	0.509		U	0.399
1,1,2-Trichloroethane		U	0.424		U	0.332
1,3-Dichloropropane		U	0.500		U	0.392
Dibromochloromethane	1.58	B	0.271	1.47	B	0.212
1,2-Dibromoethane		U	0.301		U	0.236
Tetrachloroethene		U	0.341		U	0.267
Chlorobenzene		U	0.502		U	0.393
1,1,1,2-Tetrachloroethane		U	0.337		U	0.264
Ethylbenzene	62.3		0.532	57.2		0.417
m/p-Xylenes	194	D	0.532	170	D	0.417
Bromoform		U	0.224		U	0.175

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Styrene		U	0.543		U	0.425
o-Xylene	156		0.532	182		0.417
1,1,2,2-Tetrachloroethane		U	0.337		U	0.264
1,2,3-Trichloropropane		U	0.383		U	0.300
Isopropylbenzene	19.1		0.470	17.0		0.368
Bromobenzene		U	0.360		U	0.282
2-Chlorotoluene		U	0.447		U	0.350
n-Propylbenzene	36.3		0.470	31.4		0.368
4-Chlorotoluene		U	0.447		U	0.350
1,3,5-Trimethylbenzene	158	D	0.470	131	D	0.368
tert-Butylbenzene		U	0.421		U	0.330
1,2,4-Trimethylbenzene	474	D	0.470	379	D	0.368
sec-Butylbenzene	12.6		0.421	10.8		0.330
Phenol		U	0.601		U	0.470
bis(2-Chloroethyl)ether		U	0.395		U	0.309
Aniline		U	0.607		U	0.475
2-Chlorophenol		U	0.440		U	0.344
1,3-Dichlorobenzene		U	0.385		U	0.301
1,4-Dichlorobenzene		U	0.385		U	0.301
p-Isopropyltoluene	18.2		0.421	13.6		0.330
Benzyl Alcohol		U	0.523		U	0.409
2-Methylphenol (m-cresol)		U	0.523		U	0.409
1,2-Dichlorobenzene		U	0.385		U	0.301
3,4-Methylphenol (o,p-cresol)		U	0.523		U	0.409

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
bis(2-chloroisopropyl)ether		U	0.330		U	0.259
n-Butylbenzene		U	0.421	11.9		0.330
N-nitroso-di-n-propylamine		U	0.434		U	0.340
Hexachloroethane		U	0.239		U	0.187
1,2-Dibromo-3-Chloropropane		U	0.239		U	0.187
Nitrobenzene	8.63		0.459		U	0.359
Isophorone		U	0.409		U	0.320
2-Nitrophenol		U	0.406		U	0.318
2,4-Dimethylphenol		U	0.463		U	0.362
bis(2-Chloroethoxy)methane		U	0.327		U	0.256
1,2,4-Trichlorobenzene		U	0.312		U	0.244
Naphthalene	4.53		0.441	3.13		0.345
2,4-Dichlorophenol		U	0.347		U	0.272
4-Chloroaniline		U	0.443		U	0.347
Hexachlorobutadiene		U	0.217		U	0.170
1,2,3-Trichlorobenzene		U	0.312		U	0.244
4-Chloro-3-methylphenol		U	0.396		U	0.310
2-Methylnaphthalene	1.33		0.398	0.958		0.311
1-Methylnaphthalene	0.766	J	0.398	0.521	J	0.311
Hexachlorocyclopentadiene		U	0.207		U	0.162
2,4,6-Trichlorophenol		U	0.286		U	0.224
2,4,5-Trichlorophenol		U	0.286		U	0.224
Diphenylamine		U	0.334		U	0.262
Azobenzene		U	0.310		U	0.243

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.348		U	0.272
2-Nitroaniline		U	0.409		U	0.320
1,4-Dinitrobenzene		U	0.336		U	0.263
Dimethylphthalate		U	0.291		U	0.228
1,3-Dinitrobenzene		U	0.336		U	0.263
Acenaphthylene		U	0.371		U	0.291
2,6-dinitrotoluene		U	0.310		U	0.243
1,2-Dinitrobenzene		U	0.336		U	0.263
3-Nitroaniline		U	0.409		U	0.320
Acenaphthene		U	0.367		U	0.287
2,4-Dinitrophenol		U	0.307		U	0.240
4-Nitrophenol		U	0.406		U	0.318
Dibenzofuran		U	0.336		U	0.263
2,4-dinitrotoluene		U	0.310		U	0.243
2,3,4,6-Tetrachlorophenol		U	0.244		U	0.191
2,3,5,6-Tetrachlorophenol		U	0.244		U	0.191
Diethylphthalate		U	0.254		U	0.199
4-Chlorophenyl-phenylether		U	0.276		U	0.216
Fluorene		U	0.340		U	0.266
4-Nitroaniline		U	0.409		U	0.320
4,6-Dinitro-2-methylphenol		U	0.285		U	0.223
n-Nitrosodiphenylamine		U	0.285		U	0.223
4-Bromophenyl phenyl ether		U	0.227		U	0.178
Hexachlorobenzene		U	0.199		U	0.155

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Pentachlorophenol		U	0.212		U	0.166
Phenanthrene		U	0.317		U	0.248
Anthracene		U	0.317		U	0.248
Carbazole		U	0.338		U	0.265
Di-n-butylphthalate	1.0	B	0.203	0.913	B	0.159
Bis(2-ethylhexyl) adipate		U	0.153		U	0.119
Fluoranthene		U	0.280		U	0.219
Pyrene		U	0.280		U	0.219
Butylbenzylphthalate		U	0.181		U	0.142
Benz[a]anthracene		U	0.248		U	0.194
Chrysene		U	0.248		U	0.194
bis(2-Ethylhexyl)phthalate		U	0.145		U	0.113
Di-n-octylphthalate		U	0.145		U	0.113
Benzo[b]fluoranthene		U	0.224		U	0.175
Benzo[k]fluoranthene		U	0.224		U	0.175
Benzo[a]pyrene		U	0.224		U	0.175
Indeno[1,2,3-cd]pyrene		U	0.205		U	0.160
Dibenz[a,h]anthracene		U	0.203		U	0.159
Benzo[g,h,i]perylene		U	0.205		U	0.160

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012018.D			D012019.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.39			0.49		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	65	70
4-Bromofluorobenzene	103	111
2-Fluorophenol	72	71
Phenol-d5	94	85
Nitrobenzene-d5	92	92
2-Fluorobiphenyl	94	93
2,4,6-Tribromophenol	86	78
p-Terphenyl-d14	87	90

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012021.D			D012016.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			NA		
Date Received:	1/8/2009			NA		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.44			0.44		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)		EDL

VOC & SVOC COMPOUNDS:

1,1,1-Trichloroethane		U	0.371		U	0.381
1,2-Dichloroethane		U	0.501		U	0.514
1,1-Dichloropropene		U	0.446		U	0.458
Benzene	1.02	JB	0.634	0.889	J	0.651
Carbon Tetrachloride	0.531	JB	0.322	0.724		0.331
1,2-Dichloropropane		U	0.439		U	0.450
Trichloroethene		U	0.377		U	0.387
Dibromomethane		U	0.285		U	0.293
Bromodichloromethane		U	0.302		U	0.310
Pyridine		U	0.626		U	0.643
cis-1,3-Dichloropropene		U	0.446		U	0.458
N-nitrosodimethylamine		U	0.669		U	0.686
Toluene	1.18		0.538		U	0.552
trans-1,3-Dichloropropene		U	0.446		U	0.458
1,1,2-Trichloroethane		U	0.371		U	0.381
1,3-Dichloropropane		U	0.439		U	0.450
Dibromochloromethane	1.84	B	0.238	2.01		0.244
1,2-Dibromoethane		U	0.264		U	0.271
Tetrachloroethene		U	0.299		U	0.307
Chlorobenzene		U	0.440		U	0.452
1,1,1,2-Tetrachloroethane		U	0.295		U	0.303
Ethylbenzene	0.559	J	0.467		U	0.479
m/p-Xylenes	0.966		0.467		U	0.479
Bromoform		U	0.196		U	0.201

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes	
Preservation:	None			None	
Decanted:	None			None	
Batch QC:	QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster	
File ID:	D012021.D			D012016.D	
Operator:	ERL			ERL	
Date Sampled:	12/11/2008			NA	
Date Received:	1/8/2009			NA	
Date Prepared:	1/14/2009			1/14/2009	
Date Cleanup:	NA			NA	
Date Analyzed:	1/21/2009			1/21/2009	
Sample Volume (m^3):	0.44			0.44	
Percent Solid:	NA			NA	
Prep DF:	1.00			1.00	
Analysis DF:	1.00			1.00	
Injection Volume (µl):	1.00			1.00	
Extract Volume (µl):	2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL

VOC & SVOC COMPOUNDS:

Styrene	U	0.476	U	0.488
o-Xylene	U	0.467	U	0.479
1,1,2,2-Tetrachloroethane	U	0.295	U	0.303
1,2,3-Trichloropropane	U	0.336	U	0.345
Isopropylbenzene	U	0.412	U	0.423
Bromobenzene	U	0.316	U	0.324
2-Chlorotoluene	U	0.391	U	0.402
n-Propylbenzene	U	0.412	U	0.423
4-Chlorotoluene	U	0.391	U	0.402
1,3,5-Trimethylbenzene	U	0.412	U	0.423
tert-Butylbenzene	U	0.369	U	0.379
1,2,4-Trimethylbenzene	U	0.412	U	0.423
sec-Butylbenzene	U	0.369	U	0.379
Phenol	U	0.526	U	0.540
bis(2-Chloroethyl)ether	U	0.346	U	0.356
Aniline	U	0.532	U	0.546
2-Chlorophenol	U	0.385	U	0.396
1,3-Dichlorobenzene	U	0.337	U	0.346
1,4-Dichlorobenzene	U	0.337	U	0.346
p-Isopropyltoluene	U	0.369	U	0.379
Benzyl Alcohol	U	0.458	U	0.470
2-Methylphenol (m-cresol)	U	0.458	U	0.470
1,2-Dichlorobenzene	U	0.337	U	0.346
3,4-Methylphenol (o,p-cresol)	U	0.458	U	0.470

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes	
Preservation:	None			None	
Decanted:	None			None	
Batch QC:	QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster	
File ID:	D012021.D			D012016.D	
Operator:	ERL			ERL	
Date Sampled:	12/11/2008			NA	
Date Received:	1/8/2009			NA	
Date Prepared:	1/14/2009			1/14/2009	
Date Cleanup:	NA			NA	
Date Analyzed:	1/21/2009			1/21/2009	
Sample Volume (m^3):	0.44			0.44	
Percent Solid:	NA			NA	
Prep DF:	1.00			1.00	
Analysis DF:	1.00			1.00	
Injection Volume (µl):	1.00			1.00	
Extract Volume (µl):	2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL
VOC & SVOC COMPOUNDS:					
bis(2-chloroisopropyl)ether		U	0.290		U 0.297
n-Butylbenzene		U	0.369		U 0.379
N-nitroso-di-n-propylamine		U	0.381		U 0.391
Hexachloroethane		U	0.209		U 0.215
1,2-Dibromo-3-Chloropropane		U	0.210		U 0.215
Nitrobenzene		U	0.402		U 0.413
Isophorone		U	0.358		U 0.368
2-Nitrophenol		U	0.356		U 0.366
2,4-Dimethylphenol		U	0.406		U 0.416
bis(2-Chloroethoxy)methane		U	0.286		U 0.294
1,2,4-Trichlorobenzene		U	0.273		U 0.280
Naphthalene		U	0.387		U 0.397
2,4-Dichlorophenol		U	0.304		U 0.312
4-Chloroaniline		U	0.388		U 0.399
Hexachlorobutadiene		U	0.190		U 0.195
1,2,3-Trichlorobenzene		U	0.273		U 0.280
4-Chloro-3-methylphenol		U	0.348		U 0.357
2-Methylnaphthalene		U	0.348		U 0.358
1-Methylnaphthalene		U	0.348		U 0.358
Hexachlorocyclopentadiene		U	0.182		U 0.186
2,4,6-Trichlorophenol		U	0.251		U 0.258
2,4,5-Trichlorophenol		U	0.251		U 0.258
Diphenylamine		U	0.293		U 0.301
Azobenzene		U	0.272		U 0.279

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes	
Preservation:	None			None	
Decanted:	None			None	
Batch QC:	QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster	
File ID:	D012021.D			D012016.D	
Operator:	ERL			ERL	
Date Sampled:	12/11/2008			NA	
Date Received:	1/8/2009			NA	
Date Prepared:	1/14/2009			1/14/2009	
Date Cleanup:	NA			NA	
Date Analyzed:	1/21/2009			1/21/2009	
Sample Volume (m^3):	0.44			0.44	
Percent Solid:	NA			NA	
Prep DF:	1.00			1.00	
Analysis DF:	1.00			1.00	
Injection Volume (µl):	1.00			1.00	
Extract Volume (µl):	2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL

VOC & SVOC COMPOUNDS:

2-Chloronaphthalene	U	0.305	U	0.313
2-Nitroaniline	U	0.359	U	0.368
1,4-Dinitrobenzene	U	0.295	U	0.302
Dimethylphthalate	U	0.255	U	0.262
1,3-Dinitrobenzene	U	0.295	U	0.302
Acenaphthylene	U	0.326	U	0.334
2,6-dinitrotoluene	U	0.272	U	0.279
1,2-Dinitrobenzene	U	0.295	U	0.302
3-Nitroaniline	U	0.359	U	0.368
Acenaphthene	U	0.321	U	0.330
2,4-Dinitrophenol	U	0.269	U	0.276
4-Nitrophenol	U	0.356	U	0.366
Dibenzofuran	U	0.295	U	0.302
2,4-dinitrotoluene	U	0.272	U	0.279
2,3,4,6-Tetrachlorophenol	U	0.214	U	0.219
2,3,5,6-Tetrachlorophenol	U	0.214	U	0.219
Diethylphthalate	U	0.223	U	0.229
4-Chlorophenyl-phenylether	U	0.242	U	0.248
Fluorene	U	0.298	U	0.306
4-Nitroaniline	U	0.359	U	0.368
4,6-Dinitro-2-methylphenol	U	0.250	U	0.257
n-Nitrosodiphenylamine	U	0.250	U	0.257
4-Bromophenyl phenyl ether	U	0.199	U	0.204
Hexachlorobenzene	U	0.174	U	0.179

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D012021.D			D012016.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			NA		
Date Received:	1/8/2009			NA		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/21/2009			1/21/2009		
Sample Volume (m^3):	0.44			0.44		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)		EDL
VOC & SVOC COMPOUNDS:						
Pentachlorophenol		U	0.186		U	0.191
Phenanthrene		U	0.278		U	0.285
Anthracene		U	0.278		U	0.285
Carbazole		U	0.296		U	0.304
Di-n-butylphthalate	0.957	B	0.178	0.813		0.183
Bis(2-ethylhexyl) adipate		U	0.134		U	0.137
Fluoranthene		U	0.245		U	0.251
Pyrene		U	0.245		U	0.251
Butylbenzylphthalate		U	0.159		U	0.163
Benz[a]anthracene		U	0.217		U	0.223
Chrysene		U	0.217		U	0.223
bis(2-Ethylhexyl)phthalate		U	0.127		U	0.130
Di-n-octylphthalate		U	0.127		U	0.130
Benzo[b]fluoranthene		U	0.196		U	0.202
Benzo[k]fluoranthene		U	0.196		U	0.202
Benzo[a]pyrene		U	0.196		U	0.202
Indeno[1,2,3-cd]pyrene		U	0.179		U	0.184
Dibenz[a,h]anthracene		U	0.178		U	0.183
Benzo[g,h,i]perylene		U	0.179		U	0.184

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**2NGBL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes	
Preservation:	None			None	
Decanted:	None			None	
Batch QC:	QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster	
File ID:	D012021.D			D012016.D	
Operator:	ERL			ERL	
Date Sampled:	12/11/2008			NA	
Date Received:	1/8/2009			NA	
Date Prepared:	1/14/2009			1/14/2009	
Date Cleanup:	NA			NA	
Date Analyzed:	1/21/2009			1/21/2009	
Sample Volume (m^3):	0.44			0.44	
Percent Solid:	NA			NA	
Prep DF:	1.00			1.00	
Analysis DF:	1.00			1.00	
Injection Volume (µl):	1.00			1.00	
Extract Volume (µl):	2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	70	71
4-Bromofluorobenzene	117	81
2-Fluorophenol	67	90
Phenol-d5	125	128
Nitrobenzene-d5	117	99
2-Fluorobiphenyl	93	91
2,4,6-Tribromophenol	84	86
p-Terphenyl-d14	88	82

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

2NG

VOC & SVOC
Descriptive Statistics

Natural Gas

Analyte	Mean	Median	rd Deviation	Range	Minimum	Maximum	Count
Benzene	9.53	9.53	5.81	8.21	5.42	13.6	2
Carbon Tetrachloride	0.472	0.472	0.0289	0.0409	0.452	0.492	2
Toluene	103	103	10.0	14.2	95.5	110	2
Dibromochloromethane	1.53	1.53	0.0776	0.110	1.47	1.58	2
Ethylbenzene	59.7	59.7	3.63	5.13	57.2	62.3	2
m/p-Xylenes	182	182	17.3	24.4	170	194	2
o-Xylene	169	169	17.9	25.4	156	182	2
Isopropylbenzene	18.0	18.0	1.47	2.08	17.0	19.1	2
n-Propylbenzene	33.8	33.8	3.51	4.97	31.4	36.3	2
1,3,5-Trimethylbenzene	145	145	18.9	26.7	131	158	2
1,2,4-Trimethylbenzene	427	427	67.1	94.8	379	474	2
sec-Butylbenzene	11.7	11.7	1.28	1.81	10.8	12.6	2
p-Isopropyltoluene	15.9	15.9	3.25	4.60	13.6	18.2	2
n-Butylbenzene	11.9	11.9	N/A	-	11.87	11.87	1
Nitrobenzene	8.63	8.63	N/A	-	8.63	8.63	1
Naphthalene	3.83	3.83	0.991	1.40	3.13	4.53	2
2-Methylnaphthalene	1.14	1.14	0.260	0.368	0.958	1.33	2
1-Methylnaphthalene	0.643	0.643	0.173	0.245	0.521	0.766	2
Di-n-butylphthalate	0.958	0.958	0.0641	0.0907	0.913	1.00	2

Sample ID:	**LF1BM01XA**			**LF1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120308.D			D120308.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/05/08			11/05/08		
Date Cleanup:	NA			NA		
Date Analyzed:	12/03/08			12/03/08		
Sample Volume (m^3):	0.52			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.355		U	0.392
1,2-Dichloroethane		U	0.478		U	0.528
1,1-Dichloropropene		U	0.427		U	0.471
Benzene	0.737	JB	0.606	0.730	JB	0.670
Carbon Tetrachloride	0.496	JB	0.308	0.372	JB	0.340
1,2-Dichloropropane	19.7		0.419		U	0.463
Trichloroethene		U	0.360		U	0.398
Dibromomethane		U	0.272		U	0.301
Bromodichloromethane		U	0.289		U	0.319
Pyridine		U	0.598		U	0.661
cis-1,3-Dichloropropene		U	0.427		U	0.471
N-nitrosodimethylamine		U	0.639		U	0.706
Toluene	0.537	J	0.514		U	0.568
trans-1,3-Dichloropropene		U	0.427		U	0.471
1,1,2-Trichloroethane		U	0.355		U	0.392
1,3-Dichloropropane		U	0.419		U	0.463
Dibromochloromethane						
1,2-Dibromoethane		U	0.252		U	0.278
Tetrachloroethene		U	0.286		U	0.315
Chlorobenzene		U	0.421		U	0.465
1,1,1,2-Tetrachloroethane		U	0.282		U	0.312
Ethylbenzene	0.348	J	0.446		U	0.493
m/p-Xylenes	0.609	J	0.446		U	0.493
Bromoform		U	0.187		U	0.207
Styrene		U	0.455		U	0.502
o-Xylene		U	0.446		U	0.493
1,1,2,2-Tetrachloroethane		U	0.282		U	0.312
1,2,3-Trichloropropane		U	0.321		U	0.355
Isopropylbenzene		U	0.394		U	0.435
Bromobenzene		U	0.301		U	0.333

Sample ID:	**LF1BM01XA**			**LF1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120308.D			D120308.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/05/08			11/05/08		
Date Cleanup:	NA			NA		
Date Analyzed:	12/03/08			12/03/08		
Sample Volume (m^3):	0.52			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chlorotoluene		U	0.374		U	0.413
n-Propylbenzene		U	0.394		U	0.435
4-Chlorotoluene		U	0.374		U	0.413
1,3,5-Trimethylbenzene		U	0.394		U	0.435
tert-Butylbenzene		U	0.353		U	0.390
1,2,4-Trimethylbenzene		U	0.394		U	0.435
sec-Butylbenzene		U	0.353		U	0.390
Phenol		U	0.503		U	0.556
bis(2-Chloroethyl)ether		U	0.331		U	0.366
Aniline		U	0.508		U	0.562
2-Chlorophenol		U	0.368		U	0.407
1,3-Dichlorobenzene		U	0.322		U	0.356
1,4-Dichlorobenzene		U	0.322		U	0.356
p-Isopropyltoluene		U	0.353		U	0.390
Benzyl Alcohol		U	0.438		U	0.484
2-Methylphenol (m-cresol)		U	0.438		U	0.484
1,2-Dichlorobenzene		U	0.322		U	0.356
3,4-Methylphenol (o,p-cresol)		U	0.438		U	0.484
bis(2-chloroisopropyl)ether		U	0.277		U	0.306
n-Butylbenzene		U	0.353		U	0.390
N-nitroso-di-n-propylamine		U	0.364		U	0.402
Hexachloroethane		U	0.200		U	0.221
1,2-Dibromo-3-Chloropropane		U	0.200		U	0.221
Nitrobenzene		U	0.385		U	0.425
Isophorone		U	0.343		U	0.378
2-Nitrophenol		U	0.340		U	0.376
2,4-Dimethylphenol		U	0.388		U	0.428
bis(2-Chloroethoxy)methane		U	0.274		U	0.302
1,2,4-Trichlorobenzene		U	0.261		U	0.288
Naphthalene		U	0.369		U	0.408
2,4-Dichlorophenol		U	0.290		U	0.321
4-Chloroaniline		U	0.371		U	0.410
Hexachlorobutadiene		U	0.182		U	0.201
1,2,3-Trichlorobenzene		U	0.261		U	0.288
4-Chloro-3-methylphenol		U	0.332		U	0.367
2-Methylnaphthalene		U	0.333		U	0.368
1-Methylnaphthalene		U	0.333		U	0.368
Hexachlorocyclopentadiene		U	0.174		U	0.192
2,4,6-Trichlorophenol		U	0.240		U	0.265
2,4,5-Trichlorophenol		U	0.240		U	0.265
Diphenylamine		U	0.280		U	0.309
Azobenzene		U	0.260		U	0.287

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF1BM01XA**			**LF1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120308.D			D120308.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/05/08			11/05/08		
Date Cleanup:	NA			NA		
Date Analyzed:	12/03/08			12/03/08		
Sample Volume (m^3):	0.52			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.291		U	0.322
2-Nitroaniline		U	0.343		U	0.379
1,4-Dinitrobenzene		U	0.282		U	0.311
Dimethylphthalate		U	0.244		U	0.269
1,3-Dinitrobenzene		U	0.282		U	0.311
Acenaphthylene		U	0.311		U	0.344
2,6-dinitrotoluene		U	0.260		U	0.287
1,2-Dinitrobenzene		U	0.282		U	0.311
3-Nitroaniline		U	0.343		U	0.379
Acenaphthene		U	0.307		U	0.339
2,4-Dinitrophenol		U	0.257		U	0.284
4-Nitrophenol		U	0.340		U	0.376
Dibenzofuran		U	0.281		U	0.311
2,4-dinitrotoluene		U	0.260		U	0.287
2,3,4,6-Tetrachlorophenol		U	0.204		U	0.226
2,3,5,6-Tetrachlorophenol		U	0.204		U	0.226
Diethylphthalate		U	0.213		U	0.235
4-Chlorophenyl-phenylether		U	0.231		U	0.256
Fluorene		U	0.285		U	0.315
4-Nitroaniline		U	0.343		U	0.379
4,6-Dinitro-2-methylphenol		U	0.239		U	0.264
n-Nitrosodiphenylamine		U	0.239		U	0.264
4-Bromophenyl phenyl ether		U	0.190		U	0.210
Hexachlorobenzene		U	0.166		U	0.184
Pentachlorophenol		U	0.178		U	0.196
Phenanthrene		U	0.266		U	0.293
Anthracene		U	0.266		U	0.293
Carbazole		U	0.283		U	0.313
Di-n-butylphthalate		U	0.170		U	0.188
Bis(2-ethylhexyl) adipate		U	0.128		U	0.141
Fluoranthene		U	0.234		U	0.259
Pyrene		U	0.234		U	0.259
Butylbenzylphthalate		U	0.152		U	0.167
Benz[a]anthracene		U	0.207		U	0.229
Chrysene		U	0.207		U	0.229
bis(2-Ethylhexyl)phthalate		U	0.121		U	0.134
Di-n-octylphthalate		U	0.121		U	0.134
Benzo[b]fluoranthene		U	0.188		U	0.207
Benzo[k]fluoranthene		U	0.188		U	0.207
Benzo[a]pyrene		U	0.188		U	0.207
Indeno[1,2,3-cd]pyrene		U	0.171		U	0.189
Dibenz[a,h]anthracene		U	0.170		U	0.188
Benzo[g,h,i]perylene		U	0.171		U	0.189

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF1BM01XA**			**LF1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120308.D			D120308.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/05/08			11/05/08		
Date Cleanup:	NA			NA		
Date Analyzed:	12/03/08			12/03/08		
Sample Volume (m^3):	0.52			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	59	40
4-Bromofluorobenzene	78	47
2-Fluorophenol	96	48
Phenol-d5	108	51
Nitrobenzene-d5	83	41
2-Fluorobiphenyl	102	55
2,4,6-Tribromophenol	83	38
p-Terphenyl-d14	95	55

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF1BM03XA**			**LF1BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090224-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8270M			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D031216.D			D031217.D		
Operator:	JAR			JAR		
Date Sampled:	02/05/09			02/05/09		
Date Received:	02/12/09			02/12/09		
Date Prepared:	02/24/09			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	03/13/09			03/13/09		
Sample Volume (m^3):	0.50			0.48		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.0768		U	0.0843
1,2-Dichloroethane		U	0.0570		U	0.0625
1,1-Dichloropropene		U	0.0639		U	0.0701
Benzene	0.046	JB	0.0450		BU	0.0493
Carbon Tetrachloride		U	0.0886		U	0.0972
1,2-Dichloropropane		U	0.0651		U	0.0714
Trichloroethene		U	0.0757		U	0.0830
Dibromomethane		U	0.100		U	0.110
Bromodichloromethane		U	0.0943		U	0.104
Pyridine		U	0.0455		U	0.0500
cis-1,3-Dichloropropene		U	0.0639		U	0.0701
N-nitrosodimethylamine		U	0.0427		U	0.0468
Toluene		U	0.0531		U	0.0582
trans-1,3-Dichloropropene		U	0.0639		U	0.0701
1,1,2-Trichloroethane		U	0.0768		U	0.0843
1,3-Dichloropropane		U	0.0651		U	0.0714
Dibromochloromethane		U	0.120		U	0.132
1,2-Dibromoethane		U	0.108		U	0.119
Tetrachloroethene		U	0.0955		U	0.105
Chlorobenzene		U	0.0648		U	0.0711
1,1,1,2-Tetrachloroethane		U	0.0967		U	0.106
Ethylbenzene		U	0.0611		U	0.0671
m/p-Xylenes		U	0.0611		U	0.0671
Bromoform		U	0.146		U	0.160
Styrene		U	0.0600		U	0.0658
o-Xylene		U	0.0611		U	0.0671
1,1,2,2-Tetrachloroethane		U	0.0967		U	0.106
1,2,3-Trichloropropane		U	0.0849		U	0.0931
Isopropylbenzene		U	0.0692		U	0.0759
Bromobenzene		U	0.0904		U	0.0992

Sample ID:	LF1BM03XA			LF1BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090224-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8270M			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D031216.D			D031217.D		
Operator:	JAR			JAR		
Date Sampled:	02/05/09			02/05/09		
Date Received:	02/12/09			02/12/09		
Date Prepared:	02/24/09			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	03/13/09			03/13/09		
Sample Volume (m^3):	0.50			0.48		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chlorotoluene		U	0.0729		U	0.0800
n-Propylbenzene		U	0.0692		U	0.0759
4-Chlorotoluene		U	0.0729		U	0.0800
1,3,5-Trimethylbenzene		U	0.0692		U	0.0759
tert-Butylbenzene		U	0.0773		U	0.0848
1,2,4-Trimethylbenzene	0.800		0.0692	0.606		0.0759
sec-Butylbenzene		U	0.0773		U	0.0848
Phenol		U	0.0542		U	0.0595
bis(2-Chloroethyl)ether		U	0.0824		U	0.0904
Aniline		U	0.0536		U	0.0588
2-Chlorophenol		U	0.0740		U	0.0812
1,3-Dichlorobenzene		U	0.0846		U	0.0929
1,4-Dichlorobenzene		U	0.0846		U	0.0929
p-Isopropyltoluene		U	0.0773		U	0.0848
Benzyl Alcohol		U	0.0623		U	0.0683
2-Methylphenol (m-cresol)		U	0.0623		U	0.0683
1,2-Dichlorobenzene		U	0.0846		U	0.0929
3,4-Methylphenol (o,p-cresol)		U	0.0623		U	0.0683
bis(2-chloroisopropyl)ether		U	0.0985		U	0.108
n-Butylbenzene		U	0.0773		U	0.0848
N-nitroso-di-n-propylamine		U	0.0750		U	0.0823
Hexachloroethane		U	0.136		U	0.150
1,2-Dibromo-3-Chloropropane		U	0.136		U	0.149
Nitrobenzene		U	0.0709		U	0.0778
Isophorone		U	0.0796		U	0.0873
2-Nitrophenol		U	0.0801		U	0.0879
2,4-Dimethylphenol		U	0.0703		U	0.0772
bis(2-Chloroethoxy)methane		U	0.100		U	0.109
1,2,4-Trichlorobenzene		U	0.104		U	0.115
Naphthalene		U	0.0738		U	0.0810
2,4-Dichlorophenol		U	0.0939		U	0.103
4-Chloroaniline		U	0.0735		U	0.0806
Hexachlorobutadiene		U	0.150		U	0.165
1,2,3-Trichlorobenzene		U	0.104		U	0.115
4-Chloro-3-methylphenol		U	0.0821		U	0.0901
2-Methylnaphthalene		U	0.0819		U	0.0898
1-Methylnaphthalene		U	0.0819		U	0.0898
Hexachlorocyclopentadiene		U	0.157		U	0.172
2,4,6-Trichlorophenol		U	0.114		U	0.125
2,4,5-Trichlorophenol		U	0.114		U	0.125
Diphenylamine		U	0.0974		U	0.107
Azobenzene		U	0.105		U	0.115

Sample ID:	LF1BM03XA			LF1BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090224-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8270M			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D031216.D			D031217.D		
Operator:	JAR			JAR		
Date Sampled:	02/05/09			02/05/09		
Date Received:	02/12/09			02/12/09		
Date Prepared:	02/24/09			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	03/13/09			03/13/09		
Sample Volume (m^3):	0.50			0.48		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.0936		U	0.103
2-Nitroaniline		U	0.0795		U	0.0873
1,4-Dinitrobenzene		U	0.0968		U	0.106
Dimethylphthalate		U	0.112		U	0.123
1,3-Dinitrobenzene		U	0.0968		U	0.106
Acenaphthylene		U	0.0876		U	0.0962
2,6-dinitrotoluene		U	0.105		U	0.115
1,2-Dinitrobenzene		U	0.0968		U	0.106
3-Nitroaniline		U	0.0795		U	0.0873
Acenaphthene		U	0.089		U	0.0974
2,4-Dinitrophenol		U	0.106		U	0.116
4-Nitrophenol		U	0.0801		U	0.0879
Dibenzofuran		U	0.0968		U	0.106
2,4-dinitrotoluene		U	0.105		U	0.115
2,3,4,6-Tetrachlorophenol		U	0.134		U	0.147
2,3,5,6-Tetrachlorophenol		U	0.134		U	0.147
Diethylphthalate		U	0.128		U	0.140
4-Chlorophenyl-phenylether		U	0.118		U	0.129
Fluorene		U	0.0957		U	0.105
4-Nitroaniline		U	0.0795		U	0.0873
4,6-Dinitro-2-methylphenol		U	0.114		U	0.125
n-Nitrosodiphenylamine		U	0.114		U	0.125
4-Bromophenyl phenyl ether		U	0.143		U	0.157
Hexachlorobenzene		U	0.164		U	0.180
Pentachlorophenol		U	0.153		U	0.168
Phenanthrene		U	0.103		U	0.113
Anthracene		U	0.103		U	0.113
Carbazole		U	0.096		U	0.106
Di-n-butylphthalate		U	0.160		U	0.176
Bis(2-ethylhexyl) adipate		U	0.213		U	0.234
Fluoranthene		U	0.116		U	0.128
Pyrene		U	0.116		U	0.128
Butylbenzylphthalate		U	0.180		U	0.197
Benz[a]anthracene		U	0.131		U	0.144
Chrysene		U	0.131		U	0.144
bis(2-Ethylhexyl)phthalate		U	0.225		U	0.247
Di-n-octylphthalate		U	0.225		U	0.247
Benzo[b]fluoranthene		U	0.145		U	0.159
Benzo[k]fluoranthene		U	0.145		U	0.159
Benzo[a]pyrene		U	0.145		U	0.159
Indeno[1,2,3-cd]pyrene		U	0.159		U	0.175
Dibenz[a,h]anthracene		U	0.160		U	0.176
Benzo[g,h,i]perylene		U	0.159		U	0.175

Sample ID:	**LF1BM03XA**			**LF1BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090224-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8270M			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D031216.D			D031217.D		
Operator:	JAR			JAR		
Date Sampled:	02/05/09			02/05/09		
Date Received:	02/12/09			02/12/09		
Date Prepared:	02/24/09			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	03/13/09			03/13/09		
Sample Volume (m^3):	0.50			0.48		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	80	55
4-Bromofluorobenzene	95	72
2-Fluorophenol	91	87
Phenol-d5	105	100
Nitrobenzene-d5	80	77
2-Fluorobiphenyl	92	88
2,4,6-Tribromophenol	85	81
p-Terphenyl-d14	96	91

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF1BG01XA**			**LF1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120309.D			D031218.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			02/05/09		
Date Received:	10/29/08			02/12/09		
Date Prepared:	11/05/08			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			03/13/09		
Sample Volume (m^3):	0.474			0.375		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.392		U	0.104
1,2-Dichloroethane		U	0.528	0.146	J	0.0774
1,1-Dichloropropene		U	0.471		U	0.0868
Benzene	1.85	B	0.670	0.510	B	0.0611
Carbon Tetrachloride	0.475	JB	0.340		U	0.120
1,2-Dichloropropane		U	0.463		U	0.0883
Trichloroethene		U	0.398	0.315		0.103
Dibromomethane		U	0.301		U	0.136
Bromodichloromethane		U	0.319		U	0.128
Pyridine		U	0.661		U	0.0618
cis-1,3-Dichloropropene		U	0.471		U	0.0868
N-nitrosodimethylamine		U	0.706		U	0.0579
Toluene	101		0.568	39.3	D	0.0720
trans-1,3-Dichloropropene		U	0.471		U	0.0868
1,1,2-Trichloroethane		U	0.392		U	0.104
1,3-Dichloropropane		U	0.463		U	0.0883
Dibromochloromethane					U	0.163
1,2-Dibromoethane		U	0.278		U	0.147
Tetrachloroethene	2.60		0.315	3.99		0.130
Chlorobenzene	1.57		0.465	1.33		0.0880
1,1,1,2-Tetrachloroethane		U	0.312		U	0.131
Ethylbenzene	67		0.493	59.9	D	0.0830
m/p-Xylenes	95.9		0.493	55.2	D	0.0830
Bromoform		U	0.207		U	0.198
Styrene	12.5		0.502	13.7		0.0814
o-Xylene	65.2		0.493	35.3	D	0.0830
1,1,2,2-Tetrachloroethane		U	0.312		U	0.131
1,2,3-Trichloropropane		U	0.355		U	0.115
Isopropylbenzene	11.2		0.435	9.15		0.0940
Bromobenzene		U	0.333		U	0.123

Sample ID:	LF1BG01XA			LF1BG02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120309.D			D031218.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			02/05/09		
Date Received:	10/29/08			02/12/09		
Date Prepared:	11/05/08			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			03/13/09		
Sample Volume (m^3):	0.474			0.375		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chlorotoluene	1.91		0.413		U	0.0990
n-Propylbenzene	16.5		0.435	7.21		0.0940
4-Chlorotoluene		U	0.413		U	0.0990
1,3,5-Trimethylbenzene	40.3		0.435	11.9		0.0940
tert-Butylbenzene	11.5		0.390	3.92		0.105
1,2,4-Trimethylbenzene	106	D	0.435	26.1	D	0.0940
sec-Butylbenzene	8.87		0.390	2.51		0.105
Phenol		U	0.556	1.42		0.0736
bis(2-Chloroethyl)ether		U	0.366		U	0.112
Aniline		U	0.562		U	0.073
2-Chlorophenol		U	0.407		U	0.101
1,3-Dichlorobenzene		U	0.356	0.232		0.115
1,4-Dichlorobenzene	34.2		0.356	8.04		0.115
p-Isopropyltoluene	44.8		0.390	10.4		0.105
Benzyl Alcohol	126	DU	0.484		U	0.0846
2-Methylphenol (m-cresol)		U	0.484		U	0.0846
1,2-Dichlorobenzene	2.23		0.356	0.387		0.115
3,4-Methylphenol (o,p-cresol)	0.90		0.484		U	0.0846
bis(2-chloroisopropyl)ether		U	0.306		U	0.134
n-Butylbenzene	5.27388		0.390	1.12		0.105
N-nitroso-di-n-propylamine	11.74393		0.402		U	0.102
Hexachloroethane		U	0.221		U	0.185
1,2-Dibromo-3-Chloropropane		U	0.221		U	0.185
Nitrobenzene		U	0.425		U	0.0963
Isophorone		U	0.378		U	0.108
2-Nitrophenol		U	0.376		U	0.109
2,4-Dimethylphenol		U	0.428		U	0.0955
bis(2-Chloroethoxy)methane		U	0.302		U	0.135
1,2,4-Trichlorobenzene	4.53		0.288	0.215	J	0.142
Naphthalene	23.1		0.408	1.11		0.100
2,4-Dichlorophenol		U	0.321		U	0.127
4-Chloroaniline		U	0.410		U	0.100
Hexachlorobutadiene		U	0.201		U	0.204
1,2,3-Trichlorobenzene	0.520		0.288		U	0.142
4-Chloro-3-methylphenol		U	0.367		U	0.111
2-Methylnaphthalene	2.78		0.368		U	0.111
1-Methylnaphthalene	1.58		0.368		U	0.111
Hexachlorocyclopentadiene		U	0.192		U	0.213
2,4,6-Trichlorophenol		U	0.265		U	0.154
2,4,5-Trichlorophenol		U	0.265		U	0.154
Diphenylamine		U	0.309		U	0.132
Azobenzene		U	0.287		U	0.142

Sample ID:	**LF1BG01XA**			**LF1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120309.D			D031218.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			02/05/09		
Date Received:	10/29/08			02/12/09		
Date Prepared:	11/05/08			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			03/13/09		
Sample Volume (m^3):	0.474			0.375		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.322		U	0.127
2-Nitroaniline		U	0.379		U	0.108
1,4-Dinitrobenzene		U	0.311		U	0.131
Dimethylphthalate		U	0.269		U	0.152
1,3-Dinitrobenzene		U	0.311		U	0.131
Acenaphthylene		U	0.344		U	0.119
2,6-dinitrotoluene		U	0.287		U	0.142
1,2-Dinitrobenzene		U	0.311		U	0.131
3-Nitroaniline		U	0.379		U	0.108
Acenaphthene		U	0.339		U	0.121
2,4-Dinitrophenol		U	0.284		U	0.144
4-Nitrophenol	1.74		0.376		U	0.109
Dibenzofuran		U	0.311		U	0.132
2,4-dinitrotoluene		U	0.287		U	0.142
2,3,4,6-Tetrachlorophenol		U	0.226		U	0.181
2,3,5,6-Tetrachlorophenol		U	0.226		U	0.181
Diethylphthalate		U	0.235		U	0.174
4-Chlorophenyl-phenylether		U	0.256		U	0.160
Fluorene		U	0.315		U	0.130
4-Nitroaniline		U	0.379		U	0.108
4,6-Dinitro-2-methylphenol		U	0.264		U	0.155
n-Nitrosodiphenylamine		U	0.264		U	0.155
4-Bromophenyl phenyl ether		U	0.210		U	0.195
Hexachlorobenzene		U	0.184		U	0.223
Pentachlorophenol		U	0.196		U	0.208
Phenanthrene		U	0.293		U	0.139
Anthracene		U	0.293		U	0.139
Carbazole		U	0.313		U	0.131
Di-n-butylphthalate		U	0.188		U	0.218
Bis(2-ethylhexyl) adipate		U	0.141		U	0.290
Fluoranthene		U	0.259		U	0.158
Pyrene		U	0.259		U	0.158
Butylbenzylphthalate		U	0.167		U	0.244
Benz[a]anthracene		U	0.229		U	0.179
Chrysene		U	0.229		U	0.179
bis(2-Ethylhexyl)phthalate		U	0.134		U	0.305
Di-n-octylphthalate		U	0.134		U	0.305
Benzo[b]fluoranthene		U	0.207		U	0.197
Benzo[k]fluoranthene		U	0.207		U	0.197
Benzo[a]pyrene		U	0.207		U	0.197
Indeno[1,2,3-cd]pyrene		U	0.189		U	0.216
Dibenz[a,h]anthracene		U	0.188		U	0.218
Benzo[g,h,i]perylene		U	0.189		U	0.216

Sample ID:	**LF1BG01XA**			**LF1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120309.D			D031218.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			02/05/09		
Date Received:	10/29/08			02/12/09		
Date Prepared:	11/05/08			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			03/13/09		
Sample Volume (m^3):	0.474			0.375		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	74	76
4-Bromofluorobenzene	91	95
2-Fluorophenol	93	92
Phenol-d5	83	73
Nitrobenzene-d5	95	73
2-Fluorobiphenyl	104	86
2,4,6-Tribromophenol	69	87
p-Terphenyl-d14	101	88

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF1BL01XA**			**LF1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120310.D			D031219.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			39849		
Date Received:	10/29/08			39856		
Date Prepared:	11/05/08			39868		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			39885.27917		
Sample Volume (m^3):	0.490			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.379		U	0.0863
1,2-Dichloroethane		U	0.511		U	0.0640
1,1-Dichloropropene		U	0.456		U	0.0718
Benzene	0.742	JB	0.647	0.0507	JB	0.0505
Carbon Tetrachloride	0.790	B	0.329		U	0.0995
1,2-Dichloropropane		U	0.447		U	0.0731
Trichloroethene		U	0.385		U	0.0850
Dibromomethane		U	0.291		U	0.112
Bromodichloromethane		U	0.309		U	0.106
Pyridine		U	0.639		U	0.0512
cis-1,3-Dichloropropene		U	0.456		U	0.0718
N-nitrosodimethylamine		U	0.683		U	0.0479
Toluene	0.748	J	0.549		U	0.0596
trans-1,3-Dichloropropene		U	0.456		U	0.0718
1,1,2-Trichloroethane		U	0.379		U	0.0863
1,3-Dichloropropane		U	0.447		U	0.0731
Dibromochloromethane					U	0.135
1,2-Dibromoethane		U	0.269		U	0.121
Tetrachloroethene		U	0.305		U	0.107
Chlorobenzene		U	0.449		U	0.0728
1,1,1,2-Tetrachloroethane		U	0.301		U	0.109
Ethylbenzene		U	0.476		U	0.0687
m/p-Xylenes		U	0.476		U	0.0687
Bromoform		U	0.200		U	0.163
Styrene		U	0.485		U	0.0674
o-Xylene		U	0.476		U	0.0687
1,1,2,2-Tetrachloroethane		U	0.301		U	0.109
1,2,3-Trichloropropane		U	0.343		U	0.0953
Isopropylbenzene		U	0.421		U	0.0777
Bromobenzene		U	0.322		U	0.102

Sample ID:	**LF1BL01XA**			**LF1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120310.D			D031219.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			39849		
Date Received:	10/29/08			39856		
Date Prepared:	11/05/08			39868		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			39885.27917		
Sample Volume (m^3):	0.490			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chlorotoluene		U	0.399		U	0.0819
n-Propylbenzene		U	0.421		U	0.0777
4-Chlorotoluene		U	0.399		U	0.0819
1,3,5-Trimethylbenzene		U	0.421		U	0.0777
tert-Butylbenzene		U	0.377		U	0.0868
1,2,4-Trimethylbenzene		U	0.421		U	0.0777
sec-Butylbenzene		U	0.377		U	0.0868
Phenol		U	0.537		U	0.0609
bis(2-Chloroethyl)ether		U	0.354		U	0.0925
Aniline		U	0.543		U	0.0602
2-Chlorophenol		U	0.393		U	0.0831
1,3-Dichlorobenzene		U	0.344		U	0.0951
1,4-Dichlorobenzene		U	0.344		U	0.0951
p-Isopropyltoluene		U	0.377		U	0.0868
Benzyl Alcohol		U	0.468		U	0.0699
2-Methylphenol (m-cresol)		U	0.468		U	0.0699
1,2-Dichlorobenzene		U	0.344		U	0.0951
3,4-Methylphenol (o,p-cresol)		U	0.468		U	0.0699
bis(2-chloroisopropyl)ether		U	0.296		U	0.111
n-Butylbenzene		U	0.377		U	0.0868
N-nitroso-di-n-propylamine		U	0.388		U	0.0842
Hexachloroethane		U	0.214		U	0.153
1,2-Dibromo-3-Chloropropane		U	0.214		U	0.153
Nitrobenzene		U	0.411		U	0.0796
Isophorone		U	0.366		U	0.0894
2-Nitrophenol		U	0.363		U	0.0900
2,4-Dimethylphenol		U	0.414		U	0.0790
bis(2-Chloroethoxy)methane		U	0.292		U	0.112
1,2,4-Trichlorobenzene		U	0.279		U	0.117
Naphthalene		U	0.394		U	0.0829
2,4-Dichlorophenol		U	0.310		U	0.105
4-Chloroaniline		U	0.396		U	0.0825
Hexachlorobutadiene		U	0.194		U	0.169
1,2,3-Trichlorobenzene		U	0.279		U	0.117
4-Chloro-3-methylphenol		U	0.355		U	0.0922
2-Methylnaphthalene		U	0.356		U	0.0920
1-Methylnaphthalene		U	0.356		U	0.0920
Hexachlorocyclopentadiene		U	0.185		U	0.176
2,4,6-Trichlorophenol		U	0.256		U	0.128
2,4,5-Trichlorophenol		U	0.256		U	0.128
Diphenylamine		U	0.299		U	0.109
Azobenzene		U	0.277		U	0.118

Sample ID:	**LF1BL01XA**			**LF1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120310.D			D031219.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			39849		
Date Received:	10/29/08			39856		
Date Prepared:	11/05/08			39868		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			39885.27917		
Sample Volume (m^3):	0.490			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.311		U	0.105
2-Nitroaniline		U	0.366		U	0.0893
1,4-Dinitrobenzene		U	0.301		U	0.109
Dimethylphthalate		U	0.260		U	0.126
1,3-Dinitrobenzene		U	0.301		U	0.109
Acenaphthylene		U	0.332		U	0.0984
2,6-dinitrotoluene		U	0.278		U	0.118
1,2-Dinitrobenzene		U	0.301		U	0.109
3-Nitroaniline		U	0.366		U	0.0893
Acenaphthene		U	0.328		U	0.100
2,4-Dinitrophenol		U	0.275		U	0.119
4-Nitrophenol		U	0.363		U	0.0900
Dibenzofuran		U	0.301		U	0.109
2,4-dinitrotoluene		U	0.278		U	0.118
2,3,4,6-Tetrachlorophenol		U	0.218		U	0.150
2,3,5,6-Tetrachlorophenol		U	0.218		U	0.150
Diethylphthalate		U	0.228		U	0.144
4-Chlorophenyl-phenylether		U	0.247		U	0.132
Fluorene		U	0.304		U	0.107
4-Nitroaniline		U	0.366		U	0.0893
4,6-Dinitro-2-methylphenol		U	0.255		U	0.128
n-Nitrosodiphenylamine		U	0.255		U	0.128
4-Bromophenyl phenyl ether		U	0.203		U	0.161
Hexachlorobenzene		U	0.178		U	0.184
Pentachlorophenol		U	0.190		U	0.172
Phenanthrene		U	0.284		U	0.115
Anthracene		U	0.284		U	0.115
Carbazole		U	0.302		U	0.108
Di-n-butylphthalate		U	0.182		U	0.180
Bis(2-ethylhexyl) adipate		U	0.136		U	0.240
Fluoranthene		U	0.250		U	0.131
Pyrene		U	0.250		U	0.131
Butylbenzylphthalate		U	0.162		U	0.202
Benz[a]anthracene		U	0.221		U	0.148
Chrysene		U	0.221		U	0.148
bis(2-Ethylhexyl)phthalate		U	0.129		U	0.253
Di-n-octylphthalate		U	0.129		U	0.253
Benzo[b]fluoranthene		U	0.200		U	0.163
Benzo[k]fluoranthene		U	0.200		U	0.163
Benzo[a]pyrene		U	0.200		U	0.163
Indeno[1,2,3-cd]pyrene		U	0.183		U	0.179
Dibenz[a,h]anthracene		U	0.182		U	0.180
Benzo[g,h,i]perylene		U	0.183		U	0.179

Sample ID:	**LF1BL01XA**			**LF1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	AMX			Duster		
File ID:	D120310.D			D031219.D		
Operator:	ERL			JAR		
Date Sampled:	10/20/08			39849		
Date Received:	10/29/08			39856		
Date Prepared:	11/05/08			39868		
Date Cleanup:	NA			NA		
Date Analyzed:	12/04/08			39885.27917		
Sample Volume (m^3):	0.490			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL (ppbv)	Concentration (ppbv)	Q	EDL (ppbv)

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	56	56
4-Bromofluorobenzene	75	76
2-Fluorophenol	98	82
Phenol-d5	113	95
Nitrobenzene-d5	87	81
2-Fluorobiphenyl	92	83
2,4,6-Tribromophenol	82	84
p-Terphenyl-d14	100	88

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D120304.D			D031214.D		
Operator:	ERL			JAR		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/5/2008			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	12/3/2008			3/13/2009		
Sample Volume (m^3):	1.00			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.186		U	0.0882
1,2-Dichloroethane		U	0.250		U	0.0654
1,1-Dichloropropene		U	0.223		U	0.0734
Benzene	0.114	J	0.317	0.0676	J	0.0517
Carbon Tetrachloride	0.112		0.161		U	0.102
1,2-Dichloropropane		U	0.219		U	0.0747
Trichloroethene		U	0.189		U	0.0869
Dibromomethane		U	0.143		U	0.115
Bromodichloromethane		U	0.151		U	0.108
Pyridine		U	0.313		U	0.0523
cis-1,3-Dichloropropene		U	0.223		U	0.0734
N-nitrosodimethylamine		U	0.335		U	0.0490
Toluene		U	0.269		U	0.0609
trans-1,3-Dichloropropene		U	0.223		U	0.0734
1,1,2-Trichloroethane		U	0.186		U	0.0882
1,3-Dichloropropane		U	0.219		U	0.0747
Dibromochloromethane					U	0.138
1,2-Dibromoethane		U	0.132		U	0.124
Tetrachloroethene		U	0.149		U	0.110
Chlorobenzene		U	0.220		U	0.0744
1,1,1,2-Tetrachloroethane		U	0.148		U	0.111
Ethylbenzene		U	0.233		U	0.0702
m/p-Xylenes		U	0.233		U	0.0702
Bromoform		U	0.098		U	0.167
Styrene		U	0.238		U	0.0689
o-Xylene		U	0.233		U	0.0702
1,1,2,2-Tetrachloroethane		U	0.148		U	0.111
1,2,3-Trichloropropane		U	0.168		U	0.0975
Isopropylbenzene		U	0.206		U	0.0795
Bromobenzene		U	0.158		U	0.104

Sample ID:	**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D120304.D			D031214.D		
Operator:	ERL			JAR		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/5/2008			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	12/3/2008			3/13/2009		
Sample Volume (m^3):	1.00			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Chlorotoluene		U	0.196		U	0.0837
n-Propylbenzene		U	0.206		U	0.0795
4-Chlorotoluene		U	0.196		U	0.0837
1,3,5-Trimethylbenzene		U	0.206		U	0.0795
tert-Butylbenzene		U	0.185		U	0.0888
1,2,4-Trimethylbenzene		U	0.206		U	0.0795
sec-Butylbenzene		U	0.185		U	0.0888
Phenol		U	0.263		U	0.0622
bis(2-Chloroethyl)ether		U	0.173		U	0.0946
Aniline		U	0.266		U	0.0616
2-Chlorophenol		U	0.193		U	0.0850
1,3-Dichlorobenzene		U	0.169		U	0.0972
1,4-Dichlorobenzene		U	0.169		U	0.0972
p-Isopropyltoluene		U	0.185		U	0.0888
Benzyl Alcohol		U	0.229		U	0.0715
2-Methylphenol (m-cresol)		U	0.229		U	0.0715
1,2-Dichlorobenzene		U	0.169		U	0.0972
3,4-Methylphenol (o,p-cresol)		U	0.229		U	0.0715
bis(2-chloroisopropyl)ether		U	0.145		U	0.113
n-Butylbenzene		U	0.185		U	0.0888
N-nitroso-di-n-propylamine		U	0.190		U	0.0861
Hexachloroethane		U	0.105		U	0.157
1,2-Dibromo-3-Chloropropane		U	0.105		U	0.156
Nitrobenzene		U	0.201		U	0.0814
Isophorone		U	0.179		U	0.0914
2-Nitrophenol		U	0.178		U	0.0920
2,4-Dimethylphenol		U	0.203		U	0.0808
bis(2-Chloroethoxy)methane		U	0.143		U	0.114
1,2,4-Trichlorobenzene		U	0.137		U	0.120
Naphthalene		U	0.193		U	0.0848
2,4-Dichlorophenol		U	0.152		U	0.108
4-Chloroaniline		U	0.194		U	0.0844
Hexachlorobutadiene		U	0.0950		U	0.172
1,2,3-Trichlorobenzene		U	0.137		U	0.120
4-Chloro-3-methylphenol		U	0.174		U	0.0943
2-Methylnaphthalene		U	0.174		U	0.0940
1-Methylnaphthalene		U	0.174		U	0.0940
Hexachlorocyclopentadiene		U	0.0909		U	0.180
2,4,6-Trichlorophenol		U	0.126		U	0.131
2,4,5-Trichlorophenol		U	0.126		U	0.131
Diphenylamine		U	0.146		U	0.112
Azobenzene		U	0.136		U	0.120

Sample ID:	**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D120304.D			D031214.D		
Operator:	ERL			JAR		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/5/2008			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	12/3/2008			3/13/2009		
Sample Volume (m^3):	1.00			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Chloronaphthalene		U	0.152		U	0.108
2-Nitroaniline		U	0.179		U	0.0913
1,4-Dinitrobenzene		U	0.147		U	0.111
Dimethylphthalate		U	0.128		U	0.128
1,3-Dinitrobenzene		U	0.147		U	0.111
Acenaphthylene		U	0.163		U	0.101
2,6-dinitrotoluene		U	0.136		U	0.120
1,2-Dinitrobenzene		U	0.147		U	0.111
3-Nitroaniline		U	0.179		U	0.0913
Acenaphthene		U	0.161		U	0.102
2,4-Dinitrophenol		U	0.135		U	0.122
4-Nitrophenol		U	0.178		U	0.0920
Dibenzofuran		U	0.147		U	0.111
2,4-dinitrotoluene		U	0.136		U	0.120
2,3,4,6-Tetrachlorophenol		U	0.107		U	0.153
2,3,5,6-Tetrachlorophenol		U	0.107		U	0.153
Diethylphthalate		U	0.112		U	0.147
4-Chlorophenyl-phenylether		U	0.121		U	0.135
Fluorene		U	0.149		U	0.110
4-Nitroaniline		U	0.179		U	0.0913
4,6-Dinitro-2-methylphenol		U	0.125		U	0.131
n-Nitrosodiphenylamine		U	0.125		U	0.131
4-Bromophenyl phenyl ether		U	0.0995		U	0.165
Hexachlorobenzene		U	0.0870		U	0.188
Pentachlorophenol		U	0.0931		U	0.176
Phenanthrene		U	0.139		U	0.118
Anthracene		U	0.139		U	0.118
Carbazole		U	0.148		U	0.111
Di-n-butylphthalate		U	0.0890		U	0.184
Bis(2-ethylhexyl) adipate		U	0.0669		U	0.245
Fluoranthene		U	0.123		U	0.134
Pyrene		U	0.123		U	0.134
Butylbenzylphthalate		U	0.0793		U	0.207
Benz[a]anthracene		U	0.109		U	0.151
Chrysene		U	0.109		U	0.151
bis(2-Ethylhexyl)phthalate		U	0.0635		U	0.258
Di-n-octylphthalate		U	0.0635		U	0.258
Benzo[b]fluoranthene		U	0.0982		U	0.167
Benzo[k]fluoranthene		U	0.0982		U	0.167
Benzo[a]pyrene		U	0.0982		U	0.167
Indeno[1,2,3-cd]pyrene		U	0.0897		U	0.183
Dibenz[a,h]anthracene		U	0.0890		U	0.184
Benzo[g,h,i]perylene		U	0.0897		U	0.183

Sample ID:	**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8270M		
Instrument:	Duster			Duster		
File ID:	D120304.D			D031214.D		
Operator:	ERL			JAR		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/5/2008			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	12/3/2008			3/13/2009		
Sample Volume (m^3):	1.00			0.453646667		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)		
Toluene-d8	73	78
4-Bromofluorobenzene	81	90
2-Fluorophenol	86	93
Phenol-d5	98	107
Nitrobenzene-d5	77	88
2-Fluorobiphenyl	86	92
2,4,6-Tribromophenol	79	87
p-Terphenyl-d14	85	91

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID: **QC090224-MBS**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC090224-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8270M
Instrument:	Duster
File ID:	D031215.D
Operator:	JAR
Date Sampled:	NA
Date Received:	NA
Date Prepared:	2/24/2009
Date Cleanup:	NA
Date Analyzed:	3/13/2009
Sample Volume (m^3):	0.453646667
Percent Solid:	NA
Prep DF:	1
Analysis DF:	1
Injection Volume (µl):	1
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
1,1,1-Trichloroethane	0.994		0.0882	23
1,2-Dichloroethane	1.57		0.0654	48
1,1-Dichloropropene	0.744		0.0734	20
Benzene	1.37	B	0.0517	53
Carbon Tetrachloride	0.680		0.102	13
1,2-Dichloropropane	2.36		0.0747	63
Trichloroethene	1.69		0.0869	39
Dibromomethane	3.41		0.115	59
Bromodichloromethane	2.76		0.108	51
Pyridine	2.03		0.0523	77
cis-1,3-Dichloropropene	2.38		0.0734	65
N-nitrosodimethylamine	2.00		0.0490	81
Toluene	2.26		0.0609	74
trans-1,3-Dichloropropene	2.52		0.0734	69
1,1,2-Trichloroethane	2.92		0.0882	66
1,3-Dichloropropane	2.62		0.0747	70
Dibromochloromethane	4.62		0.138	67
1,2-Dibromoethane	4.46		0.124	72
Tetrachloroethene	3.56		0.110	65
Chlorobenzene	2.82		0.0744	76
1,1,1,2-Tetrachloroethane	4.02		0.111	72
Ethylbenzene	2.81		0.0702	80
m/p-Xylenes	2.97		0.0702	85
Bromoform	6.69		0.167	80
Styrene	2.78		0.0689	81
o-Xylene	2.86		0.0702	81
1,1,2,2-Tetrachloroethane	4.49		0.111	81
1,2,3-Trichloropropane	3.90		0.0975	80
Isopropylbenzene	3.43		0.0795	86
Bromobenzene	4.10		0.104	79

Sample ID: **QC090224-MBS**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC090224-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8270M
Instrument:	Duster
File ID:	D031215.D
Operator:	JAR
Date Sampled:	NA
Date Received:	NA
Date Prepared:	2/24/2009
Date Cleanup:	NA
Date Analyzed:	3/13/2009
Sample Volume (m^3):	0.453646667
Percent Solid:	NA
Prep DF:	1
Analysis DF:	1
Injection Volume (µl):	1
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
2-Chlorotoluene	3.39		0.0837	81
n-Propylbenzene	3.31		0.0795	83
4-Chlorotoluene	3.51		0.0837	84
1,3,5-Trimethylbenzene	3.40		0.0795	85
tert-Butylbenzene	3.93		0.0888	89
1,2,4-Trimethylbenzene	3.55		0.0795	89
sec-Butylbenzene	3.86		0.0888	87
Phenol	2.76		0.0622	89
bis(2-Chloroethyl)ether	3.83		0.0946	81
Aniline	2.14		0.0616	69
2-Chlorophenol	3.50		0.0850	82
1,3-Dichlorobenzene	8.62		0.0972	89
1,4-Dichlorobenzene	8.79		0.0972	90
p-Isopropyltoluene	3.95		0.0888	89
Benzyl Alcohol	3.03		0.0715	85
2-Methylphenol (m-cresol)	3.08		0.0715	86
1,2-Dichlorobenzene	8.79		0.0972	90
3,4-Methylphenol (o,p-cresol)	3.18		0.0715	89
bis(2-chloroisopropyl)ether	4.88		0.113	86
n-Butylbenzene	4.03		0.0888	91
N-nitroso-di-n-propylamine	3.81		0.0861	88
Hexachloroethane	6.43		0.157	82
1,2-Dibromo-3-Chloropropane	6.18		0.156	79
Nitrobenzene	3.45		0.0814	85
Isophorone	3.95		0.0914	87
2-Nitrophenol	3.93		0.0920	86
2,4-Dimethylphenol	2.57		0.0808	64
bis(2-Chloroethoxy)methane	4.95		0.114	86
1,2,4-Trichlorobenzene	10.9		0.120	91
Naphthalene	8.17		0.0848	96
2,4-Dichlorophenol	4.68		0.108	87
4-Chloroaniline	1.86		0.0844	44
Hexachlorobutadiene	15.8		0.172	92
1,2,3-Trichlorobenzene	5.28		0.120	88
4-Chloro-3-methylphenol	3.99		0.0943	85
2-Methylnaphthalene	4.09		0.0940	87
1-Methylnaphthalene	4.24		0.0940	90
Hexachlorocyclopentadiene	3.94		0.180	44
2,4,6-Trichlorophenol	5.43		0.131	83
2,4,5-Trichlorophenol	5.13		0.131	79
Diphenylamine	4.86		0.112	87
Azobenzene	5.02		0.120	83

Sample ID: **QC090224-MBS**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC090224-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8270M
Instrument:	Duster
File ID:	D031215.D
Operator:	JAR
Date Sampled:	NA
Date Received:	NA
Date Prepared:	2/24/2009
Date Cleanup:	NA
Date Analyzed:	3/13/2009
Sample Volume (m^3):	0.453646667
Percent Solid:	NA
Prep DF:	1
Analysis DF:	1
Injection Volume (µl):	1
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
2-Chloronaphthalene	4.62		0.108	86
2-Nitroaniline	3.55		0.0913	78
1,4-Dinitrobenzene	4.24		0.111	76
Dimethylphthalate	5.60		0.128	87
1,3-Dinitrobenzene	4.29		0.111	77
Acenaphthylene	4.43		0.101	88
2,6-dinitrotoluene	4.74		0.120	79
1,2-Dinitrobenzene	4.25		0.111	77
3-Nitroaniline	2.13		0.0913	47
Acenaphthene	4.23		0.102	83
2,4-Dinitrophenol	4.21		0.122	69
4-Nitrophenol	3.60		0.0920	78
Dibenzofuran	4.77		0.111	86
2,4-dinitrotoluene	4.84		0.120	80
2,3,4,6-Tetrachlorophenol	6.15		0.153	80
2,3,5,6-Tetrachlorophenol	6.09		0.153	79
Diethylphthalate	6.19		0.147	84
4-Chlorophenyl-phenylether	5.51		0.135	81
Fluorene	4.76		0.110	87
4-Nitroaniline	2.88		0.0913	63
4,6-Dinitro-2-methylphenol	4.96		0.131	76
n-Nitrosodiphenylamine	5.95		0.131	91
4-Bromophenyl phenyl ether	7.05		0.165	86
Hexachlorobenzene	7.84		0.188	83
Pentachlorophenol	7.02		0.176	80
Phenanthrene	5.36		0.118	91
Anthracene	5.26		0.118	89
Carbazole	4.98		0.111	90
Di-n-butylphthalate	9.45		0.184	103
Bis(2-ethylhexyl) adipate	11.4		0.245	93
Fluoranthene	6.08		0.134	91
Pyrene	6.14		0.134	92
Butylbenzylphthalate	8.73		0.207	85
Benz[a]anthracene	6.71		0.151	89
Chrysene	6.75		0.151	89
bis(2-Ethylhexyl)phthalate	11.6		0.258	90
Di-n-octylphthalate	11.2		0.258	87
Benzo[b]fluoranthene	7.20		0.167	86
Benzo[k]fluoranthene	6.98		0.167	84
Benzo[a]pyrene	6.82		0.167	82
Indeno[1,2,3-cd]pyrene	7.45		0.183	82
Dibenz[a,h]anthracene	7.73		0.184	84
Benzo[g,h,i]perylene	7.53		0.183	82

Sample ID: **QC090224-MBS**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC090224-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8270M
Instrument:	Duster
File ID:	D031215.D
Operator:	JAR
Date Sampled:	NA
Date Received:	NA
Date Prepared:	2/24/2009
Date Cleanup:	NA
Date Analyzed:	3/13/2009
Sample Volume (m^3):	0.453646667
Percent Solid:	NA
Prep DF:	1
Analysis DF:	1
Injection Volume (µl):	1
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)	
Toluene-d8	78
4-Bromofluorobenzene	87
2-Fluorophenol	88
Phenol-d5	92
Nitrobenzene-d5	88
2-Fluorobiphenyl	90
2,4,6-Tribromophenol	86
p-Terphenyl-d14	92

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

LF1
VOC & SVOC
Descriptive Statistics

Biomethane

Analyte	Mean	Median	Deviation	Range	Minimum	Maximum	Count
Benzene	0.505	0.730	0.397	0.691	0.046	0.737	3
Carbon Tetrachloride	0.434	0.434	0.087	0.123	0.372	0.496	2
1,2-Dichloropropane	19.7	19.7	N/A	0.00	19.7	19.7	1
Toluene	0.537	0.537	N/A	0.00	0.537	0.537	1
Ethylbenzene	0.348	0.348	N/A	0.00	0.348	0.348	1
m/p-Xylenes	0.609	0.609	N/A	0.00	0.609	0.609	1
1,2,4-Trimethylbenzene	0.703	0.703	0.137	0.194	0.606	0.800	2

LF1
VOC & SVOC
Descriptive Statistics

Biogas Analyte	Mean	Median	ard Deviation	Range	Minimum	Maximum	Count
1,2-Dichloroethane	0.146	0.146	N/A	0.00	0.146	0.146	1
Benzene	1.18	1.18	0.945	1.34	0.510	1.85	2
Carbon Tetrachloride	0.475	0.475	N/A	0.00	0.475	0.475	1
Trichloroethene	0.315	0.315	N/A	0.00	0.315	0.315	1
Toluene	70.1	70.1	43.6	61.6	39.3	101	2
Tetrachloroethene	3.29	3.29	0.981	1.39	2.60	3.99	2
Chlorobenzene	1.45	1.45	0.167	0.236	1.33	1.57	2
Ethylbenzene	63.3	63.3	4.82	6.82	59.9	66.7	2
m/p-Xylenes	75.6	75.6	28.8	40.7	55.2	95.9	2
Styrene	13.1	13.1	0.848	1.20	12.5	13.7	2
o-Xylene	50.2	50.2	21.2	29.9	35.3	65.2	2
Isopropylbenzene	10.2	10.2	1.43	2.03	9.15	11.2	2
2-Chlorotoluene	1.91	1.91	N/A	0.00	1.91	1.91	1
n-Propylbenzene	11.9	11.9	6.58	9.30	7.21	16.5	2
1,3,5-Trimethylbenzene	26.1	26.1	20.1	28.4	11.9	40.3	2
tert-Butylbenzene	7.71	7.71	5.36	7.58	3.92	11.5	2
1,2,4-Trimethylbenzene	65.8	65.8	56.2	79.5	26.1	106	2
sec-Butylbenzene	5.69	5.69	4.49	6.35	2.51	8.87	2
Phenol	1.42	1.42	N/A	0.00	1.42	1.42	1
1,3-Dichlorobenzene	0.232	0.232	N/A	0.000	0.232	0.232	1
1,4-Dichlorobenzene	21.1	21.1	18.5	26.2	8.04	34.2	2
p-Isopropyltoluene	27.6	27.6	24.4	34.5	10.4	44.8	2
Benzyl Alcohol	126	126	N/A	0.00	126	126	1
1,2-Dichlorobenzene	1.31	1.31	1.30	1.85	0.387	2.23	2
3,4-Methylphenol (o,p-cres	0.904	0.904	N/A	0.00	0.904	0.904	1
n-Butylbenzene	3.20	3.20	2.94	4.15	1.12	5.27	2
N-nitroso-di-n-propylamine	11.7	11.7	N/A	0.0	11.7	11.7	1
1,2,4-Trichlorobenzene	2.37	2.37	3.05	4.31	0.22	4.53	2
Naphthalene	12.1	12.1	15.5	22.0	1.11	23.1	2
1,2,3-Trichlorobenzene	0.520	0.520	N/A	0.00	0.520	0.520	1
2-Methylnaphthalene	2.78	2.78	N/A	0	2.78	2.78	1
1-Methylnaphthalene	1.58	1.58	N/A	0	1.58	1.58	1
4-Nitrophenol	1.74	1.74	N/A	0	1.74	1.74	1

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF2BM01XA			LF2BM02XA		
Matrix:	XAD Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120312.D			D120312.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.383		U	0.366
1,2-Dichloroethane		U	0.516		U	0.493
1,1-Dichloropropene		U	0.460		U	0.440
Benzene	0.686	JB	0.654	0.783	JB	0.625
Carbon Tetrachloride	0.791	B	0.332	0.801	B	0.317
1,2-Dichloropropane		U	0.452		U	0.432
Trichloroethene		U	0.389		U	0.371
Dibromomethane		U	0.294		U	0.281
Bromodichloromethane		U	0.312		U	0.617
Pyridine		U	0.645		U	0.440
cis-1,3-Dichloropropene		U	0.460		U	0.659
N-nitrosodimethylamine		U	0.689		U	0.530
Toluene	1.088		0.554		U	0.440
trans-1,3-Dichloropropene		U	0.460		U	0.366
1,1,2-Trichloroethane		U	0.383		U	0.432
1,3-Dichloropropane		U	0.452		U	0.234
Dibromochloromethane		NA	NA		NA	NA
1,2-Dibromoethane		U	0.272		U	0.260
Tetrachloroethene		U	0.308		U	0.294
Chlorobenzene		U	0.454		U	0.434
1,1,1,2-Tetrachloroethane		U	0.304		U	0.291
Ethylbenzene		U	0.481		U	0.460
m/p-Xylenes		U	0.481		U	0.460
Bromoform		U	0.202		U	0.193
Styrene		U	0.490		U	0.469
o-Xylene		U	0.481		U	0.460
1,1,2,2-Tetrachloroethane		U	0.304		U	0.291
1,2,3-Trichloropropane		U	0.346		U	0.331
Isopropylbenzene		U	0.425		U	0.406
Bromobenzene		U	0.325		U	0.311
2-Chlorotoluene		U	0.403		U	0.386
n-Propylbenzene		U	0.425		U	0.406
4-Chlorotoluene		U	0.403		U	0.386
1,3,5-Trimethylbenzene		U	0.425		U	0.406
tert-Butylbenzene		U	0.380		U	0.364
1,2,4-Trimethylbenzene		U	0.425		U	0.406
sec-Butylbenzene		U	0.380		U	0.364
Phenol		U	0.543		U	0.519

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120312.D			D120312.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
bis(2-Chloroethyl)ether		U	0.357		U	0.341
Aniline		U	0.548		U	0.524
2-Chlorophenol		U	0.397		U	0.380
1,3-Dichlorobenzene		U	0.347		U	0.332
1,4-Dichlorobenzene		U	0.347		U	0.332
p-Isopropyltoluene		U	0.380		U	0.364
Benzyl Alcohol		U	0.472		U	0.451
2-Methylphenol (m-cresol)		U	0.472		U	0.451
1,2-Dichlorobenzene		U	0.347		U	0.332
3,4-Methylphenol (o,p-cresol)		U	0.472		U	0.451
bis(2-chloroisopropyl)ether		U	0.298		U	0.285
n-Butylbenzene		U	0.380		U	0.364
N-nitroso-di-n-propylamine		U	0.392		U	0.375
Hexachloroethane		U	0.216		U	0.206
1,2-Dibromo-3-Chloropropane		U	0.216		U	0.207
Nitrobenzene		U	0.415		U	0.396
Isophorone		U	0.369		U	0.353
2-Nitrophenol		U	0.367		U	0.351
2,4-Dimethylphenol		U	0.418		U	0.399
bis(2-Chloroethoxy)methane		U	0.295		U	0.282
1,2,4-Trichlorobenzene		U	0.281		U	0.269
Naphthalene		U	0.398		U	0.381
2,4-Dichlorophenol		U	0.313		U	0.299
4-Chloroaniline		U	0.400		U	0.383
Hexachlorobutadiene		U	0.196		U	0.187
1,2,3-Trichlorobenzene		U	0.281		U	0.269
4-Chloro-3-methylphenol		U	0.358		U	0.342
2-Methylnaphthalene		U	0.359		U	0.343
1-Methylnaphthalene		U	0.359		U	0.343
Hexachlorocyclopentadiene		U	0.187		U	0.179
2,4,6-Trichlorophenol		U	0.259		U	0.247
2,4,5-Trichlorophenol		U	0.259		U	0.247
Diphenylamine		U	0.302		U	0.288
Azobenzene		U	0.280		U	0.268
2-Chloronaphthalene		U	0.314		U	0.300
2-Nitroaniline		U	0.370		U	0.353
1,4-Dinitrobenzene		U	0.304		U	0.290

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF2BM01XA			LF2BM02XA		
Matrix:	XAD Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120312.D			D120312.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Dimethylphthalate		U	0.263		U	0.251
1,3-Dinitrobenzene		U	0.304		U	0.290
Acenaphthylene		U	0.335		U	0.321
2,6-dinitrotoluene		U	0.280		U	0.268
1,2-Dinitrobenzene		U	0.304		U	0.290
3-Nitroaniline		U	0.370		U	0.353
Acenaphthene		U	0.331		U	0.316
2,4-Dinitrophenol		U	0.277		U	0.265
4-Nitrophenol		U	0.367		U	0.351
Dibenzofuran		U	0.304		U	0.290
2,4-dinitrotoluene		U	0.280		U	0.268
2,3,4,6-Tetrachlorophenol		U	0.220		U	0.210
2,3,5,6-Tetrachlorophenol		U	0.220		U	0.210
Diethylphthalate		U	0.230	0.500	B	0.220
4-Chlorophenyl-phenylether		U	0.249		U	0.238
Fluorene		U	0.307		U	0.294
4-Nitroaniline		U	0.370		U	0.353
4,6-Dinitro-2-methylphenol		U	0.258		U	0.246
n-Nitrosodiphenylamine		U	0.258		U	0.246
4-Bromophenyl phenyl ether		U	0.205		U	0.196
Hexachlorobenzene		U	0.179		U	0.171
Pentachlorophenol		U	0.192		U	0.183
Phenanthrene		U	0.286		U	0.274
Anthracene		U	0.286		U	0.274
Carbazole		U	0.305		U	0.292
Di-n-butylphthalate		U	0.183	1.116	B	0.175
Bis(2-ethylhexyl) adipate		U	0.138		U	0.132
Fluoranthene		U	0.252		U	0.241
Pyrene		U	0.252		U	0.241
Butylbenzylphthalate		U	0.163		U	0.156
Benz[a]anthracene		U	0.224		U	0.214
Chrysene		U	0.224		U	0.214
bis(2-Ethylhexyl)phthalate		U	0.131		BU	0.125
Di-n-octylphthalate		U	0.131		U	0.125
Benzo[b]fluoranthene		U	0.202		U	0.193
Benzo[k]fluoranthene		U	0.202		U	0.193
Benzo[a]pyrene		U	0.202		U	0.193
Indeno[1,2,3-cd]pyrene		U	0.185		U	0.177
Dibenz[a,h]anthracene		U	0.183		U	0.175
Benzo[g,h,i]perylene		U	0.185		U	0.177

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120312.D			D120312.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	87	101
4-Bromofluorobenzene	99	105
2-Fluorophenol	91	101
Phenol-d5	106	117
Nitrobenzene-d5	86	89
2-Fluorobiphenyl	98	103
2,4,6-Tribromophenol	85	97
p-Terphenyl-d14	97	90

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF2BM03XA			LF2BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121724.D			D121725.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.291		U	0.332
1,2-Dichloroethane		U	0.393		U	0.448
1,1-Dichloropropene		U	0.350		U	0.400
Benzene	1.27	B	0.498	6.24	B	0.568
Carbon Tetrachloride		U	0.253		U	0.288
1,2-Dichloropropane		U	0.344	0.514	J	0.392
Trichloroethene		U	0.296	0.602	J	0.337
Dibromomethane		U	0.224		U	0.255
Bromodichloromethane		U	0.237		U	0.271
Pyridine		U	0.491		U	0.561
cis-1,3-Dichloropropene		U	0.350		U	0.400
N-nitrosodimethylamine		U	0.525		U	0.599
Toluene	0.488	J	0.422	3.64		0.481
trans-1,3-Dichloropropene		U	0.350		U	0.400
1,1,2-Trichloroethane		U	0.291		U	0.332
1,3-Dichloropropane		U	0.344		U	0.392
Dibromochloromethane		U	0.187		U	0.213
1,2-Dibromoethane		U	0.207		U	0.236
Tetrachloroethene		U	0.234		U	0.267
Chlorobenzene		U	0.345		U	0.394
1,1,1,2-Tetrachloroethane		U	0.232		U	0.264
Ethylbenzene	1.15		0.366		U	0.418
m/p-Xylenes	1.42		0.366		U	0.418
Bromoform		U	0.154		U	0.175
Styrene		U	0.373		U	0.426
o-Xylene	1.186		0.366		U	0.418
1,1,2,2-Tetrachloroethane		U	0.232		U	0.264
1,2,3-Trichloropropane		U	0.264		U	0.301
Isopropylbenzene	0.412	J	0.323		U	0.369
Bromobenzene		U	0.248		U	0.282
2-Chlorotoluene		U	0.307		U	0.350
n-Propylbenzene	0.486	J	0.323		U	0.369
4-Chlorotoluene		U	0.307		U	0.350
1,3,5-Trimethylbenzene	1.31		0.323		U	0.369
tert-Butylbenzene		U	0.290		U	0.330
1,2,4-Trimethylbenzene	4.29		0.323	0.954		0.369
sec-Butylbenzene	0.467	J	0.290		U	0.330
Phenol		U	0.413		U	0.471

Sample ID:	LF2BM03XA			LF2BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121724.D			D121725.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
bis(2-Chloroethyl)ether		U	0.272		U	0.310
Aniline		U	0.417		U	0.476
2-Chlorophenol		U	0.302		U	0.345
1,3-Dichlorobenzene		U	0.264		U	0.302
1,4-Dichlorobenzene	1.98		0.264	0.406	J	0.302
p-Isopropyltoluene	20.5		0.290	6.659		0.330
Benzyl Alcohol		U	0.359		U	0.410
2-Methylphenol (m-cresol)		U	0.359		U	0.410
1,2-Dichlorobenzene		U	0.264		U	0.302
3,4-Methylphenol (o,p-cresol)		U	0.359		U	0.410
bis(2-chloroisopropyl)ether		U	0.227		U	0.259
n-Butylbenzene	0.447	J	0.290		U	0.330
N-nitroso-di-n-propylamine		U	0.299		U	0.341
Hexachloroethane		U	0.164		U	0.187
1,2-Dibromo-3-Chloropropane		U	0.164		U	0.188
Nitrobenzene		U	0.316		U	0.360
Isophorone		U	0.281		U	0.321
2-Nitrophenol		U	0.279		U	0.319
2,4-Dimethylphenol		U	0.318		U	0.363
bis(2-Chloroethoxy)methane		U	0.225		U	0.256
1,2,4-Trichlorobenzene		U	0.214		U	0.244
Naphthalene	7.00		0.303	3.69		0.346
2,4-Dichlorophenol		U	0.238		U	0.272
4-Chloroaniline		U	0.305		U	0.348
Hexachlorobutadiene		U	0.149		U	0.170
1,2,3-Trichlorobenzene		U	0.214		U	0.244
4-Chloro-3-methylphenol		U	0.273		U	0.311
2-Methylnaphthalene	0.911		0.273	0.640		0.312
1-Methylnaphthalene	0.408	J	0.273		U	0.312
Hexachlorocyclopentadiene		U	0.142		U	0.163
2,4,6-Trichlorophenol		U	0.197		U	0.225
2,4,5-Trichlorophenol		U	0.197		U	0.225
Diphenylamine		U	0.230		U	0.262
Azobenzene		U	0.213		U	0.243
2-Chloronaphthalene		U	0.239		U	0.273
2-Nitroaniline		U	0.281		U	0.321
1,4-Dinitrobenzene		U	0.231		U	0.264

Sample ID:	LF2BM03XA			LF2BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121724.D			D121725.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Dimethylphthalate		U	0.200		U	0.228
1,3-Dinitrobenzene		U	0.231		U	0.264
Acenaphthylene		U	0.255		U	0.291
2,6-dinitrotoluene		U	0.213		U	0.243
1,2-Dinitrobenzene		U	0.231		U	0.264
3-Nitroaniline		U	0.281		U	0.321
Acenaphthene		U	0.252		U	0.288
2,4-Dinitrophenol		U	0.211		U	0.241
4-Nitrophenol		U	0.279		U	0.319
Dibenzofuran		U	0.231		U	0.264
2,4-dinitrotoluene		U	0.213		U	0.243
2,3,4,6-Tetrachlorophenol		U	0.168		U	0.191
2,3,5,6-Tetrachlorophenol		U	0.168		U	0.191
Diethylphthalate		U	0.175		U	0.200
4-Chlorophenyl-phenylether		U	0.190		U	0.217
Fluorene		U	0.234		U	0.267
4-Nitroaniline		U	0.281		U	0.321
4,6-Dinitro-2-methylphenol		U	0.196		U	0.224
n-Nitrosodiphenylamine		U	0.196		U	0.224
4-Bromophenyl phenyl ether		U	0.156		U	0.178
Hexachlorobenzene		U	0.136		U	0.156
Pentachlorophenol		U	0.146		U	0.166
Phenanthrene		U	0.218		U	0.249
Anthracene		U	0.218		U	0.249
Carbazole		U	0.232		U	0.265
Di-n-butylphthalate	0.483	B	0.140	0.589	B	0.159
Bis(2-ethylhexyl) adipate		U	0.105		U	0.120
Fluoranthene		U	0.192		U	0.219
Pyrene		U	0.192		U	0.219
Butylbenzylphthalate		U	0.124		U	0.142
Benz[a]anthracene		U	0.170		U	0.194
Chrysene		U	0.170		U	0.194
bis(2-Ethylhexyl)phthalate		U	0.100		U	0.114
Di-n-octylphthalate		U	0.100		U	0.114
Benzo[b]fluoranthene		U	0.154		U	0.176
Benzo[k]fluoranthene		U	0.154		U	0.176
Benzo[a]pyrene		U	0.154		U	0.176
Indeno[1,2,3-cd]pyrene		U	0.141		U	0.160
Dibenz[a,h]anthracene		U	0.140		U	0.159
Benzo[g,h,i]perylene		U	0.141		U	0.160

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF2BM03XA**			**LF2BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121724.D			D121725.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Extraction Surrogate Recoveries (%)						
Toluene-d8	74			67		
4-Bromofluorobenzene	90			87		
2-Fluorophenol	75			82		
Phenol-d5	86			96		
Nitrobenzene-d5	81			84		
2-Fluorobiphenyl	90			88		
2,4,6-Tribromophenol	80			88		
p-Terphenyl-d14	87			87		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF2BG01XA			LF2BG03XA		
Matrix:	XDA Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			Duster		
File ID:	D120313.D			D121726.D		
Operator:	ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/18/2008		
Sample Volume (m^3):	0.529			0.538		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.235		U	0.310
1,2-Dichloroethane		U	0.266		U	0.418
1,1-Dichloropropene		U	0.392		U	0.373
Benzene	0.957	JB	0.263	1.07	B	0.530
Carbon Tetrachloride	0.727	B	0.416	0.286	J	0.269
1,2-Dichloropropane		U	0.416		U	0.366
Trichloroethene		U	0.175		U	0.315
Dibromomethane		U	0.424		U	0.238
Bromodichloromethane		U	0.416		U	0.252
Pyridine		U	0.263		U	0.523
cis-1,3-Dichloropropene		U	0.299		U	0.373
N-nitrosodimethylamine		U	0.367		U	0.558
Toluene	20.2		0.281	31.4		0.449
trans-1,3-Dichloropropene		U	0.349	0.391	J	0.373
1,1,2-Trichloroethane		U	0.367		U	0.310
1,3-Dichloropropane		U	0.349		U	0.366
Dibromochloromethane		U	0.367		U	0.199
1,2-Dibromoethane		U	0.329		U	0.220
Tetrachloroethene	0.404	J	0.367	0.494	J	0.249
Chlorobenzene	0.882		0.329	1.33		0.367
1,1,1,2-Tetrachloroethane		U	0.469		U	0.246
Ethylbenzene	59.8		0.309	96.1		0.390
m/p-Xylenes	71.7		0.474		U	0.390
Bromoform		U	0.343		U	0.164
Styrene	5.11		0.300	7.77		0.397
o-Xylene	51.7		0.300	83.57		0.390
1,1,2,2-Tetrachloroethane		U	0.329	0.313	J	0.246
1,2,3-Trichloropropane		U	0.408		U	0.281
Isopropylbenzene	10.5		0.408	15.1		0.344
Bromobenzene		U	0.300		U	0.263
2-Chlorotoluene	2.34		0.408	2.28		0.327
n-Propylbenzene	16.3		0.258	19.6		0.344
4-Chlorotoluene		U	0.329		U	0.327
1,3,5-Trimethylbenzene	47.0		0.339	72.5		0.344
tert-Butylbenzene	12.9		0.186		U	0.308
1,2,4-Trimethylbenzene	144	DU	0.187	248	D	0.344
sec-Butylbenzene	8.30		0.358	12.1		0.308
Phenol		U	0.319		U	0.440

Sample ID:	LF2BG01XA			LF2BG03XA		
Matrix:	XDA Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			Duster		
File ID:	D120313.D			D121726.D		
Operator:	ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/18/2008		
Sample Volume (m^3):	0.529			0.538		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
bis(2-Chloroethyl)ether	0.838		0.317		U	0.289
Aniline		U	0.361		U	0.444
2-Chlorophenol		U	0.255		U	0.322
1,3-Dichlorobenzene	0.367	J	0.243		U	0.281
1,4-Dichlorobenzene	54.3		0.344	102	D	0.281
p-Isopropyltoluene	158	DU	0.271	249	D	0.308
Benzyl Alcohol	148.3	DU	0.346		U	0.382
2-Methylphenol (m-cresol)		U	0.169		U	0.382
1,2-Dichlorobenzene	1.76		0.243	2.45		0.281
3,4-Methylphenol (o,p-cresol)		U	0.309		U	0.382
bis(2-chloroisopropyl)ether		U	0.310		U	0.242
n-Butylbenzene	9.5		0.310	11.4		0.308
N-nitroso-di-n-propylamine	6.06		0.162		U	0.318
Hexachloroethane		U	0.223		U	0.175
1,2-Dibromo-3-Chloropropane		U	0.223		U	0.175
Nitrobenzene		U	0.261		U	0.336
Isophorone		U	0.242		U	0.299
2-Nitrophenol		U	0.271		U	0.297
2,4-Dimethylphenol		U	0.319		U	0.339
bis(2-Chloroethoxy)methane		U	0.262		U	0.239
1,2,4-Trichlorobenzene	2.57		0.227	1.75		0.228
Naphthalene	154	D	0.262	161	D	0.323
2,4-Dichlorophenol		U	0.290		U	0.254
4-Chloroaniline		U	0.242		U	0.324
Hexachlorobutadiene		U	0.262		U	0.159
1,2,3-Trichlorobenzene	0.560		0.319	0.346	J	0.228
4-Chloro-3-methylphenol		U	0.286		U	0.290
2-Methylnaphthalene	31.2		0.240	15.1		0.291
1-Methylnaphthalene	15.9		0.317	7.35		0.291
Hexachlorocyclopentadiene		U	0.262		U	0.152
2,4,6-Trichlorophenol		U	0.242		U	0.209
2,4,5-Trichlorophenol		U	0.190		U	0.209
Diphenylamine		U	0.190		U	0.244
Azobenzene		U	0.199		U	0.227
2-Chloronaphthalene		U	0.216		U	0.254
2-Nitroaniline		U	0.265		U	0.299
1,4-Dinitrobenzene		U	0.319		U	0.246

Sample ID:	LF2BG01XA			LF2BG03XA		
Matrix:	XDA Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			Duster		
File ID:	D120313.D			D121726.D		
Operator:	ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/18/2008		
Sample Volume (m^3):	0.529			0.538		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Dimethylphthalate		U	0.223		U	0.213
1,3-Dinitrobenzene		U	0.223		U	0.246
Acenaphthylene		U	0.177		U	0.272
2,6-dinitrotoluene		U	0.155		U	0.227
1,2-Dinitrobenzene		U	0.166		U	0.246
3-Nitroaniline		U	0.248		U	0.299
Acenaphthene	4.94		0.248	1.99		0.268
2,4-Dinitrophenol		U	0.264		U	0.225
4-Nitrophenol	1.95		0.159	1.82		0.297
Dibenzofuran	1.97		0.119	0.703		0.246
2,4-dinitrotoluene		U	0.218		U	0.227
2,3,4,6-Tetrachlorophenol		U	0.218		U	0.178
2,3,5,6-Tetrachlorophenol		U	0.141		U	0.178
Diethylphthalate	0.390	JB	0.193		U	0.186
4-Chlorophenyl-phenylether		U	0.193		U	0.202
Fluorene	1.70		0.113	0.508		0.249
4-Nitroaniline		U	0.113		U	0.299
4,6-Dinitro-2-methylphenol		U	0.175		U	0.209
n-Nitrosodiphenylamine		U	0.175		U	0.209
4-Bromophenyl phenyl ether		U	0.175		U	0.166
Hexachlorobenzene		U	0.160		U	0.145
Pentachlorophenol		U	0.159		U	0.155
Phenanthrene	0.869		0.160		U	0.232
Anthracene		U	0.248		U	0.232
Carbazole		U	0.264		U	0.247
Di-n-butylphthalate	0.923	B	0.159		BU	0.149
Bis(2-ethylhexyl) adipate		U	0.119		U	0.112
Fluoranthene		U	0.218		U	0.205
Pyrene		U	0.218		U	0.205
Butylbenzylphthalate		U	0.141		U	0.132
Benz[a]anthracene		U	0.193		U	0.181
Chrysene		U	0.193		U	0.181
bis(2-Ethylhexyl)phthalate		BU	0.113		U	0.106
Di-n-octylphthalate		U	0.113		U	0.106
Benzo[b]fluoranthene		U	0.175		U	0.164
Benzo[k]fluoranthene		U	0.175		U	0.164
Benzo[a]pyrene		U	0.175		U	0.164
Indeno[1,2,3-cd]pyrene		U	0.160		U	0.150
Dibenz[a,h]anthracene		U	0.159		U	0.149
Benzo[g,h,i]perylene		U	0.160		U	0.150

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF2BG01XA**			**LF2BG03XA**		
Matrix:	XDA Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			Duster		
File ID:	D120313.D			D121726.D		
Operator:	ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/18/2008		
Sample Volume (m^3):	0.529			0.538		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Extraction Surrogate Recoveries (%)						
Toluene-d8	67			71		
4-Bromofluorobenzene	86			82		
2-Fluorophenol	91			77		
Phenol-d5	83			57		
Nitrobenzene-d5	96			75		
2-Fluorobiphenyl	90			87		
2,4,6-Tribromophenol	79			96		
p-Terphenyl-d14	91			88		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF2BG04XA			LF2BL01XA			QC081105-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster			Duster		
File ID:	D121727.D			D121728.D			D120304.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008			NA		
Date Received:	11/26/2008			11/26/2008			NA		
Date Prepared:	12/4/2008			12/4/2008			11/5/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			12/18/2008			12/3/2008		
Sample Volume (m^3):	0.516			0.539			1.00		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:									
1,1,1-Trichloroethane		U	0.331		U	0.315		U	0.186
1,2-Dichloroethane		U	0.446		U	0.424		U	0.250
1,1-Dichloropropene		U	0.397		U	0.378		U	0.223
Benzene	1.117	JB	0.565	0.555	JB	0.538	0.114	J	0.317
Carbon Tetrachloride	0.293	J	0.287		U	0.273	0.112		0.161
1,2-Dichloropropane		U	0.390		U	0.372		U	0.219
Trichloroethene		U	0.336		U	0.320		U	0.189
Dibromomethane		U	0.254		U	0.242		U	0.143
Bromodichloromethane		U	0.269		U	0.256		U	0.151
Pyridine		U	0.557		U	0.531		U	0.313
cis-1,3-Dichloropropene		U	0.397		U	0.378		U	0.223
N-nitrosodimethylamine		U	0.595		U	0.567		U	0.335
Toluene	46.6		0.479		U	0.456		U	0.269
trans-1,3-Dichloropropene	0.543	J	0.397		U	0.378		U	0.223
1,1,2-Trichloroethane		U	0.331		U	0.315		U	0.186
1,3-Dichloropropane		U	0.390		U	0.372		U	0.219
Dibromochloromethane		U	0.212		U	0.202			
1,2-Dibromoethane		U	0.235		U	0.224		U	0.132
Tetrachloroethene	0.722		0.266		U	0.253		U	0.149
Chlorobenzene	1.83		0.392		U	0.373		U	0.220
1,1,1,2-Tetrachloroethane		U	0.263		U	0.250		U	0.148
Ethylbenzene		U	0.415		U	0.395		U	0.233
m/p-Xylenes		U	0.415		U	0.395		U	0.233
Bromoform		U	0.174		U	0.166		U	0.098
Styrene	9.56		0.423		U	0.403		U	0.238
o-Xylene		U	0.415		U	0.395		U	0.233
1,1,2,2-Tetrachloroethane		U	0.263		U	0.250		U	0.148
1,2,3-Trichloropropane		U	0.299		U	0.285		U	0.168
Isopropylbenzene	21.6		0.367		U	0.349		U	0.206
Bromobenzene		U	0.281		U	0.267		U	0.158
2-Chlorotoluene	2.94		0.348		U	0.332		U	0.196
n-Propylbenzene	24.8		0.367		U	0.349		U	0.206
4-Chlorotoluene		U	0.348		U	0.332		U	0.196
1,3,5-Trimethylbenzene	124	D	0.367		U	0.349		U	0.206
tert-Butylbenzene		U	0.329		U	0.313		U	0.185
1,2,4-Trimethylbenzene	323	D	0.367		U	0.349		U	0.206
sec-Butylbenzene	15.9		0.329		U	0.313		U	0.185
Phenol		U	0.469		U	0.446		U	0.263

Sample ID:	LF2BG04XA			LF2BL01XA			QC081105-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster			Duster		
File ID:	D121727.D			D121728.D			D120304.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008			NA		
Date Received:	11/26/2008			11/26/2008			NA		
Date Prepared:	12/4/2008			12/4/2008			11/5/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			12/18/2008			12/3/2008		
Sample Volume (m^3):	0.516			0.539			1.00		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
bis(2-Chloroethyl)ether		U	0.308		U	0.294		U	0.173
Aniline		U	0.473		U	0.451		U	0.266
2-Chlorophenol		U	0.343		U	0.327		U	0.193
1,3-Dichlorobenzene	0.370	J	0.300		U	0.286		U	0.169
1,4-Dichlorobenzene	125	D	0.300		U	0.286		U	0.169
p-Isopropyltoluene	318	D	0.329		U	0.313		U	0.185
Benzyl Alcohol		U	0.408		U	0.388		U	0.229
2-Methylphenol (m-cresol)		U	0.408		U	0.388		U	0.229
1,2-Dichlorobenzene	2.88		0.300		U	0.286		U	0.169
3,4-Methylphenol (o,p-cresol)		U	0.408		U	0.388		U	0.229
bis(2-chloroisopropyl)ether		U	0.258		U	0.245		U	0.145
n-Butylbenzene	15.3		0.329		U	0.313		U	0.185
N-nitroso-di-n-propylamine		U	0.339		U	0.323		U	0.190
Hexachloroethane		U	0.186		U	0.177		U	0.105
1,2-Dibromo-3-Chloropropane		U	0.187		U	0.178		U	0.105
Nitrobenzene		U	0.358		U	0.341		U	0.201
Isophorone		U	0.319		U	0.304		U	0.179
2-Nitrophenol		U	0.317		U	0.302		U	0.178
2,4-Dimethylphenol	1.27		0.361		U	0.344		U	0.203
bis(2-Chloroethoxy)methane		U	0.255		U	0.243		U	0.143
1,2,4-Trichlorobenzene	1.64		0.243		U	0.231		U	0.137
Naphthalene	139	D	0.344		U	0.328		U	0.193
2,4-Dichlorophenol		U	0.271		U	0.258		U	0.152
4-Chloroaniline		U	0.346		U	0.329		U	0.194
Hexachlorobutadiene		U	0.169		U	0.161		U	####
1,2,3-Trichlorobenzene	0.326	J	0.243		U	0.231		U	0.137
4-Chloro-3-methylphenol		U	0.309		U	0.294		U	0.174
2-Methylnaphthalene	10.5		0.310		U	0.295		U	0.174
1-Methylnaphthalene	5.595		0.310		U	0.295		U	0.174
Hexachlorocyclopentadiene		U	0.162		U	0.154		U	####
2,4,6-Trichlorophenol		U	0.223		U	0.213		U	0.126
2,4,5-Trichlorophenol		U	0.223		U	0.213		U	0.126
Diphenylamine		U	0.261		U	0.248		U	0.146
Azobenzene		U	0.242		U	0.230		U	0.136
2-Chloronaphthalene		U	0.271		U	0.258		U	0.152
2-Nitroaniline		U	0.319		U	0.304		U	0.179
1,4-Dinitrobenzene		U	0.262		U	0.250		U	0.147

Sample ID:	LF2BG04XA			LF2BL01XA			QC081105-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster			Duster		
File ID:	D121727.D			D121728.D			D120304.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008			NA		
Date Received:	11/26/2008			11/26/2008			NA		
Date Prepared:	12/4/2008			12/4/2008			11/5/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			12/18/2008			12/3/2008		
Sample Volume (m^3):	0.516			0.539			1.00		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Dimethylphthalate		U	0.227		U	0.216		U	0.128
1,3-Dinitrobenzene		U	0.262		U	0.250		U	0.147
Acenaphthylene		U	0.290		U	0.276		U	0.163
2,6-dinitrotoluene		U	0.242		U	0.231		U	0.136
1,2-Dinitrobenzene		U	0.262		U	0.250		U	0.147
3-Nitroaniline		U	0.319		U	0.304		U	0.179
Acenaphthene	1.16		0.286		U	0.272		U	0.161
2,4-Dinitrophenol		U	0.240		U	0.228		U	0.135
4-Nitrophenol	1.93		0.317		U	0.302		U	0.178
Dibenzofuran	0.458	J	0.262		U	0.250		U	0.147
2,4-dinitrotoluene		U	0.242		U	0.231		U	0.136
2,3,4,6-Tetrachlorophenol		U	0.190		U	0.181		U	0.107
2,3,5,6-Tetrachlorophenol		U	0.190		U	0.181		U	0.107
Diethylphthalate		U	0.198		U	0.189		U	0.112
4-Chlorophenyl-phenylether		U	0.215		U	0.205		U	0.121
Fluorene		U	0.265		U	0.253		U	0.149
4-Nitroaniline		U	0.319		U	0.304		U	0.179
4,6-Dinitro-2-methylphenol		U	0.223		U	0.212		U	0.125
n-Nitrosodiphenylamine		U	0.222		U	0.212		U	0.125
4-Bromophenyl phenyl ether		U	0.177		U	0.169		U	####
Hexachlorobenzene		U	0.155		U	0.147		U	####
Pentachlorophenol		U	0.166		U	0.158		U	####
Phenanthrene		U	0.247		U	0.236		U	0.139
Anthracene		U	0.247		U	0.236		U	0.139
Carbazole		U	0.264		U	0.251		U	0.148
Di-n-butylphthalate	0.572	B	0.158	0.535	B	0.151		U	####
Bis(2-ethylhexyl) adipate		U	0.119		U	0.113		U	####
Fluoranthene		U	0.218		U	0.208		U	0.123
Pyrene		U	0.218		U	0.208		U	0.123
Butylbenzylphthalate		U	0.141		U	0.134		U	####
Benz[a]anthracene		U	0.193		U	0.184		U	0.109
Chrysene		U	0.193		U	0.184		U	0.109
bis(2-Ethylhexyl)phthalate		U	0.113		U	0.108		U	####
Di-n-octylphthalate		U	0.113		U	0.108		U	####
Benzo[b]fluoranthene		U	0.175		U	0.166		U	####
Benzo[k]fluoranthene		U	0.175		U	0.166		U	####
Benzo[a]pyrene		U	0.175		U	0.166		U	####
Indeno[1,2,3-cd]pyrene		U	0.160		U	0.152		U	####
Dibenz[a,h]anthracene		U	0.158		U	0.151		U	####
Benzo[g,h,i]perylene		U	0.160		U	0.152		U	####

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF2BG04XA			LF2BL01XA			QC081105-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster			Duster		
File ID:	D121727.D			D121728.D			D120304.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008			NA		
Date Received:	11/26/2008			11/26/2008			NA		
Date Prepared:	12/4/2008			12/4/2008			11/5/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			12/18/2008			12/3/2008		
Sample Volume (m^3):	0.516			0.539			1.00		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Extraction Surrogate Recoveries (%)									
Toluene-d8	65			50			73		
4-Bromofluorobenzene	90			76			81		
2-Fluorophenol	66			71			86		
Phenol-d5	57			81			98		
Nitrobenzene-d5	81			70			77		
2-Fluorobiphenyl	85			83			86		
2,4,6-Tribromophenol	91			82			79		
p-Terphenyl-d14	89			82			85		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	QC081106-MB			QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes				XAD Tubes		
Preservation:	None			None				None		
Decanted:	None			None				None		
Batch QC:	QC081106-MB			QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540				EPA 3540		
Cleanup Method(s):	NA			NA				NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m				EPA 8260/8270m		
Instrument:	Duster			AMX				Duster		
File ID:	D120305.D			D120306.D				D121704.D		
Operator:	ERL			ERL				ERL		
Date Sampled:	NA			NA				NA		
Date Received:	NA			NA				NA		
Date Prepared:	11/6/2008			11/6/2008				12/4/2008		
Date Cleanup:	NA			NA				NA		
Date Analyzed:	12/3/2008			12/3/2008				12/17/2008		
Sample Volume (m^3):	1.000			1.00				0.45		
Percent Solid:	NA			NA				NA		
Prep DF:	1.00			1.00				1.00		
Analysis DF:	1.00			1.00				1.00		
Injection Volume (µl):	1.00			1.00				1.00		
Extract Volume (µl):	2000			2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recover	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:										
1,1,1-Trichloroethane		U	0.168	2.60		0.336	16		U	0.371
1,2-Dichloroethane		U	0.226	6.41		0.453	28		U	0.500
1,1-Dichloropropene		U	0.202	2.81		0.404	14		U	0.446
Benzene	0.390	J	0.287	10.9	B	0.574	38	0.814	J	0.634
Carbon Tetrachloride	0.230	J	0.146	1.79	B	0.291	12		U	0.322
1,2-Dichloropropane		U	0.198	8.41		0.397	42		U	0.438
Trichloroethene		U	0.170	5.46		0.341	32		U	0.377
Dibromomethane		U	0.129	5.40		0.258	42		U	0.285
Bromodichloromethane		U	0.283	10.2		0.566	36		U	0.302
Pyridine		U	0.202	9.89		0.404	49		U	0.626
cis-1,3-Dichloropropene		U	0.302	12.9		0.605	43		U	0.446
N-nitrosodimethylamine		U	0.243	12.8		0.486	53		U	0.668
Toluene		U	0.202	12.4		0.404	61		U	0.537
trans-1,3-Dichloropropene		U	0.168	8.63		0.336	51		U	0.446
1,1,2-Trichloroethane		U	0.198	11.4		0.397	57		U	0.371
1,3-Dichloropropane		U	0.108	5.83		0.215	54		U	0.438
Dibromochloromethane		NA	NA		NA				U	0.238
1,2-Dibromoethane		U	0.119	6.88		0.238	58		U	0.264
Tetrachloroethene		U	0.135	7.63		0.270	57		U	0.299
Chlorobenzene		U	0.199	12.6		0.398	63		U	0.440
1,1,1,2-Tetrachloroethane		U	0.133	7.53		0.267	56		U	0.295
Ethylbenzene		U	0.211	13.1		0.422	62		U	0.466
m/p-Xylenes		U	0.211	14.3		0.422	68		U	0.466
Bromoform		U	0.089	5.42		0.177	61		U	0.196
Styrene		U	0.215	13.4		0.430	62		U	0.475
o-Xylene		U	0.211						U	0.466
1,1,2,2-Tetrachloroethane		U	0.133	7.99		0.267	60		U	0.295
1,2,3-Trichloropropane		U	0.152	8.89		0.304	59		U	0.336
Isopropylbenzene		U	0.186	12.6		0.373	68		U	0.412
Bromobenzene		U	0.143	8.73		0.285	61		U	0.315
2-Chlorotoluene		U	0.177	11.8		0.354	67		U	0.391
n-Propylbenzene		U	0.186	12.7		0.373	68		U	0.412
4-Chlorotoluene		U	0.177	12.1		0.354	68		U	0.391
1,3,5-Trimethylbenzene		U	0.186	12.6		0.373	68		U	0.412
tert-Butylbenzene		U	0.167	11.7		0.334	70		U	0.369
1,2,4-Trimethylbenzene		U	0.186	13.0		0.373	70		U	0.412
sec-Butylbenzene		U	0.167	11.8		0.334	71		U	0.369
Phenol		U	0.238	14.8		0.476	62		U	0.526

Sample ID:	QC081106-MB			QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes				XAD Tubes		
Preservation:	None			None				None		
Decanted:	None			None				None		
Batch QC:	QC081106-MB			QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540				EPA 3540		
Cleanup Method(s):	NA			NA				NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m				EPA 8260/8270m		
Instrument:	Duster			AMX				Duster		
File ID:	D120305.D			D120306.D				D121704.D		
Operator:	ERL			ERL				ERL		
Date Sampled:	NA			NA				NA		
Date Received:	NA			NA				NA		
Date Prepared:	11/6/2008			11/6/2008				12/4/2008		
Date Cleanup:	NA			NA				NA		
Date Analyzed:	12/3/2008			12/3/2008				12/17/2008		
Sample Volume (m^3):	1.000			1.00				0.45		
Percent Solid:	NA			NA				NA		
Prep DF:	1.00			1.00				1.00		
Analysis DF:	1.00			1.00				1.00		
Injection Volume (µl):	1.00			1.00				1.00		
Extract Volume (µl):	2000			2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recover	Concentration (ppbv)	Q	EDL
bis(2-Chloroethyl)ether		U	0.157	9.48		0.313	61		U	0.346
Aniline		U	0.241	13.4		0.481	56		U	0.532
2-Chlorophenol		U	0.174	11.0		0.348	63		U	0.385
1,3-Dichlorobenzene		U	0.152	21.9		0.305	72		U	0.337
1,4-Dichlorobenzene		U	0.152	21.9		0.305	72		U	0.337
p-Isopropyltoluene		U	0.167	11.6		0.334	70		U	0.369
Benzyl Alcohol		U	0.207	12.1		0.414	58		U	0.458
2-Methylphenol (m-cresol)		U	0.207	13.0		0.414	63		U	0.458
1,2-Dichlorobenzene		U	0.152	22.4		0.305	74		U	0.337
3,4-Methylphenol (o,p-cresol)		U	0.207	14.7		0.414	71		U	0.458
bis(2-chloroisopropyl)ether		U	0.131	8.45		0.262	65		U	0.289
n-Butylbenzene		U	0.167	11.0		0.334	66		U	0.369
N-nitroso-di-n-propylamine		U	0.172	12.0		0.344	70		U	0.380
Hexachloroethane		U	0.095	6.27		0.189	66		U	0.209
1,2-Dibromo-3-Chloropropane		U	0.095	6.08		0.190	64		U	0.209
Nitrobenzene		U	0.182	11.2		0.364	62		U	0.402
Isophorone		U	0.162	9.40		0.324	58		U	0.358
2-Nitrophenol		U	0.161	10.2		0.322	64		U	0.356
2,4-Dimethylphenol		U	0.183	6.27		0.367	34		U	0.405
bis(2-Chloroethoxy)methane		U	0.129	8.59		0.259	66		U	0.286
1,2,4-Trichlorobenzene		U	0.123	17.9		0.247	73		U	0.273
Naphthalene		U	0.175	26.7		0.350	77		U	0.386
2,4-Dichlorophenol		U	0.137	9.10		0.275	66		U	0.304
4-Chloroaniline		U	0.176	10.4		0.351	60		U	0.388
Hexachlorobutadiene		U	0.086	12.2		0.172	71		U	0.190
1,2,3-Trichlorobenzene		U	0.123	8.79		0.247	71		U	0.273
4-Chloro-3-methylphenol		U	0.157	9.77		0.314	62		U	0.347
2-Methylnaphthalene		U	0.158	11.2		0.315	71		U	0.348
1-Methylnaphthalene		U	0.158	11.1		0.315	71		U	0.348
Hexachlorocyclopentadiene		U	0.082	2.56		0.164	31		U	0.181
2,4,6-Trichlorophenol		U	0.113	7.11		0.227	63		U	0.251
2,4,5-Trichlorophenol		U	0.113	7.39		0.227	65		U	0.251
Diphenylamine		U	0.132	8.55		0.265	65		U	0.293
Azobenzene		U	0.123	7.35		0.246	60		U	0.272
2-Chloronaphthalene		U	0.138	8.89		0.276	65		U	0.304
2-Nitroaniline		U	0.162	8.43		0.324	52		U	0.358
1,4-Dinitrobenzene		U	0.133	7.60		0.267	57		U	0.294

Sample ID:	QC081106-MB			QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes				XAD Tubes		
Preservation:	None			None				None		
Decanted:	None			None				None		
Batch QC:	QC081106-MB			QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540				EPA 3540		
Cleanup Method(s):	NA			NA				NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m				EPA 8260/8270m		
Instrument:	Duster			AMX				Duster		
File ID:	D120305.D			D120306.D				D121704.D		
Operator:	ERL			ERL				ERL		
Date Sampled:	NA			NA				NA		
Date Received:	NA			NA				NA		
Date Prepared:	11/6/2008			11/6/2008				12/4/2008		
Date Cleanup:	NA			NA				NA		
Date Analyzed:	12/3/2008			12/3/2008				12/17/2008		
Sample Volume (m^3):	1.000			1.00				0.45		
Percent Solid:	NA			NA				NA		
Prep DF:	1.00			1.00				1.00		
Analysis DF:	1.00			1.00				1.00		
Injection Volume (µl):	1.00			1.00				1.00		
Extract Volume (µl):	2000			2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recover	Concentration (ppbv)	Q	EDL
Dimethylphthalate		U	0.115	7.97		0.231	69		U	0.255
1,3-Dinitrobenzene		U	0.133	8.04		0.267	60		U	0.294
Acenaphthylene		U	0.147	10.1		0.294	69		U	0.325
2,6-dinitrotoluene		U	0.123	7.72		0.246	63		U	0.272
1,2-Dinitrobenzene		U	0.133	7.69		0.267	58		U	0.294
3-Nitroaniline		U	0.162	8.03		0.324	50		U	0.358
Acenaphthene		U	0.145	9.59		0.291	66		U	0.321
2,4-Dinitrophenol		U	0.122	6.77		0.243	56		U	0.269
4-Nitrophenol		U	0.161	8.66		0.322	54		U	0.356
Dibenzofuran		U	0.133	8.75		0.266	66		U	0.294
2,4-dinitrotoluene		U	0.123	7.13		0.246	58		U	0.272
2,3,4,6-Tetrachlorophenol		U	0.097	5.93		0.193	61		U	0.213
2,3,5,6-Tetrachlorophenol		U	0.097	6.18		0.193	64		U	0.213
Diethylphthalate	0.128	J	0.101	7.04	B	0.202	70		U	0.223
4-Chlorophenyl-phenylether		U	0.109	7.64		0.219	70		U	0.242
Fluorene		U	0.135	8.95		0.270	66		U	0.298
4-Nitroaniline		U	0.162	7.10		0.324	44		U	0.358
4,6-Dinitro-2-methylphenol		U	0.113	6.06		0.226	54		U	0.250
n-Nitrosodiphenylamine		U	0.113	7.49		0.226	66		U	0.250
4-Bromophenyl phenyl ether		U	0.090	5.94		0.180	66		U	0.199
Hexachlorobenzene		U	0.079	5.09		0.157	65		U	0.174
Pentachlorophenol		U	0.084	4.47		0.168	53		U	0.186
Phenanthrene		U	0.126	8.58		0.251	68		U	0.278
Anthracene		U	0.126	8.62		0.251	69		U	0.278
Carbazole		U	0.134	8.53		0.268	64		U	0.296
Di-n-butylphthalate	0.340		0.080	6.37	B	0.161	79	0.555		0.178
Bis(2-ethylhexyl) adipate		U	0.060	4.35		0.121	72		U	0.134
Fluoranthene		U	0.111	7.57		0.222	68		U	0.245
Pyrene		U	0.111	7.79		0.222	70		U	0.245
Butylbenzylphthalate		U	0.072	4.75		0.143	66		U	0.158
Benz[a]anthracene		U	0.098	6.81		0.196	69		U	0.217
Chrysene		U	0.098	6.85		0.196	70		U	0.217
bis(2-Ethylhexyl)phthalate	0.0597	J	0.057	3.96	B	0.115	69		U	0.127
Di-n-octylphthalate		U	0.057	3.85		0.115	67		U	0.127
Benzo[b]fluoranthene		U	0.089	6.00		0.178	68		U	0.196
Benzo[k]fluoranthene		U	0.089	6.25		0.178	70		U	0.196
Benzo[a]pyrene		U	0.089	5.82		0.178	66		U	0.196
Indeno[1,2,3-cd]pyrene		U	0.081	5.10		0.162	63		U	0.179
Dibenz[a,h]anthracene		U	0.080	5.23		0.161	65		U	0.178
Benzo[g,h,i]perylene		U	0.081	5.29		0.162	65		U	0.179

VOC and SVOC Compounds
EPA 8270M

Sample ID:	QC081106-MB			QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes				XAD Tubes		
Preservation:	None			None				None		
Decanted:	None			None				None		
Batch QC:	QC081106-MB			QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540				EPA 3540		
Cleanup Method(s):	NA			NA				NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m				EPA 8260/8270m		
Instrument:	Duster			AMX				Duster		
File ID:	D120305.D			D120306.D				D121704.D		
Operator:	ERL			ERL				ERL		
Date Sampled:	NA			NA				NA		
Date Received:	NA			NA				NA		
Date Prepared:	11/6/2008			11/6/2008				12/4/2008		
Date Cleanup:	NA			NA				NA		
Date Analyzed:	12/3/2008			12/3/2008				12/17/2008		
Sample Volume (m^3):	1.000			1.00				0.45		
Percent Solid:	NA			NA				NA		
Prep DF:	1.00			1.00				1.00		
Analysis DF:	1.00			1.00				1.00		
Injection Volume (µl):	1.00			1.00				1.00		
Extract Volume (µl):	2000			2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recover	Concentration (ppbv)	Q	EDL
Extraction Surrogate Recoveries (%)										
Toluene-d8	43			66				64		
4-Bromofluorobenzene	49			70				75		
2-Fluorophenol	55			69				79		
Phenol-d5	61			80				96		
Nitrobenzene-d5	49			68				78		
2-Fluorobiphenyl	56			73				87		
2,4,6-Tribromophenol	48			68				86		
p-Terphenyl-d14	46			61				78		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

LF2
VOC & SVOC
Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard I	Range	Minimum	Maximum	Count
Benzene	2.24	1.03	2.67	5.55	0.686	6.24	4
Carbon Tetrachloride	0.796	0.796	0.00709	0.0100	0.791	0.801	2
1,2-Dichloropropane	0.514	0.514	N/A	0.00	0.514	0.514	1
Trichloroethene	0.602	0.602	N/A	0.00	0.602	0.602	1
Toluene	1.74	1.09	1.67	3.15	0.488	3.64	3
Ethylbenzene	1.15	1.15	N/A	0.00	1.15	1.15	1
m/p-Xylenes	1.42	1.42	N/A	0.00	1.42	1.42	1
o-Xylene	1.19	1.19	N/A	0.00	1.19	1.19	1
Isopropylbenzene	0.412	0.412	N/A	0.00	0.412	0.412	1
n-Propylbenzene	0.49	0.49	N/A	0.00	0.49	0.49	1
1,3,5-Trimethylbenzene	1.31	1.31	N/A	0.00	1.31	1.31	1
1,2,4-Trimethylbenzene	2.62	2.62	2.36	3.34	0.954	4.29	2
sec-Butylbenzene	0.47	0.47	N/A	0.00	0.47	0.5	1
1,4-Dichlorobenzene	1.19	1.19	1.11	1.6	0.41	2.0	2
p-Isopropyltoluene	13.6	13.6	9.78	14	6.66	20.5	2
n-Butylbenzene	0.45	0.45	N/A	0.00	0.45	0.45	1
Naphthalene	5.35	5.35	2.34	3.31	3.69	7.00	2
2-Methylnaphthalene	0.775	0.775	0.19	0.271	0.640	0.911	2
1-Methylnaphthalene	0.408	0.408	N/A	0.00	0.408	0.408	1
Diethylphthalate	0.500	0.500	N/A	0.000	0.500	0.500	1
Di-n-butylphthalate	0.729	0.589	0.339	0.633	0.483	1.12	3

LF2
VOC & SVOC
Descriptive Statistics

Biogas

Analyte	Mean	Median	Standard I	Range	Minimum	Maximum	Count
Benzene	1.05	1.07	0.0827	0.161	0.96	1.12	3
Carbon Tetrachloride	0.435	0.293	0.253	0.441	0.286	0.73	3
Toluene	32.7	31.4	13.3	26.4	20.2	46.6	3
trans-1,3-Dichloropropene	0.467	0.467	0.108	0.152	0.391	0.543	2
Tetrachloroethene	0.540	0.494	0.164	0.318	0.404	0.722	3
Chlorobenzene	1.35	1.33	0.473	0.946	0.882	1.83	3
Ethylbenzene	78.0	78.0	25.7	36.3	59.8	96.1	2
m/p-Xylenes	71.7	71.7	N/A	0.0	71.7	71.7	1
Styrene	7.48	7.77	2.24	4.45	5.11	9.56	3
o-Xylene	67.6	67.6	22.6	31.9	51.7	83.6	2
1,1,2,2-Tetrachloroethane	0.313	0.313	N/A	0.0	0.313	0.313	1
Isopropylbenzene	15.7	15.1	5.54	11.0	10.5	21.6	3
2-Chlorotoluene	2.52	2.34	0.37	0.66	2.28	2.94	3
n-Propylbenzene	20.2	19.6	4.3	8.5	16.3	25	3
1,3,5-Trimethylbenzene	81.1	72.5	39.1	76.9	47.0	123.9	3
tert-Butylbenzene	12.9	12.9	N/A	0.00	12.9	12.9	1
1,2,4-Trimethylbenzene	238	248	90.2	180	144	323	3
sec-Butylbenzene	12.1	12.1	3.78	7.55	8.30	15.85	3
bis(2-Chloroethyl)ether	0.838	0.838	N/A	0.00	0.838	0.838	1
1,3-Dichlorobenzene	0.368	0.368	0.00187	0.00265	0.367	0.370	2
1,4-Dichlorobenzene	93.9	102	36.2	70.9	54.3	125	3
p-Isopropyltoluene	242	249	80.3	160	158	318	3
Benzyl Alcohol	148	148	N/A	0.00	148	148	1
1,2-Dichlorobenzene	2.36	2.45	0.562	1.11	1.76	2.88	3
n-Butylbenzene	12.1	11.4	2.93	5.76	9.52	15.3	3
N-nitroso-di-n-propylamine	6.06	6.06	N/A	0.00	6.06	6.06	1
2,4-Dimethylphenol	1.27	1.27	N/A	0.00	1.27	1.27	1
1,2,4-Trichlorobenzene	1.99	1.75	0.509	0.933	1.64	2.57	3
Naphthalene	151	154	11.3	22.0	139	161	3
1,2,3-Trichlorobenzene	0.410	0.346	0.130	0.234	0.326	0.560	3
2-Methylnaphthalene	18.9	15.1	10.9	20.7	10.5	31.2	3
1-Methylnaphthalene	9.60	7.35	5.49	10.3	5.59	15.9	3
Acenaphthene	2.70	1.99	1.98	3.774	1.16	4.94	3
4-Nitrophenol	1.90	1.928	0.0672	0.125	1.82	1.95	3
Dibenzofuran	1.04	0.703	0.812	1.51	0.458	1.97	3
Diethylphthalate	0.390	0.390	N/A	0.00	0.390	0.390	1
Fluorene	1.10	1.10	0.842	1.19	0.508	1.70	2
Phenanthrene	0.869	0.869	N/A	0.00	0.869	0.869	1
Di-n-butylphthalate	0.747	0.747	0.248	0.351	0.572	0.923	2

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120317.D			D120318.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.246		U	0.346
1,2-Dichloroethane		U	0.279		U	0.466
1,1-Dichloropropene		U	0.411		U	0.416
Benzene	12.29	B	0.275	14.300	B	0.591
Carbon Tetrachloride	0.535	JB	0.435	0.642	B	0.300
1,2-Dichloropropane	0.76	J	0.435	0.792	J	0.408
Trichloroethene	1.26		0.183	1.479		0.351
Dibromomethane		U	0.444		U	0.265
Bromodichloromethane		U	0.435		U	0.583
Pyridine		U	0.275		U	0.416
cis-1,3-Dichloropropene		U	0.314		U	0.623
N-nitrosodimethylamine		U	0.385		U	0.501
Toluene		U	0.294	0.509	J	0.416
trans-1,3-Dichloropropene		U	0.365		U	0.346
1,1,2-Trichloroethane		U	0.385		U	0.408
1,3-Dichloropropane		U	0.365		U	0.221
Dibromochloromethane		NA	NA		NA	NA
1,2-Dibromoethane		U	0.344		U	0.246
Tetrachloroethene		U	0.385		U	0.278
Chlorobenzene		U	0.344		U	0.410
1,1,1,2-Tetrachloroethane		U	0.491		U	0.275
Ethylbenzene		U	0.323		U	0.435
m/p-Xylenes		U	0.496		U	0.435
Bromoform		U	0.360		U	0.183
Styrene		U	0.314		U	0.443
o-Xylene		U	0.314		U	0.435
1,1,2,2-Tetrachloroethane		U	0.344		U	0.275
1,2,3-Trichloropropane		U	0.427		U	0.313
Isopropylbenzene		U	0.427		U	0.384
Bromobenzene		U	0.314		U	0.294
2-Chlorotoluene		U	0.427		U	0.364
n-Propylbenzene		U	0.270		U	0.384
4-Chlorotoluene		U	0.344		U	0.364
1,3,5-Trimethylbenzene		U	0.355		U	0.384

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120317.D			D120318.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.195		U	0.344
1,2,4-Trimethylbenzene		U	0.196		U	0.384
sec-Butylbenzene		U	0.375		U	0.344
Phenol		U	0.334		U	0.490
bis(2-Chloroethyl)ether		U	0.332		U	0.323
Aniline		U	0.378		U	0.495
2-Chlorophenol		U	0.267		U	0.359
1,3-Dichlorobenzene		U	0.255		U	0.314
1,4-Dichlorobenzene		U	0.361		U	0.314
p-Isopropyltoluene		U	0.284	0.447	J	0.344
Benzyl Alcohol		U	0.362		U	0.427
2-Methylphenol (m-cresol)		U	0.177		U	0.427
1,2-Dichlorobenzene		U	0.255		U	0.314
3,4-Methylphenol (o,p-cresol)		U	0.324		U	0.427
bis(2-chloroisopropyl)ether		U	0.325		U	0.270
n-Butylbenzene		U	0.325		U	0.344
N-nitroso-di-n-propylamine		U	0.169		U	0.354
Hexachloroethane		U	0.234		U	0.195
1,2-Dibromo-3-Chloropropane		U	0.234		U	0.195
Nitrobenzene		U	0.273		U	0.375
Isophorone		U	0.254		U	0.334
2-Nitrophenol		U	0.284		U	0.332
2,4-Dimethylphenol		U	0.335		U	0.378
bis(2-Chloroethoxy)methane		U	0.275		U	0.267
1,2,4-Trichlorobenzene		U	0.238		U	0.254
Naphthalene		U	0.275		U	0.360
2,4-Dichlorophenol		U	0.304		U	0.283
4-Chloroaniline		U	0.254		U	0.362
Hexachlorobutadiene		U	0.275		U	0.177
1,2,3-Trichlorobenzene		U	0.335		U	0.254
4-Chloro-3-methylphenol		U	0.300		U	0.324
2-Methylnaphthalene		U	0.251		U	0.324
1-Methylnaphthalene		U	0.332		U	0.324
Hexachlorocyclopentadiene		U	0.275		U	0.169
2,4,6-Trichlorophenol		U	0.254		U	0.234
2,4,5-Trichlorophenol		U	0.199		U	0.234

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120317.D			D120318.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.199		U	0.273
Azobenzene		U	0.208		U	0.253
2-Chloronaphthalene		U	0.226		U	0.284
2-Nitroaniline		U	0.278		U	0.334
1,4-Dinitrobenzene		U	0.335		U	0.274
Dimethylphthalate		U	0.233		U	0.238
1,3-Dinitrobenzene		U	0.233		U	0.274
Acenaphthylene		U	0.186		U	0.303
2,6-dinitrotoluene		U	0.162		U	0.253
1,2-Dinitrobenzene		U	0.174		U	0.274
3-Nitroaniline		U	0.259		U	0.334
Acenaphthene		U	0.259		U	0.299
2,4-Dinitrophenol		U	0.276		U	0.251
4-Nitrophenol		U	0.166		U	0.332
Dibenzofuran		U	0.125		U	0.274

Sample ID:	LF3BM01XA			LF3BM02XA		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120317.D			D120318.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.229		U	0.253
2,3,4,6-Tetrachlorophenol		U	0.229		U	0.199
2,3,5,6-Tetrachlorophenol		U	0.148		U	0.199
Diethylphthalate	0.546	B	0.202		BU	0.208
4-Chlorophenyl-phenylether		U	0.202		U	0.225
Fluorene		U	0.118		U	0.278
4-Nitroaniline		U	0.118		U	0.334
4,6-Dinitro-2-methylphenol		U	0.183		U	0.233
n-Nitrosodiphenylamine		U	0.183		U	0.233
4-Bromophenyl phenyl ether		U	0.183		U	0.185
Hexachlorobenzene		U	0.167		U	0.162
Pentachlorophenol		U	0.166		U	0.173
Phenanthrene		U	0.167		U	0.259
Anthracene		U	0.259		U	0.259
Carbazole		U	0.276		U	0.276
Di-n-butylphthalate	1.81	B	0.166	0.374	B	0.166
Bis(2-ethylhexyl) adipate		U	0.125		U	0.124
Fluoranthene		U	0.229		U	0.228
Pyrene		U	0.229		U	0.228
Butylbenzylphthalate		U	0.148		U	0.148
Benz[a]anthracene		U	0.202		U	0.202
Chrysene		U	0.202		U	0.202
bis(2-Ethylhexyl)phthalate		BU	0.118		BU	0.118
Di-n-octylphthalate		U	0.118		U	0.118
Benzo[b]fluoranthene		U	0.183		U	0.183
Benzo[k]fluoranthene		U	0.183		U	0.183
Benzo[a]pyrene		U	0.183		U	0.183
Indeno[1,2,3-cd]pyrene		U	0.167		U	0.167
Dibenz[a,h]anthracene		U	0.166		U	0.166
Benzo[g,h,i]perylene		U	0.167		U	0.167

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120317.D			D120318.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	78	68
4-Bromofluorobenzene	91	94
2-Fluorophenol	87	95
Phenol-d5	103	113
Nitrobenzene-d5	86	93
2-Fluorobiphenyl	97	103
2,4,6-Tribromophenol	84	88
p-Terphenyl-d14	98	103

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BM03XA			LF3BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121719.D			D121720.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000.000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.343		U	0.338
1,2-Dichloroethane		U	0.462		U	0.456
1,1-Dichloropropene		U	0.412		U	0.406
Benzene	0.643	JB	0.586	0.603	JB	0.577
Carbon Tetrachloride		U	0.297	0.293	J	0.293
1,2-Dichloropropane		U	0.405		U	0.399
Trichloroethene		U	0.348		U	0.343
Dibromomethane		U	0.263		U	0.259
Bromodichloromethane		U	0.279		U	0.275
Pyridine		U	0.578		U	0.570
cis-1,3-Dichloropropene		U	0.412		U	0.406
N-nitrosodimethylamine		U	0.618		U	0.609
Toluene	16.2		0.497	16.6		0.489
trans-1,3-Dichloropropene		U	0.412		U	0.406
1,1,2-Trichloroethane		U	0.343		U	0.338
1,3-Dichloropropane		U	0.405		U	0.399
Dibromochloromethane		U	0.220		U	0.216
1,2-Dibromoethane		U	0.244		U	0.240
Tetrachloroethene	0.5	J	0.276	0.473	J	0.272
Chlorobenzene		U	0.406		U	0.401
1,1,1,2-Tetrachloroethane		U	0.273		U	0.269
Ethylbenzene		U	0.431		U	0.425
m/p-Xylenes		U	0.431		U	0.425
Bromoform		U	0.181		U	0.178
Styrene		U	0.439		U	0.433
o-Xylene		U	0.431		U	0.425
1,1,2,2-Tetrachloroethane		U	0.273		U	0.269
1,2,3-Trichloropropane		U	0.310		U	0.306
Isopropylbenzene		U	0.381		U	0.375
Bromobenzene		U	0.291		U	0.287
2-Chlorotoluene		U	0.361		U	0.356
n-Propylbenzene		U	0.381		U	0.375
4-Chlorotoluene		U	0.361		U	0.356
1,3,5-Trimethylbenzene		U	0.381		U	0.375

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121719.D			D121720.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000.000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.341		U	0.336
1,2,4-Trimethylbenzene		U	0.381		U	0.375
sec-Butylbenzene		U	0.341		U	0.336
Phenol		U	0.486		U	0.479
bis(2-Chloroethyl)ether		U	0.320		U	0.315
Aniline		U	0.491		U	0.484
2-Chlorophenol		U	0.356		U	0.351
1,3-Dichlorobenzene		U	0.311		U	0.307
1,4-Dichlorobenzene		U	0.311		U	0.307
p-Isopropyltoluene		U	0.341		U	0.336
Benzyl Alcohol		U	0.423		U	0.417
2-Methylphenol (m-cresol)		U	0.423		U	0.417
1,2-Dichlorobenzene		U	0.311		U	0.307
3,4-Methylphenol (o,p-cresol)		U	0.423		U	0.417
bis(2-chloroisopropyl)ether		U	0.267		U	0.264
n-Butylbenzene		U	0.341		U	0.336
N-nitroso-di-n-propylamine		U	0.351		U	0.346
Hexachloroethane		U	0.193		U	0.190
1,2-Dibromo-3-Chloropropane		U	0.194		U	0.191
Nitrobenzene		U	0.372		U	0.366
Isophorone		U	0.331		U	0.326
2-Nitrophenol		U	0.329		U	0.324
2,4-Dimethylphenol		U	0.375		U	0.369
bis(2-Chloroethoxy)methane		U	0.264		U	0.260
1,2,4-Trichlorobenzene		U	0.252		U	0.248
Naphthalene		U	0.357		U	0.352
2,4-Dichlorophenol		U	0.281		U	0.277
4-Chloroaniline		U	0.359		U	0.353
Hexachlorobutadiene		U	0.175		U	0.173
1,2,3-Trichlorobenzene		U	0.252		U	0.248
4-Chloro-3-methylphenol		U	0.321		U	0.316
2-Methylnaphthalene		U	0.322		U	0.317
1-Methylnaphthalene		U	0.322		U	0.317
Hexachlorocyclopentadiene		U	0.168		U	0.165
2,4,6-Trichlorophenol		U	0.232		U	0.228
2,4,5-Trichlorophenol		U	0.232		U	0.228

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121719.D			D121720.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000.000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.270		U	0.266
Azobenzene		U	0.251		U	0.247
2-Chloronaphthalene		U	0.281		U	0.277
2-Nitroaniline		U	0.331		U	0.326
1,4-Dinitrobenzene		U	0.272		U	0.268
Dimethylphthalate		U	0.236		U	0.232
1,3-Dinitrobenzene		U	0.272		U	0.268
Acenaphthylene		U	0.301		U	0.296
2,6-dinitrotoluene		U	0.251		U	0.248
1,2-Dinitrobenzene		U	0.272		U	0.268
3-Nitroaniline		U	0.331		U	0.326
Acenaphthene		U	0.297		U	0.292
2,4-Dinitrophenol		U	0.249		U	0.245
4-Nitrophenol		U	0.329		U	0.324
Dibenzofuran		U	0.272		U	0.268

Sample ID:	LF3BM03XA			LF3BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121719.D			D121720.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000.000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.251		U	0.248
2,3,4,6-Tetrachlorophenol		U	0.197		U	0.194
2,3,5,6-Tetrachlorophenol		U	0.197		U	0.194
Diethylphthalate		U	0.206		U	0.203
4-Chlorophenyl-phenylether		U	0.224		U	0.220
Fluorene		U	0.275		U	0.271
4-Nitroaniline		U	0.331		U	0.326
4,6-Dinitro-2-methylphenol		U	0.231		U	0.228
n-Nitrosodiphenylamine		U	0.231		U	0.227
4-Bromophenyl phenyl ether		U	0.184		U	0.181
Hexachlorobenzene		U	0.161		U	0.158
Pentachlorophenol		U	0.172		U	0.169
Phenanthrene		U	0.257		U	0.253
Anthracene		U	0.257		U	0.253
Carbazole		U	0.274		U	0.270
Di-n-butylphthalate	0.364	B	0.164	0.487	B	0.162
Bis(2-ethylhexyl) adipate		U	0.123		U	0.122
Fluoranthene		U	0.226		U	0.223
Pyrene		U	0.226		U	0.223
Butylbenzylphthalate		U	0.146		U	0.144
Benz[a]anthracene		U	0.200		U	0.197
Chrysene		U	0.200		U	0.197
bis(2-Ethylhexyl)phthalate		U	0.117		U	0.115
Di-n-octylphthalate		U	0.117		U	0.115
Benzo[b]fluoranthene		U	0.181		U	0.179
Benzo[k]fluoranthene		U	0.181		U	0.179
Benzo[a]pyrene		U	0.181		U	0.179
Indeno[1,2,3-cd]pyrene		U	0.166		U	0.163
Dibenz[a,h]anthracene		U	0.164		U	0.162
Benzo[g,h,i]perylene		U	0.166		U	0.163

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121719.D			D121720.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000.000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	45	72
4-Bromofluorobenzene	59	93
2-Fluorophenol	58	80
Phenol-d5	70	101
Nitrobenzene-d5	56	85
2-Fluorobiphenyl	65	94
2,4,6-Tribromophenol	62	88
p-Terphenyl-d14	66	88

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BM05XA			LF3BM06XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

VOC & SVOC COMPOUNDS:

1,1,1-Trichloroethane		U	0.0747		U	0.0740
1,2-Dichloroethane		U	0.0554		U	0.0549
1,1-Dichloropropene		U	0.0621		U	0.0615
Benzene		U	0.0437		U	0.0433
Carbon Tetrachloride		U	0.0861		U	0.0853
1,2-Dichloropropane		U	0.0633		U	0.0626
Trichloroethene		U	0.0736		U	0.0728
Dibromomethane		U	0.0973		U	0.0964
Bromodichloromethane		U	0.0917		U	0.0908
Pyridine		U	0.0443		U	0.0439
cis-1,3-Dichloropropene		U	0.0621		U	0.0615
N-nitrosodimethylamine		U	0.0415		U	0.0411
Toluene	0.064	J	0.0516	0.0703	J	0.0511
trans-1,3-Dichloropropene		U	0.0621		U	0.0615
1,1,2-Trichloroethane		U	0.0747		U	0.0740
1,3-Dichloropropane		U	0.0633		U	0.0626
Dibromochloromethane	0.285	B	0.117	0.431	B	0.115
1,2-Dibromoethane		U	0.105		U	0.104
Tetrachloroethene		U	0.0928		U	0.0919
Chlorobenzene		U	0.0630		U	0.0624
1,1,1,2-Tetrachloroethane		U	0.0940		U	0.0930
Ethylbenzene		U	0.0594		U	0.0589
m/p-Xylenes		U	0.0594		U	0.0589
Bromoform		U	0.141		U	0.140
Styrene		U	0.0583		U	0.0577
o-Xylene		U	0.0594		U	0.0589
1,1,2,2-Tetrachloroethane		U	0.0940		U	0.0930
1,2,3-Trichloropropane		U	0.0825		U	0.0817
Isopropylbenzene		U	0.0673		U	0.0666
Bromobenzene		U	0.0879		U	0.0870
2-Chlorotoluene		U	0.0709		U	0.0702
n-Propylbenzene		U	0.0673		U	0.0666
4-Chlorotoluene		U	0.0709		U	0.0702
1,3,5-Trimethylbenzene		U	0.0673		U	0.0666

Sample ID:	LF3BM05XA			LF3BM06XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.0751		U	0.0744
1,2,4-Trimethylbenzene		U	0.0673		U	0.0666
sec-Butylbenzene		U	0.0751		U	0.0744
Phenol		U	0.0527		U	0.0522
bis(2-Chloroethyl)ether		U	0.0801		U	0.0793
Aniline		U	0.0521		U	0.0516
2-Chlorophenol		U	0.0720		U	0.0713
1,3-Dichlorobenzene		U	0.0823		U	0.0815
1,4-Dichlorobenzene		U	0.0823		U	0.0815
p-Isopropyltoluene		U	0.0751		U	0.0744
Benzyl Alcohol		U	0.0605		U	0.0599
2-Methylphenol (m-cresol)		U	0.0605		U	0.0599
1,2-Dichlorobenzene		U	0.0823		U	0.0815
3,4-Methylphenol (o,p-cresol)		U	0.0605		U	0.0599
bis(2-chloroisopropyl)ether		U	0.0958		U	0.0948
n-Butylbenzene		U	0.0751		U	0.0744
N-nitroso-di-n-propylamine		U	0.0729		U	0.0722
Hexachloroethane		U	0.133		U	0.131
1,2-Dibromo-3-Chloropropane		U	0.132		U	0.131
Nitrobenzene		U	0.0689		U	0.0682
Isophorone		U	0.0774		U	0.0766
2-Nitrophenol		U	0.0779		U	0.0771
2,4-Dimethylphenol		U	0.0684		U	0.0677
bis(2-Chloroethoxy)methane		U	0.0969		U	0.0959
1,2,4-Trichlorobenzene		U	0.102		U	0.101
Naphthalene		U	0.0718		U	0.0711
2,4-Dichlorophenol		U	0.0913		U	0.0904
4-Chloroaniline		U	0.0714		U	0.0707
Hexachlorobutadiene		U	0.146		U	0.145
1,2,3-Trichlorobenzene		U	0.102		U	0.101
4-Chloro-3-methylphenol		U	0.0798		U	0.0790
2-Methylnaphthalene	0.212		0.0796	0.1370	J	0.0788
1-Methylnaphthalene	0.137	J	0.0796	0.0905	J	0.0788
Hexachlorocyclopentadiene		U	0.153		U	0.151
2,4,6-Trichlorophenol		U	0.111		U	0.109
2,4,5-Trichlorophenol		U	0.111		U	0.109

Sample ID:	**LF3BM05XA**			**LF3BM06XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.0947		U	0.0938
Azobenzene		U	0.102		U	0.101
2-Chloronaphthalene		U	0.0910		U	0.0902
2-Nitroaniline		U	0.0773		U	0.0766
1,4-Dinitrobenzene		U	0.0941		U	0.0932
Dimethylphthalate		U	0.109		U	0.108
1,3-Dinitrobenzene		U	0.0941		U	0.0932
Acenaphthylene		U	0.0852		U	0.0844
2,6-dinitrotoluene		U	0.102		U	0.101
1,2-Dinitrobenzene		U	0.0941		U	0.0932
3-Nitroaniline		U	0.0773		U	0.0766
Acenaphthene		U	0.0863		U	0.0855
2,4-Dinitrophenol		U	0.103		U	0.102
4-Nitrophenol		U	0.0779		U	0.0771
Dibenzofuran		U	0.0942		U	0.0932

Sample ID:	LF3BM05XA			LF3BM06XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.102		U	0.101
2,3,4,6-Tetrachlorophenol		U	0.130		U	0.129
2,3,5,6-Tetrachlorophenol		U	0.130		U	0.129
Diethylphthalate		U	0.124		U	0.123
4-Chlorophenyl-phenylether		U	0.115		U	0.113
Fluorene		U	0.0931		U	0.0921
4-Nitroaniline		U	0.0773		U	0.0766
4,6-Dinitro-2-methylphenol		U	0.111		U	0.110
n-Nitrosodiphenylamine		U	0.111		U	0.110
4-Bromophenyl phenyl ether		U	0.139		U	0.138
Hexachlorobenzene		U	0.159		U	0.158
Pentachlorophenol		U	0.149		U	0.148
Phenanthrene		U	0.0998		U	0.0988
Anthracene		U	0.0998		U	0.0988
Carbazole		U	0.0936		U	0.0927
Di-n-butylphthalate		U	0.156		U	0.154
Bis(2-ethylhexyl) adipate		U	0.207		U	0.205
Fluoranthene		U	0.113		U	0.112
Pyrene		U	0.113		U	0.112
Butylbenzylphthalate		U	0.175		U	0.173
Benz[a]anthracene		U	0.128		U	0.127
Chrysene		U	0.128		U	0.127
bis(2-Ethylhexyl)phthalate		U	0.219		U	0.217
Di-n-octylphthalate		U	0.219		U	0.217
Benzo[b]fluoranthene		U	0.141		U	0.140
Benzo[k]fluoranthene		U	0.141		U	0.140
Benzo[a]pyrene		U	0.141		U	0.140
Indeno[1,2,3-cd]pyrene		U	0.155		U	0.153
Dibenz[a,h]anthracene		U	0.156		U	0.154
Benzo[g,h,i]perylene		U	0.155		U	0.153

Sample ID:	**LF3BM05XA**			**LF3BM06XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	54	67
4-Bromofluorobenzene	73	92
2-Fluorophenol	81	93
Phenol-d5	88	97
Nitrobenzene-d5	75	91
2-Fluorobiphenyl	85	97
2,4,6-Tribromophenol	84	102
p-Terphenyl-d14	93	106

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

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Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

VOC & SVOC COMPOUNDS:

1,1,1-Trichloroethane		U	0.0754		U	0.0761
1,2-Dichloroethane		U	0.0559		U	0.0565
1,1-Dichloropropene		U	0.0627		U	0.0633
Benzene		U	0.0442		U	0.0446
Carbon Tetrachloride		U	0.0870		U	0.0878
1,2-Dichloropropane		U	0.0639		U	0.0645
Trichloroethene		U	0.0743		U	0.0750
Dibromomethane		U	0.0983		U	0.0992
Bromodichloromethane		U	0.0926		U	0.0935
Pyridine		U	0.0447		U	0.0452
cis-1,3-Dichloropropene		U	0.0627		U	0.0633
N-nitrosodimethylamine		U	0.0419		U	0.0423
Toluene		U	0.0521		U	0.0526
trans-1,3-Dichloropropene		U	0.0627		U	0.0633
1,1,2-Trichloroethane		U	0.0754		U	0.0761
1,3-Dichloropropane		U	0.0639		U	0.0645
Dibromochloromethane	0.513	B	0.118	0.488	B	0.119
1,2-Dibromoethane		U	0.106		U	0.107
Tetrachloroethene		U	0.0937		U	0.0946
Chlorobenzene		U	0.0636		U	0.0643
1,1,1,2-Tetrachloroethane		U	0.0949		U	0.0958
Ethylbenzene		U	0.0600		U	0.0606
m/p-Xylenes		U	0.0600		U	0.0606
Bromoform		U	0.143		U	0.144
Styrene		U	0.0589		U	0.0595
o-Xylene		U	0.0600		U	0.0606
1,1,2,2-Tetrachloroethane		U	0.0949		U	0.0958
1,2,3-Trichloropropane		U	0.0833		U	0.0842
Isopropylbenzene		U	0.0680		U	0.0686
Bromobenzene		U	0.0888		U	0.0896
2-Chlorotoluene		U	0.0716		U	0.0723
n-Propylbenzene		U	0.0679		U	0.0686
4-Chlorotoluene		U	0.0716		U	0.0723
1,3,5-Trimethylbenzene		U	0.0679		U	0.0686

Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.0759		U	0.0766
1,2,4-Trimethylbenzene		U	0.0679		U	0.0686
sec-Butylbenzene		U	0.0759		U	0.0766
Phenol		U	0.0532		U	0.0537
bis(2-Chloroethyl)ether		U	0.0808		U	0.0816
Aniline		U	0.0527		U	0.0532
2-Chlorophenol		U	0.0727		U	0.0734
1,3-Dichlorobenzene		U	0.0831		U	0.0839
1,4-Dichlorobenzene		U	0.0831		U	0.0839
p-Isopropyltoluene		U	0.0759		U	0.0766
Benzyl Alcohol		U	0.0611		U	0.0617
2-Methylphenol (m-cresol)		U	0.0611		U	0.0617
1,2-Dichlorobenzene		U	0.0831		U	0.0839
3,4-Methylphenol (o,p-cresol)		U	0.0611		U	0.0617
bis(2-chloroisopropyl)ether		U	0.0967		U	0.0976
n-Butylbenzene		U	0.0759		U	0.0766
N-nitroso-di-n-propylamine		U	0.0736		U	0.0743
Hexachloroethane		U	0.134		U	0.135
1,2-Dibromo-3-Chloropropane		U	0.134		U	0.135
Nitrobenzene		U	0.0696		U	0.0703
Isophorone		U	0.0781		U	0.0789
2-Nitrophenol		U	0.0786		U	0.0794
2,4-Dimethylphenol		U	0.0691		U	0.0697
bis(2-Chloroethoxy)methane		U	0.0978		U	0.0988
1,2,4-Trichlorobenzene		U	0.103		U	0.104
Naphthalene		U	0.0725		U	0.0732
2,4-Dichlorophenol		U	0.0922		U	0.0930
4-Chloroaniline		U	0.0721		U	0.0728
Hexachlorobutadiene		U	0.147		U	0.149
1,2,3-Trichlorobenzene		U	0.103		U	0.104
4-Chloro-3-methylphenol		U	0.0806		U	0.0814
2-Methylnaphthalene		U	0.0804		U	0.0812
1-Methylnaphthalene		U	0.0804		U	0.0812
Hexachlorocyclopentadiene		U	0.154		U	0.156
2,4,6-Trichlorophenol		U	0.112		U	0.113
2,4,5-Trichlorophenol		U	0.112		U	0.113

Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.0957		U	0.0966
Azobenzene		U	0.103		U	0.104
2-Chloronaphthalene		U	0.0919		U	0.0928
2-Nitroaniline		U	0.0781		U	0.0788
1,4-Dinitrobenzene		U	0.0950		U	0.0960
Dimethylphthalate		U	0.110		U	0.111
1,3-Dinitrobenzene		U	0.0950		U	0.0960
Acenaphthylene		U	0.0860		U	0.0869
2,6-dinitrotoluene		U	0.103		U	0.104
1,2-Dinitrobenzene		U	0.0950		U	0.0960
3-Nitroaniline		U	0.0781		U	0.0788
Acenaphthene		U	0.0872		U	0.0880
2,4-Dinitrophenol		U	0.104		U	0.105
4-Nitrophenol		U	0.0786		U	0.0794
Dibenzofuran		U	0.0951		U	0.0960

Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.103		U	0.104
2,3,4,6-Tetrachlorophenol		U	0.131		U	0.132
2,3,5,6-Tetrachlorophenol		U	0.131		U	0.132
Diethylphthalate		U	0.126		U	0.127
4-Chlorophenyl-phenylether		U	0.116		U	0.117
Fluorene		U	0.0940		U	0.0949
4-Nitroaniline		U	0.0781		U	0.0788
4,6-Dinitro-2-methylphenol		U	0.112		U	0.113
n-Nitrosodiphenylamine		U	0.112		U	0.113
4-Bromophenyl phenyl ether		U	0.141		U	0.142
Hexachlorobenzene		U	0.161		U	0.163
Pentachlorophenol		U	0.151		U	0.152
Phenanthrene		U	0.1008		U	0.1017
Anthracene		U	0.1008		U	0.1017
Carbazole		U	0.0945		U	0.0954
Di-n-butylphthalate		U	0.157		U	0.159
Bis(2-ethylhexyl) adipate		U	0.209		U	0.212
Fluoranthene		U	0.114		U	0.115
Pyrene		U	0.114		U	0.115
Butylbenzylphthalate		U	0.177		U	0.178
Benz[a]anthracene		U	0.129		U	0.130
Chrysene		U	0.129		U	0.130
bis(2-Ethylhexyl)phthalate		U	0.221		U	0.223
Di-n-octylphthalate		U	0.221		U	0.223
Benzo[b]fluoranthene		U	0.143		U	0.144
Benzo[k]fluoranthene		U	0.143		U	0.144
Benzo[a]pyrene		U	0.143		U	0.144
Indeno[1,2,3-cd]pyrene		U	0.156		U	0.158
Dibenz[a,h]anthracene		U	0.157		U	0.159
Benzo[g,h,i]perylene		U	0.156		U	0.158

Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3):	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	68	69
4-Bromofluorobenzene	90	94
2-Fluorophenol	85	89
Phenol-d5	95	100
Nitrobenzene-d5	91	95
2-Fluorobiphenyl	95	102
2,4,6-Tribromophenol	77	91
p-Terphenyl-d14	106	111

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

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Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120319.D			D120320.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.350		U	0.390
1,2-Dichloroethane		U	0.472		U	0.525
1,1-Dichloropropene		U	0.421		U	0.468
Benzene	0.814	JB	0.598	1.217	JB	0.666
Carbon Tetrachloride	0.442	JB	0.304	0.679	B	0.338
1,2-Dichloropropane		U	0.413		U	0.460
Trichloroethene		U	0.355		U	0.396
Dibromomethane		U	0.269		U	0.299
Bromodichloromethane		U	0.590		U	0.657
Pyridine		U	0.421		U	0.468
cis-1,3-Dichloropropene		U	0.630		U	0.702
N-nitrosodimethylamine		U	0.507		U	0.564
Toluene	21.566		0.421	26.4		0.468
trans-1,3-Dichloropropene		U	0.350		U	0.390
1,1,2-Trichloroethane		U	0.413		U	0.460
1,3-Dichloropropane		U	0.224		U	0.250
Dibromochloromethane		NA	NA		NA	NA
1,2-Dibromoethane		U	0.249		U	0.277
Tetrachloroethene	1.165		0.282	1.511		0.314
Chlorobenzene	1.555		0.415	1.693		0.462
1,1,1,2-Tetrachloroethane		U	0.278		U	0.310
Ethylbenzene	48.6		0.440	46.5		0.490
m/p-Xylenes	57.7		0.440	56.7		0.490
Bromoform		U	0.185		U	0.206
Styrene	9.55		0.448	9.62		0.499
o-Xylene	43.8		0.440	41.5		0.490
1,1,2,2-Tetrachloroethane	0.486	J	0.278	0.338	J	0.310
1,2,3-Trichloropropane		U	0.317		U	0.353
Isopropylbenzene	10.6		0.388	9.94		0.432
Bromobenzene		U	0.297		U	0.331
2-Chlorotoluene	5.45		0.369	4.68		0.411
n-Propylbenzene	14.2		0.388	12.3		0.433
4-Chlorotoluene		U	0.369		U	0.411
1,3,5-Trimethylbenzene	46.7		0.388	39.4		0.433

Sample ID:	LF3BG01XA			LF3BG02XA		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120319.D			D120320.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene	12.1		0.348	10.49		0.387
1,2,4-Trimethylbenzene	133	DU	0.388	124	D	0.433
sec-Butylbenzene	9.6		0.348		U	0.387
Phenol		U	0.496		U	0.552
bis(2-Chloroethyl)ether		U	0.326		U	0.364
Aniline		U	0.501		U	0.558
2-Chlorophenol		U	0.363		U	0.404
1,3-Dichlorobenzene		U	0.318		U	0.354
1,4-Dichlorobenzene	91.8	D	0.318	79.5		0.354
p-Isopropyltoluene		U	0.348	518	DU	0.387
Benzyl Alcohol	243.0	DU	0.432	215	DU	0.481
2-Methylphenol (m-cresol)		U	0.432		U	0.481
1,2-Dichlorobenzene	1.55		0.318	1.47		0.354
3,4-Methylphenol (o,p-cresol)		U	0.432	1.228		0.481
bis(2-chloroisopropyl)ether		U	0.273		U	0.304
n-Butylbenzene	8.39		0.348	8.18		0.387
N-nitroso-di-n-propylamine		U	0.359		U	0.399
Hexachloroethane		U	0.197		U	0.220
1,2-Dibromo-3-Chloropropane		U	0.198		U	0.220
Nitrobenzene		U	0.379		U	0.422
Isophorone		U	0.338		U	0.376
2-Nitrophenol		U	0.336		U	0.374
2,4-Dimethylphenol		U	0.382		U	0.426
bis(2-Chloroethoxy)methane		U	0.270		U	0.300
1,2,4-Trichlorobenzene	0.521		0.257	0.807		0.286
Naphthalene	69.2		0.364	101.4	D	0.406
2,4-Dichlorophenol		U	0.286		U	0.319
4-Chloroaniline		U	0.366	3.38		0.408
Hexachlorobutadiene		U	0.179		U	0.199
1,2,3-Trichlorobenzene		U	0.257	0.428	J	0.286
4-Chloro-3-methylphenol		U	0.327		U	0.365
2-Methylnaphthalene	14.1		0.328	33.4		0.366
1-Methylnaphthalene	7.61		0.328	15.8		0.366
Hexachlorocyclopentadiene		U	0.171		U	0.191
2,4,6-Trichlorophenol		U	0.236		U	0.263
2,4,5-Trichlorophenol		U	0.236		U	0.263

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120319.D			D120320.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.276		U	0.307
Azobenzene		U	0.256		U	0.285
2-Chloronaphthalene		U	0.287		U	0.320
2-Nitroaniline		U	0.338		U	0.376
1,4-Dinitrobenzene		U	0.278		U	0.309
Dimethylphthalate		U	0.240		U	0.268
1,3-Dinitrobenzene		U	0.278		U	0.309
Acenaphthylene		U	0.307		U	0.342
2,6-dinitrotoluene		U	0.256		U	0.285
1,2-Dinitrobenzene		U	0.278		U	0.309
3-Nitroaniline		U	0.338		U	0.376
Acenaphthene	1.63		0.303	4.191		0.337
2,4-Dinitrophenol		U	0.254		U	0.282
4-Nitrophenol	2.06		0.336	2.289		0.374
Dibenzofuran	0.912		0.278	2.186		0.309

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120319.D			D120320.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.256		U	0.285
2,3,4,6-Tetrachlorophenol		U	0.201		U	0.224
2,3,5,6-Tetrachlorophenol		U	0.201		U	0.224
Diethylphthalate		BU	0.210	0.962	B	0.234
4-Chlorophenyl-phenylether		U	0.228		U	0.254
Fluorene	0.503	J	0.281	1.175		0.313
4-Nitroaniline		U	0.338		U	0.376
4,6-Dinitro-2-methylphenol		U	0.236		U	0.262
n-Nitrosodiphenylamine		U	0.236		U	0.262
4-Bromophenyl phenyl ether		U	0.187		U	0.209
Hexachlorobenzene		U	0.164		U	0.183
Pentachlorophenol		U	0.175		U	0.195
Phenanthrene		U	0.262		U	0.292
Anthracene		U	0.262		U	0.292
Carbazole		U	0.279		U	0.311
Di-n-butylphthalate	0.453	B	0.168	1.85	B	0.187
Bis(2-ethylhexyl) adipate		U	0.126		U	0.140
Fluoranthene		U	0.231		U	0.257
Pyrene		U	0.231		U	0.257
Butylbenzylphthalate		U	0.149		U	0.166
Benz[a]anthracene		U	0.205		U	0.228
Chrysene		U	0.205		U	0.228
bis(2-Ethylhexyl)phthalate		BU	0.120		BU	0.133
Di-n-octylphthalate		U	0.120		U	0.133
Benzo[b]fluoranthene		U	0.185		U	0.206
Benzo[k]fluoranthene		U	0.185		U	0.206
Benzo[a]pyrene		U	0.185		U	0.206
Indeno[1,2,3-cd]pyrene		U	0.169		U	0.188
Dibenz[a,h]anthracene		U	0.168		U	0.187
Benzo[g,h,i]perylene		U	0.169		U	0.188

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	AMX			AMX		
File ID:	D120319.D			D120320.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/4/2008			12/4/2008		
Sample Volume (m^3):	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	53	47
4-Bromofluorobenzene	72	70
2-Fluorophenol	82	81
Phenol-d5	72	77
Nitrobenzene-d5	92	92
2-Fluorobiphenyl	93	90
2,4,6-Tribromophenol	69	76
p-Terphenyl-d14	100	101

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BG03XA			LF3BG04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121721.D			D121722.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.493			0.493		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.338		U	0.343
1,2-Dichloroethane		U	0.456		U	0.462
1,1-Dichloropropene		U	0.407		U	0.412
Benzene	1.26	B	0.578		BU	0.585
Carbon Tetrachloride		U	0.293	0.325	J	0.297
1,2-Dichloropropane		U	0.400		U	0.404
Trichloroethene		U	0.344		U	0.348
Dibromomethane		U	0.260		U	0.263
Bromodichloromethane		U	0.276		U	0.279
Pyridine		U	0.571		U	0.578
cis-1,3-Dichloropropene		U	0.407		U	0.412
N-nitrosodimethylamine		U	0.609		U	0.617
Toluene	64.4		0.490	28.0		0.496
trans-1,3-Dichloropropene		U	0.407		U	0.412
1,1,2-Trichloroethane		U	0.338		U	0.343
1,3-Dichloropropane		U	0.400		U	0.404
Dibromochloromethane		U	0.217		U	0.219
1,2-Dibromoethane		U	0.240		U	0.243
Tetrachloroethene	3.84		0.272	2.121		0.276
Chlorobenzene	2.37		0.401	1.44		0.406
1,1,1,2-Tetrachloroethane		U	0.269		U	0.272
Ethylbenzene	77.9		0.425	53.4		0.430
m/p-Xylenes	100		0.425	71.3		0.430
Bromoform		U	0.179		U	0.181
Styrene	13.5		0.433	11.5		0.439
o-Xylene	62.6		0.425	45.6		0.430
1,1,2,2-Tetrachloroethane	0.641		0.269	0.427	J	0.272
1,2,3-Trichloropropane		U	0.306		U	0.310
Isopropylbenzene	13.6		0.376	10.2		0.380
Bromobenzene		U	0.288		U	0.291
2-Chlorotoluene	5.50		0.357	3.77		0.361
n-Propylbenzene	16.8		0.376	12.4		0.380
4-Chlorotoluene		U	0.357	3.770		0.361
1,3,5-Trimethylbenzene	56.6		0.376	43.8		0.380

Sample ID:	LF3BG03XA			LF3BG04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121721.D			D121722.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.493			0.493		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.336		U	0.340
1,2,4-Trimethylbenzene		U	0.376		U	0.380
sec-Butylbenzene	11.6		0.336	10.4		0.340
Phenol	1.67		0.480	1.25		0.486
bis(2-Chloroethyl)ether	0.986		0.316	0.742		0.320
Aniline		U	0.485		U	0.491
2-Chlorophenol		U	0.351		U	0.355
1,3-Dichlorobenzene		U	0.307		U	0.311
1,4-Dichlorobenzene	147	D	0.307	128	D	0.311
p-Isopropyltoluene	760	D	0.336	704	D	0.340
Benzyl Alcohol		U	0.417		U	0.423
2-Methylphenol (m-cresol)		U	0.417		U	0.423
1,2-Dichlorobenzene	1.97		0.307	1.38		0.311
3,4-Methylphenol (o,p-cresol)		U	0.417		U	0.423
bis(2-chloroisopropyl)ether		U	0.264		U	0.267
n-Butylbenzene	11.7		0.336	10.0		0.340
N-nitroso-di-n-propylamine		U	0.347		U	0.351
Hexachloroethane		U	0.191		U	0.193
1,2-Dibromo-3-Chloropropane		U	0.191		U	0.193
Nitrobenzene		U	0.367		U	0.371
Isophorone		U	0.327		U	0.331
2-Nitrophenol		U	0.325		U	0.329
2,4-Dimethylphenol		U	0.370		U	0.374
bis(2-Chloroethoxy)methane		U	0.261		U	0.264
1,2,4-Trichlorobenzene	0.756		0.249	0.486	J	0.252
Naphthalene	217	D	0.352	196	D	0.357
2,4-Dichlorophenol		U	0.277		U	0.280
4-Chloroaniline		U	0.354		U	0.358
Hexachlorobutadiene		U	0.173		U	0.175
1,2,3-Trichlorobenzene		U	0.249		U	0.252
4-Chloro-3-methylphenol		U	0.317		U	0.321
2-Methylnaphthalene	33.3		0.317	22.1		0.321
1-Methylnaphthalene	14.6		0.317	10.4		0.321
Hexachlorocyclopentadiene		U	0.165		U	0.168
2,4,6-Trichlorophenol		U	0.229		U	0.231
2,4,5-Trichlorophenol		U	0.229		U	0.231

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121721.D			D121722.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.493			0.493		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.267		U	0.270
Azobenzene		U	0.248		U	0.251
2-Chloronaphthalene		U	0.278		U	0.281
2-Nitroaniline		U	0.327		U	0.331
1,4-Dinitrobenzene		U	0.269		U	0.272
Dimethylphthalate		U	0.232		U	0.235
1,3-Dinitrobenzene		U	0.269		U	0.272
Acenaphthylene		U	0.297		U	0.300
2,6-dinitrotoluene		U	0.248		U	0.251
1,2-Dinitrobenzene		U	0.269		U	0.272
3-Nitroaniline		U	0.327		U	0.331
Acenaphthene	1.73		0.293	0.869		0.296
2,4-Dinitrophenol		U	0.245		U	0.248
4-Nitrophenol	1.98		0.325	2.00		0.329
Dibenzofuran	0.452	J	0.268		U	0.272

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121721.D			D121722.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.493			0.493		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.248		U	0.251
2,3,4,6-Tetrachlorophenol		U	0.195		U	0.197
2,3,5,6-Tetrachlorophenol		U	0.195		U	0.197
Diethylphthalate		U	0.203		U	0.206
4-Chlorophenyl-phenylether		U	0.221		U	0.223
Fluorene		U	0.272		U	0.275
4-Nitroaniline		U	0.327		U	0.331
4,6-Dinitro-2-methylphenol		U	0.228		U	0.231
n-Nitrosodiphenylamine		U	0.228		U	0.231
4-Bromophenyl phenyl ether		U	0.181		U	0.183
Hexachlorobenzene		U	0.159		U	0.160
Pentachlorophenol		U	0.169		U	0.172
Phenanthrene		U	0.253		U	0.256
Anthracene		U	0.253		U	0.256
Carbazole		U	0.270		U	0.273
Di-n-butylphthalate	0.542	B	0.162	0.517	B	0.164
Bis(2-ethylhexyl) adipate		U	0.122		U	0.123
Fluoranthene		U	0.223		U	0.226
Pyrene		U	0.223		U	0.226
Butylbenzylphthalate		U	0.145		U	0.146
Benz[a]anthracene		U	0.198		U	0.200
Chrysene		U	0.198		U	0.200
bis(2-Ethylhexyl)phthalate		U	0.116		U	0.117
Di-n-octylphthalate		U	0.116		U	0.117
Benzo[b]fluoranthene		U	0.179		U	0.181
Benzo[k]fluoranthene		U	0.179		U	0.181
Benzo[a]pyrene		U	0.179		U	0.181
Indeno[1,2,3-cd]pyrene		U	0.163		U	0.165
Dibenz[a,h]anthracene		U	0.162		U	0.164
Benzo[g,h,i]perylene		U	0.163		U	0.165

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121721.D			D121722.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.493			0.493		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	62	64
4-Bromofluorobenzene	82	69
2-Fluorophenol	79	68
Phenol-d5	70	61
Nitrobenzene-d5	88	84
2-Fluorobiphenyl	88	88
2,4,6-Tribromophenol	81	82
p-Terphenyl-d14	89	86

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF3BL01XA**			**LF3BL02XA**			**QC081106-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC090922-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8081A			EPA 8260/8270m		
Instrument:	Duster			AMX			Duster		
File ID:	D121723.D			A092420.D			D120305.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			9/9/2009			NA		
Date Received:	11/26/2008			9/18/2009			NA		
Date Prepared:	12/4/2008			9/22/2009			11/6/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			9/25/2009			12/3/2008		
Sample Volume (m^3):	0.493			0.489			1.000		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:									
1,1,1-Trichloroethane		U	0.346		U	0.0751		U	0.168
1,2-Dichloroethane		U	0.466		U	0.0557		U	0.226
1,1-Dichloropropene		U	0.416		U	0.0624		U	0.202
Benzene		BU	0.591		U	0.0439	0.390	J	0.287
Carbon Tetrachloride		U	0.300		U	0.0865	0.230	J	0.146
1,2-Dichloropropane		U	0.408		U	0.0636		U	0.198
Trichloroethene		U	0.351		U	0.0739		U	0.170
Dibromomethane		U	0.265		U	0.0978		U	0.129
Bromodichloromethane		U	0.282		U	0.0922		U	0.283
Pyridine		U	0.583		U	0.0445		U	0.202
cis-1,3-Dichloropropene		U	0.416		U	0.0624		U	0.302
N-nitrosodimethylamine		U	0.623		U	0.0417		U	0.243
Toluene		U	0.501		U	0.0518		U	0.202
trans-1,3-Dichloropropene		U	0.416		U	0.0624		U	0.168
1,1,2-Trichloroethane		U	0.346	0.160		0.0751		U	0.198
1,3-Dichloropropane		U	0.408		U	0.0636		U	0.108
Dibromochloromethane		U	0.222	0.223	JB	0.117		NA	NA
1,2-Dibromoethane		U	0.246		U	0.106		U	0.119
Tetrachloroethene		U	0.278		U	0.0933		U	0.135
Chlorobenzene		U	0.410		U	0.0633		U	0.199
1,1,1,2-Tetrachloroethane		U	0.275		U	0.0944		U	0.133
Ethylbenzene		U	0.435		U	0.0597		U	0.211
m/p-Xylenes		U	0.435		U	0.0597		U	0.211
Bromoform		U	0.183		U	0.142		U	0.089
Styrene		U	0.443		U	0.0586		U	0.215
o-Xylene		U	0.435		U	0.0597		U	0.211
1,1,2,2-Tetrachloroethane		U	0.275	0.511		0.0944		U	0.133
1,2,3-Trichloropropane		U	0.313		U	0.0829		U	0.152
Isopropylbenzene		U	0.384		U	0.0676		U	0.186
Bromobenzene		U	0.294		U	0.0883		U	0.143
2-Chlorotoluene		U	0.365		U	0.0712		U	0.177
n-Propylbenzene		U	0.384		U	0.0676		U	0.186
4-Chlorotoluene		U	0.365		U	0.0712		U	0.177
1,3,5-Trimethylbenzene		U	0.384		U	0.0676		U	0.186

Sample ID:	LF3BL01XA			LF3BL02XA			QC081106-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC090922-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8081A			EPA 8260/8270m		
Instrument:	Duster			AMX			Duster		
File ID:	D121723.D			A092420.D			D120305.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			9/9/2009			NA		
Date Received:	11/26/2008			9/18/2009			NA		
Date Prepared:	12/4/2008			9/22/2009			11/6/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			9/25/2009			12/3/2008		
Sample Volume (m^3):	0.493			0.489			1.000		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
tert-Butylbenzene		U	0.344		U	0.0755		U	0.167
1,2,4-Trimethylbenzene		U	0.384		U	0.0676		U	0.186
sec-Butylbenzene		U	0.344		U	0.0755		U	0.167
Phenol		U	0.490		U	0.0529		U	0.238
bis(2-Chloroethyl)ether		U	0.323		U	0.0805		U	0.157
Aniline		U	0.495		U	0.0524		U	0.241
2-Chlorophenol		U	0.359		U	0.0723		U	0.174
1,3-Dichlorobenzene		U	0.314		U	0.0827		U	0.152
1,4-Dichlorobenzene		U	0.314		U	0.0827		U	0.152
p-Isopropyltoluene		U	0.344		U	0.0755		U	0.167
Benzyl Alcohol		U	0.427		U	0.0608		U	0.207
2-Methylphenol (m-cresol)		U	0.427		U	0.0608		U	0.207
1,2-Dichlorobenzene		U	0.314		U	0.0827		U	0.152
3,4-Methylphenol (o,p-cresol)		U	0.427		U	0.0608		U	0.207
bis(2-chloroisopropyl)ether		U	0.270		U	0.0962		U	0.131
n-Butylbenzene		U	0.344		U	0.0755		U	0.167
N-nitroso-di-n-propylamine		U	0.354		U	0.0732		U	0.172
Hexachloroethane		U	0.195		U	0.133		U	0.095
1,2-Dibromo-3-Chloropropane		U	0.195		U	0.133		U	0.095
Nitrobenzene		U	0.375		U	0.0693		U	0.182
Isophorone		U	0.334		U	0.0778		U	0.162
2-Nitrophenol		U	0.332		U	0.0783		U	0.161
2,4-Dimethylphenol		U	0.378		U	0.0687		U	0.183
bis(2-Chloroethoxy)methane		U	0.267		U	0.0974		U	0.129
1,2,4-Trichlorobenzene		U	0.254		U	0.102		U	0.123
Naphthalene		U	0.360		U	0.0721		U	0.175
2,4-Dichlorophenol		U	0.283		U	0.0917		U	0.137
4-Chloroaniline		U	0.362		U	0.0718		U	0.176
Hexachlorobutadiene		U	0.177		U	0.147		U	0.086
1,2,3-Trichlorobenzene		U	0.254		U	0.102		U	0.123
4-Chloro-3-methylphenol		U	0.324		U	0.0802		U	0.157
2-Methylnaphthalene		U	0.324		U	0.0800		U	0.158
1-Methylnaphthalene		U	0.324		U	0.0800		U	0.158
Hexachlorocyclopentadiene		U	0.169		U	0.153		U	0.082
2,4,6-Trichlorophenol		U	0.234		U	0.111		U	0.113
2,4,5-Trichlorophenol		U	0.234		U	0.111		U	0.113

Sample ID:	**LF3BL01XA**			**LF3BL02XA**			**QC081106-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC090922-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8081A			EPA 8260/8270m		
Instrument:	Duster			AMX			Duster		
File ID:	D121723.D			A092420.D			D120305.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			9/9/2009			NA		
Date Received:	11/26/2008			9/18/2009			NA		
Date Prepared:	12/4/2008			9/22/2009			11/6/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			9/25/2009			12/3/2008		
Sample Volume (m^3):	0.493			0.489			1.000		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Diphenylamine		U	0.273		U	0.0952		U	0.132
Azobenzene		U	0.253		U	0.103		U	0.123
2-Chloronaphthalene		U	0.284		U	0.0915		U	0.138
2-Nitroaniline		U	0.334		U	0.0777		U	0.162
1,4-Dinitrobenzene		U	0.274		U	0.0946		U	0.133
Dimethylphthalate		U	0.238		U	0.109		U	0.115
1,3-Dinitrobenzene		U	0.274		U	0.0946		U	0.133
Acenaphthylene		U	0.303		U	0.0856		U	0.147
2,6-dinitrotoluene		U	0.253		U	0.102		U	0.123
1,2-Dinitrobenzene		U	0.274		U	0.0946		U	0.133
3-Nitroaniline		U	0.334		U	0.0777		U	0.162
Acenaphthene		U	0.299		U	0.0868		U	0.145
2,4-Dinitrophenol		U	0.251		U	0.104		U	0.122
4-Nitrophenol		U	0.332		U	0.0783		U	0.161
Dibenzofuran		U	0.274		U	0.0946		U	0.133

Sample ID:	LF3BL01XA			LF3BL02XA			QC081106-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC090922-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8081A			EPA 8260/8270m		
Instrument:	Duster			AMX			Duster		
File ID:	D121723.D			A092420.D			D120305.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			9/9/2009			NA		
Date Received:	11/26/2008			9/18/2009			NA		
Date Prepared:	12/4/2008			9/22/2009			11/6/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			9/25/2009			12/3/2008		
Sample Volume (m^3):	0.493			0.489			1.000		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene		U	0.253		U	0.102		U	0.123
2,3,4,6-Tetrachlorophenol		U	0.199		U	0.130		U	0.097
2,3,5,6-Tetrachlorophenol		U	0.199		U	0.130		U	0.097
Diethylphthalate		U	0.208		U	0.125	0.128	J	0.101
4-Chlorophenyl-phenylether		U	0.225		U	0.115		U	0.109
Fluorene		U	0.278		U	0.0935		U	0.135
4-Nitroaniline		U	0.334		U	0.0777		U	0.162
4,6-Dinitro-2-methylphenol		U	0.233		U	0.111		U	0.113
n-Nitrosodiphenylamine		U	0.233		U	0.112		U	0.113
4-Bromophenyl phenyl ether		U	0.185		U	0.140		U	0.090
Hexachlorobenzene		U	0.162		U	0.160		U	0.079
Pentachlorophenol		U	0.173		U	0.150		U	0.084
Phenanthrene		U	0.259		U	0.100		U	0.126
Anthracene		U	0.259		U	0.100		U	0.126
Carbazole		U	0.276		U	0.0941		U	0.134
Di-n-butylphthalate		BU	0.166		U	0.157	0.340		0.080
Bis(2-ethylhexyl) adipate		U	0.125		U	0.208		U	0.060
Fluoranthene		U	0.228		U	0.114		U	0.111
Pyrene		U	0.228		U	0.114		U	0.111
Butylbenzylphthalate		U	0.148		U	0.176		U	0.072
Benz[a]anthracene		U	0.202		U	0.128		U	0.098
Chrysene		U	0.202		U	0.128		U	0.098
bis(2-Ethylhexyl)phthalate		U	0.118		U	0.220	0.0597	J	0.057
Di-n-octylphthalate		U	0.118		U	0.220		U	0.057
Benzo[b]fluoranthene		U	0.183		U	0.142		U	0.089
Benzo[k]fluoranthene		U	0.183		U	0.142		U	0.089
Benzo[a]pyrene		U	0.183		U	0.142		U	0.089
Indeno[1,2,3-cd]pyrene		U	0.167		U	0.155		U	0.081
Dibenz[a,h]anthracene		U	0.166		U	0.157		U	0.080
Benzo[g,h,i]perylene		U	0.167		U	0.155		U	0.081

Sample ID:	**LF3BL01XA**			**LF3BL02XA**			**QC081106-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC090922-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8081A			EPA 8260/8270m		
Instrument:	Duster			AMX			Duster		
File ID:	D121723.D			A092420.D			D120305.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			9/9/2009			NA		
Date Received:	11/26/2008			9/18/2009			NA		
Date Prepared:	12/4/2008			9/22/2009			11/6/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/18/2008			9/25/2009			12/3/2008		
Sample Volume (m^3):	0.493			0.489			1.000		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL

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Extraction Surrogate Recoveries (%)		35	
Toluene-d8	72	37	43
4-Bromofluorobenzene	88	32	49
2-Fluorophenol	73	33	55
Phenol-d5	89	32	61
Nitrobenzene-d5	81	23	49
2-Fluorobiphenyl	92	43	56
2,4,6-Tribromophenol	92		48
p-Terphenyl-d14	86		46

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

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Sample ID:	QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes		
Preservation:	None				None		
Decanted:	None				None		
Batch QC:	QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540				EPA 3540		
Cleanup Method(s):	NA				NA		
Analysis Method:	EPA 8260/8270m				EPA 8260/8270m		
Instrument:	AMX				Duster		
File ID:	D120306.D				D121704.D		
Operator:	ERL				ERL		
Date Sampled:	NA				NA		
Date Received:	NA				NA		
Date Prepared:	11/6/2008				12/4/2008		
Date Cleanup:	NA				NA		
Date Analyzed:	12/3/2008				12/17/2008		
Sample Volume (m^3):	1.00				0.45		
Percent Solid:	NA				NA		
Prep DF:	1.00				1.00		
Analysis DF:	1.00				1.00		
Injection Volume (µl):	1.00				1.00		
Extract Volume (µl):	2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:							
1,1,1-Trichloroethane	2.60		0.336	16		U	0.371
1,2-Dichloroethane	6.41		0.453	28		U	0.500
1,1-Dichloropropene	2.81		0.404	14		U	0.446
Benzene	10.9	B	0.574	38	0.814	J	0.634
Carbon Tetrachloride	1.79	B	0.291	12		U	0.322
1,2-Dichloropropane	8.41		0.397	42		U	0.438
Trichloroethene	5.46		0.341	32		U	0.377
Dibromomethane	5.40		0.258	42		U	0.285
Bromodichloromethane	10.2		0.566	36		U	0.302
Pyridine	9.89		0.404	49		U	0.626
cis-1,3-Dichloropropene	12.9		0.605	43		U	0.446
N-nitrosodimethylamine	12.8		0.486	53		U	0.668
Toluene	12.4		0.404	61		U	0.537
trans-1,3-Dichloropropene	8.63		0.336	51		U	0.446
1,1,2-Trichloroethane	11.4		0.397	57		U	0.371
1,3-Dichloropropane	5.83		0.215	54		U	0.438
Dibromochloromethane		NA				U	0.238
1,2-Dibromoethane	6.88		0.238	58		U	0.264
Tetrachloroethene	7.63		0.270	57		U	0.299
Chlorobenzene	12.6		0.398	63		U	0.440
1,1,1,2-Tetrachloroethane	7.53		0.267	56		U	0.295
Ethylbenzene	13.1		0.422	62		U	0.466
m/p-Xylenes	14.3		0.422	68		U	0.466
Bromoform	5.42		0.177	61		U	0.196
Styrene	13.4		0.430	62		U	0.475
o-Xylene						U	0.466
1,1,2,2-Tetrachloroethane	7.99		0.267	60		U	0.295
1,2,3-Trichloropropane	8.89		0.304	59		U	0.336
Isopropylbenzene	12.6		0.373	68		U	0.412
Bromobenzene	8.73		0.285	61		U	0.315
2-Chlorotoluene	11.8		0.354	67		U	0.391
n-Propylbenzene	12.7		0.373	68		U	0.412
4-Chlorotoluene	12.1		0.354	68		U	0.391
1,3,5-Trimethylbenzene	12.6		0.373	68		U	0.412

Sample ID:	QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes		
Preservation:	None				None		
Decanted:	None				None		
Batch QC:	QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540				EPA 3540		
Cleanup Method(s):	NA				NA		
Analysis Method:	EPA 8260/8270m				EPA 8260/8270m		
Instrument:	AMX				Duster		
File ID:	D120306.D				D121704.D		
Operator:	ERL				ERL		
Date Sampled:	NA				NA		
Date Received:	NA				NA		
Date Prepared:	11/6/2008				12/4/2008		
Date Cleanup:	NA				NA		
Date Analyzed:	12/3/2008				12/17/2008		
Sample Volume (m^3):	1.00				0.45		
Percent Solid:	NA				NA		
Prep DF:	1.00				1.00		
Analysis DF:	1.00				1.00		
Injection Volume (µl):	1.00				1.00		
Extract Volume (µl):	2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL
tert-Butylbenzene	11.7		0.334	70		U	0.369
1,2,4-Trimethylbenzene	13.0		0.373	70		U	0.412
sec-Butylbenzene	11.8		0.334	71		U	0.369
Phenol	14.8		0.476	62		U	0.526
bis(2-Chloroethyl)ether	9.48		0.313	61		U	0.346
Aniline	13.4		0.481	56		U	0.532
2-Chlorophenol	11.0		0.348	63		U	0.385
1,3-Dichlorobenzene	21.9		0.305	72		U	0.337
1,4-Dichlorobenzene	21.9		0.305	72		U	0.337
p-Isopropyltoluene	11.6		0.334	70		U	0.369
Benzyl Alcohol	12.1		0.414	58		U	0.458
2-Methylphenol (m-cresol)	13.0		0.414	63		U	0.458
1,2-Dichlorobenzene	22.4		0.305	74		U	0.337
3,4-Methylphenol (o,p-cresol)	14.7		0.414	71		U	0.458
bis(2-chloroisopropyl)ether	8.45		0.262	65		U	0.289
n-Butylbenzene	11.0		0.334	66		U	0.369
N-nitroso-di-n-propylamine	12.0		0.344	70		U	0.380
Hexachloroethane	6.27		0.189	66		U	0.209
1,2-Dibromo-3-Chloropropane	6.08		0.190	64		U	0.209
Nitrobenzene	11.2		0.364	62		U	0.402
Isophorone	9.40		0.324	58		U	0.358
2-Nitrophenol	10.2		0.322	64		U	0.356
2,4-Dimethylphenol	6.27		0.367	34		U	0.405
bis(2-Chloroethoxy)methane	8.59		0.259	66		U	0.286
1,2,4-Trichlorobenzene	17.9		0.247	73		U	0.273
Naphthalene	26.7		0.350	77		U	0.386
2,4-Dichlorophenol	9.10		0.275	66		U	0.304
4-Chloroaniline	10.4		0.351	60		U	0.388
Hexachlorobutadiene	12.2		0.172	71		U	0.190
1,2,3-Trichlorobenzene	8.79		0.247	71		U	0.273
4-Chloro-3-methylphenol	9.77		0.314	62		U	0.347
2-Methylnaphthalene	11.2		0.315	71		U	0.348
1-Methylnaphthalene	11.1		0.315	71		U	0.348
Hexachlorocyclopentadiene	2.56		0.164	31		U	0.181
2,4,6-Trichlorophenol	7.11		0.227	63		U	0.251
2,4,5-Trichlorophenol	7.39		0.227	65		U	0.251

Sample ID:	**QC081106-MBS**				**QC081204-MB**		
Matrix:	XAD Tubes				XAD Tubes		
Preservation:	None				None		
Decanted:	None				None		
Batch QC:	QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540				EPA 3540		
Cleanup Method(s):	NA				NA		
Analysis Method:	EPA 8260/8270m				EPA 8260/8270m		
Instrument:	AMX				Duster		
File ID:	D120306.D				D121704.D		
Operator:	ERL				ERL		
Date Sampled:	NA				NA		
Date Received:	NA				NA		
Date Prepared:	11/6/2008				12/4/2008		
Date Cleanup:	NA				NA		
Date Analyzed:	12/3/2008				12/17/2008		
Sample Volume (m^3):	1.00				0.45		
Percent Solid:	NA				NA		
Prep DF:	1.00				1.00		
Analysis DF:	1.00				1.00		
Injection Volume (µl):	1.00				1.00		
Extract Volume (µl):	2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL
Diphenylamine	8.55		0.265	65		U	0.293
Azobenzene	7.35		0.246	60		U	0.272
2-Chloronaphthalene	8.89		0.276	65		U	0.304
2-Nitroaniline	8.43		0.324	52		U	0.358
1,4-Dinitrobenzene	7.60		0.267	57		U	0.294
Dimethylphthalate	7.97		0.231	69		U	0.255
1,3-Dinitrobenzene	8.04		0.267	60		U	0.294
Acenaphthylene	10.1		0.294	69		U	0.325
2,6-dinitrotoluene	7.72		0.246	63		U	0.272
1,2-Dinitrobenzene	7.69		0.267	58		U	0.294
3-Nitroaniline	8.03		0.324	50		U	0.358
Acenaphthene	9.59		0.291	66		U	0.321
2,4-Dinitrophenol	6.77		0.243	56		U	0.269
4-Nitrophenol	8.66		0.322	54		U	0.356
Dibenzofuran	8.75		0.266	66		U	0.294

Sample ID:	QC081106-MBS				QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes		
Preservation:	None				None		
Decanted:	None				None		
Batch QC:	QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540				EPA 3540		
Cleanup Method(s):	NA				NA		
Analysis Method:	EPA 8260/8270m				EPA 8260/8270m		
Instrument:	AMX				Duster		
File ID:	D120306.D				D121704.D		
Operator:	ERL				ERL		
Date Sampled:	NA				NA		
Date Received:	NA				NA		
Date Prepared:	11/6/2008				12/4/2008		
Date Cleanup:	NA				NA		
Date Analyzed:	12/3/2008				12/17/2008		
Sample Volume (m^3):	1.00				0.45		
Percent Solid:	NA				NA		
Prep DF:	1.00				1.00		
Analysis DF:	1.00				1.00		
Injection Volume (µl):	1.00				1.00		
Extract Volume (µl):	2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL
2,4-dinitrotoluene	7.13		0.246	58		U	0.272
2,3,4,6-Tetrachlorophenol	5.93		0.193	61		U	0.213
2,3,5,6-Tetrachlorophenol	6.18		0.193	64		U	0.213
Diethylphthalate	7.04	B	0.202	70		U	0.223
4-Chlorophenyl-phenylether	7.64		0.219	70		U	0.242
Fluorene	8.95		0.270	66		U	0.298
4-Nitroaniline	7.10		0.324	44		U	0.358
4,6-Dinitro-2-methylphenol	6.06		0.226	54		U	0.250
n-Nitrosodiphenylamine	7.49		0.226	66		U	0.250
4-Bromophenyl phenyl ether	5.94		0.180	66		U	0.199
Hexachlorobenzene	5.09		0.157	65		U	0.174
Pentachlorophenol	4.47		0.168	53		U	0.186
Phenanthrene	8.58		0.251	68		U	0.278
Anthracene	8.62		0.251	69		U	0.278
Carbazole	8.53		0.268	64		U	0.296
Di-n-butylphthalate	6.37	B	0.161	79	0.555		0.178
Bis(2-ethylhexyl) adipate	4.35		0.121	72		U	0.134
Fluoranthene	7.57		0.222	68		U	0.245
Pyrene	7.79		0.222	70		U	0.245
Butylbenzylphthalate	4.75		0.143	66		U	0.158
Benz[a]anthracene	6.81		0.196	69		U	0.217
Chrysene	6.85		0.196	70		U	0.217
bis(2-Ethylhexyl)phthalate	3.96	B	0.115	69		U	0.127
Di-n-octylphthalate	3.85		0.115	67		U	0.127
Benzo[b]fluoranthene	6.00		0.178	68		U	0.196
Benzo[k]fluoranthene	6.25		0.178	70		U	0.196
Benzo[a]pyrene	5.82		0.178	66		U	0.196
Indeno[1,2,3-cd]pyrene	5.10		0.162	63		U	0.179
Dibenz[a,h]anthracene	5.23		0.161	65		U	0.178
Benzo[g,h,i]perylene	5.29		0.162	65		U	0.179

Sample ID:	**QC081106-MBS**				**QC081204-MB**		
Matrix:	XAD Tubes				XAD Tubes		
Preservation:	None				None		
Decanted:	None				None		
Batch QC:	QC081106-MB				QC081204-MB		
Preparation Method:	EPA 3540				EPA 3540		
Cleanup Method(s):	NA				NA		
Analysis Method:	EPA 8260/8270m				EPA 8260/8270m		
Instrument:	AMX				Duster		
File ID:	D120306.D				D121704.D		
Operator:	ERL				ERL		
Date Sampled:	NA				NA		
Date Received:	NA				NA		
Date Prepared:	11/6/2008				12/4/2008		
Date Cleanup:	NA				NA		
Date Analyzed:	12/3/2008				12/17/2008		
Sample Volume (m^3):	1.00				0.45		
Percent Solid:	NA				NA		
Prep DF:	1.00				1.00		
Analysis DF:	1.00				1.00		
Injection Volume (µl):	1.00				1.00		
Extract Volume (µl):	2000.00				2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL

Extraction Surrogate Recoveries (%)		
Toluene-d8	66	64
4-Bromofluorobenzene	70	75
2-Fluorophenol	69	79
Phenol-d5	80	96
Nitrobenzene-d5	68	78
2-Fluorobiphenyl	73	87
2,4,6-Tribromophenol	68	86
p-Terphenyl-d14	61	78

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**QC090922-MB**			**QC090922-MBS**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090922-MB			QC090922-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			
File ID:	A092413.D			A092414.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	9/22/2009			9/22/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	9/25/2009			9/25/2009			
Sample Volume (m^3):	0.489			0.496			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:							
1,1,1-Trichloroethane		U	0.0822	0.168		0.0822	4
1,2-Dichloroethane		U	0.0610	0.491		0.0610	16
1,1-Dichloropropene		U	0.0684	0.135	J	0.0684	4
Benzene		U	0.0481	0.345		0.0481	14
Carbon Tetrachloride		U	0.0948	0.104	J	0.0948	2
1,2-Dichloropropane		U	0.0696	0.975		0.0696	28
Trichloroethene		U	0.0810	0.407		0.0810	10
Dibromomethane		U	0.107	1.27		0.107	24
Bromodichloromethane		U	0.101	1.01		0.101	20
Pyridine		U	0.0487	1.54		0.0487	63
cis-1,3-Dichloropropene		U	0.0684	1.13		0.0684	33
N-nitrosodimethylamine		U	0.0456	1.59		0.0456	70
Toluene		U	0.0568	1.15		0.0568	41
trans-1,3-Dichloropropene		U	0.0684	1.42		0.0684	42
1,1,2-Trichloroethane		U	0.0822	1.80		0.0822	44
1,3-Dichloropropane		U	0.0696	1.58		0.0696	46
Dibromochloromethane	0.250	J	0.128	0.140	JB	0.128	2
1,2-Dibromoethane		U	0.116	2.78		0.116	48
Tetrachloroethene		U	0.102	1.76		0.102	35
Chlorobenzene		U	0.0694	1.70		0.0694	49
1,1,1,2-Tetrachloroethane		U	0.103	2.51		0.103	49
Ethylbenzene		U	0.0654	1.71		0.0654	53
m/p-Xylenes		U	0.0654	1.90		0.0654	58
Bromoform		U	0.156	4.06		0.156	52
Styrene		U	0.0642	1.78		0.0642	56
o-Xylene		U	0.0654	1.84		0.0654	56
1,1,2,2-Tetrachloroethane		U	0.103	2.72		0.103	53
1,2,3-Trichloropropane		U	0.0908	2.66		0.0908	59
Isopropylbenzene		U	0.0741	2.18		0.0741	59
Bromobenzene		U	0.0967	2.77		0.0967	58
2-Chlorotoluene		U	0.0780	2.24		0.0780	58
n-Propylbenzene		U	0.0741	2.19		0.0741	59
4-Chlorotoluene		U	0.0780	2.29		0.0780	59
1,3,5-Trimethylbenzene		U	0.0741	2.21		0.0741	60

Sample ID:	**QC090922-MB**			**QC090922-MBS**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090922-MB			QC090922-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			
File ID:	A092413.D			A092414.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	9/22/2009			9/22/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	9/25/2009			9/25/2009			
Sample Volume (m^3):	0.489			0.496			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
tert-Butylbenzene		U	0.0827	2.44		0.0827	59
1,2,4-Trimethylbenzene		U	0.0741	2.29		0.0741	62
sec-Butylbenzene		U	0.0827	2.61		0.0827	64
Phenol		U	0.0580	2.03		0.0580	70
bis(2-Chloroethyl)ether		U	0.0881	3.02		0.0881	69
Aniline		U	0.0574	1.65		0.0574	58
2-Chlorophenol		U	0.0792	2.65		0.0792	67
1,3-Dichlorobenzene		U	0.0906	5.61		0.0906	62
1,4-Dichlorobenzene		U	0.0906	5.79		0.0906	64
p-Isopropyltoluene		U	0.0827	2.62		0.0827	64
Benzyl Alcohol		U	0.0666	2.41		0.0666	73
2-Methylphenol (m-cresol)		U	0.0666	2.30		0.0666	70
1,2-Dichlorobenzene		U	0.0906	5.79		0.0906	64
3,4-Methylphenol (o,p-cresol)		U	0.0666	2.36		0.0666	71
bis(2-chloroisopropyl)ether		U	0.105	3.74		0.105	71
n-Butylbenzene		U	0.0827	2.62		0.0827	64
N-nitroso-di-n-propylamine		U	0.0802	3.04		0.0802	76
Hexachloroethane		U	0.146	4.53		0.146	62
1,2-Dibromo-3-Chloropropane		U	0.146	4.70		0.146	65
Nitrobenzene		U	0.0759	2.57		0.0759	68
Isophorone		U	0.0852	2.98		0.0852	70
2-Nitrophenol		U	0.0857	3.02		0.0857	71
2,4-Dimethylphenol		U	0.0753	1.75		0.0753	47
bis(2-Chloroethoxy)methane		U	0.107	3.74		0.107	70
1,2,4-Trichlorobenzene		U	0.112	7.42		0.112	67
Naphthalene		U	0.0790	5.43		0.0790	69
2,4-Dichlorophenol		U	0.100	3.55		0.100	71
4-Chloroaniline		U	0.0786	2.52		0.0786	65
Hexachlorobutadiene		U	0.161	11.0		0.161	69
1,2,3-Trichlorobenzene		U	0.112	3.73		0.112	67
4-Chloro-3-methylphenol		U	0.0879	3.22		0.0879	74
2-Methylnaphthalene		U	0.0876	3.21		0.0876	74
1-Methylnaphthalene		U	0.0876	3.17		0.0876	73
Hexachlorocyclopentadiene		U	0.168	4.65		0.168	56
2,4,6-Trichlorophenol		U	0.122	4.76		0.122	79
2,4,5-Trichlorophenol		U	0.122	4.94		0.122	82

Sample ID:	**QC090922-MB**			**QC090922-MBS**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090922-MB			QC090922-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			
File ID:	A092413.D			A092414.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	9/22/2009			9/22/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	9/25/2009			9/25/2009			
Sample Volume (m^3):	0.489			0.496			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
Diphenylamine		U	0.104	4.36		0.104	84
Azobenzene		U	0.112	4.37		0.112	78
2-Chloronaphthalene		U	0.100	3.78		0.100	76
2-Nitroaniline		U	0.0851	3.32		0.0851	78
1,4-Dinitrobenzene		U	0.104	4.15		0.104	81
Dimethylphthalate		U	0.120	5.21		0.120	87
1,3-Dinitrobenzene		U	0.104	4.10		0.104	80
Acenaphthylene		U	0.0938	3.81		0.0938	82
2,6-dinitrotoluene		U	0.112	4.88		0.112	87
1,2-Dinitrobenzene		U	0.104	3.98		0.104	77
3-Nitroaniline		U	0.0851	3.42		0.0851	81
Acenaphthene		U	0.0950	3.69		0.0950	78
2,4-Dinitrophenol		U	0.113	2.83		0.113	50
4-Nitrophenol		U	0.0857	3.12		0.0857	73
Dibenzofuran		U	0.104	4.15		0.104	80

Sample ID:	**QC090922-MB**			**QC090922-MBS**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090922-MB			QC090922-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			
File ID:	A092413.D			A092414.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	9/22/2009			9/22/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	9/25/2009			9/25/2009			
Sample Volume (m^3):	0.489			0.496			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
2,4-dinitrotoluene		U	0.112	4.85		0.112	87
2,3,4,6-Tetrachlorophenol		U	0.143	5.67		0.143	80
2,3,5,6-Tetrachlorophenol		U	0.143	6.04		0.143	85
Diethylphthalate		U	0.137	5.66		0.137	83
4-Chlorophenyl-phenylether		U	0.126	5.29		0.126	84
Fluorene		U	0.102	4.16		0.102	82
4-Nitroaniline		U	0.0851	3.51		0.0851	83
4,6-Dinitro-2-methylphenol		U	0.122	4.65		0.122	77
n-Nitrosodiphenylamine		U	0.122	5.00		0.122	82
4-Bromophenyl phenyl ether		U	0.153	6.24		0.153	82
Hexachlorobenzene		U	0.175	7.34		0.175	84
Pentachlorophenol		U	0.164	5.76		0.164	71
Phenanthrene		U	0.110	4.41		0.110	81
Anthracene		U	0.110	4.25		0.110	78
Carbazole		U	0.103	4.09		0.103	80
Di-n-butylphthalate		U	0.172	7.17		0.172	84
Bis(2-ethylhexyl) adipate		U	0.228	9.55		0.228	84
Fluoranthene		U	0.125	5.13		0.125	83
Pyrene		U	0.125	5.13		0.125	83
Butylbenzylphthalate		U	0.192	7.80		0.192	81
Benz[a]anthracene		U	0.141	5.65		0.141	81
Chrysene		U	0.141	5.67		0.141	81
bis(2-Ethylhexyl)phthalate		U	0.241	9.80		0.241	82
Di-n-octylphthalate		U	0.241	10.06		0.241	84
Benzo[b]fluoranthene		U	0.155	6.56		0.155	85
Benzo[k]fluoranthene		U	0.155	6.65		0.155	86
Benzo[a]pyrene		U	0.155	6.48		0.155	84
Indeno[1,2,3-cd]pyrene		U	0.170	7.33		0.170	86
Dibenz[a,h]anthracene		U	0.172	7.50		0.172	88
Benzo[g,h,i]perylene		U	0.170	7.16		0.170	85

Sample ID:	**QC090922-MB**			**QC090922-MBS**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090922-MB			QC090922-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			
File ID:	A092413.D			A092414.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	9/22/2009			9/22/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	9/25/2009			9/25/2009			
Sample Volume (m^3):	0.489			0.496			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
	55			39			
Extraction Surrogate Recoveries	82			62			
Toluene-d8	80			69			
4-Bromofluorobenzene	86			77			
2-Fluorophenol	84			70			
Phenol-d5	85			80			
Nitrobenzene-d5	89			86			
2-Fluorobiphenyl	99			94			
2,4,6-Tribromophenol							
p-Terphenyl-d14							

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

LF3

Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard Deviation	Range	Minimum	Maximum	Count
Benzene	6.96	6.46	7.36	13.7	0.603	14.3	4
Carbon Tetrachloride	0.490	0.535	0.179	0.349	0.293	0.642	3
1,2-Dichloropropane	0.777	0.777	0.0209	0.0296	0.762	0.792	2
Trichloroethene	1.37	1.37	0.153	0.217	1.26	1.48	2
Toluene	6.69	0.509	8.87	16.5	0.0637	16.6	5
Dibromochloromethane	0.429	0.460	0.102	0.227	0.285	0.513	4
Tetrachloroethene	0.475	0.475	0	0.00538	0.473	0.478	2
p-Isopropyltoluene	0.447	0.447	N/A	0	0.447	0.447	1
2-Methylnaphthalene	0.175	0.175	0.0533	0.0753	0.137	0.212	2
1-Methylnaphthalene	0.114	0.114	0.0331	0.0468	0.0905	0.137	2
Diethylphthalate	0.546	0.546	N/A	0	0.546	0.546	1
Di-n-butylphthalate	0.759	0.431	0.704	1.45	0.364	1.81	4

LF3

Descriptive Statistics

Biogas

Analyte	Mean	Median	Standard Deviation	Range	Minimum	Maximum	Count
Benzene	1.10	1.22	0.247	0.450	0.814	1.26	3
Carbon Tetrachloride	0.482	0.442	0.180	0.354	0.325	0.679	3
Toluene	35.1	27.2	19.8	42.9	21.6	64.4	4
Tetrachloroethene	2.16	1.82	1.19	2.67	1.16	3.84	4
Chlorobenzene	1.77	1.62	0.416	0.928	1.44	2.37	4
Ethylbenzene	56.6	51.0	14.5	31.4	46.5	77.9	4
m/p-Xylenes	71.4	64.5	20.2	43.4	56.7	100	4
Styrene	11.1	10.6	1.89	3.99	9.55	13.5	4
o-Xylene	48.4	44.7	9.66	21.2	41.5	62.6	4
1,1,2,2-Tetrachloroethane	0.473	0.457	0.128	0.304	0.338	0.641	4
Isopropylbenzene	11.1	10.4	1.67	3.63	9.94	13.6	4
2-Chlorotoluene	4.85	5.06	0.812	1.73	3.77	5.50	4
n-Propylbenzene	13.9	13.3	2.14	4.56	12.3	16.8	4
4-Chlorotoluene	3.77	3.77	N/A	0	3.77	3.77	1
1,3,5-Trimethylbenzene	46.6	45.2	7.32	17.3	39.4	56.6	4
tert-Butylbenzene	11.3	11.3	1.13	1.59	10.5	12.1	2
1,2,4-Trimethylbenzene	128	128	6.24	8.83	124	133	2
sec-Butylbenzene	10.5	10.4	0.978	1.95	9.61	11.6	3
Phenol	1.46	1.46	0.291	0.411	1.25	1.67	2
bis(2-Chloroethyl)ether	1	1	0.2	0.2	0.7	1	2
1,4-Dichlorobenzene	112	110	31	67	79	147	4
p-Isopropyltoluene	661	704	126.8	242.3	518	760	3
Benzyl Alcohol	229	229	19.8	28.0	215	243	2
1,2-Dichlorobenzene	1.59	1.51	0.26	1	1.38	1.97	4
3,4-Methylphenol (o,p-cresol)	1.23	1.23	N/A	0.00	1.23	1.2	1
n-Butylbenzene	9.58	9.19	1.66	3.56	8.18	11.7	4
1,2,4-Trichlorobenzene	1	1	0.2	0	0.5	1	4
Naphthalene	146	149	71.6	148	69.2	217	4
4-Chloroaniline	3.38	3.38	N/A	0.00	3.38	3.38	1
1,2,3-Trichlorobenzene	0.428	0.428	N/A	0.000	0.428	0.428	1
2-Methylnaphthalene	25.7	27.7	9.40	19.3	14.1	33.4	4
1-Methylnaphthalene	12.1	12.5	3.77	8.17	7.61	15.8	4
Acenaphthene	2.10	1.68	1.44	3.32	0.869	4.19	4
4-Nitrophenol	2.08	2.03	0.14	0	1.98	2.29	4
Dibenzofuran	1.18	0.912	0.898	1.734	0.452	2.19	3
Diethylphthalate	0.962	0.962	N/A	0.00	0.962	0.962	1
Fluorene	0.839	0.839	0.475	0.672	0.503	1.17	2
Di-n-butylphthalate	0.841	0.530	0.674	1.40	0.453	1.85	4

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF4BG01XA**			**LF4BL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes	
Preservation:	None			None			None	
Decanted:	None			None			None	
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster			Duster	
File ID:	D012021.D			D012020.D			D012016.D	
Operator:	ERL			ERL			ERL	
Date Sampled:	12/10/2008			12/10/2008			NA	
Date Received:	1/8/2009			1/8/2009			NA	
Date Prepared:	1/12/2009			1/14/2009			1/14/2009	
Date Cleanup:	NA			NA			NA	
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009	
Sample Volume (m^3):	0.48			0.44			0.44	
Percent Solid:	NA			NA			NA	
Prep DF:	1.00			1.00			1.00	
Analysis DF:	1.00			1.00			1.00	
Injection Volume (µl):	1.00			1.00			1.00	
Extract Volume (µl):	2000			2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL
VOC & SVOC COMPOUNDS:								
1,1,1-Trichloroethane		U	0.356		U	0.388		U 0.381
1,2-Dichloroethane		U	0.479		U	0.523		U 0.514
1,1-Dichloropropene		U	0.428		U	0.467		U 0.458
Benzene	0.876	JB	0.607	0.786	JB	0.663	0.889	J 0.651
Carbon Tetrachloride	0.411	JB	0.308	0.430	JB	0.337	0.724	0.331
1,2-Dichloropropane		U	0.420		U	0.458		U 0.450
Trichloroethene		U	0.361		U	0.394		U 0.387
Dibromomethane		U	0.273		U	0.298		U 0.293
Bromodichloromethane		U	0.290		U	0.316		U 0.310
Pyridine		U	0.600		U	0.655		U 0.643
cis-1,3-Dichloropropene		U	0.428		U	0.467		U 0.458
N-nitrosodimethylamine		U	0.641		U	0.699		U 0.686
Toluene	6.31		0.515		U	0.562		U 0.552
trans-1,3-Dichloropropene		U	0.428		U	0.467		U 0.458
1,1,2-Trichloroethane		U	0.356		U	0.388		U 0.381
1,3-Dichloropropane		U	0.420		U	0.458		U 0.450
Dibromochloromethane	1.28	B	0.228	1.85	B	0.249	2.01	0.244
1,2-Dibromoethane		U	0.253		U	0.276		U 0.271
Tetrachloroethene	0.630		0.286		U	0.312		U 0.307
Chlorobenzene	0.555	J	0.422		U	0.460		U 0.452
1,1,1,2-Tetrachloroethane		U	0.283		U	0.309		U 0.303
Ethylbenzene	61.5		0.447		U	0.488		U 0.479
m/p-Xylenes	98.2		0.447	0.524	J	0.488		U 0.479
Bromoform		U	0.188		U	0.205		U 0.201
Styrene	9.53		0.456		U	0.497		U 0.488
o-Xylene	69.4		0.447		U	0.488		U 0.479
1,1,2,2-Tetrachloroethane		U	0.283		U	0.309		U 0.303
1,2,3-Trichloropropane		U	0.322		U	0.351		U 0.345
Isopropylbenzene	14.3		0.395		U	0.431		U 0.423
Bromobenzene		U	0.302		U	0.330		U 0.324
2-Chlorotoluene		U	0.375		U	0.409		U 0.402
n-Propylbenzene	23.9		0.395		U	0.431		U 0.423
4-Chlorotoluene		U	0.375		U	0.409		U 0.402
1,3,5-Trimethylbenzene	77.4		0.395		U	0.431		U 0.423
tert-Butylbenzene		U	0.354		U	0.386		U 0.379
1,2,4-Trimethylbenzene	271	D	0.395	395	U	0.431		U 0.423
sec-Butylbenzene	15.7		0.354		U	0.386		U 0.379
Phenol		U	0.504		U	0.550		U 0.540
bis(2-Chloroethyl)ether		U	0.332		U	0.362		U 0.356
Aniline		U	0.509		U	0.556		U 0.546
2-Chlorophenol		U	0.369		U	0.403		U 0.396

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF4BG01XA			LF4BL01XA			QC090114-MB	
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes	
Preservation:	None			None			None	
Decanted:	None			None			None	
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster			Duster	
File ID:	D012021.D			D012020.D			D012016.D	
Operator:	ERL			ERL			ERL	
Date Sampled:	12/10/2008			12/10/2008			NA	
Date Received:	1/8/2009			1/8/2009			NA	
Date Prepared:	1/12/2009			1/14/2009			1/14/2009	
Date Cleanup:	NA			NA			NA	
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009	
Sample Volume (m^3):	0.48			0.44			0.44	
Percent Solid:	NA			NA			NA	
Prep DF:	1.00			1.00			1.00	
Analysis DF:	1.00			1.00			1.00	
Injection Volume (µl):	1.00			1.00			1.00	
Extract Volume (µl):	2000			2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL
VOC & SVOC COMPOUNDS:								
1,3-Dichlorobenzene		U	0.323		U	0.352		U 0.346
1,4-Dichlorobenzene		U	0.323		U	0.352		U 0.346
p-Isopropyltoluene	768	D	0.354		U	0.386		U 0.379
Benzyl Alcohol		U	0.439		U	0.479		U 0.470
2-Methylphenol (m-cresol)		U	0.439		U	0.479		U 0.470
1,2-Dichlorobenzene	2.11		0.323		U	0.352		U 0.346
3,4-Methylphenol (o,p-cresol)		U	0.439		U	0.479		U 0.470
bis(2-chloroisopropyl)ether		U	0.277		U	0.303		U 0.297
n-Butylbenzene		U	0.354		U	0.386		U 0.379
N-nitroso-di-n-propylamine		U	0.364		U	0.398		U 0.391
Hexachloroethane		U	0.200		U	0.219		U 0.215
1,2-Dibromo-3-Chloropropane		U	0.201		U	0.219		U 0.215
Nitrobenzene		U	0.385		U	0.421		U 0.413
Isophorone		U	0.343		U	0.375		U 0.368
2-Nitrophenol		U	0.341		U	0.372		U 0.366
2,4-Dimethylphenol		U	0.388		U	0.424		U 0.416
bis(2-Chloroethoxy)methane		U	0.274		U	0.299		U 0.294
1,2,4-Trichlorobenzene	1.29		0.261		U	0.285		U 0.280
Naphthalene	101		0.370		U	0.404		U 0.397
2,4-Dichlorophenol		U	0.291		U	0.318		U 0.312
4-Chloroaniline		U	0.372		U	0.406		U 0.399
Hexachlorobutadiene		U	0.182		U	0.199		U 0.195
1,2,3-Trichlorobenzene	0.317	J	0.261		U	0.285		U 0.280
4-Chloro-3-methylphenol		U	0.333		U	0.363		U 0.357
2-Methylnaphthalene	13.8		0.334		U	0.364		U 0.358
1-Methylnaphthalene	7.27		0.334		U	0.364		U 0.358
Hexachlorocyclopentadiene		U	0.174		U	0.190		U 0.186
2,4,6-Trichlorophenol		U	0.240		U	0.262		U 0.258
2,4,5-Trichlorophenol		U	0.240		U	0.262		U 0.258
Diphenylamine		U	0.280		U	0.306		U 0.301
Azobenzene		U	0.260		U	0.284		U 0.279
2-Chloronaphthalene		U	0.292		U	0.318		U 0.313
2-Nitroaniline		U	0.344		U	0.375		U 0.368
1,4-Dinitrobenzene		U	0.282		U	0.308		U 0.302
Dimethylphthalate		U	0.244		U	0.267		U 0.262

VOC and SVOC Compounds
EPA 8270M

Sample ID:	LF4BG01XA			LF4BL01XA			QC090114-MB	
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes	
Preservation:	None			None			None	
Decanted:	None			None			None	
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster			Duster	
File ID:	D012021.D			D012020.D			D012016.D	
Operator:	ERL			ERL			ERL	
Date Sampled:	12/10/2008			12/10/2008			NA	
Date Received:	1/8/2009			1/8/2009			NA	
Date Prepared:	1/12/2009			1/14/2009			1/14/2009	
Date Cleanup:	NA			NA			NA	
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009	
Sample Volume (m^3):	0.48			0.44			0.44	
Percent Solid:	NA			NA			NA	
Prep DF:	1.00			1.00			1.00	
Analysis DF:	1.00			1.00			1.00	
Injection Volume (µl):	1.00			1.00			1.00	
Extract Volume (µl):	2000			2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL
VOC & SVOC COMPOUNDS:								
1,3-Dinitrobenzene		U	0.282		U	0.308		U 0.302
Acenaphthylene		U	0.312		U	0.340		U 0.334
2,6-dinitrotoluene		U	0.261		U	0.284		U 0.279
1,2-Dinitrobenzene		U	0.282		U	0.308		U 0.302
3-Nitroaniline		U	0.344		U	0.375		U 0.368
Acenaphthene	1.47		0.308		U	0.336		U 0.330
2,4-Dinitrophenol		U	0.258		U	0.281		U 0.276
4-Nitrophenol		U	0.341		U	0.372		U 0.366
Dibenzofuran	0.582		0.282		U	0.308		U 0.302
2,4-dinitrotoluene		U	0.261		U	0.284		U 0.279
2,3,4,6-Tetrachlorophenol		U	0.205		U	0.223		U 0.219
2,3,5,6-Tetrachlorophenol		U	0.205		U	0.223		U 0.219
Diethylphthalate		U	0.214		U	0.233		U 0.229
4-Chlorophenyl-phenylether		U	0.232		U	0.253		U 0.248
Fluorene	0.438	J	0.285		U	0.312		U 0.306
4-Nitroaniline		U	0.344		U	0.375		U 0.368
4,6-Dinitro-2-methylphenol		U	0.239		U	0.261		U 0.257
n-Nitrosodiphenylamine		U	0.239		U	0.261		U 0.257
4-Bromophenyl phenyl ether		U	0.190		U	0.208		U 0.204
Hexachlorobenzene		U	0.167		U	0.182		U 0.179
Pentachlorophenol		U	0.178		U	0.194		U 0.191
Phenanthrene		U	0.266		U	0.291		U 0.285
Anthracene		U	0.266		U	0.291		U 0.285
Carbazole		U	0.284		U	0.310		U 0.304
Di-n-butylphthalate		U	0.170	0.910	B	0.186	0.813	0.183
Bis(2-ethylhexyl) adipate		U	0.128		U	0.140		U 0.137
Fluoranthene		U	0.235		U	0.256		U 0.251
Pyrene		U	0.235		U	0.256		U 0.251
Butylbenzylphthalate		U	0.152		U	0.166		U 0.163
Benz[a]anthracene		U	0.208		U	0.227		U 0.223
Chrysene		U	0.208		U	0.227		U 0.223
bis(2-Ethylhexyl)phthalate		U	0.121		U	0.133		U 0.130
Di-n-octylphthalate		U	0.121		U	0.133		U 0.130
Benzo[b]fluoranthene		U	0.188		U	0.205		U 0.202
Benzo[k]fluoranthene		U	0.188		U	0.205		U 0.202
Benzo[a]pyrene		U	0.188		U	0.205		U 0.202
Indeno[1,2,3-cd]pyrene		U	0.172		U	0.187		U 0.184
Dibenz[a,h]anthracene		U	0.170		U	0.186		U 0.183
Benzo[g,h,i]perylene		U	0.172		U	0.187		U 0.184

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**LF4BG01XA**			**LF4BL01XA**			**QC090114-MB**	
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes	
Preservation:	None			None			None	
Decanted:	None			None			None	
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB	
Preparation Method:	EPA 3540			EPA 3540			EPA 3540	
Cleanup Method(s):	NA			NA			NA	
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m			EPA 8260/8270m	
Instrument:	Duster			Duster			Duster	
File ID:	D012021.D			D012020.D			D012016.D	
Operator:	ERL			ERL			ERL	
Date Sampled:	12/10/2008			12/10/2008			NA	
Date Received:	1/8/2009			1/8/2009			NA	
Date Prepared:	1/12/2009			1/14/2009			1/14/2009	
Date Cleanup:	NA			NA			NA	
Date Analyzed:	1/21/2009			1/21/2009			1/21/2009	
Sample Volume (m^3):	0.48			0.44			0.44	
Percent Solid:	NA			NA			NA	
Prep DF:	1.00			1.00			1.00	
Analysis DF:	1.00			1.00			1.00	
Injection Volume (µl):	1.00			1.00			1.00	
Extract Volume (µl):	2000			2000			2000	
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	EDL

VOC & SVOC COMPOUNDS:

Extraction Surrogate Recoveries (%)			
Toluene-d8	81	67	71
4-Bromofluorobenzene	100	112	81
2-Fluorophenol	59	75	90
Phenol-d5	81	116	128
Nitrobenzene-d5	98	109	99
2-Fluorobiphenyl	94	93	91
2,4,6-Tribromophenol	29	79	86
p-Terphenyl-d14	97	88	82

NA - Not applicable.
B - Analyte detected in the Method Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	WWTP1BM01XA			WWTP1BM02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121708.D			D121709.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3):	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.299		U	0.351
1,2-Dichloroethane		U	0.403		U	0.473
1,1-Dichloropropene		U	0.359		U	0.422
Benzene	0.611	JB	0.511	0.829	JB	0.599
Carbon Tetrachloride		U	0.259	0.309	J	0.304
1,2-Dichloropropane		U	0.353		U	0.414
Trichloroethene		U	0.304		U	0.356
Dibromomethane		U	0.229		U	0.269
Bromodichloromethane		U	0.243		U	0.286
Pyridine		U	0.504		U	0.592
cis-1,3-Dichloropropene		U	0.359		U	0.422
N-nitrosodimethylamine		U	0.538		U	0.632
Toluene		U	0.433		U	0.508
trans-1,3-Dichloropropene		U	0.359		U	0.422
1,1,2-Trichloroethane		U	0.299		U	0.351
1,3-Dichloropropane		U	0.353		U	0.414
Dibromochloromethane		U	0.191		U	0.225
1,2-Dibromoethane		U	0.212		U	0.249
Tetrachloroethene		U	0.241		U	0.282
Chlorobenzene		U	0.354		U	0.416
1,1,1,2-Tetrachloroethane		U	0.238		U	0.279
Ethylbenzene		U	0.376		U	0.441
m/p-Xylenes		U	0.376		U	0.441
Bromoform		U	0.158		U	0.185
Styrene		U	0.383		U	0.449
o-Xylene		U	0.376		U	0.441
1,1,2,2-Tetrachloroethane		U	0.238	0.421	J	0.279
1,2,3-Trichloropropane		U	0.270		U	0.317
Isopropylbenzene		U	0.332		U	0.389
Bromobenzene		U	0.254		U	0.298
2-Chlorotoluene		U	0.315		U	0.370
n-Propylbenzene		U	0.332		U	0.389

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121708.D			D121709.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3):	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4-Chlorotoluene		U	0.315		U	0.370
1,3,5-Trimethylbenzene		U	0.332		U	0.389
tert-Butylbenzene		U	0.297		U	0.349
1,2,4-Trimethylbenzene		U	0.332		U	0.389
sec-Butylbenzene		U	0.297		U	0.349
Phenol		U	0.424		U	0.497
bis(2-Chloroethyl)ether		U	0.279		U	0.327
Aniline		U	0.428		U	0.502
2-Chlorophenol		U	0.310		U	0.364
1,3-Dichlorobenzene		U	0.271		U	0.318
1,4-Dichlorobenzene		U	0.271		U	0.318
p-Isopropyltoluene		U	0.297	0.403	J	0.349
Benzyl Alcohol		U	0.369		U	0.433
2-Methylphenol (m-cresol)		U	0.369		U	0.433
1,2-Dichlorobenzene		U	0.271		U	0.318
3,4-Methylphenol (o,p-cresol)		U	0.369		U	0.433
bis(2-chloroisopropyl)ether		U	0.233		U	0.274
n-Butylbenzene		U	0.297		U	0.349
N-nitroso-di-n-propylamine		U	0.306		U	0.359
Hexachloroethane		U	0.168		U	0.198
1,2-Dibromo-3-Chloropropane		U	0.169		U	0.198
Nitrobenzene		U	0.324		U	0.380
Isophorone		U	0.289		U	0.339
2-Nitrophenol		U	0.287		U	0.336
2,4-Dimethylphenol		U	0.326		U	0.383
bis(2-Chloroethoxy)methane		U	0.230		U	0.270
1,2,4-Trichlorobenzene		U	0.220		U	0.258
Naphthalene		U	0.311		U	0.365
2,4-Dichlorophenol		U	0.245		U	0.287
4-Chloroaniline		U	0.313		U	0.367
Hexachlorobutadiene		U	0.153		U	0.179
1,2,3-Trichlorobenzene		U	0.220		U	0.258
4-Chloro-3-methylphenol		U	0.280		U	0.328

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121708.D			D121709.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3):	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Methylnaphthalene		U	0.280		U	0.329
1-Methylnaphthalene		U	0.280		U	0.329
Hexachlorocyclopentadiene		U	0.146		U	0.172
2,4,6-Trichlorophenol		U	0.202		U	0.237
2,4,5-Trichlorophenol		U	0.202		U	0.237
Diphenylamine		U	0.236		U	0.277
Azobenzene		U	0.219		U	0.257
2-Chloronaphthalene		U	0.245		U	0.288
2-Nitroaniline		U	0.289		U	0.339
1,4-Dinitrobenzene		U	0.237		U	0.278
Dimethylphthalate		U	0.205		U	0.241
1,3-Dinitrobenzene		U	0.237		U	0.278
Acenaphthylene		U	0.262		U	0.307
2,6-dinitrotoluene		U	0.219		U	0.257
1,2-Dinitrobenzene		U	0.237		U	0.278
3-Nitroaniline		U	0.289		U	0.339
Acenaphthene		U	0.259		U	0.303
2,4-Dinitrophenol		U	0.217		U	0.254
4-Nitrophenol		U	0.287		U	0.336
Dibenzofuran		U	0.237		U	0.278
2,4-dinitrotoluene		U	0.219		U	0.257
2,3,4,6-Tetrachlorophenol		U	0.172		U	0.202
2,3,5,6-Tetrachlorophenol		U	0.172		U	0.202
Diethylphthalate		U	0.179		U	0.211
4-Chlorophenyl-phenylether		U	0.195		U	0.229
Fluorene		U	0.240		U	0.282
4-Nitroaniline		U	0.289		U	0.339

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121708.D			D121709.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3):	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4,6-Dinitro-2-methylphenol		U	0.201		U	0.236
n-Nitrosodiphenylamine		U	0.201		U	0.236
4-Bromophenyl phenyl ether		U	0.160		U	0.188
Hexachlorobenzene		U	0.140		U	0.164
Pentachlorophenol		U	0.150		U	0.176
Phenanthrene		U	0.224		U	0.263
Anthracene		U	0.224		U	0.263
Carbazole		U	0.238		U	0.280
Di-n-butylphthalate		U	0.143		U	0.168
Bis(2-ethylhexyl) adipate		U	0.108		U	0.126
Fluoranthene		U	0.197		U	0.231
Pyrene		U	0.197		U	0.231
Butylbenzylphthalate		U	0.128		U	0.150
Benz[a]anthracene		U	0.175		U	0.205
Chrysene		U	0.175		U	0.205
bis(2-Ethylhexyl)phthalate		U	0.102		U	0.120
Di-n-octylphthalate		U	0.102		U	0.120
Benzo[b]fluoranthene		U	0.158		U	0.185
Benzo[k]fluoranthene		U	0.158		U	0.185
Benzo[a]pyrene		U	0.158		U	0.185
Indeno[1,2,3-cd]pyrene		U	0.144		U	0.169
Dibenz[a,h]anthracene		U	0.143		U	0.168
Benzo[g,h,i]perylene		U	0.144		U	0.169

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121708.D			D121709.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3):	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Extraction Surrogate Recoveries (%)						
Toluene-d8	84			81		
4-Bromofluorobenzene	93			93		
2-Fluorophenol	85			82		
Phenol-d5	96			94		
Nitrobenzene-d5	79			80		
2-Fluorobiphenyl	88			89		
2,4,6-Tribromophenol	70			76		
p-Terphenyl-d14	88			89		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM03XA**			**WWTP1BG01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121713.D			D121710.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3):	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.363		U	0.443
1,2-Dichloroethane		U	0.489		U	0.597
1,1-Dichloropropene		U	0.436		U	0.532
Benzene	0.670	JB	0.620	1.14	JB	0.756
Carbon Tetrachloride		U	0.315	0.410	J	0.384
1,2-Dichloropropane		U	0.429		U	0.523
Trichloroethene		U	0.368		U	0.450
Dibromomethane		U	0.279		U	0.340
Bromodichloromethane		U	0.296		U	0.361
Pyridine		U	0.612		U	0.747
cis-1,3-Dichloropropene		U	0.436		U	0.532
N-nitrosodimethylamine		U	0.654		U	0.798
Toluene		U	0.525	2.94		0.641
trans-1,3-Dichloropropene		U	0.436		U	0.532
1,1,2-Trichloroethane		U	0.363		U	0.443
1,3-Dichloropropane		U	0.429		U	0.523
Dibromochloromethane		U	0.232		U	0.284
1,2-Dibromoethane		U	0.258		U	0.314
Tetrachloroethene		U	0.292		U	0.356
Chlorobenzene		U	0.430		U	0.525
1,1,1,2-Tetrachloroethane		U	0.288		U	0.352
Ethylbenzene		U	0.456	1.44		0.556
m/p-Xylenes		U	0.456	1.37		0.556
Bromoform		U	0.192		U	0.234
Styrene		U	0.465		U	0.567
o-Xylene		U	0.456	0.918	J	0.556
1,1,2,2-Tetrachloroethane	0.466	J	0.288		U	0.352
1,2,3-Trichloropropane		U	0.328		U	0.401
Isopropylbenzene		U	0.403		U	0.492
Bromobenzene		U	0.308		U	0.376
2-Chlorotoluene		U	0.382		U	0.467
n-Propylbenzene		U	0.403	0.756	J	0.492

VOC and SVOC Compounds
EPA 8270M

Sample ID:	WWTP1BM03XA			WWTP1BG01XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121713.D			D121710.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3):	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4-Chlorotoluene		U	0.382		U	0.467
1,3,5-Trimethylbenzene		U	0.403	2.97		0.492
tert-Butylbenzene		U	0.361		U	0.440
1,2,4-Trimethylbenzene		U	0.403			0.492
sec-Butylbenzene		U	0.361	0.457	J	0.440
Phenol		U	0.514		U	0.628
bis(2-Chloroethyl)ether		U	0.339		U	0.413
Aniline		U	0.520		U	0.634
2-Chlorophenol		U	0.377		U	0.460
1,3-Dichlorobenzene		U	0.329		U	0.402
1,4-Dichlorobenzene		U	0.329	92.9		0.402
p-Isopropyltoluene	0.403	J	0.361	28.4	D	0.440
Benzyl Alcohol		U	0.448		U	0.546
2-Methylphenol (m-cresol)		U	0.448		U	0.546
1,2-Dichlorobenzene		U	0.329		U	0.402
3,4-Methylphenol (o,p-cresol)		U	0.448		U	0.546
bis(2-chloroisopropyl)ether		U	0.283		U	0.345
n-Butylbenzene		U	0.361	1.15		0.440
N-nitroso-di-n-propylamine		U	0.372		U	0.454
Hexachloroethane		U	0.205		U	0.250
1,2-Dibromo-3-Chloropropane		U	0.205		U	0.250
Nitrobenzene		U	0.393		U	0.480
Isophorone		U	0.350		U	0.427
2-Nitrophenol		U	0.348		U	0.425
2,4-Dimethylphenol		U	0.396		U	0.484
bis(2-Chloroethoxy)methane		U	0.280		U	0.341
1,2,4-Trichlorobenzene		U	0.267		U	0.326
Naphthalene		U	0.378	2.34		0.461
2,4-Dichlorophenol		U	0.297		U	0.362
4-Chloroaniline		U	0.380		U	0.463
Hexachlorobutadiene		U	0.186		U	0.227
1,2,3-Trichlorobenzene		U	0.267		U	0.326
4-Chloro-3-methylphenol		U	0.340		U	0.414

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM03XA**			**WWTP1BG01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121713.D			D121710.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3):	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Methylnaphthalene		U	0.340	2.56		0.415
1-Methylnaphthalene		U	0.340	1.25		0.415
Hexachlorocyclopentadiene		U	0.178		U	0.217
2,4,6-Trichlorophenol		U	0.245		U	0.299
2,4,5-Trichlorophenol		U	0.245		U	0.299
Diphenylamine		U	0.286		U	0.349
Azobenzene		U	0.266		U	0.324
2-Chloronaphthalene		U	0.298		U	0.363
2-Nitroaniline		U	0.351		U	0.428
1,4-Dinitrobenzene		U	0.288		U	0.351
Dimethylphthalate		U	0.249		U	0.304
1,3-Dinitrobenzene		U	0.288		U	0.351
Acenaphthylene		U	0.318		U	0.388
2,6-dinitrotoluene		U	0.266		U	0.324
1,2-Dinitrobenzene		U	0.288		U	0.351
3-Nitroaniline		U	0.351		U	0.428
Acenaphthene		U	0.314		U	0.383
2,4-Dinitrophenol		U	0.263		U	0.321
4-Nitrophenol		U	0.348	2.60		0.425
Dibenzofuran		U	0.288		U	0.351
2,4-dinitrotoluene		U	0.266		U	0.324
2,3,4,6-Tetrachlorophenol		U	0.209		U	0.255
2,3,5,6-Tetrachlorophenol		U	0.209		U	0.255
Diethylphthalate		U	0.218		U	0.266
4-Chlorophenyl-phenylether		U	0.237		U	0.289
Fluorene		U	0.291		U	0.355
4-Nitroaniline		U	0.351		U	0.428

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM03XA**			**WWTP1BG01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121713.D			D121710.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3):	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4,6-Dinitro-2-methylphenol		U	0.244		U	0.298
n-Nitrosodiphenylamine		U	0.244		U	0.298
4-Bromophenyl phenyl ether		U	0.194		U	0.237
Hexachlorobenzene		U	0.170		U	0.207
Pentachlorophenol		U	0.182		U	0.222
Phenanthrene		U	0.272		U	0.331
Anthracene		U	0.272		U	0.331
Carbazole		U	0.290		U	0.353
Di-n-butylphthalate	0.539	B	0.174		U	0.212
Bis(2-ethylhexyl) adipate		U	0.131		U	0.159
Fluoranthene		U	0.239		U	0.292
Pyrene		U	0.239		U	0.292
Butylbenzylphthalate		U	0.155		U	0.189
Benz[a]anthracene		U	0.212		U	0.259
Chrysene		U	0.212		U	0.259
bis(2-Ethylhexyl)phthalate	6.10		0.124	3.02		0.151
Di-n-octylphthalate		U	0.124		U	0.151
Benzo[b]fluoranthene		U	0.192		U	0.234
Benzo[k]fluoranthene		U	0.192		U	0.234
Benzo[a]pyrene		U	0.192		U	0.234
Indeno[1,2,3-cd]pyrene		U	0.175		U	0.214
Dibenz[a,h]anthracene		U	0.174		U	0.212
Benzo[g,h,i]perylene		U	0.175		U	0.214

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BM03XA**			**WWTP1BG01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121713.D			D121710.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3):	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Extraction Surrogate Recoveries (%)						
Toluene-d8	68			63		
4-Bromofluorobenzene	81			54		
2-Fluorophenol	68			83		
Phenol-d5	83			91		
Nitrobenzene-d5	74			74		
2-Fluorobiphenyl	85			67		
2,4,6-Tribromophenol	85			49		
p-Terphenyl-d14	79			62		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG02XA**			**WWTP1BG03XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121711.D			D121714.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3):	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.498		U	0.499
1,2-Dichloroethane		U	0.671		U	0.672
1,1-Dichloropropene		U	0.598		U	0.599
Benzene	0.992	JB	0.850	1.05	JB	0.852
Carbon Tetrachloride	0.462	J	0.432		U	0.432
1,2-Dichloropropane		U	0.588		U	0.589
Trichloroethene		U	0.505		U	0.506
Dibromomethane		U	0.382		U	0.383
Bromodichloromethane		U	0.405		U	0.406
Pyridine		U	0.840		U	0.841
cis-1,3-Dichloropropene		U	0.598		U	0.599
N-nitrosodimethylamine		U	0.896		U	0.898
Toluene	3.59		0.721	2.54		0.722
trans-1,3-Dichloropropene		U	0.598		U	0.599
1,1,2-Trichloroethane		U	0.498		U	0.499
1,3-Dichloropropane		U	0.588		U	0.589
Dibromochloromethane		U	0.319		U	0.319
1,2-Dibromoethane		U	0.353		U	0.354
Tetrachloroethene	0.733	J	0.401		U	0.401
Chlorobenzene		U	0.590		U	0.591
1,1,1,2-Tetrachloroethane		U	0.396		U	0.396
Ethylbenzene	1.51		0.625	0.933	J	0.626
m/p-Xylenes	2.00		0.625	0.986	J	0.626
Bromoform		U	0.263		U	0.263
Styrene		U	0.638		U	0.639
o-Xylene	1.45		0.625	0.732	J	0.626
1,1,2,2-Tetrachloroethane		U	0.396		U	0.396
1,2,3-Trichloropropane		U	0.450		U	0.451
Isopropylbenzene	0.871	J	0.552		U	0.553
Bromobenzene		U	0.423		U	0.424
2-Chlorotoluene		U	0.525		U	0.525
n-Propylbenzene	1.61		0.553	0.802	J	0.553

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG02XA**			**WWTP1BG03XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121711.D			D121714.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3):	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4-Chlorotoluene		U	0.525		U	0.525
1,3,5-Trimethylbenzene	4.74		0.553	2.77		0.553
tert-Butylbenzene		U	0.495		U	0.496
1,2,4-Trimethylbenzene	12.9		0.553			0.553
sec-Butylbenzene	0.819	J	0.495	0.568	J	0.496
Phenol		U	0.706		U	0.707
bis(2-Chloroethyl)ether		U	0.464		U	0.465
Aniline		U	0.713		U	0.714
2-Chlorophenol		U	0.517		U	0.517
1,3-Dichlorobenzene		U	0.452		U	0.452
1,4-Dichlorobenzene	38.4	D	0.452	99.0		0.452
p-Isopropyltoluene	97.0	D	0.495	286	D	0.496
Benzyl Alcohol		U	0.614		U	0.615
2-Methylphenol (m-cresol)		U	0.614		U	0.615
1,2-Dichlorobenzene		U	0.452		U	0.452
3,4-Methylphenol (o,p-cresol)		U	0.614		U	0.615
bis(2-chloroisopropyl)ether		U	0.388		U	0.389
n-Butylbenzene		U	0.495	1.28		0.496
N-nitroso-di-n-propylamine		U	0.510		U	0.511
Hexachloroethane		U	0.281		U	0.281
1,2-Dibromo-3-Chloropropane		U	0.281		U	0.281
Nitrobenzene		U	0.539		U	0.540
Isophorone		U	0.480		U	0.481
2-Nitrophenol		U	0.477		U	0.478
2,4-Dimethylphenol		U	0.544		U	0.544
bis(2-Chloroethoxy)methane		U	0.384		U	0.384
1,2,4-Trichlorobenzene		U	0.366		U	0.367
Naphthalene	3.48		0.518	2.90		0.519
2,4-Dichlorophenol		U	0.407		U	0.408
4-Chloroaniline		U	0.521		U	0.521
Hexachlorobutadiene		U	0.255		U	0.255
1,2,3-Trichlorobenzene		U	0.366		U	0.367
4-Chloro-3-methylphenol		U	0.466		U	0.466

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG02XA**			**WWTP1BG03XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121711.D			D121714.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3):	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Methylnaphthalene	2.91		0.467	2.84		0.468
1-Methylnaphthalene	1.58		0.467	1.45		0.468
Hexachlorocyclopentadiene		U	0.243		U	0.244
2,4,6-Trichlorophenol		U	0.336		U	0.337
2,4,5-Trichlorophenol		U	0.336		U	0.337
Diphenylamine		U	0.392		U	0.393
Azobenzene		U	0.364		U	0.365
2-Chloronaphthalene		U	0.408		U	0.409
2-Nitroaniline		U	0.481		U	0.482
1,4-Dinitrobenzene		U	0.395		U	0.396
Dimethylphthalate		U	0.342		U	0.343
1,3-Dinitrobenzene		U	0.395		U	0.396
Acenaphthylene		U	0.436		U	0.437
2,6-dinitrotoluene		U	0.365		U	0.365
1,2-Dinitrobenzene		U	0.395		U	0.396
3-Nitroaniline		U	0.481		U	0.482
Acenaphthene		U	0.431		U	0.431
2,4-Dinitrophenol		U	0.361		U	0.361
4-Nitrophenol	2.92		0.477	2.92		0.478
Dibenzofuran		U	0.395		U	0.395
2,4-dinitrotoluene		U	0.365		U	0.365
2,3,4,6-Tetrachlorophenol		U	0.286		U	0.287
2,3,5,6-Tetrachlorophenol		U	0.286		U	0.287
Diethylphthalate		U	0.299		U	0.299
4-Chlorophenyl-phenylether		U	0.324		U	0.325
Fluorene		U	0.400		U	0.400
4-Nitroaniline		U	0.481		U	0.482

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG02XA**			**WWTP1BG03XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121711.D			D121714.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3):	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4,6-Dinitro-2-methylphenol		U	0.335		U	0.336
n-Nitrosodiphenylamine		U	0.335		U	0.336
4-Bromophenyl phenyl ether		U	0.267		U	0.267
Hexachlorobenzene		U	0.233		U	0.234
Pentachlorophenol		U	0.249		U	0.250
Phenanthrene		U	0.373		U	0.373
Anthracene		U	0.373		U	0.373
Carbazole		U	0.397		U	0.398
Di-n-butylphthalate		U	0.239		BU	0.239
Bis(2-ethylhexyl) adipate	0.183	J	0.179		U	0.179
Fluoranthene		U	0.328		U	0.329
Pyrene		U	0.328		U	0.329
Butylbenzylphthalate		U	0.213		U	0.213
Benz[a]anthracene		U	0.291		U	0.291
Chrysene		U	0.291		U	0.291
bis(2-Ethylhexyl)phthalate	1.33		0.170	0.783		0.170
Di-n-octylphthalate		U	0.170		U	0.170
Benzo[b]fluoranthene		U	0.263		U	0.264
Benzo[k]fluoranthene		U	0.263		U	0.264
Benzo[a]pyrene		U	0.263		U	0.264
Indeno[1,2,3-cd]pyrene		U	0.240		U	0.241
Dibenz[a,h]anthracene		U	0.239		U	0.239
Benzo[g,h,i]perylene		U	0.240		U	0.241

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG02XA**			**WWTP1BG03XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121711.D			D121714.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3):	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Extraction Surrogate Recoveries (%)						
Toluene-d8	67			67		
4-Bromofluorobenzene	81			76		
2-Fluorophenol	86			89		
Phenol-d5	91			98		
Nitrobenzene-d5	81			85		
2-Fluorobiphenyl	86			88		
2,4,6-Tribromophenol	74			93		
p-Terphenyl-d14	87			94		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121715.D			D121712.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.507		U	0.441
1,2-Dichloroethane		U	0.684		U	0.595
1,1-Dichloropropene		U	0.610		U	0.530
Benzene	0.944	JB	0.866	0.768	JB	0.753
Carbon Tetrachloride		U	0.440		U	0.383
1,2-Dichloropropane		U	0.599		U	0.521
Trichloroethene		U	0.515		U	0.448
Dibromomethane		U	0.389		U	0.339
Bromodichloromethane		U	0.413		U	0.359
Pyridine		U	0.856		U	0.744
cis-1,3-Dichloropropene		U	0.610		U	0.530
N-nitrosodimethylamine		U	0.914		U	0.794
Toluene	1.43	J	0.734		U	0.639
trans-1,3-Dichloropropene		U	0.610		U	0.530
1,1,2-Trichloroethane		U	0.507		U	0.441
1,3-Dichloropropane		U	0.599		U	0.521
Dibromochloromethane		U	0.325		U	0.283
1,2-Dibromoethane		U	0.360		U	0.313
Tetrachloroethene	0.464	J	0.408		U	0.355
Chlorobenzene		U	0.601		U	0.523
1,1,1,2-Tetrachloroethane		U	0.403		U	0.351
Ethylbenzene	1.29		0.637		U	0.554
m/p-Xylenes	1.76		0.637		U	0.554
Bromoform		U	0.268		U	0.233
Styrene		U	0.650		U	0.565
o-Xylene	1.39		0.637		U	0.554
1,1,2,2-Tetrachloroethane	0.480	J	0.403		U	0.351
1,2,3-Trichloropropane		U	0.459		U	0.399
Isopropylbenzene	0.930	J	0.563		U	0.490
Bromobenzene		U	0.431		U	0.375
2-Chlorotoluene		U	0.535		U	0.465
n-Propylbenzene	1.65		0.563		U	0.490

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121715.D			D121712.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4-Chlorotoluene		U	0.535		U	0.465
1,3,5-Trimethylbenzene	5.11		0.563		U	0.490
tert-Butylbenzene		U	0.504		U	0.438
1,2,4-Trimethylbenzene	13.5		0.563		U	0.490
sec-Butylbenzene	0.970	J	0.504		U	0.438
Phenol		U	0.719		U	0.625
bis(2-Chloroethyl)ether		U	0.473		U	0.411
Aniline		U	0.727		U	0.632
2-Chlorophenol		U	0.526		U	0.458
1,3-Dichlorobenzene		U	0.460		U	0.400
1,4-Dichlorobenzene	217	D	0.460		U	0.400
p-Isopropyltoluene	549	D	0.504		U	0.438
Benzyl Alcohol		U	0.626		U	0.544
2-Methylphenol (m-cresol)		U	0.626		U	0.544
1,2-Dichlorobenzene		U	0.460		U	0.400
3,4-Methylphenol (o,p-cresol)		U	0.626		U	0.544
bis(2-chloroisopropyl)ether		U	0.396		U	0.344
n-Butylbenzene	1.81		0.504		U	0.438
N-nitroso-di-n-propylamine		U	0.520		U	0.452
Hexachloroethane		U	0.286		U	0.249
1,2-Dibromo-3-Chloropropane		U	0.286		U	0.249
Nitrobenzene		U	0.550		U	0.478
Isophorone		U	0.490		U	0.426
2-Nitrophenol		U	0.486		U	0.423
2,4-Dimethylphenol		U	0.554		U	0.482
bis(2-Chloroethoxy)methane		U	0.391		U	0.340
1,2,4-Trichlorobenzene		U	0.373		U	0.324
Naphthalene	2.46		0.528		U	0.459
2,4-Dichlorophenol		U	0.415		U	0.361
4-Chloroaniline		U	0.530		U	0.461
Hexachlorobutadiene		U	0.260		U	0.226
1,2,3-Trichlorobenzene		U	0.373		U	0.324
4-Chloro-3-methylphenol		U	0.475		U	0.413

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121715.D			D121712.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Methylnaphthalene	1.52		0.476		U	0.414
1-Methylnaphthalene	0.79	J	0.476		U	0.414
Hexachlorocyclopentadiene		U	0.248		U	0.216
2,4,6-Trichlorophenol		U	0.343		U	0.298
2,4,5-Trichlorophenol		U	0.343		U	0.298
Diphenylamine		U	0.400		U	0.348
Azobenzene		U	0.371		U	0.323
2-Chloronaphthalene		U	0.416		U	0.362
2-Nitroaniline		U	0.490		U	0.426
1,4-Dinitrobenzene		U	0.403		U	0.350
Dimethylphthalate		U	0.349		U	0.303
1,3-Dinitrobenzene		U	0.403		U	0.350
Acenaphthylene		U	0.445		U	0.387
2,6-dinitrotoluene		U	0.372		U	0.323
1,2-Dinitrobenzene		U	0.403		U	0.350
3-Nitroaniline		U	0.490		U	0.426
Acenaphthene		U	0.439		U	0.382
2,4-Dinitrophenol		U	0.368		U	0.320
4-Nitrophenol	2.97		0.486		U	0.423
Dibenzofuran		U	0.402		U	0.350
2,4-dinitrotoluene		U	0.372		U	0.323
2,3,4,6-Tetrachlorophenol		U	0.292		U	0.254
2,3,5,6-Tetrachlorophenol		U	0.292		U	0.254
Diethylphthalate		U	0.305		U	0.265
4-Chlorophenyl-phenylether		U	0.331		U	0.288
Fluorene		U	0.407		U	0.354
4-Nitroaniline		U	0.490		U	0.426

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121715.D			D121712.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4,6-Dinitro-2-methylphenol		U	0.342		U	0.297
n-Nitrosodiphenylamine		U	0.341		U	0.297
4-Bromophenyl phenyl ether		U	0.272		U	0.236
Hexachlorobenzene		U	0.238		U	0.207
Pentachlorophenol		U	0.254		U	0.221
Phenanthrene		U	0.380		U	0.330
Anthracene		U	0.380		U	0.330
Carbazole		U	0.405		U	0.352
Di-n-butylphthalate	0.816	B	0.243		BU	0.211
Bis(2-ethylhexyl) adipate		U	0.183		U	0.159
Fluoranthene		U	0.335		U	0.291
Pyrene		U	0.335		U	0.291
Butylbenzylphthalate		U	0.217		U	0.188
Benz[a]anthracene		U	0.296		U	0.258
Chrysene		U	0.296		U	0.258
bis(2-Ethylhexyl)phthalate	2.04		0.173		U	0.151
Di-n-octylphthalate		U	0.173		U	0.151
Benzo[b]fluoranthene		U	0.268		U	0.233
Benzo[k]fluoranthene		U	0.268		U	0.233
Benzo[a]pyrene		U	0.268		U	0.233
Indeno[1,2,3-cd]pyrene		U	0.245		U	0.213
Dibenz[a,h]anthracene		U	0.243		U	0.211
Benzo[g,h,i]perylene		U	0.245		U	0.213

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121715.D			D121712.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Extraction Surrogate Recoveries (%)						
Toluene-d8	66			51		
4-Bromofluorobenzene	78			73		
2-Fluorophenol	80			84		
Phenol-d5	85			102		
Nitrobenzene-d5	76			78		
2-Fluorobiphenyl	81			92		
2,4,6-Tribromophenol	74			97		
p-Terphenyl-d14	88			88		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BL02XA**			**QC081202-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081211-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121729.D			D121704.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/11/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2009			12/17/2008		
Sample Volume (m^3):	0.539			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
1,1,1-Trichloroethane		U	0.334		U	0.354
1,2-Dichloroethane		U	0.451		U	0.478
1,1-Dichloropropene		U	0.402		U	0.426
Benzene		BU	0.571	0.792	J	0.605
Carbon Tetrachloride	0.642	B	0.290		U	0.307
1,2-Dichloropropane		U	0.395		U	0.418
Trichloroethene		U	0.339		U	0.360
Dibromomethane		U	0.256		U	0.272
Bromodichloromethane		U	0.272		U	0.289
Pyridine		U	0.564		U	0.598
cis-1,3-Dichloropropene		U	0.402		U	0.426
N-nitrosodimethylamine		U	0.602		U	0.638
Toluene		U	0.484		U	0.513
trans-1,3-Dichloropropene		U	0.402		U	0.426
1,1,2-Trichloroethane		U	0.334		U	0.354
1,3-Dichloropropane		U	0.395		U	0.418
Dibromochloromethane		U	0.214		U	0.227
1,2-Dibromoethane		U	0.237		U	0.252
Tetrachloroethene		BU	0.269		U	0.285
Chlorobenzene		U	0.396		U	0.420
1,1,1,2-Tetrachloroethane		U	0.266		U	0.282
Ethylbenzene		U	0.420		U	0.445
m/p-Xylenes		U	0.420		U	0.445
Bromoform		U	0.176		U	0.187
Styrene		U	0.428		U	0.454
o-Xylene		U	0.420		U	0.445
1,1,2,2-Tetrachloroethane		U	0.266		U	0.282
1,2,3-Trichloropropane		U	0.302		U	0.321
Isopropylbenzene		U	0.371		U	0.393
Bromobenzene		U	0.284		U	0.301
2-Chlorotoluene		U	0.352		U	0.373
n-Propylbenzene		U	0.371		U	0.393

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BL02XA**			**QC081202-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081211-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121729.D			D121704.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/11/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2009			12/17/2008		
Sample Volume (m^3):	0.539			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4-Chlorotoluene		U	0.352		U	0.373
1,3,5-Trimethylbenzene		U	0.371		U	0.393
tert-Butylbenzene		U	0.332		U	0.352
1,2,4-Trimethylbenzene		U	0.371		U	0.393
sec-Butylbenzene		U	0.332		U	0.352
Phenol		U	0.474		U	0.502
bis(2-Chloroethyl)ether		U	0.312		U	0.331
Aniline		U	0.479		U	0.508
2-Chlorophenol		U	0.347		U	0.368
1,3-Dichlorobenzene		U	0.303		U	0.322
1,4-Dichlorobenzene		U	0.303		U	0.322
p-Isopropyltoluene		U	0.332		U	0.352
Benzyl Alcohol		U	0.412		U	0.437
2-Methylphenol (m-cresol)		U	0.412		U	0.437
1,2-Dichlorobenzene		U	0.303		U	0.322
3,4-Methylphenol (o,p-cresol)		U	0.412		U	0.437
bis(2-chloroisopropyl)ether		U	0.261		U	0.276
n-Butylbenzene		U	0.332		U	0.352
N-nitroso-di-n-propylamine		U	0.342		U	0.363
Hexachloroethane		U	0.188		U	0.200
1,2-Dibromo-3-Chloropropane		U	0.189		U	0.200
Nitrobenzene		U	0.362		U	0.384
Isophorone		U	0.323		U	0.342
2-Nitrophenol		U	0.320		U	0.340
2,4-Dimethylphenol		U	0.365		U	0.387
bis(2-Chloroethoxy)methane		U	0.258		U	0.273
1,2,4-Trichlorobenzene		U	0.246		U	0.260
Naphthalene		U	0.348		U	0.369
2,4-Dichlorophenol		U	0.274		U	0.290
4-Chloroaniline		U	0.349		U	0.371
Hexachlorobutadiene		U	0.171		U	0.181
1,2,3-Trichlorobenzene		U	0.246		U	0.260
4-Chloro-3-methylphenol		U	0.313		U	0.332

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BL02XA**			**QC081202-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081211-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121729.D			D121704.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/11/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2009			12/17/2008		
Sample Volume (m^3):	0.539			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
2-Methylnaphthalene		U	0.314		U	0.332
1-Methylnaphthalene		U	0.314		U	0.332
Hexachlorocyclopentadiene		U	0.163		U	0.173
2,4,6-Trichlorophenol		U	0.226		U	0.239
2,4,5-Trichlorophenol		U	0.226		U	0.239
Diphenylamine		U	0.263		U	0.279
Azobenzene		U	0.245		U	0.259
2-Chloronaphthalene		U	0.274		U	0.291
2-Nitroaniline		U	0.323		U	0.342
1,4-Dinitrobenzene		U	0.265		U	0.281
Dimethylphthalate		U	0.230		U	0.243
1,3-Dinitrobenzene		U	0.265		U	0.281
Acenaphthylene		U	0.293		U	0.311
2,6-dinitrotoluene		U	0.245		U	0.260
1,2-Dinitrobenzene		U	0.265		U	0.281
3-Nitroaniline		U	0.323		U	0.342
Acenaphthene		U	0.289		U	0.307
2,4-Dinitrophenol		U	0.242		U	0.257
4-Nitrophenol		U	0.320		U	0.340
Dibenzofuran		U	0.265		U	0.281
2,4-dinitrotoluene		U	0.245		U	0.260
2,3,4,6-Tetrachlorophenol		U	0.192		U	0.204
2,3,5,6-Tetrachlorophenol		U	0.192		U	0.204
Diethylphthalate		U	0.201		U	0.213
4-Chlorophenyl-phenylether		U	0.218		U	0.231
Fluorene		U	0.268		U	0.284
4-Nitroaniline		U	0.323		U	0.342

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BL02XA**			**QC081202-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081211-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121729.D			D121704.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/11/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2009			12/17/2008		
Sample Volume (m^3):	0.539			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
4,6-Dinitro-2-methylphenol		U	0.225		U	0.239
n-Nitrosodiphenylamine		U	0.225		U	0.238
4-Bromophenyl phenyl ether		U	0.179		U	0.190
Hexachlorobenzene		U	0.157		U	0.166
Pentachlorophenol		U	0.167		U	0.177
Phenanthrene		U	0.250		U	0.265
Anthracene		U	0.250		U	0.265
Carbazole		U	0.267		U	0.283
Di-n-butylphthalate	0.387	B	0.160		U	0.170
Bis(2-ethylhexyl) adipate		U	0.120		U	0.128
Fluoranthene		U	0.220		U	0.234
Pyrene		U	0.220		U	0.234
Butylbenzylphthalate		U	0.143		U	0.151
Benz[a]anthracene		U	0.195		U	0.207
Chrysene		U	0.195		U	0.207
bis(2-Ethylhexyl)phthalate		U	0.114		U	0.121
Di-n-octylphthalate		U	0.114		U	0.121
Benzo[b]fluoranthene		U	0.177		U	0.187
Benzo[k]fluoranthene		U	0.177		U	0.187
Benzo[a]pyrene		U	0.177		U	0.187
Indeno[1,2,3-cd]pyrene		U	0.161		U	0.171
Dibenz[a,h]anthracene		U	0.160		U	0.170
Benzo[g,h,i]perylene		U	0.161		U	0.171

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**WWTP1BL02XA**			**QC081202-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081211-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8260/8270m			EPA 8260/8270m		
Instrument:	Duster			Duster		
File ID:	D121729.D			D121704.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/11/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2009			12/17/2008		
Sample Volume (m^3):	0.539			0.47		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
VOC & SVOC COMPOUNDS:						
Extraction Surrogate Recoveries (%)						
Toluene-d8	63			70		
4-Bromofluorobenzene	79			81		
2-Fluorophenol	76			85		
Phenol-d5	86			101		
Nitrobenzene-d5	76			81		
2-Fluorobiphenyl	83			89		
2,4,6-Tribromophenol	92			78		
p-Terphenyl-d14	81			75		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID: **QC081202-MBS**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC081202-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8260/8270m
Instrument:	Duster
File ID:	D121707.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	12/2/2008
Date Cleanup:	NA
Date Analyzed:	12/17/2008
Sample Volume (m^3):	1.00
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
1,1,1-Trichloroethane	3.61		0.354	20
1,2-Dichloroethane	10.2		0.478	43
1,1-Dichloropropene	4.08		0.426	19
Benzene	14.5	B	0.605	48
Carbon Tetrachloride	2.01		0.307	13
1,2-Dichloropropane	13.6		0.418	65
Trichloroethene	7.72		0.360	43
Dibromomethane	9.05		0.272	67
Bromodichloromethane	8.29		0.289	58
Pyridine	21.8		0.598	73
cis-1,3-Dichloropropene	14.6		0.426	69
N-nitrosodimethylamine	24.4		0.638	77
Toluene	22.9		0.513	90
trans-1,3-Dichloropropene	17.0		0.426	80
1,1,2-Trichloroethane	14.8		0.354	84
1,3-Dichloropropane	16.8		0.418	81
Dibromochloromethane				
1,2-Dibromoethane	10.7		0.252	86
Tetrachloroethene	11.8		0.285	83
Chlorobenzene	19.6		0.420	94
1,1,1,2-Tetrachloroethane	13.1		0.282	93
Ethylbenzene	20.8		0.445	94
m/p-Xylenes	22.4		0.445	101
Bromoform	9.13		0.187	98
Styrene	21.5		0.454	95
o-Xylene				
1,1,2,2-Tetrachloroethane	12.6		0.282	90
1,2,3-Trichloropropane	15.1		0.321	95
Isopropylbenzene	19.4		0.393	99
Bromobenzene	13.1		0.301	87
2-Chlorotoluene	17.2		0.373	92
n-Propylbenzene	18.3		0.393	94

Sample ID:	**QC081202-MBS**
Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC081202-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8260/8270m
Instrument:	Duster
File ID:	D121707.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	12/2/2008
Date Cleanup:	NA
Date Analyzed:	12/17/2008
Sample Volume (m^3):	1.00
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
4-Chlorotoluene	17.6		0.373	95
1,3,5-Trimethylbenzene	18.6		0.393	95
tert-Butylbenzene	16.7		0.352	95
1,2,4-Trimethylbenzene	18.5		0.393	94
sec-Butylbenzene	16.7		0.352	95
Phenol	21.9		0.502	87
bis(2-Chloroethyl)ether	13.8		0.331	84
Aniline	19.6		0.508	77
2-Chlorophenol	16.6		0.368	91
1,3-Dichlorobenzene	31.1		0.322	97
1,4-Dichlorobenzene	31.7		0.322	99
p-Isopropyltoluene	16.5		0.352	94
Benzyl Alcohol	20.0		0.437	92
2-Methylphenol (m-cresol)	19.7		0.437	90
1,2-Dichlorobenzene	31.5		0.322	99
3,4-Methylphenol (o,p-cresol)	21.1		0.437	97
bis(2-chloroisopropyl)ether	12.1		0.276	88
n-Butylbenzene	15.8		0.352	90
N-nitroso-di-n-propylamine	17.9		0.363	99
Hexachloroethane	9.43		0.200	95
1,2-Dibromo-3-Chloropropane	9.30		0.200	93
Nitrobenzene	18.0		0.384	94
Isophorone	14.5		0.342	85
2-Nitrophenol	16.1		0.340	95
2,4-Dimethylphenol	13.6		0.387	70
bis(2-Chloroethoxy)methane	12.7		0.273	94
1,2,4-Trichlorobenzene	26.7		0.260	103
Naphthalene	37.2		0.369	101
2,4-Dichlorophenol	14.6		0.290	101
4-Chloroaniline	14.9		0.371	81
Hexachlorobutadiene	19.8		0.181	110
1,2,3-Trichlorobenzene	13.5		0.260	104
4-Chloro-3-methylphenol	16.2		0.332	98

VOC and SVOC Compounds
EPA 8270M

Sample ID:	**QC081202-MBS**
Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC081202-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8260/8270m
Instrument:	Duster
File ID:	D121707.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	12/2/2008
Date Cleanup:	NA
Date Analyzed:	12/17/2008
Sample Volume (m^3):	1.00
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
2-Methylnaphthalene	17.0		0.332	103
1-Methylnaphthalene	16.9		0.332	102
Hexachlorocyclopentadiene	2.50		0.173	29
2,4,6-Trichlorophenol	11.3		0.239	95
2,4,5-Trichlorophenol	12.0		0.239	101
Diphenylamine	13.1		0.279	94
Azobenzene	11.0		0.259	85
2-Chloronaphthalene	13.2		0.291	91
2-Nitroaniline	14.3		0.342	84
1,4-Dinitrobenzene	12.1		0.281	87
Dimethylphthalate	11.8		0.243	97
1,3-Dinitrobenzene	12.6		0.281	90
Acenaphthylene	14.5		0.311	94
2,6-dinitrotoluene	11.5		0.260	89
1,2-Dinitrobenzene	11.8		0.281	84
3-Nitroaniline	11.1		0.342	65
Acenaphthene	14.4		0.307	95
2,4-Dinitrophenol	9.82		0.257	77
4-Nitrophenol	14.2		0.340	84
Dibenzofuran	13.3		0.281	95
2,4-dinitrotoluene	11.9		0.260	92
2,3,4,6-Tetrachlorophenol	9.62		0.204	95
2,3,5,6-Tetrachlorophenol	9.95		0.204	98
Diethylphthalate	10.4		0.213	98
4-Chlorophenyl-phenylether	11.7		0.231	102
Fluorene	13.7		0.284	97
4-Nitroaniline	12.5		0.342	74

Sample ID:	**QC081202-MBS**
Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC081202-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8260/8270m
Instrument:	Duster
File ID:	D121707.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	12/2/2008
Date Cleanup:	NA
Date Analyzed:	12/17/2008
Sample Volume (m^3):	1.00
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
VOC & SVOC COMPOUNDS:				
4,6-Dinitro-2-methylphenol	10.4		0.239	87
n-Nitrosodiphenylamine	10.9		0.238	92
4-Bromophenyl phenyl ether	8.99		0.190	95
Hexachlorobenzene	8.10		0.166	98
Pentachlorophenol	8.39		0.177	95
Phenanthrene	12.4		0.265	94
Anthracene	12.6		0.265	95
Carbazole	12.6		0.283	90
Di-n-butylphthalate	8.37		0.170	99
Bis(2-ethylhexyl) adipate	6.17		0.128	97
Fluoranthene	11.3		0.234	97
Pyrene	11.5		0.234	99
Butylbenzylphthalate	7.16		0.151	95
Benz[a]anthracene	10.2		0.207	99
Chrysene	10.3		0.207	100
bis(2-Ethylhexyl)phthalate	5.85		0.121	97
Di-n-octylphthalate	5.91		0.121	98
Benzo[b]fluoranthene	8.88		0.187	95
Benzo[k]fluoranthene	9.68		0.187	104
Benzo[a]pyrene	9.14		0.187	98
Indeno[1,2,3-cd]pyrene	8.10		0.171	95
Dibenz[a,h]anthracene	8.45		0.170	100
Benzo[g,h,i]perylene	8.19		0.171	96

Sample ID:	**QC081202-MBS**			
Matrix:	XAD Tubes			
Preservation:	None			
Decanted:	None			
Batch QC:	QC081202-MB			
Preparation Method:	EPA 3540			
Cleanup Method(s):	NA			
Analysis Method:	EPA 8260/8270m			
Instrument:	Duster			
File ID:	D121707.D			
Operator:	ERL			
Date Sampled:	NA			
Date Received:	NA			
Date Prepared:	12/2/2008			
Date Cleanup:	NA			
Date Analyzed:	12/17/2008			
Sample Volume (m^3):	1.00			
Percent Solid:	NA			
Prep DF:	1.00			
Analysis DF:	1.00			
Injection Volume (µl):	1.00			
Extract Volume (µl):	2000			
Units	Concentration (ppbv)	Q	EDL	% Recovery

VOC & SVOC COMPOUNDS:	
Extraction Surrogate Recoveries (%)	
Toluene-d8	83
4-Bromofluorobenzene	89
2-Fluorophenol	86
Phenol-d5	101
Nitrobenzene-d5	85
2-Fluorobiphenyl	92
2,4,6-Tribromophenol	89
p-Terphenyl-d14	85

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentrat
EDL - Estimated detection limit is 50% of RL.

WWTP1

VOC & SVOC
Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard Dev	Range	Minimum	Maximum	Count
Benzene	0.703	0.670	0.11	0.218	0.611	0.83	3
Carbon Tetrachloride	0.309	0.309	NA	0	0.309	0.309	1
1,1,2,2-Tetrachloroethane	0.44	0.44	0.03	0	0.42	0.47	2
p-Isopropyltoluene	0.40	0.40	0.00	0	0.40	0.40	2
Di-n-butylphthalate	0.54	0.54	NA	0	0.54	0.54	1
bis(2-Ethylhexyl)phthalate	6.098	6.098	NA	0	6.098	6.098	1

WWTP1

VOC & SVOC
Descriptive Statistics

Biogas

Analyte	Mean	Median	Standard D	Range	Minimum	Maximum	Count
Benzene	1.03	1.02	0.0829	0.194	0.944	1.14	4
Carbon Tetrachloride	0.436	0.436	0.0373	0.0527	0.410	0.462	2
Toluene	2.62	2.74	0.906	2.16	1.43	3.59	4
Tetrachloroethene	0.598	0.598	0.190	0.269	0.464	0.733	2
Ethylbenzene	1.29	1.37	0.258	0.579	0.933	1.51	4
m/p-Xylenes	1.53	1.56	0.446	1.02	0.986	2.00	4
o-Xylene	1.12	1.15	0.354	0.721	0.732	1.45	4
1,1,2,2-Tetrachloroethane	0.480	0.480	N/A	0.000	0.480	0.480	1
Isopropylbenzene	0.900	0.900	0.041	0.059	0.871	0.930	2
n-Propylbenzene	1.21	1.21	0.494	0.898	0.756	1.65	4
1,3,5-Trimethylbenzene	3.90	3.85	1.20	2.34	2.77	5.11	4
1,2,4-Trimethylbenzene	13.2	13.2	0.43	0.61	12.9	13.5	2
sec-Butylbenzene	0.703	0.694	0.233	0.513	0.457	0.970	4
1,4-Dichlorobenzene	112	96.0	75.3	179	38.4	217	4
p-Isopropyltoluene	240	192	233	521	28.4	549	4
n-Butylbenzene	1.41	1.28	0.349	0.657	1.15	1.81	3
Naphthalene	2.80	2.68	0.518	1.14	2.34	3.48	4
2-Methylnaphthalene	2.46	2.70	0.641	1.39	1.52	2.91	4
1-Methylnaphthalene	1.27	1.35	0.345	0.785	0.792	1.58	4
4-Nitrophenol	2.85	2.92	0.170	0.373	2.60	2.97	4
Di-n-butylphthalate	0.816	0.82	N/A	0.00	0.816	0.816	1
Bis(2-ethylhexyl) adipate	0.183	0.183	N/A	0.00	0.183	0.183	1
bis(2-Ethylhexyl)phthalate	1.79	1.68	0.967	2.24	0.783	3.02	4

Appendix H – Aldehydes and Ketones Analysis

Aldehydes and Ketones
EPA 8315

Sample ID:	**1NG01DN**			**1NG02DN**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090109-MBa, QC090109 MBb			QC090109-MBa, QC090109 MBb		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	2171-2182, 2218-2229			2171-21852, 2218-2232		
Operator:	RS			RS		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/9/2009			1/9/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/13/09, 1/14/09			1/13/09, 1/14/09		
Sample Size (m^3):	0.258			0.257		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	5			5		
Injection Volume (µl):	1			1		
Extract Volume (µl):	10.00			10.00		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	0.750		0.212		U	0.215
Acetaldehyde	25.6		0.0992	28.22		0.100
Acetone	28.8	B	0.0934	33.01	B	0.0946
Acrolein		U	0.0943		U	0.0955
Propionaldehyde	1.08		0.0934	1.32		0.0946
Crotonaldehyde		U	0.0890		U	0.0901
2-Butanone	5.61		0.0883	7.05		0.0894
Methacrolein		U	0.0890		U	0.0901
Butanal	0.870		0.0883	1.01		0.0894
Benzaldehyde		U	0.0778		U	0.0788
Pentanal		U	0.0836		U	0.0847
p-Tolualdehyde		U	0.0741		U	0.0751
Hexanal		U	0.0794		U	0.0805

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Aldehydes and Ketones
EPA 8315

Sample ID:	**1NGBL01DN**			**QC090109-MBa**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090109-MBa			QC090109-MBa		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	2171-2188			2171-2176		
Operator:	RS			RS		
Date Sampled:	12/8/2008			NA		
Date Received:	1/8/2009			NA		
Date Prepared:	1/9/2009			1/9/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/13/2009			1/13/2009		
Sample Size (m^3):	0.258			0.26		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	5			5		
Injection Volume (µl):	1			1		
Extract Volume (µl):	10.00			10.00		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde		U	0.214		U	0.206
Acetaldehyde		U	0.100		U	0.0962
Acetone	1.66	B	0.0942	3.49		0.0906
Acrolein		U	0.0950		U	0.0914
Propionaldehyde		U	0.0942		U	0.0906
Crotonaldehyde		U	0.0897		U	0.0863
2-Butanone		U	0.0890		U	0.0856
Methacrolein		U	0.0897		U	0.0863
Butanal		U	0.0890		U	0.0856
Benzaldehyde		U	0.0784		U	0.0755
Pentanal		U	0.0843		U	0.0811
p-Tolualdehyde		U	0.0748		U	0.0719
Hexanal		U	0.0801		U	0.0770

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Aldehydes and Ketones
EPA 8315

Sample ID:	**QC090109-MBb**			**QC090109-MBSa**			
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC090109-MBa			QC090109-MBa			
Preparation Method:	EPA 8315			EPA 8315			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8315			EPA 8315			
Instrument:	F			F			
File ID:	2218-2223			2218-2226			
Operator:	RS			RS			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	1/9/2009			1/9/2009			
Date Cleanup:	NA			NA			
Date Analyzed:	1/13/2009			1/13/2009			
Sample Size (m^3):	0.26			0.26			
Percent Solid:	NA			NA			
Prep DF:	5000			5000			
Analysis DF:	5			5			
Injection Volume (µl):	1			1			
Extract Volume (µl):	10.00			10.00			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:							
Formaldehyde		U	0.205	3.37		0.206	55
Acetaldehyde		U	0.0956	4.21		0.0962	109
Acetone	4.16	B	0.0901	8.64	B	0.0906	476
Acrolein		U	0.0909	2.02		0.0914	110
Propionaldehyde		U	0.0901	1.84		0.0906	101
Crotonaldehyde		U	0.0858		U	0.0863	
2-Butanone		U	0.0851		U	0.0856	
Methacrolein		U	0.0858		U	0.0863	
Butanal		U	0.0851	1.38		0.0856	81
Benzaldehyde		U	0.0750	0.617		0.0755	41
Pentanal		U	0.0806		U	0.0811	
p-Tolualdehyde		U	0.0715		U	0.0719	
Hexanal		U	0.0766		U	0.0770	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**QC090109-MBSb**
Matrix:	BPE-DNPH Cartridge
Preservation:	None
Decanted:	None
Batch QC:	QC090109-MBa
Preparation Method:	EPA 8315
Cleanup Method(s):	NA
Analysis Method:	EPA 8315
Instrument:	F
File ID:	2218-2226
Operator:	RS
Date Sampled:	NA
Date Received:	NA
Date Prepared:	1/9/2009
Date Cleanup:	NA
Date Analyzed:	1/13/2009
Sample Size (m^3):	0.26
Percent Solid:	NA
Prep DF:	5000
Analysis DF:	5
Injection Volume (µl):	1
Extract Volume (µl):	10.00

Units	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:				
Formaldehyde	3.17		0.207	52
Acetaldehyde	3.99		0.0967	104
Acetone	4.67	B	0.0911	258
Acrolein	1.72		0.0919	94
Propionaldehyde	1.74		0.0911	96
Crotonaldehyde		U	0.0867	
2-Butanone		U	0.0861	
Methacrolein		U	0.0867	
Butanal	1.32		0.0861	77
Benzaldehyde	0.524		0.0758	35
Pentanal		U	0.0816	
p-Tolualdehyde		U	0.0723	
Hexanal		U	0.077	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concent
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

1NG

Aldehyde & Ketone

Descriptive Statistics

Natural Gas

Analyte	Count	Mean	Deviation	Minimum	Maximum
Formaldehyde	1	0.750	N/A	0.750	0.750
Acetaldehyde	2	26.9	1.83	25.6	28.2
Acetone	2	30.9	2.99	28.8	33.0
Propionaldehyde	2	1.20	0.172	1.08	1.32
2-Butanone	2	6.33	1.02	5.61	7.05
Butanal	2	0.941	0.100	0.870	1.01

Sample ID:	2NG01DN			2NG02DN			2NGBL01DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090109-MBa, QC090109 MBb			QC090109-MBa, QC090109 MBb			QC090109-MBa		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	2171-2191, 2218-2235			2171-2194, 2218-2238			2171-2200		
Operator:	RS			RS			RS		
Date Sampled:	12/11/2008			12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009			1/8/2009		
Date Prepared:	1/9/2009			1/9/2009			1/9/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/13/09, 1/14/09			1/13/09, 1/14/09			1/13/2009		
Sample Size (m^3):	0.261			0.292			0.277		
Percent Solid:	NA			NA			NA		
Prep DF:	5000			5000			5000		
Analysis DF:	5			5			5		
Injection Volume (µl):	1			1			1		
Extract Volume (µl):	10.00			10.00			10.00		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds									
Formaldehyde		U	0.199	6.41		0.178		U	0.188
Acetaldehyde		U	0.0931	6.21		0.0837		U	0.0879
Acetone		BU	0.0877	1.26	B	0.0788	2.17	B	0.0828
Acrolein		U	0.0884		U	0.0795		U	0.0835
Propionaldehyde		U	0.0877	1.29		0.0788		U	0.0828
Crotonaldehyde		U	0.0835		U	0.0750		U	0.0788
2-Butanone		U	0.0828		U	0.0745		U	0.0782
Methacrolein		U	0.0835	0.566		0.0750		U	0.0788
Butanal		U	0.0828	0.684		0.0745		U	0.0782
Benzaldehyde		U	0.0730	1.72		0.0656		U	0.0689
Pentanal		U	0.0785	0.496		0.0705		U	0.0741
p-Tolualdehyde		U	0.0696		U	0.0625		U	0.0657
Hexanal		U	0.0745		U	0.0670		U	0.0704

NA - Not applicable.
B - Analyte detected in the Blank
J - Estimated value; detected between the RL and DL
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound

Sample ID:	**QC090109-MBa**			**QC090109-MBb**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090109-MBa			QC090109-MBa		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	2171-2176			2218-2223		
Operator:	RS			RS		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	1/9/2009			1/9/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/13/2009			1/13/2009		
Sample Size (m^3):	0.26			0.26		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	5			5		
Injection Volume (µl):	1			1		
Extract Volume (µl):	10.00			10.00		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds						
Formaldehyde		U	0.206		U	0.205
Acetaldehyde		U	0.0962		U	0.0956
Acetone	3.49		0.0906	4.16	B	0.0901
Acrolein		U	0.0914		U	0.0909
Propionaldehyde		U	0.0906		U	0.0901
Crotonaldehyde		U	0.0863		U	0.0858
2-Butanone		U	0.0856		U	0.0851
Methacrolein		U	0.0863		U	0.0858
Butanal		U	0.0856		U	0.0851
Benzaldehyde		U	0.0755		U	0.0750
Pentanal		U	0.0811		U	0.0806
p-Tolualdehyde		U	0.0719		U	0.0715
Hexanal		U	0.0770		U	0.0766

NA - Not applicable.
B - Analyte detected in the Blank
J - Estimated value; detected between the RL and DL
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound

Aldehydes and Ketones
EPA 8315

Sample ID:	QC090109-MBSa				QC090109-MBSb			
Matrix:	BPE-DNPH Cartridge				BPE-DNPH Cartridge			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC090109-MBa				QC090109-MBa			
Preparation Method:	EPA 8315				EPA 8315			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8315				EPA 8315			
Instrument:	F				F			
File ID:	2218-2226				2218-2226			
Operator:	RS				RS			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	1/9/2009				1/9/2009			
Date Cleanup:	NA				NA			
Date Analyzed:	1/13/2009				1/13/2009			
Sample Size (m^3):	0.26				0.26			
Percent Solid:	NA				NA			
Prep DF:	5000				5000			
Analysis DF:	5				5			
Injection Volume (µl):	1				1			
Extract Volume (µl):	10.00				10.00			
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds								
Formaldehyde	3.37		0.206	55	3.17		0.207	52
Acetaldehyde	4.21		0.0962	109	3.99		0.0967	104
Acetone	8.64	B	0.0906	476	4.67	B	0.0911	258
Acrolein	2.02		0.0914	110	1.72		0.0919	94
Propionaldehyde	1.84		0.0906	101	1.74		0.0911	96
Crotonaldehyde		U	0.0863			U	0.0867	
2-Butanone		U	0.0856			U	0.0861	
Methacrolein		U	0.0863			U	0.0867	
Butanal	1.38		0.0856	81	1.32		0.0861	77
Benzaldehyde	0.617		0.0755	41	0.524		0.0758	35
Pentanal		U	0.0811			U	0.0816	
p-Tolualdehyde		U	0.0719			U	0.0723	
Hexanal		U	0.0770			U	0.077	

NA - Not applicable.
B - Analyte detected in the Blank
J - Estimated value; detected between the RL and DL
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound

2NG

Aldehyde & Ketone

Descriptive Statistics

Natural Gas

Analyte	Count	Mean	Deviation	Minimum	Maximum
Formaldehy	1	6.41	N/A	6.41	6.41
Acetaldehy	1	6.21	N/A	6.21	6.21
Acetone	1	1.26	N/A	1.26	1.26
Propionald	1	1.29	N/A	1.29	1.29
Methacrole	1	0.566	N/A	0.566	0.566
Butanal	1	0.684	N/A	0.684	0.684
Benzaldehy	1	1.72	N/A	1.72	1.72
Pentanal	1	0.496	N/A	0.496	0.496

Sample ID:	LF1BM01DN			LF1BM02DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC081113-MB		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1618			1607-1621		
Operator:	RS			RS		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/13/08			11/13/08		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/08			11/19/08		
Sample Size (m3):	0.140			0.250		
Percent Solid:	NA			NA		
Prep DF:	5.00			5.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	1.38		0.418	0.843		0.236
Acetaldehyde	1.23		0.196	0.725		0.110
Acetone	0.802	B	0.184	0.228	B	0.104
Acrolein		U	0.186		U	0.105
Propionaldehyde		U	0.184		U	0.104
Crotonaldehyde		U	0.175		U	0.0990
2-Butanone		U	0.174		U	0.0983
Methacrolein		U	0.175		U	0.0990
Butanal		U	0.174		U	0.0983
Benzaldehyde		U	0.153		U	0.0866
Pentanal		U	0.165		U	0.0931
p-Tolualdehyde		U	0.146		U	0.0825
Hexanal		U	0.157		U	0.0884

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF1BM03DN**			**LF1BM04DN**		
	GT090212-05a,b			GT090212-06a,b		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090303-MBa			QC090303-MBa		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	2352-2366, 2391-2402			2352-2369, 2391-2405		
Operator:	RS			RS		
Date Sampled:	2/5/2009			2/5/2009		
Date Received:	2/12/2009			2/12/2009		
Date Prepared:	3/3/2009			3/3/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	3/6/2009, 3/9/2009			3/6/2009, 3/9/2009		
Sample Size (m3):	0.268			0.329		
Percent Solid:	NA			NA		
Prep DF:	5			5		
Analysis DF:	1			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde		U	0.205	0.171	J	0.160
Acetaldehyde	1.96	B	0.0963	2.60	B	0.0751
Acetone	1.16	B	0.0907	2.90	B	0.0707
Acrolein	0.245	B	0.0915	0.755	B	0.0713
Propionaldehyde		U	0.0907		U	0.0707
Crotonaldehyde		U	0.0863		U	0.0673
2-Butanone		U	0.0857		U	0.0668
Methacrolein		U	0.0863		U	0.0673
Butanal		U	0.0857		U	0.0668
Benzaldehyde		U	0.0755		U	0.0589
Pentanal		U	0.0812		U	0.0633
p-Tolualdehyde		U	0.0719		U	0.0561
Hexanal		BU	0.0771		BU	0.0601

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF1BG01DN			LF1BG02DN		
				GT090212-07a,b		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC090303-MBa,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1624			2352-2372, 2391-2408		
Operator:	RS			RS		
Date Sampled:	10/20/08			2/5/2009		
Date Received:	10/29/08			2/12/2009		
Date Prepared:	11/13/08			3/3/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/08			3/6/2009, 3/9/2009		
Sample Size (m3):	0.292			0.255		
Percent Solid:	NA			NA		
Prep DF:	5.00			5		
Analysis DF:	1.00			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	3.16		0.202	2.13		0.214
Acetaldehyde	33.2		0.0945	59.73	B	0.100
Acetone	31.6	B	0.0890	151	EB	0.0941
Acrolein		U	0.0898		BU	0.0949
Propionaldehyde	13.1		0.0890	15.77		0.0941
Crotonaldehyde		U	0.0848	18.43		0.0896
2-Butanone	45.0	E	0.0841	125	E	0.0889
Methacrolein		U	0.0848	109	E	0.0896
Butanal	37.1	E	0.0841	24.69		0.0889
Benzaldehyde	10.2		0.0741		U	0.0784
Pentanal	5.04		0.0797		U	0.0843
p-Tolualdehyde	1.71		0.0707		U	0.0747
Hexanal	6.43		0.0757	0.439	B	0.0800

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF1BL01DN**			**LF1BL02DN**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC090303-MBa		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1627			2352-2375		
Operator:	RS			RS		
Date Sampled:	10/20/08			2/5/2009		
Date Received:	10/29/08			2/12/2009		
Date Prepared:	11/13/08			3/3/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/08			3/6/2009		
Sample Size (m3):	0.227			0.284		
Percent Solid:	NA			NA		
Prep DF:	5.00			5		
Analysis DF:	1.00			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde		U	0.257		U	0.192
Acetaldehyde		U	0.120	0.407	B	0.0898
Acetone	0.729	B	0.113	1.49	B	0.0846
Acrolein		U	0.114	0.629	B	0.0853
Propionaldehyde		U	0.113		U	0.0846
Crotonaldehyde		U	0.108	1.97		0.0806
2-Butanone		U	0.107		U	0.0799
Methacrolein		U	0.108		U	0.0806
Butanal		U	0.107	0.107	J	0.0799
Benzaldehyde		U	0.0944		U	0.0704
Pentanal		U	0.101		U	0.0757
p-Tolualdehyde		U	0.0899		U	0.0671
Hexanal		U	0.0963		BU	0.0719

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**QC090303-MBa**				**QC090303-MBSb**			
Matrix:	BPE-DNPH Cartridge				BPE-DNPH Cartridge			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC090303-MBa				QC090303-MBa			
Preparation Method:	EPA 8315				EPA 8315			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8315				EPA 8315			
Instrument:	F				F			
File ID:	2352-2360				2391-2399			
Operator:	RS				RS			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	3/3/2009				3/3/2009			
Date Cleanup:	NA				NA			
Date Analyzed:	3/6/2009				3/9/2009			
Sample Size (m3):	0.284				0.284			
Percent Solid:	NA				NA			
Prep DF:	5				5			
Analysis DF:	1				1			
Injection Volume (µl):	10.00				10.00			
Extract Volume (µl):	5000				5000			
Units	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:									
Formaldehyde	U	0.178		U	0.188	2.97		0.188	79.0
Acetaldehyde	U	0.0832	0.701		0.0879	4.09	B	0.0931	116
Acetone		0.0783	1.55		0.0827	3.17	B	0.0877	192
Acrolein	U	0.0790	0.891		0.0835	2.39	B	0.0885	143
Propionaldehyde	U	0.0783		U	0.0827	1.68		0.0877	101
Crotonaldehyde	U	0.0746		U	0.0788		U	0.0835	
2-Butanone	U	0.0740		U	0.0782		U	0.0829	
Methacrolein	U	0.0746		U	0.0788		U	0.0835	
Butanal	U	0.0740		U	0.0782	0.565		0.0829	36.0
Benzaldehyde	U	0.0652		U	0.0689	0.384		0.0730	28.0
Pentanal	U	0.0701		U	0.0741		U	0.0785	
p-Tolualdehyde	U	0.0621		U	0.0657		U	0.0696	
Hexanal	U	0.0666	0.512		0.0703		BU	0.0746	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

LF1
Aldehydes and Ketones
Descriptive Statistics

Biomethane

Analyte	Count	Mean	Standard Deviation	Minimum	Maximum
Formaldehyde	3	0.798	0.606	0.171	1.38
Acetaldehyde	4	1.63	0.823	0.725	2.60
Acetone	4	1.27	1.15	0.228	2.90
Acrolein	2	0.500	0.361	0.245	0.755

LF1
Aldehydes and Ketones
Descriptive Statistics

Biogas

Analyte	Count	Mean	Standard Deviation	Minimum	Maximum
Formaldehyde	2	2.65	0.731	2.13	3.16
Acetaldehyde	2	46.5	18.8	33.2	59.7
Acetone	2	91.1	84.2	31.6	151
Propionaldehyde	2	14.4	1.92	13.1	15.8
Crotonaldehyde	1	18.4	N/A	18.4	18.4
2-Butanone	2	85.1	56.7	45.0	125
Methacrolein	1	109	N/A	109	109
Butanal	2	30.9	8.80	24.7	37.1
Benzaldehyde	1	10.2	N/A	10.2	10.2
Pentanal	1	5.04	N/A	5.04	5.04
p-Tolualdehyde	1	1.71	N/A	1.71	1.71
Hexanal	2	3.44	4.24	0.44	6.43

Sample ID:	LF2BM01DN			LF2BM02DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC081113-MB		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1630			1607-1633		
Operator:	RS			RS		
Date Sampled:	10/22/08			10/22/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/13/08			11/13/08		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/08			11/19/08		
Sample Size (m^3):	0.284			0.283		
Percent Solid:	NA			NA		
Prep DF:	5.00			5.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde		U	0.202		U	0.207
Acetaldehyde	0.602		0.0948	0.671		0.0969
Acetone	7.56	B	0.0893	109	ΞB	0.0912
Acrolein		U	0.0901		U	0.0920
Propionaldehyde	0.217		0.0893	1.12		0.0912
Crotonaldehyde	0.117	J	0.0850	0.633		0.0869
2-Butanone		U	0.0844		U	0.0862
Methacrolein	0.224		0.0850	4.11		0.0869
Butanal	0.459		0.0844	1.63		0.0862
Benzaldehyde		U	0.0743		U	0.0760
Pentanal		U	0.0799		U	0.0817
p-Tolualdehyde		U	0.0708		U	0.0724
Hexanal		U	0.0759		U	0.0776

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF2BM03DN			LF2BM04DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.328			0.282		
Percent Solid:	NA			NA		
Prep DF:	5000			5000.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	10			10		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	0.356		0.152	2.02		0.177
Acetaldehyde	2.55		0.0712	1.42		0.0826
Acetone	5.05	B	0.0670	45.8	ΞB	0.0778
Acrolein		U	0.0676		U	0.0785
Propionaldehyde		U	0.0670	0.23		0.0778
Crotonaldehyde		U	0.0638		U	0.0741
2-Butanone	1.40		0.0633	18.7		0.0735
Methacrolein		U	0.0638		U	0.0741
Butanal		U	0.0633	0.51		0.0735
Benzaldehyde	0.40		0.0558	2.19		0.0648
Pentanal		U	0.0600		U	0.0697
p-Tolualdehyde		U	0.0532		U	0.0618
Hexanal		U	0.0570		U	0.0662

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF2BG01DN			LF2BG03DN			LF2BG04DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081113-MB			QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	1607-1636			1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS			RS		
Date Sampled:	10/22/08			11/18/2008			11/18/2008		
Date Received:	10/29/08			11/26/2008			11/26/2008		
Date Prepared:	11/13/08			12/2/2008			12/2/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/19/08			12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.491			0.304			0.265		
Percent Solid:	NA			NA			NA		
Prep DF:	5.00			5000.00			5000.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	10.00			10.00			10.00		
Extract Volume (µl):	5000			10			10		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:									
Formaldehyde	0.363		0.113	0.901		0.164	0.678		0.189
Acetaldehyde	0.762		0.0530	12.5		0.0768	7.33		0.0883
Acetone	46.6	ΞB	0.0499	124	B	0.0723	207	ΞB	0.0831
Acrolein		U	0.0503		U	0.0729		U	0.0838
Propionaldehyde	0.223		0.0499	4.79		0.0723	2.34		0.0831
Crotonaldehyde		U	0.0475		U	0.0688		U	0.0791
2-Butanone	81.6	E	0.0471	165	E	0.0683	169	E	0.0785
Methacrolein		U	0.0475		U	0.0688		U	0.0791
Butanal	0.479		0.0471	5.66		0.0683	4.74		0.0785
Benzaldehyde	9.79		0.0415	10.8		0.0602		U	0.0692
Pentanal		U	0.0447		U	0.0647	17.4		0.0744
p-Tolualdehyde		U	0.0396		U	0.0574	57.0	E	0.0659
Hexanal		U	0.0424	0.730		0.0615		U	0.0707

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF2BL01DN			QC081113-MB			QC081202-MBa		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-Mba,b			QC081113-MB			QC081202-MBa		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	1957-1971, 2063-2077			1882-1884			1957-1959		
Operator:	RS			RS			RS		
Date Sampled:	11/18/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/2/2008			11/13/2008			12/2/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	39790			12/2/2008			12/8/2008		
Sample Size (m^3):	0.295			0.30			0.27		
Percent Solid:	NA			NA			NA		
Prep DF:	5000.00			5.00			5		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	10.00			10.00			10		
Extract Volume (µl):	10			5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:									
Formaldehyde		U	0.170		U	0.178		U	0.196
Acetaldehyde		U	0.0792		U	0.0832		U	0.0919
Acetone	1.27	B	0.0746	0.536		0.0783	0.590		0.0866
Acrolein		U	0.0752		U	0.0790		U	0.0874
Propionaldehyde		U	0.0746		U	0.0783		U	0.0866
Crotonaldehyde		U	0.0710		U	0.0746		U	0.0824
2-Butanone		U	0.0705		U	0.0740		U	0.0818
Methacrolein		U	0.0710		U	0.0746		U	0.0824
Butanal		U	0.0705		U	0.0740		U	0.0818
Benzaldehyde		U	0.0621		U	0.0652		U	0.0721
Pentanal		U	0.0668		U	0.0701		U	0.0775
p-Tolualdehyde		U	0.0592		U	0.0621		U	0.0687
Hexanal		U	0.0634		U	0.0666		U	0.0736

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	QC081202-MBb			QC081202-MBSa				QC081202-MBSb			
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge				BPE-DNPH Cartridge			
Preservation:	None			None				None			
Decanted:	None			None				None			
Batch QC:	QC081202-MBb			QC081202-MBa				QC081202-MBb			
Preparation Method:	EPA 8315			EPA 8315				EPA 8315			
Cleanup Method(s):	NA			NA				NA			
Analysis Method:	EPA 8315			EPA 8315				EPA 8315			
Instrument:	F			F				F			
File ID:	2063-2065			1957-1962				2063-2068			
Operator:	RS			RS				RS			
Date Sampled:	NA			NA				NA			
Date Received:	NA			NA				NA			
Date Prepared:	12/2/2008			12/2/2008				12/2/2008			
Date Cleanup:	NA			NA				NA			
Date Analyzed:	12/15/2008			12/8/2008				12/15/2008			
Sample Size (m^3):	0.27			0.27				0.27			
Percent Solid:	NA			NA				NA			
Prep DF:	5			5				5			
Analysis DF:	1			1				1			
Injection Volume (µl):	10			10				10			
Extract Volume (µl):	5000			5000				5000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:											
Formaldehyde		U	0.196	2.88		0.196	49	3.05		0.196	52
Acetaldehyde		U	0.0918	3.54		0.0918	64	3.87		0.0918	70
Acetone	0.532	B	0.0865	2.4	B	0.0865	139	2.32	B	0.0865	134
Acrolein		U	0.0873	1.58		0.0873	91	1.65		0.0873	95
Propionaldehyde		U	0.0865	1.57		0.0865	91	1.71		0.0865	99
Crotonaldehyde		U	0.0824		U	0.0824			U	0.0824	
2-Butanone		U	0.0817		U	0.0817			U	0.0817	
Methacrolein		U	0.0824		U	0.0824			U	0.0824	
Butanal		U	0.0817	1.2		0.0817	74	1.27		0.0817	78
Benzaldehyde		U	0.0720	0.688		0.0720	48	0.794		0.0720	55
Pentanal		U	0.0774		U	0.0774			U	0.0774	
p-Tolualdehyde		U	0.0686		U	0.0686			U	0.0686	
Hexanal		U	0.0735		U	0.0735			U	0.0735	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

LF2
Aldehydes and Ketones
Descriptive Statistics

Biomethane

Analyte	Count	Mean	Standard Deviation	Minimum	Maximum
Formaldehyde	2	1.19	1.18	0.356	2.02
Acetaldehyde	4	1.31	0.906	0.602	2.55
Acetone	4	41.8	48.3	5.05	109
Propionaldehyde	3	0.524	0.520	0.217	1.12
Crotonaldehyde	2	0.37	0.365	0.117	0.633
2-Butanone	2	10.0	12.2	1.40	18.7
Methacrolein	2	2.2	2.75	0.224	4.11
Butanal	3	0.865	0.663	0.459	1.63
Benzaldehyde	2	1.29	1.27	0.395	2.19

LF2
Aldehydes and Ketones
Descriptive Statistics

Biogas

Analyte	Count	Mean	Standard Deviation	Minimum	Maximum
Formaldehyde	3	0.647	0.271	0.363	0.901
Acetaldehyde	3	6.86	5.87	0.762	12.5
Acetone	3	126	80.0	46.6	207
Propionaldehyde	3	2.45	2.29	0.223	4.79
2-Butanone	3	138	49.1	81.6	169
Butanal	3	3.62	2.76	0.479	5.66
Benzaldehyde	2	10.3	0.743	9.79	10.84
Pentanal	1	17.4	N/A	17.4	17.4
p-Tolualdehyde	1	57.0	N/A	57.0	57.0
Hexanal	1	0.730	N/A	0.730	0.730

Sample ID:	LF3BM01aDN			LF3BM02aDN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC081113-MB		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1639			1607-1642		
Operator:	RS			RS		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/13/2008			11/13/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/2008			11/19/2008		
Sample Size (m^3):	0.27			0.31		
Percent Solid:	NA			NA		
Prep DF:	5			5		
Analysis DF:	1			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	2.38		0.208	2.33		0.181
Acetaldehyde	3.56		0.0971	4.26		0.0847
Acetone	155	EB	0.0915	133	EB	0.0798
Acrolein		U	0.0923		U	0.0805
Propionaldehyde	6.14		0.0915	6.45		0.0798
Crotonaldehyde		U	0.0871		U	0.0760
2-Butanone	198	E	0.0864	167	E	0.0754
Methacrolein		U	0.0871		U	0.0760
Butanal	9.34		0.0864	6.46		0.0754
Benzaldehyde		U	0.0762		U	0.0664
Pentanal		U	0.0819		U	0.0714
p-Tolualdehyde		U	0.0726		U	0.0633
Hexanal		U	0.0778		U	0.0678

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF3BM03DN			LF3BM04DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.28			0.29		
Percent Solid:	NA			NA		
Prep DF:	5			5		
Analysis DF:	1			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	0.385		0.177	0.566		0.173
Acetaldehyde	12.0		0.0826	17.4		0.0809
Acetone	314	EB	0.0778	281	EB	0.0762
Acrolein		U	0.0785		U	0.0768
Propionaldehyde	7.03		0.0778	9.02		0.0762
Crotonaldehyde		U	0.0741		U	0.0725
2-Butanone		U	0.0735		U	0.0720
Methacrolein		U	0.0741		U	0.0725
Butanal	0.398		0.0735	0.509		0.0720
Benzaldehyde		U	0.0648		U	0.0634
Pentanal		U	0.0697		U	0.0682
p-Tolualdehyde		U	0.0618		U	0.0604
Hexanal		U	0.0662		U	0.0647

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF3BG01aDN			LF3BG02aDN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081113-MB			QC081113-MB		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1607-1645			1607-1648		
Operator:	RS			RS		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/13/2008			11/13/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/19/2008			11/19/2008		
Sample Size (m^3):	0.48			0.27		
Percent Solid:	NA			NA		
Prep DF:	5			5		
Analysis DF:	1			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	0.213	J	0.115	0.238	J	0.205
Acetaldehyde	8.35		0.0540	3.41		0.0960
Acetone	44.8	EB	0.0508	235	EB	0.0904
Acrolein		U	0.0513		U	0.0912
Propionaldehyde	4.97		0.0508	1.38		0.0904
Crotonaldehyde		U	0.0484		U	0.0861
2-Butanone	86.9	E	0.0480	115	E	0.0854
Methacrolein	1.45		0.0484		U	0.0861
Butanal	3.77		0.0480	1.28		0.0854
Benzaldehyde		U	0.0423		U	0.0753
Pentanal	0.289		0.0455		U	0.0809
p-Tolualdehyde	0.775		0.0403		U	0.0717
Hexanal	0.621		0.0432		U	0.0769

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF3BG03DN			LF3BG04DN		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.26			0.25		
Percent Solid:	NA			NA		
Prep DF:	5			5		
Analysis DF:	1			1		
Injection Volume (µl):	10.00			10.00		
Extract Volume (µl):	5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde	1.04		0.195	0.657		0.200
Acetaldehyde	35.3		0.0910	33.9		0.0934
Acetone	159	EB	0.0857	243	EB	0.0879
Acrolein		U	0.0864		U	0.0887
Propionaldehyde	15.1		0.0857	10.5		0.0879
Crotonaldehyde		U	0.0816		U	0.0837
2-Butanone	304	E	0.0809	400	E	0.0831
Methacrolein		U	0.0816		U	0.0837
Butanal	11.7		0.0809	7.37		0.0831
Benzaldehyde		U	0.0713	19.6		0.0732
Pentanal	0.540		0.0767		U	0.0787
p-Tolualdehyde	2.20		0.0680		U	0.0698
Hexanal		U	0.0728	0.546		0.0748

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF3BL01DN			QC081113-MB			QC081202-MBa		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-Mba,b			QC081113-MB			QC081202-MBa		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	1957-1971, 2063-2077			1882-1884			1957-1959		
Operator:	RS			RS			RS		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/2/2008			11/13/2008			12/2/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/8/2008			12/2/2008			12/8/2008		
Sample Size (m^3):	0.27			0.30			0.27		
Percent Solid:	NA			NA			NA		
Prep DF:	5			5			5		
Analysis DF:	1			1			1		
Injection Volume (µl):	10.00			10.00			10.00		
Extract Volume (µl):	5000			5000			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:									
Formaldehyde	1.36		0.186		U	0.178		U	0.196
Acetaldehyde		U	0.0867		U	0.0832		U	0.0919
Acetone	0.566	B	0.0816	0.536		0.0783	0.590		0.0866
Acrolein		U	0.0823		U	0.0790		U	0.0874
Propionaldehyde		U	0.0816		U	0.0783		U	0.0866
Crotonaldehyde		U	0.0777		U	0.0746		U	0.0824
2-Butanone		U	0.0771		U	0.0740		U	0.0818
Methacrolein		U	0.0777		U	0.0746		U	0.0824
Butanal		U	0.0771		U	0.0740		U	0.0818
Benzaldehyde		U	0.0679		U	0.0652		U	0.0721
Pentanal		U	0.0731		U	0.0701		U	0.0775
p-Tolualdehyde		U	0.0648		U	0.0621		U	0.0687
Hexanal		U	0.0694		U	0.0666		U	0.0736

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	QC081202-MBb			QC081202-MBSa				QC081202-MBSb			
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge				BPE-DNPH Cartridge			
Preservation:	None			None				None			
Decanted:	None			None				None			
Batch QC:	QC081202-MBb			QC081202-MBa				QC081202-MBb			
Preparation Method:	EPA 8315			EPA 8315				EPA 8315			
Cleanup Method(s):	NA			NA				NA			
Analysis Method:	EPA 8315			EPA 8315				EPA 8315			
Instrument:	F			F				F			
File ID:	2063-2065			1957-1962				2063-2068			
Operator:	RS			RS				RS			
Date Sampled:	NA			NA				NA			
Date Received:	NA			NA				NA			
Date Prepared:	12/2/2008			12/2/2008				12/2/2008			
Date Cleanup:	NA			NA				NA			
Date Analyzed:	12/15/2008			12/8/2008				12/15/2008			
Sample Size (m^3):	0.27			0.27				0.27			
Percent Solid:	NA			NA				NA			
Prep DF:	5			5				5			
Analysis DF:	1			1				1			
Injection Volume (µl):	10.00			10.00				10.00			
Extract Volume (µl):	5000			5000				5000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:											
Formaldehyde		U	0.196	2.88		0.196	49	3.05		0.196	52
Acetaldehyde		U	0.0918	3.54		0.0918	64	3.87		0.0918	70
Acetone	0.532	B	0.0865	2.4	B	0.0865	139	2.32	B	0.0865	134
Acrolein		U	0.0873	1.58		0.0873	91	1.65		0.0873	95
Propionaldehyde		U	0.0865	1.57		0.0865	91	1.71		0.0865	99
Crotonaldehyde		U	0.0824		U	0.0824			U	0.0824	
2-Butanone		U	0.0817		U	0.0817			U	0.0817	
Methacrolein		U	0.0824		U	0.0824			U	0.0824	
Butanal		U	0.0817	1.2		0.0817	74	1.27		0.0817	78
Benzaldehyde		U	0.0720	0.688		0.0720	48	0.794		0.0720	55
Pentanal		U	0.0774		U	0.0774			U	0.0774	
p-Tolualdehyde		U	0.0686		U	0.0686			U	0.0686	
Hexanal		U	0.0735		U	0.0735			U	0.0735	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

LF3

Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard I	Range	Minimum	Maximum	Count
Formaldeh	1.41	1.45	1.09	1.99	0.385	2.38	4
Acetaldehy	9.31	8.12	6.63	13.9	3.56	17.4	4
Acetone	221	218	90.2	181	133	314	4
Propionald	7.16	6.74	1.29	2.88	6.14	9.02	4
2-Butanone	183	183	22.1	31.2	167	198	2
Butanal	4.18	3.49	4.46	8.94	0.398	9.34	4

LF3

Descriptive Statistics

Biogas

Analyte	Mean	Median	Standard I	Range	Minimum	Maximum	Count
maldehyde	0.537	0.447	0.393	0.829	0.213	1.04	4
Acetaldehy	20.2	21.1	16.7	31.8	3.41	35.3	4
Acetone	170	197	91.8	198	44.8	243	4
Propionald	7.98	7.74	6.04	13.7	1.38	15.1	4
2-Butanone	226	210	151	313	86.9	400	4
Methacrole	1.45	1.45	N/A	0.00	1.45	1.45	1
Butanal	6.04	5.57	4.55	10.5	1.28	11.7	4
Benzaldeh	19.6	19.6	N/A	0.00	19.6	19.6	1
Pentanal	0.415	0.415	0.178	0.251	0.289	0.54	2
p-Tolualdel	1.49	1.49	1.01	1.42	0.775	2.20	2
Hexanal	0.583	0.583	0.0528	0.0747	0.546	0.621	2

Aldehydes and Ketones
EPA 8315

Sample ID:	LF4BG01DN			LF4BL01DN			QC090109-MBa		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090109-MBa, QC090109 MBb			QC090109-MBa			QC090109-MBa		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	2171-2197, 2218-2241			2171-2203			2171-2176		
Operator:	RS			RS			RS		
Date Sampled:	12/11/2008			12/10/2008			NA		
Date Received:	1/8/2009			1/8/2009			NA		
Date Prepared:	1/9/2009			1/9/2009			1/9/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/13/09, 1/14/09			1/13/2009			1/13/2009		
Sample Size (m^3):	0.236			0.236			0.26		
Percent Solid:	NA			NA			NA		
Prep DF:	5000			5000			5000		
Analysis DF:	5			5			5		
Injection Volume (µl):	1			1			1		
Extract Volume (µl):	10.00			10.00			10.00		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:									
Formaldehyde	0.737		0.230		U	0.230		U	0.206
Acetaldehyde	7.4		0.108		U	0.108		U	0.0962
Acetone	368	EB	0.101	2.62	B	0.101	3.49		0.0906
Acrolein		U	0.102		U	0.102		U	0.0914
Propionaldehyde	2.67		0.101		U	0.101		U	0.0906
Crotonaldehyde	6.93		0.0966		U	0.0966		U	0.0863
2-Butanone	345	E	0.0959		U	0.0959		U	0.0856
Methacrolein		U	0.0966		U	0.0966		U	0.0863
Butanal	3.95		0.0959		U	0.0959		U	0.0856
Benzaldehyde		U	0.0845		U	0.0845		U	0.0755
Pentanal		U	0.0909		U	0.0909		U	0.0811
p-Tolualdehyde	0.138	J	0.0805		U	0.0805		U	0.0719
Hexanal		U	0.0863		U	0.0863		U	0.0770

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

ALdehydes and Ketones
EPA 8315

Sample ID:	**WWTP1BM01DN**			**WWTP1BM02DN**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1965,2063-2071			1957-1968, 2063-2074		
Operator:	RS			RS		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.253			0.258		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	1			1		
Injection Volume (µl):	10			10		
Extract Volume (µl):	10			10		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde-DNPH		U	0.204		U	0.205
Acetaldehyde-DNPH		U	0.0953	0.279		0.0958
Acetone-DNPH	0.715	B	0.0897	0.697	B	0.0902
Acrolein-DNPH		U	0.0905		U	0.0910
Propionaldehyde-DNPH		U	0.0897		U	0.0902
Crotonaldehyde-DNPH		U	0.0854		U	0.0859
2-Butanone-DNPH		U	0.0848		U	0.0852
Methacrolein-DNPH		U	0.0854		U	0.0859
Butanal-DNPH		U	0.0848		U	0.0852
Benzaldehyde-DNPH		U	0.0747		U	0.0751
Pentanal-DNPH		U	0.0803		U	0.0808
p-Tolualdehyde-DNPH		U	0.0712		U	0.0716
Hexanal-DNPH		U	0.0763		U	0.0767

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

ALdehydes and Ketones
EPA 8315

Sample ID:	**WWTP1BM03DN**			**WWTP1BG01DN**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.259			0.270		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	1			1		
Injection Volume (µl):	10			10		
Extract Volume (µl):	10			10		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde-DNPH		U	0.199	0.727	J	0.191
Acetaldehyde-DNPH		U	0.0930	4.730		0.0893
Acetone-DNPH	0.523	B	0.0875	0.704	B	0.0841
Acrolein-DNPH		U	0.0883		U	0.0848
Propionaldehyde-DNPH		U	0.0875		U	0.0841
Crotonaldehyde-DNPH		U	0.0834		U	0.0801
2-Butanone-DNPH		U	0.0827	0.298		0.0795
Methacrolein-DNPH		U	0.0834		U	0.0801
Butanal-DNPH		U	0.0827		U	0.0795
Benzaldehyde-DNPH		U	0.0729	3.932		0.0700
Pentanal-DNPH		U	0.0784		U	0.0753
p-Tolualdehyde-DNPH		U	0.0695		U	0.0667
Hexanal-DNPH		U	0.0744	2.718		0.0715

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**WWTP1BG02DN**		
Matrix:	BPE-DNPH Cartridge		
Preservation:	None		
Decanted:	None		
Batch QC:	QC081202-Mba,b		
Preparation Method:	EPA 8315		
Cleanup Method(s):	NA		
Analysis Method:	EPA 8315		
Instrument:	F		
File ID:	1957-1971, 2063-2077		
Operator:	RS		
Date Sampled:	11/5/2008		
Date Received:	11/26/2008		
Date Prepared:	12/2/2008		
Date Cleanup:	NA		
Date Analyzed:	12/8/08, 12/15/08		
Sample Size (m^3):	0.263		
Percent Solid:	NA		
Prep DF:	5000		
Analysis DF:	1		
Injection Volume (µl):	10		
Extract Volume (µl):	10		
Units	Concentration (ppbv)	Q	EDL

Aldehyde & Ketone Compounds:

Formaldehyde-DNPH		U	0.200
Acetaldehyde-DNPH	0.262		0.0939
Acetone-DNPH	0.157	JB	0.0885
Acrolein-DNPH		U	0.0892
Propionaldehyde-DNPH		U	0.0885
Crotonaldehyde-DNPH		U	0.0842
2-Butanone-DNPH		U	0.0836
Methacrolein-DNPH		U	0.0842
Butanal-DNPH		U	0.0836
Benzaldehyde-DNPH		U	0.0736
Pentanal-DNPH		U	0.0792
p-Tolualdehyde-DNPH	0.411		0.0702
Hexanal-DNPH		U	0.0752

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interferen
RL - Reporting limit is the sample equivalent of the lowest line
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**WWTP1BG03DN**			**WWTP1BG04DN**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b		
Preparation Method:	EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8315			EPA 8315		
Instrument:	F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077		
Operator:	RS			RS		
Date Sampled:	11/6/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/8/08, 12/15/08			12/8/08, 12/15/08		
Sample Size (m^3):	0.256			0.260		
Percent Solid:	NA			NA		
Prep DF:	5000			5000		
Analysis DF:	1			1		
Injection Volume (µl):	10			10		
Extract Volume (µl):	10			10		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:						
Formaldehyde-DNPH		U	0.205		U	0.192
Acetaldehyde-DNPH	2.67		0.0962		U	0.0898
Acetone-DNPH	0.340	B	0.0906	1.24	B	0.0846
Acrolein-DNPH		U	0.0914		U	0.0854
Propionaldehyde-DNPH		U	0.0906		U	0.0846
Crotonaldehyde-DNPH		U	0.0863		U	0.0806
2-Butanone-DNPH		U	0.0856		U	0.0799
Methacrolein-DNPH		U	0.0863		U	0.0806
Butanal-DNPH		U	0.0856		U	0.0799
Benzaldehyde-DNPH	2.94		0.0754		U	0.0704
Pentanal-DNPH		U	0.0811		U	0.0757
p-Tolualdehyde-DNPH		U	0.0719		U	0.0671
Hexanal-DNPH		U	0.0770		U	0.0719

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**WWTP1BL01DN**			**WWTP1BL02DN**			**QC081202-MBa**		
Matrix:	BPE-DNPH Cartridge			BPE-DNPH Cartridge			BPE-DNPH Cartridge		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-Mba,b			QC081202-Mba,b			QC081202-MBa		
Preparation Method:	EPA 8315			EPA 8315			EPA 8315		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8315			EPA 8315			EPA 8315		
Instrument:	F			F			F		
File ID:	1957-1971, 2063-2077			1957-1971, 2063-2077			1957-1959		
Operator:	RS			RS			RS		
Date Sampled:	11/5/2008			11/6/2008			NA		
Date Received:	11/26/2008			11/26/2008			NA		
Date Prepared:	12/2/2008			12/2/2008			12/2/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	39790			39790			12/8/2008		
Sample Size (m^3):	0.261			0.258			0.27		
Percent Solid:	NA			NA			NA		
Prep DF:	5000			5000			5		
Analysis DF:	1			1			1		
Injection Volume (µl):	10			10			10		
Extract Volume (µl):	10			10			5000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
Aldehyde & Ketone Compounds:									
Formaldehyde-DNPH		U	0.198		U	0.193		U	0.196
Acetaldehyde-DNPH		U	0.0925		U	0.0903		U	0.0919
Acetone-DNPH	0.525	B	0.0871	0.667	B	0.0850	0.590		0.0866
Acrolein-DNPH		U	0.0879		U	0.0858		U	0.0874
Propionaldehyde-DNPH		U	0.0871		U	0.0850		U	0.0866
Crotonaldehyde-DNPH		U	0.0829		U	0.0810		U	0.0824
2-Butanone-DNPH		U	0.0823		U	0.0803		U	0.0818
Methacrolein-DNPH		U	0.0829		U	0.0810		U	0.0824
Butanal-DNPH		U	0.0823		U	0.0803		U	0.0818
Benzaldehyde-DNPH		U	0.0725		U	0.0708		U	0.0721
Pentanal-DNPH		U	0.0780		U	0.0761		U	0.0775
p-Tolualdehyde-DNPH		U	0.0691		U	0.0675		U	0.0687
Hexanal-DNPH		U	0.0740		U	0.0723		U	0.0736

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

QC081202-MBb

BPE-DNPH Cartridge		
None		
None		
QC081202-MBb		
EPA 8315		
NA		
EPA 8315		
F		
2063-2065		
RS		
NA		
NA		
12/2/2008		
NA		
12/15/2008		
0.27		
NA		
5		
1		
10		
5000		
Concentration (ppbv)	Q	EDL
	U	0.196
	U	0.0918
0.532	B	0.0865
	U	0.0873
	U	0.0865
	U	0.0824
	U	0.0817
	U	0.0824
	U	0.0817
	U	0.0720
	U	0.0774
	U	0.0686
	U	0.0735

Sample ID:	**QC081202-MBSa**				**QC081202-MBSb**			
Matrix:	BPE-DNPH Cartridge				BPE-DNPH Cartridge			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC081202-MBa				QC081202-MBb			
Preparation Method:	EPA 8315				EPA 8315			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8315				EPA 8315			
Instrument:	F				F			
File ID:	1957-1962				2063-2068			
Operator:	RS				RS			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	12/2/2008				12/2/2008			
Date Cleanup:	NA				NA			
Date Analyzed:	12/8/2008				12/15/2008			
Sample Size (m^3):	0.27				0.27			
Percent Solid:	NA				NA			
Prep DF:	5				5			
Analysis DF:	1				1			
Injection Volume (µl):	10				10			
Extract Volume (µl):	5000				5000			
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
Aldehyde & Ketone Compounds:								
Formaldehyde-DNPH	2.88		0.196	49	3.05		0.196	52
Acetaldehyde-DNPH	3.54		0.0918	64	3.87		0.0918	70
Acetone-DNPH	2.4	B	0.0865	139	2.32	B	0.0865	134
Acrolein-DNPH	1.58		0.0873	91	1.65		0.0873	95
Propionaldehyde-DNPI	1.57		0.0865	91	1.71		0.0865	99
Crotonaldehyde-DNPH		U	0.0824			U	0.0824	
2-Butanone-DNPH		U	0.0817			U	0.0817	
Methacrolein-DNPH		U	0.0824			U	0.0824	
Butanal-DNPH	1.2		0.0817	74	1.27		0.0817	78
Benzaldehyde-DNPH	0.688		0.0720	48	0.794		0.0720	55
Pentanal-DNPH		U	0.0774			U	0.0774	
p-Tolualdehyde-DNPH		U	0.0686			U	0.0686	
Hexanal-DNPH		U	0.0735			U	0.0735	

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

WWTP1

Aldehydes and Ketones
Descriptive Statistics

Biomethane

Analyte	Count	Mean	Standard I	Minimum	Maximum
Acetaldehyde-DNPH	1	0.279	N/A	0.279	0.279
Acetone-DNPH	3	0.645	0.106	0.523	0.715

/

WWTP1

Aldehydes and Ketones
Descriptive Statistics

Biogas

Analyte	Count	Mean	Standard I	Minimum	Maximum
Formaldehyde-DNPH	1	0.727	N/A	0.727	0.727
Acetaldehyde-DNPH	3	2.55	2.24	0.262	4.73
Acetone-DNPH	4	0.609	0.476	0.157	1.237
2-Butanone-DNPH	1	0.298	N/A	0.298	0.298
Benzaldehyde-DNPH	2	3.44	0.698	2.94	3.93
p-Tolualdehyde-DNPH	1	0.411	N/A	0.411	0.411
Hexanal-DNPH	1	2.72	N/A	2.72	2.72

Appendix I – Pesticides Analysis

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A011618.D			A011619.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/17/2009			1/18/2009		
Sample Volume (m^3)	0.359			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000439		U	0.000337
b-BHC		U	0.000439		U	0.000337
g-BHC		U	0.000439		U	0.000337
d-BHC		U	0.000439		U	0.000337
Heptachlor		U	0.000342		U	0.000263
Aldrin		U	0.000349		U	0.000269
Heptachlor epoxide		U	0.000328		U	0.000252
g-Chlordane		U	0.000311		U	0.000239
Endosulfan I		U	0.000313		U	0.000241
a-Chlordane		U	0.000311		U	0.000239
Dieldrin		U	0.000335		U	0.000257
4,4'-DDE		U	0.000401		U	0.000308
Endrin		U	0.000335		U	0.000257
Endosulfan II		U	0.000313		U	0.000241
4,4'-DDD		U	0.000398		U	0.000306
Endrin aldehyde		U	0.000335		U	0.000257
Endosulfan sulfate		U	0.000302		U	0.000232
4,4'-DDT		U	0.000360		U	0.000276
Endrin ketone		U	0.000335		U	0.000257
Methoxychlor		U	0.000369		U	0.000284
Toxaphene		U	0.000308		U	0.000237
Technical Chlordane		U	0.000311		U	0.000239
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	68			68		
Decachlorobiphenyl	120			124		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	1NGBL01XA			QC090112-MB			QC090112-MBS1			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			AMX			
File ID:	A011620.D			A011614.D			A011616.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/18/2009			1/17/2009			1/17/2009			
Sample Volume (m^3)	0.416			0.416			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
ORGANOCHLORINE PESTICIDES:										
a-BHC		U	0.000382		U	0.000370	0.0288		0.000154	75
b-BHC		U	0.000382		U	0.000370	0.0300		0.000154	78
g-BHC		U	0.000382		U	0.000370	0.0285		0.000154	74
d-BHC		U	0.000382		U	0.000370	0.0304		0.000154	49
Heptachlor		U	0.000298		U	0.000288	0.0248		0.000120	83
Aldrin		U	0.000304		U	0.000295	0.0196		0.000123	64
Heptachlor epoxide		U	0.000285		U	0.000276	0.0221		0.000115	77
g-Chlordane		U	0.000271		U	0.000262	0.0222		0.000109	81
Endosulfan I		U	0.000273		U	0.000264	0.0151		0.000110	55
a-Chlordane		U	0.000271		U	0.000262	0.0192		0.000109	70
Dieldrin		U	0.000292		U	0.000282	0.0227		0.000118	77
4,4'-DDE		U	0.000349		U	0.000338	0.0249		0.000141	71
Endrin		U	0.000292		U	0.000282	0.0220		0.000118	75
Endosulfan II		U	0.000273		U	0.000264	0.0178		0.000110	65
4,4'-DDD		U	0.000347		U	0.000336	0.0276		0.000140	79
Endrin aldehyde		U	0.000292		U	0.000282	0.0282		0.000118	96
Endosulfan sulfate		U	0.000263		U	0.000254	0.0214		0.000106	81
4,4'-DDT		U	0.000313		U	0.000303	0.0264		0.000126	84
Endrin ketone		U	0.000292		U	0.000282	0.0272		0.000118	92
Methoxychlor		U	0.000321		U	0.000311	0.0345		0.000130	106
Toxaphene		U	0.000268		U	0.000260		U	0.000108	
Technical Chlordane		U	0.000271		U	0.000262		U	0.000109	
Extraction Surrogate Recoveries (%)										
Tetrachloro-m-xylene	60			56			64			
Decachlorobiphenyl	100			112			108			

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**2NG01XA**			**2NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A011622.D			A011623.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			12/11/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/18/2009			1/18/2009		
Sample Volume (m^3)	0.386			0.494		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000390		U	0.000305
b-BHC		U	0.000390		U	0.000305
g-BHC		U	0.000390		U	0.000305
d-BHC		U	0.000390		U	0.000305
Heptachlor		U	0.000304		U	0.000238
Aldrin		U	0.000311		U	0.000243
Heptachlor epoxide		U	0.000292		U	0.000228
g-Chlordane		U	0.000277		U	0.000217
Endosulfan I		U	0.000279		U	0.000218
a-Chlordane		U	0.000277		U	0.000217
Dieldrin		U	0.000298		U	0.000233
4,4'-DDE		U	0.000357		U	0.000279
Endrin		U	0.000298		U	0.000233
Endosulfan II		U	0.000279		U	0.000218
4,4'-DDD		U	0.000355		U	0.000277
Endrin aldehyde		U	0.000298		U	0.000233
Endosulfan sulfate		U	0.000268		U	0.000210
4,4'-DDT		U	0.000320		U	0.000250
Endrin ketone		U	0.000298		U	0.000233
Methoxychlor		U	0.000328		U	0.000257
Toxaphene		U	0.000274		U	0.000214
Technical Chlordane		U	0.000277		U	0.000217
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	60			68		
Decachlorobiphenyl	120			140		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**2NGBL01XA**			**QC090114-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A011628.D			A011615.D		
Operator:	ERL			ERL		
Date Sampled:	12/11/2008			NA		
Date Received:	1/8/2009			NA		
Date Prepared:	1/14/2009			1/14/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/18/2009			1/17/2009		
Sample Volume (m^3)	0.440			0.440		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000342		U	0.000351
b-BHC		U	0.000342		U	0.000351
g-BHC		U	0.000342		U	0.000351
d-BHC		U	0.000342		U	0.000351
Heptachlor		U	0.000266		U	0.000273
Aldrin		U	0.000272		U	0.000279
Heptachlor epoxide		U	0.000255		U	0.000262
g-Chlordane		U	0.000242		U	0.000249
Endosulfan I		U	0.000244		U	0.000250
a-Chlordane		U	0.000242		U	0.000249
Dieldrin		U	0.000261		U	0.000268
4,4'-DDE		U	0.000312		U	0.000320
Endrin		U	0.000261		U	0.000268
Endosulfan II		U	0.000244		U	0.000250
4,4'-DDD		U	0.000310		U	0.000318
Endrin aldehyde		U	0.000261		U	0.000268
Endosulfan sulfate		U	0.000235		U	0.000241
4,4'-DDT		U	0.000280		U	0.000288
Endrin ketone		U	0.000261		U	0.000268
Methoxychlor		U	0.000287		U	0.000295
Toxaphene		U	0.000240		U	0.000246
Technical Chlordane		U	0.000242		U	0.000249
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	68			56		
Decachlorobiphenyl	132			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF1BM01XA**			**LF1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111217.D			A111218.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			10/20/08		
Date Received:	10/29/08			10/29/08		
Date Prepared:	11/05/08			11/05/08		
Date Cleanup:	NA			NA		
Date Analyzed:	11/13/08			11/13/08		
Sample Volume (m^3)	0.525			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000316		U	0.000357
b-BHC		U	0.000316		U	0.000357
g-BHC		U	0.000316		U	0.000357
d-BHC		U	0.000316		U	0.000357
Heptachlor		U	0.000246		U	0.000278
Aldrin		U	0.000252		U	0.000284
Heptachlor epoxide		U	0.000236		U	0.000266
g-Chlordane		U	0.000225		U	0.000253
Endosulfan I		U	0.000226		U	0.000255
a-Chlordane		U	0.000225		U	0.000253
Dieldrin		U	0.000242		U	0.000272
4,4'-DDE		U	0.000289		U	0.000326
Endrin		U	0.000242		U	0.000272
Endosulfan II		U	0.000226		U	0.000255
4,4'-DDD		U	0.000287		U	0.000324
Endrin aldehyde		U	0.000242		U	0.000272
Endosulfan sulfate		U	0.000218		U	0.000245
4,4'-DDT		U	0.000260		U	0.000292
Endrin ketone		U	0.000242		U	0.000272
Methoxychlor		U	0.000266		U	0.000300
Toxaphene		U	0.000222		U	0.000251
Technical Chlordane		U	0.000225		U	0.000253
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	56			32		
Decachlorobiphenyl	132			44		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	LF1BM03XA			LF1BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090224-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A030439.D			A030440.D		
Operator:	ERL			ERL		
Date Sampled:	02/05/09			02/05/09		
Date Received:	02/12/09			02/12/09		
Date Prepared:	02/24/09			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	03/06/09			03/06/09		
Sample Volume (m^3)	0.505			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000335		U	0.000367
b-BHC		U	0.000335		U	0.000367
g-BHC		U	0.000335		U	0.000367
d-BHC		U	0.000335		U	0.000367
Heptachlor		U	0.000430		U	0.000472
Aldrin		U	0.000420		U	0.000461
Heptachlor epoxide		U	0.000448		U	0.000492
g-Chlordane		U	0.000472		U	0.000518
Endosulfan I		U	0.000469		U	0.000514
a-Chlordane		U	0.000472		U	0.000518
Dieldrin		U	0.000439		U	0.000481
4,4'-DDE		U	0.000366		U	0.000402
Endrin		U	0.000439		U	0.000481
Endosulfan II		U	0.000469		U	0.000514
4,4'-DDD		U	0.000369		U	0.000404
Endrin aldehyde		U	0.000439		U	0.000481
Endosulfan sulfate		U	0.000487		U	0.000534
4,4'-DDT		U	0.000408		U	0.000448
Endrin ketone		U	0.000439		U	0.000481
Methoxychlor		U	0.000398		U	0.000437
Toxaphene		U	0.000477		U	0.000523
Technical Chlordane		U	0.000472		U	0.000518
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	76			66		
Decachlorobiphenyl	99			81		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	LF1BG01XA			LF1BG02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111219.D			A030441.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			02/05/09		
Date Received:	10/29/08			02/12/09		
Date Prepared:	11/05/08			02/24/09		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/08			03/06/09		
Sample Volume (m^3)	0.474			0.375		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000360		U	0.000453
b-BHC		U	0.000360		U	0.000453
g-BHC		U	0.000360		U	0.000453
d-BHC		U	0.000360		U	0.000453
Heptachlor		U	0.000280		U	0.000582
Aldrin		U	0.000287		U	0.000568
Heptachlor epoxide		U	0.000269		U	0.000607
g-Chlordane		U	0.000255		U	0.000638
Endosulfan I		U	0.000257		U	0.000634
a-Chlordane		U	0.000255		U	0.000638
Dieldrin		U	0.000275		U	0.000593
4,4'-DDE		U	0.000329		U	0.000495
Endrin		U	0.000275		U	0.000593
Endosulfan II		U	0.000257		U	0.000634
4,4'-DDD		U	0.000327		U	0.000499
Endrin aldehyde		U	0.000275		U	0.000593
Endosulfan sulfate		U	0.000247		U	0.000659
4,4'-DDT		U	0.000295		U	0.000552
Endrin ketone		U	0.000275		U	0.000593
Methoxychlor		U	0.000303		U	0.000539
Toxaphene		U	0.000253		U	0.000645
Technical Chlordane		U	0.000255		U	0.000638
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	60			51		
Decachlorobiphenyl	144			68		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	LF1BL01XA			LF1BL02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111220.D			A030442.D		
Operator:	ERL			ERL		
Date Sampled:	10/20/08			2/5/2009		
Date Received:	10/29/08			2/12/2009		
Date Prepared:	11/05/08			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/08			3/6/2009		
Sample Volume (m^3)	0.490			0.454		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000345		U	0.000377
b-BHC		U	0.000345		U	0.000377
g-BHC		U	0.000345		U	0.000377
d-BHC		U	0.000345		U	0.000377
Heptachlor		U	0.000268		U	0.000484
Aldrin		U	0.000275		U	0.000473
Heptachlor epoxide		U	0.000257		U	0.000505
g-Chlordane		U	0.000245		U	0.000531
Endosulfan I		U	0.000246		U	0.000528
a-Chlordane		U	0.000245		U	0.000531
Dieldrin		U	0.000263		U	0.000494
4,4'-DDE		U	0.000315		U	0.000412
Endrin		U	0.000263		U	0.000494
Endosulfan II		U	0.000246		U	0.000528
4,4'-DDD		U	0.000313		U	0.000415
Endrin aldehyde		U	0.000263		U	0.000494
Endosulfan sulfate		U	0.000237		U	0.000548
4,4'-DDT		U	0.000283		U	0.000460
Endrin ketone		U	0.000263		U	0.000494
Methoxychlor		U	0.000290		U	0.000448
Toxaphene		U	0.000242		U	0.000536
Technical Chlordane		U	0.000244		U	0.000531

Extraction Surrogate Recoveries (%)

Tetrachloro-m-xylene	64
Decachlorobiphenyl	228

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111214.D			A030436.D		
Operator:	ERL			ERL		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/05/08			2/24/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	11/13/08			3/5/2009		
Sample Volume (m^3)	1.000			0.454		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000154		U	0.000385
b-BHC		U	0.000154		U	0.000385
g-BHC		U	0.000154		U	0.000385
d-BHC		U	0.000154		U	0.000385
Heptachlor		U	0.000120		U	0.000495
Aldrin		U	0.000123		U	0.000484
Heptachlor epoxide		U	0.000115		U	0.000516
g-Chlordane		U	0.000109		U	0.000543
Endosulfan I		U	0.000110		U	0.000539
a-Chlordane		U	0.000109		U	0.000543
Dieldrin		U	0.000118		U	0.000505
4,4'-DDE		U	0.000141		U	0.000422
Endrin		U	0.000118		U	0.000505
Endosulfan II		U	0.000110		U	0.000539
4,4'-DDD		U	0.000140		U	0.000424
Endrin aldehyde		U	0.000118		U	0.000505
Endosulfan sulfate		U	0.000106		U	0.000561
4,4'-DDT		U	0.000126		U	0.000470
Endrin ketone		U	0.000118		U	0.000505
Methoxychlor		U	0.000130		U	0.000458
Toxaphene		U	0.000108		U	0.000549
Technical Chlordane		U	0.000109		U	0.000543

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	52	50
Decachlorobiphenyl	116	64

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID: **QC081105-MBS2**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC081105-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8081A
Instrument:	AMX
File ID:	A111215.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	11/05/08
Date Cleanup:	NA
Date Analyzed:	11/13/08
Sample Volume (m^3)	1.000
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
ORGANOCHLORINE PESTICIDES:				
a-BHC	0.0217		0.000154	56
b-BHC	0.0208		0.000154	54
g-BHC	0.0230		0.000154	60
d-BHC	0.0156		0.000154	40
Heptachlor	0.0182		0.000120	61
Aldrin	0.0152		0.000123	50
Heptachlor epoxide	0.0162		0.000115	56
g-Chlordane	0.0152		0.000109	56
Endosulfan I	0.0159		0.000110	58
a-Chlordane	0.0138		0.000109	50
Dieldrin	0.0153		0.000118	52
4,4'-DDE	0.0173		0.000141	49
Endrin	0.0143		0.000118	49
Endosulfan II	0.0130		0.000110	47
4,4'-DDD	0.0167		0.000140	48
Endrin aldehyde	0.0144		0.000118	49
Endosulfan sulfate	0.0093		0.000106	35
4,4'-DDT	0.0150		0.000126	48
Endrin ketone	0.0135		0.000118	46
Methoxychlor	0.0169		0.000130	52
Toxaphene		U	0.000108	
Technical Chlordane		U	0.000109	

Extraction Surrogate Recoveries (%)

Tetrachloro-m-xylene	48
Decachlorobiphenyl	56

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID: **QC090224-MBS1-PEST**

Matrix:	XAD Tubes
Preservation:	None
Decanted:	None
Batch QC:	QC090224-MB
Preparation Method:	EPA 3540
Cleanup Method(s):	NA
Analysis Method:	EPA 8081A
Instrument:	AMX
File ID:	A030437.D
Operator:	ERL
Date Sampled:	NA
Date Received:	NA
Date Prepared:	2/24/2009
Date Cleanup:	NA
Date Analyzed:	3/5/2009
Sample Volume (m^3)	0.454
Percent Solid:	NA
Prep DF:	1.00
Analysis DF:	1.00
Injection Volume (µl):	1.00
Extract Volume (µl):	2000

Units	Concentration (ppbv)	Q	EDL	% Recovery
ORGANOCHLORINE PESTICIDES:				
a-BHC	0.0765		0.000385	79
b-BHC	0.0792		0.000385	82
g-BHC	0.0764		0.000385	79
d-BHC	0.0845		0.000385	88
Heptachlor	0.129		0.000495	104
Aldrin	0.0761		0.000484	63
Heptachlor epoxide	0.0933		0.000516	72
g-Chlordane	0.102		0.000543	75
Endosulfan I	0.106		0.000539	79
a-Chlordane	0.0932		0.000543	69
Dieldrin	0.0880		0.000505	70
4,4'-DDE	0.0746		0.000422	71
Endrin	0.125		0.000505	99
Endosulfan II	0.0888		0.000539	66
4,4'-DDD	0.0929		0.000424	88
Endrin aldehyde	0.0928		0.000505	74
Endosulfan sulfate	0.0980		0.000561	70
4,4'-DDT	0.0761		0.000470	65
Endrin ketone	0.0977		0.000505	77
Methoxychlor	0.181		0.000458	158
Toxaphene		U	0.000549	
Technical Chlordane		U	0.000543	

Extraction Surrogate Recoveries (%)

Tetrachloro-m-xylene	61
Decachlorobiphenyl	79

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF2BM01XA			LF2BM02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111221.D			A111224.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000331		U	0.000333
b-BHC		U	0.000331		U	0.000333
g-BHC		U	0.000331		U	0.000333
d-BHC		U	0.000331		U	0.000333
Heptachlor		U	0.000258		U	0.000259
Aldrin		U	0.000264		U	0.000265
Heptachlor epoxide		U	0.000247		U	0.000248
g-Chlordane		U	0.000235		U	0.000236
Endosulfan I		U	0.000236		U	0.000238
a-Chlordane		U	0.000235		U	0.000236
Dieldrin		U	0.000253		U	0.000254
4,4'-DDE		U	0.000302		U	0.000304
Endrin		U	0.000253		U	0.000254
Endosulfan II		U	0.000236		U	0.000238
4,4'-DDD		U	0.000301		U	0.000302
Endrin aldehyde		U	0.000253		U	0.000254
Endosulfan sulfate		U	0.000227		U	0.000229
4,4'-DDT		U	0.000271		U	0.000273
Endrin ketone		U	0.000253		U	0.000254
Methoxychlor		U	0.000278		U	0.000280
Toxaphene		U	0.000232		U	0.000234
Technical Chlordane		U	0.000235		U	0.000236
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	68			76		
Decachlorobiphenyl	108			180		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF2BG01XA			LF2BM03XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111228.D			A121539.D		
Operator:	ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			12/19/2008		
Sample Volume (m^3)	0.529			0.586		
Percent Solid:	NA			NA		
Prep DF:	1.00			1		
Analysis DF:	1.00			1		
Injection Volume (µl):	1.00			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000309		U	0.000267
b-BHC		U	0.000309		U	0.000267
g-BHC		U	0.000309		U	0.000267
d-BHC		U	0.000309		U	0.000267
Heptachlor		U	0.000240		U	0.000208
Aldrin		U	0.000246		U	0.000212
Heptachlor epoxide		U	0.000230		U	0.000199
g-Chlordane		U	0.000219		U	0.000189
Endosulfan I		U	0.000220		U	0.000190
a-Chlordane		U	0.000219		U	0.000189
Dieldrin		U	0.000236		U	0.000203
4,4'-DDE		U	0.000282		U	0.000244
Endrin		U	0.000236		U	0.000203
Endosulfan II		U	0.000220		U	0.000190
4,4'-DDD		U	0.000280		U	0.000242
Endrin aldehyde		U	0.000236		U	0.000203
Endosulfan sulfate		U	0.000212		U	0.000183
4,4'-DDT		U	0.000253		U	0.000219
Endrin ketone		U	0.000236		U	0.000203
Methoxychlor		U	0.000260		U	0.000224
Toxaphene		U	0.000217		U	0.000187
Technical Chlordane		U	0.000219		U	0.000189
Extraction Surrogate Recoveries (%)				460		
Tetrachloro-m-xylene	76			740		
Decachlorobiphenyl	72					

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF2BM04XA			LF2BG03XA			LF2BG04XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX			AMX		
File ID:	A121540.D			A121546.D			A121547.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			12/20/2008			12/20/2008		
Sample Volume (m^3)	0.517			0.538			0.516		
Percent Solid:	NA			NA			NA		
Prep DF:	1			1			1		
Analysis DF:	1			1			1		
Injection Volume (µl):	1			1			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:									
a-BHC		U	0.000302		U	0.000294		U	0.000297
b-BHC		U	0.000302		U	0.000294		U	0.000297
g-BHC		U	0.000302		U	0.000294		U	0.000297
d-BHC		U	0.000302		U	0.000294		U	0.000297
Heptachlor		U	0.000236		U	0.000229		U	0.000231
Aldrin		U	0.000241		U	0.000234		U	0.000236
Heptachlor epoxide		U	0.000226		U	0.000220		U	0.000222
g-Chlordane		U	0.000215		U	0.000209		U	0.000211
Endosulfan I		U	0.000216		U	0.000210		U	0.000212
a-Chlordane		U	0.000215		U	0.000209		U	0.000211
Dieldrin		U	0.000231		U	0.000224		U	0.000227
4,4'-DDE		U	0.000277		U	0.000269		U	0.000271
Endrin		U	0.000231		U	0.000224		U	0.000227
Endosulfan II		U	0.000216		U	0.000210		U	0.000212
4,4'-DDD		U	0.000275		U	0.000267		U	0.000270
Endrin aldehyde		U	0.000231		U	0.000224		U	0.000227
Endosulfan sulfate		U	0.000208		U	0.000202		U	0.000204
4,4'-DDT		U	0.000248		U	0.000241		U	0.000243
Endrin ketone		U	0.000231		U	0.000224		U	0.000227
Methoxychlor		U	0.000254		U	0.000247		U	0.000250
Toxaphene		U	0.000213		U	0.000207		U	0.000209
Technical Chlordane		U	0.000215		U	0.000209		U	0.000211
Extraction Surrogate Recoveries (%)	360			380			360		
Tetrachloro-m-xylene	520			420			400		
Decachlorobiphenyl									

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF2BL01XA			QC081105-MB			QC081105-MBS2			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC081204-MB			QC081105-MB			QC081105-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			AMX			
File ID:	A121548.D			A111214.D			A111215.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	11/18/2008			NA			NA			
Date Received:	11/26/2008			NA			NA			
Date Prepared:	12/4/2008			11/05/08			11/05/08			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	12/20/2008			11/13/08			11/13/08			
Sample Volume (m^3)	0.539			1.000			1.000			
Percent Solid:	NA			NA			NA			
Prep DF:	1			1.00			1.00			
Analysis DF:	1			1.00			1.00			
Injection Volume (µl):	1			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
ORGANOCHLORINE PESTICIDES:										
a-BHC		U	0.000290		U	0.000154	0.0217		0.000154	56
b-BHC		U	0.000290		U	0.000154	0.0208		0.000154	54
g-BHC		U	0.000290		U	0.000154	0.0230		0.000154	60
d-BHC		U	0.000290		U	0.000154	0.0156		0.000154	40
Heptachlor		U	0.000226		U	0.000120	0.0182		0.000120	61
Aldrin		U	0.000231		U	0.000123	0.0152		0.000123	50
Heptachlor epoxide		U	0.000216		U	0.000115	0.0162		0.000115	56
g-Chlordane		U	0.000205		U	0.000109	0.0152		0.000109	56
Endosulfan I		U	0.000207		U	0.000110	0.0159		0.000110	58
a-Chlordane		U	0.000205		U	0.000109	0.0138		0.000109	50
Dieldrin		U	0.000221		U	0.000118	0.0153		0.000118	52
4,4'-DDE		U	0.000265		U	0.000141	0.0173		0.000141	49
Endrin		U	0.000221		U	0.000118	0.0143		0.000118	49
Endosulfan II		U	0.000207		U	0.000110	0.0130		0.000110	47
4,4'-DDD		U	0.000263		U	0.000140	0.0167		0.000140	48
Endrin aldehyde		U	0.000221		U	0.000118	0.0144		0.000118	49
Endosulfan sulfate		U	0.000199		U	0.000106	0.0093		0.000106	35
4,4'-DDT		U	0.000238		U	0.000126	0.0150		0.000126	48
Endrin ketone		U	0.000221		U	0.000118	0.0135		0.000118	46
Methoxychlor		U	0.000244		U	0.000130	0.0169		0.000130	52
Toxaphene		U	0.000203		U	0.000108		U	0.000108	
Technical Chlordane		U	0.000205		U	0.000109		U	0.000109	
Extraction Surrogate Recoveries (%)	400									
Tetrachloro-m-xylene	560			52			48			
Decachlorobiphenyl				116			56			

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**QC081106-MB**			**QC081204-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111223.D			A121525.D		
Operator:	ERL			ERL		
Date Sampled:	NA			NA		
Date Received:	NA			NA		
Date Prepared:	11/06/08			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/08			12/18/2008		
Sample Volume (m^3)	0.500			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000308		U	0.000384
b-BHC		U	0.000308		U	0.000384
g-BHC		U	0.000308		U	0.000384
d-BHC		U	0.000308		U	0.000384
Heptachlor		U	0.000240		U	0.000299
Aldrin		U	0.000246		U	0.000306
Heptachlor epoxide		U	0.000230		U	0.000287
g-Chlordane		U	0.000219		U	0.000272
Endosulfan I		U	0.000220		U	0.000274
a-Chlordane		U	0.000219		U	0.000272
Dieldrin		U	0.000235		U	0.000293
4,4'-DDE		U	0.000282		U	0.000351
Endrin		U	0.000235		U	0.000293
Endosulfan II		U	0.000220		U	0.000274
4,4'-DDD		U	0.000280		U	0.000349
Endrin aldehyde		U	0.000235		U	0.000293
Endosulfan sulfate		U	0.000212		U	0.000264
4,4'-DDT		U	0.000253		U	0.000315
Endrin ketone		U	0.000235		U	0.000293
Methoxychlor		U	0.000259		U	0.000323
Toxaphene		U	0.000217		U	0.000270
Technical Chlordane		U	0.000219		U	0.000272
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	44			72		
Decachlorobiphenyl	76			116		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111229.D			A111230.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000318		U	0.000329
b-BHC		U	0.000318		U	0.000329
g-BHC		U	0.000318		U	0.000329
d-BHC		U	0.000318		U	0.000329
Heptachlor		U	0.000248		U	0.000256
Aldrin		U	0.000253		U	0.000262
Heptachlor epoxide		U	0.000237		U	0.000246
g-Chlordane		U	0.000226		U	0.000233
Endosulfan I		U	0.000227		U	0.000235
a-Chlordane		U	0.000226		U	0.000233
Dieldrin		U	0.000243		U	0.000251
4,4'-DDE		U	0.000291		U	0.000301
Endrin		U	0.000243		U	0.000251
Endosulfan II		U	0.000227		U	0.000235
4,4'-DDD		U	0.000289		U	0.000299
Endrin aldehyde		U	0.000243		U	0.000251
Endosulfan sulfate		U	0.000219		U	0.000226
4,4'-DDT		U	0.000261		U	0.000270
Endrin ketone		U	0.000243		U	0.000251
Methoxychlor		U	0.000267		U	0.000277
Toxaphene		U	0.000223		U	0.000231
Technical Chlordane		U	0.000226		U	0.000233
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	76			76		
Decachlorobiphenyl	216			228		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000320		U	0.000364
b-BHC		U	0.000320		U	0.000364
g-BHC		U	0.000320		U	0.000364
d-BHC		U	0.000320		U	0.000364
Heptachlor		U	0.000250		U	0.000284
Aldrin		U	0.000255		U	0.000290
Heptachlor epoxide		U	0.000239		U	0.000272
g-Chlordane		U	0.000227		U	0.000259
Endosulfan I		U	0.000229		U	0.000260
a-Chlordane		U	0.000227		U	0.000259
Dieldrin		U	0.000245		U	0.000278
4,4'-DDE		U	0.000293		U	0.000333
Endrin		U	0.000245		U	0.000278
Endosulfan II		U	0.000229		U	0.000260
4,4'-DDD		U	0.000291		U	0.000331
Endrin aldehyde		U	0.000245		U	0.000278
Endosulfan sulfate		U	0.000220		U	0.000251
4,4'-DDT		U	0.000263		U	0.000299
Endrin ketone		U	0.000245		U	0.000278
Methoxychlor		U	0.000270		U	0.000307
Toxaphene		U	0.000225		U	0.000256
Technical Chlordane		U	0.000227		U	0.000259

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	60	80
Decachlorobiphenyl	92	112

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BM03XA			LF3BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121534.D			A121535.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000317		U	0.000310
b-BHC		U	0.000317		U	0.000310
g-BHC		U	0.000317		U	0.000310
d-BHC		U	0.000317		U	0.000310
Heptachlor		U	0.000247		U	0.000242
Aldrin		U	0.000253		U	0.000247
Heptachlor epoxide		U	0.000237		U	0.000232
g-Chlordane		U	0.000225		U	0.000220
Endosulfan I		U	0.000227		U	0.000222
a-Chlordane		U	0.000225		U	0.000220
Dieldrin		U	0.000242		U	0.000237
4,4'-DDE		U	0.000290		U	0.000284
Endrin		U	0.000242		U	0.000237
Endosulfan II		U	0.000227		U	0.000222
4,4'-DDD		U	0.000288		U	0.000282
Endrin aldehyde		U	0.000242		U	0.000237
Endosulfan sulfate		U	0.000218		U	0.000213
4,4'-DDT		U	0.000260	0.00252		0.000254
Endrin ketone		U	0.000242		U	0.000237
Methoxychlor		U	0.000267		U	0.000261
Toxaphene		U	0.000223		U	0.000218
Technical Chlordane		U	0.000225		U	0.000220

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	280	320
Decachlorobiphenyl	440	540

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF3BM05XA**			**LF3BM06XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092416.D			A092417.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3)	0.491			0.496		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000343		U	0.000340
b-BHC		U	0.000343		U	0.000340
g-BHC		U	0.000343		U	0.000340
d-BHC		U	0.000343		U	0.000340
Heptachlor		U	0.000267		U	0.000265
Aldrin		U	0.000274		U	0.000271
Heptachlor epoxide		U	0.000256		U	0.000254
g-Chlordane		U	0.000244		U	0.000241
Endosulfan I		U	0.000245		U	0.000243
a-Chlordane		U	0.000244		U	0.000241
Dieldrin		U	0.000262		U	0.000260
4,4'-DDE		U	0.000314		U	0.000311
Endrin		U	0.000262		U	0.000260
Endosulfan II		U	0.000245		U	0.000243
4,4'-DDD		U	0.000312		U	0.000309
Endrin aldehyde		U	0.000262		U	0.000260
Endosulfan sulfate		U	0.000236		U	0.000234
4,4'-DDT		U	0.000282		U	0.000279
Endrin ketone		U	0.000262		U	0.000260
Methoxychlor		U	0.000289		U	0.000286
Toxaphene		U	0.000241		U	0.000239
Technical Chlordane		U	0.000244		U	0.000241
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	82			86		
Decachlorobiphenyl	94			119		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	**LF3BM07XA**			**LF3BM08XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090922-MB			QC090922-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A092418.D			A092419.D		
Operator:	ERL			ERL		
Date Sampled:	9/9/2009			9/9/2009		
Date Received:	9/18/2009			9/18/2009		
Date Prepared:	9/22/2009			9/22/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	9/25/2009			9/25/2009		
Sample Volume (m^3)	0.486			0.481		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000348		U	0.000351
b-BHC		U	0.000348		U	0.000351
g-BHC		U	0.000348		U	0.000351
d-BHC		U	0.000348		U	0.000351
Heptachlor		U	0.000271		U	0.000273
Aldrin		U	0.000277		U	0.000280
Heptachlor epoxide		U	0.000260		U	0.000262
g-Chlordane		U	0.000247		U	0.000249
Endosulfan I		U	0.000248		U	0.000251
a-Chlordane		U	0.000247		U	0.000249
Dieldrin		U	0.000265		U	0.000268
4,4'-DDE		U	0.000318		U	0.000321
Endrin		U	0.000265		U	0.000268
Endosulfan II		U	0.000248		U	0.000251
4,4'-DDD		U	0.000316		U	0.000319
Endrin aldehyde		U	0.000265		U	0.000268
Endosulfan sulfate		U	0.000239		U	0.000241
4,4'-DDT		U	0.000285		U	0.000288
Endrin ketone		U	0.000265		U	0.000268
Methoxychlor		U	0.000292		U	0.000295
Toxaphene		U	0.000244		U	0.000247
Technical Chlordane		U	0.000247		U	0.000249
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	80			72		
Decachlorobiphenyl	112			106		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BG01XA			LF3BG02XA		
Matrix:	XDA Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000320		U	0.000364
b-BHC		U	0.000320		U	0.000364
g-BHC		U	0.000320		U	0.000364
d-BHC		U	0.000320		U	0.000364
Heptachlor		U	0.000250		U	0.000284
Aldrin		U	0.000255		U	0.000290
Heptachlor epoxide		U	0.000239		U	0.000272
g-Chlordane		U	0.000227		U	0.000259
Endosulfan I		U	0.000229		U	0.000260
a-Chlordane		U	0.000227		U	0.000259
Dieldrin		U	0.000245		U	0.000278
4,4'-DDE		U	0.000293		U	0.000333
Endrin		U	0.000245		U	0.000278
Endosulfan II		U	0.000229		U	0.000260
4,4'-DDD		U	0.000291		U	0.000331
Endrin aldehyde		U	0.000245		U	0.000278
Endosulfan sulfate		U	0.000220		U	0.000251
4,4'-DDT		U	0.000263		U	0.000299
Endrin ketone		U	0.000245		U	0.000278
Methoxychlor		U	0.000270		U	0.000307
Toxaphene		U	0.000225		U	0.000256
Technical Chlordane		U	0.000227		U	0.000259
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	60			80		
Decachlorobiphenyl	92			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BG03XA			LF3BG04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000311		U	0.000311
b-BHC		U	0.000311		U	0.000311
g-BHC		U	0.000311		U	0.000311
d-BHC		U	0.000311		U	0.000311
Heptachlor		U	0.000242		U	0.000242
Aldrin		U	0.000248		U	0.000248
Heptachlor epoxide		U	0.000232		U	0.000232
g-Chlordane		U	0.000221		U	0.000221
Endosulfan I		U	0.000222		U	0.000222
a-Chlordane		U	0.000221		U	0.000221
Dieldrin		U	0.000237		U	0.000238
4,4'-DDE		U	0.000284		U	0.000285
Endrin		U	0.000237		U	0.000238
Endosulfan II		U	0.000222		U	0.000222
4,4'-DDD		U	0.000282		U	0.000283
Endrin aldehyde		U	0.000237		U	0.000238
Endosulfan sulfate		U	0.000214		U	0.000214
4,4'-DDT		U	0.000255		U	0.000255
Endrin ketone		U	0.000237		U	0.000238
Methoxychlor		U	0.000262		U	0.000262
Toxaphene		U	0.000218		U	0.000219
Technical Chlordane		U	0.000221		U	0.000221
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	360			400		
Decachlorobiphenyl	520			540		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BL01XA			LF3BG02XA		
Matrix:	XAD Tubes			XDA Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121538.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			10/23/2008		
Date Received:	11/26/2008			10/29/2008		
Date Prepared:	12/4/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			11/15/2008		
Sample Volume (m^3)	0.492			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000312		U	0.000364
b-BHC		U	0.000312		U	0.000364
g-BHC		U	0.000312		U	0.000364
d-BHC		U	0.000312		U	0.000364
Heptachlor		U	0.000243		U	0.000284
Aldrin		U	0.000249		U	0.000290
Heptachlor epoxide		U	0.000233		U	0.000272
g-Chlordane		U	0.000222		U	0.000259
Endosulfan I		U	0.000223		U	0.000260
a-Chlordane		U	0.000222		U	0.000259
Dieldrin		U	0.000238		U	0.000278
4,4'-DDE		U	0.000285		U	0.000333
Endrin		U	0.000238		U	0.000278
Endosulfan II		U	0.000223		U	0.000260
4,4'-DDD		U	0.000284		U	0.000331
Endrin aldehyde		U	0.000238		U	0.000278
Endosulfan sulfate		U	0.000215		U	0.000251
4,4'-DDT		U	0.000256		U	0.000299
Endrin ketone		U	0.000238		U	0.000278
Methoxychlor		U	0.000263		U	0.000307
Toxaphene		U	0.000219		U	0.000256
Technical Chlordane		U	0.000222		U	0.000259
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	300			80		
Decachlorobiphenyl	460			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	QC081106-MB			QC081204-MB			Sample ID:
Matrix:	XAD Tubes			XAD Tubes			Matrix:
Preservation:	None			None			Preservation:
Decanted:	None			None			Decanted:
Batch QC:	QC081106-MB			QC081202-MB			Batch QC:
Preparation Method:	EPA 3540			EPA 3540			Preparation Method:
Cleanup Method(s):	NA			NA			Cleanup Method(s):
Analysis Method:	EPA 8081A			EPA 8081A			Analysis Method:
Instrument:	AMX			AMX			Instrument:
File ID:	A111223.D			A121525.D			File ID:
Operator:	ERL			ERL			Operator:
Date Sampled:	NA			NA			Date Sampled:
Date Received:	NA			NA			Date Received:
Date Prepared:	11/06/08			12/4/2008			Date Prepared:
Date Cleanup:	NA			NA			Date Cleanup:
Date Analyzed:	11/14/08			12/18/2008			Date Analyzed:
Sample Volume (m^3)	0.500			0.402			Sample Volume (m^3)
Percent Solid:	NA			NA			Percent Solid:
Prep DF:	1.00			1.00			Prep DF:
Analysis DF:	1.00			1.00			Analysis DF:
Injection Volume (µl):	1.00			1.00			Injection Volume (µl):
Extract Volume (µl):	2000			2000			Extract Volume (µl):
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Units
ORGANOCHLORINE PESTICIDES:							ORGANOCHLORINE P
a-BHC		U	0.000308		U	0.000384	a-BHC
b-BHC		U	0.000308		U	0.000384	b-BHC
g-BHC		U	0.000308		U	0.000384	g-BHC
d-BHC		U	0.000308		U	0.000384	d-BHC
Heptachlor		U	0.000240		U	0.000299	Heptachlor
Aldrin		U	0.000246		U	0.000306	Aldrin
Heptachlor epoxide		U	0.000230		U	0.000287	Heptachlor epoxide
g-Chlordane		U	0.000219		U	0.000272	g-Chlordane
Endosulfan I		U	0.000220		U	0.000274	Endosulfan I
a-Chlordane		U	0.000219		U	0.000272	a-Chlordane
Dieldrin		U	0.000235		U	0.000293	Dieldrin
4,4'-DDE		U	0.000282		U	0.000351	4,4'-DDE
Endrin		U	0.000235		U	0.000293	Endrin
Endosulfan II		U	0.000220		U	0.000274	Endosulfan II
4,4'-DDD		U	0.000280		U	0.000349	4,4'-DDD
Endrin aldehyde		U	0.000235		U	0.000293	Endrin aldehyde
Endosulfan sulfate		U	0.000212		U	0.000264	Endosulfan sulfate
4,4'-DDT		U	0.000253		U	0.000315	4,4'-DDT
Endrin ketone		U	0.000235		U	0.000293	Endrin ketone
Methoxychlor		U	0.000259		U	0.000323	Methoxychlor
Toxaphene		U	0.000217		U	0.000270	Toxaphene
Technical Chlordane		U	0.000219		U	0.000272	Technical Chlordane
Extraction Surrogate Recoveries (%)							*Extraction Surrogate R*
Tetrachloro-m-xylene	44			72			Tetrachloro-m-xylene
Decachlorobiphenyl	76			116			Decachlorobiphenyl

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

NA - Not applicable.
B - Analyte detected in
J - Estimated value; de
U - Analyte not detecte
D - Analyte reported fro
E - Estimate, result det
I - Concentration/Peak
RL - Reporting limit is t
EDL - Estimated detect

QC090922-MB			QC090922-MBS			
XAD Tubes			XAD Tubes			
None			None			
None			None			
QC090922-MB			QC090922-MB			
EPA 3540			EPA 3540			
NA			NA			
EPA 8081A			EPA 8081A			
AMX			AMX			
A092413.D			A092414.D			
ERL			ERL			
NA			NA			
NA			NA			
9/22/2009			9/22/2009			
NA			NA			
9/25/2009			9/25/2009			
0.489			0.496			
NA			NA			
1.00			1.00			
1.00			1.00			
1.00			1.00			
2000			2000			
Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PESTICIDES:						
	U	0.000315	0.0963		0.000310	62
	U	0.000315	0.0994		0.000310	64
	U	0.000315	0.0894		0.000310	58
	U	0.000315	0.0955		0.000310	62
	U	0.000245	0.0648		0.000242	54
	U	0.000251	0.0632		0.000247	51
	U	0.000235	0.0650		0.000232	56
	U	0.000224	0.0585		0.000220	53
	U	0.000225	0.0611		0.000222	55
	U	0.000224	0.0569		0.000220	52
	U	0.000241	0.0641		0.000237	54
	U	0.000288	0.0761		0.000284	54
	U	0.000241	0.0670		0.000237	57
	U	0.000225	0.0633		0.000222	57
	U	0.000286	0.0875		0.000282	62
	U	0.000241	0.0947		0.000237	80
	U	0.000217	0.0614		0.000213	58
	U	0.000258	0.0771		0.000255	61
	U	0.000241	0.0659		0.000237	56
	U	0.000265	0.0940		0.000261	72
	U	0.000221		U	0.000218	
	U	0.000224		U	0.000220	
ecoveries (%)						
	77		69			
	95		75			

the Blank.
tected between the RL and DL.
d above DL.
om a diluted extract.
ected above calibration range.
ID uncertain due to potential interference.
he sample equivalent of the lowest linear calibration concentration.
tion limit is 50% of RL.

Sample ID:	LF3BG03XA			LF3BG04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000311		U	0.000311
b-BHC		U	0.000311		U	0.000311
g-BHC		U	0.000311		U	0.000311
d-BHC		U	0.000311		U	0.000311
Heptachlor		U	0.000242		U	0.000242
Aldrin		U	0.000248		U	0.000248
Heptachlor epoxide		U	0.000232		U	0.000232
g-Chlordane		U	0.000221		U	0.000221
Endosulfan I		U	0.000222		U	0.000222
a-Chlordane		U	0.000221		U	0.000221
Dieldrin		U	0.000237		U	0.000238
4,4'-DDE		U	0.000284		U	0.000285
Endrin		U	0.000237		U	0.000238
Endosulfan II		U	0.000222		U	0.000222
4,4'-DDD		U	0.000282		U	0.000283
Endrin aldehyde		U	0.000237		U	0.000238
Endosulfan sulfate		U	0.000214		U	0.000214
4,4'-DDT		U	0.000255		U	0.000255
Endrin ketone		U	0.000237		U	0.000238
Methoxychlor		U	0.000262		U	0.000262
Toxaphene		U	0.000218		U	0.000219
Technical Chlordane		U	0.000221		U	0.000221

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	360	400
Decachlorobiphenyl	520	540

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Sample ID:	LF3BL01XA			QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX			AMX		
File ID:	A121538.D			A111223.D			A121525.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/4/2008			11/06/08			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			11/14/08			12/18/2008		
Sample Volume (m^3)	0.492			0.500			0.402		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:									
a-BHC		U	0.000312		U	0.000308		U	0.000384
b-BHC		U	0.000312		U	0.000308		U	0.000384
g-BHC		U	0.000312		U	0.000308		U	0.000384
d-BHC		U	0.000312		U	0.000308		U	0.000384
Heptachlor		U	0.000243		U	0.000240		U	0.000299
Aldrin		U	0.000249		U	0.000246		U	0.000306
Heptachlor epoxide		U	0.000233		U	0.000230		U	0.000287
g-Chlordane		U	0.000222		U	0.000219		U	0.000272
Endosulfan I		U	0.000223		U	0.000220		U	0.000274
a-Chlordane		U	0.000222		U	0.000219		U	0.000272
Dieldrin		U	0.000238		U	0.000235		U	0.000293
4,4'-DDE		U	0.000285		U	0.000282		U	0.000351
Endrin		U	0.000238		U	0.000235		U	0.000293
Endosulfan II		U	0.000223		U	0.000220		U	0.000274
4,4'-DDD		U	0.000284		U	0.000280		U	0.000349
Endrin aldehyde		U	0.000238		U	0.000235		U	0.000293
Endosulfan sulfate		U	0.000215		U	0.000212		U	0.000264
4,4'-DDT		U	0.000256		U	0.000253		U	0.000315
Endrin ketone		U	0.000238		U	0.000235		U	0.000293
Methoxychlor		U	0.000263		U	0.000259		U	0.000323
Toxaphene		U	0.000219		U	0.000217		U	0.000270
Technical Chlordane		U	0.000222		U	0.000219		U	0.000272
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	300			44			72		
Decachlorobiphenyl	460			76			116		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

LF3

Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard D	Range	Minimum	Maximum	Count
4,4'-DDT	0.00252	0.00252	N/A	0	0.00252	0.00252	1

Pesticides
EPA 8081A

Sample ID:	LF4BG01XA			LF4BL01XA			QC090114-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX			AMX		
File ID:	A011621.D			A011627.D			A011615.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	12/8/2008			12/10/2008			NA		
Date Received:	1/8/2009			1/8/2009			NA		
Date Prepared:	1/12/2009			1/14/2009			1/14/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/18/2009			1/18/2009			1/17/2009		
Sample Volume (m^3)	0.480			0.440			0.440		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:									
a-BHC		U	0.000327		U	0.000356924		U	0.000351
b-BHC		U	0.000327		U	0.000356924		U	0.000351
g-BHC		U	0.000327		U	0.000356924		U	0.000351
d-BHC		U	0.000327		U	0.000356924		U	0.000351
Heptachlor		U	0.000255		U	0.000278043		U	0.000273
Aldrin		U	0.000261		U	0.000284444		U	0.000279
Heptachlor epoxide		U	0.000244		U	0.000266602		U	0.000262
g-Chlordane		U	0.000232		U	0.000253303		U	0.000249
Endosulfan I		U	0.000234		U	0.000255065		U	0.000250
a-Chlordane		U	0.000232		U	0.000253303		U	0.000249
Dieldrin		U	0.000250		U	0.000272488		U	0.000268
4,4'-DDE		U	0.000299		U	0.000326364		U	0.000320
Endrin		U	0.000250		U	0.000272488		U	0.000268
Endosulfan II		U	0.000234		U	0.000255065		U	0.000250
4,4'-DDD		U	0.000297		U	0.000324314		U	0.000318
Endrin aldehyde		U	0.000250		U	0.000272503		U	0.000268
Endosulfan sulfate		U	0.000225		U	0.000245421		U	0.000241
4,4'-DDT		U	0.000268		U	0.000292797		U	0.000288
Endrin ketone		U	0.000250		U	0.000272488		U	0.000268
Methoxychlor		U	0.000275		U	0.000300285		U	0.000295
Toxaphene		U	0.000230		U	0.00025083		U	0.000246
Technical Chlordane		U	0.000232		U	0.000253291		U	0.000249
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	84			68			56		
Decachlorobiphenyl	140			124			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121520.D			A121521.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/17/2008		
Sample Volume (m^3)	0.617			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000274		U	0.000321
b-BHC		U	0.000274		U	0.000321
g-BHC		U	0.000274		U	0.000321
d-BHC		U	0.000274		U	0.000321
Heptachlor		U	0.000214		U	0.000250
Aldrin		U	0.000219		U	0.000256
Heptachlor epoxide		U	0.000205		U	0.000240
g-Chlordane		U	0.000195		U	0.000228
Endosulfan I		U	0.000196		U	0.000229
a-Chlordane		U	0.000195		U	0.000228
Dieldrin		U	0.000209		U	0.000245
4,4'-DDE		U	0.000251		U	0.000294
Endrin		U	0.000209		U	0.000245
Endosulfan II		U	0.000196		U	0.000229
4,4'-DDD		U	0.000249		U	0.000292
Endrin aldehyde		U	0.000209		U	0.000245
Endosulfan sulfate		U	0.000189		U	0.000221
4,4'-DDT	0.00632		0.000225	0.00340		0.000263
Endrin ketone		U	0.000209		U	0.000245
Methoxychlor		U	0.000231		U	0.000270
Toxaphene		U	0.000193		U	0.000226
Technical Chlordane		U	0.000195		U	0.000228
Extraction Surrogate Recoveries (%)	72			68		
Tetrachloro-m-xylene	108			112		
Decachlorobiphenyl						

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**WWTP1BM03XA**			**WWTP1BG01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121531.D			A121522.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/17/2008		
Sample Volume (m^3)	0.505			0.417		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000322		U	0.000406
b-BHC		U	0.000322		U	0.000406
g-BHC		U	0.000322		U	0.000406
d-BHC		U	0.000322		U	0.000406
Heptachlor		U	0.000251		U	0.000317
Aldrin		U	0.000256		U	0.000324
Heptachlor epoxide		U	0.000240		U	0.000304
g-Chlordane		U	0.000228		U	0.000288
Endosulfan I		U	0.000230		U	0.000290
a-Chlordane		U	0.000228		U	0.000288
Dieldrin		U	0.000246		U	0.000310
4,4'-DDE		U	0.000294		U	0.000372
Endrin		U	0.000246		U	0.000310
Endosulfan II		U	0.000230		U	0.000290
4,4'-DDD		U	0.000292		U	0.000369
Endrin aldehyde		U	0.000246		U	0.000310
Endosulfan sulfate		U	0.000221		U	0.000279
4,4'-DDT		U	0.000264	0.00535		0.000333
Endrin ketone		U	0.000246		U	0.000310
Methoxychlor		U	0.000271		U	0.000342
Toxaphene		U	0.000226		U	0.000286
Technical Chlordane		U	0.000228		U	0.000288
Extraction Surrogate Recoveries (%)				68		
Tetrachloro-m-xylene	64			92		
Decachlorobiphenyl	100					

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	WWTP1BG02XA			WWTP1BG03XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121523.D			A121532.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/17/2008			12/18/2008		
Sample Volume (m^3)	0.356			0.368		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000455		U	0.000458
b-BHC		U	0.000455		U	0.000458
g-BHC		U	0.000455		U	0.000458
d-BHC		U	0.000455		U	0.000458
Heptachlor		U	0.000355		U	0.000357
Aldrin		U	0.000363		U	0.000365
Heptachlor epoxide		U	0.000340		U	0.000342
g-Chlordane		U	0.000323		U	0.000325
Endosulfan I		U	0.000325		U	0.000327
a-Chlordane		U	0.000323		U	0.000325
Dieldrin		U	0.000347		U	0.000350
4,4'-DDE		U	0.000416		U	0.000419
Endrin		U	0.000347		U	0.000350
Endosulfan II		U	0.000325		U	0.000327
4,4'-DDD		U	0.000414		U	0.000416
Endrin aldehyde		U	0.000347		U	0.000350
Endosulfan sulfate		U	0.000313		U	0.000315
4,4'-DDT	0.00860		0.000373	0.00372		0.000376
Endrin ketone		U	0.000347		U	0.000350
Methoxychlor		U	0.000383		U	0.000386
Toxaphene		U	0.000320		U	0.000322
Technical Chlordane		U	0.000323		U	0.000325
Extraction Surrogate Recoveries (%)	64					
Tetrachloro-m-xylene	108			60		
Decachlorobiphenyl				92		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	**WWTP1BG04XA**			**WWTP1BL01XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8081A			EPA 8081A		
Instrument:	AMX			AMX		
File ID:	A121533.D			A121526.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3)	0.332			0.402		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
ORGANOCHLORINE PESTICIDES:						
a-BHC		U	0.000505		U	0.000384
b-BHC		U	0.000505		U	0.000384
g-BHC		U	0.000505		U	0.000384
d-BHC		U	0.000505		U	0.000384
Heptachlor		U	0.000393		U	0.000299
Aldrin		U	0.000402		U	0.000306
Heptachlor epoxide		U	0.000377		U	0.000287
g-Chlordane		U	0.000358		U	0.000272
Endosulfan I		U	0.000361		U	0.000274
a-Chlordane		U	0.000358		U	0.000272
Dieldrin		U	0.000385		U	0.000293
4,4'-DDE		U	0.000461		U	0.000351
Endrin		U	0.000385		U	0.000293
Endosulfan II		U	0.000361		U	0.000274
4,4'-DDD		U	0.000458		U	0.000349
Endrin aldehyde		U	0.000385		U	0.000293
Endosulfan sulfate		U	0.000347		U	0.000264
4,4'-DDT		U	0.000414		U	0.000315
Endrin ketone		U	0.000385		U	0.000293
Methoxychlor		U	0.000424		U	0.000323
Toxaphene		U	0.000355		U	0.000270
Technical Chlordane		U	0.000358		U	0.000272
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	80			76		
Decachlorobiphenyl	112			120		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

Pesticides
EPA 8081A

Sample ID:	WWTP1BL02XA			QC081202-MB			QC081202-MBS1			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC081211-MB			QC081202-MB			QC081202-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8081A			EPA 8081A			EPA 8081A			
Instrument:	AMX			AMX			AMX			
File ID:	A121549.D			A121517.D			A121518.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	11/6/2008			NA			NA			
Date Received:	11/26/2008			NA			NA			
Date Prepared:	12/11/2008			12/2/2008			12/2/2008			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	12/20/2008			12/17/2008			12/17/2008			
Sample Volume (m^3)	0.539			0.474			1.00			
Percent Solid:	1			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
ORGANOCHLORINE PESTICIDES:										
a-BHC		U	0.0003058		U	0.000325	0.0471		0.000154	122
b-BHC		U	0.0003058		U	0.000325	0.0465		0.000154	121
g-BHC		U	0.0003058		U	0.000325	0.0444		0.000154	115
d-BHC		U	0.0003058		U	0.000325	0.0467		0.000154	121
Heptachlor		U	0.0002382		U	0.000253	0.0355		0.000120	118
Aldrin		U	0.0002437		U	0.000259	0.0344		0.000123	112
Heptachlor epoxide		U	0.0002284		U	0.000243	0.0346		0.000115	120
g-Chlordane		U	0.000217		U	0.000231	0.0337		0.000109	123
Endosulfan I		U	0.0002185		U	0.000232	0.0317		0.000110	115
a-Chlordane		U	0.000217		U	0.000231	0.0319		0.000109	117
Dieldrin		U	0.0002335		U	0.000248	0.0396		0.000118	135
4,4'-DDE		U	0.000280		U	0.000297	0.0442		0.000141	126
Endrin		U	0.000233		U	0.000248	0.0380		0.000118	129
Endosulfan II		U	0.000219		U	0.000232	0.0339		0.000110	123
4,4'-DDD		U	0.000278		U	0.000295	0.0470		0.000140	134
Endrin aldehyde		U	0.000233		U	0.000248	0.0462		0.000118	157
Endosulfan sulfate		U	0.000210		U	0.000224	0.0347		0.000106	131
4,4'-DDT		U	0.000251		U	0.000267	0.0343		0.000126	108
Endrin ketone		U	0.000233		U	0.000248	0.0378		0.000118	128
Methoxychlor		U	0.0002573		U	0.000273	0.0334		0.000130	103
Toxaphene		U	0.0002149		U	0.000228		U	0.000108	
Technical Chlordane		U	0.000217		U	0.000231		U	0.000109	
Extraction Surrogate Recoveries (%)										
Tetrachloro-m-xylene	72			72			76			
Decachlorobiphenyl	196			108			108			

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.

WWTP1
Organochlorine Pesticides
Descriptive Statistics

Biomethane

Analyte	Mean	Median	Standard D	Range	Minimum	Maximum	Count
4,4'-DDT	0.00486	0.00486	0.00206	0.00292	0.00340	0.00632	2

WWTP1
Organochlorine Pesticides
Descriptive Statistics

Biogas

Analyte	Mean	Median	Standard I	Range	Minimum	Maximum	Count
4,4'-DDT	0.00589	0.00535	0.00248	0	0.00372	0.00860	3

Appendix J – Polychlorinated Biphenyls Analysis

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A011618.D			A011619.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/17/2009			1/18/2009		
Sample Volume (m^3)	0.359			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00339		U	0.00260
PCB 2		U	0.00339		U	0.00260
PCB 3		U	0.00339		U	0.00260
PCB 4/10		U	0.00286		U	0.00220
PCB 7/9		U	0.00286		U	0.00220
PCB 6		U	0.00286		U	0.00220
PCB 8		U	0.00286		U	0.00220
PCB 5		U	0.00286		U	0.00220
PCB 19		U	0.00248		U	0.00190
PCB 12/13		U	0.00286		U	0.00220
PCB 18		U	0.00248		U	0.00190
PCB 17		U	0.00248		U	0.00190
PCB 15		U	0.00286		U	0.00220
PCB 24/27		U	0.00248		U	0.00190
PCB 16/32		U	0.00248		U	0.00190
PCB 34		U	0.00248		U	0.00190
PCB 29		U	0.00248		U	0.00190
PCB 54		U	0.00219		U	0.00168
PCB 26		U	0.00248		U	0.00190
PCB 25		U	0.00248		U	0.00190
PCB 31		U	0.00248		U	0.00190
PCB 50		U	0.00219		U	0.00168
PCB 28		U	0.00248		U	0.00190
PCB 20/33		U	0.00248		U	0.00190
PCB 53		U	0.00219		U	0.00168
PCB 51		U	0.00219		U	0.00168
PCB 22		U	0.00248		U	0.00190
PCB 45		U	0.00219		U	0.00168
PCB 46		U	0.00219		U	0.00168
PCB 69		U	0.00219		U	0.00168
PCB 52/73		U	0.00219		U	0.00168
PCB 49		U	0.00219		U	0.00168
PCB 47/48/75		U	0.00219		U	0.00168
PCB 104		U	0.00196		U	0.00150
PCB 35		U	0.00248		U	0.00190
PCB 44		U	0.00219		U	0.00168
PCB 59		U	0.00219		U	0.00168
PCB 37		U	0.00248		U	0.00190
PCB 42		U	0.00219		U	0.00168
PCB 71		U	0.00219		U	0.00168
PCB 41/64		U	0.00219		U	0.00168
PCB 40		U	0.00219		U	0.00168
PCB 103		U	0.00196		U	0.00150
PCB 67		U	0.00219		U	0.00168
PCB 100		U	0.00196		U	0.00150
PCB 63		U	0.00219		U	0.00168
PCB 74		U	0.00219		U	0.00168
PCB 70		U	0.00219		U	0.00168
PCB 66		U	0.00219		U	0.00168
PCB 93/95		U	0.00196		U	0.00150

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A011618.D			A011619.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/17/2009			1/18/2009		
Sample Volume (m^3)	0.359			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 91		U	0.00196		U	0.00150
PCB 56/60		U	0.00219		U	0.00168
PCB 92		U	0.00196		U	0.00150
PCB 84		U	0.00196		U	0.00150
PCB 90/101		U	0.00196		U	0.00150
PCB 99		U	0.00196		U	0.00150
PCB 119		U	0.00196		U	0.00150
PCB 83		U	0.00196		U	0.00150
PCB 97		U	0.00196		U	0.00150
PCB 117		U	0.00196		U	0.00150
PCB 81		U	0.00196		U	0.00150
PCB 87/115		U	0.00219		U	0.00168
PCB 85		U	0.00196		U	0.00150
PCB 136		U	0.00177		U	0.00136
PCB 77		U	0.00219		U	0.00168
PCB 110		U	0.00196		U	0.00150
PCB 154		U	0.00177		U	0.00136
PCB 82		U	0.00196		U	0.00150
PCB 151		U	0.00177		U	0.00136
PCB 135/144		U	0.00177		U	0.00136
PCB 124		U	0.00196		U	0.00150
PCB 147		U	0.00177		U	0.00136
PCB 107		U	0.00196		U	0.00150
PCB 123		U	0.00196		U	0.00150
PCB 149		U	0.00177		U	0.00136
PCB 118		U	0.00196		U	0.00150
PCB 134		U	0.00177		U	0.00136
PCB 114		U	0.00196		U	0.00150

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A011618.D			A011619.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/17/2009			1/18/2009		
Sample Volume (m^3)	0.359			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 131		U	0.00177		U	0.00136
PCB 122		U	0.00196		U	0.00150
PCB 165		U	0.00177		U	0.00136
PCB 146		U	0.00177		U	0.00136
PCB 188		U	0.00162		U	0.00124
PCB 153		U	0.00177		U	0.00136
PCB 132		U	0.00177		U	0.00136
PCB 105		U	0.00196		U	0.00150
PCB 141		U	0.00177		U	0.00136
PCB 179		U	0.00162		U	0.00124
PCB 137		U	0.00177		U	0.00136
PCB 176		U	0.00162		U	0.00124
PCB 130		U	0.00177		U	0.00136
PCB 138/163/164		U	0.00177		U	0.00136
PCB 158		U	0.00177		U	0.00136
PCB 129		U	0.00177		U	0.00136
PCB 178		U	0.00162		U	0.00124
PCB 175		U	0.00162		U	0.00124
PCB 187		U	0.00162		U	0.00124
PCB 183		U	0.00162		U	0.00124
PCB 128		U	0.00177		U	0.00136
PCB 167		U	0.00177		U	0.00136
PCB 185		U	0.00162		U	0.00124
PCB 174		U	0.00162		U	0.00124
PCB 177		U	0.00162		U	0.00124
PCB 202		U	0.00149		U	0.00114
PCB 171		U	0.00162		U	0.00124
PCB 156		U	0.00177		U	0.00136
PCB 173		U	0.00162		U	0.00124
PCB 157		U	0.00177		U	0.00136
PCB 201		U	0.00149		U	0.00114
PCB 172		U	0.00162		U	0.00124
PCB 197		U	0.00149		U	0.00114
PCB 180		U	0.00162		U	0.00124
PCB 193		U	0.00162		U	0.00124
PCB 191		U	0.00162		U	0.00124
PCB 200		U	0.00149		U	0.00114
PCB 170		U	0.00162		U	0.00124
PCB 190		U	0.00162		U	0.00124
PCB 199		U	0.00149		U	0.00114
PCB 196/203		U	0.00149		U	0.00114
PCB 189		U	0.00162		U	0.00124
PCB 208		U	0.00138		U	0.00106
PCB 195		U	0.00149		U	0.00114
PCB 207		U	0.00138		U	0.00106
PCB 194		U	0.00149		U	0.00114
PCB 205		U	0.00149		U	0.00114
PCB 206		U	0.00138		U	0.00106
PCB 209		U	0.00128		U	0.00098

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NG01XA**			**1NG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC090112-MB			QC090112-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A011618.D			A011619.D		
Operator:	ERL			ERL		
Date Sampled:	12/8/2008			12/8/2008		
Date Received:	1/8/2009			1/8/2009		
Date Prepared:	1/12/2009			1/12/2009		
Date Cleanup:	NA			NA		
Date Analyzed:	1/17/2009			1/18/2009		
Sample Volume (m^3)	0.359			0.473		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	68			68		
Decachlorobiphenyl	120			124		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8082			EPA 8082			EPA 8082			
Instrument:	AMX			AMX			AMX			
File ID:	A011620.D			A011614.D			A011616.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/18/2009			1/17/2009			1/17/2009			
Sample Volume (m^3)	0.416			0.416			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:										
PCB 1		U	0.00294		U	0.00285		U	0.00119	
PCB 2		U	0.00294		U	0.00285		U	0.00119	
PCB 3		U	0.00294		U	0.00285		U	0.00119	
PCB 4/10		U	0.00249		U	0.00241		U	0.00100	
PCB 7/9		U	0.00249		U	0.00241		U	0.00100	
PCB 6		U	0.00249		U	0.00241		U	0.00100	
PCB 8		U	0.00249		U	0.00241		U	0.00100	
PCB 5		U	0.00249		U	0.00241		U	0.00100	
PCB 19		U	0.00216		U	0.00209		U	0.000870	
PCB 12/13		U	0.00249		U	0.00241		U	0.00100	
PCB 18		U	0.00216		U	0.00209		U	0.000870	
PCB 17		U	0.00216		U	0.00209		U	0.000870	
PCB 15		U	0.00249		U	0.00241		U	0.001004	
PCB 24/27		U	0.00216		U	0.00209		U	0.000870	
PCB 16/32		U	0.00216		U	0.00209		U	0.000870	
PCB 34		U	0.00216		U	0.00209		U	0.000870	
PCB 29		U	0.00216		U	0.00209		U	0.000870	
PCB 54		U	0.00190		U	0.00184		U	0.000767	
PCB 26		U	0.00216		U	0.00209		U	0.000870	
PCB 25		U	0.00216		U	0.00209		U	0.000870	
PCB 31		U	0.00216		U	0.00209		U	0.000870	
PCB 50		U	0.00190		U	0.00184		U	0.000767	
PCB 28		U	0.00216		U	0.00209		U	0.000870	
PCB 20/33		U	0.00216		U	0.00209	0.01114		0.000870	64
PCB 53		U	0.00190		U	0.00184	0.01105		0.000767	72
PCB 51		U	0.00190		U	0.00184		U	0.000767	
PCB 22		U	0.00216		U	0.00209		U	0.000870	
PCB 45		U	0.00190		U	0.00184		U	0.000767	
PCB 46		U	0.00190		U	0.00184		U	0.000767	
PCB 69		U	0.00190		U	0.00184		U	0.000767	
PCB 52/73		U	0.00190		U	0.00184		U	0.000767	
PCB 49		U	0.00190		U	0.00184		U	0.000767	
PCB 47/48/75		U	0.00190		U	0.00184		U	0.000767	
PCB 104		U	0.00170		U	0.00165		U	0.000686	
PCB 35		U	0.00216		U	0.00209		U	0.000870	
PCB 44		U	0.00190		U	0.00184		U	0.000767	
PCB 59		U	0.00190		U	0.00184		U	0.000767	
PCB 37		U	0.00216		U	0.00209		U	0.000870	
PCB 42		U	0.00190		U	0.00184		U	0.000767	
PCB 71		U	0.00190		U	0.00184		U	0.000767	
PCB 41/64		U	0.00190		U	0.00184		U	0.000767	
PCB 40		U	0.00190		U	0.00184		U	0.000767	
PCB 103		U	0.00170		U	0.00165		U	0.000686	
PCB 67		U	0.00190		U	0.00184		U	0.000767	
PCB 100		U	0.00170		U	0.00165		U	0.000686	
PCB 63		U	0.00190		U	0.00184		U	0.000767	
PCB 74		U	0.00190		U	0.00184		U	0.000767	
PCB 70		U	0.00190		U	0.00184		U	0.000767	
PCB 66		U	0.00190		U	0.00184		U	0.000767	
PCB 93/95		U	0.00170		U	0.00165		U	0.000686	

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	1NGBL01XA			QC090112-MB			QC090112-MBS			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8082			EPA 8082			EPA 8082			
Instrument:	AMX			AMX			AMX			
File ID:	A011620.D			A011614.D			A011616.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/18/2009			1/17/2009			1/17/2009			
Sample Volume (m^3)	0.416			0.416			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:										
PCB 91		U	0.00170		U	0.00165		U	0.000686	
PCB 56/60		U	0.00190		U	0.00184		U	0.000767	
PCB 92		U	0.00170		U	0.00165		U	0.000686	
PCB 84		U	0.00170		U	0.00165		U	0.000686	
PCB 90/101		U	0.00170		U	0.00165		U	0.000686	
PCB 99		U	0.00170		U	0.00165		U	0.000686	
PCB 119		U	0.00170		U	0.00165		U	0.000686	
PCB 83		U	0.00170		U	0.00165		U	0.000686	
PCB 97		U	0.00170		U	0.00165		U	0.000686	
PCB 117		U	0.00170		U	0.00165	0.00714		0.000686	52
PCB 81		U	0.00170		U	0.00165		U	0.000686	
PCB 87/115		U	0.00190		U	0.00184		U	0.000767	
PCB 85		U	0.00170		U	0.00165		U	0.000686	
PCB 136		U	0.00154		U	0.00149		U	0.000621	
PCB 77		U	0.00190		U	0.00184	0.00951		0.000767	62
PCB 110		U	0.00170		U	0.00165		U	0.000686	
PCB 154		U	0.00154		U	0.00149		U	0.000621	
PCB 82		U	0.00170		U	0.00165		U	0.000686	
PCB 151		U	0.00154		U	0.00149		U	0.000621	
PCB 135/144		U	0.00154		U	0.00149		U	0.000621	
PCB 124		U	0.00170		U	0.00165		U	0.000686	
PCB 147		U	0.00154		U	0.00149		U	0.000621	
PCB 107		U	0.00170		U	0.00165		U	0.000686	
PCB 123		U	0.00170		U	0.00165	0.00824		0.000686	60
PCB 149		U	0.00154		U	0.00149		U	0.000621	
PCB 118		U	0.00170		U	0.00165	0.00933		0.000686	68
PCB 134		U	0.00154		U	0.00149		U	0.000621	
PCB 114		U	0.00170		U	0.00165	0.00824		0.000686	60

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8082			EPA 8082			EPA 8082			
Instrument:	AMX			AMX			AMX			
File ID:	A011620.D			A011614.D			A011616.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/18/2009			1/17/2009			1/17/2009			
Sample Volume (m^3)	0.416			0.416			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:										
PCB 131		U	0.00154		U	0.00149		U	0.000621	
PCB 122		U	0.00170		U	0.00165		U	0.000686	
PCB 165		U	0.00154		U	0.00149		U	0.000621	
PCB 146		U	0.00154		U	0.00149		U	0.000621	
PCB 188		U	0.00140		U	0.00136		U	0.000567	
PCB 153		U	0.00154		U	0.00149		U	0.000621	
PCB 132		U	0.00154		U	0.00149		U	0.000621	
PCB 105		U	0.00170		U	0.00165	0.00714		0.000686	52
PCB 141		U	0.00154		U	0.00149		U	0.000621	
PCB 179		U	0.00140		U	0.00136		U	0.000567	
PCB 137		U	0.00154		U	0.00149		U	0.000621	
PCB 176		U	0.00140		U	0.00136		U	0.000567	
PCB 130		U	0.00154		U	0.00149		U	0.000621	
PCB 138/163/164		U	0.00154		U	0.00149		U	0.000621	
PCB 158		U	0.00154		U	0.00149		U	0.000621	
PCB 129		U	0.00154		U	0.00149	0.00844		0.000621	68
PCB 178		U	0.00140		U	0.00136		U	0.000567	
PCB 175		U	0.00140		U	0.00136		U	0.000567	
PCB 187		U	0.00140		U	0.00136		U	0.000567	
PCB 183		U	0.00140		U	0.00136		U	0.000567	
PCB 128		U	0.00154		U	0.00149		U	0.000621	
PCB 167		U	0.00154		U	0.00149	0.00819		0.000621	66
PCB 185		U	0.00140		U	0.00136		U	0.000567	
PCB 174		U	0.00140		U	0.00136		U	0.000567	
PCB 177		U	0.00140		U	0.00136		U	0.000567	
PCB 202		U	0.00129		U	0.00125		U	0.000521	
PCB 171		U	0.00140		U	0.00136		U	0.000567	
PCB 156		U	0.00154		U	0.00149	0.00770		0.000621	62
PCB 173		U	0.00140		U	0.00136		U	0.000567	
PCB 157		U	0.00154		U	0.00149	0.00708		0.000621	57
PCB 201		U	0.00129		U	0.00125		U	0.000521	
PCB 172		U	0.00140		U	0.00136		U	0.000567	
PCB 197		U	0.00129		U	0.00125		U	0.000521	
PCB 180		U	0.00140		U	0.00136		U	0.000567	
PCB 193		U	0.00140		U	0.00136		U	0.000567	
PCB 191		U	0.00140		U	0.00136		U	0.000567	
PCB 200		U	0.00129		U	0.00125		U	0.000521	
PCB 170		U	0.00140		U	0.00136	0.00748		0.000567	66
PCB 190		U	0.00140		U	0.00136		U	0.000567	
PCB 199		U	0.00129		U	0.00125		U	0.000521	
PCB 196/203		U	0.00129		U	0.00125		U	0.000521	
PCB 189		U	0.00140		U	0.00136	0.00725		0.000567	64
PCB 208		U	0.00120		U	0.00116		U	0.000483	
PCB 195		U	0.00129		U	0.00125		U	0.000521	
PCB 207		U	0.00120		U	0.00116		U	0.000483	
PCB 194		U	0.00129		U	0.00125		U	0.000521	
PCB 205		U	0.00129		U	0.00125		U	0.000521	
PCB 206		U	0.00120		U	0.00116		U	0.000483	
PCB 209		U	0.00111		U	0.00108		U	0.000449	

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**1NGBL01XA**			**QC090112-MB**			**QC090112-MBS**			
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes			
Preservation:	None			None			None			
Decanted:	None			None			None			
Batch QC:	QC090112-MB			QC090112-MB			QC090112-MB			
Preparation Method:	EPA 3540			EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			NA			
Analysis Method:	EPA 8082			EPA 8082			EPA 8082			
Instrument:	AMX			AMX			AMX			
File ID:	A011620.D			A011614.D			A011616.D			
Operator:	ERL			ERL			ERL			
Date Sampled:	12/8/2008			NA			NA			
Date Received:	1/8/2009			NA			NA			
Date Prepared:	1/12/2009			1/12/2009			1/12/2009			
Date Cleanup:	NA			NA			NA			
Date Analyzed:	1/18/2009			1/17/2009			1/17/2009			
Sample Volume (m^3)	0.416			0.416			1.00			
Percent Solid:	NA			NA			NA			
Prep DF:	1.00			1.00			1.00			
Analysis DF:	1.00			1.00			1.00			
Injection Volume (µl):	1.00			1.00			1.00			
Extract Volume (µl):	2000			2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:										
Extraction Surrogate Recoveries (%)										
Tetrachloro-m-xylene	60			56			68			
Decachlorobiphenyl	100			112			104			

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**	**2NG02XA**
Matrix:	XAD Tubes	XAD Tubes
Preservation:	None	None
Decanted:	None	None
Batch QC:	QC090114-MB	QC090114-MB
Preparation Method:	EPA 3540	EPA 3540
Cleanup Method(s):	NA	NA
Analysis Method:	EPA 8082	EPA 8082
Instrument:	AMX	AMX
File ID:	A011622.D	A011623.D
Operator:	ERL	ERL
Date Sampled:	12/11/2008	12/11/2008
Date Received:	1/8/2009	1/8/2009
Date Prepared:	1/14/2009	1/14/2009
Date Cleanup:	NA	NA
Date Analyzed:	1/18/2009	1/18/2009
Sample Volume (m^3)	0.386	0.494
Percent Solid:	NA	NA
Prep DF:	1.00	1.00
Analysis DF:	1.00	1.00
Injection Volume (µl):	1.00	1.00
Extract Volume (µl):	2000	2000
Units	Concentration (ppbv)	Concentration (ppbv)

PCB Congeners:

PCB 1	U	0.00300	U	0.00235
PCB 2	U	0.00300	U	0.00235
PCB 3	U	0.00300	U	0.00235
PCB 4/10	U	0.00253	U	0.00198
PCB 7/9	U	0.00253	U	0.00198
PCB 6	U	0.00253	U	0.00198
PCB 8	U	0.00253	U	0.00198
PCB 5	U	0.00253	U	0.00198
PCB 19	U	0.00220	U	0.00172
PCB 12/13	U	0.00253	U	0.00198
PCB 18	U	0.00220	U	0.00172
PCB 17	U	0.00220	U	0.00172
PCB 15	U	0.00253	U	0.00198
PCB 24/27	U	0.00220	U	0.00172
PCB 16/32	U	0.00220	U	0.00172
PCB 34	U	0.00220	U	0.00172
PCB 29	U	0.00220	U	0.00172
PCB 54	U	0.00194	U	0.00152
PCB 26	U	0.00220	U	0.00172
PCB 25	U	0.00220	U	0.00172
PCB 31	U	0.00220	U	0.00172
PCB 50	U	0.00194	U	0.00152
PCB 28	U	0.00220	U	0.00172
PCB 20/33	U	0.00220	U	0.00172
PCB 53	U	0.00194	U	0.00152
PCB 51	U	0.00194	U	0.00152
PCB 22	U	0.00220	U	0.00172

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**	**2NG02XA**
Matrix:	XAD Tubes	XAD Tubes
Preservation:	None	None
Decanted:	None	None
Batch QC:	QC090114-MB	QC090114-MB
Preparation Method:	EPA 3540	EPA 3540
Cleanup Method(s):	NA	NA
Analysis Method:	EPA 8082	EPA 8082
Instrument:	AMX	AMX
File ID:	A011622.D	A011623.D
Operator:	ERL	ERL
Date Sampled:	12/11/2008	12/11/2008
Date Received:	1/8/2009	1/8/2009
Date Prepared:	1/14/2009	1/14/2009
Date Cleanup:	NA	NA
Date Analyzed:	1/18/2009	1/18/2009
Sample Volume (m^3)	0.386	0.494
Percent Solid:	NA	NA
Prep DF:	1.00	1.00
Analysis DF:	1.00	1.00
Injection Volume (µl):	1.00	1.00
Extract Volume (µl):	2000	2000
Units	Concentration (ppbv)	Concentration (ppbv)

PCB Congeners:

PCB 45	U	0.00194	U	0.00152
PCB 46	U	0.00194	U	0.00152
PCB 69	U	0.00194	U	0.00152
PCB 52/73	U	0.00194	U	0.00152
PCB 49	U	0.00194	U	0.00152
PCB 47/48/75	U	0.00194	U	0.00152
PCB 104	U	0.00173	U	0.00136
PCB 35	U	0.00220	U	0.00172
PCB 44	U	0.00194	U	0.00152
PCB 59	U	0.00194	U	0.00152
PCB 37	U	0.00220	U	0.00172
PCB 42	U	0.00194	U	0.00152
PCB 71	U	0.00194	U	0.00152
PCB 41/64	U	0.00194	U	0.00152
PCB 40	U	0.00194	U	0.00152
PCB 103	U	0.00173	U	0.00136
PCB 67	U	0.00194	U	0.00152
PCB 100	U	0.00173	U	0.00136
PCB 63	U	0.00194	U	0.00152
PCB 74	U	0.00194	U	0.00152
PCB 70	U	0.00194	U	0.00152
PCB 66	U	0.00194	U	0.00152
PCB 93/95	U	0.00173	U	0.00136
PCB 91	U	0.00173	U	0.00136
PCB 56/60	U	0.00194	U	0.00152
PCB 92	U	0.00173	U	0.00136
PCB 84	U	0.00173	U	0.00136

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**	**2NG02XA**
Matrix:	XAD Tubes	XAD Tubes
Preservation:	None	None
Decanted:	None	None
Batch QC:	QC090114-MB	QC090114-MB
Preparation Method:	EPA 3540	EPA 3540
Cleanup Method(s):	NA	NA
Analysis Method:	EPA 8082	EPA 8082
Instrument:	AMX	AMX
File ID:	A011622.D	A011623.D
Operator:	ERL	ERL
Date Sampled:	12/11/2008	12/11/2008
Date Received:	1/8/2009	1/8/2009
Date Prepared:	1/14/2009	1/14/2009
Date Cleanup:	NA	NA
Date Analyzed:	1/18/2009	1/18/2009
Sample Volume (m^3)	0.386	0.494
Percent Solid:	NA	NA
Prep DF:	1.00	1.00
Analysis DF:	1.00	1.00
Injection Volume (µl):	1.00	1.00
Extract Volume (µl):	2000	2000
Units	Concentration (ppbv)	Concentration (ppbv)

PCB Congeners:

PCB 90/101	U	0.00173	U	0.00136
PCB 99	U	0.00173	U	0.00136
PCB 119	U	0.00173	U	0.00136
PCB 83	U	0.00173	U	0.00136
PCB 97	U	0.00173	U	0.00136
PCB 117	U	0.00173	U	0.00136
PCB 81	U	0.00173	U	0.00136
PCB 87/115	U	0.00194	U	0.00152
PCB 85	U	0.00173	U	0.00136
PCB 136	U	0.00157	U	0.00123
PCB 77	U	0.00194	U	0.00152
PCB 110	U	0.00173	U	0.00136
PCB 154	U	0.00157	U	0.00123
PCB 82	U	0.00173	U	0.00136
PCB 151	U	0.00157	U	0.00123
PCB 135/144	U	0.00157	U	0.00123
PCB 124	U	0.00173	U	0.00136
PCB 147	U	0.00157	U	0.00123
PCB 107	U	0.00173	U	0.00136
PCB 123	U	0.00173	U	0.00136
PCB 149	U	0.00157	U	0.00123
PCB 118	U	0.00173	U	0.00136
PCB 134	U	0.00157	U	0.00123
PCB 114	U	0.00173	U	0.00136
PCB 131	U	0.00157	U	0.00123
PCB 122	U	0.00173	U	0.00136
PCB 165	U	0.00157	U	0.00123

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**	**2NG02XA**
Matrix:	XAD Tubes	XAD Tubes
Preservation:	None	None
Decanted:	None	None
Batch QC:	QC090114-MB	QC090114-MB
Preparation Method:	EPA 3540	EPA 3540
Cleanup Method(s):	NA	NA
Analysis Method:	EPA 8082	EPA 8082
Instrument:	AMX	AMX
File ID:	A011622.D	A011623.D
Operator:	ERL	ERL
Date Sampled:	12/11/2008	12/11/2008
Date Received:	1/8/2009	1/8/2009
Date Prepared:	1/14/2009	1/14/2009
Date Cleanup:	NA	NA
Date Analyzed:	1/18/2009	1/18/2009
Sample Volume (m^3)	0.386	0.494
Percent Solid:	NA	NA
Prep DF:	1.00	1.00
Analysis DF:	1.00	1.00
Injection Volume (µl):	1.00	1.00
Extract Volume (µl):	2000	2000
Units	Concentration (ppbv)	Concentration (ppbv)

PCB Congeners:

PCB 146	U	0.00157	U	0.00123
PCB 188	U	0.00143	U	0.00112
PCB 153	U	0.00157	U	0.00123
PCB 132	U	0.00157	U	0.00123
PCB 105	U	0.00173	U	0.00136
PCB 141	U	0.00157	U	0.00123
PCB 179	U	0.00143	U	0.00112
PCB 137	U	0.00157	U	0.00123
PCB 176	U	0.00143	U	0.00112
PCB 130	U	0.00157	U	0.00123
PCB 138/163/164	U	0.00157	U	0.00123
PCB 158	U	0.00157	U	0.00123
PCB 129	U	0.00157	U	0.00123
PCB 178	U	0.00143	U	0.00112
PCB 175	U	0.00143	U	0.00112
PCB 187	U	0.00143	U	0.00112
PCB 183	U	0.00143	U	0.00112
PCB 128	U	0.00157	U	0.00123
PCB 167	U	0.00157	U	0.00123
PCB 185	U	0.00143	U	0.00112
PCB 174	U	0.00143	U	0.00112
PCB 177	U	0.00143	U	0.00112
PCB 202	U	0.00132	U	0.00103
PCB 171	U	0.00143	U	0.00112
PCB 156	U	0.00157	U	0.00123
PCB 173	U	0.00143	U	0.00112
PCB 157	U	0.00157	U	0.00123

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**		**2NG02XA**	
Matrix:	XAD Tubes		XAD Tubes	
Preservation:	None		None	
Decanted:	None		None	
Batch QC:	QC090114-MB		QC090114-MB	
Preparation Method:	EPA 3540		EPA 3540	
Cleanup Method(s):	NA		NA	
Analysis Method:	EPA 8082		EPA 8082	
Instrument:	AMX		AMX	
File ID:	A011622.D		A011623.D	
Operator:	ERL		ERL	
Date Sampled:	12/11/2008		12/11/2008	
Date Received:	1/8/2009		1/8/2009	
Date Prepared:	1/14/2009		1/14/2009	
Date Cleanup:	NA		NA	
Date Analyzed:	1/18/2009		1/18/2009	
Sample Volume (m^3)	0.386		0.494	
Percent Solid:	NA		NA	
Prep DF:	1.00		1.00	
Analysis DF:	1.00		1.00	
Injection Volume (µl):	1.00		1.00	
Extract Volume (µl):	2000		2000	
Units	Concentration (ppbv)		Concentration (ppbv)	
PCB Congeners:				
PCB 201	U	0.00132	U	0.00103
PCB 172	U	0.00143	U	0.00112
PCB 197	U	0.00132	U	0.00103
PCB 180	U	0.00143	U	0.00112
PCB 193	U	0.00143	U	0.00112
PCB 191	U	0.00143	U	0.00112
PCB 200	U	0.00132	U	0.00103
PCB 170	U	0.00143	U	0.00112
PCB 190	U	0.00143	U	0.00112
PCB 199	U	0.00132	U	0.00103
PCB 196/203	U	0.00132	U	0.00103
PCB 189	U	0.00143	U	0.00112
PCB 208	U	0.00122	U	0.000953
PCB 195	U	0.00132	U	0.00103
PCB 207	U	0.00122	U	0.000953
PCB 194	U	0.00132	U	0.00103
PCB 205	U	0.00132	U	0.00103
PCB 206	U	0.00122	U	0.000953
PCB 209	U	0.00113	U	0.000887

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NG01XA**	**2NG02XA**
Matrix:	XAD Tubes	XAD Tubes
Preservation:	None	None
Decanted:	None	None
Batch QC:	QC090114-MB	QC090114-MB
Preparation Method:	EPA 3540	EPA 3540
Cleanup Method(s):	NA	NA
Analysis Method:	EPA 8082	EPA 8082
Instrument:	AMX	AMX
File ID:	A011622.D	A011623.D
Operator:	ERL	ERL
Date Sampled:	12/11/2008	12/11/2008
Date Received:	1/8/2009	1/8/2009
Date Prepared:	1/14/2009	1/14/2009
Date Cleanup:	NA	NA
Date Analyzed:	1/18/2009	1/18/2009
Sample Volume (m^3)	0.386	0.494
Percent Solid:	NA	NA
Prep DF:	1.00	1.00
Analysis DF:	1.00	1.00
Injection Volume (µl):	1.00	1.00
Extract Volume (µl):	2000	2000
Units	Concentration (ppbv)	Concentration (ppbv)

PCB Congeners:

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	60	68
Decachlorobiphenyl	120	140

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**	**QC090114-MB**		
Matrix:	XAD Tubes	XAD Tubes		
Preservation:	None	None		
Decanted:	None	None		
Batch QC:	QC090114-MB	QC090114-MB		
Preparation Method:	EPA 3540	EPA 3540		
Cleanup Method(s):	NA	NA		
Analysis Method:	EPA 8082	EPA 8082		
Instrument:	AMX	AMX		
File ID:	A011628.D	A011615.D		
Operator:	ERL	ERL		
Date Sampled:	12/10/2008	NA		
Date Received:	1/8/2009	NA		
Date Prepared:	1/14/2009	1/14/2009		
Date Cleanup:	NA	NA		
Date Analyzed:	1/18/2009	1/17/2009		
Sample Volume (m^3)	0.440	0.440		
Percent Solid:	NA	NA		
Prep DF:	1.00	1.00		
Analysis DF:	1.00	1.00		
Injection Volume (µl):	1.00	1.00		
Extract Volume (µl):	2000	2000		
Units	Concentration (ppbv)	Concentration (ppbv)	Q	EDL
PCB Congeners:				
PCB 1	U	0.00263	U	0.00270
PCB 2	U	0.00263	U	0.00270
PCB 3	U	0.00263	U	0.00270
PCB 4/10	U	0.00222	U	0.00228
PCB 7/9	U	0.00222	U	0.00228
PCB 6	U	0.00222	U	0.00228
PCB 8	U	0.00222	U	0.00228
PCB 5	U	0.00222	U	0.00228
PCB 19	U	0.00192	U	0.00197
PCB 12/13	U	0.00222	U	0.00228
PCB 18	U	0.00192	U	0.00197
PCB 17	U	0.00192	U	0.00197
PCB 15	U	0.00222	U	0.00228
PCB 24/27	U	0.00192	U	0.00197
PCB 16/32	U	0.00192	U	0.00197
PCB 34	U	0.00192	U	0.00197
PCB 29	U	0.00192	U	0.00197
PCB 54	U	0.00170	U	0.00174
PCB 26	U	0.00192	U	0.00197
PCB 25	U	0.00192	U	0.00197
PCB 31	U	0.00192	U	0.00197
PCB 50	U	0.00170	U	0.00174
PCB 28	U	0.00192	U	0.00197
PCB 20/33	U	0.00192	U	0.00197
PCB 53	U	0.00170	U	0.00174
PCB 51	U	0.00170	U	0.00174
PCB 22	U	0.00192	U	0.00197

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**	**QC090114-MB**		
Matrix:	XAD Tubes	XAD Tubes		
Preservation:	None	None		
Decanted:	None	None		
Batch QC:	QC090114-MB	QC090114-MB		
Preparation Method:	EPA 3540	EPA 3540		
Cleanup Method(s):	NA	NA		
Analysis Method:	EPA 8082	EPA 8082		
Instrument:	AMX	AMX		
File ID:	A011628.D	A011615.D		
Operator:	ERL	ERL		
Date Sampled:	12/10/2008	NA		
Date Received:	1/8/2009	NA		
Date Prepared:	1/14/2009	1/14/2009		
Date Cleanup:	NA	NA		
Date Analyzed:	1/18/2009	1/17/2009		
Sample Volume (m^3)	0.440	0.440		
Percent Solid:	NA	NA		
Prep DF:	1.00	1.00		
Analysis DF:	1.00	1.00		
Injection Volume (µl):	1.00	1.00		
Extract Volume (µl):	2000	2000		
Units	Concentration (ppbv)	Concentration (ppbv)	Q	EDL
PCB Congeners:				
PCB 45	U 0.00170	U 0.00174		
PCB 46	U 0.00170	U 0.00174		
PCB 69	U 0.00170	U 0.00174		
PCB 52/73	U 0.00170	U 0.00174		
PCB 49	U 0.00170	U 0.00174		
PCB 47/48/75	U 0.00170	U 0.00174		
PCB 104	U 0.00152	U 0.00156		
PCB 35	U 0.00192	U 0.00197		
PCB 44	U 0.00170	U 0.00174		
PCB 59	U 0.00170	U 0.00174		
PCB 37	U 0.00192	U 0.00197		
PCB 42	U 0.00170	U 0.00174		
PCB 71	U 0.00170	U 0.00174		
PCB 41/64	U 0.00170	U 0.00174		
PCB 40	U 0.00170	U 0.00174		
PCB 103	U 0.00152	U 0.00156		
PCB 67	U 0.00170	U 0.00174		
PCB 100	U 0.00152	U 0.00156		
PCB 63	U 0.00170	U 0.00174		
PCB 74	U 0.00170	U 0.00174		
PCB 70	U 0.00170	U 0.00174		
PCB 66	U 0.00170	U 0.00174		
PCB 93/95	U 0.00152	U 0.00156		
PCB 91	U 0.00152	U 0.00156		
PCB 56/60	U 0.00170	U 0.00174		
PCB 92	U 0.00152	U 0.00156		
PCB 84	U 0.00152	U 0.00156		

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**	**QC090114-MB**		
Matrix:	XAD Tubes	XAD Tubes		
Preservation:	None	None		
Decanted:	None	None		
Batch QC:	QC090114-MB	QC090114-MB		
Preparation Method:	EPA 3540	EPA 3540		
Cleanup Method(s):	NA	NA		
Analysis Method:	EPA 8082	EPA 8082		
Instrument:	AMX	AMX		
File ID:	A011628.D	A011615.D		
Operator:	ERL	ERL		
Date Sampled:	12/10/2008	NA		
Date Received:	1/8/2009	NA		
Date Prepared:	1/14/2009	1/14/2009		
Date Cleanup:	NA	NA		
Date Analyzed:	1/18/2009	1/17/2009		
Sample Volume (m^3)	0.440	0.440		
Percent Solid:	NA	NA		
Prep DF:	1.00	1.00		
Analysis DF:	1.00	1.00		
Injection Volume (µl):	1.00	1.00		
Extract Volume (µl):	2000	2000		
Units	Concentration (ppbv)	Concentration (ppbv)	Q	EDL
PCB Congeners:				
PCB 90/101	U	0.00152	U	0.00156
PCB 99	U	0.00152	U	0.00156
PCB 119	U	0.00152	U	0.00156
PCB 83	U	0.00152	U	0.00156
PCB 97	U	0.00152	U	0.00156
PCB 117	U	0.00152	U	0.00156
PCB 81	U	0.00152	U	0.00156
PCB 87/115	U	0.00170	U	0.00174
PCB 85	U	0.00152	U	0.00156
PCB 136	U	0.00137	U	0.00141
PCB 77	U	0.00170	U	0.00174
PCB 110	U	0.00152	U	0.00156
PCB 154	U	0.00137	U	0.00141
PCB 82	U	0.00152	U	0.00156
PCB 151	U	0.00137	U	0.00141
PCB 135/144	U	0.00137	U	0.00141
PCB 124	U	0.00152	U	0.00156
PCB 147	U	0.00137	U	0.00141
PCB 107	U	0.00152	U	0.00156
PCB 123	U	0.00152	U	0.00156
PCB 149	U	0.00137	U	0.00141
PCB 118	U	0.00152	U	0.00156
PCB 134	U	0.00137	U	0.00141
PCB 114	U	0.00152	U	0.00156
PCB 131	U	0.00137	U	0.00141
PCB 122	U	0.00152	U	0.00156
PCB 165	U	0.00137	U	0.00141

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**	**QC090114-MB**		
Matrix:	XAD Tubes	XAD Tubes		
Preservation:	None	None		
Decanted:	None	None		
Batch QC:	QC090114-MB	QC090114-MB		
Preparation Method:	EPA 3540	EPA 3540		
Cleanup Method(s):	NA	NA		
Analysis Method:	EPA 8082	EPA 8082		
Instrument:	AMX	AMX		
File ID:	A011628.D	A011615.D		
Operator:	ERL	ERL		
Date Sampled:	12/10/2008	NA		
Date Received:	1/8/2009	NA		
Date Prepared:	1/14/2009	1/14/2009		
Date Cleanup:	NA	NA		
Date Analyzed:	1/18/2009	1/17/2009		
Sample Volume (m^3)	0.440	0.440		
Percent Solid:	NA	NA		
Prep DF:	1.00	1.00		
Analysis DF:	1.00	1.00		
Injection Volume (µl):	1.00	1.00		
Extract Volume (µl):	2000	2000		
Units	Concentration (ppbv)	Concentration (ppbv)	Q	EDL
PCB Congeners:				
PCB 146	U	0.00137	U	0.00141
PCB 188	U	0.00125	U	0.00129
PCB 153	U	0.00137	U	0.00141
PCB 132	U	0.00137	U	0.00141
PCB 105	U	0.00152	U	0.00156
PCB 141	U	0.00137	U	0.00141
PCB 179	U	0.00125	U	0.00129
PCB 137	U	0.00137	U	0.00141
PCB 176	U	0.00125	U	0.00129
PCB 130	U	0.00137	U	0.00141
PCB 138/163/164	U	0.00137	U	0.00141
PCB 158	U	0.00137	U	0.00141
PCB 129	U	0.00137	U	0.00141
PCB 178	U	0.00125	U	0.00129
PCB 175	U	0.00125	U	0.00129
PCB 187	U	0.00125	U	0.00129
PCB 183	U	0.00125	U	0.00129
PCB 128	U	0.00137	U	0.00141
PCB 167	U	0.00137	U	0.00141
PCB 185	U	0.00125	U	0.00129
PCB 174	U	0.00125	U	0.00129
PCB 177	U	0.00125	U	0.00129
PCB 202	U	0.00115	U	0.00118
PCB 171	U	0.00125	U	0.00129
PCB 156	U	0.00137	U	0.00141
PCB 173	U	0.00125	U	0.00129
PCB 157	U	0.00137	U	0.00141

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**		**QC090114-MB**		
Matrix:	XAD Tubes		XAD Tubes		
Preservation:	None		None		
Decanted:	None		None		
Batch QC:	QC090114-MB		QC090114-MB		
Preparation Method:	EPA 3540		EPA 3540		
Cleanup Method(s):	NA		NA		
Analysis Method:	EPA 8082		EPA 8082		
Instrument:	AMX		AMX		
File ID:	A011628.D		A011615.D		
Operator:	ERL		ERL		
Date Sampled:	12/10/2008		NA		
Date Received:	1/8/2009		NA		
Date Prepared:	1/14/2009		1/14/2009		
Date Cleanup:	NA		NA		
Date Analyzed:	1/18/2009		1/17/2009		
Sample Volume (m^3)	0.440		0.440		
Percent Solid:	NA		NA		
Prep DF:	1.00		1.00		
Analysis DF:	1.00		1.00		
Injection Volume (µl):	1.00		1.00		
Extract Volume (µl):	2000		2000		
Units	Concentration (ppbv)		Concentration (ppbv)	Q	EDL
PCB Congeners:					
PCB 201	U	0.00115	U		0.00118
PCB 172	U	0.00125	U		0.00129
PCB 197	U	0.00115	U		0.00118
PCB 180	U	0.00125	U		0.00129
PCB 193	U	0.00125	U		0.00129
PCB 191	U	0.00125	U		0.00129
PCB 200	U	0.00115	U		0.00118
PCB 170	U	0.00125	U		0.00129
PCB 190	U	0.00125	U		0.00129
PCB 199	U	0.00115	U		0.00118
PCB 196/203	U	0.00115	U		0.00118
PCB 189	U	0.00125	U		0.00129
PCB 208	U	0.00107	U		0.00110
PCB 195	U	0.00115	U		0.00118
PCB 207	U	0.00107	U		0.00110
PCB 194	U	0.00115	U		0.00118
PCB 205	U	0.00115	U		0.00118
PCB 206	U	0.00107	U		0.00110
PCB 209	U	0.000994	U		0.00102

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**2NGBL01XA**	**QC090114-MB**		
Matrix:	XAD Tubes	XAD Tubes		
Preservation:	None	None		
Decanted:	None	None		
Batch QC:	QC090114-MB	QC090114-MB		
Preparation Method:	EPA 3540	EPA 3540		
Cleanup Method(s):	NA	NA		
Analysis Method:	EPA 8082	EPA 8082		
Instrument:	AMX	AMX		
File ID:	A011628.D	A011615.D		
Operator:	ERL	ERL		
Date Sampled:	12/10/2008	NA		
Date Received:	1/8/2009	NA		
Date Prepared:	1/14/2009	1/14/2009		
Date Cleanup:	NA	NA		
Date Analyzed:	1/18/2009	1/17/2009		
Sample Volume (m^3)	0.440	0.440		
Percent Solid:	NA	NA		
Prep DF:	1.00	1.00		
Analysis DF:	1.00	1.00		
Injection Volume (µl):	1.00	1.00		
Extract Volume (µl):	2000	2000		
Units	Concentration (ppbv)	Concentration (ppbv)	Q	EDL

PCB Congeners:

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	68	56
Decachlorobiphenyl	132	112

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF1BM01XA			LF1BM02XA			LF1BM03XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111217.D			A111218.D			A030439.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			10/20/08			02/05/09		
Date Received:	10/29/08			10/29/08			02/12/09		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/13/2008			11/13/2008			3/6/2009		
Sample Volume (m^3)	0.525			0.473			0.505		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00100		U	0.00110		U	0.00109
PCB 2		U	0.00100		U	0.00110		U	0.00109
PCB 3		U	0.00100		U	0.00110		U	0.00109
PCB 4/10		U	0.00118		U	0.00130		U	0.00128
PCB 7/9		U	0.00118		U	0.00130		U	0.00128
PCB 6		U	0.00118		U	0.00130		U	0.00128
PCB 8		U	0.00118		U	0.00130		U	0.00128
PCB 5		U	0.00118		U	0.00130		U	0.00128
PCB 19		U	0.00136		U	0.00150		U	0.00148
PCB 12/13		U	0.00118		U	0.00130		U	0.00128
PCB 18		U	0.00136		U	0.00150		U	0.00148
PCB 17		U	0.00136		U	0.00150		U	0.00148
PCB 15		U	0.00118		U	0.00130		U	0.00128
PCB 24/27		U	0.00136		U	0.00150		U	0.00148
PCB 16/32		U	0.00136		U	0.00150		U	0.00148
PCB 34		U	0.00136		U	0.00150		U	0.00148
PCB 29		U	0.00136		U	0.00150		U	0.00148
PCB 54		U	0.00155		U	0.00170		U	0.00168
PCB 26		U	0.00136		U	0.00150		U	0.00148
PCB 25		U	0.00136		U	0.00150		U	0.00148
PCB 31		U	0.00136		U	0.00150		U	0.00148
PCB 50		U	0.00155		U	0.00170		U	0.00168
PCB 28		U	0.00136		U	0.00150		U	0.00148
PCB 20/33		U	0.00136		U	0.00150		U	0.00148
PCB 53		U	0.00155		U	0.00170		U	0.00168
PCB 51		U	0.00155		U	0.00170		U	0.00168
PCB 22		U	0.00136		U	0.00150		U	0.00148
PCB 45		U	0.00155		U	0.00170		U	0.00168
PCB 46		U	0.00155		U	0.00170		U	0.00168
PCB 69		U	0.00155		U	0.00170		U	0.00168
PCB 52/73		U	0.00155		U	0.00170		U	0.00168
PCB 49		U	0.00155		U	0.00170		U	0.00168
PCB 47/48/75		U	0.00155		U	0.00170		U	0.00168
PCB 104		U	0.00173		U	0.00190		U	0.00188
PCB 35		U	0.00136		U	0.00150		U	0.00148
PCB 44		U	0.00155		U	0.00170		U	0.00168
PCB 59		U	0.00155		U	0.00170		U	0.00168
PCB 37		U	0.00136		U	0.00150		U	0.00148
PCB 42		U	0.00155		U	0.00170		U	0.00168
PCB 71		U	0.00155		U	0.00170		U	0.00168
PCB 41/64		U	0.00155		U	0.00170		U	0.00168
PCB 40		U	0.00155		U	0.00170		U	0.00168
PCB 103		U	0.00173		U	0.00190		U	0.00188
PCB 67		U	0.00155		U	0.00170		U	0.00168

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF1BM01XA			LF1BM02XA			LF1BM03XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111217.D			A111218.D			A030439.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			10/20/08			02/05/09		
Date Received:	10/29/08			10/29/08			02/12/09		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/13/2008			11/13/2008			3/6/2009		
Sample Volume (m^3)	0.525			0.473			0.505		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 100		U	0.00173		U	0.00190		U	0.00188
PCB 63		U	0.00155		U	0.00170		U	0.00168
PCB 74		U	0.00155		U	0.00170		U	0.00168
PCB 70		U	0.00155		U	0.00170		U	0.00168
PCB 66		U	0.00155		U	0.00170		U	0.00168
PCB 93/95		U	0.00173		U	0.00190		U	0.00188
PCB 91		U	0.00173		U	0.00190		U	0.00188
PCB 56/60		U	0.00155		U	0.00170		U	0.00168
PCB 92		U	0.00173		U	0.00190		U	0.00188
PCB 84		U	0.00173		U	0.00190		U	0.00188
PCB 90/101		U	0.00173		U	0.00190		U	0.00188
PCB 99		U	0.00173		U	0.00190		U	0.00188
PCB 119		U	0.00173		U	0.00190		U	0.00188
PCB 83		U	0.00173		U	0.00190		U	0.00188
PCB 97		U	0.00173		U	0.00190		U	0.00188
PCB 117		U	0.00173		U	0.00190		U	0.00188
PCB 81		U	0.00173		U	0.00190		U	0.00188
PCB 87/115		U	0.00155		U	0.00170		U	0.00168
PCB 85		U	0.00173		U	0.00190		U	0.00188
PCB 136		U	0.00191		U	0.00210		U	0.00208
PCB 77		U	0.00155		U	0.00170		U	0.00168
PCB 110		U	0.00173		U	0.00190		U	0.00188
PCB 154		U	0.00191		U	0.00210		U	0.00208
PCB 82		U	0.00173		U	0.00190		U	0.00188
PCB 151		U	0.00191		U	0.00210		U	0.00208
PCB 135/144		U	0.00191		U	0.00210		U	0.00208
PCB 124		U	0.00173		U	0.00190		U	0.00188
PCB 147		U	0.00191		U	0.00210		U	0.00208
PCB 107		U	0.00173		U	0.00190		U	0.00188
PCB 123		U	0.00173		U	0.00190		U	0.00188
PCB 149		U	0.00191		U	0.00210		U	0.00208
PCB 118		U	0.00173		U	0.00190		U	0.00188
PCB 134		U	0.00191		U	0.00210		U	0.00208
PCB 114		U	0.00173		U	0.00190		U	0.00188
PCB 131		U	0.00191		U	0.00210		U	0.00208
PCB 122		U	0.00173		U	0.00190		U	0.00188
PCB 165		U	0.00191		U	0.00210		U	0.00208
PCB 146		U	0.00191		U	0.00210		U	0.00208
PCB 188		U	0.00209		U	0.00230		U	0.00228
PCB 153		U	0.00191		U	0.00210		U	0.00208
PCB 132		U	0.00191		U	0.00210		U	0.00208
PCB 105		U	0.00173		U	0.00190		U	0.00188
PCB 141		U	0.00191		U	0.00210		U	0.00208
PCB 179		U	0.00209		U	0.00230		U	0.00228
PCB 137		U	0.00191		U	0.00210		U	0.00208
PCB 176		U	0.00209		U	0.00230		U	0.00228
PCB 130		U	0.00191		U	0.00210		U	0.00208
PCB 138/163/164		U	0.00191		U	0.00210		U	0.00208
PCB 158		U	0.00191		U	0.00210		U	0.00208

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF1BM01XA**			**LF1BM02XA**			**LF1BM03XA**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111217.D			A111218.D			A030439.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			10/20/08			02/05/09		
Date Received:	10/29/08			10/29/08			02/12/09		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/13/2008			11/13/2008			3/6/2009		
Sample Volume (m^3)	0.525			0.473			0.505		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 129		U	0.00191		U	0.00210		U	0.00208
PCB 178		U	0.00209		U	0.00230		U	0.00228
PCB 175		U	0.00209		U	0.00230		U	0.00228
PCB 187		U	0.00209		U	0.00230		U	0.00228
PCB 183		U	0.00209		U	0.00230		U	0.00228
PCB 128		U	0.00191		U	0.00210		U	0.00208
PCB 167		U	0.00191		U	0.00210		U	0.00208
PCB 185		U	0.00209		U	0.00230		U	0.00228
PCB 174		U	0.00209		U	0.00230		U	0.00228
PCB 177		U	0.00209		U	0.00230		U	0.00228
PCB 202		U	0.00228		U	0.00250		U	0.00247
PCB 171		U	0.00209		U	0.00230		U	0.00228
PCB 156		U	0.00191		U	0.00210		U	0.00208
PCB 173		U	0.00209		U	0.00230		U	0.00228
PCB 157		U	0.00191		U	0.00210		U	0.00208
PCB 201		U	0.00228		U	0.00250		U	0.00247
PCB 172		U	0.00209		U	0.00230		U	0.00228
PCB 197		U	0.00228		U	0.00250		U	0.00247
PCB 180		U	0.00209		U	0.00230		U	0.00228
PCB 193		U	0.00209		U	0.00230		U	0.00228
PCB 191		U	0.00209		U	0.00230		U	0.00228
PCB 200		U	0.00228		U	0.00250		U	0.00247
PCB 170		U	0.00209		U	0.00230		U	0.00228
PCB 190		U	0.00209		U	0.00230		U	0.00228
PCB 199		U	0.00228		U	0.00250		U	0.00247
PCB 196/203		U	0.00228		U	0.00250		U	0.00247
PCB 189		U	0.00209		U	0.00230		U	0.00228
PCB 208		U	0.00246		U	0.00270		U	0.00267
PCB 195		U	0.00228		U	0.00250		U	0.00247
PCB 207		U	0.00246		U	0.00270		U	0.00267
PCB 194		U	0.00228		U	0.00250		U	0.00247
PCB 205		U	0.00228		U	0.00250		U	0.00247
PCB 206		U	0.00246		U	0.00270		U	0.00267
PCB 209		U	0.00264		U	0.00290		U	0.00287
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	56			32			76		
Decachlorobiphenyl	132			44			99		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF1BM04XA			LF1BG01XA			LF1BG02XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090224-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A030440.D			A111219.D			A030441.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	02/05/09			10/20/08			02/05/09		
Date Received:	02/12/09			10/29/08			02/12/09		
Date Prepared:	2/24/2009			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	3/6/2009			11/14/2008			3/6/2009		
Sample Volume (m^3)	0.481			0.474			0.375		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00119		U	0.00108		U	0.00147
PCB 2		U	0.00119		U	0.00108		U	0.00147
PCB 3		U	0.00119		U	0.00108		U	0.00147
PCB 4/10		U	0.00141		U	0.00128		U	0.00174
PCB 7/9		U	0.00141		U	0.00128		U	0.00174
PCB 6		U	0.00141		U	0.00128		U	0.00174
PCB 8		U	0.00141		U	0.00128		U	0.00174
PCB 5		U	0.00141		U	0.00128		U	0.00174
PCB 19		U	0.00163		U	0.00148		U	0.00201
PCB 12/13		U	0.00141		U	0.00128		U	0.00174
PCB 18		U	0.00163		U	0.00148		U	0.00201
PCB 17		U	0.00163		U	0.00148		U	0.00201
PCB 15		U	0.00141		U	0.00128		U	0.00174
PCB 24/27		U	0.00163		U	0.00148		U	0.00201
PCB 16/32		U	0.00163		U	0.00148		U	0.00201
PCB 34		U	0.00163		U	0.00148		U	0.00201
PCB 29		U	0.00163		U	0.00148		U	0.00201
PCB 54		U	0.00184		U	0.00167		U	0.00228
PCB 26		U	0.00163		U	0.00148		U	0.00201
PCB 25		U	0.00163		U	0.00148		U	0.00201
PCB 31		U	0.00163		U	0.00148		U	0.00201
PCB 50		U	0.00184		U	0.00167		U	0.00228
PCB 28		U	0.00163		U	0.00148		U	0.00201
PCB 20/33		U	0.00163		U	0.00148		U	0.00201
PCB 53		U	0.00184		U	0.00167		U	0.00228
PCB 51		U	0.00184		U	0.00167		U	0.00228
PCB 22		U	0.00163		U	0.00148		U	0.00201
PCB 45		U	0.00184		U	0.00167		U	0.00228
PCB 46		U	0.00184		U	0.00167		U	0.00228
PCB 69		U	0.00184		U	0.00167		U	0.00228
PCB 52/73		U	0.00184		U	0.00167		U	0.00228
PCB 49		U	0.00184		U	0.00167		U	0.00228
PCB 47/48/75		U	0.00184		U	0.00167		U	0.00228
PCB 104		U	0.00206		U	0.00187		U	0.00255
PCB 35		U	0.00163		U	0.00148		U	0.00201
PCB 44		U	0.00184		U	0.00167		U	0.00228
PCB 59		U	0.00184		U	0.00167		U	0.00228
PCB 37		U	0.00163		U	0.00148		U	0.00201
PCB 42		U	0.00184		U	0.00167		U	0.00228
PCB 71		U	0.00184		U	0.00167		U	0.00228
PCB 41/64		U	0.00184		U	0.00167		U	0.00228
PCB 40		U	0.00184		U	0.00167		U	0.00228
PCB 103		U	0.00206		U	0.00187		U	0.00255
PCB 67		U	0.00184		U	0.00167		U	0.00228

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF1BM04XA			LF1BG01XA			LF1BG02XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090224-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A030440.D			A111219.D			A030441.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	02/05/09			10/20/08			02/05/09		
Date Received:	02/12/09			10/29/08			02/12/09		
Date Prepared:	2/24/2009			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	3/6/2009			11/14/2008			3/6/2009		
Sample Volume (m^3)	0.481			0.474			0.375		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 100		U	0.00206		U	0.00187		U	0.00255
PCB 63		U	0.00184		U	0.00167		U	0.00228
PCB 74		U	0.00184		U	0.00167		U	0.00228
PCB 70		U	0.00184		U	0.00167		U	0.00228
PCB 66		U	0.00184		U	0.00167		U	0.00228
PCB 93/95		U	0.00206		U	0.00187		U	0.00255
PCB 91		U	0.00206		U	0.00187		U	0.00255
PCB 56/60		U	0.00184		U	0.00167		U	0.00228
PCB 92		U	0.00206		U	0.00187		U	0.00255
PCB 84		U	0.00206		U	0.00187		U	0.00255
PCB 90/101		U	0.00206		U	0.00187		U	0.00255
PCB 99		U	0.00206		U	0.00187		U	0.00255
PCB 119		U	0.00206		U	0.00187		U	0.00255
PCB 83		U	0.00206		U	0.00187		U	0.00255
PCB 97		U	0.00206		U	0.00187		U	0.00255
PCB 117		U	0.00206		U	0.00187		U	0.00255
PCB 81		U	0.00206		U	0.00187		U	0.00255
PCB 87/115		U	0.00184		U	0.00167		U	0.00228
PCB 85		U	0.00206		U	0.00187		U	0.00255
PCB 136		U	0.00228		U	0.00207		U	0.00282
PCB 77		U	0.00184		U	0.00167		U	0.00228
PCB 110		U	0.00206		U	0.00187		U	0.00255
PCB 154		U	0.00228		U	0.00207		U	0.00282
PCB 82		U	0.00206		U	0.00187		U	0.00255
PCB 151		U	0.00228		U	0.00207		U	0.00282
PCB 135/144		U	0.00228		U	0.00207		U	0.00282
PCB 124		U	0.00206		U	0.00187		U	0.00255
PCB 147		U	0.00228		U	0.00207		U	0.00282
PCB 107		U	0.00206		U	0.00187		U	0.00255
PCB 123		U	0.00206		U	0.00187		U	0.00255
PCB 149		U	0.00228		U	0.00207		U	0.00282
PCB 118		U	0.00206		U	0.00187		U	0.00255
PCB 134		U	0.00228		U	0.00207		U	0.00282
PCB 114		U	0.00206		U	0.00187		U	0.00255
PCB 131		U	0.00228		U	0.00207		U	0.00282
PCB 122		U	0.00206		U	0.00187		U	0.00255
PCB 165		U	0.00228		U	0.00207		U	0.00282
PCB 146		U	0.00228		U	0.00207		U	0.00282
PCB 188		U	0.00250		U	0.00227		U	0.00309
PCB 153		U	0.00228		U	0.00207		U	0.00282
PCB 132		U	0.00228		U	0.00207		U	0.00282
PCB 105		U	0.00206		U	0.00187		U	0.00255
PCB 141		U	0.00228		U	0.00207		U	0.00282
PCB 179		U	0.00250		U	0.00227		U	0.00309
PCB 137		U	0.00228		U	0.00207		U	0.00282
PCB 176		U	0.00250		U	0.00227		U	0.00309
PCB 130		U	0.00228		U	0.00207		U	0.00282
PCB 138/163/164		U	0.00228		U	0.00207		U	0.00282
PCB 158		U	0.00228		U	0.00207		U	0.00282

Sample ID:	LF1BM04XA			LF1BG01XA			LF1BG02XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090224-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A030440.D			A111219.D			A030441.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	02/05/09			10/20/08			02/05/09		
Date Received:	02/12/09			10/29/08			02/12/09		
Date Prepared:	2/24/2009			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	3/6/2009			11/14/2008			3/6/2009		
Sample Volume (m^3)	0.481			0.474			0.375		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 129		U	0.00228		U	0.00207		U	0.00282
PCB 178		U	0.00250		U	0.00227		U	0.00309
PCB 175		U	0.00250		U	0.00227		U	0.00309
PCB 187		U	0.00250		U	0.00227		U	0.00309
PCB 183		U	0.00250		U	0.00227		U	0.00309
PCB 128		U	0.00228		U	0.00207		U	0.00282
PCB 167		U	0.00228		U	0.00207		U	0.00282
PCB 185		U	0.00250		U	0.00227		U	0.00309
PCB 174		U	0.00250		U	0.00227		U	0.00309
PCB 177		U	0.00250		U	0.00227		U	0.00309
PCB 202		U	0.00272		U	0.00246		U	0.00336
PCB 171		U	0.00250		U	0.00227		U	0.00309
PCB 156		U	0.00228		U	0.00207		U	0.00282
PCB 173		U	0.00250		U	0.00227		U	0.00309
PCB 157		U	0.00228		U	0.00207		U	0.00282
PCB 201		U	0.00272		U	0.00246		U	0.00336
PCB 172		U	0.00250		U	0.00227		U	0.00309
PCB 197		U	0.00272		U	0.00246		U	0.00336
PCB 180		U	0.00250		U	0.00227		U	0.00309
PCB 193		U	0.00250		U	0.00227		U	0.00309
PCB 191		U	0.00250		U	0.00227		U	0.00309
PCB 200		U	0.00272		U	0.00246		U	0.00336
PCB 170		U	0.00250		U	0.00227		U	0.00309
PCB 190		U	0.00250		U	0.00227		U	0.00309
PCB 199		U	0.00272		U	0.00246		U	0.00336
PCB 196/203		U	0.00272		U	0.00246		U	0.00336
PCB 189		U	0.00250		U	0.00227		U	0.00309
PCB 208		U	0.00293		U	0.00266		U	0.00363
PCB 195		U	0.00272		U	0.00246		U	0.00336
PCB 207		U	0.00293		U	0.00266		U	0.00363
PCB 194		U	0.00272		U	0.00246		U	0.00336
PCB 205		U	0.00272		U	0.00246		U	0.00336
PCB 206		U	0.00293		U	0.00266		U	0.00363
PCB 209		U	0.00315		U	0.00286		U	0.00390
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	66			60			51		
Decachlorobiphenyl	81			144			68		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF1BL01XA**			**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111220.D			A111214.D			A030436.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			NA			NA		
Date Received:	10/29/08			NA			NA		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			11/13/2008			3/5/2009		
Sample Volume (m^3)	0.490			1.000			0.454		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00105		U	0.000567		U	0.00125
PCB 2		U	0.00105		U	0.000567		U	0.00125
PCB 3		U	0.00105		U	0.000567		U	0.00125
PCB 4/10		U	0.00125		U	0.000671		U	0.00148
PCB 7/9		U	0.00125		U	0.000671		U	0.00148
PCB 6		U	0.00125		U	0.000671		U	0.00148
PCB 8		U	0.00125		U	0.000671		U	0.00148
PCB 5		U	0.00125		U	0.000671		U	0.00148
PCB 19		U	0.00144		U	0.000774		U	0.00170
PCB 12/13		U	0.00125		U	0.000671		U	0.00148
PCB 18		U	0.00144		U	0.000774		U	0.00170
PCB 17		U	0.00144		U	0.000774		U	0.00170
PCB 15		U	0.00125		U	0.000671		U	0.00148
PCB 24/27		U	0.00144		U	0.000774		U	0.00170
PCB 16/32		U	0.00144		U	0.000774		U	0.00170
PCB 34		U	0.00144		U	0.000774		U	0.00170
PCB 29		U	0.00144		U	0.000774		U	0.00170
PCB 54		U	0.00163		U	0.000878		U	0.00193
PCB 26		U	0.00144		U	0.000774		U	0.00170
PCB 25		U	0.00144		U	0.000774		U	0.00170
PCB 31		U	0.00144		U	0.000774		U	0.00170
PCB 50		U	0.00163		U	0.000878		U	0.00193
PCB 28		U	0.00144		U	0.000774		U	0.00170
PCB 20/33		U	0.00144		U	0.000774		U	0.00170
PCB 53		U	0.00163		U	0.000878		U	0.00193
PCB 51		U	0.00163		U	0.000878		U	0.00193
PCB 22		U	0.00144		U	0.000774		U	0.00170
PCB 45		U	0.00163		U	0.000878		U	0.00193
PCB 46		U	0.00163		U	0.000878		U	0.00193
PCB 69		U	0.00163		U	0.000878		U	0.00193
PCB 52/73		U	0.00163		U	0.000878		U	0.00193
PCB 49		U	0.00163		U	0.000878		U	0.00193
PCB 47/48/75		U	0.00163		U	0.000878		U	0.00193
PCB 104		U	0.00183		U	0.000981		U	0.00216
PCB 35		U	0.00144		U	0.000774		U	0.00170
PCB 44		U	0.00163		U	0.000878		U	0.00193
PCB 59		U	0.00163		U	0.000878		U	0.00193
PCB 37		U	0.00144		U	0.000774		U	0.00170
PCB 42		U	0.00163		U	0.000878		U	0.00193
PCB 71		U	0.00163		U	0.000878		U	0.00193
PCB 41/64		U	0.00163		U	0.000878		U	0.00193
PCB 40		U	0.00163		U	0.000878		U	0.00193
PCB 103		U	0.00183		U	0.000981		U	0.00216
PCB 67		U	0.00163		U	0.000878		U	0.00193

Sample ID:	LF1BL01XA			QC081105-MB			QC090224-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111220.D			A111214.D			A030436.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			NA			NA		
Date Received:	10/29/08			NA			NA		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			11/13/2008			3/5/2009		
Sample Volume (m^3)	0.490			1.000			0.454		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 100		U	0.00183		U	0.000981		U	0.00216
PCB 63		U	0.00163		U	0.000878		U	0.00193
PCB 74		U	0.00163		U	0.000878		U	0.00193
PCB 70		U	0.00163		U	0.000878		U	0.00193
PCB 66		U	0.00163		U	0.000878		U	0.00193
PCB 93/95		U	0.00183		U	0.000981		U	0.00216
PCB 91		U	0.00183		U	0.000981		U	0.00216
PCB 56/60		U	0.00163		U	0.000878		U	0.00193
PCB 92		U	0.00183		U	0.000981		U	0.00216
PCB 84		U	0.00183		U	0.000981		U	0.00216
PCB 90/101		U	0.00183		U	0.000981		U	0.00216
PCB 99		U	0.00183		U	0.000981		U	0.00216
PCB 119		U	0.00183		U	0.000981		U	0.00216
PCB 83		U	0.00183		U	0.000981		U	0.00216
PCB 97		U	0.00183		U	0.000981		U	0.00216
PCB 117		U	0.00183		U	0.000981		U	0.00216
PCB 81		U	0.00183		U	0.000981		U	0.00216
PCB 87/115		U	0.00163		U	0.000878		U	0.00193
PCB 85		U	0.00183		U	0.000981		U	0.00216
PCB 136		U	0.00202		U	0.00108		U	0.00239
PCB 77		U	0.00163		U	0.000878		U	0.00193
PCB 110		U	0.00183		U	0.000981		U	0.00216
PCB 154		U	0.00202		U	0.00108		U	0.00239
PCB 82		U	0.00183		U	0.000981		U	0.00216
PCB 151		U	0.00202		U	0.00108		U	0.00239
PCB 135/144		U	0.00202		U	0.00108		U	0.00239
PCB 124		U	0.00183		U	0.000981		U	0.00216
PCB 147		U	0.00202		U	0.00108		U	0.00239
PCB 107		U	0.00183		U	0.000981		U	0.00216
PCB 123		U	0.00183		U	0.000981		U	0.00216
PCB 149		U	0.00202		U	0.00108		U	0.00239
PCB 118		U	0.00183		U	0.000981		U	0.00216
PCB 134		U	0.00202		U	0.00108		U	0.00239
PCB 114		U	0.00183		U	0.000981		U	0.00216
PCB 131		U	0.00202		U	0.00108		U	0.00239
PCB 122		U	0.00183		U	0.000981		U	0.00216
PCB 165		U	0.00202		U	0.00108		U	0.00239
PCB 146		U	0.00202		U	0.00108		U	0.00239
PCB 188		U	0.00221		U	0.00119		U	0.00261
PCB 153		U	0.00202		U	0.00108		U	0.00239
PCB 132		U	0.00202		U	0.00108		U	0.00239
PCB 105		U	0.00183		U	0.000981		U	0.00216
PCB 141		U	0.00202		U	0.00108		U	0.00239
PCB 179		U	0.00221		U	0.00119		U	0.00261
PCB 137		U	0.00202		U	0.00108		U	0.00239
PCB 176		U	0.00221		U	0.00119		U	0.00261
PCB 130		U	0.00202		U	0.00108		U	0.00239
PCB 138/163/164		U	0.00202		U	0.00108		U	0.00239
PCB 158		U	0.00202		U	0.00108		U	0.00239

Sample ID:	**LF1BL01XA**			**QC081105-MB**			**QC090224-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081105-MB			QC081105-MB			QC090224-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX			AMX		
File ID:	A111220.D			A111214.D			A030436.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/20/08			NA			NA		
Date Received:	10/29/08			NA			NA		
Date Prepared:	11/5/2008			11/5/2008			2/24/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			11/13/2008			3/5/2009		
Sample Volume (m^3)	0.490			1.000			0.454		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 129		U	0.00202		U	0.00108		U	0.00239
PCB 178		U	0.00221		U	0.00119		U	0.00261
PCB 175		U	0.00221		U	0.00119		U	0.00261
PCB 187		U	0.00221		U	0.00119		U	0.00261
PCB 183		U	0.00221		U	0.00119		U	0.00261
PCB 128		U	0.00202		U	0.00108		U	0.00239
PCB 167		U	0.00202		U	0.00108		U	0.00239
PCB 185		U	0.00221		U	0.00119		U	0.00261
PCB 174		U	0.00221		U	0.00119		U	0.00261
PCB 177		U	0.00221		U	0.00119		U	0.00261
PCB 202		U	0.00240		U	0.00129		U	0.00284
PCB 171		U	0.00221		U	0.00119		U	0.00261
PCB 156		U	0.00202		U	0.00108		U	0.00239
PCB 173		U	0.00221		U	0.00119		U	0.00261
PCB 157		U	0.00202		U	0.00108		U	0.00239
PCB 201		U	0.00240		U	0.00129		U	0.00284
PCB 172		U	0.00221		U	0.00119		U	0.00261
PCB 197		U	0.00240		U	0.00129		U	0.00284
PCB 180		U	0.00221		U	0.00119		U	0.00261
PCB 193		U	0.00221		U	0.00119		U	0.00261
PCB 191		U	0.00221		U	0.00119		U	0.00261
PCB 200		U	0.00240		U	0.00129		U	0.00284
PCB 170		U	0.00221		U	0.00119		U	0.00261
PCB 190		U	0.00221		U	0.00119		U	0.00261
PCB 199		U	0.00240		U	0.00129		U	0.00284
PCB 196/203		U	0.00240		U	0.00129		U	0.00284
PCB 189		U	0.00221		U	0.00119		U	0.00261
PCB 208		U	0.00260		U	0.00140		U	0.00307
PCB 195		U	0.00240		U	0.00129		U	0.00284
PCB 207		U	0.00260		U	0.00140		U	0.00307
PCB 194		U	0.00240		U	0.00129		U	0.00284
PCB 205		U	0.00240		U	0.00129		U	0.00284
PCB 206		U	0.00260		U	0.00140		U	0.00307
PCB 209		U	0.00279		U	0.00150		U	0.00330
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	64			52			50		
Decachlorobiphenyl	228			116			64		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**QC081105-MBS2**				**QC090224-MBS2-PCB**			
Matrix:	XAD Tubes				XAD Tubes			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC081105-MB				QC090224-MB			
Preparation Method:	EPA 3540				EPA 3540			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8082M				EPA 8082M			
Instrument:	AMX				AMX			
File ID:	A111215.D				A030438.D			
Operator:	ERL				ERL			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	11/5/2008				2/24/2009			
Date Cleanup:	NA				NA			
Date Analyzed:	11/13/2008				3/5/2009			
Sample Volume (m^3)	1.000				0.454			
Percent Solid:	NA				NA			
Prep DF:	1.000				1			
Analysis DF:	1.000				1			
Injection Volume (µl):	1.000				1			
Extract Volume (µl):	2000.000				2000			
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:								
PCB 1		U	0.000567			U	0.00125	
PCB 2		U	0.000567			U	0.00125	
PCB 3		U	0.000567			U	0.00125	
PCB 4/10		U	0.000671			U	0.00148	
PCB 7/9		U	0.000671			U	0.00148	
PCB 6		U	0.000671			U	0.00148	
PCB 8		U	0.000671			U	0.00148	
PCB 5		U	0.000671			U	0.00148	
PCB 19		U	0.000774			U	0.00170	
PCB 12/13		U	0.000671			U	0.00148	
PCB 18		U	0.000774			U	0.00170	
PCB 17		U	0.000774			U	0.00170	
PCB 15		U	0.000671			U	0.00148	
PCB 24/27		U	0.000774			U	0.00170	
PCB 16/32		U	0.000774			U	0.00170	
PCB 34		U	0.000774			U	0.00170	
PCB 29		U	0.000774			U	0.00170	
PCB 54		U	0.000878			U	0.00193	
PCB 26		U	0.000774			U	0.00170	
PCB 25		U	0.000774			U	0.00170	
PCB 31		U	0.000774			U	0.00170	
PCB 50		U	0.000878			U	0.00193	
PCB 28		U	0.000774			U	0.00170	
PCB 20/33	0.00248		0.000774	16	0.0232		0.00170	68
PCB 53	0.00316		0.000878	18	0.0233		0.00193	60
PCB 51		U	0.000878			U	0.00193	
PCB 22		U	0.000774			U	0.00170	
PCB 45		U	0.000878			U	0.00193	
PCB 46		U	0.000878			U	0.00193	
PCB 69		U	0.000878			U	0.00193	
PCB 52/73		U	0.000878			U	0.00193	
PCB 49		U	0.000878			U	0.00193	
PCB 47/48/75		U	0.000878			U	0.00193	
PCB 104		U	0.000981			U	0.00216	
PCB 35		U	0.000774			U	0.00170	
PCB 44		U	0.000878			U	0.00193	
PCB 59		U	0.000878			U	0.00193	
PCB 37		U	0.000774			U	0.00170	
PCB 42		U	0.000878			U	0.00193	
PCB 71		U	0.000878			U	0.00193	
PCB 41/64		U	0.000878			U	0.00193	
PCB 40		U	0.000878			U	0.00193	
PCB 103		U	0.000981			U	0.00216	
PCB 67		U	0.000878			U	0.00193	

Sample ID:	**QC081105-MBS2**				**QC090224-MBS2-PCB**			
Matrix:	XAD Tubes				XAD Tubes			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC081105-MB				QC090224-MB			
Preparation Method:	EPA 3540				EPA 3540			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8082M				EPA 8082M			
Instrument:	AMX				AMX			
File ID:	A111215.D				A030438.D			
Operator:	ERL				ERL			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	11/5/2008				2/24/2009			
Date Cleanup:	NA				NA			
Date Analyzed:	11/13/2008				3/5/2009			
Sample Volume (m^3)	1.000				0.454			
Percent Solid:	NA				NA			
Prep DF:	1.000				1			
Analysis DF:	1.000				1			
Injection Volume (µl):	1.000				1			
Extract Volume (µl):	2000.000				2000			
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:								
PCB 100		U	0.000981			U	0.00216	
PCB 63		U	0.000878			U	0.00193	
PCB 74		U	0.000878			U	0.00193	
PCB 70		U	0.000878			U	0.00193	
PCB 66		U	0.000878			U	0.00193	
PCB 93/95		U	0.000981			U	0.00216	
PCB 91		U	0.000981			U	0.00216	
PCB 56/60		U	0.000878			U	0.00193	
PCB 92		U	0.000981			U	0.00216	
PCB 84		U	0.000981			U	0.00216	
PCB 90/101		U	0.000981			U	0.00216	
PCB 99		U	0.000981			U	0.00216	
PCB 119		U	0.000981			U	0.00216	
PCB 83		U	0.000981			U	0.00216	
PCB 97		U	0.000981			U	0.00216	
PCB 117	0.00314		0.000981	16	0.0225		0.00216	52
PCB 81		U	0.000981			U	0.00216	
PCB 87/115		U	0.000878			U	0.00193	
PCB 85		U	0.000981			U	0.00216	
PCB 136		U	0.00108			U	0.00239	
PCB 77	0.00263		0.000878	15	0.0233		0.00193	60
PCB 110	0.00294		0.000981	15		U	0.00216	
PCB 154		U	0.00108			U	0.00239	
PCB 82		U	0.000981			U	0.00216	
PCB 151		U	0.00108			U	0.00239	
PCB 135/144		U	0.00108			U	0.00239	
PCB 124		U	0.000981			U	0.00216	
PCB 147		U	0.00108			U	0.00239	
PCB 107		U	0.000981			U	0.00216	
PCB 123	0.00314		0.000981	16	0.0225		0.00216	52
PCB 149		U	0.00108			U	0.00239	
PCB 118	0.00294		0.000981	15	0.0289		0.00216	67
PCB 134		U	0.00108			U	0.00239	
PCB 114	0.00255		0.000981	13	0.0264		0.00216	61
PCB 131		U	0.00108			U	0.00239	
PCB 122		U	0.000981			U	0.00216	
PCB 165		U	0.00108			U	0.00239	
PCB 146		U	0.00108			U	0.00239	
PCB 188		U	0.00119			U	0.00261	
PCB 153		U	0.00108			U	0.00239	
PCB 132		U	0.00108			U	0.00239	
PCB 105	0.00235		0.000981	12	0.0237		0.00216	55
PCB 141		U	0.00108			U	0.00239	
PCB 179		U	0.00119			U	0.00261	
PCB 137		U	0.00108			U	0.00239	
PCB 176		U	0.00119			U	0.00261	
PCB 130		U	0.00108			U	0.00239	
PCB 138/163/164		U	0.00108			U	0.00239	
PCB 158		U	0.00108			U	0.00239	

Sample ID:	**QC081105-MBS2**				**QC090224-MBS2-PCB**			
Matrix:	XAD Tubes				XAD Tubes			
Preservation:	None				None			
Decanted:	None				None			
Batch QC:	QC081105-MB				QC090224-MB			
Preparation Method:	EPA 3540				EPA 3540			
Cleanup Method(s):	NA				NA			
Analysis Method:	EPA 8082M				EPA 8082M			
Instrument:	AMX				AMX			
File ID:	A111215.D				A030438.D			
Operator:	ERL				ERL			
Date Sampled:	NA				NA			
Date Received:	NA				NA			
Date Prepared:	11/5/2008				2/24/2009			
Date Cleanup:	NA				NA			
Date Analyzed:	11/13/2008				3/5/2009			
Sample Volume (m^3)	1.000				0.454			
Percent Solid:	NA				NA			
Prep DF:	1.000				1			
Analysis DF:	1.000				1			
Injection Volume (µl):	1.000				1			
Extract Volume (µl):	2000.000				2000			
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:								
PCB 129		U	0.00108			U	0.00239	
PCB 178		U	0.00119			U	0.00261	
PCB 175		U	0.00119			U	0.00261	
PCB 187		U	0.00119			U	0.00261	
PCB 183		U	0.00119			U	0.00261	
PCB 128		U	0.00108			U	0.00239	
PCB 167		U	0.00108		0.0239		0.00239	50
PCB 185		U	0.00119			U	0.00261	
PCB 174		U	0.00119			U	0.00261	
PCB 177		U	0.00119			U	0.00261	
PCB 202		U	0.00129			U	0.00284	
PCB 171		U	0.00119			U	0.00261	
PCB 156	0.00325		0.00108	15	0.0248		0.00239	52
PCB 173		U	0.00119			U	0.00261	
PCB 157	0.00347		0.00108	16	0.0263		0.00239	55
PCB 201		U	0.00129			U	0.00284	
PCB 172		U	0.00119			U	0.00261	
PCB 197		U	0.00129			U	0.00284	
PCB 180		U	0.00119			U	0.00261	
PCB 193		U	0.00119			U	0.00261	
PCB 191		U	0.00119			U	0.00261	
PCB 200		U	0.00129			U	0.00284	
PCB 170	0.00380		0.00119	16	0.0324		0.00261	62
PCB 190		U	0.00119			U	0.00261	
PCB 199		U	0.00129			U	0.00284	
PCB 196/203		U	0.00129			U	0.00284	
PCB 189	0.00356		0.00119	15	0.0324		0.00261	62
PCB 208		U	0.00140			U	0.00307	
PCB 195		U	0.00129			U	0.00284	
PCB 207		U	0.00140			U	0.00307	
PCB 194		U	0.00129			U	0.00284	
PCB 205		U	0.00129			U	0.00284	
PCB 206		U	0.00140			U	0.00307	
PCB 209		U	0.00150			U	0.00330	

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	16	61
Decachlorobiphenyl	20	79

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111221.D			A111224.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00112		U	0.00103
PCB 2		U	0.00112		U	0.00103
PCB 3		U	0.00112		U	0.00103
PCB 4/10		U	0.00133		U	0.00122
PCB 7/9		U	0.00133		U	0.00122
PCB 6		U	0.00133		U	0.00122
PCB 8		U	0.00133		U	0.00122
PCB 5		U	0.00133		U	0.00122
PCB 19		U	0.00153		U	0.00141
PCB 12/13		U	0.00133		U	0.00122
PCB 18		U	0.00153		U	0.00141
PCB 17		U	0.00153		U	0.00141
PCB 15		U	0.00133		U	0.00122
PCB 24/27		U	0.00153		U	0.00141
PCB 16/32		U	0.00153		U	0.00141
PCB 34		U	0.00153		U	0.00141
PCB 29		U	0.00153		U	0.00141
PCB 54		U	0.00173		U	0.00159
PCB 26		U	0.00153		U	0.00141
PCB 25		U	0.00153		U	0.00141
PCB 31		U	0.00153		U	0.00141
PCB 50		U	0.00173		U	0.00159
PCB 28		U	0.00153		U	0.00141
PCB 20/33		U	0.00153		U	0.00141
PCB 53		U	0.00173		U	0.00159
PCB 51		U	0.00173		U	0.00159
PCB 22		U	0.00153		U	0.00141
PCB 45		U	0.00173		U	0.00159
PCB 46		U	0.00173		U	0.00159
PCB 69		U	0.00173		U	0.00159
PCB 52/73		U	0.00173		U	0.00159
PCB 49		U	0.00173		U	0.00159
PCB 47/48/75		U	0.00173		U	0.00159
PCB 104		U	0.00194		U	0.00178
PCB 35		U	0.00153		U	0.00141
PCB 44		U	0.00173		U	0.00159
PCB 59		U	0.00173		U	0.00159
PCB 37		U	0.00153		U	0.00141
PCB 42		U	0.00173		U	0.00159
PCB 71		U	0.00173		U	0.00159
PCB 41/64		U	0.00173		U	0.00159
PCB 40		U	0.00173		U	0.00159
PCB 103		U	0.00194		U	0.00178
PCB 67		U	0.00173		U	0.00159

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111221.D			A111224.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 100		U	0.00194		U	0.00178
PCB 63		U	0.00173		U	0.00159
PCB 74		U	0.00173		U	0.00159
PCB 70		U	0.00173		U	0.00159
PCB 66		U	0.00173		U	0.00159
PCB 93/95		U	0.00194		U	0.00178
PCB 91		U	0.00194		U	0.00178
PCB 56/60		U	0.00173		U	0.00159
PCB 92		U	0.00194		U	0.00178
PCB 84		U	0.00194		U	0.00178
PCB 90/101		U	0.00194		U	0.00178
PCB 99		U	0.00194		U	0.00178
PCB 119		U	0.00194		U	0.00178
PCB 83		U	0.00194		U	0.00178
PCB 97		U	0.00194		U	0.00178
PCB 117		U	0.00194		U	0.00178
PCB 81		U	0.00194		U	0.00178
PCB 87/115		U	0.00173		U	0.00159
PCB 85		U	0.00194		U	0.00178
PCB 136		U	0.00214		U	0.00197
PCB 77		U	0.00173		U	0.00159
PCB 110		U	0.00194		U	0.00178
PCB 154		U	0.00214		U	0.00197
PCB 82		U	0.00194		U	0.00178
PCB 151		U	0.00214		U	0.00197
PCB 135/144		U	0.00214		U	0.00197
PCB 124		U	0.00194		U	0.00178
PCB 147		U	0.00214		U	0.00197
PCB 107		U	0.00194		U	0.00178
PCB 123		U	0.00194		U	0.00178
PCB 149		U	0.00214		U	0.00197
PCB 118		U	0.00194		U	0.00178
PCB 134		U	0.00214		U	0.00197
PCB 114		U	0.00194		U	0.00178
PCB 131		U	0.00214		U	0.00197
PCB 122		U	0.00194		U	0.00178
PCB 165		U	0.00214		U	0.00197
PCB 146		U	0.00214		U	0.00197

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111221.D			A111224.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 188		U	0.00235		U	0.00216
PCB 153		U	0.00214		U	0.00197
PCB 132		U	0.00214		U	0.00197
PCB 105		U	0.00194		U	0.00178
PCB 141		U	0.00214		U	0.00197
PCB 179		U	0.00235		U	0.00216
PCB 137		U	0.00214		U	0.00197
PCB 176		U	0.00235		U	0.00216
PCB 130		U	0.00214		U	0.00197
PCB 138/163/164		U	0.00214		U	0.00197
PCB 158		U	0.00214		U	0.00197
PCB 129		U	0.00214		U	0.00197
PCB 178		U	0.00235		U	0.00216
PCB 175		U	0.00235		U	0.00216
PCB 187		U	0.00235		U	0.00216
PCB 183		U	0.00235		U	0.00216
PCB 128		U	0.00214		U	0.00197
PCB 167		U	0.00214		U	0.00197
PCB 185		U	0.00235		U	0.00216
PCB 174		U	0.00235		U	0.00216
PCB 177		U	0.00235		U	0.00216
PCB 202		U	0.00255		U	0.00235
PCB 171		U	0.00235		U	0.00216
PCB 156		U	0.00214		U	0.00197
PCB 173		U	0.00235		U	0.00216
PCB 157		U	0.00214		U	0.00197
PCB 201		U	0.00255		U	0.00235
PCB 172		U	0.00235		U	0.00216
PCB 197		U	0.00255		U	0.00235

Sample ID:	**LF2BM01XA**			**LF2BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081105-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111221.D			A111224.D		
Operator:	ERL			ERL		
Date Sampled:	10/29/2008			10/22/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/5/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.486			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 180		U	0.00235		U	0.00216
PCB 193		U	0.00235		U	0.00216
PCB 191		U	0.00235		U	0.00216
PCB 200		U	0.00255		U	0.00235
PCB 170		U	0.00235		U	0.00216
PCB 190		U	0.00235		U	0.00216
PCB 199		U	0.00255		U	0.00235
PCB 196/203		U	0.00255		U	0.00235
PCB 189		U	0.00235		U	0.00216
PCB 208		U	0.00276		U	0.00253
PCB 195		U	0.00255		U	0.00235
PCB 207		U	0.00276		U	0.00253
PCB 194		U	0.00255		U	0.00235
PCB 205		U	0.00255		U	0.00235
PCB 206		U	0.00276		U	0.00253
PCB 209		U	0.00296		U	0.00272
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	68			76		
Decachlorobiphenyl	108			180		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF2BM03XA**			**LF2BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121539.D			A121540.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00205		U	0.00234
PCB 2		U	0.00205		U	0.00234
PCB 3		U	0.00205		U	0.00234
PCB 4/10		U	0.00173		U	0.00198
PCB 7/9		U	0.00173		U	0.00198
PCB 6		U	0.00173		U	0.00198
PCB 8		U	0.00173		U	0.00198
PCB 5		U	0.00173		U	0.00198
PCB 19		U	0.00150		U	0.00171
PCB 12/13		U	0.00173		U	0.00198
PCB 18		U	0.00150		U	0.00171
PCB 17		U	0.00150		U	0.00171
PCB 15		U	0.00173		U	0.00198
PCB 24/27		U	0.00150		U	0.00171
PCB 16/32		U	0.00150		U	0.00171
PCB 34		U	0.00150		U	0.00171
PCB 29		U	0.00150		U	0.00171
PCB 54		U	0.00132		U	0.00151
PCB 26		U	0.00150		U	0.00171
PCB 25		U	0.00150		U	0.00171
PCB 31		U	0.00150		U	0.00171
PCB 50		U	0.00132		U	0.00151
PCB 28		U	0.00150		U	0.00171
PCB 20/33		U	0.00150		U	0.00171
PCB 53		U	0.00132		U	0.00151
PCB 51		U	0.00132		U	0.00151
PCB 22		U	0.00150		U	0.00171
PCB 45		U	0.00132		U	0.00151
PCB 46		U	0.00132		U	0.00151
PCB 69		U	0.00132		U	0.00151
PCB 52/73		U	0.00132		U	0.00151
PCB 49		U	0.00132		U	0.00151
PCB 47/48/75		U	0.00132		U	0.00151
PCB 104		U	0.00118		U	0.00135
PCB 35		U	0.00150		U	0.00171
PCB 44		U	0.00132		U	0.00151
PCB 59		U	0.00132		U	0.00151
PCB 37		U	0.00150		U	0.00171
PCB 42		U	0.00132		U	0.00151
PCB 71		U	0.00132		U	0.00151
PCB 41/64		U	0.00132		U	0.00151
PCB 40		U	0.00132		U	0.00151
PCB 103		U	0.00118		U	0.00135
PCB 67		U	0.00132		U	0.00151

Sample ID:	**LF2BM03XA**			**LF2BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121539.D			A121540.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 100		U	0.00118		U	0.00135
PCB 63		U	0.00132		U	0.00151
PCB 74		U	0.00132		U	0.00151
PCB 70		U	0.00132		U	0.00151
PCB 66		U	0.00132		U	0.00151
PCB 93/95		U	0.00118		U	0.00135
PCB 91		U	0.00118		U	0.00135
PCB 56/60		U	0.00132		U	0.00151
PCB 92		U	0.00118		U	0.00135
PCB 84		U	0.00118		U	0.00135
PCB 90/101		U	0.00118		U	0.00135
PCB 99		U	0.00118		U	0.00135
PCB 119		U	0.00118		U	0.00135
PCB 83		U	0.00118		U	0.00135
PCB 97		U	0.00118		U	0.00135
PCB 117		U	0.00118		U	0.00135
PCB 81		U	0.00118		U	0.00135
PCB 87/115		U	0.00132		U	0.00151
PCB 85		U	0.00118		U	0.00135
PCB 136		U	0.00107		U	0.00122
PCB 77		U	0.00132		U	0.00151
PCB 110		U	0.00118		U	0.00135
PCB 154		U	0.00107		U	0.00122
PCB 82		U	0.00118		U	0.00135
PCB 151		U	0.00107		U	0.00122
PCB 135/144		U	0.00107		U	0.00122
PCB 124		U	0.00118		U	0.00135
PCB 147		U	0.00107		U	0.00122
PCB 107		U	0.00118		U	0.00135
PCB 123		U	0.00118		U	0.00135
PCB 149		U	0.00107		U	0.00122
PCB 118		U	0.00118		U	0.00135
PCB 134		U	0.00107		U	0.00122
PCB 114		U	0.00118		U	0.00135
PCB 131		U	0.00107		U	0.00122
PCB 122		U	0.00118		U	0.00135
PCB 165		U	0.00107		U	0.00122
PCB 146		U	0.00107		U	0.00122

Sample ID:	**LF2BM03XA**			**LF2BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121539.D			A121540.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 188		U	0.00098		U	0.00112
PCB 153		U	0.00107		U	0.00122
PCB 132		U	0.00107		U	0.00122
PCB 105		U	0.00118		U	0.00135
PCB 141		U	0.00107		U	0.00122
PCB 179		U	0.00098		U	0.00112
PCB 137		U	0.00107		U	0.00122
PCB 176		U	0.00098		U	0.00112
PCB 130		U	0.00107		U	0.00122
PCB 138/163/164		U	0.00107		U	0.00122
PCB 158		U	0.00107		U	0.00122
PCB 129		U	0.00107		U	0.00122
PCB 178		U	0.00098		U	0.00112
PCB 175		U	0.00098		U	0.00112
PCB 187		U	0.00098		U	0.00112
PCB 183		U	0.00098		U	0.00112
PCB 128		U	0.00107		U	0.00122
PCB 167		U	0.00107		U	0.00122
PCB 185		U	0.00098		U	0.00112
PCB 174		U	0.00098		U	0.00112
PCB 177		U	0.00098		U	0.00112
PCB 202		U	0.00090		U	0.00103
PCB 171		U	0.00098		U	0.00112
PCB 156		U	0.00107		U	0.00122
PCB 173		U	0.00098		U	0.00112
PCB 157		U	0.00107		U	0.00122
PCB 201		U	0.00090		U	0.00103
PCB 172		U	0.00098		U	0.00112
PCB 197		U	0.00090		U	0.00103

Sample ID:	**LF2BM03XA**			**LF2BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121539.D			A121540.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			11/18/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.586			0.517		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 180		U	0.00098		U	0.00112
PCB 193		U	0.00098		U	0.00112
PCB 191		U	0.00098		U	0.00112
PCB 200		U	0.00090		U	0.00103
PCB 170		U	0.00098		U	0.00112
PCB 190		U	0.00098		U	0.00112
PCB 199		U	0.00090		U	0.00103
PCB 196/203		U	0.00090		U	0.00103
PCB 189		U	0.00098		U	0.00112
PCB 208		U	0.00083		U	0.000950
PCB 195		U	0.00090		U	0.00103
PCB 207		U	0.00083		U	0.000950
PCB 194		U	0.00090		U	0.00103
PCB 205		U	0.00090		U	0.00103
PCB 206		U	0.00083		U	0.000950
PCB 209		U	0.00077		U	0.000884
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	92			72		
Decachlorobiphenyl	148			104		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF2BG01XA			LF2BG03XA			LF2BG04XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081106-MB			QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A111228.D			A121546.D			A121547.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			12/20/2008			12/20/2008		
Sample Volume (m^3)	0.529			0.538			0.516		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00101		U	0.00227		U	0.00229
PCB 2		U	0.00101		U	0.00227		U	0.00229
PCB 3		U	0.00101		U	0.00227		U	0.00229
PCB 4/10		U	0.00120		U	0.00192		U	0.00193
PCB 7/9		U	0.00120		U	0.00192		U	0.00193
PCB 6		U	0.00120		U	0.00192		U	0.00193
PCB 8		U	0.00120		U	0.00192		U	0.00193
PCB 5		U	0.00120		U	0.00192		U	0.00193
PCB 19		U	0.00138		U	0.00166		U	0.00168
PCB 12/13		U	0.00120		U	0.00192		U	0.00193
PCB 18		U	0.00138		U	0.00166		U	0.00168
PCB 17		U	0.00138		U	0.00166		U	0.00168
PCB 15		U	0.00120		U	0.00192		U	0.00193
PCB 24/27		U	0.00138		U	0.00166		U	0.00168
PCB 16/32		U	0.00138		U	0.00166		U	0.00168
PCB 34		U	0.00138		U	0.00166		U	0.00168
PCB 29		U	0.00138		U	0.00166		U	0.00168
PCB 54		U	0.00157		U	0.00146		U	0.00148
PCB 26		U	0.00138		U	0.00166		U	0.00168
PCB 25		U	0.00138		U	0.00166		U	0.00168
PCB 31		U	0.00138		U	0.00166		U	0.00168
PCB 50		U	0.00157		U	0.00146		U	0.00148
PCB 28		U	0.00138		U	0.00166		U	0.00168
PCB 20/33		U	0.00138		U	0.00166		U	0.00168
PCB 53		U	0.00157		U	0.00146		U	0.00148
PCB 51		U	0.00157		U	0.00146		U	0.00148
PCB 22		U	0.00138		U	0.00166		U	0.00168
PCB 45		U	0.00157		U	0.00146		U	0.00148
PCB 46		U	0.00157		U	0.00146		U	0.00148
PCB 69		U	0.00157		U	0.00146		U	0.00148
PCB 52/73		U	0.00157		U	0.00146		U	0.00148
PCB 49		U	0.00157		U	0.00146		U	0.00148
PCB 47/48/75		U	0.00157		U	0.00146		U	0.00148
PCB 104		U	0.00175		U	0.00131		U	0.00132
PCB 35		U	0.00138		U	0.00166		U	0.00168
PCB 44		U	0.00157		U	0.00146		U	0.00148
PCB 59		U	0.00157		U	0.00146		U	0.00148
PCB 37		U	0.00138		U	0.00166		U	0.00168
PCB 42		U	0.00157		U	0.00146		U	0.00148
PCB 71		U	0.00157		U	0.00146		U	0.00148
PCB 41/64		U	0.00157		U	0.00146		U	0.00148
PCB 40		U	0.00157		U	0.00146		U	0.00148
PCB 103		U	0.00175		U	0.00131		U	0.00132
PCB 67		U	0.00157		U	0.00146		U	0.00148

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BG01XA**			**LF2BG03XA**			**LF2BG04XA**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081106-MB			QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A111228.D			A121546.D			A121547.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			12/20/2008			12/20/2008		
Sample Volume (m^3)	0.529			0.538			0.516		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 100		U	0.00175		U	0.00131		U	0.00132
PCB 63		U	0.00157		U	0.00146		U	0.00148
PCB 74		U	0.00157		U	0.00146		U	0.00148
PCB 70		U	0.00157		U	0.00146		U	0.00148
PCB 66		U	0.00157		U	0.00146		U	0.00148
PCB 93/95		U	0.00175		U	0.00131		U	0.00132
PCB 91		U	0.00175		U	0.00131		U	0.00132
PCB 56/60		U	0.00157		U	0.00146		U	0.00148
PCB 92		U	0.00175		U	0.00131		U	0.00132
PCB 84		U	0.00175		U	0.00131		U	0.00132
PCB 90/101		U	0.00175		U	0.00131		U	0.00132
PCB 99		U	0.00175		U	0.00131		U	0.00132
PCB 119		U	0.00175		U	0.00131		U	0.00132
PCB 83		U	0.00175		U	0.00131		U	0.00132
PCB 97		U	0.00175		U	0.00131		U	0.00132
PCB 117		U	0.00175		U	0.00131		U	0.00132
PCB 81		U	0.00175		U	0.00131		U	0.00132
PCB 87/115		U	0.00157		U	0.00146		U	0.00148
PCB 85		U	0.00175		U	0.00131		U	0.00132
PCB 136		U	0.00193		U	0.00118		U	0.00120
PCB 77		U	0.00157		U	0.00146		U	0.00148
PCB 110		U	0.00175		U	0.00131		U	0.00132
PCB 154		U	0.00193		U	0.00118		U	0.00120
PCB 82		U	0.00175		U	0.00131		U	0.00132
PCB 151		U	0.00193		U	0.00118		U	0.00120
PCB 135/144		U	0.00193		U	0.00118		U	0.00120
PCB 124		U	0.00175		U	0.00131		U	0.00132
PCB 147		U	0.00193		U	0.00118		U	0.00120
PCB 107		U	0.00175		U	0.00131		U	0.00132
PCB 123		U	0.00175		U	0.00131		U	0.00132
PCB 149		U	0.00193		U	0.00118		U	0.00120
PCB 118		U	0.00175		U	0.00131		U	0.00132
PCB 134		U	0.00193		U	0.00118		U	0.00120
PCB 114		U	0.00175		U	0.00131		U	0.00132
PCB 131		U	0.00193		U	0.00118		U	0.00120
PCB 122		U	0.00175		U	0.00131		U	0.00132
PCB 165		U	0.00193		U	0.00118		U	0.00120
PCB 146		U	0.00193		U	0.00118		U	0.00120

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF2BG01XA			LF2BG03XA			LF2BG04XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081106-MB			QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A111228.D			A121546.D			A121547.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			12/20/2008			12/20/2008		
Sample Volume (m^3)	0.529			0.538			0.516		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 188		U	0.00212		U	0.00108		U	0.00109
PCB 153		U	0.00193		U	0.00118		U	0.00120
PCB 132		U	0.00193		U	0.00118		U	0.00120
PCB 105		U	0.00175		U	0.00131		U	0.00132
PCB 141		U	0.00193		U	0.00118		U	0.00120
PCB 179		U	0.00212		U	0.00108		U	0.00109
PCB 137		U	0.00193		U	0.00118		U	0.00120
PCB 176		U	0.00212		U	0.00108		U	0.00109
PCB 130		U	0.00193		U	0.00118		U	0.00120
PCB 138/163/164		U	0.00193		U	0.00118		U	0.00120
PCB 158		U	0.00193		U	0.00118		U	0.00120
PCB 129		U	0.00193		U	0.00118		U	0.00120
PCB 178		U	0.00212		U	0.00108		U	0.00109
PCB 175		U	0.00212		U	0.00108		U	0.00109
PCB 187		U	0.00212		U	0.00108		U	0.00109
PCB 183		U	0.00212		U	0.00108		U	0.00109
PCB 128		U	0.00193		U	0.00118		U	0.00120
PCB 167		U	0.00193		U	0.00118		U	0.00120
PCB 185		U	0.00212		U	0.00108		U	0.00109
PCB 174		U	0.00212		U	0.00108		U	0.00109
PCB 177		U	0.00212		U	0.00108		U	0.00109
PCB 202		U	0.00230		U	0.000994		U	0.00100
PCB 171		U	0.00212		U	0.00108		U	0.00109
PCB 156		U	0.00193		U	0.00118		U	0.00120
PCB 173		U	0.00212		U	0.00108		U	0.00109
PCB 157		U	0.00193		U	0.00118		U	0.00120
PCB 201		U	0.00230		U	0.000994		U	0.00100
PCB 172		U	0.00212		U	0.00108		U	0.00109
PCB 197		U	0.00230		U	0.000994		U	0.00100

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BG01XA**			**LF2BG03XA**			**LF2BG04XA**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081106-MB			QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082M			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A111228.D			A121546.D			A121547.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	10/22/2008			11/18/2008			11/18/2008		
Date Received:	10/29/2008			11/26/2008			11/26/2008		
Date Prepared:	11/6/2008			12/4/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	11/14/2008			12/20/2008			12/20/2008		
Sample Volume (m^3)	0.529			0.538			0.516		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1.00		
Analysis DF:	1.00			1.00			1.00		
Injection Volume (µl):	1.00			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 180		U	0.00212		U	0.00108		U	0.00109
PCB 193		U	0.00212		U	0.00108		U	0.00109
PCB 191		U	0.00212		U	0.00108		U	0.00109
PCB 200		U	0.00230		U	0.000994		U	0.00100
PCB 170		U	0.00212		U	0.00108		U	0.00109
PCB 190		U	0.00212		U	0.00108		U	0.00109
PCB 199		U	0.00230		U	0.000994		U	0.00100
PCB 196/203		U	0.00230		U	0.000994		U	0.00100
PCB 189		U	0.00212		U	0.00108		U	0.00109
PCB 208		U	0.00249		U	0.000921		U	0.000929
PCB 195		U	0.00230		U	0.000994		U	0.00100
PCB 207		U	0.00249		U	0.000921		U	0.000929
PCB 194		U	0.00230		U	0.000994		U	0.00100
PCB 205		U	0.00230		U	0.000994		U	0.00100
PCB 206		U	0.00249		U	0.000921		U	0.000929
PCB 209		U	0.00267		U	0.000857		U	0.000865
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	76			76			72		
Decachlorobiphenyl	72			84			80		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF2BL01XA**			**QC081105-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A121548.D			A111214.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/4/2008			11/5/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/20/2008			11/13/2008		
Sample Volume (m^3)	0.539			1.000		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00224		U	0.000567
PCB 2		U	0.00224		U	0.000567
PCB 3		U	0.00224		U	0.000567
PCB 4/10		U	0.00189		U	0.000671
PCB 7/9		U	0.00189		U	0.000671
PCB 6		U	0.00189		U	0.000671
PCB 8		U	0.00189		U	0.000671
PCB 5		U	0.00189		U	0.000671
PCB 19		U	0.00164		U	0.000774
PCB 12/13		U	0.00189		U	0.000671
PCB 18		U	0.00164		U	0.000774
PCB 17		U	0.00164		U	0.000774
PCB 15		U	0.00189		U	0.000671
PCB 24/27		U	0.00164		U	0.000774
PCB 16/32		U	0.00164		U	0.000774
PCB 34		U	0.00164		U	0.000774
PCB 29		U	0.00164		U	0.000774
PCB 54		U	0.00145		U	0.000878
PCB 26		U	0.00164		U	0.000774
PCB 25		U	0.00164		U	0.000774
PCB 31		U	0.00164		U	0.000774
PCB 50		U	0.00145		U	0.000878
PCB 28		U	0.00164		U	0.000774
PCB 20/33		U	0.00164		U	0.000774
PCB 53		U	0.00145		U	0.000878
PCB 51		U	0.00145		U	0.000878
PCB 22		U	0.00164		U	0.000774
PCB 45		U	0.00145		U	0.000878
PCB 46		U	0.00145		U	0.000878
PCB 69		U	0.00145		U	0.000878
PCB 52/73		U	0.00145		U	0.000878
PCB 49		U	0.00145		U	0.000878
PCB 47/48/75		U	0.00145		U	0.000878
PCB 104		U	0.00129		U	0.000981
PCB 35		U	0.00164		U	0.000774
PCB 44		U	0.00145		U	0.000878
PCB 59		U	0.00145		U	0.000878
PCB 37		U	0.00164		U	0.000774
PCB 42		U	0.00145		U	0.000878
PCB 71		U	0.00145		U	0.000878
PCB 41/64		U	0.00145		U	0.000878
PCB 40		U	0.00145		U	0.000878
PCB 103		U	0.00129		U	0.000981
PCB 67		U	0.00145		U	0.000878

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BL01XA**			**QC081105-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A121548.D			A111214.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/4/2008			11/5/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/20/2008			11/13/2008		
Sample Volume (m^3)	0.539			1.000		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 100		U	0.00129		U	0.000981
PCB 63		U	0.00145		U	0.000878
PCB 74		U	0.00145		U	0.000878
PCB 70		U	0.00145		U	0.000878
PCB 66		U	0.00145		U	0.000878
PCB 93/95		U	0.00129		U	0.000981
PCB 91		U	0.00129		U	0.000981
PCB 56/60		U	0.00145		U	0.000878
PCB 92		U	0.00129		U	0.000981
PCB 84		U	0.00129		U	0.000981
PCB 90/101		U	0.00129		U	0.000981
PCB 99		U	0.00129		U	0.000981
PCB 119		U	0.00129		U	0.000981
PCB 83		U	0.00129		U	0.000981
PCB 97		U	0.00129		U	0.000981
PCB 117		U	0.00129		U	0.000981
PCB 81		U	0.00129		U	0.000981
PCB 87/115		U	0.00145		U	0.000878
PCB 85		U	0.00129		U	0.000981
PCB 136		U	0.00117		U	0.00108
PCB 77		U	0.00145		U	0.000878
PCB 110		U	0.00129		U	0.000981
PCB 154		U	0.00117		U	0.00108
PCB 82		U	0.00129		U	0.000981
PCB 151		U	0.00117		U	0.00108
PCB 135/144		U	0.00117		U	0.00108
PCB 124		U	0.00129		U	0.000981
PCB 147		U	0.00117		U	0.00108
PCB 107		U	0.00129		U	0.000981
PCB 123		U	0.00129		U	0.000981
PCB 149		U	0.00117		U	0.00108
PCB 118		U	0.00129		U	0.000981
PCB 134		U	0.00117		U	0.00108
PCB 114		U	0.00129		U	0.000981
PCB 131		U	0.00117		U	0.00108
PCB 122		U	0.00129		U	0.000981
PCB 165		U	0.00117		U	0.00108
PCB 146		U	0.00117		U	0.00108

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF2BL01XA**			**QC081105-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A121548.D			A111214.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/4/2008			11/5/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/20/2008			11/13/2008		
Sample Volume (m^3)	0.539			1.000		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 188		U	0.00107		U	0.00119
PCB 153		U	0.00117		U	0.00108
PCB 132		U	0.00117		U	0.00108
PCB 105		U	0.00129		U	0.000981
PCB 141		U	0.00117		U	0.00108
PCB 179		U	0.00107		U	0.00119
PCB 137		U	0.00117		U	0.00108
PCB 176		U	0.00107		U	0.00119
PCB 130		U	0.00117		U	0.00108
PCB 138/163/164		U	0.00117		U	0.00108
PCB 158		U	0.00117		U	0.00108
PCB 129		U	0.00117		U	0.00108
PCB 178		U	0.00107		U	0.00119
PCB 175		U	0.00107		U	0.00119
PCB 187		U	0.00107		U	0.00119
PCB 183		U	0.00107		U	0.00119
PCB 128		U	0.00117		U	0.00108
PCB 167		U	0.00117		U	0.00108
PCB 185		U	0.00107		U	0.00119
PCB 174		U	0.00107		U	0.00119
PCB 177		U	0.00107		U	0.00119
PCB 202		U	0.000982		U	0.00129
PCB 171		U	0.00107		U	0.00119
PCB 156		U	0.00117		U	0.00108
PCB 173		U	0.00107		U	0.00119
PCB 157		U	0.00117		U	0.00108
PCB 201		U	0.000982		U	0.00129
PCB 172		U	0.00107		U	0.00119
PCB 197		U	0.000982		U	0.00129

Sample ID:	**LF2BL01XA**			**QC081105-MB**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081105-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A121548.D			A111214.D		
Operator:	ERL			ERL		
Date Sampled:	11/18/2008			NA		
Date Received:	11/26/2008			NA		
Date Prepared:	12/4/2008			11/5/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/20/2008			11/13/2008		
Sample Volume (m^3)	0.539			1.000		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 180		U	0.00107		U	0.00119
PCB 193		U	0.00107		U	0.00119
PCB 191		U	0.00107		U	0.00119
PCB 200		U	0.000982		U	0.00129
PCB 170		U	0.00107		U	0.00119
PCB 190		U	0.00107		U	0.00119
PCB 199		U	0.000982		U	0.00129
PCB 196/203		U	0.000982		U	0.00129
PCB 189		U	0.00107		U	0.00119
PCB 208		U	0.000909		U	0.00140
PCB 195		U	0.000982		U	0.00129
PCB 207		U	0.000909		U	0.00140
PCB 194		U	0.000982		U	0.00129
PCB 205		U	0.000982		U	0.00129
PCB 206		U	0.000909		U	0.00140
PCB 209		U	0.000847		U	0.00150
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	80			52		
Decachlorobiphenyl	112			116		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	QC081105-MBS2				QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes			XAD Tubes		
Preservation:	None				None			None		
Decanted:	None				None			None		
Batch QC:	QC081105-MB				QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540				EPA 3540			EPA 3540		
Cleanup Method(s):	NA				NA			NA		
Analysis Method:	EPA 8082M				EPA 8082M			EPA 8082		
Instrument:	AMX				AMX			AMX		
File ID:	A111215.D				A111223.D			A121525.D		
Operator:	ERL				ERL			ERL		
Date Sampled:	NA				NA			NA		
Date Received:	NA				NA			NA		
Date Prepared:	11/5/2008				11/06/08			12/4/2008		
Date Cleanup:	NA				NA			NA		
Date Analyzed:	11/13/2008				11/14/08			12/18/2008		
Sample Volume (m^3)	1.000				0.500			0.402		
Percent Solid:	NA				NA			NA		
Prep DF:	1.000				1.00			1.00		
Analysis DF:	1.000				1.00			1.00		
Injection Volume (µl):	1.000				1.00			1.00		
Extract Volume (µl):	2000.000				2000			2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:										
PCB 1		U	0.000567			U	0.00113		U	0.00296
PCB 2		U	0.000567			U	0.00113		U	0.00296
PCB 3		U	0.000567			U	0.00113		U	0.00296
PCB 4/10		U	0.000671			U	0.00134		U	0.00250
PCB 7/9		U	0.000671			U	0.00134		U	0.00250
PCB 6		U	0.000671			U	0.00134		U	0.00250
PCB 8		U	0.000671			U	0.00134		U	0.00250
PCB 5		U	0.000671			U	0.00134		U	0.00250
PCB 19		U	0.000774			U	0.00155		U	0.00217
PCB 12/13		U	0.000671			U	0.00134		U	0.00250
PCB 18		U	0.000774			U	0.00155		U	0.00217
PCB 17		U	0.000774			U	0.00155		U	0.00217
PCB 15		U	0.000671			U	0.00134		U	0.00250
PCB 24/27		U	0.000774			U	0.00155		U	0.00217
PCB 16/32		U	0.000774			U	0.00155		U	0.00217
PCB 34		U	0.000774			U	0.00155		U	0.00217
PCB 29		U	0.000774			U	0.00155		U	0.00217
PCB 54		U	0.000878			U	0.00176		U	0.00191
PCB 26		U	0.000774			U	0.00155		U	0.00217
PCB 25		U	0.000774			U	0.00155		U	0.00217
PCB 31		U	0.000774			U	0.00155		U	0.00217
PCB 50		U	0.000878			U	0.00176		U	0.00191
PCB 28		U	0.000774			U	0.00155		U	0.00217
PCB 20/33	0.00248		0.000774	16		U	0.00155		U	0.00217
PCB 53	0.00316		0.000878	18		U	0.00176		U	0.00191
PCB 51		U	0.000878			U	0.00176		U	0.00191
PCB 22		U	0.000774			U	0.00155		U	0.00217
PCB 45		U	0.000878			U	0.00176		U	0.00191
PCB 46		U	0.000878			U	0.00176		U	0.00191
PCB 69		U	0.000878			U	0.00176		U	0.00191
PCB 52/73		U	0.000878			U	0.00176		U	0.00191
PCB 49		U	0.000878			U	0.00176		U	0.00191
PCB 47/48/75		U	0.000878			U	0.00176		U	0.00191
PCB 104		U	0.000981			U	0.00196		U	0.00171
PCB 35		U	0.000774			U	0.00155		U	0.00217
PCB 44		U	0.000878			U	0.00176		U	0.00191
PCB 59		U	0.000878			U	0.00176		U	0.00191
PCB 37		U	0.000774			U	0.00155		U	0.00217
PCB 42		U	0.000878			U	0.00176		U	0.00191
PCB 71		U	0.000878			U	0.00176		U	0.00191
PCB 41/64		U	0.000878			U	0.00176		U	0.00191
PCB 40		U	0.000878			U	0.00176		U	0.00191
PCB 103		U	0.000981			U	0.00196		U	0.00171
PCB 67		U	0.000878			U	0.00176		U	0.00191

Sample ID:	QC081105-MBS2				QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes			XAD Tubes		
Preservation:	None				None			None		
Decanted:	None				None			None		
Batch QC:	QC081105-MB				QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540				EPA 3540			EPA 3540		
Cleanup Method(s):	NA				NA			NA		
Analysis Method:	EPA 8082M				EPA 8082M			EPA 8082		
Instrument:	AMX				AMX			AMX		
File ID:	A111215.D				A111223.D			A121525.D		
Operator:	ERL				ERL			ERL		
Date Sampled:	NA				NA			NA		
Date Received:	NA				NA			NA		
Date Prepared:	11/5/2008				11/06/08			12/4/2008		
Date Cleanup:	NA				NA			NA		
Date Analyzed:	11/13/2008				11/14/08			12/18/2008		
Sample Volume (m^3)	1.000				0.500			0.402		
Percent Solid:	NA				NA			NA		
Prep DF:	1.000				1.00			1.00		
Analysis DF:	1.000				1.00			1.00		
Injection Volume (µl):	1.000				1.00			1.00		
Extract Volume (µl):	2000.000				2000			2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 100		U	0.000981			U	0.00196		U	0.00171
PCB 63		U	0.000878			U	0.00176		U	0.00191
PCB 74		U	0.000878			U	0.00176		U	0.00191
PCB 70		U	0.000878			U	0.00176		U	0.00191
PCB 66		U	0.000878			U	0.00176		U	0.00191
PCB 93/95		U	0.000981			U	0.00196		U	0.00171
PCB 91		U	0.000981			U	0.00196		U	0.00171
PCB 56/60		U	0.000878			U	0.00176		U	0.00191
PCB 92		U	0.000981			U	0.00196		U	0.00171
PCB 84		U	0.000981			U	0.00196		U	0.00171
PCB 90/101		U	0.000981			U	0.00196		U	0.00171
PCB 99		U	0.000981			U	0.00196		U	0.00171
PCB 119		U	0.000981			U	0.00196		U	0.00171
PCB 83		U	0.000981			U	0.00196		U	0.00171
PCB 97		U	0.000981			U	0.00196		U	0.00171
PCB 117	0.00314		0.000981	16		U	0.00196		U	0.00171
PCB 81		U	0.000981			U	0.00196		U	0.00171
PCB 87/115		U	0.000878			U	0.00176		U	0.00191
PCB 85		U	0.000981			U	0.00196		U	0.00171
PCB 136		U	0.00108			U	0.00217		U	0.00155
PCB 77	0.00263		0.000878	15		U	0.00176		U	0.00191
PCB 110	0.00294		0.000981	15		U	0.00196		U	0.00171
PCB 154		U	0.00108			U	0.00217		U	0.00155
PCB 82		U	0.000981			U	0.00196		U	0.00171
PCB 151		U	0.00108			U	0.00217		U	0.00155
PCB 135/144		U	0.00108			U	0.00217		U	0.00155
PCB 124		U	0.000981			U	0.00196		U	0.00171
PCB 147		U	0.00108			U	0.00217		U	0.00155
PCB 107		U	0.000981			U	0.00196		U	0.00171
PCB 123	0.00314		0.000981	16		U	0.00196		U	0.00171
PCB 149		U	0.00108			U	0.00217		U	0.00155
PCB 118	0.00294		0.000981	15		U	0.00196		U	0.00171
PCB 134		U	0.00108			U	0.00217		U	0.00155
PCB 114	0.00255		0.000981	13		U	0.00196		U	0.00171
PCB 131		U	0.00108			U	0.00217		U	0.00155
PCB 122		U	0.000981			U	0.00196		U	0.00171
PCB 165		U	0.00108			U	0.00217		U	0.00155
PCB 146		U	0.00108			U	0.00217		U	0.00155

Sample ID:	QC081105-MBS2				QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes				XAD Tubes			XAD Tubes		
Preservation:	None				None			None		
Decanted:	None				None			None		
Batch QC:	QC081105-MB				QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540				EPA 3540			EPA 3540		
Cleanup Method(s):	NA				NA			NA		
Analysis Method:	EPA 8082M				EPA 8082M			EPA 8082		
Instrument:	AMX				AMX			AMX		
File ID:	A111215.D				A111223.D			A121525.D		
Operator:	ERL				ERL			ERL		
Date Sampled:	NA				NA			NA		
Date Received:	NA				NA			NA		
Date Prepared:	11/5/2008				11/06/08			12/4/2008		
Date Cleanup:	NA				NA			NA		
Date Analyzed:	11/13/2008				11/14/08			12/18/2008		
Sample Volume (m^3)	1.000				0.500			0.402		
Percent Solid:	NA				NA			NA		
Prep DF:	1.000				1.00			1.00		
Analysis DF:	1.000				1.00			1.00		
Injection Volume (µl):	1.000				1.00			1.00		
Extract Volume (µl):	2000.000				2000			2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 188		U	0.00119			U	0.00238		U	0.00141
PCB 153		U	0.00108			U	0.00217		U	0.00155
PCB 132		U	0.00108			U	0.00217		U	0.00155
PCB 105	0.00235		0.000981	12		U	0.00196		U	0.00171
PCB 141		U	0.00108			U	0.00217		U	0.00155
PCB 179		U	0.00119			U	0.00238		U	0.00141
PCB 137		U	0.00108			U	0.00217		U	0.00155
PCB 176		U	0.00119			U	0.00238		U	0.00141
PCB 130		U	0.00108			U	0.00217		U	0.00155
PCB 138/163/164		U	0.00108			U	0.00217		U	0.00155
PCB 158		U	0.00108			U	0.00217		U	0.00155
PCB 129		U	0.00108			U	0.00217		U	0.00155
PCB 178		U	0.00119			U	0.00238		U	0.00141
PCB 175		U	0.00119			U	0.00238		U	0.00141
PCB 187		U	0.00119			U	0.00238		U	0.00141
PCB 183		U	0.00119			U	0.00238		U	0.00141
PCB 128		U	0.00108			U	0.00217		U	0.00155
PCB 167		U	0.00108			U	0.00217		U	0.00155
PCB 185		U	0.00119			U	0.00238		U	0.00141
PCB 174		U	0.00119			U	0.00238		U	0.00141
PCB 177		U	0.00119			U	0.00238		U	0.00141
PCB 202		U	0.00129			U	0.00258		U	0.00130
PCB 171		U	0.00119			U	0.00238		U	0.00141
PCB 156	0.00325		0.00108	15		U	0.00217		U	0.00155
PCB 173		U	0.00119			U	0.00238		U	0.00141
PCB 157	0.00347		0.00108	16		U	0.00217		U	0.00155
PCB 201		U	0.00129			U	0.00258		U	0.00130
PCB 172		U	0.00119			U	0.00238		U	0.00141
PCB 197		U	0.00129			U	0.00258		U	0.00130

Sample ID:	**QC081105-MBS2**				**QC081106-MB**			**QC081204-MB**		
Matrix:	XAD Tubes				XAD Tubes			XAD Tubes		
Preservation:	None				None			None		
Decanted:	None				None			None		
Batch QC:	QC081105-MB				QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540				EPA 3540			EPA 3540		
Cleanup Method(s):	NA				NA			NA		
Analysis Method:	EPA 8082M				EPA 8082M			EPA 8082		
Instrument:	AMX				AMX			AMX		
File ID:	A111215.D				A111223.D			A121525.D		
Operator:	ERL				ERL			ERL		
Date Sampled:	NA				NA			NA		
Date Received:	NA				NA			NA		
Date Prepared:	11/5/2008				11/06/08			12/4/2008		
Date Cleanup:	NA				NA			NA		
Date Analyzed:	11/13/2008				11/14/08			12/18/2008		
Sample Volume (m^3)	1.000				0.500			0.402		
Percent Solid:	NA				NA			NA		
Prep DF:	1.000				1.00			1.00		
Analysis DF:	1.000				1.00			1.00		
Injection Volume (µl):	1.000				1.00			1.00		
Extract Volume (µl):	2000.000				2000			2000		
Units	Concentration (ppbv)	Q	EDL	% Recovery	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 180		U	0.00119			U	0.00238		U	0.00141
PCB 193		U	0.00119			U	0.00238		U	0.00141
PCB 191		U	0.00119			U	0.00238		U	0.00141
PCB 200		U	0.00129			U	0.00258		U	0.00130
PCB 170	0.00380		0.00119	16		U	0.00238		U	0.00141
PCB 190		U	0.00119			U	0.00238		U	0.00141
PCB 199		U	0.00129			U	0.00258		U	0.00130
PCB 196/203		U	0.00129			U	0.00258		U	0.00130
PCB 189	0.00356		0.00119	15		U	0.00238		U	0.00141
PCB 208		U	0.00140			U	0.00279		U	0.00120
PCB 195		U	0.00129			U	0.00258		U	0.00130
PCB 207		U	0.00140			U	0.00279		U	0.00120
PCB 194		U	0.00129			U	0.00258		U	0.00130
PCB 205		U	0.00129			U	0.00258		U	0.00130
PCB 206		U	0.00140			U	0.00279		U	0.00120
PCB 209		U	0.00150			U	0.00300		U	0.00112
Extraction Surrogate Recoveries (%)										
Tetrachloro-m-xylene	16				44			72		
Decachlorobiphenyl	20				76			116		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111229.D			A111230.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00107		U	0.00104
PCB 2		U	0.00107		U	0.00104
PCB 3		U	0.00107		U	0.00104
PCB 4/10		U	0.00126		U	0.00123
PCB 7/9		U	0.00126		U	0.00123
PCB 6		U	0.00126		U	0.00123
PCB 8		U	0.00126		U	0.00123
PCB 5		U	0.00126		U	0.00123
PCB 19		U	0.00146		U	0.00142
PCB 12/13		U	0.00126		U	0.00123
PCB 18		U	0.00146		U	0.00142
PCB 17		U	0.00146		U	0.00142
PCB 15		U	0.00126		U	0.00123
PCB 24/27		U	0.00146		U	0.00142
PCB 16/32		U	0.00146		U	0.00142
PCB 34		U	0.00146		U	0.00142
PCB 29		U	0.00146		U	0.00142
PCB 54		U	0.00165		U	0.00161
PCB 26		U	0.00146		U	0.00142
PCB 25		U	0.00146		U	0.00142
PCB 31		U	0.00146		U	0.00142
PCB 50		U	0.00165		U	0.00161
PCB 28		U	0.00146		U	0.00142
PCB 20/33		U	0.00146		U	0.00142
PCB 53		U	0.00165		U	0.00161
PCB 51		U	0.00165		U	0.00161
PCB 22		U	0.00146		U	0.00142
PCB 45		U	0.00165		U	0.00161
PCB 46		U	0.00165		U	0.00161
PCB 69		U	0.00165		U	0.00161
PCB 52/73		U	0.00165		U	0.00161
PCB 49		U	0.00165		U	0.00161
PCB 47/48/75		U	0.00165		U	0.00161
PCB 104		U	0.00185		U	0.00180
PCB 35		U	0.00146		U	0.00142
PCB 44		U	0.00165		U	0.00161
PCB 59		U	0.00165		U	0.00161
PCB 37		U	0.00146		U	0.00142
PCB 42		U	0.00165		U	0.00161
PCB 71		U	0.00165		U	0.00161
PCB 41/64		U	0.00165		U	0.00161
PCB 40		U	0.00165		U	0.00161

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111229.D			A111230.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 103		U	0.00185		U	0.00180
PCB 67		U	0.00165		U	0.00161
PCB 100		U	0.00185		U	0.00180
PCB 63		U	0.00165		U	0.00161
PCB 74		U	0.00165		U	0.00161
PCB 70		U	0.00165		U	0.00161
PCB 66		U	0.00165		U	0.00161
PCB 93/95		U	0.00185		U	0.00180
PCB 91		U	0.00185		U	0.00180
PCB 56/60		U	0.00165		U	0.00161
PCB 92		U	0.00185		U	0.00180
PCB 84		U	0.00185		U	0.00180
PCB 90/101		U	0.00185		U	0.00180
PCB 99		U	0.00185		U	0.00180
PCB 119		U	0.00185		U	0.00180
PCB 83		U	0.00185		U	0.00180
PCB 97		U	0.00185		U	0.00180
PCB 117		U	0.00185		U	0.00180
PCB 81		U	0.00185		U	0.00180
PCB 87/115		U	0.00165		U	0.00161
PCB 85		U	0.00185		U	0.00180
PCB 136		U	0.00204		U	0.00199
PCB 77		U	0.00165		U	0.00161
PCB 110		U	0.00185		U	0.00180
PCB 154		U	0.00204		U	0.00199
PCB 82		U	0.00185		U	0.00180
PCB 151		U	0.00204		U	0.00199
PCB 135/144		U	0.00204		U	0.00199
PCB 124		U	0.00185		U	0.00180
PCB 147		U	0.00204		U	0.00199
PCB 107		U	0.00185		U	0.00180
PCB 123		U	0.00185		U	0.00180
PCB 149		U	0.00204		U	0.00199
PCB 118		U	0.00185		U	0.00180
PCB 134		U	0.00204		U	0.00199
PCB 114		U	0.00185		U	0.00180
PCB 131		U	0.00204		U	0.00199
PCB 122		U	0.00185		U	0.00180
PCB 165		U	0.00204		U	0.00199
PCB 146		U	0.00204		U	0.00199
PCB 188		U	0.00223		U	0.00218
PCB 153		U	0.00204		U	0.00199
PCB 132		U	0.00204		U	0.00199

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111229.D			A111230.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 105		U	0.00185		U	0.00180
PCB 141		U	0.00204		U	0.00199
PCB 179		U	0.00223		U	0.00218
PCB 137		U	0.00204		U	0.00199
PCB 176		U	0.00223		U	0.00218
PCB 130		U	0.00204		U	0.00199
PCB 138/163/164		U	0.00204		U	0.00199
PCB 158		U	0.00204		U	0.00199
PCB 129		U	0.00204		U	0.00199
PCB 178		U	0.00223		U	0.00218
PCB 175		U	0.00223		U	0.00218
PCB 187		U	0.00223		U	0.00218
PCB 183		U	0.00223		U	0.00218
PCB 128		U	0.00204		U	0.00199
PCB 167		U	0.00204		U	0.00199
PCB 185		U	0.00223		U	0.00218
PCB 174		U	0.00223		U	0.00218
PCB 177		U	0.00223		U	0.00218
PCB 202		U	0.00243		U	0.00237
PCB 171		U	0.00223		U	0.00218
PCB 156		U	0.00204		U	0.00199
PCB 173		U	0.00223		U	0.00218
PCB 157		U	0.00204		U	0.00199
PCB 201		U	0.00243		U	0.00237
PCB 172		U	0.00223		U	0.00218
PCB 197		U	0.00243		U	0.00237
PCB 180		U	0.00223		U	0.00218
PCB 193		U	0.00223		U	0.00218
PCB 191		U	0.00223		U	0.00218
PCB 200		U	0.00243		U	0.00237
PCB 170		U	0.00223		U	0.00218
PCB 190		U	0.00223		U	0.00218
PCB 199		U	0.00243		U	0.00237
PCB 196/203		U	0.00243		U	0.00237
PCB 189		U	0.00223		U	0.00218
PCB 208		U	0.00262		U	0.00256
PCB 195		U	0.00243		U	0.00237
PCB 207		U	0.00262		U	0.00256
PCB 194		U	0.00243		U	0.00237
PCB 205		U	0.00243		U	0.00237
PCB 206		U	0.00262		U	0.00256
PCB 209		U	0.00282		U	0.00275

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF3BM01XA**			**LF3BM02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111229.D			A111230.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/14/2008			11/14/2008		
Sample Volume (m^3)	0.507			0.506		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	76			76		
Decachlorobiphenyl	216			228		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121534.D			A121535.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00244		U	0.00239
PCB 2		U	0.00244		U	0.00239
PCB 3		U	0.00244		U	0.00239
PCB 4/10		U	0.00207		U	0.00202
PCB 7/9		U	0.00207		U	0.00202
PCB 6		U	0.00207		U	0.00202
PCB 8		U	0.00207		U	0.00202
PCB 5		U	0.00207		U	0.00202
PCB 19		U	0.00179		U	0.00175
PCB 12/13		U	0.00207		U	0.00202
PCB 18		U	0.00179		U	0.00175
PCB 17		U	0.00179		U	0.00175
PCB 15		U	0.00207		U	0.00202
PCB 24/27		U	0.00179		U	0.00175
PCB 16/32		U	0.00179		U	0.00175
PCB 34		U	0.00179		U	0.00175
PCB 29		U	0.00179		U	0.00175
PCB 54		U	0.00158		U	0.00154
PCB 26		U	0.00179		U	0.00175
PCB 25		U	0.00179		U	0.00175
PCB 31		U	0.00179		U	0.00175
PCB 50		U	0.00158		U	0.00154
PCB 28		U	0.00179		U	0.00175
PCB 20/33		U	0.00179		U	0.00175
PCB 53		U	0.00158		U	0.00154
PCB 51		U	0.00158		U	0.00154
PCB 22		U	0.00179		U	0.00175
PCB 45		U	0.00158		U	0.00154
PCB 46		U	0.00158		U	0.00154
PCB 69		U	0.00158		U	0.00154
PCB 52/73		U	0.00158		U	0.00154
PCB 49		U	0.00158		U	0.00154
PCB 47/48/75		U	0.00158		U	0.00154
PCB 104		U	0.00141		U	0.00138
PCB 35		U	0.00179		U	0.00175
PCB 44		U	0.00158		U	0.00154
PCB 59		U	0.00158		U	0.00154
PCB 37		U	0.00179		U	0.00175
PCB 42		U	0.00158		U	0.00154
PCB 71		U	0.00158		U	0.00154
PCB 41/64		U	0.00158		U	0.00154
PCB 40		U	0.00158		U	0.00154

Sample ID:	LF3BM03XA			LF3BM04XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121534.D			A121535.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 103		U	0.00141		U	0.00138
PCB 67		U	0.00158		U	0.00154
PCB 100		U	0.00141		U	0.00138
PCB 63		U	0.00158		U	0.00154
PCB 74		U	0.00158		U	0.00154
PCB 70		U	0.00158		U	0.00154
PCB 66		U	0.00158		U	0.00154
PCB 93/95		U	0.00141		U	0.00138
PCB 91		U	0.00141		U	0.00138
PCB 56/60		U	0.00158		U	0.00154
PCB 92		U	0.00141		U	0.00138
PCB 84		U	0.00141		U	0.00138
PCB 90/101		U	0.00141		U	0.00138
PCB 99		U	0.00141		U	0.00138
PCB 119		U	0.00141		U	0.00138
PCB 83		U	0.00141		U	0.00138
PCB 97		U	0.00141		U	0.00138
PCB 117		U	0.00141		U	0.00138
PCB 81		U	0.00141		U	0.00138
PCB 87/115		U	0.00158		U	0.00154
PCB 85		U	0.00141		U	0.00138
PCB 136		U	0.00128		U	0.00125
PCB 77		U	0.00158		U	0.00154
PCB 110		U	0.00141		U	0.00138
PCB 154		U	0.00128		U	0.00125
PCB 82		U	0.00141		U	0.00138
PCB 151		U	0.00128		U	0.00125
PCB 135/144		U	0.00128		U	0.00125
PCB 124		U	0.00141		U	0.00138
PCB 147		U	0.00128		U	0.00125
PCB 107		U	0.00141		U	0.00138
PCB 123		U	0.00141		U	0.00138
PCB 149		U	0.00128		U	0.00125
PCB 118		U	0.00141		U	0.00138
PCB 134		U	0.00128		U	0.00125
PCB 114		U	0.00141		U	0.00138
PCB 131		U	0.00128		U	0.00125
PCB 122		U	0.00141		U	0.00138
PCB 165		U	0.00128		U	0.00125
PCB 146		U	0.00128		U	0.00125
PCB 188		U	0.00117		U	0.00114
PCB 153		U	0.00128		U	0.00125
PCB 132		U	0.00128		U	0.00125

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121534.D			A121535.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 105		U	0.00141		U	0.00138
PCB 141		U	0.00128		U	0.00125
PCB 179		U	0.00117		U	0.00114
PCB 137		U	0.00128		U	0.00125
PCB 176		U	0.00117		U	0.00114
PCB 130		U	0.00128		U	0.00125
PCB 138/163/164		U	0.00128		U	0.00125
PCB 158		U	0.00128		U	0.00125
PCB 129		U	0.00128		U	0.00125
PCB 178		U	0.00117		U	0.00114
PCB 175		U	0.00117		U	0.00114
PCB 187		U	0.00117		U	0.00114
PCB 183		U	0.00117		U	0.00114
PCB 128		U	0.00128		U	0.00125
PCB 167		U	0.00128		U	0.00125
PCB 185		U	0.00117		U	0.00114
PCB 174		U	0.00117		U	0.00114
PCB 177		U	0.00117		U	0.00114
PCB 202		U	0.00107		U	0.00105
PCB 171		U	0.00117		U	0.00114
PCB 156		U	0.00128		U	0.00125
PCB 173		U	0.00117		U	0.00114
PCB 157		U	0.00128		U	0.00125
PCB 201		U	0.00107		U	0.00105
PCB 172		U	0.00117		U	0.00114
PCB 197		U	0.00107		U	0.00105
PCB 180		U	0.00117		U	0.00114
PCB 193		U	0.00117		U	0.00114
PCB 191		U	0.00117		U	0.00114
PCB 200		U	0.00107		U	0.00105
PCB 170		U	0.00117		U	0.00114
PCB 190		U	0.00117		U	0.00114
PCB 199		U	0.00107		U	0.00105
PCB 196/203		U	0.00107		U	0.00105
PCB 189		U	0.00117		U	0.00114
PCB 208		U	0.000993		U	0.000971
PCB 195		U	0.00107		U	0.00105
PCB 207		U	0.000993		U	0.000971
PCB 194		U	0.00107		U	0.00105
PCB 205		U	0.00107		U	0.00105
PCB 206		U	0.000993		U	0.000971
PCB 209		U	0.000924		U	0.000904

Sample ID:	**LF3BM03XA**			**LF3BM04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121534.D			A121535.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.488			0.495		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	56			64		
Decachlorobiphenyl	88			108		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00107		U	0.00118
PCB 2		U	0.00107		U	0.00118
PCB 3		U	0.00107		U	0.00118
PCB 4/10		U	0.00127		U	0.00140
PCB 7/9		U	0.00127		U	0.00140
PCB 6		U	0.00127		U	0.00140
PCB 8		U	0.00127		U	0.00140
PCB 5		U	0.00127		U	0.00140
PCB 19		U	0.00147		U	0.00161
PCB 12/13		U	0.00127		U	0.00140
PCB 18		U	0.00147		U	0.00161
PCB 17		U	0.00147		U	0.00161
PCB 15		U	0.00127		U	0.00140
PCB 24/27		U	0.00147		U	0.00161
PCB 16/32		U	0.00147		U	0.00161
PCB 34		U	0.00147		U	0.00161
PCB 29		U	0.00147		U	0.00161
PCB 54		U	0.00166		U	0.00183
PCB 26		U	0.00147		U	0.00161
PCB 25		U	0.00147		U	0.00161
PCB 31		U	0.00147		U	0.00161
PCB 50		U	0.00166		U	0.00183
PCB 28		U	0.00147		U	0.00161
PCB 20/33		U	0.00147		U	0.00161
PCB 53		U	0.00166		U	0.00183
PCB 51		U	0.00166		U	0.00183
PCB 22		U	0.00147		U	0.00161
PCB 45		U	0.00166		U	0.00183
PCB 46		U	0.00166		U	0.00183
PCB 69		U	0.00166		U	0.00183
PCB 52/73		U	0.00166		U	0.00183
PCB 49		U	0.00166		U	0.00183
PCB 47/48/75		U	0.00166		U	0.00183
PCB 104		U	0.00186		U	0.00204
PCB 35		U	0.00147		U	0.00161
PCB 44		U	0.00166		U	0.00183
PCB 59		U	0.00166		U	0.00183
PCB 37		U	0.00147		U	0.00161
PCB 42		U	0.00166		U	0.00183
PCB 71		U	0.00166		U	0.00183
PCB 41/64		U	0.00166		U	0.00183
PCB 40		U	0.00166		U	0.00183

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 103		U	0.00186		U	0.00204
PCB 67		U	0.00166		U	0.00183
PCB 100		U	0.00186		U	0.00204
PCB 63		U	0.00166		U	0.00183
PCB 74		U	0.00166		U	0.00183
PCB 70		U	0.00166		U	0.00183
PCB 66		U	0.00166		U	0.00183
PCB 93/95		U	0.00186		U	0.00204
PCB 91		U	0.00186		U	0.00204
PCB 56/60		U	0.00166		U	0.00183
PCB 92		U	0.00186		U	0.00204
PCB 84		U	0.00186		U	0.00204
PCB 90/101		U	0.00186		U	0.00204
PCB 99		U	0.00186		U	0.00204
PCB 119		U	0.00186		U	0.00204
PCB 83		U	0.00186		U	0.00204
PCB 97		U	0.00186		U	0.00204
PCB 117		U	0.00186		U	0.00204
PCB 81		U	0.00186		U	0.00204
PCB 87/115		U	0.00166		U	0.00183
PCB 85		U	0.00186		U	0.00204
PCB 136		U	0.00205		U	0.00226
PCB 77		U	0.00166		U	0.00183
PCB 110		U	0.00186		U	0.00204
PCB 154		U	0.00205		U	0.00226
PCB 82		U	0.00186		U	0.00204
PCB 151		U	0.00205		U	0.00226
PCB 135/144		U	0.00205		U	0.00226
PCB 124		U	0.00186		U	0.00204
PCB 147		U	0.00205		U	0.00226
PCB 107		U	0.00186		U	0.00204
PCB 123		U	0.00186		U	0.00204
PCB 149		U	0.00205		U	0.00226
PCB 118		U	0.00186		U	0.00204
PCB 134		U	0.00205		U	0.00226
PCB 114		U	0.00186		U	0.00204
PCB 131		U	0.00205		U	0.00226
PCB 122		U	0.00186		U	0.00204
PCB 165		U	0.00205		U	0.00226
PCB 146		U	0.00205		U	0.00226
PCB 188		U	0.00225		U	0.00248
PCB 153		U	0.00205		U	0.00226
PCB 132		U	0.00205		U	0.00226

Sample ID:	LF3BG01XA			LF3BG02XA		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 105		U	0.00186		U	0.00204
PCB 141		U	0.00205		U	0.00226
PCB 179		U	0.00225		U	0.00248
PCB 137		U	0.00205		U	0.00226
PCB 176		U	0.00225		U	0.00248
PCB 130		U	0.00205		U	0.00226
PCB 138/163/164		U	0.00205		U	0.00226
PCB 158		U	0.00205		U	0.00226
PCB 129		U	0.00205		U	0.00226
PCB 178		U	0.00225		U	0.00248
PCB 175		U	0.00225		U	0.00248
PCB 187		U	0.00225		U	0.00248
PCB 183		U	0.00225		U	0.00248
PCB 128		U	0.00205		U	0.00226
PCB 167		U	0.00205		U	0.00226
PCB 185		U	0.00225		U	0.00248
PCB 174		U	0.00225		U	0.00248
PCB 177		U	0.00225		U	0.00248
PCB 202		U	0.00245		U	0.00269
PCB 171		U	0.00225		U	0.00248
PCB 156		U	0.00205		U	0.00226
PCB 173		U	0.00225		U	0.00248
PCB 157		U	0.00205		U	0.00226
PCB 201		U	0.00245		U	0.00269
PCB 172		U	0.00225		U	0.00248
PCB 197		U	0.00245		U	0.00269
PCB 180		U	0.00225		U	0.00248
PCB 193		U	0.00225		U	0.00248
PCB 191		U	0.00225		U	0.00248
PCB 200		U	0.00245		U	0.00269
PCB 170		U	0.00225		U	0.00248
PCB 190		U	0.00225		U	0.00248
PCB 199		U	0.00245		U	0.00269
PCB 196/203		U	0.00245		U	0.00269
PCB 189		U	0.00225		U	0.00248
PCB 208		U	0.00264		U	0.00291
PCB 195		U	0.00245		U	0.00269
PCB 207		U	0.00264		U	0.00291
PCB 194		U	0.00245		U	0.00269
PCB 205		U	0.00245		U	0.00269
PCB 206		U	0.00264		U	0.00291
PCB 209		U	0.00284		U	0.00312

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF3BG01XA**			**LF3BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081106-MB			QC081106-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082M			EPA 8082M		
Instrument:	AMX			AMX		
File ID:	A111231.D			A111232.D		
Operator:	ERL			ERL		
Date Sampled:	10/23/2008			10/23/2008		
Date Received:	10/29/2008			10/29/2008		
Date Prepared:	11/6/2008			11/6/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	11/15/2008			11/15/2008		
Sample Volume (m^3)	0.503			0.450		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	64			80		
Decachlorobiphenyl	152			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00239		U	0.00241
PCB 2		U	0.00239		U	0.00241
PCB 3		U	0.00239		U	0.00241
PCB 4/10		U	0.00202		U	0.00203
PCB 7/9		U	0.00202		U	0.00203
PCB 6		U	0.00202		U	0.00203
PCB 8		U	0.00202		U	0.00203
PCB 5		U	0.00202		U	0.00203
PCB 19		U	0.00175		U	0.00176
PCB 12/13		U	0.00202		U	0.00203
PCB 18		U	0.00175		U	0.00176
PCB 17		U	0.00175		U	0.00176
PCB 15		U	0.00202		U	0.00203
PCB 24/27		U	0.00175		U	0.00176
PCB 16/32		U	0.00175		U	0.00176
PCB 34		U	0.00175		U	0.00176
PCB 29		U	0.00175		U	0.00176
PCB 54		U	0.00154		U	0.00155
PCB 26		U	0.00175		U	0.00176
PCB 25		U	0.00175		U	0.00176
PCB 31		U	0.00175		U	0.00176
PCB 50		U	0.00154		U	0.00155
PCB 28		U	0.00175		U	0.00176
PCB 20/33		U	0.00175		U	0.00176
PCB 53		U	0.00154		U	0.00155
PCB 51		U	0.00154		U	0.00155
PCB 22		U	0.00175		U	0.00176
PCB 45		U	0.00154		U	0.00155
PCB 46		U	0.00154		U	0.00155
PCB 69		U	0.00154		U	0.00155
PCB 52/73		U	0.00154		U	0.00155
PCB 49		U	0.00154		U	0.00155
PCB 47/48/75		U	0.00154		U	0.00155
PCB 104		U	0.00138		U	0.00139
PCB 35		U	0.00175		U	0.00176
PCB 44		U	0.00154		U	0.00155
PCB 59		U	0.00154		U	0.00155
PCB 37		U	0.00175		U	0.00176
PCB 42		U	0.00154		U	0.00155
PCB 71		U	0.00154		U	0.00155
PCB 41/64		U	0.00154		U	0.00155
PCB 40		U	0.00154		U	0.00155

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 103		U	0.00138		U	0.00139
PCB 67		U	0.00154		U	0.00155
PCB 100		U	0.00138		U	0.00139
PCB 63		U	0.00154		U	0.00155
PCB 74		U	0.00154		U	0.00155
PCB 70		U	0.00154		U	0.00155
PCB 66		U	0.00154		U	0.00155
PCB 93/95		U	0.00138		U	0.00139
PCB 91		U	0.00138		U	0.00139
PCB 56/60		U	0.00154		U	0.00155
PCB 92		U	0.00138		U	0.00139
PCB 84		U	0.00138		U	0.00139
PCB 90/101		U	0.00138		U	0.00139
PCB 99		U	0.00138		U	0.00139
PCB 119		U	0.00138		U	0.00139
PCB 83		U	0.00138		U	0.00139
PCB 97		U	0.00138		U	0.00139
PCB 117		U	0.00138		U	0.00139
PCB 81		U	0.00138		U	0.00139
PCB 87/115		U	0.00154		U	0.00155
PCB 85		U	0.00138		U	0.00139
PCB 136		U	0.00125		U	0.00126
PCB 77		U	0.00154		U	0.00155
PCB 110		U	0.00138		U	0.00139
PCB 154		U	0.00125		U	0.00126
PCB 82		U	0.00138		U	0.00139
PCB 151		U	0.00125		U	0.00126
PCB 135/144		U	0.00125		U	0.00126
PCB 124		U	0.00138		U	0.00139
PCB 147		U	0.00125		U	0.00126
PCB 107		U	0.00138		U	0.00139
PCB 123		U	0.00138		U	0.00139
PCB 149		U	0.00125		U	0.00126
PCB 118		U	0.00138		U	0.00139
PCB 134		U	0.00125		U	0.00126
PCB 114		U	0.00138		U	0.00139
PCB 131		U	0.00125		U	0.00126
PCB 122		U	0.00138		U	0.00139
PCB 165		U	0.00125		U	0.00126
PCB 146		U	0.00125		U	0.00126
PCB 188		U	0.00114		U	0.00115
PCB 153		U	0.00125		U	0.00126
PCB 132		U	0.00125		U	0.00126

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 105		U	0.00138		U	0.00139
PCB 141		U	0.00125		U	0.00126
PCB 179		U	0.00114		U	0.00115
PCB 137		U	0.00125		U	0.00126
PCB 176		U	0.00114		U	0.00115
PCB 130		U	0.00125		U	0.00126
PCB 138/163/164		U	0.00125		U	0.00126
PCB 158		U	0.00125		U	0.00126
PCB 129		U	0.00125		U	0.00126
PCB 178		U	0.00114		U	0.00115
PCB 175		U	0.00114		U	0.00115
PCB 187		U	0.00114		U	0.00115
PCB 183		U	0.00114		U	0.00115
PCB 128		U	0.00125		U	0.00126
PCB 167		U	0.00125		U	0.00126
PCB 185		U	0.00114		U	0.00115
PCB 174		U	0.00114		U	0.00115
PCB 177		U	0.00114		U	0.00115
PCB 202		U	0.00105		U	0.00106
PCB 171		U	0.00114		U	0.00115
PCB 156		U	0.00125		U	0.00126
PCB 173		U	0.00114		U	0.00115
PCB 157		U	0.00125		U	0.00126
PCB 201		U	0.00105		U	0.00106
PCB 172		U	0.00114		U	0.00115
PCB 197		U	0.00105		U	0.00106
PCB 180		U	0.00114		U	0.00115
PCB 193		U	0.00114		U	0.00115
PCB 191		U	0.00114		U	0.00115
PCB 200		U	0.00105		U	0.00106
PCB 170		U	0.00114		U	0.00115
PCB 190		U	0.00114		U	0.00115
PCB 199		U	0.00105		U	0.00106
PCB 196/203		U	0.00105		U	0.00106
PCB 189		U	0.00114		U	0.00115
PCB 208		U	0.000971		U	0.00098
PCB 195		U	0.00105		U	0.00106
PCB 207		U	0.00097		U	0.000977
PCB 194		U	0.00105		U	0.00106
PCB 205		U	0.00105		U	0.00106
PCB 206		U	0.000971		U	0.000977
PCB 209		U	0.000904		U	0.000910

Sample ID:	**LF3BG03XA**			**LF3BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081204-MB			QC081204-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121536.D			A121537.D		
Operator:	ERL			ERL		
Date Sampled:	11/17/2008			11/17/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/19/2008			12/19/2008		
Sample Volume (m^3)	0.493			0.491		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
Extraction Surrogate Recoveries (%)						
Tetrachloro-m-xylene	72			80		
Decachlorobiphenyl	104			108		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	LF3BL01XA			QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082M			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121538.D			A111223.D			A121525.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/4/2008			11/06/08			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			11/14/08			12/18/2008		
Sample Volume (m^3)	0.492			0.500			0.402		
Percent Solid:	NA			NA			NA		
Prep DF:	1			1.00			1.00		
Analysis DF:	1			1.00			1.00		
Injection Volume (µl):	1			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00242		U	0.00113		U	0.00296
PCB 2		U	0.00242		U	0.00113		U	0.00296
PCB 3		U	0.00242		U	0.00113		U	0.00296
PCB 4/10		U	0.00204		U	0.00134		U	0.00250
PCB 7/9		U	0.00204		U	0.00134		U	0.00250
PCB 6		U	0.00204		U	0.00134		U	0.00250
PCB 8		U	0.00204		U	0.00134		U	0.00250
PCB 5		U	0.00204		U	0.00134		U	0.00250
PCB 19		U	0.00177		U	0.00155		U	0.00217
PCB 12/13		U	0.00204		U	0.00134		U	0.00250
PCB 18		U	0.00177		U	0.00155		U	0.00217
PCB 17		U	0.00177		U	0.00155		U	0.00217
PCB 15		U	0.00204		U	0.00134		U	0.00250
PCB 24/27		U	0.00177		U	0.00155		U	0.00217
PCB 16/32		U	0.00177		U	0.00155		U	0.00217
PCB 34		U	0.00177		U	0.00155		U	0.00217
PCB 29		U	0.00177		U	0.00155		U	0.00217
PCB 54		U	0.00156		U	0.00176		U	0.00191
PCB 26		U	0.00177		U	0.00155		U	0.00217
PCB 25		U	0.00177		U	0.00155		U	0.00217
PCB 31		U	0.00177		U	0.00155		U	0.00217
PCB 50		U	0.00156		U	0.00176		U	0.00191
PCB 28		U	0.00177		U	0.00155		U	0.00217
PCB 20/33		U	0.00177		U	0.00155		U	0.00217
PCB 53		U	0.00156		U	0.00176		U	0.00191
PCB 51		U	0.00156		U	0.00176		U	0.00191
PCB 22		U	0.00177		U	0.00155		U	0.00217
PCB 45		U	0.00156		U	0.00176		U	0.00191
PCB 46		U	0.00156		U	0.00176		U	0.00191
PCB 69		U	0.00156		U	0.00176		U	0.00191
PCB 52/73		U	0.00156		U	0.00176		U	0.00191
PCB 49		U	0.00156		U	0.00176		U	0.00191
PCB 47/48/75		U	0.00156		U	0.00176		U	0.00191
PCB 104		U	0.00140		U	0.00196		U	0.00171
PCB 35		U	0.00177		U	0.00155		U	0.00217
PCB 44		U	0.00156		U	0.00176		U	0.00191
PCB 59		U	0.00156		U	0.00176		U	0.00191
PCB 37		U	0.00177		U	0.00155		U	0.00217
PCB 42		U	0.00156		U	0.00176		U	0.00191
PCB 71		U	0.00156		U	0.00176		U	0.00191
PCB 41/64		U	0.00156		U	0.00176		U	0.00191
PCB 40		U	0.00156		U	0.00176		U	0.00191

Sample ID:	LF3BL01XA			QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082M			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121538.D			A111223.D			A121525.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/4/2008			11/06/08			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			11/14/08			12/18/2008		
Sample Volume (m^3)	0.492			0.500			0.402		
Percent Solid:	NA			NA			NA		
Prep DF:	1			1.00			1.00		
Analysis DF:	1			1.00			1.00		
Injection Volume (µl):	1			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 103		U	0.00140		U	0.00196		U	0.00171
PCB 67		U	0.00156		U	0.00176		U	0.00191
PCB 100		U	0.00140		U	0.00196		U	0.00171
PCB 63		U	0.00156		U	0.00176		U	0.00191
PCB 74		U	0.00156		U	0.00176		U	0.00191
PCB 70		U	0.00156		U	0.00176		U	0.00191
PCB 66		U	0.00156		U	0.00176		U	0.00191
PCB 93/95		U	0.00140		U	0.00196		U	0.00171
PCB 91		U	0.00140		U	0.00196		U	0.00171
PCB 56/60		U	0.00156		U	0.00176		U	0.00191
PCB 92		U	0.00140		U	0.00196		U	0.00171
PCB 84		U	0.00140		U	0.00196		U	0.00171
PCB 90/101		U	0.00140		U	0.00196		U	0.00171
PCB 99		U	0.00140		U	0.00196		U	0.00171
PCB 119		U	0.00140		U	0.00196		U	0.00171
PCB 83		U	0.00140		U	0.00196		U	0.00171
PCB 97		U	0.00140		U	0.00196		U	0.00171
PCB 117		U	0.00140		U	0.00196		U	0.00171
PCB 81		U	0.00140		U	0.00196		U	0.00171
PCB 87/115		U	0.00156		U	0.00176		U	0.00191
PCB 85		U	0.00140		U	0.00196		U	0.00171
PCB 136		U	0.00126		U	0.00217		U	0.00155
PCB 77		U	0.00156		U	0.00176		U	0.00191
PCB 110		U	0.00140		U	0.00196		U	0.00171
PCB 154		U	0.00126		U	0.00217		U	0.00155
PCB 82		U	0.00140		U	0.00196		U	0.00171
PCB 151		U	0.00126		U	0.00217		U	0.00155
PCB 135/144		U	0.00126		U	0.00217		U	0.00155
PCB 124		U	0.00140		U	0.00196		U	0.00171
PCB 147		U	0.00126		U	0.00217		U	0.00155
PCB 107		U	0.00140		U	0.00196		U	0.00171
PCB 123		U	0.00140		U	0.00196		U	0.00171
PCB 149		U	0.00126		U	0.00217		U	0.00155
PCB 118		U	0.00140		U	0.00196		U	0.00171
PCB 134		U	0.00126		U	0.00217		U	0.00155
PCB 114		U	0.00140		U	0.00196		U	0.00171
PCB 131		U	0.00126		U	0.00217		U	0.00155
PCB 122		U	0.00140		U	0.00196		U	0.00171
PCB 165		U	0.00126		U	0.00217		U	0.00155
PCB 146		U	0.00126		U	0.00217		U	0.00155
PCB 188		U	0.00115		U	0.00238		U	0.00141
PCB 153		U	0.00126		U	0.00217		U	0.00155
PCB 132		U	0.00126		U	0.00217		U	0.00155

Sample ID:	LF3BL01XA			QC081106-MB			QC081204-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082M			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121538.D			A111223.D			A121525.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/4/2008			11/06/08			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			11/14/08			12/18/2008		
Sample Volume (m^3)	0.492			0.500			0.402		
Percent Solid:	NA			NA			NA		
Prep DF:	1			1.00			1.00		
Analysis DF:	1			1.00			1.00		
Injection Volume (µl):	1			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 105		U	0.00140		U	0.00196		U	0.00171
PCB 141		U	0.00126		U	0.00217		U	0.00155
PCB 179		U	0.00115		U	0.00238		U	0.00141
PCB 137		U	0.00126		U	0.00217		U	0.00155
PCB 176		U	0.00115		U	0.00238		U	0.00141
PCB 130		U	0.00126		U	0.00217		U	0.00155
PCB 138/163/164		U	0.00126		U	0.00217		U	0.00155
PCB 158		U	0.00126		U	0.00217		U	0.00155
PCB 129		U	0.00126		U	0.00217		U	0.00155
PCB 178		U	0.00115		U	0.00238		U	0.00141
PCB 175		U	0.00115		U	0.00238		U	0.00141
PCB 187		U	0.00115		U	0.00238		U	0.00141
PCB 183		U	0.00115		U	0.00238		U	0.00141
PCB 128		U	0.00126		U	0.00217		U	0.00155
PCB 167		U	0.00126		U	0.00217		U	0.00155
PCB 185		U	0.00115		U	0.00238		U	0.00141
PCB 174		U	0.00115		U	0.00238		U	0.00141
PCB 177		U	0.00115		U	0.00238		U	0.00141
PCB 202		U	0.00106		U	0.00258		U	0.00130
PCB 171		U	0.00115		U	0.00238		U	0.00141
PCB 156		U	0.00126		U	0.00217		U	0.00155
PCB 173		U	0.00115		U	0.00238		U	0.00141
PCB 157		U	0.00126		U	0.00217		U	0.00155
PCB 201		U	0.00106		U	0.00258		U	0.00130
PCB 172		U	0.00115		U	0.00238		U	0.00141
PCB 197		U	0.00106		U	0.00258		U	0.00130
PCB 180		U	0.00115		U	0.00238		U	0.00141
PCB 193		U	0.00115		U	0.00238		U	0.00141
PCB 191		U	0.00115		U	0.00238		U	0.00141
PCB 200		U	0.00106		U	0.00258		U	0.00130
PCB 170		U	0.00115		U	0.00238		U	0.00141
PCB 190		U	0.00115		U	0.00238		U	0.00141
PCB 199		U	0.00106		U	0.00258		U	0.00130
PCB 196/203		U	0.00106		U	0.00258		U	0.00130
PCB 189		U	0.00115		U	0.00238		U	0.00141
PCB 208		U	0.000983		U	0.00279		U	0.00120
PCB 195		U	0.00106		U	0.00258		U	0.00130
PCB 207		U	0.000983		U	0.00279		U	0.00120
PCB 194		U	0.00106		U	0.00258		U	0.00130
PCB 205		U	0.00106		U	0.00258		U	0.00130
PCB 206		U	0.000983		U	0.00279		U	0.00120
PCB 209		U	0.000915		U	0.00300		U	0.00112

Sample ID:	**LF3BL01XA**			**QC081106-MB**			**QC081204-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081204-MB			QC081106-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082M			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121538.D			A111223.D			A121525.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/17/2008			NA			NA		
Date Received:	11/26/2008			NA			NA		
Date Prepared:	12/4/2008			11/06/08			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/19/2008			11/14/08			12/18/2008		
Sample Volume (m^3)	0.492			0.500			0.402		
Percent Solid:	NA			NA			NA		
Prep DF:	1			1.00			1.00		
Analysis DF:	1			1.00			1.00		
Injection Volume (µl):	1			1.00			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	60			44			72		
Decachlorobiphenyl	92			76			116		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF4BG01XA**			**LF4BGBLXA**			**QC090114-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A011621.D			A011627.D			A011615.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	12/10/2008			39792			NA		
Date Received:	1/8/2009			39821			NA		
Date Prepared:	1/12/2009			39827			1/14/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/18/2009			39831			1/17/2009		
Sample Volume (m^3)	0.480			0.44022			0.440		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1			1.00		
Analysis DF:	1.00			1			1.00		
Injection Volume (µl):	1.00			1			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00252		U	0.00275		U	0.00270
PCB 2		U	0.00252		U	0.00275		U	0.00270
PCB 3		U	0.00252		U	0.00275		U	0.00270
PCB 4/10		U	0.00213		U	0.00232		U	0.00228
PCB 7/9		U	0.00213		U	0.00232		U	0.00228
PCB 6		U	0.00213		U	0.00232		U	0.00228
PCB 8		U	0.00213		U	0.00232		U	0.00228
PCB 5		U	0.00213		U	0.00232		U	0.00228
PCB 19		U	0.00184		U	0.00201		U	0.00197
PCB 12/13		U	0.00213		U	0.00232		U	0.00228
PCB 18		U	0.00184		U	0.00201		U	0.00197
PCB 17		U	0.00184		U	0.00201		U	0.00197
PCB 15		U	0.00213		U	0.00232		U	0.00228
PCB 24/27		U	0.00184		U	0.00201		U	0.00197
PCB 16/32		U	0.00184		U	0.00201		U	0.00197
PCB 34		U	0.00184		U	0.00201		U	0.00197
PCB 29		U	0.00184		U	0.00201		U	0.00197
PCB 54		U	0.00162		U	0.00177		U	0.00174
PCB 26		U	0.00184		U	0.00201		U	0.00197
PCB 25		U	0.00184		U	0.00201		U	0.00197
PCB 31		U	0.00184		U	0.00201		U	0.00197
PCB 50		U	0.00162		U	0.00177		U	0.00174
PCB 28		U	0.00184		U	0.00201		U	0.00197
PCB 20/33		U	0.00184		U	0.00201		U	0.00197
PCB 53		U	0.00162		U	0.00177		U	0.00174
PCB 51		U	0.00162		U	0.00177		U	0.00174
PCB 22		U	0.00184		U	0.00201		U	0.00197
PCB 45		U	0.00162		U	0.00177		U	0.00174
PCB 46		U	0.00162		U	0.00177		U	0.00174
PCB 69		U	0.00162		U	0.00177		U	0.00174
PCB 52/73		U	0.00162		U	0.00177		U	0.00174
PCB 49		U	0.00162		U	0.00177		U	0.00174
PCB 47/48/75		U	0.00162		U	0.00177		U	0.00174
PCB 104		U	0.00145		U	0.00159		U	0.00156
PCB 35		U	0.00184		U	0.00201		U	0.00197
PCB 44		U	0.00162		U	0.00177		U	0.00174
PCB 59		U	0.00162		U	0.00177		U	0.00174
PCB 37		U	0.00184		U	0.00201		U	0.00197
PCB 42		U	0.00162		U	0.00177		U	0.00174
PCB 71		U	0.00162		U	0.00177		U	0.00174
PCB 41/64		U	0.00162		U	0.00177		U	0.00174
PCB 40		U	0.00162		U	0.00177		U	0.00174
PCB 103		U	0.00145		U	0.00159		U	0.00156
PCB 67		U	0.00162		U	0.00177		U	0.00174
PCB 100		U	0.00145		U	0.00159		U	0.00156

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF4BG01XA			LF4BGBLXA			QC090114-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A011621.D			A011627.D			A011615.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	12/10/2008			39792			NA		
Date Received:	1/8/2009			39821			NA		
Date Prepared:	1/12/2009			39827			1/14/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/18/2009			39831			1/17/2009		
Sample Volume (m^3)	0.480			0.44022			0.440		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1			1.00		
Analysis DF:	1.00			1			1.00		
Injection Volume (µl):	1.00			1			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 63		U	0.00162		U	0.00177		U	0.00174
PCB 74		U	0.00162		U	0.00177		U	0.00174
PCB 70		U	0.00162		U	0.00177		U	0.00174
PCB 66		U	0.00162		U	0.00177		U	0.00174
PCB 93/95		U	0.00145		U	0.00159		U	0.00156
PCB 91		U	0.00145		U	0.00159		U	0.00156
PCB 56/60		U	0.00162		U	0.00177		U	0.00174
PCB 92		U	0.00145		U	0.00159		U	0.00156
PCB 84		U	0.00145		U	0.00159		U	0.00156
PCB 90/101		U	0.00145		U	0.00159		U	0.00156
PCB 99		U	0.00145		U	0.00159		U	0.00156
PCB 119		U	0.00145		U	0.00159		U	0.00156
PCB 83		U	0.00145		U	0.00159		U	0.00156
PCB 97		U	0.00145		U	0.00159		U	0.00156
PCB 117		U	0.00145		U	0.00159		U	0.00156
PCB 81		U	0.00145		U	0.00159		U	0.00156
PCB 87/115		U	0.00162		U	0.00177		U	0.00174
PCB 85		U	0.00145		U	0.00159		U	0.00156
PCB 136		U	0.00131		U	0.00143		U	0.00141
PCB 77		U	0.00162		U	0.00177		U	0.00174
PCB 110		U	0.00145		U	0.00159		U	0.00156
PCB 154		U	0.00131		U	0.00143		U	0.00141
PCB 82		U	0.00145		U	0.00159		U	0.00156
PCB 151		U	0.00131		U	0.00143		U	0.00141
PCB 135/144		U	0.00131		U	0.00143		U	0.00141
PCB 124		U	0.00145		U	0.00159		U	0.00156
PCB 147		U	0.00131		U	0.00143		U	0.00141
PCB 107		U	0.00145		U	0.00159		U	0.00156
PCB 123		U	0.00145		U	0.00159		U	0.00156
PCB 149		U	0.00131		U	0.00143		U	0.00141
PCB 118		U	0.00145		U	0.00159		U	0.00156
PCB 134		U	0.00131		U	0.00143		U	0.00141
PCB 114		U	0.00145		U	0.00159		U	0.00156
PCB 131		U	0.00131		U	0.00143		U	0.00141
PCB 122		U	0.00145		U	0.00159		U	0.00156
PCB 165		U	0.00131		U	0.00143		U	0.00141
PCB 146		U	0.00131		U	0.00143		U	0.00141

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	LF4BG01XA			LF4BGBLXA			QC090114-MB		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A011621.D			A011627.D			A011615.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	12/10/2008			39792			NA		
Date Received:	1/8/2009			39821			NA		
Date Prepared:	1/12/2009			39827			1/14/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/18/2009			39831			1/17/2009		
Sample Volume (m^3)	0.480			0.44022			0.440		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1			1.00		
Analysis DF:	1.00			1			1.00		
Injection Volume (µl):	1.00			1			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 188		U	0.00120		U	0.00131		U	0.00129
PCB 153		U	0.00131		U	0.00143		U	0.00141
PCB 132		U	0.00131		U	0.00143		U	0.00141
PCB 105		U	0.00145		U	0.00159		U	0.00156
PCB 141		U	0.00131		U	0.00143		U	0.00141
PCB 179		U	0.00120		U	0.00131		U	0.00129
PCB 137		U	0.00131		U	0.00143		U	0.00141
PCB 176		U	0.00120		U	0.00131		U	0.00129
PCB 130		U	0.00131		U	0.00143		U	0.00141
PCB 138/163/164		U	0.00131		U	0.00143		U	0.00141
PCB 158		U	0.00131		U	0.00143		U	0.00141
PCB 129		U	0.00131		U	0.00143		U	0.00141
PCB 178		U	0.00120		U	0.00131		U	0.00129
PCB 175		U	0.00120		U	0.00131		U	0.00129
PCB 187		U	0.00120		U	0.00131		U	0.00129
PCB 183		U	0.00120		U	0.00131		U	0.00129
PCB 128		U	0.00131		U	0.00143		U	0.00141
PCB 167		U	0.00131		U	0.00143		U	0.00141
PCB 185		U	0.00120		U	0.00131		U	0.00129
PCB 174		U	0.00120		U	0.00131		U	0.00129
PCB 177		U	0.00120		U	0.00131		U	0.00129
PCB 202		U	0.00110		U	0.00120		U	0.00118
PCB 171		U	0.00120		U	0.00131		U	0.00129
PCB 156		U	0.00131		U	0.00143		U	0.00141
PCB 173		U	0.00120		U	0.00131		U	0.00129
PCB 157		U	0.00131		U	0.00143		U	0.00141
PCB 201		U	0.00110		U	0.00120		U	0.00118
PCB 172		U	0.00120		U	0.00131		U	0.00129
PCB 197		U	0.00110		U	0.00120		U	0.00118
PCB 180		U	0.00120		U	0.00131		U	0.00129
PCB 193		U	0.00120		U	0.00131		U	0.00129
PCB 191		U	0.00120		U	0.00131		U	0.00129
PCB 200		U	0.00110		U	0.00120		U	0.00118
PCB 170		U	0.00120		U	0.00131		U	0.00129
PCB 190		U	0.00120		U	0.00131		U	0.00129
PCB 199		U	0.00110		U	0.00120		U	0.00118
PCB 196/203		U	0.00110		U	0.00120		U	0.00118
PCB 189		U	0.00120		U	0.00131		U	0.00129
PCB 208		U	0.00102		U	0.00112		U	0.00110
PCB 195		U	0.00110		U	0.00120		U	0.00118
PCB 207		U	0.00102		U	0.00112		U	0.00110
PCB 194		U	0.00110		U	0.00120		U	0.00118
PCB 205		U	0.00110		U	0.00120		U	0.00118
PCB 206		U	0.00102		U	0.00112		U	0.00110
PCB 209		U	0.000951		U	0.00104		U	0.00102

Polychlorinated Biphenyls
EPA 8082M

Sample ID:	**LF4BG01XA**			**LF4BGBLXA**			**QC090114-MB**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC090112-MB			QC090114-MB			QC090114-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A011621.D			A011627.D			A011615.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	12/10/2008			39792			NA		
Date Received:	1/8/2009			39821			NA		
Date Prepared:	1/12/2009			39827			1/14/2009		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	1/18/2009			39831			1/17/2009		
Sample Volume (m^3)	0.480			0.44022			0.440		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1			1.00		
Analysis DF:	1.00			1			1.00		
Injection Volume (µl):	1.00			1			1.00		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
Extraction Surrogate Recoveries (%)									
Tetrachloro-m-xylene	84			68			56		
Decachlorobiphenyl	140			124			112		

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	WWTP1BM01XA			WWTP1BM02XA			WWTP1BM03XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-MB			QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121520.D			A121521.D			A121531.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/17/2008			12/17/2008			12/18/2008		
Sample Volume (m^3):	0.617			0.506			0.50496		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:									
PCB 1		U	0.00211		U	0.00248		U	0.00248
PCB 2		U	0.00211		U	0.00248		U	0.00248
PCB 3		U	0.00211		U	0.00248		U	0.00248
PCB 4/10		U	0.00179		U	0.00210		U	0.00210
PCB 7/9		U	0.00179		U	0.00210		U	0.00210
PCB 6		U	0.00179		U	0.00210		U	0.00210
PCB 8		U	0.00179		U	0.00210		U	0.00210
PCB 5		U	0.00179		U	0.00210		U	0.00210
PCB 19		U	0.00155		U	0.00182		U	0.00182
PCB 12/13		U	0.00179		U	0.00210		U	0.00210
PCB 18		U	0.00155		U	0.00182		U	0.00182
PCB 17		U	0.00155		U	0.00182		U	0.00182
PCB 15		U	0.00179		U	0.00210		U	0.00210
PCB 24/27		U	0.00155		U	0.00182		U	0.00182
PCB 16/32		U	0.00155		U	0.00182		U	0.00182
PCB 34		U	0.00155		U	0.00182		U	0.00182
PCB 29		U	0.00155		U	0.00182		U	0.00182
PCB 54		U	0.00137		U	0.00160		U	0.00160
PCB 26		U	0.00155		U	0.00182		U	0.00182
PCB 25		U	0.00155		U	0.00182		U	0.00182
PCB 31		U	0.00155		U	0.00182		U	0.00182
PCB 50		U	0.00137		U	0.00160		U	0.00160
PCB 28		U	0.00155		U	0.00182		U	0.00182
PCB 20/33		U	0.00155		U	0.00182		U	0.00182
PCB 53		U	0.00137		U	0.00160		U	0.00160
PCB 51		U	0.00137		U	0.00160		U	0.00160
PCB 22		U	0.00155		U	0.00182		U	0.00182
PCB 45		U	0.00137		U	0.00160		U	0.00160
PCB 46		U	0.00137		U	0.00160		U	0.00160
PCB 69		U	0.00137		U	0.00160		U	0.00160
PCB 52/73		U	0.00137		U	0.00160		U	0.00160
PCB 49		U	0.00137		U	0.00160		U	0.00160
PCB 47/48/75		U	0.00137		U	0.00160		U	0.00160
PCB 104		U	0.00122		U	0.00143		U	0.00143
PCB 35		U	0.00155		U	0.00182		U	0.00182
PCB 44		U	0.00137		U	0.00160		U	0.00160
PCB 59		U	0.00137		U	0.00160		U	0.00160
PCB 37		U	0.00155		U	0.00182		U	0.00182
PCB 42		U	0.00137		U	0.00160		U	0.00160
PCB 71		U	0.00137		U	0.00160		U	0.00160
PCB 41/64		U	0.00137		U	0.00160		U	0.00160

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**			**WWTP1BM03XA**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-MB			QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121520.D			A121521.D			A121531.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/17/2008			12/17/2008			12/18/2008		
Sample Volume (m^3):	0.617			0.506			0.50496		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 40		U	0.00137		U	0.00160		U	0.00160
PCB 103		U	0.00122		U	0.00143		U	0.00143
PCB 67		U	0.00137		U	0.00160		U	0.00160
PCB 100		U	0.00122		U	0.00143		U	0.00143
PCB 63		U	0.00137		U	0.00160		U	0.00160
PCB 74		U	0.00137		U	0.00160		U	0.00160
PCB 70		U	0.00137		U	0.00160		U	0.00160
PCB 66		U	0.00137		U	0.00160		U	0.00160
PCB 93/95		U	0.00122		U	0.00143		U	0.00143
PCB 91		U	0.00122		U	0.00143		U	0.00143
PCB 56/60		U	0.00137		U	0.00160		U	0.00160
PCB 92		U	0.00122		U	0.00143		U	0.00143
PCB 84		U	0.00122		U	0.00143		U	0.00143
PCB 90/101		U	0.00122		U	0.00143		U	0.00143
PCB 99		U	0.00122		U	0.00143		U	0.00143
PCB 119		U	0.00122		U	0.00143		U	0.00143
PCB 83		U	0.00122		U	0.00143		U	0.00143
PCB 97		U	0.00122		U	0.00143		U	0.00143
PCB 117		U	0.00122		U	0.00143		U	0.00143
PCB 81		U	0.00122		U	0.00143		U	0.00143
PCB 87/115		U	0.00137		U	0.00160		U	0.00160
PCB 85		U	0.00122		U	0.00143		U	0.00143
PCB 136		U	0.00111		U	0.00130		U	0.00130
PCB 77		U	0.00137		U	0.00160		U	0.00160
PCB 110		U	0.00122		U	0.00143		U	0.00143
PCB 154		U	0.00111		U	0.00130		U	0.00130
PCB 82		U	0.00122		U	0.00143		U	0.00143
PCB 151		U	0.00111		U	0.00130		U	0.00130
PCB 135/144		U	0.00111		U	0.00130		U	0.00130
PCB 124		U	0.00122		U	0.00143		U	0.00143
PCB 147		U	0.00111		U	0.00130		U	0.00130
PCB 107		U	0.00122		U	0.00143		U	0.00143
PCB 123		U	0.00122		U	0.00143		U	0.00143
PCB 149		U	0.00111		U	0.00130		U	0.00130
PCB 118		U	0.00122		U	0.00143		U	0.00143
PCB 134		U	0.00111		U	0.00130		U	0.00130
PCB 114		U	0.00122		U	0.00143		U	0.00143
PCB 131		U	0.00111		U	0.00130		U	0.00130
PCB 122		U	0.00122		U	0.00143		U	0.00143
PCB 165		U	0.00111		U	0.00130		U	0.00130
PCB 146		U	0.00111		U	0.00130		U	0.00130
PCB 188		U	0.00101		U	0.00118		U	0.00118

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BM01XA**			**WWTP1BM02XA**			**WWTP1BM03XA**		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-MB			QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121520.D			A121521.D			A121531.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/17/2008			12/17/2008			12/18/2008		
Sample Volume (m^3):	0.617			0.506			0.50496		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 153		U	0.00111		U	0.00130		U	0.00130
PCB 132		U	0.00111		U	0.00130		U	0.00130
PCB 105		U	0.00122		U	0.00143		U	0.00143
PCB 141		U	0.00111		U	0.00130		U	0.00130
PCB 179		U	0.00101		U	0.00118		U	0.00118
PCB 137		U	0.00111		U	0.00130		U	0.00130
PCB 176		U	0.00101		U	0.00118		U	0.00118
PCB 130		U	0.00111		U	0.00130		U	0.00130
PCB 138/163/164		U	0.00111		U	0.00130		U	0.00130
PCB 158		U	0.00111		U	0.00130		U	0.00130
PCB 129		U	0.00111		U	0.00130		U	0.00130
PCB 178		U	0.00101		U	0.00118		U	0.00118
PCB 175		U	0.00101		U	0.00118		U	0.00118
PCB 187		U	0.00101		U	0.00118		U	0.00118
PCB 183		U	0.00101		U	0.00118		U	0.00118
PCB 128		U	0.00111		U	0.00130		U	0.00130
PCB 167		U	0.00111		U	0.00130		U	0.00130
PCB 185		U	0.00101		U	0.00118		U	0.00118
PCB 174		U	0.00101		U	0.00118		U	0.00118
PCB 177		U	0.00101		U	0.00118		U	0.00118
PCB 202		U	0.000928		U	0.00109		U	0.00109
PCB 171		U	0.00101		U	0.00118		U	0.00118
PCB 156		U	0.00111		U	0.00130		U	0.00130
PCB 173		U	0.00101		U	0.00118		U	0.00118
PCB 157		U	0.00111		U	0.00130		U	0.00130
PCB 201		U	0.000928		U	0.00109		U	0.00109
PCB 172		U	0.00101		U	0.00118		U	0.00118

Polychlorinated Biphenyls
8082M

Sample ID:	WWTP1BM01XA			WWTP1BM02XA			WWTP1BM03XA		
Matrix:	XAD Tubes			XAD Tubes			XAD Tubes		
Preservation:	None			None			None		
Decanted:	None			None			None		
Batch QC:	QC081202-MB			QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA			NA		
Analysis Method:	EPA 8082			EPA 8082			EPA 8082		
Instrument:	AMX			AMX			AMX		
File ID:	A121520.D			A121521.D			A121531.D		
Operator:	ERL			ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008			12/4/2008		
Date Cleanup:	NA			NA			NA		
Date Analyzed:	12/17/2008			12/17/2008			12/18/2008		
Sample Volume (m^3):	0.617			0.506			0.50496		
Percent Solid:	NA			NA			NA		
Prep DF:	1.00			1.00			1		
Analysis DF:	1.00			1.00			1		
Injection Volume (µl):	1.00			1.00			1		
Extract Volume (µl):	2000			2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 197		U	0.000928		U	0.00109		U	0.00109
PCB 180		U	0.00101		U	0.00118		U	0.00118
PCB 193		U	0.00101		U	0.00118		U	0.00118
PCB 191		U	0.00101		U	0.00118		U	0.00118
PCB 200		U	0.000928		U	0.00109		U	0.00109
PCB 170		U	0.00101		U	0.00118		U	0.00118
PCB 190		U	0.00101		U	0.00118		U	0.00118
PCB 199		U	0.000928		U	0.00109		U	0.00109
PCB 196/203		U	0.000928		U	0.00109		U	0.00109
PCB 189		U	0.00101		U	0.00118		U	0.00118
PCB 208		U	0.000859		U	0.00101		U	0.00101
PCB 195		U	0.000928		U	0.00109		U	0.00109
PCB 207		U	0.000859		U	0.00101		U	0.00101
PCB 194		U	0.000928		U	0.00109		U	0.00109
PCB 205		U	0.000928		U	0.00109		U	0.00109
PCB 206		U	0.000859		U	0.00101		U	0.00101
PCB 209		U	0.000800		U	0.000938		U	0.000938

Extraction Surrogate Recoveries (%)			
Tetrachloro-m-xylene	72	68	64
Decachlorobiphenyl	108	112	100

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**WWTP1BG01XA**			**WWTP1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121522.D			A121523.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.417			0.356		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00313		U	0.00352
PCB 2		U	0.00313		U	0.00352
PCB 3		U	0.00313		U	0.00352
PCB 4/10		U	0.00265		U	0.00298
PCB 7/9		U	0.00265		U	0.00298
PCB 6		U	0.00265		U	0.00298
PCB 8		U	0.00265		U	0.00298
PCB 5		U	0.00265		U	0.00298
PCB 19		U	0.00229		U	0.00258
PCB 12/13		U	0.00265		U	0.00298
PCB 18		U	0.00229		U	0.00258
PCB 17		U	0.00229		U	0.00258
PCB 15		U	0.00265		U	0.00298
PCB 24/27		U	0.00229		U	0.00258
PCB 16/32		U	0.00229		U	0.00258
PCB 34		U	0.00229		U	0.00258
PCB 29		U	0.00229		U	0.00258
PCB 54		U	0.00202		U	0.00227
PCB 26		U	0.00229		U	0.00258
PCB 25		U	0.00229		U	0.00258
PCB 31		U	0.00229		U	0.00258
PCB 50		U	0.00202		U	0.00227
PCB 28		U	0.00229		U	0.00258
PCB 20/33		U	0.00229		U	0.00258
PCB 53		U	0.00202		U	0.00227
PCB 51		U	0.00202		U	0.00227
PCB 22		U	0.00229		U	0.00258
PCB 45		U	0.00202		U	0.00227
PCB 46		U	0.00202		U	0.00227
PCB 69		U	0.00202		U	0.00227
PCB 52/73		U	0.00202		U	0.00227
PCB 49		U	0.00202		U	0.00227
PCB 47/48/75		U	0.00202		U	0.00227
PCB 104		U	0.00181		U	0.00203
PCB 35		U	0.00229		U	0.00258
PCB 44		U	0.00202		U	0.00227
PCB 59		U	0.00202		U	0.00227
PCB 37		U	0.00229		U	0.00258
PCB 42		U	0.00202		U	0.00227
PCB 71		U	0.00202		U	0.00227
PCB 41/64		U	0.00202		U	0.00227

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BG01XA**			**WWTP1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121522.D			A121523.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.417			0.356		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 40		U	0.00202		U	0.00227
PCB 103		U	0.00181		U	0.00203
PCB 67		U	0.00202		U	0.00227
PCB 100		U	0.00181		U	0.00203
PCB 63		U	0.00202		U	0.00227
PCB 74		U	0.00202		U	0.00227
PCB 70		U	0.00202		U	0.00227
PCB 66		U	0.00202		U	0.00227
PCB 93/95		U	0.00181		U	0.00203
PCB 91		U	0.00181		U	0.00203
PCB 56/60		U	0.00202		U	0.00227
PCB 92		U	0.00181		U	0.00203
PCB 84		U	0.00181		U	0.00203
PCB 90/101		U	0.00181		U	0.00203
PCB 99		U	0.00181		U	0.00203
PCB 119		U	0.00181		U	0.00203
PCB 83		U	0.00181		U	0.00203
PCB 97		U	0.00181		U	0.00203
PCB 117		U	0.00181		U	0.00203
PCB 81		U	0.00181		U	0.00203
PCB 87/115		U	0.00202		U	0.00227
PCB 85		U	0.00181		U	0.00203
PCB 136		U	0.00164		U	0.00184
PCB 77		U	0.00202		U	0.00227
PCB 110		U	0.00181		U	0.00203
PCB 154		U	0.00164		U	0.00184
PCB 82		U	0.00181		U	0.00203
PCB 151		U	0.00164		U	0.00184
PCB 135/144		U	0.00164		U	0.00184
PCB 124		U	0.00181		U	0.00203
PCB 147		U	0.00164		U	0.00184
PCB 107		U	0.00181		U	0.00203
PCB 123		U	0.00181		U	0.00203
PCB 149		U	0.00164		U	0.00184
PCB 118		U	0.00181		U	0.00203
PCB 134		U	0.00164		U	0.00184
PCB 114		U	0.00181		U	0.00203
PCB 131		U	0.00164		U	0.00184
PCB 122		U	0.00181		U	0.00203
PCB 165		U	0.00164		U	0.00184
PCB 146		U	0.00164		U	0.00184
PCB 188		U	0.00149		U	0.00168

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BG01XA**			**WWTP1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121522.D			A121523.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.417			0.356		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 153		U	0.00164		U	0.00184
PCB 132		U	0.00164		U	0.00184
PCB 105		U	0.00181		U	0.00203
PCB 141		U	0.00164		U	0.00184
PCB 179		U	0.00149		U	0.00168
PCB 137		U	0.00164		U	0.00184
PCB 176		U	0.00149		U	0.00168
PCB 130		U	0.00164		U	0.00184
PCB 138/163/164		U	0.00164		U	0.00184
PCB 158		U	0.00164		U	0.00184
PCB 129		U	0.00164		U	0.00184
PCB 178		U	0.00149		U	0.00168
PCB 175		U	0.00149		U	0.00168
PCB 187		U	0.00149		U	0.00168
PCB 183		U	0.00149		U	0.00168
PCB 128		U	0.00164		U	0.00184
PCB 167		U	0.00164		U	0.00184
PCB 185		U	0.00149		U	0.00168
PCB 174		U	0.00149		U	0.00168
PCB 177		U	0.00149		U	0.00168
PCB 202		U	0.00137		U	0.00155
PCB 171		U	0.00149		U	0.00168
PCB 156		U	0.00164		U	0.00184
PCB 173		U	0.00149		U	0.00168
PCB 157		U	0.00164		U	0.00184
PCB 201		U	0.00137		U	0.00155
PCB 172		U	0.00149		U	0.00168

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BG01XA**			**WWTP1BG02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121522.D			A121523.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/5/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/2/2008			12/2/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.417			0.356		
Percent Solid:	NA			NA		
Prep DF:	1.00			1.00		
Analysis DF:	1.00			1.00		
Injection Volume (µl):	1.00			1.00		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 197		U	0.00137		U	0.00155
PCB 180		U	0.00149		U	0.00168
PCB 193		U	0.00149		U	0.00168
PCB 191		U	0.00149		U	0.00168
PCB 200		U	0.00137		U	0.00155
PCB 170		U	0.00149		U	0.00168
PCB 190		U	0.00149		U	0.00168
PCB 199		U	0.00137		U	0.00155
PCB 196/203		U	0.00137		U	0.00155
PCB 189		U	0.00149		U	0.00168
PCB 208		U	0.00127		U	0.00143
PCB 195		U	0.00137		U	0.00155
PCB 207		U	0.00127		U	0.00143
PCB 194		U	0.00137		U	0.00155
PCB 205		U	0.00137		U	0.00155
PCB 206		U	0.00127		U	0.00143
PCB 209		U	0.00118		U	0.00133

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	68	64
Decachlorobiphenyl	92	108

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**WWTP1BG03XA**			**WWTP1BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121532.D			A121533.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.36804			0.33216		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00353		U	0.00390
PCB 2		U	0.00353		U	0.00390
PCB 3		U	0.00353		U	0.00390
PCB 4/10		U	0.00298		U	0.00330
PCB 7/9		U	0.00298		U	0.00330
PCB 6		U	0.00298		U	0.00330
PCB 8		U	0.00298		U	0.00330
PCB 5		U	0.00298		U	0.00330
PCB 19		U	0.00258		U	0.00286
PCB 12/13		U	0.00298		U	0.00330
PCB 18		U	0.00258		U	0.00286
PCB 17		U	0.00258		U	0.00286
PCB 15		U	0.00298		U	0.00330
PCB 24/27		U	0.00258		U	0.00286
PCB 16/32		U	0.00258		U	0.00286
PCB 34		U	0.00258		U	0.00286
PCB 29		U	0.00258		U	0.00286
PCB 54		U	0.00228		U	0.00252
PCB 26		U	0.00258		U	0.00286
PCB 25		U	0.00258		U	0.00286
PCB 31		U	0.00258		U	0.00286
PCB 50		U	0.00228		U	0.00252
PCB 28		U	0.00258		U	0.00286
PCB 20/33		U	0.00258		U	0.00286
PCB 53		U	0.00228		U	0.00252
PCB 51		U	0.00228		U	0.00252
PCB 22		U	0.00258		U	0.00286
PCB 45		U	0.00228		U	0.00252
PCB 46		U	0.00228		U	0.00252
PCB 69		U	0.00228		U	0.00252
PCB 52/73		U	0.00228		U	0.00252
PCB 49		U	0.00228		U	0.00252
PCB 47/48/75		U	0.00228		U	0.00252
PCB 104		U	0.00204		U	0.00226
PCB 35		U	0.00258		U	0.00286
PCB 44		U	0.00228		U	0.00252
PCB 59		U	0.00228		U	0.00252
PCB 37		U	0.00258		U	0.00286
PCB 42		U	0.00228		U	0.00252
PCB 71		U	0.00228		U	0.00252
PCB 41/64		U	0.00228		U	0.00252

Sample ID:	**WWTP1BG03XA**			**WWTP1BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121532.D			A121533.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.36804			0.33216		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 40		U	0.00228		U	0.00252
PCB 103		U	0.00204		U	0.00226
PCB 67		U	0.00228		U	0.00252
PCB 100		U	0.00204		U	0.00226
PCB 63		U	0.00228		U	0.00252
PCB 74		U	0.00228		U	0.00252
PCB 70		U	0.00228		U	0.00252
PCB 66		U	0.00228		U	0.00252
PCB 93/95		U	0.00204		U	0.00226
PCB 91		U	0.00204		U	0.00226
PCB 56/60		U	0.00228		U	0.00252
PCB 92		U	0.00204		U	0.00226
PCB 84		U	0.00204		U	0.00226
PCB 90/101		U	0.00204		U	0.00226
PCB 99		U	0.00204		U	0.00226
PCB 119		U	0.00204		U	0.00226
PCB 83		U	0.00204		U	0.00226
PCB 97		U	0.00204		U	0.00226
PCB 117		U	0.00204		U	0.00226
PCB 81		U	0.00204		U	0.00226
PCB 87/115		U	0.00228		U	0.00252
PCB 85		U	0.00204		U	0.00226
PCB 136		U	0.00184		U	0.00204
PCB 77		U	0.00228		U	0.00252
PCB 110		U	0.00204		U	0.00226
PCB 154		U	0.00184		U	0.00204
PCB 82		U	0.00204		U	0.00226
PCB 151		U	0.00184		U	0.00204
PCB 135/144		U	0.00184		U	0.00204
PCB 124		U	0.00204		U	0.00226
PCB 147		U	0.00184		U	0.00204
PCB 107		U	0.00204		U	0.00226
PCB 123		U	0.00204		U	0.00226
PCB 149		U	0.00184		U	0.00204
PCB 118		U	0.00204		U	0.00226
PCB 134		U	0.00184		U	0.00204
PCB 114		U	0.00204		U	0.00226
PCB 131		U	0.00184		U	0.00204
PCB 122		U	0.00204		U	0.00226
PCB 165		U	0.00184		U	0.00204
PCB 146		U	0.00184		U	0.00204
PCB 188		U	0.00168		U	0.00186

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BG03XA**			**WWTP1BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121532.D			A121533.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.36804			0.33216		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 153		U	0.00184		U	0.00204
PCB 132		U	0.00184		U	0.00204
PCB 105		U	0.00204		U	0.00226
PCB 141		U	0.00184		U	0.00204
PCB 179		U	0.00168		U	0.00186
PCB 137		U	0.00184		U	0.00204
PCB 176		U	0.00168		U	0.00186
PCB 130		U	0.00184		U	0.00204
PCB 138/163/164		U	0.00184		U	0.00204
PCB 158		U	0.00184		U	0.00204
PCB 129		U	0.00184		U	0.00204
PCB 178		U	0.00168		U	0.00186
PCB 175		U	0.00168		U	0.00186
PCB 187		U	0.00168		U	0.00186
PCB 183		U	0.00168		U	0.00186
PCB 128		U	0.00184		U	0.00204
PCB 167		U	0.00184		U	0.00204
PCB 185		U	0.00168		U	0.00186
PCB 174		U	0.00168		U	0.00186
PCB 177		U	0.00168		U	0.00186
PCB 202		U	0.00155		U	0.00171
PCB 171		U	0.00168		U	0.00186
PCB 156		U	0.00184		U	0.00204
PCB 173		U	0.00168		U	0.00186
PCB 157		U	0.00184		U	0.00204
PCB 201		U	0.00155		U	0.00171
PCB 172		U	0.00168		U	0.00186

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BG03XA**			**WWTP1BG04XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081202-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121532.D			A121533.D		
Operator:	ERL			ERL		
Date Sampled:	11/6/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/4/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/18/2008		
Sample Volume (m^3):	0.36804			0.33216		
Percent Solid:	NA			NA		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 197		U	0.00155		U	0.00171
PCB 180		U	0.00168		U	0.00186
PCB 193		U	0.00168		U	0.00186
PCB 191		U	0.00168		U	0.00186
PCB 200		U	0.00155		U	0.00171
PCB 170		U	0.00168		U	0.00186
PCB 190		U	0.00168		U	0.00186
PCB 199		U	0.00155		U	0.00171
PCB 196/203		U	0.00155		U	0.00171
PCB 189		U	0.00168		U	0.00186
PCB 208		U	0.00143		U	0.00159
PCB 195		U	0.00155		U	0.00171
PCB 207		U	0.00143		U	0.00159
PCB 194		U	0.00155		U	0.00171
PCB 205		U	0.00155		U	0.00171
PCB 206		U	0.00143		U	0.00159
PCB 209		U	0.00133		U	0.00148

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	60	80
Decachlorobiphenyl	92	112

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**WWTP1BL01XA**			**WWTP1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081211-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121526.D			A121549.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/11/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/20/2008		
Sample Volume (m^3):	0.402			0.539		
Percent Solid:	NA			1		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB Congeners:						
PCB 1		U	0.00296	0	U	0.00236
PCB 2		U	0.00296		U	0.00236
PCB 3		U	0.00296		U	0.00236
PCB 4/10		U	0.00250		U	0.00200
PCB 7/9		U	0.00250		U	0.00200
PCB 6		U	0.00250		U	0.00200
PCB 8		U	0.00250		U	0.00200
PCB 5		U	0.00250		U	0.00200
PCB 19		U	0.00217		U	0.00173
PCB 12/13		U	0.00250		U	0.00200
PCB 18		U	0.00217		U	0.00173
PCB 17		U	0.00217		U	0.00173
PCB 15		U	0.00250		U	0.00200
PCB 24/27		U	0.00217		U	0.00173
PCB 16/32		U	0.00217		U	0.00173
PCB 34		U	0.00217		U	0.00173
PCB 29		U	0.00217		U	0.00173
PCB 54		U	0.00191		U	0.00153
PCB 26		U	0.00217		U	0.00173
PCB 25		U	0.00217		U	0.00173
PCB 31		U	0.00217		U	0.00173
PCB 50		U	0.00191		U	0.00153
PCB 28		U	0.00217		U	0.00173
PCB 20/33		U	0.00217		U	0.00173
PCB 53		U	0.00191		U	0.00153
PCB 51		U	0.00191		U	0.00153
PCB 22		U	0.00217		U	0.00173
PCB 45		U	0.00191		U	0.00153
PCB 46		U	0.00191		U	0.00153
PCB 69		U	0.00191		U	0.00153
PCB 52/73		U	0.00191		U	0.00153
PCB 49		U	0.00191		U	0.00153
PCB 47/48/75		U	0.00191		U	0.00153
PCB 104		U	0.00171		U	0.00137
PCB 35		U	0.00217		U	0.00173
PCB 44		U	0.00191		U	0.00153
PCB 59		U	0.00191		U	0.00153
PCB 37		U	0.00217		U	0.00173
PCB 42		U	0.00191		U	0.00153
PCB 71		U	0.00191		U	0.00153
PCB 41/64		U	0.00191		U	0.00153

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BL01XA**			**WWTP1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081211-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121526.D			A121549.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/11/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/20/2008		
Sample Volume (m^3):	0.402			0.539		
Percent Solid:	NA			1		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 40		U	0.00191		U	0.00153
PCB 103		U	0.00171		U	0.00137
PCB 67		U	0.00191		U	0.00153
PCB 100		U	0.00171		U	0.00137
PCB 63		U	0.00191		U	0.00153
PCB 74		U	0.00191		U	0.00153
PCB 70		U	0.00191		U	0.00153
PCB 66		U	0.00191		U	0.00153
PCB 93/95		U	0.00171		U	0.00137
PCB 91		U	0.00171		U	0.00137
PCB 56/60		U	0.00191		U	0.00153
PCB 92		U	0.00171		U	0.00137
PCB 84		U	0.00171		U	0.00137
PCB 90/101		U	0.00171		U	0.00137
PCB 99		U	0.00171		U	0.00137
PCB 119		U	0.00171		U	0.00137
PCB 83		U	0.00171		U	0.00137
PCB 97		U	0.00171		U	0.00137
PCB 117		U	0.00171		U	0.00137
PCB 81		U	0.00171		U	0.00137
PCB 87/115		U	0.00191		U	0.00153
PCB 85		U	0.00171		U	0.00137
PCB 136		U	0.00155		U	0.00124
PCB 77		U	0.00191		U	0.00153
PCB 110		U	0.00171		U	0.00137
PCB 154		U	0.00155		U	0.00124
PCB 82		U	0.00171		U	0.00137
PCB 151		U	0.00155		U	0.00124
PCB 135/144		U	0.00155		U	0.00124
PCB 124		U	0.00171		U	0.00137
PCB 147		U	0.00155		U	0.00124
PCB 107		U	0.00171		U	0.00137
PCB 123		U	0.00171		U	0.00137
PCB 149		U	0.00155		U	0.00124
PCB 118		U	0.00171		U	0.00137
PCB 134		U	0.00155		U	0.00124
PCB 114		U	0.00171		U	0.00137
PCB 131		U	0.00155		U	0.00124
PCB 122		U	0.00171		U	0.00137
PCB 165		U	0.00155		U	0.00124
PCB 146		U	0.00155		U	0.00124
PCB 188		U	0.00141		U	0.00113

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BL01XA**			**WWTP1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081211-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121526.D			A121549.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/11/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/20/2008		
Sample Volume (m^3):	0.402			0.539		
Percent Solid:	NA			1		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 153		U	0.00155		U	0.00124
PCB 132		U	0.00155		U	0.00124
PCB 105		U	0.00171		U	0.00137
PCB 141		U	0.00155		U	0.00124
PCB 179		U	0.00141		U	0.00113
PCB 137		U	0.00155		U	0.00124
PCB 176		U	0.00141		U	0.00113
PCB 130		U	0.00155		U	0.00124
PCB 138/163/164		U	0.00155		U	0.00124
PCB 158		U	0.00155		U	0.00124
PCB 129		U	0.00155		U	0.00124
PCB 178		U	0.00141		U	0.00113
PCB 175		U	0.00141		U	0.00113
PCB 187		U	0.00141		U	0.00113
PCB 183		U	0.00141		U	0.00113
PCB 128		U	0.00155		U	0.00124
PCB 167		U	0.00155		U	0.00124
PCB 185		U	0.00141		U	0.00113
PCB 174		U	0.00141		U	0.00113
PCB 177		U	0.00141		U	0.00113
PCB 202		U	0.00130		U	0.00104
PCB 171		U	0.00141		U	0.00113
PCB 156		U	0.00155		U	0.00124
PCB 173		U	0.00141		U	0.00113
PCB 157		U	0.00155		U	0.00124
PCB 201		U	0.00130		U	0.00104
PCB 172		U	0.00141		U	0.00113

Polychlorinated Biphenyls
8082M

Sample ID:	**WWTP1BL01XA**			**WWTP1BL02XA**		
Matrix:	XAD Tubes			XAD Tubes		
Preservation:	None			None		
Decanted:	None			None		
Batch QC:	QC081202-MB			QC081211-MB		
Preparation Method:	EPA 3540			EPA 3540		
Cleanup Method(s):	NA			NA		
Analysis Method:	EPA 8082			EPA 8082		
Instrument:	AMX			AMX		
File ID:	A121526.D			A121549.D		
Operator:	ERL			ERL		
Date Sampled:	11/5/2008			11/6/2008		
Date Received:	11/26/2008			11/26/2008		
Date Prepared:	12/4/2008			12/11/2008		
Date Cleanup:	NA			NA		
Date Analyzed:	12/18/2008			12/20/2008		
Sample Volume (m^3):	0.402			0.539		
Percent Solid:	NA			1		
Prep DF:	1			1		
Analysis DF:	1			1		
Injection Volume (µl):	1			1		
Extract Volume (µl):	2000			2000		
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL
PCB 197		U	0.00130		U	0.00104
PCB 180		U	0.00141		U	0.00113
PCB 193		U	0.00141		U	0.00113
PCB 191		U	0.00141		U	0.00113
PCB 200		U	0.00130		U	0.00104
PCB 170		U	0.00141		U	0.00113
PCB 190		U	0.00141		U	0.00113
PCB 199		U	0.00130		U	0.00104
PCB 196/203		U	0.00130		U	0.00104
PCB 189		U	0.00141		U	0.00113
PCB 208		U	0.00120		U	0.000960
PCB 195		U	0.00130		U	0.00104
PCB 207		U	0.00120		U	0.000960
PCB 194		U	0.00130		U	0.00104
PCB 205		U	0.00130		U	0.00104
PCB 206		U	0.00120		U	0.000960
PCB 209		U	0.00112		U	0.000894

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	76	
Decachlorobiphenyl	120	72

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Sample ID:	**QC081202-MB**			**QC081202-MBS2**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC081202-MB			QC081202-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8082			EPA 8082			
Instrument:	AMX			AMX			
File ID:	A121517.D			A121519.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	12/2/2008			12/2/2008			
Date Cleanup:	NA			NA			
Date Analyzed:	12/17/2008			12/17/2008			
Sample Volume (m^3):	0.474			1.00			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB Congeners:							
PCB 1		U	0.00251		U	0.00119	
PCB 2		U	0.00251		U	0.00119	
PCB 3		U	0.00251		U	0.00119	
PCB 4/10		U	0.00212		U	0.00100	
PCB 7/9		U	0.00212		U	0.00100	
PCB 6		U	0.00212		U	0.00100	
PCB 8		U	0.00212		U	0.00100	
PCB 5		U	0.00212		U	0.00100	
PCB 19		U	0.00184		U	0.000870	
PCB 12/13		U	0.00212		U	0.00100	
PCB 18		U	0.00184		U	0.000870	
PCB 17		U	0.00184		U	0.000870	
PCB 15		U	0.00212		U	0.00100	
PCB 24/27		U	0.00184		U	0.000870	
PCB 16/32		U	0.00184		U	0.000870	
PCB 34		U	0.00184		U	0.000870	
PCB 29		U	0.00184		U	0.000870	
PCB 54		U	0.00162		U	0.000767	
PCB 26		U	0.00184		U	0.000870	
PCB 25		U	0.00184		U	0.000870	
PCB 31		U	0.00184		U	0.000870	
PCB 50		U	0.00162		U	0.000767	
PCB 28		U	0.00184		U	0.000870	
PCB 20/33		U	0.00184	0.0143		0.000870	82
PCB 53		U	0.00162	0.0192		0.000767	125
PCB 51		U	0.00162		U	0.000767	
PCB 22		U	0.00184		U	0.000870	
PCB 45		U	0.00162		U	0.000767	
PCB 46		U	0.00162		U	0.000767	
PCB 69		U	0.00162		U	0.000767	
PCB 52/73		U	0.00162		U	0.000767	
PCB 49		U	0.00162		U	0.000767	
PCB 47/48/75		U	0.00162		U	0.000767	
PCB 104		U	0.00145		U	0.000686	
PCB 35		U	0.00184		U	0.000870	
PCB 44		U	0.00162		U	0.000767	
PCB 59		U	0.00162		U	0.000767	
PCB 37		U	0.00184		U	0.000870	
PCB 42		U	0.00162		U	0.000767	
PCB 71		U	0.00162		U	0.000767	
PCB 41/64		U	0.00162		U	0.000767	

Sample ID:	**QC081202-MB**			**QC081202-MBS2**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC081202-MB			QC081202-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8082			EPA 8082			
Instrument:	AMX			AMX			
File ID:	A121517.D			A121519.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	12/2/2008			12/2/2008			
Date Cleanup:	NA			NA			
Date Analyzed:	12/17/2008			12/17/2008			
Sample Volume (m^3):	0.474			1.00			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB 40		U	0.00162		U	0.000767	
PCB 103		U	0.00145		U	0.000686	
PCB 67		U	0.00162		U	0.000767	
PCB 100		U	0.00145		U	0.000686	
PCB 63		U	0.00162		U	0.000767	
PCB 74		U	0.00162		U	0.000767	
PCB 70		U	0.00162		U	0.000767	
PCB 66		U	0.00162		U	0.000767	
PCB 93/95		U	0.00145		U	0.000686	
PCB 91		U	0.00145		U	0.000686	
PCB 56/60		U	0.00162		U	0.000767	
PCB 92		U	0.00145		U	0.000686	
PCB 84		U	0.00145		U	0.000686	
PCB 90/101		U	0.00145		U	0.000686	
PCB 99		U	0.00145		U	0.000686	
PCB 119		U	0.00145		U	0.000686	
PCB 83		U	0.00145		U	0.000686	
PCB 97		U	0.00145		U	0.000686	
PCB 117		U	0.00145	0.00988		0.000686	72
PCB 81		U	0.00145		U	0.000686	
PCB 87/115		U	0.00162		U	0.000767	
PCB 85		U	0.00145		U	0.000686	
PCB 136		U	0.00131		U	0.000621	
PCB 77		U	0.00162	0.0132		0.000767	86
PCB 110		U	0.00145		U	0.000686	
PCB 154		U	0.00131		U	0.000621	
PCB 82		U	0.00145		U	0.000686	
PCB 151		U	0.00131		U	0.000621	
PCB 135/144		U	0.00131		U	0.000621	
PCB 124		U	0.00145		U	0.000686	
PCB 147		U	0.00131		U	0.000621	
PCB 107		U	0.00145		U	0.000686	
PCB 123		U	0.00145	0.0129		0.000686	94
PCB 149		U	0.00131		U	0.000621	
PCB 118		U	0.00145	0.0115		0.000686	84
PCB 134		U	0.00131		U	0.000621	
PCB 114		U	0.00145	0.0121		0.000686	88
PCB 131		U	0.00131		U	0.000621	
PCB 122		U	0.00145		U	0.000686	
PCB 165		U	0.00131		U	0.000621	
PCB 146		U	0.00131		U	0.000621	
PCB 188		U	0.00120		U	0.000567	

Polychlorinated Biphenyls
8082M

Sample ID:	**QC081202-MB**			**QC081202-MBS2**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC081202-MB			QC081202-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8082			EPA 8082			
Instrument:	AMX			AMX			
File ID:	A121517.D			A121519.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	12/2/2008			12/2/2008			
Date Cleanup:	NA			NA			
Date Analyzed:	12/17/2008			12/17/2008			
Sample Volume (m^3):	0.474			1.00			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB 153		U	0.00131		U	0.000621	
PCB 132		U	0.00131		U	0.000621	
PCB 105		U	0.00145	0.0104		0.000686	76
PCB 141		U	0.00131		U	0.000621	
PCB 179		U	0.00120		U	0.000567	
PCB 137		U	0.00131		U	0.000621	
PCB 176		U	0.00120		U	0.000567	
PCB 130		U	0.00131		U	0.000621	
PCB 138/163/164		U	0.00131		U	0.000621	
PCB 158		U	0.00131		U	0.000621	
PCB 129		U	0.00131	0.0127		0.000621	102
PCB 178		U	0.00120		U	0.000567	
PCB 175		U	0.00120		U	0.000567	
PCB 187		U	0.00120		U	0.000567	
PCB 183		U	0.00120		U	0.000567	
PCB 128		U	0.00131		U	0.000621	
PCB 167		U	0.00131	0.0115		0.000621	93
PCB 185		U	0.00120		U	0.000567	
PCB 174		U	0.00120		U	0.000567	
PCB 177		U	0.00120		U	0.000567	
PCB 202		U	0.00110		U	0.000521	
PCB 171		U	0.00120		U	0.000567	
PCB 156		U	0.00131	0.0110		0.000621	89
PCB 173		U	0.00120		U	0.000567	
PCB 157		U	0.00131	0.0127		0.000621	102
PCB 201		U	0.00110		U	0.000521	
PCB 172		U	0.00120		U	0.000567	

Polychlorinated Biphenyls
8082M

Sample ID:	**QC081202-MB**			**QC081202-MBS2**			
Matrix:	XAD Tubes			XAD Tubes			
Preservation:	None			None			
Decanted:	None			None			
Batch QC:	QC081202-MB			QC081202-MB			
Preparation Method:	EPA 3540			EPA 3540			
Cleanup Method(s):	NA			NA			
Analysis Method:	EPA 8082			EPA 8082			
Instrument:	AMX			AMX			
File ID:	A121517.D			A121519.D			
Operator:	ERL			ERL			
Date Sampled:	NA			NA			
Date Received:	NA			NA			
Date Prepared:	12/2/2008			12/2/2008			
Date Cleanup:	NA			NA			
Date Analyzed:	12/17/2008			12/17/2008			
Sample Volume (m^3):	0.474			1.00			
Percent Solid:	NA			NA			
Prep DF:	1.00			1.00			
Analysis DF:	1.00			1.00			
Injection Volume (µl):	1.00			1.00			
Extract Volume (µl):	2000			2000			
Units	Concentration (ppbv)	Q	EDL	Concentration (ppbv)	Q	EDL	% Recovery
PCB 197		U	0.00110		U	0.000521	
PCB 180		U	0.00120		U	0.000567	
PCB 193		U	0.00120		U	0.000567	
PCB 191		U	0.00120		U	0.000567	
PCB 200		U	0.00110		U	0.000521	
PCB 170		U	0.00120	0.0109		0.000567	96
PCB 190		U	0.00120		U	0.000567	
PCB 199		U	0.00110		U	0.000521	
PCB 196/203		U	0.00110		U	0.000521	
PCB 189		U	0.00120	0.0105		0.000567	93
PCB 208		U	0.00102		U	0.000483	
PCB 195		U	0.00110		U	0.000521	
PCB 207		U	0.00102		U	0.000483	
PCB 194		U	0.00110		U	0.000521	
PCB 205		U	0.00110		U	0.000521	
PCB 206		U	0.00102		U	0.000483	
PCB 209		U	0.000948		U	0.000449	

Extraction Surrogate Recoveries (%)		
Tetrachloro-m-xylene	72	80
Decachlorobiphenyl	108	112

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Appendix K – Deviations in QC Data for Tier II Chemical Testing

Deviations in Quality Control Data

VOCs & SVOCs by GC/MS

Surrogate percent recovery outside 50-120% laboratory criteria:

• QC081106-MB: QC sample ruptured during concentration step; toluene-d8 (43%), 4-Bromofluorobenzene (49%), Nitrobenzene-d5 (49%), 2,4,6-Tribromophenol (48%), p-Terphenyl-d14 (46%)

• LF1BM02XA: Toluene-d8 (40%), 4-Bromofluorobenzene (47%), 2-Fluorophenol (48%), Nitrobenzene-d5 (41%), 2,4,6-Tribromophenol (38%)

• LF3BG02XA: Toluene-d8 (47%)

• WWTP1BG01XA: 2,4,6-Tribromophenol (49%)

• LF3BM03XA: Toluene-d8 (45%)

• 1NGBL01XA: Phenol-d5 (133%)

• LF4BG01XA: 2,4,6-Tribromophenol (29%)

• QC090112-MBS: Phenol-d5 (126%)

• QC090114-MB: Phenol-d5 (128%)

• 2NGBL01XA: Phenol-d5 (125%)

Notes: The surrogate compound recovery criteria that META uses (50 – 120%) was established by the laboratory as a guideline. The surrogate compound recovery ranges recommended by EPA (National Functional Guidelines for Organic Data Review) tend to be broader. Further, the recovery range for VOCs, such as toluene-d8, by Soxhlet extraction tend to be lower than less volatile constituents.

Compound detected above reporting limit in method blank:

• QC081105-MB: Carbon tetrachloride

• QC081106-MB: Di-n-butylphthalate

• QC081204-MB: Di-n-butylphthalate

• QC081211-MB: Carbon tetrachloride, Di-n-butylphthalate

• QC090114-MB: Carbon tetrachloride, Di-n-butylphthalate

Note: Carbon tetrachloride is an artifact from the dichloromethane extraction solvent. Di-nbutylphthalate is a plasticizer from an unknown origin, but may be present in the XAD tubes.

Spike percent recovery outside 50-120% laboratory criteria:

• QC081105-MBS: QC sample was lost to breakage during sample preparation step. MBS was re-extracted as QC081106-MBS

• QC081106-MBS: QC sample ruptured during concentration step, a portion of the extract was lost. As a result, 14 compounds were recovered below the acceptable criteria

• QC081202-MBS: 6 volatile compounds and 1 reactive compound were recovered below the acceptable criteria

• QC090112-MBS: 4 volatile compounds and 1 reactive compound were recovered below the acceptable criteria. 7 compounds quantified from internal standard perylene-d12 were over-recovered due to low perylene-d12 response. 2 other compounds were also over recovered

Note: Several of the QC samples exhibited irregular boiling and unexpected bumping during the sample concentration step of early batches of samples due to boiling chip failure. Some extract was lost from some samples resulting in loss of surrogate and spike compounds. The reason for this could not be exactly determined, but appeared to be related to the XAD resin or moisture. The problem did not affect the samples and was mostly controlled in later batches of samples by an extract drying step and the use of additional boiling chips.

Pesticides and PCBs by GC/ECD

Surrogate percent recovery outside 50-120% laboratory criteria:

• QC081105-MBS1 (PEST): tetrachloro-m-xylene (TCMX) (48%)

• QC081105-MBS2 (PCB): TCMX (16%), DCB (20%)

• QC081106-MB: QC sample ruptured during concentration step; TCMX (44%)

• LF1BM01XA: Decachlorobiphenyl (DCB) (132%)

• LF1BM02XA: TCMX (32%), DCB (44%)

• LF1BG01XA: DCB (144%)

• LF1BL01XA: DCB (228%)

• LF2BM02XA: DCB (180%)

• LF3BG01XA: DCB (152%)

• QC081208-MB: QC sample was lost due to breakage

• LF2BM03XA: DCB (148%)

• WWTP1BL02XA: DCB (196%)

• 1NG02XA: DCB (124%)

• LF4BG01XA: DCB (140%)

• 2NG02XA: DCB (140%)

• LF4BL01XA: DCB (124%)

• 2NGBL01XA: DCB (132%)

Notes: The pesticide and PCB analyses were conducted using two GC columns. DCB was recovered at greater than 120% in several samples when calculated from the primary column as shown above. Recoveries were lower when determined using the confirmatory column responses, indicating an intermittent interference with DCB on the primary column. It is recommended that there be no qualification of the data based on DCB surrogate recovery.

Spike percent recovery outside 70-120% laboratory criteria:

• QC081105-MBS1 (PEST): All compounds under-recovered.

• QC081105-MBS2 (PCB): All compounds under-recovered.

• QC081202-MBS1 (PEST): 13 out of 20 compounds over-recovered. Appears to be due to

over-spiking.

• QC090112-MBS1 (PEST): endosulfan I (55%) and Endosulfan II (65%) under-recovered QC090112-MBS2 (PCB): 13 out of 14 compounds under-recovered (52-68%).

Note: LCS recoveries of spiked compounds in samples QC081105-MBS1 (pest) and QC081105-MBS2 (pcb) were low, suggesting poor recovery of native compounds. However, the recovery of the surrogate compounds was equivalently low. Since the surrogates and native compounds are added to the LCS separately, this result confirms a sample preparation effect. However, surrogate recoveries for the associated field samples were within acceptable ranges for most samples, indicating that the sample data is not biased and can be used as reported.

Carbonyls by HPLC

Compound detected above reporting limit in method blank:

• QC081113-MB: Acetone-DNPH

• QC081202-MBa: Acetone-DNPH

• QC081202-MBb: Acetone-DNPH

• QC090109-MBa: Acetone-DNPH

• QC090109-MBb: Acetone-DNPH

Note: Acetone is used actively in the laboratory, and was likely introduced to the blanks from the laboratory air.

Spike percent recovery outside 70-120% laboratory criteria:

• QC081126-MBS: Formaldehyde-DNPH (51%) under-recovered

• QC081202-MBSa: Formaldehyde-DNPH (49%) and Benzaldehyde-DNPH (48%) underrecovered; Acetone-DNPH (139%) over-recovered.

• QC081202-MBSb: Formaldehyde-DNPH (52%) and Benzaldehyde-DNPH (55%) underrecovered; Acetone-DNPH (134%) over-recovered.

• QC090109-MBSa: Formaldehyde-DNPH (55%) and Benzaldehyde-DNPH (41%) underrecovered; Acetone-DNPH (476%) over-recovered.

• QC090109-MBSb: Formaldehyde-DNPH (52%) and Benzaldehyde-DNPH (35%) underrecovered; Acetone-DNPH (258%) over-recovered.

Note: Elevated recoveries of acetone-DNPH were due to the acetone background in the laboratory. It is likely that any detections of acetone-DNPH in field samples at less than the levels in the associated method blank were false positives. For those samples with no detectable acetone-DNPH, the results are acceptable. The 70 to 120% recovery range was established by META as a guide based on other methods. Spiked blank (LCS) samples exhibited relatively low recoveries of formaldehyde-DNPH and benzaldehyde-DNPH as shown above. Based on the results of the LCS samples, the concentrations of those compounds in field samples may be biased low by a factor of about 2.

Appendix L – Biological Analyses

Detection of Live Bacteria via Most Probable Number

	Bacteria (#/100 scf)		
Sample ID	Anaerobic	Aerobic	Total
1NG01BC	<108*	1.08E+02	1.08E+02
1NG02BC	<170*	<170*	<340*
2NG01BC	4.39E+02	5.85E+03	6.29E+03
2NG02BC	<149*	5.46E+05	5.46E+05
3NG01BC	3.70E+04	5.84E+04	9.55E+04
3NG02BC	1.99E+05	4.19E+04	2.40E+05
LF1BM01BC	<170*	3.96E+02	3.96E+02
LF1BM02BC	<170*	<170*	<340*
LF1BM03BC	<92*	<92*	<184*
LF1BM04BC	<83*	<83*	<166*
LF2BM01BC	<76*	<76*	<152*
LF2BM02BC	<81*	<81*	<162*
LF2BM03BC	<184*	<184*	<368*
LF2BM04BC	<170*	<170*	<340*
LF3BM01BC	<102*	1.53E+03	1.53E+03
LF3BM02BC	<155*	<155*	<310*
LF3BM03BC	<117*	<117*	<234*
LF3BM04BC	<73*	<73*	<146*
LF3BM05BC	2.35E+02	<176	2.35E+02
LF3BM06BC	2.31E+03	6.47E+02	2.96E+03
LF3BM07BC	<140	<140	<280
LF3BM08BC	<123	<123	<246
LF4BG01BC	<90*	9.00E+01	9.00E+01
WWTP1BM01BC	<74*	1.10E+03	1.10E+03
WWTP1BM02BC	3.98E+02	1.45E+02	5.43E+02
WWTP1BM03BC	<66*	5.52E+02	5.52E+02
WWTP1BM04BC	1.69E+02	1.08E+03	1.25E+03

*no growth detected

Total Bacteria and Corrosion-Causing Bacteria via Quantitative Polymerase Chain Reaction

	Bacteria (# per 100 scf)			
Sample ID	Total Bacteria	Total acid-producing	Total iron-oxidizing	Total sulfate-reducing
1NG01BC	1.94E+06	6.55E+04	4.29E+03	BDL
1NG02BC	6.68E+05	1.45E+05	9.99E+03	BDL
2NG01BC	3.20E+06	BDL	2.16E+04	BDL
2NG02BC	2.06E+06	4.19E+04	9.49E+03	BDL
3NG01BC	4.86E+06	2.71E+05	BDL	BDL
3NG02BC	7.39E+06	4.99E+05	1.19E+04	BDL
LF1BM01BC	6.70E+06	2.73E+04	8.30E+02	BDL
LF1BM02BC	3.19E+06	2.75E+04	2.10E+04	BDL
LF1BM03BC	2.16E+06	8.50E+03	1.28E+04	BDL
LF1BM04BC	1.68E+06	2.92E+03	1.02E+04	BDL
LF2BM01BC	1.78E+07	2.97E+04	BDL	BDL
LF2BM02BC	3.75E+06	7.86E+03	BDL	BDL
LF2BM03BC	3.62E+04	5.13E+03	BDL	BDL
LF2BM04BC	2.98E+04	1.78E+03	BDL	BDL
LF3BM01BC	1.68E+06	4.66E+04	BDL	BDL
LF3BM02BC	2.22E+07	1.03E+04	1.36E+04	BDL
LF3BM03BC	8.79E+05	4.12E+04	BDL	BDL
LF3BM04BC	2.46E+04	BDL	BDL	BDL
LF3BM05BC	7.96E+06	1.83E+05	2.68E+04	2.87E+04
LF3BM06BC	8.23E+06	BDL	3.94E+04	4.02E+04
LF3BM07BC	4.84E+06	1.23E+05	BDL	2.47E+04
LF3BM08BC	5.29E+06	BDL	BDL	1.76E+04
LF4BG01BC	1.33E+06	1.90E+04	3.25E+03	BDL
WWTP1BM01BC	2.14E+06	2.25E+04	2.97E+03	BDL
WWTP1BM02BC	1.64E+06	6.54E+04	BDL	BDL
WWTP1BM03BC	9.85E+05	1.35E+04	BDL	BDL
WWTP1BM04BC	1.08E+06	1.91E+04	BDL	BDL

The results within this report relate only to the items tested.
Technical Contact: Sean Zhu (847) 768-0621

BDL below detection limit

Detection of Spores via NASA Protocol NHB 5340.1D mod.

	Spore (#/100 scf)		
Sample ID	Aerobic	Anaerobic	Total
1NG01BC	*	1.79E+03	1.79E+03
1NG02BC	*	*	*
2NG01BC	*	*	*
2NG02BC	*	*	*
3NG01BC	*	*	*
3NG02BC	*	*	*
LF1BM01BC	*	*	*
LF1BM02BC	*	*	*
LF1BM03BC	*	*	*
LF1BM04BC	*	*	*
LF2BM01BC	*	*	*
LF2BM02BC	*	*	*
LF2BM03BC	*	*	*
LF2BM04BC	*	*	*
LF3BM01BC	*	1.70E+02	1.70E+02
LF3BM02BC	*	*	*
LF3BM03BC	*	1.94E+02	1.94E+02
LF3BM04BC	*	4.87E+02	4.87E+02
LF3BM05BC	2.94E+02	*	2.94E+02
LF3BM06BC	9.24E+02	1.39E+03	2.31E+03
LF3BM07BC	*	*	*
LF3BM08BC	*	*	*
LF4BG01BC	*	*	*
WWTP1BM01BC	2.46E+03	*	2.46E+03
WWTP1BM02BC	3.62E+03	*	3.62E+03
WWTP1BM03BC	6.62E+03	*	6.62E+03
WWTP1BM04BC	*	1.21E+04	1.21E+04

*no growth detected

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF1BM01BC	Diaphorobacter sp. TPSY	CP001392	99	1
	Staphylococcus epidermidis clone 1C3	AM157417	99	3
	Staphylococcus epidermidis clone 1C4	AM157427	99	2
	Staphylococcus epidermidis CV64	AJ717377	99	2
	Staphylococcus epidermidis SLF1	AJ880759	99	1
	Staphylococcus epidermidis strain HNR19	EU373384	99	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	99	1
	Uncultured bacterium clone Oh3137A12B	EU137450	99	1
	Uncultured bacterium clone Sco2-20-228	AM883185	99	2
	Uncultured bacterium clone SD04E06	FM875681	99-100	3
	Uncultured Streptococcus sp. clone KL-27-1-5	AF408263	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF1BM02BC	Bacillus licheniformis ATCC 14580	CP000002	99	1
	Bacillus sp. isolate LD82	AM913908	99	1
	Comamonas sp. R-25014 strain R-25014	AM084026	99	1
	Staphylococcus epidermidis clone 1C3	AM157417	99	1
	Staphylococcus epidermidis clone 1C4	AM157427	99	1
	Streptococcus salivarius clone 1V5	AM157451	98-99	2
	Streptococcus salivarius clone 3C3	AM157419	98	3
	Uncultured bacterium clone Fe_C53	EU735743	99	1
	Uncultured bacterium clone MC02A07	FM874129	100	1
	Uncultured bacterium clone MSFC_4M9I	DQ447856	99	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	99	2
	Uncultured bacterium clone Oh_3127A3A	EU137578	99	1
	Uncultured bacterium clone SB01B02	FM874933	99	1
	Uncultured bacterium clone UASB22	AB329644	99	1
	Uncultured Streptococcus sp. clone AV_6J-G13	EU341245	99	1
	Uncultured Streptococcus sp. clone KL-27-1-5	AF408263	100	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank accession No.	% Identity	Frequency
LF1BM03BC	Bacillus licheniformis	AY017347	95	1
	Bacillus licheniformis strain CICC10180	AY794053	96	1
	Bacillus licheniformis strain HNL09	EU373344	99-100	2
	Bacillus pumilus strain SH-B23	FJ549016	99	1
	Bacillus sp. 24KZ	FJ615520	99	3
	Paenibacillus sp. isolate P163	AM183351	99	4
	Paenibacillus sp. isolate vortex	AJ131119	97	1
	Paenibacillus sp. UXO5-11	DQ522106	96-99	5
	Uncultured bacterium clone SBK_e07	EU778772	95	1

Sample ID	Closest relative in Genbank	Genbank accession No.	% Identity	Frequency
LF1BM04BC	Bacillus licheniformis strain CICC10180	AY794053	97	1
	Bacillus sp. 24KZ	FJ615520	99	2
	Paenibacillus glucanolyticus	AB073189	96-99	3
	Paenibacillus sp. isolate P163	AM183351	95-99	4
	Paenibacillus sp. UXO5-11	DQ522106	98-100	8

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF2BM01BC	Staphylococcus epidermidis clone 1C3	AM157417	99	3
	Staphylococcus epidermidis clone 1C4	AM157427	99	3
	Staphylococcus epidermidis RP62A	CP000029	99	2
	Staphylococcus epidermidis SLF1	AJ880759	99	4
	Staphylococcus sp. MO28	AY553115	99	1
	Uncultured bacterium clone MD02E11	FM874434	99	1
	Uncultured bacterium clone MD03F10	FM874570	99	1
	Uncultured bacterium clone SD04E06	FM875681	99-100	2
	Uncultured bacterium clone SD05A03	FM875705	99	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF2BM02BC	Bacillus sp. f-2-1	FJ561297	99	1
	Bacillus sp. FIA07	EU308307	99	1
	Bacillus sp. LD121	AM913912	99	1
	Bacillus sp. LD82	AM913908	99	1
	Cloacibacterium normanense strain tu29	FJ544401	99	1
	Comamonas sp. R-25014	AM084026	99	1
	Staphylococcus epidermidis clone 1C3	AM157417	99	3
	Staphylococcus epidermidis strain HNR19	EU373384	98	2
	Staphylococcus sp. MO28	AY553115	99	1
	Streptococcus salivarius clone 3C3	AM157419	99	1
	Uncultured bacterium clone MD03F10	FM874570	100	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	100	1
	Uncultured bacterium clone SD04E06	FM875681	99	1
	Uncultured Staphylococcus sp. clone 222	EU160502	99	1
	Uncultured Staphylococcus sp. clone B208	EU328035	100	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM01BC	Bacillus pumilus strain PRE19	EU880529	99	1
	Bacillus sp. isolate LD82	AM913908	99-100	3
	Diaphorobacter sp. TPSY	CP001392	100	1
	Pseudomonas luteola IAM 13000	D84002	99	1
	Staphylococcus epidermidis clone 1C4	AM157427	99	2
	Staphylococcus epidermidis isolate SLF1	AJ880759	99	1
	Uncultured bacterium clone EC3-1	EU741795	99	1
	Uncultured bacterium clone F1E	DQ860015	99-100	2
	Uncultured bacterium clone MA02H05	FM873691	99	1
	Uncultured bacterium clone MSFC_4M9I	DQ447856	99	1
	Uncultured bacterium clone Oh_3127A10C	EU137625	100	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	99	3
	Uncultured bacterium clone Oh_3137A2C	EU137383	99	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM02BC	Comamonas denitrificans strain 14	DQ836252	99	2
	Staphylococcus epidermidis clone 1C3	AM157417	99	2
	Staphylococcus epidermidis clone 1C4	AM157427	99	3
	Staphylococcus epidermidis CV64	AJ717377	99	1
	Staphylococcus epidermidis SLF1	AJ880759	99	2
	Staphylococcus epidermidis strain CU22	EF522128	99	3
	Staphylococcus epidermidis strain HNR19	EU373384	99	1
	Staphylococcus sp. MO28	AY553115	99	2
	Streptococcus thermophilus strain Y-2	DQ911624	100	1
	Uncultured bacterium clone MD02C10	FM874419	100	1
	Uncultured Mycobacterium sp. clone EHFS1_S04a	EU071480	100	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM01BC	Bacillus safensis strain HY1	FJ609722	99	1
	Bacillus sp. 24KZ	FJ615520	99	1
	Bacillus sp. 5LF 43TD	FM958154	96	1
	Bacillus sp. isolate LD82	AM913908	99	2
	Bacillus sp. KI-6	EU889238	98	1
	Bacillus sp. N6	AB043854	99	1
	Bacillus sp. Z8	FJ624482	95	1
	Paenibacillus glucanolyticus	AB073189	99	1
	Paenibacillus sp. isolate P163	AM183351	99	2
	Paenibacillus sp. PRE17	EU880530	99	1
	Paenibacillus sp. UXO5-11	DQ522106	99	2
	Streptococcus salivarius clone 3C3	AM157419	99	2
	Uncultured bacterium clone Oh_3127A2A	EU137570	100	1
	Uncultured bacterium clone SBK_e07_1	EU778772	97	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM02BC	Acinetobacter sp. Ic2	DQ421391	99	1
	Bacillus firmus	DQ355388	99	3
	Bacillus licheniformis isolate D14A3	FJ655808	99	1
	Bacillus licheniformis strain PB1	EU650317	94	1
	Bacillus sp. 50B11_3	EU308302	99-100	2
	Bacillus sp. CSS-4	DQ084465	99	2
	Bacillus sp. N6	AB043854	99	1
	Diaphorobacter sp. TPSY	CP001392	100	1
	Paenibacillus glucanolyticus	AB073189	99	3
	Paenibacillus sp. DFVB13	EU249588	96	1
	Paenibacillus sp. UXO5-11	DQ522106	99	2
	Uncultured bacterium clone Oh_3127A10C	EU137625	100	1
	Uncultured bacterium clone Oh_3127A3A	EU137578	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM04BC	Bacillus pumilus strain PRE19	EU880529	99	1
	Bacillus sp. isolate LD82	AM913908	99-100	5
	Paenibacillus glucanolyticus	AB073189	98	1
	Streptococcus salivarius clone 3C3	AM157419	99	1
	Uncultured Azospira sp. clone MFC-B162-G10	FJ393134	99	1
	Uncultured bacterium clone A_S_01_77	FJ470589	99	1
	Uncultured bacterium clone Oh_3127A10C	EU137625	100	2
	Uncultured bacterium clone Oh_3127A2A	EU137570	100	1
	Uncultured bacterium clone Oh_3127A3A	EU137578	99	2
	Uncultured bacterium clone Sco2-20-228	AM883185	99	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM03BC	Bacillus licheniformis	AY017347	99	1
	Bacillus sp. 50B11_3	EU308302	100	1
	Bacillus sp. Epbas6	EU675997	99	1
	Bacillus sp. isolate LD82	AM913908	99	1
	Bacillus sp. N6	AB043854	99	1
	Diaphorobacter sp. TPSY	CP001392	99	1
	Paenibacillus glucanolyticus	AB073189	98	2
	Streptococcus salivarius clone 1V5	AM157451	99	1
	Uncultured bacterium clone 6C233393	EU805385	99	1
	Uncultured bacterium clone MA03F08	FM873726	99	1
	Uncultured bacterium clone MSFC_4M9I	DQ447856	99	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	99	1
	Uncultured bacterium clone Oh_3127A3A	EU137578	99-100	3
	Uncultured Comamonadaceae bacterium clone MFC-B162-H08	FJ393143	99	1
	Uncultured Gemella sp. clone EHFS1_S01h	EU071472	99	1
	Uncultured Pseudomonadaceae bacterium clone D004023B01	EU721796	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM03BC	Bacillus firmus	DQ355388	97	2
	Bacillus licheniformis isolate D14A3	FJ655808	99	1
	Bacillus sp. 24KZ	FJ615520	99	1
	Bacillus sp. 5LF 43TD	FM958154	97	1
	Paenibacillus glucanolyticus	AB073189	97-98	2
	Paenibacillus sp. PRE17	EU880530	98	1
	Paenibacillus sp. UXO5-11	DQ522106	95-99	10
	Uncultured Bacillus sp. clone CBHOS-08	EU371582	99	1
	Uncultured bacterium clone A_D_02_42	FJ470468	91	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM04BC	Bacillus licheniformis	AY017347	97	1
	Bacillus licheniformis strain HNL09	EU373344	99-100	3
	Bacillus licheniformis strain LQ98	EF472268	96-99	2
	Bacillus licheniformis strain PB1	EU650317	99	1
	Bacillus licheniformis strain TCCC11009	EU231623	99	1
	Bacillus sp. 24KZ	FJ615520	99	1
	Paenibacillus glucanolyticus	AB073189	98-99	2
	Paenibacillus sp. isolate P163	AM183351	99	2
	Paenibacillus sp. UXO5-11	DQ522106	96-99	3
	Uncultured bacterium clone 6C233393	EU805385	99	1
	Uncultured Bacteroidetes bacterium clone RB_16f	EF123551	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF2BM03BC	Bacillus licheniformis	AB196350	96	1
	Bacillus sp. 24KZ	FJ615520	99	1
	Bacillus sp. 44-3	FJ607048	99	1
	Paenibacillus glucanolyticus	AB073189	97	1
	Paenibacillus sp. isolate P163	AM183351	99	5
	Paenibacillus sp. UXO5-11	DQ522106	99	8
	Uncultured bacterium clone SBK_e07_1	EU778772	97	1
	Uncultured bacterium isolate BF0001C143	AM697302	98	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF2BM04BC	Bacillus licheniformis	AY017347	97	1
	Bacillus licheniformis isolate D14A3	FJ655808	99	1
	Bacillus licheniformis strain AnBa7	AY887129	96	1
	Bacillus licheniformis strain PB1	EU650317	99	1
	Bacillus pumilus	AY946289	96	1
	Bacillus pumilus strain SH-B23	FJ549016	97	1
	Bacillus sp. 24KZ	FJ615520	99	4
	Bacillus sp. isolate LD82	AM913908	99	2
	Paenibacillus glucanolyticus	AB073189	95-99	2
	Paenibacillus glucanolyticus strain EIII-4	FJ613558	99	1
	Paenibacillus sp. isolate P163	AM183351	96	1
	Paenibacillus sp. UXO5-11	DQ522106	99	2
	Uncultured bacterium clone SBK_e07_1	EU778772	95	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
1NG01BC	Acidovorax sp. strain R-24607	AM084011	99	1
	Bacillus licheniformis isolate D14A3	FJ655808	99	1
	Bacillus sp. 44-3	FJ607048	99	4
	Bacillus sp. f-2-1	FJ561297	99	1
	Bacillus sp. YDC6-J	EU781523	98-99	3
	Bacillus sp. Z8	FJ624482	97	1
	Paenibacillus glucanolyticus	AB073189	97-99	2
	Paenibacillus sp. isolate P163	AM183351	95-99	2
	Paenibacillus sp. UXO5-11	DQ522106	99	2
	Streptococcus sanguinis strain CCRI-282	EU156789	99	1
	Uncultured bacterium clone SBK_e07_1	EU778772	96	1
	Uncultured bacterium clone SR21	DQ298277	96	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
1NG02BC	Bacillus licheniformis isolate D14A3	FJ655808	99	1
	Bacillus licheniformis strain F1	EU257696	98	1
	Bacillus pumilus strain SH-B23	FJ549016	100	1
	Bacillus sp. 24KZ	FJ615520	99	2
	Bacillus sp. isolate Bt 23	AJ971873	97	1
	Bacillus sp. PK-1	EU685820	98	1
	Paenibacillus glucanolyticus	AB073189	99	3
	Paenibacillus sp. isolate P163	AM183351	96	1
	Paenibacillus sp. UXO5-11	DQ522106	99	4
	Uncultured bacterium clone AR42	EU008389	95	1
	Uncultured bacterium clone Oh_3127A2A	EU137570	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF4BG01BC	Bacillus licheniformis isolate D14A3	FJ655808	100	1
	Bacillus licheniformis strain pJ	FJ614259	98	1
	Bacillus sp. 24KZ	FJ615520	99	4
	Bacillus sp. 44-3	FJ607048	100	3
	Bacillus sp. isolate Bt 23	AJ971873	97	1
	Bacillus sp. strain 5LF 43TD	FM958154	95	1
	Paenibacillus glucanolyticus	AB073189	99	4
	Paenibacillus sp. isolate P163	AM183351	95	1
	Paenibacillus sp. UXO5-11	DQ522106	99	2
	Uncultured bacterium clone AR42	EU008389	95	1
	Uncultured bacterium clone SBK_e07_1	EU778772	97	1

Identification of Bacteria

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
2NG01BC	Acidovorax sp. strain R-24607	AM084011	99	1
	Bacillus sp. 24KZ	FJ615520	99	4
	Bacillus sp. C3(2008)	FJ535470	99	1
	Paenibacillus glucanolyticus	AB073189	99	4
	Paenibacillus sp. UXO5-11	DQ522106	97-100	7
	Uncultured bacterium clone A02_CR02_full	AM911348	99	1
	Uncultured bacterium clone SBK_e07_1	EU778772	97	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
2NG02BC	Bacillus licheniformis isolate LB 6C	EF113324	99	2
	Bacillus licheniformis strain CICC10180	AY794053	99	1
	Bacillus licheniformis strain WX-02	EU564336	99	1
	Bacillus sp. 24KZ	FJ615520	99	5
	Bacillus sp. 5LF 43TD	FM958154	99	1
	Bacillus sp. LM4	EU821340	99	1
	Bacillus sp. NTU-06	EU159468	96	1
	Bacillus sp. YDC6-J	EU781523	98	1
	Paenibacillus glucanolyticus	AB073189	99	1
	Paenibacillus sp. isolate P163	AM183351	98-99	2
	Uncultured bacterium clone SBK_e07_1	EU778772	95-96	3

Identification of Spores

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM01BC	Bacillus licheniformis ATCC 14580	CP000002	99	1
	Bacillus licheniformis strain CSB03	FJ189781	99	1
	Bacillus licheniformis strain TCCC11009	EU231623	100	1
	Bacillus licheniformis strain YP1A	EF105377	100	1
	Bacillus sp. 3LF 16T	FM958173	100	1
	Bacillus sp. CSS-4	DQ084465	99-100	2
	Bacillus sp. Epbas6	EU675997	99	2

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM01BC	Paenibacillus glucanolyticus	AB073189	98-99	10

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM02BC	Paenibacillus glucanolyticus	AB073189	98	6
	Paenibacillus sp. PRE17	EU880530	98	2
	Paenibacillus sp. UXO5-11	DQ522106	99	2

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM03BC	Paenibacillus glucanolyticus	AB073189	99	7
	Paenibacillus sp. PRE17	EU880530	98	2
	Paenibacillus sp. UXO5-11	DQ522106	99	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
WWTP1BM04BC	Paenibacillus glucanolyticus	AB073189	98-99	7
	Paenibacillus sp. PRE17	EU880530	98	1
	Paenibacillus sp. UXO5-11	DQ522106	99	1

Identification of Spores

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM03BC	Bacillus firmus strain AU9	EF032672	99-100	6
	Bacillus firmus strain FSL_h8462	EU147171	100	1
	Bacillus sp. PK-1	EU685820	99	2
	Bacillus sp. YDC6-J	EU781523	100	1

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
LF3BM04BC	Bacillus firmus strain AU9	EF032672	99	6
	Bacillus sp. 5.5LF 6TD	FM958170	99	1
	Bacillus sp. PK-1	EU685820	99-100	3

Sample ID	Closest relative in Genbank	Genbank Accession No.	% Identity	Frequency
1NG01BC	Paenibacillus glucanolyticus	AB073189	98-99	8
	Paenibacillus glucanolyticus strain EIII-4	FJ613558	99	1
	Paenibacillus sp. UXO5-11	DQ522106	99	1

Appendix M – Second Tier Chemical Testing Precision Study Results

META Environmental, Inc.
CCV Precision Study - SVOC Curve (0.5 µg/mL - 140.0 µg/mL)
Method EPA 8082

Date Acquired	12/17/2008	12/18/2008	12/18/2008	12/19/2008	12/20/2008	3/13/2009	5/4/2009			
Data File Name	D121703.D	D121718.D	D121732.D	D121747.D	D121762.D	D031212.D	D050414.D			
Sample Name	A770	A770	A770	A770	A770	A860	A860	Mean	Standard Deviation	% RSD
6) 1,1,1-Trichloroethane	27.8190	26.5320	27.4570	28.5660	26.3840	25.9350	21.9200	26.3733	2.1649	**8.209**
7) 1,2-Dichloroethane	25.9520	26.4560	27.5120	29.3770	27.0570	26.5250	22.5870	26.4951	2.0504	**7.739**
8) 1,1-Dichloropropene	24.8050	22.8770	22.3320	21.9580	21.1390	26.4220	23.9770	23.3586	1.8273	**7.823**
9) Benzene	24.8740	23.7210	21.6140	21.5470	24.7530	27.9650	24.4080	24.1260	2.1945	**9.096**
10) Carbon Tetrachloride	28.5710	26.3380	29.1720	30.8350	28.5150	26.1780	20.9770	27.2266	3.1942	**11.732**
12) 1,2-Dichloropropane	25.2240	25.1260	23.2310	23.6270	22.2360	26.2760	24.4050	24.3036	1.3728	**5.649**
13) Trichloroethene	28.1110	26.5510	27.6030	28.4230	24.7260	26.7220	24.2810	26.6310	1.6079	**6.038**
14) Dibromomethane	29.1910	29.0080	28.5930	30.1360	25.8070	25.8700	22.4070	27.2874	2.7210	**9.972**
15) Bromodichloromethane	28.9500	29.3320	30.1380	31.5090	27.2700	26.3270	21.7210	27.8924	3.2207	**11.547**
16) Pyridine	23.3940	23.4330	23.1220	24.0150	25.2650	25.8560	24.0870	24.1674	1.0260	**4.245**
17) cis-1,3-Dichloropropene	25.4870	25.6200	25.1320	26.1310	26.0420	27.1190	23.6730	25.6006	1.0591	**4.137**
18) N-nitrosodimethylamine	25.2770	24.5360	22.0780	22.2970	23.3240	24.6360	24.1760	23.7606	1.2250	**5.156**
21) Toluene	28.1890	27.0640	27.1780	26.0870	26.8730	27.0570	25.7130	26.8801	0.8019	**2.983**
22) trans-1,3-Dichloropropene	27.3600	27.1480	27.4790	26.9290	27.2040	25.8760	23.5310	26.5039	1.4143	**5.336**
23) 1,1,2-Trichloroethane	27.0900	27.0320	26.5170	25.6330	25.0300	25.2500	25.9430	26.0707	0.8293	**3.181**
24) 1,3-Dichloropropane	25.7330	26.8020	25.7700	24.9870	25.0060	25.2430	26.3500	25.6987	0.6882	**2.678**
26) 1,2-Dibromoethane	26.6760	27.6460	27.0540	26.9150	26.1360	25.0810	26.1700	26.5254	0.8240	**3.106**
27) Tetrachloroethene	29.0970	29.4590	29.9170	30.6390	28.0750	26.2650	24.5010	28.2790	2.1865	**7.732**
28) Chlorobenzene	27.3480	27.5790	27.1380	27.1350	27.4220	26.1320	25.3970	26.8787	0.8054	**2.996**
29) 1,1,1,2-Tetrachloroethane	28.3700	29.8850	29.8590	31.0150	30.5410	26.0320	23.7550	28.4939	2.6733	**9.382**
30) Ethylbenzene	27.5600	29.0040	28.5220	28.5000	28.8580	26.6810	24.5150	27.6629	1.6098	**5.820**
31) m/p-Xylenes	29.3930	29.6320	29.3570	30.1590	29.4440	26.9200	23.1040	28.2870	2.5084	**8.868**
32) Bromoform	28.5340	30.9460	30.3100	32.2530	30.3500	26.4030	23.1920	28.8554	3.1213	**10.817**
33) Styrene	27.0460	27.3060	26.9490	27.0250	27.3340	25.4120	25.7830	26.6936	0.7699	**2.884**
34) o-Xylene	27.9700	28.8510	28.1050	28.4340	28.2560	26.3050	23.8510	27.3960	1.7571	**6.414**
35) 1,1,2,2-Tetrachloroethane	25.4520	25.4100	24.6530	25.2070	25.6020	25.1130	25.7060	25.3061	0.3543	**1.400**
36) 1,2,3-Trichloropropane	27.2940	28.0450	26.9730	27.3250	26.4720	25.0340	23.6660	26.4013	1.5294	**5.793**
37) Isopropylbenzene	28.2690	29.1390	28.8020	29.6000	29.0250	26.8520	23.6300	27.9024	2.0805	**7.456**
40) Bromobenzene	25.6770	24.0560	23.4000	22.7220	25.1130	25.4860	23.9590	24.3447	1.1125	**4.570**
41) 2-Chlorotoluene	25.5320	24.3260	24.0310	23.7360	26.8680	25.5910	24.8830	24.9953	1.0898	**4.360**
42) n-Propylbenzene	25.1150	24.6140	24.1090	23.5110	25.3660	26.6400	24.8110	24.8809	0.9944	**3.997**
43) 4-Chlorotoluene	25.2470	24.4430	24.3570	23.6920	26.1970	25.7610	25.6910	25.0554	0.9095	**3.630**
44) 1,3,5-Trimethylbenzene	26.2710	25.8810	25.6330	25.3530	27.1810	26.6050	23.4550	25.7684	1.1905	**4.620**
45) tert-Butylbenzene	25.8560	25.5510	25.2650	25.7190	25.8040	26.2860	22.1570	25.2340	1.3918	**5.516**
46) 1,2,4-Trimethylbenzene	26.2210	25.3840	25.1120	25.4850	25.5360	26.4340	22.8380	25.2871	1.1780	**4.659**
47) sec-Butylbenzene	27.3590	27.2230	27.0220	27.6870	27.4610	26.2460	21.5590	26.3653	2.1686	**8.225**
50) Phenol	25.0130	23.3160	22.4640	22.6000	23.4890	25.6780	25.4700	24.0043	1.3571	**5.654**
51) bis(2-Chloroethyl)ether	23.6240	22.5070	22.1170	21.9470	23.4930	25.1020	25.5960	23.4837	1.4308	**6.093**
52) Aniline	22.9930	21.6580	21.2540	21.2640	22.3200	26.2410	25.4360	23.0237	2.0314	**8.823**
53) 2-Chlorophenol	24.6470	24.1890	23.5630	23.9020	24.8310	24.7270	25.5150	24.4820	0.6510	**2.659**
54) 1,3-Dichlorobenzene	52.6720	51.1970	52.3880	51.9050	52.1270	53.4930	44.6580	51.2057	2.9718	**5.804**
55) 1,4-Dichlorobenzene	55.2860	53.9990	53.2420	54.5090	53.3640	52.2840	43.3970	52.2973	4.0407	**7.726**
56) p-Isopropyltoluene	26.0590	25.4800	25.4090	25.1970	26.1590	26.3860	23.3700	25.4371	1.0117	**3.977**
57) Benzyl Alcohol	26.3780	23.8490	24.4420	24.4430	24.3050	25.5420	24.0240	24.7119	0.9123	**3.692**
58) 2-Methylphenol (m-cresol)	24.0870	23.5070	22.9800	22.8450	23.7330	26.1450	25.6000	24.1281	1.2743	**5.281**
59) 1,2-Dichlorobenzene	53.6210	51.4340	51.9910	51.9250	50.5710	53.5640	45.4240	51.2186	2.7812	**5.430**
60) 3,4-Methylphenol (o,p-cres	25.2570	24.6220	24.1250	25.0920	23.9810	25.7440	23.1440	24.5664	0.8854	**3.604**
61) bis(2-chloroisopropyl)ethe	23.6640	21.0820	20.1770	19.6690	20.1360	25.5020	25.7430	22.2819	2.6319	**11.812**
62) n-Butylbenzene	24.9550	24.2810	23.1720	23.7590	24.1120	26.7870	23.3560	24.3460	1.2309	**5.056**
63) N-nitroso-di-n-propylamine	26.4770	25.2940	24.7580	25.2150	24.3070	25.9270	22.6270	24.9436	1.2464	**4.997**
64) Hexachloroethane	25.4930	23.9710	25.2630	24.3810	23.9080	25.3520	23.6030	24.5673	0.7865	**3.201**
66) 1,2-Dibromo-3-Chloropropan	27.0390	28.2220	27.1240	28.0190	28.3720	26.0640	23.3510	26.8844	1.7573	**6.537**
68) Nitrobenzene	28.1520	27.2950	26.7250	25.8450	26.4900	26.0160	22.9750	26.2140	1.6293	**6.215**
69) Isophorone	26.8970	26.1680	25.2430	25.9150	26.3280	26.4590	24.6770	25.9553	0.7602	**2.929**
70) 2-Nitrophenol	28.1220	28.3200	27.3250	28.3190	28.1940	25.7450	26.4500	27.4964	1.0348	**3.763**
71) 2,4-Dimethylphenol	26.5500	25.8580	26.1790	26.6530	25.5830	26.5130	23.3300	25.8094	1.1614	**4.500**
72) bis(2-Chloroethoxy)methane	27.6620	26.4240	25.8610	26.1870	26.7220	25.6950	25.7800	26.3330	0.6932	**2.632**
73) 1,2,4-Trichlorobenzene	59.7240	60.6830	61.3230	61.4610	61.2730	53.9960	44.8870	57.6210	6.2032	**10.766**
74) Naphthalene	57.5360	57.0390	55.8500	56.7980	55.5650	55.2150	43.8270	54.5471	4.8012	**8.802**
75) 2,4-Dichlorophenol	28.2640	29.7880	29.0730	30.5140	31.4600	26.2210	23.9940	28.4734	2.5934	**9.108**
76) 4-Chloroaniline	26.8500	25.9650	26.1230	26.3470	27.5880	26.8850	25.7760	26.5049	0.6364	**2.401**
77) Hexachlorobutadiene	63.5150	66.0380	67.9500	69.1770	66.9670	54.2060	44.7020	61.7936	9.0356	**14.622**
78) 1,2,3-Trichlorobenzene	29.7570	30.2200	29.7880	30.5520	30.5510	26.7570	24.2590	28.8406	2.4092	**8.354**
79) 4-Chloro-3-methylphenol	29.0500	29.7100	29.1920	30.5820	31.3240	26.1970	23.0630	28.4454	2.8694	**10.087**
80) 2-Methylnaphthalene	28.6460	28.5590	28.0590	29.3340	29.7360	26.9410	24.2480	27.9319	1.8571	**6.649**
81) 1-Methylnaphthalene	28.2410	28.6090	28.2180	28.4220	29.5930	26.7270	24.3700	27.7400	1.7086	**6.159**
83) Hexachlorocyclopentadiene	25.9970	23.2360	28.4350	19.5650	15.5860	27.5920	23.9080	23.4741	4.5768	**19.497**
84) 2,4,6-Trichlorophenol	27.2200	28.7410	28.8600	29.4420	30.8610	25.3710	25.1690	27.9520	2.1241	**7.599**
85) 2,4,5-Trichlorophenol	27.9510	29.8590	30.6220	29.5880	30.1860	25.0480	23.8360	28.1557	2.6931	**9.565**
86) Diphenylamine	26.1490	26.0490	27.2240	26.9710	26.7200	26.6380	23.6740	26.2036	1.1910	**4.545**
87) Azobenzene	27.0260	22.9600	25.7990	25.3570	25.7300	26.4600	25.2130	25.5064	1.2875	**5.048**
89) 2-Chloronaphthalene	25.9670	26.5650	26.7210	26.5240	27.2520	26.3500	25.5370	26.4166	0.5484	**2.076**

90) 2-Nitroaniline	24.4980	24.8330	25.1320	24.6230	25.2870	25.3520	24.5400	24.8950	0.3606	**1.448**
91) 1,4-Dinitrobenzene	24.8720	25.8710	25.4840	25.7400	27.1650	24.4820	24.2100	25.4034	0.9998	**3.936**
92) Dimethylphthalate	26.6690	27.9190	28.0510	27.7940	25.5560	27.0070	23.7300	26.6751	1.5668	**5.874**
93) 1,3-Dinitrobenzene	24.9700	26.1530	26.3110	26.1280	26.3480	24.3690	24.9900	25.6099	0.8097	**3.162**
94) Acenaphthylene	26.5610	26.6580	27.3120	26.7430	26.6180	26.5440	23.7000	26.3051	1.1788	**4.481**
95) 2,6-dinitrotoluene	25.3390	25.2590	26.6520	26.9630	26.5720	24.4350	24.2890	25.6441	1.0921	**4.259**
96) 1,2-Dinitrobenzene	23.8190	25.4280	25.2690	25.1170	24.9220	24.0200	25.2730	24.8354	0.6475	**2.607**
97) 3-Nitroaniline	21.4180	23.1330	23.3990	22.7260	22.2000	24.0920	26.5490	23.3596	1.6471	**7.051**
98) Acenaphthene	26.3960	26.1570	27.0480	26.3700	26.0750	26.1980	24.6730	26.1310	0.7191	**2.752**
99) 2,4-Dinitrophenol	27.7420	30.2200	28.6570	28.4540	29.1100	23.9320	24.1540	27.4670	2.4568	**8.945**
100) 4-Nitrophenol	30.1390	33.7090	33.8750	32.8430	32.1980	25.0040	23.6210	30.1984	4.2246	**13.989**
101) Dibenzofuran	25.9180	26.5050	27.1540	26.7500	26.5880	26.2210	24.7360	26.2674	0.7797	**2.968**
102) 2,4-dinitrotoluene	25.5150	26.5320	27.0080	26.4420	27.0230	24.4900	24.0830	25.8704	1.1982	**4.631**
103) 2,3,4,6-Tetrachlorophenol	28.5570	28.9910	30.4860	30.1530	31.0490	25.2550	24.7030	28.4563	2.5282	**8.885**
104) 2,3,5,6-Tetrachlorophenol	28.9290	27.8230	30.9490	29.9740	30.4440	24.5460	23.1620	27.9753	3.0219	**10.802**
105) Diethylphthalate	27.3250	27.9180	28.5840	27.6260	28.1810	26.1980	23.8160	27.0926	1.6312	**6.021**
106) 4-Chlorophenyl-phenylether	27.5680	28.2680	29.4000	28.2290	28.6220	25.4960	24.6260	27.4584	1.7444	**6.353**
107) Fluorene	25.7600	26.3020	26.9730	26.8260	26.9640	26.0960	24.4430	26.1949	0.9014	**3.441**
108) 4-Nitroaniline	22.6800	23.9060	23.1930	24.8780	23.9100	24.4240	27.5730	24.3663	1.5910	**6.530**
110) 4,6-Dinitro-2-methylphenol	25.6180	26.3910	26.0350	25.7190	26.2160	24.4080	24.6740	25.5801	0.7621	**2.979**
111) n-Nitrosodiphenylamine	26.7690	25.9660	25.8090	26.2590	26.6110	27.1140	24.5560	26.1549	0.8394	**3.209**
113) 4-Bromophenyl phenyl ether	26.8930	28.1190	27.1400	28.2050	28.9160	25.8940	25.9540	27.3030	1.1605	**4.251**
114) Hexachlorobenzene	29.1160	27.9280	28.9600	28.7810	28.9220	26.3390	26.1280	28.0249	1.2840	**4.581**
115) Pentachlorophenol	29.1520	31.4480	30.9470	30.5000	32.0270	25.4100	24.6690	29.1647	2.9630	**10.159**
116) Phenanthrene	26.5070	26.6220	26.3990	25.9590	26.1150	26.9330	25.7180	26.3219	0.4169	**1.584**
117) Anthracene	27.2230	26.0330	26.3850	26.5700	26.0670	26.8040	25.0560	26.3054	0.6903	**2.624**
118) Carbazole	26.1100	25.9220	24.7720	24.9640	25.0750	27.2130	25.2640	25.6171	0.8604	**3.359**
119) Di-n-butylphthalate	39.7060	38.2860	37.0980	37.1760	38.4460	27.6620	25.0180	34.7703	5.8747	**16.896**
120) Bis(2-ethylhexyl) adipate	26.2200	23.9840	23.7030	22.5480	25.0160	27.4440	25.4740	24.9127	1.6513	**6.628**
121) Fluoranthene	27.2050	27.5030	27.2510	26.8360	27.5360	27.4420	25.3150	27.0126	0.7859	**2.909**
122) Pyrene	28.1320	26.6510	26.7660	26.9900	27.5250	27.1130	25.1460	26.9033	0.9236	**3.433**
125) Butylbenzylphthalate	26.6880	26.0030	25.8480	26.3060	27.0890	26.0850	26.1830	26.3146	0.4328	**1.645**
126) Benz[a]anthracene	28.1790	27.6160	27.6980	28.3940	28.5170	26.3770	25.4400	27.4601	1.1432	**4.163**
127) Chrysene	26.9860	27.3590	27.0210	26.2920	27.2070	26.3860	25.8930	26.7349	0.5453	**2.040**
128) bis(2-Ethylhexyl)phthalate	26.3250	25.5610	24.9640	25.1530	25.9490	26.3160	26.0870	25.7650	0.5496	**2.133**
130) Di-n-octylphthalate	26.4950	26.3480	25.1920	25.5370	26.4830	25.1300	24.8500	25.7193	0.7065	**2.747**
131) Benzo[b]fluoranthene	27.3770	26.8340	26.2010	28.3000	29.0320	24.1920	24.7650	26.6716	1.7679	**6.628**
132) Benzo[k]fluoranthene	27.6290	29.4180	27.6890	26.7040	27.6230	25.2820	24.1270	26.9246	1.7492	**6.497**
133) Benzo[a]pyrene	27.6230	28.0210	27.3600	26.8900	28.6180	24.5200	24.6670	26.8141	1.6094	**6.002**
134) Indeno[1,2,3-cd]pyrene	27.8530	28.5120	32.8910	26.2160	29.0790	25.0370	24.6460	27.7477	2.8324	**10.208**
135) Dibenz[a,h]anthracene	27.5270	28.2100	27.2900	25.5680	27.9710	24.8540	24.6770	26.5853	1.5065	**5.667**
136) Benzo[g,h,i]perylene	27.3380	28.6180	27.8050	25.3180	28.2880	24.5000	24.7590	26.6609	1.7481	**6.557**

META Environmental, Inc.
Precision Study 1µg/mL (0.1- 20 µg/mL)
EPA Method: 8315A

Date Acquired	11/19/2008	11/26/2008	12/2/2008	12/8/2008	12/15/2008	12/15/2008	1/13/2009	1/14/2009			
Data File Name	1607-1615	1868-1873	1882-1887	1949-1954	2054-2059	2063-2095	2171-2206	2210-2215			
Sample Name	A844	A844	A844	A844	A844	A844	A844	A844			
Extraction Personell: RS											
Analysis Personell: RS											
									Mean	Standard Deviation	%RSD
Formaldehyde- DNPH	1.0676	1.0634	0.9885	0.9461	0.9616	1.0544	0.9832	0.9329	0.9997	0.0546	**5.458**
Acetaldehyde- DNPH	1.0461	1.0467	0.9582	0.9267	0.9587	1.0407	0.9844	0.9584	0.9900	0.0478	**4.824**
Acetone- DNPH	1.0158	1.0442	0.9814	0.9664	1.0118	1.0428	0.9248	0.9985	0.9982	0.0402	**4.023**
Acrolein- DNPH	1.0260	1.0528	0.9967	0.9315	0.9841	1.0506	0.9338	0.9947	0.9962	0.0467	**4.691**
Propionaldehyde- DNPH	0.9808	1.0169	0.9867	0.9301	0.9549	1.0729	0.9226	0.9485	0.9767	0.0498	**5.101**
Crotonaldehyde- DNPH	1.0287	0.9853	0.9287	0.9726	0.9372	1.0857	0.9728	0.9576	0.9836	0.0515	**5.234**
2-Butanone- DNPH	0.9787	0.9684	0.9399	0.8987	1.0029	1.0310	0.8989	0.9256	0.9555	0.0481	**5.038**
Methacrolein- DNPH	1.0044	1.0063	0.9220	0.9066	0.9346	1.0511	0.9256	0.9579	0.9636	0.0513	**5.326**
Butanal- DNPH	1.0311	1.0031	0.9535	0.9255	0.9820	1.1489	0.9833	0.9298	0.9946	0.0719	**7.227**
Benzaldehyde- DNPH	0.9423	1.0050	0.9111	0.8991	0.9478	0.9942	0.9065	0.8946	0.9376	0.0429	**4.574**
Pentanal- DNPH	1.0051	1.0246	0.9811	0.9566	0.9666	1.0720	0.8929	0.9296	0.9786	0.0560	**5.719**
p- Tolualdehyde- DNPH	0.9646	1.0284	0.9522	0.8734	0.9901	1.0704	0.9049	0.9179	0.9627	0.0656	**6.813**
Hexanal- DNPH	1.1188	1.0109	0.9454	0.9708	0.9900	1.0362	0.8749	0.8851	0.9790	0.0800	**8.172**

META Environmental, Inc.
CCV Precision Study - Pesticide Curve (0.002 µg/mL - 0.2 µg/mL)
Method EPA 8081A

Date Acquired	11/14/2008	12/18/2008	12/18/2008	12/19/2008	12/22/2008	1/18/2009	1/19/2009	3/6/2009			
Data File Name	A111226.D	A121530.D	A121528.D	A121542.D	A121553.D	A011625.D	A011632.D	A030444.D			
Sample Name	A794	A794	A794	A794	A794	A794	A794	A794			
Analysis Personell: ERL									Mean	Standard Deviation	% RSD
a-BHC	0.0530	0.0650	0.0650	0.0460	0.0540	0.0670	0.0500	0.0410	0.0551	0.0096	**17.492**
b-BHC	0.0520	0.0600	0.0600	0.0440	0.0500	0.0670	0.0480	0.0420	0.0529	0.0087	**16.470**
g-BHC	0.0520	0.0660	0.0660	0.0480	0.0540	0.0700	0.0490	0.0420	0.0559	0.0102	**18.212**
d-BHC	0.0520	0.0640	0.0640	0.0460	0.0530	0.0670	0.0530	0.0400	0.0549	0.0095	**17.273**
Heptachlor	0.0530	0.0620	0.0600	0.0450	0.0510	0.0640	0.0460	0.0590	0.0550	0.0073	**13.254**
Aldrin	0.0510	0.0600	0.0600	0.0430	0.0550	0.0640	0.0510	0.0410	0.0531	0.0082	**15.504**
Heptachlor epoxide	0.0530	0.0630	0.0620	0.0450	0.0530	0.0670	0.0530	0.0440	0.0550	0.0084	**15.212**
g-Chlordane	0.0520	0.0610	0.0600	0.0440	0.0540	0.0650	0.0510	0.0420	0.0536	0.0081	**15.148**
Endosulfan I	0.0520	0.0620	0.0610	0.0440	0.0540	0.0660	0.0520	0.0420	0.0541	0.0085	**15.753**
a-Chlordane	0.0500	0.0600	0.0590	0.0420	0.0550	0.0630	0.0520	0.0420	0.0529	0.0079	**15.009**
Dieldrin	0.1040	0.1300	0.1280	0.0920	0.1110	0.1400	0.1100	0.0860	0.1126	0.0189	**16.799**
4,4'-DDE	0.0940	0.1120	0.1100	0.0760	0.1030	0.1190	0.1100	0.0790	0.1004	0.0159	**15.824**
Endrin	0.1050	0.1280	0.1250	0.0900	0.1060	0.1360	0.1070	0.0810	0.1098	0.0190	**17.273**
Endosulfan II	0.1050	0.1270	0.1260	0.0910	0.1080	0.1370	0.1080	0.0840	0.1108	0.0183	**16.507**
4,4'-DDD	0.1050	0.1270	0.1260	0.0910	0.1030	0.1400	0.1100	0.1190	0.1151	0.0158	**13.738**
Endrin aldehyde	0.1150	0.1400	0.1380	0.0970	0.1160	0.1400	0.1130	0.0820	0.1176	0.0212	**18.011**
Endosulfan sulfate	0.1030	0.1250	0.1210	0.0870	0.1080	0.1330	0.1060	0.0810	0.1080	0.0181	**16.718**
4,4'-DDT	0.1040	0.1290	0.1230	0.0880	0.1070	0.1380	0.1060	0.1190	0.1143	0.0160	**14.018**
Endrin ketone	0.0940	0.1330	0.1290	0.0920	0.1080	0.1400	0.1070	0.0770	0.1100	0.0223	**20.246**
Methoxychlor	0.4520	0.6690	0.6290	0.4580	0.5070	0.6950	0.5230	0.6180	0.5689	0.0955	**16.788**

META Environmental, Inc.
CCV Precision Study - PCB Curve (0.01 µg/mL - 1.0 µg/mL)
Method EPA 8082

Date Acquired	11/13/2008	11/14/2008	12/18/2008	12/19/2008	12/19/2008	1/18/2009	1/19/2009			
Data File Name	A111211.D	A111227.D	A121529.D	A121543.D	A121552.D	A011626.D	A011631.D			
Sample Name	A625	A625	A625	A625	A625	A625	A625			
Analysis Personell: ERL								Mean	Standard Deviation	% RSD
PCB-1	0.107	0.104	0.107	0.097	0.102	0.094	0.099	0.1014	0.0050	**4.925**
PCB-2	0.101	0.079	0.119	0.099	0.105	0.095	0.096	0.0991	0.0120	**12.110**
PCB-3	0.100	0.104	0.097	0.098	0.102	0.096	0.101	0.0997	0.0029	**2.878**
PCB-4	0.100	0.103	0.099	0.095	0.098	0.093	0.098	0.0980	0.0033	**3.333**
PCB-10	0.100	0.103	0.099	0.095	0.098	0.093	0.098	0.0980	0.0033	**3.333**
PCB-7	0.100	0.103	0.100	0.096	0.100	0.094	0.098	0.0987	0.0030	**3.023**
PCB-9	0.100	0.103	0.100	0.096	0.100	0.094	0.098	0.0987	0.0030	**3.023**
PCB-6	0.099	0.102	0.099	0.097	0.101	0.093	0.098	0.0984	0.0029	**2.983**
PCB-8	0.100	0.102	0.099	0.096	0.100	0.093	0.097	0.0981	0.0030	**3.081**
PCB-5	0.100	0.102	0.099	0.096	0.100	0.093	0.097	0.0981	0.0030	**3.081**
PCB-19	0.099	0.102	0.098	0.097	0.102	0.093	0.096	0.0981	0.0032	**3.298**
PCB-12	0.100	0.101	0.099	0.094	0.098	0.089	0.093	0.0963	0.0044	**4.555**
PCB-13	0.096	0.098	0.097	0.094	0.095	0.093	0.097	0.0957	0.0018	**1.880**
PCB-18	0.100	0.100	0.088	0.099	0.104	0.091	0.093	0.0964	0.0058	**6.013**
PCB-17	0.100	0.102	0.101	0.095	0.100	0.090	0.094	0.0974	0.0045	**4.585**
PCB-15	0.099	0.101	0.099	0.099	0.103	0.090	0.094	0.0979	0.0044	**4.510**
PCB-24	0.100	0.101	0.099	0.095	0.099	0.090	0.093	0.0967	0.0041	**4.251**
PCB-27	0.100	0.101	0.099	0.095	0.099	0.090	0.093	0.0967	0.0041	**4.251**
PCB-16	0.100	0.101	0.099	0.095	0.099	0.089	0.093	0.0966	0.0044	**4.547**
PCB-32	0.100	0.101	0.099	0.095	0.099	0.089	0.093	0.0966	0.0044	**4.547**
PCB-34	0.100	0.101	0.098	0.096	0.101	0.089	0.093	0.0969	0.0045	**4.672**
PCB-29	0.100	0.100	0.098	0.095	0.100	0.089	0.092	0.0963	0.0044	**4.595**
PCB-54	0.100	0.101	0.098	0.095	0.100	0.089	0.092	0.0964	0.0046	**4.747**
PCB-26	0.100	0.101	0.098	0.097	0.102	0.089	0.092	0.0970	0.0048	**4.980**
PCB-25	0.100	0.101	0.098	0.097	0.102	0.089	0.092	0.0970	0.0048	**4.980**
PCB-31	0.100	0.098	0.093	0.090	0.097	0.090	0.093	0.0944	0.0040	**4.185**
PCB-50	0.100	0.096	0.094	0.095	0.098	0.090	0.092	0.0950	0.0034	**3.595**
PCB-28	0.100	0.096	0.101	0.090	0.096	0.091	0.093	0.0953	0.0042	**4.441**
PCB-20	0.099	0.100	0.099	0.098	0.104	0.090	0.094	0.0977	0.0045	**4.604**
PCB-33	0.100	0.100	0.103	0.089	0.091	0.090	0.094	0.0953	0.0056	**5.928**
PCB-53	0.100	0.103	0.105	0.099	0.105	0.086	0.085	0.0976	0.0086	**8.774**
PCB-51	0.099	0.098	0.100	0.095	0.100	0.089	0.090	0.0959	0.0047	**4.872**
PCB-22	0.100	0.102	0.098	0.096	0.101	0.086	0.090	0.0961	0.0060	**6.253**
PCB-45	0.100	0.096	0.096	0.086	0.093	0.081	0.082	0.0906	0.0075	**8.308**
PCB-46	0.099	0.099	0.098	0.094	0.099	0.085	0.088	0.0946	0.0059	**6.192**
PCB-69	0.099	0.100	0.098	0.096	0.100	0.086	0.088	0.0953	0.0059	**6.141**
PCB-52	0.100	0.100	0.098	0.095	0.100	0.087	0.088	0.0954	0.0057	**5.985**
PCB-73	0.099	0.099	0.098	0.095	0.100	0.087	0.088	0.0951	0.0055	**5.739**
PCB-49	0.097	0.098	0.096	0.095	0.099	0.086	0.089	0.0943	0.0049	**5.186**
PCB-47	0.100	0.100	0.098	0.096	0.100	0.087	0.088	0.0956	0.0057	**5.976**
PCB-48	0.099	0.100	0.098	0.096	0.100	0.087	0.088	0.0954	0.0056	**5.861**
PCB-75	0.100	0.100	0.098	0.096	0.100	0.087	0.088	0.0956	0.0057	**5.976**
PCB-104	0.098	0.097	0.095	0.096	0.100	0.087	0.088	0.0944	0.0050	**5.290**
PCB-35	0.099	0.100	0.098	0.096	0.100	0.086	0.087	0.0951	0.0061	**6.377**
PCB-44	0.100	0.100	0.098	0.095	0.100	0.085	0.087	0.0950	0.0064	**6.767**
PCB-59	0.095	0.102	0.100	0.100	0.107	0.089	0.089	0.0974	0.0068	**6.932**

PCB-37	0.096	0.103	0.102	0.100	0.107	0.086	0.089	0.0976	0.0077	**7.869**
PCB-42	0.096	0.100	0.102	0.100	0.107	0.087	0.088	0.0971	0.0074	**7.575**
PCB-71	0.100	0.100	0.098	0.096	0.101	0.086	0.088	0.0956	0.0061	**6.389**
PCB-41	0.100	0.100	0.098	0.096	0.101	0.086	0.088	0.0956	0.0061	**6.389**
PCB-64	0.100	0.100	0.098	0.096	0.101	0.086	0.088	0.0956	0.0061	**6.389**
PCB-40	0.099	0.098	0.096	0.096	0.099	0.084	0.085	0.0939	0.0065	**6.944**
PCB-103	0.100	0.101	0.096	0.094	0.097	0.084	0.087	0.0941	0.0064	**6.813**
PCB-67	0.099	0.100	0.098	0.096	0.101	0.085	0.086	0.0950	0.0067	**7.035**
PCB-100	0.100	0.100	0.098	0.096	0.101	0.085	0.086	0.0951	0.0068	**7.140**
PCB-63	0.100	0.101	0.097	0.097	0.102	0.084	0.085	0.0951	0.0075	**7.899**
PCB-74	0.100	0.101	0.098	0.097	0.102	0.085	0.086	0.0956	0.0071	**7.420**
PCB-70	0.099	0.100	0.097	0.097	0.102	0.085	0.085	0.0950	0.0070	**7.418**
PCB-66	0.098	0.097	0.094	0.093	0.099	0.084	0.085	0.0929	0.0061	**6.563**
PCB-93	0.099	0.099	0.095	0.093	0.099	0.084	0.085	0.0934	0.0065	**6.988**
PCB-95	0.103	0.101	0.094	0.093	0.099	0.084	0.083	0.0939	0.0079	**8.444**
PCB-91	0.099	0.099	0.098	0.095	0.099	0.082	0.083	0.0936	0.0077	**8.229**
PCB-56	0.099	0.101	0.097	0.098	0.104	0.085	0.085	0.0956	0.0076	**7.919**
PCB-60	0.099	0.101	0.097	0.098	0.104	0.085	0.085	0.0956	0.0076	**7.919**
PCB-92	0.099	0.100	0.097	0.095	0.100	0.083	0.082	0.0937	0.0079	**8.396**
PCB-84	0.100	0.099	0.101	0.096	0.101	0.082	0.082	0.0944	0.0087	**9.168**
PCB-90	0.100	0.100	0.097	0.096	0.100	0.083	0.082	0.0940	0.0080	**8.533**
PCB-101	0.100	0.100	0.098	0.096	0.100	0.083	0.082	0.0941	0.0081	**8.595**
PCB-99	0.100	0.101	0.098	0.096	0.101	0.082	0.082	0.0943	0.0086	**9.097**
PCB-119	0.100	0.099	0.096	0.097	0.099	0.081	0.082	0.0934	0.0083	**8.845**
PCB-83	0.100	0.100	0.097	0.095	0.100	0.081	0.084	0.0939	0.0080	**8.555**
PCB-97	0.099	0.100	0.098	0.095	0.100	0.082	0.081	0.0936	0.0084	**9.002**
PCB-117	0.098	0.096	0.096	0.098	0.105	0.083	0.083	0.0941	0.0082	**8.704**
PCB-81	0.100	0.099	0.098	0.096	0.104	0.080	0.080	0.0939	0.0098	**10.411**
PCB-87	0.100	0.099	0.098	0.096	0.104	0.080	0.082	0.0941	0.0093	**9.897**
PCB-115	0.100	0.099	0.098	0.096	0.104	0.080	0.082	0.0941	0.0093	**9.897**
PCB-85	0.100	0.101	0.097	0.097	0.101	0.080	0.082	0.0940	0.0091	**9.633**
PCB-136	0.100	0.099	0.097	0.094	0.098	0.081	0.080	0.0927	0.0086	**9.230**
PCB-77	0.100	0.101	0.098	0.098	0.103	0.081	0.081	0.0946	0.0094	**9.973**
PCB-110	0.100	0.101	0.100	0.095	0.098	0.081	0.081	0.0937	0.0089	**9.499**
PCB-154	0.100	0.101	0.098	0.095	0.099	0.081	0.079	0.0933	0.0093	**9.955**
PCB-82	0.099	0.100	0.098	0.097	0.101	0.080	0.079	0.0934	0.0096	**10.282**
PCB-151	0.100	0.100	0.098	0.095	0.099	0.080	0.078	0.0929	0.0096	**10.375**
PCB-135	0.099	0.100	0.097	0.096	0.101	0.080	0.079	0.0931	0.0095	**10.174**
PCB-144	0.099	0.100	0.097	0.096	0.101	0.080	0.080	0.0933	0.0092	**9.897**
PCB-124	0.099	0.100	0.097	0.096	0.101	0.081	0.079	0.0933	0.0093	**9.916**
PCB-147	0.101	0.095	0.092	0.090	0.097	0.087	0.080	0.0917	0.0069	**7.547**
PCB-107	0.090	0.086	0.092	0.096	0.106	0.092	0.091	0.0933	0.0063	**6.800**
PCB-123	0.102	0.101	0.097	0.101	0.108	0.086	0.090	0.0979	0.0076	**7.725**
PCB-149	0.108	0.117	0.095	0.101	0.108	0.086	0.076	0.0987	0.0142	**14.347**
PCB-118	0.100	0.104	0.096	0.097	0.100	0.086	0.084	0.0953	0.0075	**7.870**
PCB-134	0.100	0.100	0.098	0.095	0.099	0.088	0.087	0.0953	0.0056	**5.866**
PCB-114	0.100	0.103	0.098	0.099	0.104	0.095	0.093	0.0989	0.0040	**4.022**
PCB-131	0.100	0.101	0.098	0.097	0.102	0.088	0.086	0.0960	0.0064	**6.670**
PCB-122	0.100	0.101	0.098	0.097	0.102	0.088	0.086	0.0960	0.0064	**6.670**
PCB-165	0.100	0.101	0.098	0.096	0.100	0.087	0.085	0.0953	0.0066	**6.901**
PCB-146	0.100	0.101	0.098	0.095	0.101	0.087	0.085	0.0953	0.0067	**7.033**
PCB-188	0.100	0.102	0.098	0.097	0.095	0.084	0.082	0.0940	0.0079	**8.354**
PCB-153	0.100	0.102	0.098	0.097	0.095	0.084	0.082	0.0940	0.0079	**8.354**
PCB-132	0.100	0.101	0.098	0.097	0.095	0.084	0.082	0.0939	0.0077	**8.194**
PCB-105	0.100	0.101	0.098	0.097	0.095	0.084	0.082	0.0939	0.0077	**8.194**
PCB-141	0.100	0.101	0.098	0.096	0.101	0.085	0.083	0.0949	0.0076	**8.062**
PCB-179	0.100	0.101	0.098	0.096	0.101	0.085	0.083	0.0949	0.0076	**8.062**

PCB-137	0.100	0.102	0.098	0.098	0.104	0.091	0.088	0.0973	0.0058	**5.956**
PCB-176	0.100	0.094	0.097	0.107	0.096	0.080	0.086	0.0943	0.0089	**9.461**
PCB-130	0.109	0.094	0.094	0.096	0.106	0.094	0.092	0.0979	0.0067	**6.891**
PCB-138	0.100	0.101	0.098	0.097	0.102	0.083	0.081	0.0946	0.0088	**9.276**
PCB-163	0.100	0.101	0.098	0.097	0.102	0.083	0.081	0.0946	0.0088	**9.276**
PCB-164	0.100	0.101	0.098	0.097	0.102	0.083	0.081	0.0946	0.0088	**9.276**
PCB-158	0.100	0.102	0.098	0.097	0.103	0.090	0.087	0.0967	0.0060	**6.253**
PCB-129	0.100	0.102	0.098	0.097	0.102	0.092	0.089	0.0971	0.0050	**5.127**
PCB-178	0.099	0.099	0.096	0.094	0.099	0.094	0.091	0.0960	0.0032	**3.294**
PCB-175	0.099	0.100	0.097	0.095	0.100	0.084	0.082	0.0939	0.0076	**8.147**
PCB-187	0.100	0.100	0.098	0.095	0.099	0.092	0.089	0.0961	0.0043	**4.471**
PCB-183	0.100	0.101	0.098	0.095	0.100	0.093	0.090	0.0967	0.0042	**4.293**
PCB-128	0.100	0.102	0.098	0.098	0.102	0.092	0.089	0.0973	0.0050	**5.130**
PCB-167	0.100	0.101	0.098	0.097	0.102	0.088	0.085	0.0959	0.0067	**6.957**
PCB-185	0.100	0.101	0.098	0.097	0.102	0.088	0.085	0.0959	0.0067	**6.957**
PCB-174	0.100	0.100	0.098	0.095	0.100	0.089	0.087	0.0956	0.0055	**5.758**
PCB-177	0.100	0.100	0.097	0.095	0.100	0.091	0.089	0.0960	0.0045	**4.735**
PCB-202	0.100	0.102	0.102	0.102	0.104	0.086	0.083	0.0970	0.0087	**8.928**
PCB-171	0.100	0.102	0.102	0.102	0.104	0.088	0.084	0.0974	0.0080	**8.187**
PCB-156	0.099	0.100	0.092	0.102	0.104	0.082	0.087	0.0951	0.0083	**8.719**
PCB-173	0.100	0.103	0.097	0.098	0.101	0.081	0.083	0.0947	0.0089	**9.418**
PCB-157	0.100	0.104	0.098	0.100	0.103	0.106	0.102	0.1019	0.0027	**2.684**
PCB-201	0.100	0.104	0.098	0.100	0.103	0.096	0.094	0.0993	0.0036	**3.618**
PCB-172	0.100	0.100	0.097	0.097	0.101	0.089	0.086	0.0957	0.0059	**6.143**
PCB-197	0.100	0.101	0.098	0.095	0.101	0.088	0.085	0.0954	0.0065	**6.814**
PCB-180	0.100	0.102	0.098	0.097	0.102	0.089	0.086	0.0963	0.0063	**6.588**
PCB-193	0.100	0.101	0.098	0.096	0.101	0.088	0.085	0.0956	0.0065	**6.804**
PCB-191	0.100	0.102	0.098	0.097	0.102	0.089	0.086	0.0963	0.0063	**6.588**
PCB-200	0.100	0.100	0.098	0.096	0.101	0.088	0.085	0.0954	0.0064	**6.679**
PCB-170	0.100	0.102	0.098	0.099	0.105	0.080	0.078	0.0946	0.0109	**11.516**
PCB-190	0.100	0.102	0.098	0.099	0.105	0.080	0.078	0.0946	0.0109	**11.516**
PCB-199	0.100	0.101	0.098	0.096	0.101	0.087	0.085	0.0954	0.0067	**7.026**
PCB-196	0.100	0.101	0.098	0.098	0.103	0.077	0.075	0.0931	0.0119	**12.725**
PCB-203	0.100	0.101	0.098	0.098	0.103	0.077	0.075	0.0931	0.0119	**12.725**
PCB-189	0.100	0.103	0.098	0.099	0.105	0.086	0.084	0.0964	0.0082	**8.485**
PCB-208	0.100	0.101	0.098	0.098	0.104	0.076	0.074	0.0930	0.0125	**13.416**
PCB-195	0.100	0.101	0.098	0.098	0.104	0.076	0.075	0.0931	0.0122	**13.126**
PCB-207	0.100	0.101	0.099	0.097	0.102	0.086	0.083	0.0954	0.0077	**8.046**
PCB-194	0.100	0.102	0.099	0.099	0.104	0.082	0.080	0.0951	0.0098	**10.341**
PCB-205	0.100	0.103	0.099	0.100	0.106	0.085	0.083	0.0966	0.0089	**9.240**
PCB-206	0.100	0.102	0.101	0.100	0.106	0.082	0.080	0.0959	0.0104	**10.815**
PCB-209	0.100	0.101	0.102	0.102	0.107	0.085	0.083	0.0971	0.0093	**9.536**

Appendix N – First Tier Chemical Testing QC Data

ICP Metals Spikes and QCs

Note: One spike performed per batch of samples analyzed.
QC checks performed at start and end of analysis.
Each sample site has a blank.

Analysis Batch 1

Element	blank 081649 mg/l	blank 081655 mg/l	blank 081658 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l	QC-3 0.2 mg/l
As	bdl	bdl	bdl	115.5%	0.21	0.21	0.212
Ba	bdl	bdl	bdl	64.1%	0.21	0.20	0.201
Be	bdl	bdl	bdl	82.6%	0.21	0.22	0.2182
Cd	bdl	bdl	bdl	115.6%	0.22	0.22	0.2224
Co	bdl	bdl	bdl	115.4%	0.23	0.23	0.2317
Cr	bdl	bdl	bdl	137.6%	0.21	0.22	0.2171
Cu	bdl	bdl	bdl	92.2%	0.21	0.21	0.2103
Mn	bdl	bdl	bdl	132.6%	0.21	0.22	0.2181
Mo	bdl	bdl	bdl	137.5%	0.22	0.22	0.2154
Ni	bdl	bdl	bdl	125.2%	0.21	0.22	0.2195
Pb	bdl	bdl	bdl	125.7%	0.21	0.22	0.2181
Sb	bdl	bdl	bdl	123.1%	0.19	0.19	0.1949
Se	bdl	bdl	bdl	86.6%	0.22	0.21	0.2181
Sr	bdl	bdl	bdl	115.8%	0.21	0.22	0.2209
Tl	bdl	bdl	bdl	125.6%	0.21	0.22	0.2203
Zn	0.37	0.38	0.20	85.0%	0.23	0.23	0.2316

Analysis Batch 2

Element	blank 081677 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l	QC-3 0.2 mg/l
As	bdl	120.3%	0.21	0.21	0.21
Ba	bdl	69.7%	0.21	0.21	0.21
Be	bdl	83.3%	0.21	0.23	0.23
Cd	bdl	110.6%	0.22	0.22	0.22
Co	bdl	111.0%	0.23	0.24	0.23
Cr	bdl	129.3%	0.21	0.22	0.22
Cu	bdl	107.2%	0.21	0.22	0.22
Mn	bdl	132.0%	0.21	0.23	0.22
Mo	bdl	134.6%	0.21	0.20	0.21
Ni	bdl	123.9%	0.22	0.23	0.22
Pb	bdl	123.0%	0.22	0.21	0.22
Sb	bdl	130.7%	0.20	0.18	0.19
Se	bdl	80.5%	0.23	0.20	0.20
Sr	bdl	120.5%	0.21	0.24	0.23
Tl	bdl	122.7%	0.22	0.22	0.22
Zn	0.41	55.0%	0.23	0.23	0.23

Zinc spike concentration was much smaller than background

ICP Metals Spikes and QCs

Note: One spike performed per batch of samples analyzed.
QC checks performed at start and end of analysis.
Each sample site has a blank.

Analysis Batch 3

Element	blank 081682 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l
As	bdl	101.6%	0.21	0.21
Ba	bdl	74.6%	0.21	0.21
Be	bdl	79.8%	0.23	0.23
Cd	bdl	97.7%	0.22	0.22
Co	bdl	102.7%	0.24	0.23
Cr	bdl	123.2%	0.22	0.22
Cu	bdl	94.3%	0.22	0.22
Mn	bdl	123.0%	0.23	0.22
Mo	bdl	129.6%	0.20	0.21
Ni	bdl	111.9%	0.23	0.22
Pb	bdl	111.5%	0.21	0.22
Sb	bdl	114.0%	0.18	0.19
Se	bdl	79.4%	0.20	0.20
Sr	bdl	115.7%	0.24	0.23
Tl	bdl	113.7%	0.22	0.22
Zn	0.29	65.5%	0.23	0.23

Zinc spike concentration was much smaller than background

Analysis Batch 4

Element	blank 081710 mg/l	blank 081716 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l
As	bdl	bdl	73.9%	0.21	0.21
Ba	bdl	bdl	120.9%	0.21	0.20
Be	bdl	bdl	80.6%	0.21	0.23
Cd	bdl	bdl	75.5%	0.22	0.22
Co	bdl	bdl	87.3%	0.22	0.24
Cr	bdl	bdl	89.1%	0.21	0.22
Cu	bdl	bdl	95.0%	0.21	0.22
Mn	bdl	bdl	90.3%	0.21	0.23
Mo	bdl	bdl	98.2%	0.21	0.20
Ni	bdl	bdl	87.1%	0.22	0.24
Pb	bdl	bdl	78.9%	0.21	0.20
Sb	bdl	bdl	79.0%	0.19	0.19
Se	bdl	bdl	51.8%	0.22	0.19
Sr	bdl	bdl	90.1%	0.21	0.23
Tl	bdl	bdl	79.2%	0.21	0.22
Zn	1.08	0.38	36.3%	0.2314	0.23

Zinc spike concentration was much smaller than background

ICP Metals Spikes and QCs

Note: One spike performed per batch of samples analyzed.
QC checks performed at start and end of analysis.
Each sample site has a blank.

Analysis Batch 5

Element	blank 081748 mg/l	blank 081753 mg/l	blank 081755 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l	QC-3 0.2 mg/l
As	bdl	bdl	bdl	64.2%	0.22	0.21	0.21
Ba	bdl	bdl	bdl	96.1%	0.20	0.20	0.16
Be	bdl	bdl	bdl	77.0%	0.23	0.24	0.25
Cd	bdl	bdl	bdl	69.6%	0.24	0.24	0.24
Co	bdl	bdl	bdl	82.9%	0.23	0.23	0.24
Cr	bdl	bdl	bdl	91.7%	0.22	0.23	0.23
Cu	bdl	bdl	bdl	93.8%	0.22	0.23	0.22
Mn	bdl	bdl	bdl	86.2%	0.22	0.23	0.23
Mo	bdl	bdl	bdl	95.0%	0.22	0.22	0.22
Ni	bdl	bdl	bdl	78.3%	0.23	0.23	0.23
Pb	bdl	bdl	bdl	71.9%	0.21	0.21	0.21
Sb	bdl	bdl	bdl	72.5%	0.22	0.21	0.20
Se	bdl	bdl	bdl	48.8%	0.25	0.23	0.22
Sr	bdl	bdl	bdl	86.7%	0.23	0.25	0.26
Tl	bdl	bdl	bdl	65.2%	0.20	0.20	0.21
Zn	0.11	0.22	0.13	63.5%	0.26	0.25	0.24

Analysis Batch 6

Element	blank 091071 mg/l	spike % recovery	nitric acid mg/l	H2O2 mg/l	QC-1 0.2 mg/l	QC-2 0.2 mg/l
As	bdl	67.9%	bdl	bdl	0.21	0.21
Ba	bdl	87.4%	bdl	bdl	not analyzed	0.20
Be	bdl	77.1%	bdl	bdl	0.21	0.22
Cd	bdl	71.9%	bdl	bdl	0.22	0.22
Co	bdl	82.0%	bdl	bdl	0.22	0.22
Cr	bdl	87.7%	bdl	bdl	0.21	0.22
Cu	bdl	91.1%	bdl	bdl	0.21	0.21
Mn	bdl	83.6%	bdl	bdl	0.21	0.22
Mo	bdl	90.4%	bdl	bdl	0.21	0.20
Ni	bdl	81.8%	bdl	bdl	0.23	0.23
Pb	bdl	77.5%	bdl	bdl	0.21	0.21
Sb	bdl	75.3%	bdl	bdl	0.20	0.20
Se	bdl	59.1%	bdl	bdl	0.23	0.22
Sr	bdl	84.7%	bdl	bdl	0.21	0.22
Tl	bdl	75.8%	bdl	bdl	0.21	0.22
Zn	0.11	66.6%	bdl	bdl	0.23	0.23

ICP Metals Spikes and QCs

Note: One spike performed per batch of samples analyzed.
QC checks performed at start and end of analysis.
Each sample site has a blank.

Analysis Batch 7

Element	blank 091152-5 mg/l	blank 091152-7 mg/l	spike % recovery	QC-1 0.2 mg/l	QC-2 0.2 mg/l
As	bdl	bdl	59.5%	0.21	0.21
Ba	0.05	0.04	69.9%	not analyzed	0.19
Be	bdl	bdl	74.1%	0.22	0.23
Cd	bdl	bdl	60.6%	0.22	0.22
Co	bdl	bdl	75.8%	0.22	0.23
Cr	bdl	bdl	86.4%	0.21	0.22
Cu	0.51	0.18	84.1%	0.21	0.22
Mn	bdl	bdl	78.8%	0.21	0.22
Mo	bdl	bdl	87.5%	0.22	0.22
Ni	bdl	bdl	78.3%	0.23	0.23
Pb	bdl	bdl	73.2%	0.21	0.22
Sb	bdl	bdl	69.6%	0.22	0.22
Se	bdl	bdl	49.8%	0.23	0.22
Sr	bdl	bdl	69.7%	0.20	0.22
Tl	bdl	bdl	71.5%	0.21	0.21
Zn	0.15	0.06	48.7%	0.22	0.22

Metals Key

Batch 1

blank 081649	blank 081655	blank 081658
LF1BM01MT	LF3BM01MT	LF2BM01MT
LF1BM02MT	LF3BM02MT	LF2BM02MT
LF1BG01MT	LF3BG01MT	LF2BG01MT
	LF3BG02MT	LF2BG02MT

Batch 2

blank 081677
WWTP1BM01MT
WWTP1BM02MT
WWTP1BG01MT
WWTP1BG02MT

Batch 3

blank 081682
WWTP1BM03MT
WWTP1BG03MT
WWTP1BG04MT

Batch 4

blank 081710	blank 081716
LF3BM03MT	LF2BM03MT
LF3BG03MT	LF2BM04MT
	LF2BG03MT
	LF2BG04MT

Batch 5

blank 081748	blank 081753	blank 081755
1NG01MT	LF4BG01MT	2NG01MT
1NG02MT		2NG02MT

Batch 6

blank 091071
LF1BM03MT
LF1BM04MT

Batch 7

blank 091152-5	blank 091152-7
3NG01MT	3NG02MT

Mercury Recoveries
recovery of standard injected as an unknown

QC Batch	Observed Recoveries from analytical standards
Batch 1	110% 102%
Batch 2	100% 103% 99% 100%
Batch 3	104%
Batch 4	99% 98% 110% 112% 97% 97%
Batch 5	99% 103% 98% 91% 92%
Batch 6	92% 91% 105% 104% 104% 108% 97%
Batch 7	106% 106%
Batch 8	100%

Mercury Key

Batch 1

LF1BM01HG	LF3BM01HG	LF2BM01HG	WWTP1BM01HG	WWTP1BM03HG	LF2BM03HG
LF1BM02HG	LF3BM02HG	LF2BM02HG	WWTP1BM02HG	WWTP1BM04HG	LF2BM04HG

Batch 2

LF3BM02HG	WWTP1BG01HG	WWTP1BG03HG
LF3BG01HG	WWTP1BG02HG	WWTP1BG04HG

Batch 3

LF2BG01HG	LF3BM03HG
	LF3BM04HG

Batch 4

LF3BG03HG	LF2BG03HG	LF2BM03HG
LF3BG04HG	LF2BG04HG	LF2BM04HG

Batch 5

1NG01HG	2NG01HG
1NG02HG	2NG02HG

Batch 6

LF4BG01HG

Batch 7

LF1BM03HG
LF1BM04HG

Batch 8

3NG01HG
3NG02HG

Measurement Uncertainty

	relative percent uncertainty	
Helium	3.59%	based on control chart data
Hydrogen	4.64%	based on control chart data
Carbon Dioxide	4.75%	based on control chart data
Carbon Monoxide	3.73%	based on control chart data
Nitrogen	3.47%	based on control chart data
Oxygen/Argon	3.95%	based on control chart data
Methane	0.52%	based on control chart data
Ethane	4.76%	based on control chart data
Ethene	3.18%	based on control chart data
Ethyne	2.80%	based on control chart data
Propane	3.11%	based on control chart data
Propene	3.42%	based on control chart data
Propyne	4.22%	based on control chart data
Propadiene	4.62%	based on control chart data
i-Butane	3.15%	based on control chart data
n-Butane	4.58%	based on control chart data
trans-2-Butene	2.88%	based on control chart data
1-Butene	3.69%	based on control chart data
i-Butene	2.81%	based on control chart data
cis-2-Butene	2.91%	based on control chart data
1,3-Butadiene	2.47%	based on control chart data
i-Pentane	4.55%	based on control chart data
n-Pentane	4.42%	based on control chart data
neo-pent	2.89%	based on control chart data
Pentenes	4.38%	based on control chart data
Hexane	5.58%	based on control chart data
Calculated Heating Value	0.88%	based on control chart data
Ammonia	14.6%	based on limited control chart data near detection limit
sulfur (low level)	4.86%	based on control chart data
sulfur (high level)	3.47%	based on control chart data
trace hydrocarbons	4.33%	based on control chart data
halocarbons	40%	based on control chart data near detection limit
siloxanes	11%	based on control chart data near detection limit
mercury	2%	estimated
metals	4.6%	estimated (average of control chart elements available, not all elements in this report are charted)

<u>determination of absolute uncertainty example</u>
calculated concentration = 10
relative percent uncertainty = 5%
uncertainty in concentration is 10*0.05=0.5
concentration error = 10 ± 0.5

the Energy to Lead

FINAL REPORT

DOT PROJECT NUMBER 250/GTI PROJECT NUMBER 20736

Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion

Task 2 Report – Draft National Guidance Document

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1.0 EXECUTIVE SUMMARY – TASK 2

The Gas Technology Institute (GTI) has constructed a Draft Guidance Document (Task 2) as part of a larger DOT/PHMSA funded project: *Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion.* This Draft Guidance Document is not prescriptive; it is intended to provide framework for productive discussions regarding biomethane quality. It has been termed "Draft" because an independently verified database specific to landfill and wastewater treatment biomethane is limited (at the time of publication of this document) and therefore, definitive characterization is premature. Rather, this Document provides reference and recommendations for the introduction of biomethane, a renewable natural gas (RNG), from dairy waste digestion, wastewater treatment off-gas and landfill biogas with natural gas in existing gas pipeline networks in North America. The Draft Guidance Document incorporates information and data gathered as a result of Task 1 work of the overall, larger project. The purpose of this Task 2 Document is to enable useful dialog between suppliers of biomethane and companies who will be receiving the RNG. This DOT/PHMSA project (Project 250) was parceled into 5 Tasks as follows: Task 1 captures all results of the biogas/biomethane and natural gas sampling and analytical testing program, Task 3 covers review and recommendations regarding thermal heating value (Wobbe Index) of biomethane, Task 4 is a review of gas conditioning processes, and, Task 5 is project management. Task 2 of the project is the so-called "Draft Guidance Document" which compiles constituents and parameters which may need to be considered for introduction of biomethane to pipeline networks. While specific gas quality tariffs may vary, many common basic quality parameters exist. Overview of the basic gas quality parameters for biomethane, analytical ranges typical to pipeline tariffs for the parameters and representative analytical tests are included in this Draft Guidance Document. Additionally, an example Verification Testing Program and schedule for gas quality monitoring has been presented. Through the total work effort of this specific project executed by GTI and based upon the criteria against which the biomethane samples were evaluated, it can be concluded and demonstrated that biomethane of high quality may be produced within agreed-upon tolerance specifications for introduction with natural gas supplies. However, raw biogas needs to be conditioned, cleaned and/or filtered depending on the specifics of the biomass source and the specific requirements of the natural gas pipeline network into which the biomethane is to be injected. The degree to which the biomethane is conditioned, etc. maybe company specific. The net heating value of biomethane may be too low to be considered as a direct replacement for natural gas and adjustments may be necessary for optimal end use equipment performance. *Specific tariff requirements for individual gas companies must be considered for the purpose of constructing a suitable contract for biomethane. Introduction of biomethane into an existing natural gas pipeline network system may require modification of existing tariffs to include additional Tier II analytical and biological parameters specific to these sources.*

2.0 PURPOSE AND SCOPE

The purpose of the Draft Guidance Document of the project *Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion* is to establish a common framework for the introduction of a RNG fuel, biomethane, into existing natural gas supply networks. Biomethane introduction with natural gas supplies is relatively new to the natural gas industry in North America; there is a need to understand the quality and potential impacts of introduced gases to the pipeline network. ***This Document does not provide specific "cleanup standards" for biomethane.*** Rather, it may serve as industry-wide reference covering basic biomethane quality/characteristics and measurement techniques that can be used in contracts or new tariffs. Existing tariffs may require revision, especially with regard to Tier II constituents and parameters. This Document explains analytical parameters in biomethane (cleaned biogas) which may be of importance, referenced by way of the range of typical natural gas tariffs in North America. Refer to Section 8 of this Document for definitions and terminology. The intent of this Document is to create common understanding of the product between all stakeholders: natural gas companies, farmers, landfill and wastewater treatment owners/operators, developers and providers of biogas cleanup technologies.

The Guidance Document is organized as follows: each parameter has an overview, a range of values for contract consideration, and, representative analytical tests suitable for testing of the parameter. This Document also provides an *example* Program for Biomethane Quality Verification /Test Schedule; the purpose of the Verification Testing Program is to offer a model test scheme if independent corroboration of gas quality is desired. Such a Test scheme helps to assure the gas company that the produced biomethane meets requirements for introduction. The Verification Testing Program is based upon a similar and successful program jointly executed by a biomethane producer and a natural gas company to bring forth a merchantable biomethane product. The Verification Testing Program can be modified or expanded to suit particular situations, depending upon results of testing, biomass quality and variations over time, cleanup equipment, seasonal variations, etc. *Introduction of new RNG fuels, such as biomethane, into the natural gas network often depends on multiple factors beyond specific gas quality objectives. Productive dialog between all parties is key.*

Reference analytical values cited in this Document are further detailed in the American Gas Association's (AGA) *Report No. 4A - Natural Gas Contract Measurement and Quality Clauses (DRAFT update, 2009*) The AGA Report 4A serves as an industry-wide reference tool pertaining to natural gas quality and measurement provisions in contracts or tariffs (see www.ferc.gov). This *Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion* may supplement Report 4A information, focused on gas parameters particular to biomethane generated from anaerobic digestion of biomass material.

In some cases, analytical criteria for potential biomethane constituents are not included in industry tariffs (i.e., pesticides, pharmaceuticals, etc.) In these cases, independent evaluation of the compounds may be necessary. References such as manufacturer tolerance levels, NIOSH and OSHA values may be helpful if applied in the appropriate context[1].

This Document does not comment on or endorse specific methods or designs of cleanup technology employed to produce high quality biomethane; rather, gas quality itself is the focus. Values or numbers found in this report are not intended to take precedence over existing contract or tariff values. *It is strongly advised that individual company gas quality tariffs and other parameters be considered in evaluating the suitability of any proposed gas product for introduction to the pipeline network. Conditions for biomethane introduction may vary between natural gas companies and interconnection points. Tariff value ranges reported in this study may not be representative of actual delivered supplies into a specific market area. Readers are strongly advised to assess historically delivered supplies into a specific market area of concern in conjunction with appropriate tariff information.*

2.0 DRAFT GUIDANCE DOCUMENT OVERVIEW – TASK 1 CONCLUSIONS

This Draft Guidance Document is an effort focused at enabling the use of renewable natural gas products into the natural gas pipeline network. The project is aimed at understanding the suitability of biomethane (refer to Section 8 for definitions) for inclusion into natural gas supplies. The purpose of the study was to understand biogas and biomethane analytical characteristics, to test representative samples of biogas and biomethane (and natural gas), *evaluate them against typical pipeline tariff (natural gas) requirements, as cited in AGA Report 4A.* These tariffs may require modification for inclusion of biomethane, with particular regard to Tier II constituents. The Draft Guidance Document has been prepared based upon the information available through this study (compiled in Task 1 of the project).

Task 1 results include the following:

- ***Biomethane of high quality may be produced <u>within existing tariff ranges</u> for introduction into natural gas networks. Biogas needs to be conditioned, cleaned***

[1] NIOSH and OSHA exposure limit criteria is specific to hazard assessments and use assessing personal exposure of constituents over a specified period of time. These reference limits **are not intended to be used as surrogate gas quality constituent limits for contracts or tariffs and may not be transferable to this context.**

and/or filtered, depending on the specifics of the biomass source (dairy operation, landfill, wastewater treatment plant) and the specific pipeline network requirements. <u>Pipeline network requirements may be different across North America, depending upon a variety of influencing factors</u>.

- The constituents present in biogas from landfills and wastewater treatment plants can vary widely
- Raw biogas requires upgrading/conditioning for producing a product suitable of introduction to the natural gas pipeline network. Raw biogas possess high concentration of constituents, such as CO2 or N2, which make this product unacceptable to the pipeline network
- Heating content (Wobbe Index) differences may vary substantially from traditional natural gas (refer to Task 3 of this report). Biomethane may need augmentation for inclusion in the pipeline network in order to mitigate impact to end use equipment
- Landfill biogas/biomethane profiles may change with time
- Tier I and Tier II analytes may be present in landfill/wastewater biomethane in greater concentrations than in natural gas
- Tier I and Tier II analytes not present in natural gas may be present in biomethane
- Concentrations of trace constituents (Tier I and Tier II) from cleaned biomethane *samples tested* were lower than OSHA/NIOSH exposure limits
- Biologicals are present in both biomethane and natural gas
- Bacterial profiles change over time
- The database pertaining to landfill and wastewater treatment biomethane profiling is incomplete

The following recommendation was presented in Task 1 of this project:

"Sample sets should be independently retrieved and analyzed using standard protocols for the parameters listed in this report (Task 1):

- Samples from one landfill: upgraded biomethane, in triplicate (for statistical purposes) over a period of at least a year, in order to examine biomethane characteristics through a four season period. Concurrent sampling of biogas would be additionally helpful to assess the performance of the upgrading system versus the constituent profile in the landfill gas product
- Samples (triplicate) from a wide variety of landfills upgrading biogas to quality biomethane (expanded study). Samples should be retrieved from all regions of the US (northeast, south, Mid-west and west coast). Samples should be retrieved in triplicate, for statistical purposes. Natural gas samples from the network into which the biomethane is introduced should be collected, for accurate comparison.
- Samples retrieved from a variety of sites which upgrade biogas using different upgrading systems.
- Historical perspective of each landfill, to provide background information and understanding of chemical profile.

- Samples of natural gas across the US, for baseline analysis and comparison"

3.0 GUIDANCE DOCUMENT GOAL

The goal of this Guidance Document is to provide the framework and recommend analytical methodologies for successful integration of biomethane from a variety of biomass sources into existing natural gas transmission and distribution systems. Depending upon the characteristics and source of the biomass, resulting biomethane may contain a variety of organic and inorganic compounds, as well as other constituents. The Guidance provided here may serve as a resource for examination of biomass conversion. This document may serve as reference for biomethane suppliers, for technical considerations of their product; natural gas companies may use this Document in establishing biomethane quality specifications for the purposes of contracts with suppliers. *This Guidance Document is not intended to replace specific natural gas transmission and distribution company tariffs.* Through consideration of the recommendations set forth herein, natural gas transmission and distribution companies can be more assured that biomethane of a consistent and suitable quality is supplied to their system, and biomethane producers will be able to verify their product as meeting gas company specifications. In this way, successful integration of this RNG with the existing natural gas supplies can be achieved.

4.0 CONSIDERATIONS FOR INTRODUCTION OF BIOMETHANE TO NATURAL GAS NETWORK

Interchangeability is defined as, "the ability to substitute one gaseous fuel for another in a combustion application without materially changing operational safety, efficiency, performance or materially increasing air pollution emissions". The ability to substitute or supplement an existing gas supply is dependent on quantitative evaluation of the combustion impacts of the proposed "interchange" using standard interchangeability evaluation methods such as AGA Bulletin 36, Weaver, or combinations of surrogate parameters such as Wobbe and Heating Value. Interchangeability evaluations are conducted based on knowledge of the constituents and parameters of historically delivered supplies into a defined market area relative to the constituent and associated parameters with the proposed "substitute" gas. Additional tariff provisions may be necessary, as existing provisions may not capture biomethane constituents. Additional details regarding gas interchangeability can be found in the NGC+ White Paper on Natural Gas Interchangeability and Non-Combustion End Use (NGC+ White Paper, see references).

Each system operator is advised to conduct an overall interchangeability assessment. This assessment should include at a minimum:

- Assess historically delivered supplies into a market area (gas quality constituents and parameters that define interchangeability, aka "adjustment gas", specific constituents of concern, etc.)
- Understand the proposed biomethane cleanup technology and maximum constituent concentrations (boundaries of cleanup system and proposed "substitute gas")
- Model the zone of influence of proposed substitute gas and determine if the aggregated supply profile meets contract of tariff and/or contract requirements
- Assess any sensitive receptors within the zone of influence (end users that may be sensitive to changes in gas quality, including "node points" in the system where gas quality variations may be more substantial)
- Optimize the cleanup system and balance concerns of potentially sensitive end users (may include specific end use retrofits if limited in scope)

Referencing the AGA Report 4A, 2001, interchangeability is qualified through various indices (single index and multiple index) that have demonstrated broad applications to end-users. It has been suggested that interchangeability limits be evaluated and established for a specific market area, considering the nature of the installed appliance population or specific end-user requirement. Also noted in AGA Report 4A, 2009, caution needs to be exercised when using tariff value ranges suggested herein or within the Report 4A Document, as local requirements may vary. This Guidance Document addresses general interchange of biomethane and suggested tolerance limits. **Specific tariff requirements for individual gas companies should be consulted for the purpose of constructing a suitable contract for biomethane delivery.** *These limits may not be representative of gas delivered into a specific market area and the reader is cautioned to completely understand the gas quality of actual delivered supplies in the evaluation process*.

5.0 UNIQUE CONTRACT CONSIDERATIONS

Some of the parameters and monitoring techniques detailed in this Guidance Document are supplementary to typical General Terms and Conditions documents used for contracting purposes. Exact Terms and Conditions cannot be referenced herein because they will vary depending upon specific pipeline operator's requirements and specific local conditions. As well, recommendations described herein are made based upon best available information at the time of construction of the Guidance Document. Compliance to terms deemed necessary for safe gas

interchange is generally mandatory, as appropriate parameters and tariff ranges are approved by the Federal Energy Regulatory Commission (FERC).

There are parameters described within this Guidance Document that are considered by some contracting parties as supplemental to those normally found in tariffs. It is advised that gas companies, pipelines and biomethane suppliers consider these additional parameters for safe interchange. This Guidance Document will explain each specific parameter and will verify that biomethane samples tested and evaluated against the applicable tariff met quality objectives.

6.0 GUIDANCE FOR BIOMETHANE QUALITY

Individual tariffs for individual gas companies may not include all parameters listed below. The Guidance provided herein encompasses parameters and language typical of natural gas tariffs. Individual tariffs and particulars specific to the point of proposed gas injection should be considered when assessing suitability of a fuel such as biomethane for introduction to the natural gas pipeline network. The intent of this Document is to assist the natural gas company; analytical parameters particular to biogas and biomethane may influence the overall gas quality within their pipeline network. *It is highly advised that gas companies review all applicable tariffs and conditions for specific analytical boundaries*.

6.1 HEATING VALUE

6.1.1. PARAMETER OVERVIEW

Gross heating value, also known as Higher Heating Value (HHV), is defined as the amount of energy transferred as heat from the complete, ideal combustion of the gas with air, at a standard temperature, in which all the water formed by the reaction condenses to liquid.

Custody transfer of natural gas is generally based on an energy basis (per BTU/scf, using HHV). As a result, transportation of low BTU gas may reduce the economic efficiency of some pipelines. In addition, local distribution companies that meter gas considering its energy content may need to consider the influence of low BTU gas on its overall billing/accounting process. Low BTU gas may have detrimental effects on end use equipment and may not be compatible with many systems.

6.1.2 BIOMETHANE RANGE GUIDANCE

The reported ranges typically found in tariffs for natural gas are between: minimum heat content (dry, HHV) of 950-1,000 Btu/scf and maximum heat content (dry, HHV) of 1,075 – 1,200 Btu/scf. Biomethane may yield a lower Btu range, and augmentation with other, higher Btu gases, such as propane, may be considered. Blending or aggregation with existing pipeline supplies may be needed or required to ensure compatibility.

Based upon results of biomethane testing as part of this GTI program, tariff values can be achieved with proper conditioning or upgrading of biogas. It was shown that biomethane can be up to 99.6% methane through pressure swing absorption treatment (PSA), which corresponds to a Gross Dry Btu content of 1,010.3 Btu/SCF, at 60% and 14.73 psia. The Btu value is calculated at specific temperature and pressure conditions. The Gross Btu is defined as the amount of energy transferred as heat from the complete, ideal combustion of gas with air, at standard temperature, in which all the water formed during the combustion process condenses to liquid. Individual company tariffs and quality requirements for heating value requirements should be considered.

6.1.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER

The heating value of a gas is determined from the molar compositional data obtained from gas chromatography (GC) analysis. Biomethane (methane) gas GC analyses can be performed following ASTM D1945 or GPA 2261. This analysis physically separates the major and minor components of a gas utilizing a gas chromatograph with detection by a thermal conductivity detector (TCD), or a combination of a TCD plus a flame ionization detector (FID). Historically, GC gas analyses reported hydrocarbons speciated out to pentane. All other hydrocarbons were backflushed from the GC column and reported as a C6+ fraction. Ratios were defined for the C6, C7, and C8 fractions and apply to the backflushed C6+ determination. This practice was adopted by the gas industry in the early days of GC analysis because it was performed isothermally.

The respective ideal gas value for each component is determined through ratio analysis, corrected using a compressibility factor calculated similarly. The procedure and ideal gas values are taken from Tables in ASTM 3588-98, GPA 2172, and GPA 2145.

6.2 TEMPERATURE

6.2.1 PARAMETER OVERVIEW

The effects and limitations of equipment, materials and fittings relative to gas temperatures should be considered. Temperature limitations serve to primarily protect external coatings, or pipe materials, as well as downstream gas processing and handling equipment.

6.2.2. BIOMETHANE RANGE GUIDANCE

The reported temperature ranges typically found in tariffs for natural gas are between: no less than 20^0 F (reported 20^0 to 65^0F) and no more than 120^0 F (reported 80^0 to 120^0 F).

Based upon results of biomethane testing as part of this GTI program, tariff values for temperature can be achieved. Individual company tariffs and quality requirements for temperature should be considered.

7.2.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER

Biomethane temperature may be continuously measured on-line using a sensor.

6.3 HYDROCARBON DEWPOINT

6.3.1 PARAMETER OVERVIEW

The hydrocarbon dew point (HDP) is the temperature of the corresponding state condition at which the non-methane components of natural gas begin to condense into the liquid phase. The HDP of natural gas is regulated to prevent or control the formation of liquids in the pipeline. The formation of liquids has differing impacts on operations. Gases containing

heavy hydrocarbons have a higher dew point temperature resulting in the possibility of a hydrocarbon fluid forming when the pipeline gas temperature is colder than the HDP.

6.3.2 BIOMETHANE RANGE GUIDANCE

The reported hydrocarbon dewpoint values typically found in tariffs for delivered natural gas are between the range between 0 and 25°F at either fixed or operating pressures.

Based upon results of biomethane testing as part of this GTI program, tariff values can be achieved. Individual company tariffs and quality requirements for hydrocarbon dewpoint should be considered.

6.3.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER

As with BTU analyses, hydrocarbon dewpoint analyses are performed following ASTM D1945 or GPA 2261. The accuracy of this practice varies depending on quality of the gas. For the most precise hydrocarbon dew point calculation, gases that are known to contain heavier hydrocarbons should be analyzed out to at least C20. However, this is less likely in biomethane. This usually involves a separate GC analysis utilizing a dedicated FID for greatest sensitivity.

The hydrocarbon dew point is calculated using the compositional data and a process simulation program containing an equation-of-state (EOS) model. The gas composition is determined by a GC analysis. A chilled mirror dew point tester and various types of real time analytical instrumentation are also utilized in industry for hydrocarbon dew point determination.

6.4 WATER CONTENT

6.4.1 PARAMETER OVERVIEW

The presence of water vapor in biomethane, as with natural gas, can pose many problems particularly associated with corrosion. Carbon dioxide (CO_2) and hydrogen sulfide (H_2S) are common components associated with raw biogas, as these are typical gases produced from anaerobic digestion of organic waste. Water combined with CO_2 and H_2S under certain conditions can form acidic mixtures, which are corrosive to pipeline systems. Water vapor is

also limited to prevent condensation and to reduce hydrate formation. Hydrates are an ice-like mixture of water and hydrocarbons formed at high pressures where high water vapor is present.

6.4.2 BIOMETHANE RANGE GUIDANCE

The reported water vapor values typically found in tariffs for delivered natural gas are as follows: delivered free of liquid water and should contain between no more than four to seven pounds of water in vapor phase per million cubic feet (MMscf) of gas.

Based upon results of biomethane testing as part of this GTI program, tariff values for water vapor content can be achieved. Individual company tariffs and quality requirements for water vapor content should be considered.

6.4.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER

Moisture can be tested on-line using a "chilled mirror technique" (ASTM D1142), an electronic moisture analyzer (ASTM D5454) containing sensors based on phosphorus pentoxide, aluminum oxide, or silicon among others or a detection sensor which utilizes laser technology.

6.5 TOTAL SULFUR, SULFIDE AND MERCAPTANS

6.5.1 PARAMETER OVERVIEW

Total sulfur is the sum of the contribution of sulfur by all sulfur-containing compounds in gas and is calculated for individual sulfur containing compounds based on relative molecular weight of sulfur in the compound. Sulfur is corrosive with or without the presence of water. The primary sulfur compound found in raw biogas is hydrogen sulfide. It is generated from anaerobic microbial decomposition of sulfate and sulfur-containing organic matter. Additionally, some water sources contain sulfate and hydrogen sulfide. The presence of H_2S and other sulfur-containing odorants are regulated because of their potential corrosive and destructive nature on pipeline materials. In the presence of water, sulfur compounds can eventually form sulfuric acid, a strong acid with an aggressive corrosion potential. Sulfur species corrosion is synergistic if other compounds are present, especially CO_2 and O_2. Mercaptans are sulfur compounds

which may be naturally occurring or added to natural gas as an odorant. Lower molecular weight mercaptans, such as methyl mercaptan, are typically found in biogenic gases. When present in concentrations greater than 1 ppmv, these mercaptans can severely degrade the quality of odorization and cause operational problems in distribution systems. Some pipeline tariffs or related industry regulations include a limit on mercaptan concentrations.

6.5.2 BIOMETHANE RANGE GUIDANCE

The reported total sulfur and hydrogen sulfide values typically found in tariffs for delivered natural gas are as follows: total sulfur compounds (as sulfur) within the range of 0.5 and 20 grains per one hundred standard cubic feet (scf) of gas (conversion to ppm Sulfur (S): 1 gr S/100scf = 16.96215 ppmS(v) (@ 15C& 101.325 kPa), therefore the equivalent range would be 8.48 to 339.24 ppmS(v)) and hydrogen sulfide concentrations within 0.25 and 1.0 grains per one hundred scf of gas. Mercaptan concentrations range between 0.20 and 2.0 grains per one hundred scf of gas. However, it is clear from testing of raw and partially cleaned biogas that methyl mercaptan can be found in concentrations above 1 ppmv; consideration of mercaptan concentrations in biomethane is therefore important. Based upon testing of biomethane, below detection limit (0.05 ppmv) can be achieved for all mercaptan compounds with appropriate cleanup.

Based upon results of biomethane testing as part of this GTI program, typical reported tariff values for total sulfur, hydrogen sulfide and mercaptan content can be achieved. Individual company tariffs and quality requirements for these constituents should be considered.

6.5.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER

Off-line sulfur species analysis is usually performed by gas chromatography following either ASTM D6228 or D5504. The two methods use different techniques for detection of sulfur species. D6228 uses a flame photometric detector (FPD) and D5504 uses a sulfur chemiluminescence detector (SCD). Total sulfur analysis can be performed by ASTM D3246 using oxidative microcoulometry.

Because the presence of an odorant in fuel gas is mandated by law, real-time or near-real time monitoring systems that measure sulfur compounds are very common in the fuel gas and gas transmission industries. This "on-line" sulfur analysis is also performed by GC techniques. Various detectors are used including sulfur chemiluminescence (D5504), flame

photometric (D6228), electrochemical cell (currently considered by ASTM D03 committee), oxidative cell and reductive cells.

6.6 DUSTS, GUMS AND BIOLOGICALS

6.6.1 PARAMETER OVERVIEW

Particulate matter, such as dust, gums and biologicals, can be introduced into the gas distribution network from a variety of sources. In the case of biomethane production, particulate matter may be carried along from the production process into the final biomethane gas product. Another source may be chemical interactions between concomitant gas species in the raw biogas. Specific microbes contained in biomethane may induce/exacerbate pipeline corrosion (microbial induced corrosion or "MIC"). Depending upon the starting biomass, a variety of microbial populations may exist in the resulting gas stream. The amount and size of particulate matter in the biomethane stream should be minimized to avoid contamination, clogging and erosion of processing plant and distribution line components. Particles can usually be removed by filters, sedimentation or centrifugal collectors.

6.6.2 BIOMETHANE RANGE GUIDANCE

Some tariffs for natural gas state that the gas is to be "commercially free of dusts and gums" or solid particles must be within the range of 3 – 15 microns. There is no specific requirement for biologicals (microbes and spores). However, biological agents may be considered as particulate matter, as they can be filtered from the gas stream.

Based upon results of biomethane testing as part of this GTI program, typical tariff values for dust and gum particulate matter can be achieved through in-line filtration (1 micron filter). However, biological matter may require a .3 micron filter, as spores and bacteria can pass through a 1 micron filter. Individual company tariffs and quality requirements for particulate matter should be considered.

6.6.3 REPRESENTATIVE ANALYTICAL TESTS FOR THIS PARAMETER

6.6.3.1 DUST AND GUMS

Filters may be installed in-line after the biogas cleanup process, collected on a periodic basis and subjected to analysis for the presence of particles. Analysis for particulate matter can also be achieved through on-line instrumentation using an isokinetic sampling method (like EPA Method 5).

6.6.3.2 BIOLOGICALS

Where the downstream pipeline environment is conducive to microbially induced corrosion, it is recommended that .2 or .3 micron filters be installed for proper filtration of microbes. Please refer to the Appendix for further specifics on this topic.

6.7 INERT AND DILUENT GASES TOTAL

6.7.1 OVERVIEW

Inert and diluent gases are non-hydrocarbons and reduce the overall heating value of the biomethane. Inerts (nitrogen, argon, helium, etc.) are not chemically reactive with the surrounding environment. However, diluents gases may chemically react with the surrounding environment; the primary diluent in biomethane is carbon dioxide, but others such as oxygen may be present. Some pipelines group all non-hydrocarbon gases together as “total inerts”, but may also have specific limit values for each inert gas.

Concentrations and combinations of inerts and/or diluents may impart various impacts to pipeline operations, gas facilities and end-use equipment. These are detailed in the following sections.

6.7.1.1 CARBON DIOXIDE (CO_2)

Carbon dioxide is considered a diluent and is an odorless, colorless gas. Carbon dioxide reduces the overall heating value of the gas stream per unit volume. Carbon dioxide is non-corrosive in the absence of water, but if water is present, under certain conditions, it can form

carbonic acid. Additionally, carbon dioxide can act synergistically with H_2S and O_2, thereby enhancing the corrosion of pipeline materials.

6.7.1.2 OXYGEN (O_2)

The presence of oxygen is critical because it increases both the effect and rate of other corrosion mechanisms. In combination with free water and/or with other constituents such as carbon dioxide, hydrogen sulfide and bacteria (naturally occurring), enhanced corrosion can result. Therefore, a dry biomethane product is desired. Small amounts of oxygen can support colonies of sulfate-reducing bacteria, especially in the presence of moisture. Oxygen is also problematic if there are integrity impacts , as there is a potential for combustion.

6.7.1.3 NITROGEN (N_2)

Nitrogen is an inert gas that is colorless, odorless and non-corrosive. It is usually regulated because it affects the calorific value of the gas or gas used as feedstock (fuel cells, hydrogen production and natural gas liquefaction). At elevated concentrations, combustion operations may be impacted, possibly causing poor flame stability and producing a flame with yellow tipping and lifting. Concentrations of nitrogen also may affect compressibility of the gas.

6.7.2 BIOMETHANE RANGE GUIDANCE

Reported tariff values for total diluents gases (total inerts) in natural gas ranges between no more than 2 - 6% of total by volume. Reported tariff values for carbon dioxide ranges from 1 – 3 % by volume, oxygen ranges from 0.001 – 1% by volume and nitrogen ranges from 1 – 4% by volume.

Based upon results of biomethane testing as part of this GTI program, typical tariff values for inert and diluents gases can be achieved. Individual company tariffs and quality requirements for these gases, separately or in total, be considered.

6.7.3 REPRESENTATIVE ANALYTICAL TEST FOR THIS PARAMETER (CARBON DIOXIDE, OXYGEN AND NITROGEN)

Carbon dioxide, oxygen and nitrogen can be determined by gas chromatograph analysis with a thermal conductivity detector following ASTM D1945/1946.

6.8 OTHER TRACE CONSTITUENTS

6.8.1 OVERVIEW

Depending upon the quality and composition of the starting biomass material and the conditions under which the biomass is anaerobically digested, it is possible that higher organic compounds and other so-called "trace" substances could be introduced into the resulting biogas. Microbes are able to degrade or transform a wide variety of organic and inorganic compounds by way of enzymatic action or incomplete digestion. As well, some compounds are simply volatilized through agitation in the bioreactors (digesters) or under landfill gas extraction. Some trace constituents may be problematic to the pipeline network (inducing/exacerbating corrosion, contributing to odorant fade, accumulating on pipeline walls, etc), end-use equipment (burner tip accumulation, equipment/product compromise, feedstock applications etc.). Examination for such constituents is important and prudent. Ranges of tariff specifications in the area of "Trace Constituents, Contaminants and Objectionable Material" vary throughout the industry; individual companies should consider specific requirements for their particular system and customer base. Testing for the presence of specific trace constituents may be achieved by gas chromatography, or other methods, as required. However, testing should be designed around the specific compounds of interest and testing should include quality standards for comparison purposes.

6.8.2 HEAVY METALS

Heavy metal concentrations are of particular concern when dealing with biomethane generation because volatile metals may be released through the degradation of concentrated plant materials and metal-containing products.

Heavy metals may cause toxicological and environmental problems. The primary impact from the presence of some heavy metals in the gas stream is potential corrosion of aluminum metal and alloys used to construct gas processing equipment. This is particularly problematic because heavy metals, such as mercury, may concentrate in cryogenic liquids and other processing fluids.

Sampling for volatile metals can be performed on-line using a sparger containing a mix of hydrogen peroxide and nitric acid, returned to the lab, and analyzed by ICP or AAS. (The

sparger technique is similar to EPA Method 29 for stack gas sampling, where a known volume of gas is passed through a gas bubbler.)

Routine analysis for mercury can be done following ASTM D5954 or D6350. These methods utilize on-site collection on gilded silica sorbent tubes followed by lab analysis by atomic absorption or atomic fluorescence spectroscopy. These techniques require knowledge of the total gas sampled via a dry test meter (preferred) or rotameter. On-line analyzers are available for continuous monitoring.

Metals should be extracted from the biomethane at the point of gas sampling. Accurate mercury analysis cannot be performed through collection of the biomethane in a cylinder and shipment to the laboratory for further analysis.

Individual company tariffs and quality requirements for heavy metals should be considered; reference to NIOSH or OSHA concentrations may be considered for particular application.

6.8.3 HYDROGEN

Hydrogen is not a typical constituent of natural gas, but some raw natural gas wells or storage fields may contain hydrogen; it may be present in biomethane. Hydrogen can be problematic when in contact with steel; hydrogen stress cracking or hydrogen embrittlement may occur. Hydrogen stress cracking is a degradation process that steel can undergo due to the extreme solubility of atomic hydrogen in the iron alloy lattice. Atomic hydrogen may result from spontaneous dissociation of molecular hydrogen. The presence of hydrogen sulfide in the gas accelerates the permeation of atomic hydrogen into the iron lattice. Other concerns are with reactions between hydrogen and sulfur and chlorine-containing compounds, especially in the presence of water, forming sulfuric and hydrochloric acids.

Hydrogen can be determined on-line using a solid state sensor, or in the laboratory from a field sample using gas chromatography with a thermal conductivity detector (ASTM D1945/1946). Other detectors can be used to reduce detection limits if hydrogen presence is a concern.

Based upon results of biomethane testing as part of this GTI program, typical tariff values for hydrogen can be achieved. The reported hydrogen value typically found in tariffs for delivered natural gas is between 400 – 1000 ppm. Individual company tariffs and quality requirements for hydrogen should be considered.

6.8.4 AMMONIA

The presence of ammonia could impact on downstream gas processing equipment and odorization of pipeline gas. When present in a gas that is combusted, it could form nitrogen oxides that would have an impact on end use operations. Nitrogen oxides are an environmental concern because they are known to assist in the creation of smog, foster the depletion of the ozone layer, and contribute to acid rain.

Ammonia can be determined on-line or in the laboratory from a field sample using a nitrogen chemiluminescence detector.

Individual company tariffs and quality requirements for ammonia should be considered.

6.8.5 SILOXANES

Siloxanes are organic compounds that contain silicon, oxygen, hydrogen, and carbon. Due to the increase in silicon-containing personal hygiene, health care, and industrial products, the presence of siloxanes in waste streams has increased. As the silicon-containing waste stream is digested, the silicon converts to siloxane compounds that volatilize and become entrained in the biogas. When this gas is combusted under high heat and pressure, silicon dioxide is formed. This silica dust damages internal combustion engines, turbines, and add-on air pollution control devices. Silicon dioxide has also been linked to diseases of the lungs and other health effects. The current OSHA permissible exposure limit (PEL) for crystalline silica respirable dust is 10 milligrams silica per cubic meter of air (mg/m^3) divided by the percent silica in the dust +2. For total dust the PEL is $30mg/m^3$ divided by the percent silica in the dust +2. The formula is found in Table Z-3 of 29 CFR 1910.1000.

$$\text{PEL } (mg/m^3)\text{, respirable dust} = \frac{10\ mg/m^3}{(\%SiO_2 + 2)}$$

While there are no generally accepted pipeline specification for siloxane concentrations in natural gas, its introduction into the gas system is to be avoided.

Analysis for siloxanes is performed by two methods. One method to detect these compounds utilizes an inerted gas sample collection cylinder that can be directly analyzed in the lab with no additional sample preparation. The final analysis is by GC-AED. The Atomic Emission Detector is an element specific detector that can look exclusively at silicon emission responses. Another technique uses alcohol filled glass spargers that the gas is bubbled through. This sample collection must be performed in the field with the final analysis by GC-MS in the laboratory.

Individual company quality requirements and end use tolerance for siloxane concentrations should be considered. The NIOSH and OSHA exposure limits may be applicable.

6.8.6 PESTICIDES

Pesticides are commonly used for many applications across the US and may be present in the biomass source. Sampling for pesticides in biogas, can be performed on-line using XAD-2 sorbent tubes. The sample should be collected using two sorbent tubes attached in series connected to a personal air pump capable of sampling at a rate of up to 5 L/min. Samples should be collected for four hours at a rate of 2L/min. This XAD sorbent tube sampling method is similar to NIOSH Methods 5600/5601.

Individual company tariffs and quality requirement for pesticides should be considered.

6.8.7 PHARMACEUTICALS

Many types of drugs and other chemical products are used throughout the US. These chemicals may be present in wastes and could be carried over to the biogas. Consequently, it may be recommended that biomethane samples be analyzed for widely used pharmaceutical products.

The suggested sampling method (which is similar to existing NIOSH methods) can be performed on-line using Porapak-R sorbent tubes. The sample should be collected using two sorbent tubes attached in series connected to a personal air pump capable of sampling at a rate of 5L/min. The sample should be collected at a rate of 1 L/min for 4 hours. The samples should subsequently be analyzed using GC/MS and/or LC/MS for determination of human/animal drugs and care products, using known standards.

Individual company tariffs and quality requirements for pharmaceuticals should be considered.

6.8.9 HIGHER ORGANICS/CHLORINATED COMPOUNDS (PCBS)

Polychlorinated biphenyls (PCBs) are addressed under the category of *Trace Constituents and Objectionable Matter* and PCBs are routinely sampled in natural gas pipelines and are highly regulated chemicals in the natural gas industry.

Sampling for PCBs in biomethane can be performed on-line using XAD-2 sorbent tubes. The sample should be collected using two sorbent tubes attached in series connected to a personal air pump capable of sampling at a rate of up to 5 L/min. Samples should be collected for four hours at a rate of 2L/min. This XAD sorbent tube sampling method is similar to NIOSH Methods 5503. The samples should be analyzed using EPA Method 8082 for determination of PCBs.

Individual company tariffs and quality requirement for chlorinated compounds should be considered.

6.8.10 SEMI-VOLATIVE AND VOLATILE COMPOUNDS (VOCS AND SVOCS)

Biogas produced from landfill and wastewater treatment biomass sources typically consists of methane and other major components but can also contain hundreds of other chemicals -- most of which are known as "non-methane organic compounds" or NMOCs. Most NMOCs are volatile organic compounds (VOCs). Volatile organic compounds are formed as intermediate metabolites in the degradation of organic and inorganic matter. Under aerobic conditions, any VOC formed are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are initially degraded microbially to volatile organic acids and other volatile organic compounds before complete conversion to methane and carbon dioxide by methanogenic bacteria. When the metabolic activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are consumed and the potential for VOC emissions is nominal. However, the inhibition of methane formation results in a buildup of VOCs in the manure and ultimate volatilization to the biogas.

Sampling for volatile and semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), can be performed on-line using XAD-2 sorbent tubes. The sample should be collected using two sorbent tubes attached in series connected to a personal air pump (or other suitable pumping apparatus) capable of sampling at a rate of up to 5 L/min. Samples should be collected for four hours at a rate of 2 L/min. This XAD sorbent tube sampling method is similar to NIOSH Method 5515. There are also real time analytical instrumentations available which monitor and record specific and total VOCs; these instruments are GCs which utilize FID or TCD detectors.

Individual company tariffs and quality requirement for VOCs and SVOCs should be considered.

6.8.11 HALOCARBONS

Halocarbons are organic compounds containing carbon, hydrogen, and chlorine, fluorine, and bromine. They are used in various applications, such as air conditioning systems, refrigeration systems, firefighting agents, aerosols, and foam-blowing agents. For example, the various forms of Freon are halocarbons.

Halocarbons present in the gas stream can cause operational problems for gas processing. When combusted, chloride ions form, causing potentially corrosive conditions to the pipeline. Even small amounts of halocarbon compounds can produce noxious and corrosive acids in gas flames affecting many manufacturing processes.

Analysis for halocarbons is by gas chromatography using a electron capture detector (ECD) or an electrolytic conductivity detector (ELCD). Both the GC-ECD and GC-ELCD techniques are capable of detecting chlorine-containing compounds. The former GC detector is much more sensitive than the latter. However, sulfur-containing organics and aromatics also respond to the ECD, reducing the selectivity to halocarbons. The latter technique is more selective, making positive identification of halocarbons much easier.

Individual company tariffs and quality requirement for halocarbons should be considered. Modifications to existing tariffs may apply for Tier II parameters. Quality criteria may consider NIOSH and OSHA exposure limits for the specific compound.

6.8.12 OTHERS

Depending upon the biomass material digested, materials introduced into the digester, conditions under which the material is digested, quality of gas cleanup, gas volumes produced and introduced, local conditions of the pipeline network, end-use applications or human health and environmental considerations, and other considerations, concentrations of additional organic/inorganic or biological constituents may be necessary.

7.0 AN EXAMPLE PROGRAM FOR BIOMETHANE QUALITY VERIFICATION

7.1 PURPOSE

Prior to introduction to the natural gas pipeline network, it is suggested that the biomethane product be monitored for quality for a discreet test period. Depending upon the specifics pertaining to any individual natural gas company, this test period may vary in length. ***As an example and for the purposes of this Document***, a test period of *three months* has been constructed. During the test period, field samples are regularly retrieved and tested by independent laboratories for quality and accuracy with on-line instrumentation. It is recommended that the test period be executed prior to introduction to the natural gas pipeline network. The following is *a sample of such a test program, termed the* "*Biomethane Verification Program*". This example test program offers a model for gas testing and is aimed at confirming that biomethane from a discrete system, given a discrete biomass input, can consistently achieve required value ranges for specific compounds in the product.

This example Verification Program achieves 3 goals:

1) The natural gas company is able to monitor and assure the quality of the new fuel product and the routine production of the product over a trial period of time,

2) The biomethane provider is able to verify that the product is consistent and safe for pipeline interchange, and,

3) Both parties may better understand the nature of specific gas quality parameters and constituents necessary to optimize the cleanup process prior to introduction to the pipeline network.

A three month intensive testing program, following by a continued yet reduced program, is proposed.

7.2 SAMPLE ANALYTICAL PACKAGE

In order to impart security in the sustainable quality of a biomethane system, it is proposed that the biomethane be intensively monitored for an agreed upon test schedule period. *A sample test period of 3 months is proposed here, titled the Biomethane Verification*

Program. Each individual gas company should evaluate the appropriateness of this test program for their purposes; it is not prescriptive.

A test/verification period should cover changes in the system. Until the variability of a specific process is thoroughly understood, use of an on-line GC test with Btu calculation is proposed and readings should be performed as frequently as possible. Modern on-line instruments would customarily allow for an analysis every 5-15 minutes (depending on which analyzer is used). The Btu content is measured frequently at custody transfer points because gas is sold on an energy basis, not a volume basis. Other surrogate testing may achieve similar levels of confidence.

It is also recommended that an on-line sulfur analyzer be installed, to remove concerns about sulfur stability and holding time in cylinders, as well as all other on-line monitors described above (moisture, particulate matter, etc).

It is recommended that all on-line measurements be available for independent viewing by qualified personnel for verification of quality during the test period. This period of testing and system analysis is for the protection of the receiving pipeline system and will provide data which assures routine and rigorous gas quality.

As a point of reference, when the EPA monitors sulfur emissions from a stationary source (gas-fired combustion engines), monthly analysis for 1-3 years is required. This is required even though existing natural gas sources are utilized.

Once verification of minimum gas quality has been routinely reported, a “maintenance” testing schedule can be established. If reporting is satisfactory after the *sample* three month Verification Testing Program has been completed, it is suggested that reporting be decreased but maintained over an agreed upon period of time. On-line verification of BTU content, through installed instruments to the biomethane processing system, should remain open for the receiving pipeline system verification of quality. If deemed necessary, a program of continued testing should be established at the end of the three-month test period, based upon test period results.

7.3 SAMPLE: BIOMETHANE VERIFICATION PROGRAM

Parameter	Analysis	Referenced Method	Reported Tariff Ranges	Frequency
Heating Value	Gas Chromatography	ASTM D1945 or GPA 2261	950 - 1000 Btu/scf (min) 1075 – 1200 Btu/scf (max)	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation. NOTE: Heating Value, HCDP, Water Content, Total Sulfur, H2S, CO2, O2, N2 and Inerts can effectively been monitored all at the same time, on a real time basis, as required.
Temperature	On-line Analysis	NA	20°F - 120°F	Continuously measured on-line
Hydrocarbon Dew Point	Equation-of-state (EOS) model	NA	0°F - 25°F @ either fixed or operating pressures	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Water Content	Chilled Mirror Technique or an Electronic Moisture Analyzer	ASTM D1142 or ASTM D5454	4 – 7 lb./MMscf	Continuous real-time or near-real time monitoring and monthly field samples for independent confirmation
Total Sulfur	Oxidative Microcoulometry	ASTM D3246	0.5 - 20 grains total sulfur/100 scf	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Hydrogen Sulfide	Lead acetate reaction rate method	ASTM D4084	0.25 - 1 grain of hydrogen sulfide/100 scf	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Max. Solid Particle Size	On-line instrumentation using an isokinetic sampling method	Similar to EPA Method 5	3 – 15 microns	In-line or on-line filters be collected monthly for determination of particulates
Biologicals	Quantitative Polymerase Chain Reaction (qPCR), Most Probable Number, NASA Protocol for Spore Testing	Spores enumeration via modified NASA Protocol for Spore Testing NHB 5340.1D	Refer to Individual Company Requirements	In-line or on-line filters be examined weekly for determination of live and dead bacteria and spores throughout the test schedule. Bi-weekly testing for MIC bacteria is advised through the test period.
Volatile metals	Inductively Coupled Plasma or Atomic Absorption Spectroscopy	NA	Refer to Individual Company Requirements	Monthly*
Mercury	Atomic Absorption or Atomic Flouresence Spectroscopy	ASTM D5954 or ASTM D6350	Refer to Individual Company Requirements	Monthly*

Parameter	Analysis	Referenced Method	Reported Tariff Ranges	Frequency
Hydrogen	Gas Chromatography with a Thermal Conductivity Detector	ASTM D1945/1946	400 - 1000 ppm	Monthly*
Carbon dioxide	Gas Chromatography	ASTM D1945/1946	1 - 3%	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Nitrogen	Gas Chromatography	ASTM D1945/1946	1 - 4%	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Oxygen	Gas Chromatography	ASTM D1945/1946	0.001 - 1%	Continuous real-time or near-real time monitoring and weekly field samples for independent confirmation
Siloxanes	Gas Chromatography with an Atomic Emission Detector	NA	Refer to Individual Company Requirements	Monthly*
Ammonia	Gas Chromatography, Nitrogen Chemiluminescence Detector	ASTM D1945/1946	Refer to Individual Company Requirements	Monthly*
Pesticides	Gas Chromatography with an Electron Capture Detector	EPA Method 8081	Refer to Individual Company Requirements	Monthly*
Pharmaceuticals	Gas Chromatography with a Mass Spectrometer or Liquid Chromatography with a Mass Spectrometer	NA	Refer to Individual Company Requirements	Monthly*
Polychlorinated Biphenyls	Gas Chromatography with an Atomic Emission Detector	EPA Method 8082	Refer to Individual Company Requirements	Monthly*
Semi-volatile and Volatile Compounds	Gas Chromatography with a Mass Spectrometer	EPA Method 8270	Refer to Individual Company Requirements	Monthly*
Halocarbons	Gas Chromatography with an Electron Capture Detector or and Electrolytic Conductivity Detector	NA	Refer to Individual Company Requirements	Monthly*

*Increased or decreased frequency, depending upon concentrations at first sample point.

8.0 TERMINOLOGY/DEFINITIONS

The definitions provided here are intentionally limited in scope and are offered for general information only.

Biogas - The gas resulting from the anaerobic digestion of biomass. Depending upon the digestion process used and conditions of digestion, biogas consists of 40 – 65% methane. The remaining 35 – 60% of the biogas consists of "other" gases, with carbon dioxide being the major other gas along with trace gases including nitrogen compounds (ammonia, etc), water vapor, sulfur compounds (hydrogen sulfide, etc) and other constituents, depending upon the biomass used for digestion. Biogas is considered "raw" unless cleaned or "conditioned" to meet the requirements of end use or inclusion within natural pipeline systems. "Raw" biogas is not considered suitable for interchange within natural gas pipeline networks.

Biomass – Organic materials that may be converted to gaseous fuel through digestion (breakdown) or high temperature conversion (gasification). These materials may include all organic substances, but some biomass materials possess more caloric value than others, thereby producing more energy. Biomass sources vary widely and include domestic wastes, animal wastes, livestock operation residues, forest and mill residues, agricultural crops and wastes, wood and wood wastes, aquatic plants, fast-growing trees and plants, and municipal and industrial wastes.

Biomethane - The portion of biogas which consists primarily of methane. Biomethane is generally extracted from raw biogas through cleanup or "conditioning", to remove "other" gases which impact gas quality. Using effective biogas cleanup (removal of gases which effect overall gas quality), biomethane can be up to 99% methane, with concentrations of "other" gases. However, "raw" biogas may contain only 35 – 65% methane. Biomethane is considered suitable for many end-use applications and may be considered suitable for inclusion in general pipeline systems, depending upon other characteristics of the gas and specific tariff requirements.

Biomethane Verification Testing Program - A period of time in which the gas resulting from a biomethane production process is subject to analytical testing and review, to confirm biomethane quality. Such a program is advised, as the quality of biogas and biomethane varies with process design, biomass input, choice of cleanup unit and other parameters. It is advised that the verification program be executed prior to introduction of the biomethane product to the natural gas system, so that analytical compliance may be demonstrated over a period of time.

Biweekly - Every other week.

Chromatograph - An analytical instrument that separates a gas sample into its components for measuring and is used to determine gas quality data such as heating value, relative density (specific gravity), and compressibility.

Detection Limit - Detection limit is defined here as 50% of the reporting limit. Reporting limit is defined as the sample equivalent of the lowest linear calibration concentration for the target analyte. Therefore, if a concentration is reported as "below detection limit" (BDL), the analyte was not detected at a concentration greater than the specified detection limit.

Digester (Anaerobic) – A tank, covered lagoon or other covered vessel designed to convert biomass to biogas. Digesters are common to the wastewater treatment industry as well as in farming operations for manure management. Conversion of the biomass in the digester depends upon bacterial degradation or transformation of compounds, both carbon-based and other, to gaseous products, which are then present in the resulting biogas. Digesters vary in complexity and design. The maximum quantity of biogas generated from digestion of biomass is dependent upon the design of the digester (temperature and hydraulic retention time), biologically degradable fraction of the raw material and other factors. Biogas generated through anaerobic digestion of biomass in digesters requires further cleanup prior to use (interchange) within natural gas pipeline systems.

Gas Cleanup - Used in reference to cleaning raw biogas resulting from biomass conversion (anaerobic digestion or landfill digestion). The goal of the gas cleanup unit is to remove constituents within the raw biogas in order to produce a clean "biomethane" product, suitable for further end use or potential inclusion within gas pipeline networks. Cleanup efficiencies for particular constituents vary between cleanup or "conditioning" units.

Grain – A measurement of weight. 7,000 grains = 1 lb.

Halogens - The elements fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At), which make up the seventh period in the periodic table of the elements. Compounds which consist of these elements are often used in disinfectant solutions. Upon degradation, the elements may be released as gases.

Heavy Hydrocarbons - Heavier molecular weight hydrocarbons are more prone to condense from the natural gas stream and are the major constituents of hydrocarbon condensate.

Heavy Metals - Heavy metals refers to a group of mostly toxic metals that have high atomic weights. Some are always toxic (e.g. lead, mercury, cadmium, arsenic, chromium) and others are toxic at high concentrations (e.g. zinc, copper). They are found everywhere in the environment because they are naturally part of the earth's crust or are concentrated in waste streams due to

the use of a compound that incorporates a heavy metal element. When a compound that contains a heavy metal is degraded, the element can be released as a toxic gas.

Interchangeability – The ability to substitute one gas for another, in the context of natural gas replacement, without materially changing or influencing environmental health and safety, end use performance or pipeline integrity.

Landfill Gas – Gas which is emitted from the breakdown of materials in a landfill. This gas is considered "raw" and requires upgrade for introduction to the pipeline network.

Microbial Induced Corrosion (MIC) - Corrosion caused by bacteria present in a pipeline network. Secific groups of bacteria can produce acids that deteriorate pipes through pitting and oxidation. MIC bacteria groupings include, but are not limited to: sulfate-reducing bacteria (SRB), acid-producing bacteria (APB), including acetic-acid producing bacteria (total group) and butyric-acid producing bacteria (total group), iron-oxidizing bacteria (IOB), denitrifying bacteria (DNB), and methanogens – microbes which produce methane (in the Archaea domain). MIC can be very deleterious to pipeline integrity and has been associated with pipeline failure.

Pesticides - Chemical products used to reduce or eliminate unwanted organisms, regarded as "pests". Pesticides are often used on agricultural land, gardens, roadsides, and golf courses to eliminate species considered undesirable or damaging. Pesticides may incorporate elements which are deleterious to human health and the environment and, when degraded, may release compounds/elements of concern.

Pharmaceuticals - Pharmaceuticals are substances that are aimed to cure, prevent, or recognize diseases and relieve pains through their application in the organism. Breakdown or volatilization of pharmaceutical products may pose secondary health effects in receptors for which the products were not intended.

Siloxane - Any chemical compound composed of units of the form R_2Sio_2, where R is a hydrogen atom or a hydrocarbon group. A siloxane has a branched or unbranched backbone of alternating silicon and oxygen atoms, -Si-O-Si-O-Si, with side chains R attached to the silicon atoms. The word siloxane is derived from the words **sil**icon, **ox**ygen and alk**ane**. Siloxanes can be found in products such as cosmetics, deodorants, water repelling windshield coatings, food additives and some soaps. When combusted, the siloxane molecules are reduced to silicon dust; this is extremely abrasive and damaging to internal engine components. Combustion of siloxanes also causes a glass-like build up around burner tips and on the tubes of heat exchangers. Silicon dust, resulting from the combustion of siloxanes, may pose health risks to humans and other receptors.

Wastewater Treatment – Process that modifies wastewater characteristics such as its biological oxygen demand (BOD), chemical oxygen demand (COD), pH, etc., to enable it meet effluent standards. Resulting biogas from this process requires upgrade in order to be suitable for introduction to the natural gas network.

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AGA Natural Gas Contract Measurement and Quality Clauses, Transmission Measurement Committee, Report No. 4A, 2001.

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APPENDIX A: INTRODUCTION TO MIC

Microbially-induced corrosion (MIC) is one of the leading causes of pipe failure in the natural gas industry. This corrosion is caused by bacteria produced acids which cause pitting in the pipes. This is especially prevalent in gas lines in which moisture has collected, or in wet gas systems. Bacteria associated with MIC can be difficult to enumerate and identify. Traditionally, corrosion-causing bacteria are detected and quantified through simple bacterial growth tests that incorporate different enrichment media. In these tests, samples are collected and provided with growth medium (food and nutrients) on which the bacteria grow. However, there are problems with these types of tests: 1) the bacteria may not grow on the selected medium, 2) the bacteria may be very slow to grow and are therefore not counted, and, 3) the conditions (temperature, etc) are not correct for the growth of target bacteria. Bacteria which cause MIC are difficult to grow and, using the plate growth method, are often overlooked or misrepresented in final numbers. Also, given the conditions of biomethane production and cleanup, bacteria may be present in the cleaned gas stream but may not be alive. Traditional plate tests, commonly used in the natural gas industry, cannot account for the presence of dead bacteria.

One of the most traditional growth methods is called the Most Probable Number test or MPN test. It relies on liquid samples containing live bacteria, and takes up to 4 weeks to obtain the results. Unfortunately, as numerous researchers have shown, only 0.1% to 10% of total live bacteria can actually grow in an artificial medium such as that used in the MPN tests and a significant portion of bacteria growing in the media are actually not the target bacteria. Therefore, this growth test is unable to accurately quantify the target bacteria in the samples.

New methods have been developed to more accurately assess microbial populations. Common and widely used molecular biology techniques can be deployed to assay for live and dead bacteria (16s rRNA analysis). GTI, for instance, has developed and patented a procedure based upon a common and referenced molecular biology technique to test specifically for the bacteria which cause MIC in pipeline, to overcome the problems with the MPN testing. The technique allows for direct detection and quantification, without prior growth, of corrosion-causing microorganisms typically found in pipes and other equipment used by the natural gas, petroleum, chemical, water, and wastewater industries. This test allows for quantification and identification of live and dead bacteria because it does not involve bacterial growth. This test specifically targets functional genes (segments of DNA) associated with bacteria that cause corrosion. In other words, it looks specifically for the DNA sequences within the dead or live bacteria, which are associated with MIC-corrosion capabilities. The testing technique is far more accurate than traditional microbial growth tests with an accuracy of ± 10%, and can analyze almost any type of samples (liquid, biofilms, or solid samples), including dried solid samples,

which only contain dead bacteria. It is also rapid; genetic tests can be completed in 24 to 48 hours. This testing is called qPCR (Quantitative Polymerase Chain Reaction). The test of qPCR is a common molecular biology technique and has been used in many types of microbial testing programs, but GTI has developed the test specific to MIC testing and identification. Other qPCR, protein or nucleic acids tests may also be useful.

Another consideration of transmission of bacteria into the natural gas system is the introduction of pathogens to gas supplies. Identifying bacterial strains which may be pathogenic is achieved through Genbank analysis. Consideration of the transmission of pathogenic microbes and spores has been mentioned in research documents generated in Europe (BONGO Collective).

DESCRIPTION OF MIC BACTERIA/MICROBES

Corrosion producing bacteria can be arranged into five basic groups:

- Sulfate-reducing bacteria (SRB)
- Acid-producing bacteria (APB)
    - Acetic-acid producing bacteria (total group)
    - Butyric-acid producing bacteria (total group)
- Iron-oxidizing bacteria (IOB)
    - *Leptothrix* and *Sphaerotilus* genus
    - *Gallionella* genus
- Denitrifying bacteria (DNB)
- Methanogens – microbes in the Archaea domain that produce methane

Of the set listed above, SRB, APB and IOB are widely considered the most aggressive corrosion-causing bacteria, even though SRB are often not the most abundant microbes in pipeline samples. The DNB and methanogens are frequently retrieved from pipeline samples, and also cause corrosion. Of note, the total APB number reported in Task 1 of this project includes both acetic acid–producing bacteria and butyric acid-producing bacteria, which are two most common APB in the pipes. The total IOB number reported here includes *Leptothrix*, *Sphaerotilus*, and *Gallionella*, which are the most common IOB related to corrosion.

Methanogens do not belong to Bacteria Domain; they are a very primitive organism, and belong to Archaea domain.

DESCRIPTION OF SPORES

A bacterial spore is a hard protective coating that encases the key parts of the bacterium, produced by the bacterium when conditions for growth are adverse. Bacterial spores are approximately 0.8 to 1.2 microns in size and consist of protective membrane layers, wrapping essential genetic elements necessary for bacterial survival in the future. They can be spherical and ellipsoidal. Within these membranes and the hard coating, the dormant bacterium is able to survive for weeks, even years, through drought, heat and radiation. When conditions become more favorable again (more water or food available), the bacterium "comes to life" again, transforming from a spore back into a cell. Some bacterial spores have possibly been revived after they lay underground for thousands of years.

Specific types of bacteria in the environment readily produce spores. Some bacteria which convert biomass to methane or perform accessory degradative processes within anaerobic digesters are among the groups that produce spores. Bacteria that produce spores are found among aerobes (require air to grow) and anaerobes (grow without air). Spores can be collected, enumerated and identified.

For confirmatory biological collection and testing, filters of size 0.2 microns, encased in a stainless steel pressure filtration funnel, may be installed in-line after the biogas cleanup and primary biomethane filtering process. The filters can be collected on a periodic basis and evaluated for the presence of microbes and spores. Filtering time depends upon the quality and volume of biomethane that passes through the filter. Filters are folded inward and placed in sterile plastic bags for overnight shipment to the laboratory. Bacteria/spore counts are recorded as number per 100 standard cubic feet of gas.

For testing for the presence of *live and dead bacteria,* all samples can be tested *to the level of type of bacterium* using qPCR primers (GTI) or other qPCR testing to the grouping level (test for genetic segments which indicate the presence of the MIC-bacteria, etc. listed in Section 8.0). *These tests can determine the total number of bacteria (live and dead) in the sample and can identify the bacteria as associated with MIC.*

Live bacteria can be enumerated through traditional bacterial MPN testing (TG Media, Commercial Microbiology). In MPN tests, 10-fold dilution series of filter suspension are inoculated, in triplicate, in the thioglycolate medium to quantify live bacteria and incubated at

37º C for one week. The positive and negative readings of each culture bottle and the resulting most-probable-number values are then determined according to manufacturer's instructions.

For samples with positive MPN results (live bacteria present), the MPN culture can be used for DNA isolation and qPCR analysis to determine the types of bacteria present after growth in the medium.

Spore testing can be achieved by using the NASA standard assay NHB 5340.1D. The filter sample used to retrieve bacteria can be used for spore testing. GTI Task 1 testing included taxonomic identification of spores found in biomethane samples through Genbank analysis. Identification of spores may be desirable if there is a concern for pathogenic carryover.

Refer to Task 1 for further information regarding microbial testing.

TASK 3 REPORT

GTI PROJECT NUMBER 20736

Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion

Task 3: Review and Recommendations Regarding Thermal Heating Value (Wobbe Index) of Biogas

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I. Executive Summary

Local gas distribution companies (LDCs) are increasingly asked to purchase and take delivery of biogas for co-mingling into their existing lines for general distribution. Biogas, sometimes known as fermentation gas or renewable natural gas (RNG), is biologically derived from microbes acting on organic matter under anaerobic conditions. Such gases can be produced from anaerobic biomass digesters, from the degradation of municipal solid waste in landfills, and from the microbial digestion of organic matter found in waste water. The resultant decomposition of organic feedstock yields a gas that is principally comprised of methane (CH4) and carbon dioxide (CO2). Methane typically accounts for roughly 60% of the raw biogas and carbon dioxide for approximately 40%. Minor components of raw biogas may account for a few percent in total, and all trace constituents amount to roughly 1% or less. The profile of the minor and trace components depends on the biomass feedstock and the conditions under which it is transformed into biogas. Raw biogas often has to undergo a cleanup process to enrich its methane content before it can be utilized.

The requirements for blending biogases or interchanging them with natural gas derive from 3 broad areas of consideration: pipeline gas quality specifications, historical commercial gas characteristics, and interchangeability attributes. One of the most important attributes, particularly in Europe, is the Wobbe Index of a gas destined for introduction into the pipe.

The Wobbe Index provides an indicator of the heat flux emitted from a burner tip during combustion of the fuel gas. As such, it provides a useful, but not exclusive, indicator for interchangeability and blending. Herein, a Flame Lift Index, based on the ratio of flame speeds in two interchanged fuel gases, is identified. It also provides valuable information on the impact on end-use equipment of blending and of the interchangeability of gases. Jointly, the Wobbe Index and the Flame Lift Index provide constraints on the composition of biogas to be introduced into the pipe, either through blending or through outright substitution. Consideration of flame lift, for example, in some cases provides a stronger constraint on the allowable fraction of CO2 than the Wobbe Index does.

Although the Flame Lift Index (LI) is fundamentally based on the physics of the combustion process and proves useful, it has a drawback. Calculating it requires computer simulations of the combustion process for the fuel gases under consideration. It is, therefore, complicated to calculate. However, an empirically-derived AGA lifting index (Ref. 2) correlates well with the more fundamental Flame Lift Index described herein. The AGA lifting index gives nearly identical maximum CO2 fractions for the conditions studied. For those circumstances of interchangeability that are close to the conditions under which the AGA lifting index was determined, it may serve as an alternative that is more straightforward to employ than the fundamental Lift Index described in Section III.

End users who may receive pure biogas that has been cleaned are likely to place stringent limits on the fuel composition (and hence on the cleanup required prior to injection into a pipeline). For example, were a requirement of a narrow acceptance band of 4% width in the Wobbe Index imposed, as advocated by the NGC+ committee on fuel interchangeability, very tight CO2 limits for the fuel gas result. Such limits impose cleanup requirements on the raw biogas to diminish its

CO2 content. A wider band in the Wobbe Index allows, of course, a wider range of acceptable fuel compositions.

Rather than accepting pure, cleaned biogas alone as a fuel gas, receiving a blend of natural gas and cleaned biogas is a potential, and perhaps more probable, alternative. A blended fuel gas that remains within a given acceptance band of Wobbe Index allows for relaxed requirements on the CO2 content of the biogas itself. The maximum allowable quantity of biogas that can be mixed with natural gas and that can still adhere to a given set of specifications depends on the composition of both the natural gas and the biogas. In some instances, this may be used to an advantage in blending biogases to ballast high-calorific gases such as LNG. However, for gases which contain high CO2 fractions (either in the biogas or in the biogas/natural gas admixtures), the maximum allowable CO2 concentrations for introduction to the pipeline network may be based on pipeline integrity requirements rather than on the Wobbe Index or on the Flame Lift Index.

II. Introduction

Project Background

Local gas distribution companies (LDCs) and natural gas transmission companies are increasingly asked to purchase and take delivery of (introduce) biomethane from the digestion of a wide variety of wastes (including landfills, wastewater treatment facilities, dairy operations, agriculture, etc.) for co-mingling into their existing lines for general distribution. Although some cases exist to the contrary, biomethane or renewable natural gas (RNG) is a relatively new fuel to the gas pipeline network and has not been routinely accepted into existing pipeline systems. The potential effects of RNG constituents on human health and safety, gas transmission and distribution components (including corrosion and deterioration), and combustion systems have not been thoroughly quantified. The quality of geologically-derived natural gas is currently specified in gas transportation tariffs, through the Federal Energy Regulatory Commission (FERC). However, RNG quality is not covered in these tariff requirements. Based upon biomass source, produced RNG may contain constituents, compounds and other particulate matter not found in natural gas supplies. These constituents may compromise or affect pipeline integrity and system operations and may impact pipeline safety.

A document that bounds the analytical and safety requirements of this new fuel, by biomass source, is necessary. This project is relevant to PHMSA's mission in the area of New Fuels Transportation. Biogas holds potential as a significant "green" renewable energy source. Within the last year, there has been great enthusiasm and investment in bioconversion of waste products to quality fuel, supported by political and public pressure to create and use renewable energy products. However, due to problematic constituents within this new fuel, transportation of RNGthrough existing pipeline networks may ultimately impart risks to people, the environment, and the pipeline network itself. A document providing analytical specifications for RNGto transmission and distribution companies detailing is needed.

Overall Project Objectives

The overall objective of the larger project, *Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and landfill Conversion,* (five Tasks) is the development of Guidance on analytical criteria necessary for the introduction of RNG from wastewater treatment and landfills facilities into existing pipeline networks. This Guidance Document has been developed through laboratory testing of raw (before cleanup) and post-cleanup biogas from wastewater sludge and landfills in order to assess their quality, safety, and compatibility with existing supplies and pipeline delivery infrastructure. The Guidance Document will serve as a foundation onto which additional and specific gas requirements may be added, based upon LDC and end user requirements. Identification and potential for removal of problematic components and determination of acceptable analytical biogas specifications per biomass source is the goal. In addition, the anticipated heating value ranges of the resulting clean biomethane has been investigated and appropriate conditioning units, suitable for cleanup of landfill and wastewater treatment biogas has been compiled. This project has not addressed interchangeability of other fuels, such as hydrogen, syngas or LNG. The information represented in this report captures Task 3 work.

Overall Project Structure

The Task structure of the project reflects its objectives. Task 1 entails field sampling and analytic laboratory testing of biogas samples. Task 2 involves the preparation of the draft national guidance document. Task 3 work includes a review of the thermal heating value of biogas, with specific attention to the Wobbe index. Finally, in Task 4 a review of cleanup and conditioning of biogas to pipeline quality is performed. Table 1 contains a summary of the task structure and the associated deliverables.

Table 1: Project Task Structure

Task #	Task Name	Deliverables
1	Laboratory Testing and Analysis of Biogas	Report of all analytical findings
2	Draft National Guidance Document Preparation	Final draft guidance document
3	Review of Thermal Heating Value	Report of findings
4	Conditioning Process Review	Report of findings
5	Project Management	Regular reporting, project communications, budget and work management

Objective of This Report

The purpose of this report is to meet the goals of Task 3 by reviewing biogas (RNG) thermal heating values, in particular the Wobbe index. Key gas quality indicators and the impacts on them of mixing RNG with natural gas will be covered.

III. Gas Quality and Its Indicators

General Introduction

Gas quality indicators serve a variety of purposes, and they can be loosely divided into three types. First, a number of indicators pertain to "pipeline" quality; that is, they relate to the behavior and interactions of gases in and with the natural gas pipeline network. They are generally related to the potential for corrosion and potential for the formation of condensed phases. Thus, specifications for certain constituents, such as sulfur-containing compounds, water dew point, carbon dioxide and hydrocarbon dew point are required, to mitigate the risks for corrosion and condensate formation to acceptable levels. Many of the current gas quality specifications also consider the interaction of some deleterious components, such as that between water and CO_2, often leading to different specifications for tolerable CO_2 concentrations in "dry" and "wet" gas networks.

A second, broad group of indicators can be categorized under the heading of "commercial" aspects. Although the heating value is a primary characteristic of natural gases and is used, for example, to adjust appliances in the field, its use for billing purposes can be considered the most important. Other aspects relate to the "merchantability" of the gas: dust and trace components (such siloxanes in biogases) that reduce the attractiveness of the gas as a product.

The third group of indicators regards interchangeability, the focus of the work in Task 3. Interchangeability indicators characterize the behavior of different gases. A modern definition of interchangeability was given in the NGC+ White Paper [1] as: "The ability to substitute one gaseous fuel for another in a combustion application without materially changing operational safety, efficiency, performance or materially increasing air pollutant emissions". The indicators used to describe interchangeability have traditionally focused on operational safety and performance, usually characterizing flame lift, flash-back, soot formation and carbon monoxide emission. Although the relations between gas composition and pollutants such as NO_x deserve attention, the indices generated to date [2,3] have not considered such pollutants.

Historically, the interchangeability indices were derived to help characterize the shift from manufactured gases to natural gases [2]. Usually being from a limited number of sources, once supplies of natural gas obtained a dominant position local variations in gas quality also became limited, and the local population of gas utilization equipment was adjusted to this local quality. As a result, the characterization of interchangeability fell into disuse. The arrival of "new" gases, such as LNG, having a significantly different composition than the traditional distribution gases, necessitated a renewed interest in the practice of characterizing interchangeability. The growing interest in introducing sustainable gases such as biogas, which also have substantially different compositions from natural gases, also necessitates consideration of interchangeability effects.

Interchangeability Indicators

The effects of different fuels on the performance of gas utilization equipment depend intrinsically on the actual composition of the fuel; interchangeability indicators attempt to characterize these effects on a more global level. Usually referred to as "indices", the most useful indicators have been well summarized in [4]. Below is briefly discussed the origins and use of a

number of indices, followed by a description of the physical origins of interchangeability effects and the relation between these origins and the indices used. The discussion focuses on those aspects important to the interchangeability of RNG, particularly flame lift. Lastly, the method used here to characterize RNG is described.

Phenomena Covered by Indices

Interchangeability indices are intended for laminar-flame, Bunsen-type burners typically used in domestic appliances. The following combustion phenomena are specified with interchangeability indices when considering the relationship of these properties between gases to be exchanged.

Flame lift [5]: Flame lift occurs when the burning velocity of the fuel-air mixture in the stabilization region of a flame (usually at the edge of the burner or burner port) is lower than the local exit velocity of the mixture from the burner nozzle. The flame is then "pushed" away from the burner. While this can lead to "blow-off" in the extreme case (the flame leaves the burner completely, giving uncontrolled escape of combustible mixture), slight flame lift at the edges of the flame result in the escape of unburned mixture, which in turn leads to significant CO emissions [6]. Flame lift is a risk when the "new" gas (called the "substitute" gas in the use of indices) is slower burning than the traditional gas for which an appliance is adjusted (the so-called "adjust" gas). Typically, RNG, the type under discussion in this report, have high fractions of CO_2 that significantly lower the burning velocities of the fuel-air mixture as compared to pure hydrocarbons [7-9]; thus, the use of such RNG increases the risk of flame lift.

Flash-back [5]: Flash-back, or light-back, occurs when the burning velocity of the fuel-air mixture is higher than the exit velocity of the mixture everywhere in the flame. Rather than being stabilized above the burner, the flame enters the burner; this can lead to physical damage to the burner (overheating) and extinction of the flame, resulting in the uncontrolled escape of combustible mixture. Flash-back is usually a concern for hydrogen-containing gases, although it can also be a risk in modern lean-premixed (low-NO_x) appliances when substituting rich natural gases for lean gases.

Yellow tipping: Yellow tipping is generally caused by oxygen deficiency in the primary reaction zone of Bunsen-type flames, resulting in soot formation in the flame. Often, soot formed in the flame is oxidized further downstream, when sufficient oxygen has mixed with the hot gases. However, concern regarding the actual deposition of soot in heat exchangers, with negative consequences for the safety and efficiency of an appliance [10], makes yellow tip formation an interchangeability issue. Yellow tipping is also much easier to observe as an indicator of soot formation compared to measuring actual soot deposition.

Incomplete combustion: Although yellow tip formation is also an indication of incomplete oxidation of the fuel, the term *incomplete combustion* is generally reserved for the amount of carbon monoxide (CO) emitted from an appliance. Different countries have different standards for acceptable CO emissions, which are usually based upon the relation between exposure and CO poisoning.

Thermal input: A very basic interchangeability parameter regards variations in thermal input when changing gas composition. Substantial variations in thermal input lead to overheating of the appliance or the inability of generating enough heat for the purpose of the appliance.

Dimensionless Indices: AGA, Weaver, and Dutton

All three of these sets of indices are empirically based, i.e., the indices were derived from empirical fits to a series of experimental data. Each index has an assumed functional form dependent on relevant physical parameters of the gas. The strengths of the physical bases for these assumed functional forms varies.

AGA:

The AGA indices (Bulletin 36 [2]) were based on experiments performed on a test burner, essentially a Bunsen burner with variable air input. The well-defined geometry of this burner allowed clearer distinction of the effects of gas quality than those often seen in practical appliances. The indices for flame lift, flash-back and yellow tipping, and their acceptable range of variation, were derived from measurements on a wide variety of fuel compositions, with an emphasis on manufactured gases. Although the Wobbe Index (see below) is not mentioned in Bulletin 36, it occurs implicitly in every AGA index through the "primary air factor", which is essentially the inverse of the Wobbe Index. AGA indices are cited in some US tariffs.

Weaver:

The Weaver indices [3] for flame lift, flash-back, yellow tipping and incomplete combustion, were based on experiments on several tens of domestic appliances. As such, given the effects of individual appliance/burner design on these combustion aspects, there was significant scatter in the data used to derive the indices. Although CO emissions were considered explicitly, which has been an advantage in the discussion of the introduction of "rich" natural gases (NGC+ white paper), the assumptions made for the incomplete combustion index (using the carbon-hydrogen ratio) are speculative at best. However, despite this principle drawback, the results of the Weaver incomplete combustion index compare very well with those of a more fundamentally correct method [10].

The AGA and Weaver methods characterize the gases relative to each other, that is, given an "adjust" gas, the indices indicate whether a "substitute" gas is better than, equal to, or worse than the adjust gas for the given interchangeability aspect. As a rule, "exact" interchangeability between two gases is given by the value of 0 or 1 for a given index. Additional ranges of acceptability, for a given "average" gas, for example, were based on the spread of the results obtained (for Weaver, based on the appliance population used in his examination) and with the insights of the researcher at the time. One must be cautious when generalizing these ranges to modern gases and modern appliances.

Dutton:

In the 1970s, Dutton of British Gas studied the interchangeability of gases for specific appliances commonly used in the UK [11]. Here, he chose specific appliances for individual indices; for example, instantaneous hot-water heaters were used for his incomplete combustion index (CO emissions). Rather than indices to compare gases among themselves, Dutton's indices couple gas composition to acceptable behavior for the UK appliance population. Thus, the limiting values for his indices for incomplete combustion, soot formation and flame lift, are in this sense absolute. The coupling of the indices describing the behavior of different gases to the specific appliance population renders extension to other appliance populations problematical. However, this coupling to the British market lead to his results being incorporated in the law regarding entry specifications to the UK gas market, the so-called Gas Safety (Management) Regulations or the GS(M)R [12].

The Wobbe Index

In contrast to the dimensionless indices discussed above, the Wobbe Index [13] has dimensions. Given its importance as a physical parameter describing the dominant effects in gas utilization equipment, and its role as primary gas quality specification around the world, this index is examined in somewhat more detail. The Wobbe Index determines both the thermal input to an appliance and the fuel-air ratio of all equipment not having a fuel-air ratio control.

Thermal Input:

At a given thermal input, gas is supplied in all domestic appliances (and in the vast majority of industrial burners as well) at a constant pressure drop over a nozzle. Since the thermal input of a burner is B, by definition, is B= H*F, where H is the heating value (say in Btu/scf) of the gas and F the volumetric flow rate. Recognizing that at constant pressure F is inversely proportional to the square root of the density[1] suggests that $B \propto H/\sqrt{\rho}$, in which ρ is the density of the gas. Normalizing the density of the fuel by that of air to give the specific gravity (SG), yields $B \propto H/\sqrt{SG}$, and the definition of the Wobbe number, $W = H/\sqrt{SG}$, arises in a natural fashion.

(Primary) Air Ratio:

In "atmospheric burners", using natural aspiration for the supply of primary air, the flow of natural gas out of the nozzle entrains its own primary air, usually in a venturi. The amount of air entrained (and thus the volumetric flow rate of primary air, V) is solely determined by the momentum flux of the gas jet [14,15]. Following [15], the momentum flux of the gas jet leaving the nozzle (having cross-sectional area A), is given by $\rho F^2/A$. Consideration of the dependence of F in the footnote below, demonstrates that the momentum flux of the gas is, to a good approximation, solely determined by the pressure drop over the nozzle. Since the gas pressure is usually not changed when substituting one gas for another, the amount of air entrained, and thus V is independent of the gas composition [16]. The primary air ratio or equivalence ratio, φ (the fuel/air ratio) for a given gas is given by $\varphi = SF/V$, where S is the stoichiometric air factor for the gas (volume air/unit volume gas). So, since V is constant, $\varphi \propto SF$. Now, recalling the unusual property of the lower alkanes, that the ratio of the stoichiometric air factor to the heating value is constant to a very good approximation, and the dependence of F on the relative density, $\varphi \propto H/\sqrt{\rho}$. Again using the specific gravity for the density, the simple relation $\varphi \propto W$ obtains; this relationship was derived without considering the Wobbe Index in AGA Bulletin #10.

Although this property was derived for naturally aspirated burners in domestic appliances, it is perfectly general. For burners using fans for air transport, the flow rate of air is not usually dependent on the gas composition, and is generally only coupled to the pressure in the gas nozzle. Thus, here too, the air rate is constant, and the air factor varies with the Wobbe Index. In fact, for all burners that rely on a pressure drop across a nozzle for gas transport, and not having an air ratio control, the air ratio is proportional to the Wobbe Index.

---

[1] Recall that Bernoulli's law for incompressible fluid flow yields $F \propto \sqrt{\frac{2\Delta P}{\rho}}$, in which ΔP is the pressure drop over the nozzle, and in which ρ is the gas density.

In burners having some degree of premixing (nearly all domestic appliances and many modern low-NO_x burners), the primary air ratio is the most important determinant for flame behavior, having the largest influence on the burning velocity [17] and affecting CO and NO_x emissions. Since the changes in burning velocity with equivalence ratio are essential to understanding variations in flame stability when using biogases, this point is examined below.

Fundamentally Derived Lift Index

For the purposes of evaluating changes in the lift properties of biogases compared to natural gases, a fundamentally derived lift index, based on earlier work on the subject [8,9], is used. Briefly, flame lift is related to the phenomenon of flame stretch [18]; in essence, the burning velocity of a flame changes in gradients in the gas flow. For most burners, the gradients in gas flow are largest at the edges of the burner, exactly the region in which flames are stabilized. Critical changes in flame stability (such as extinction) are often described in terms of a Karlovitz factor [18], which among other things is proportional to heat and mass transport terms, the magnitude of the flow gradients, and the inverse of the square of the burning velocity. For the relatively modest changes in gas composition discussed here, the changes in the burning velocity are the only significant changes in the Karlovitz factor. Thus, flame lift is taken to be proportional to $1/S_L^2$, where S_L is the laminar burning velocity; this relation has also been shown to be adequate by experiment [8]. In order to form an index, the square of the burning velocity of the "substitute" gas is divided by the square of the burning velocity of the "adjust" gas, $LI = (S_L^s/S_L^a)^2$. When the Lift Index LI = 1, the substitute gas has identical lift characteristics to the adjust gas, and LI<1 means the gas has poorer lift properties than the gas with which it is being compared. In the context discussed below, $LI \geq 1$ is a criterion for acceptability. Although the burning velocity of a mixture is dependent on the actual gas composition, the variations due to the details of the composition are usually modest. They are neglected in the discussion below; however, they can be incorporated in an analysis considering gases having significant variations in composition.

Following the earlier reference [8], showing that even for fuel-rich Bunsen flames that the equivalence ratio in the stabilizing region is fuel lean, the adjust gas is assumed to be adjusted at an equivalence ratio of 0.85, roughly 20% excess primary air, as typical for practical burners that are sensitive to flame lift (such as cooking burners). This equivalence ratio is also similar to that found in lean-premixed appliances, such as condensing boilers. Any variation in actual conditions results in only modest changes in the conclusions. The burning velocity is then computed for the adjust gas at $\varphi = 0.85$, using the flame code CHEMKIN [19] and GRI-Mech 3.0 as chemical mechanism [20]. The burning velocity of the substitute gas is then computed at an equivalence ratio that differs from that of the adjust gas proportional to the ratio of the Wobbe Indices, as discussed above. These two velocities are then squared and their ratio forms the LI.

As a rule, when considering interchangeability within a band of gases, as will be discussed in detail below, it is assumed that an appliance has been physically adjusted for its equivalence ratio at the average Wobbe Index. The LI for the gas taken as the "adjust" gas (in the interchangeability sense) is then derived; for flame lift, this is generally the gas at the lowest Wobbe Index in the band. Thus, in the method the appliance has been physically adjusted for the average gas, but that its lift behavior is only acceptable down to the lowest Wobbe limit. That a point of physical adjustment must be chosen is given by the fact that the method is physically based. This provides realistic insight into different types of burner (Bunsen, lean-premix), which

can lead to different conclusions regarding interchangeability. For the discussion of domestic appliances, as discussed above, a single point of physical adjustment is adequate. The choice of a physical adjustment, whether in the middle or at the edge of a distribution band, has a negligible effect on the results presented here for flame lift.

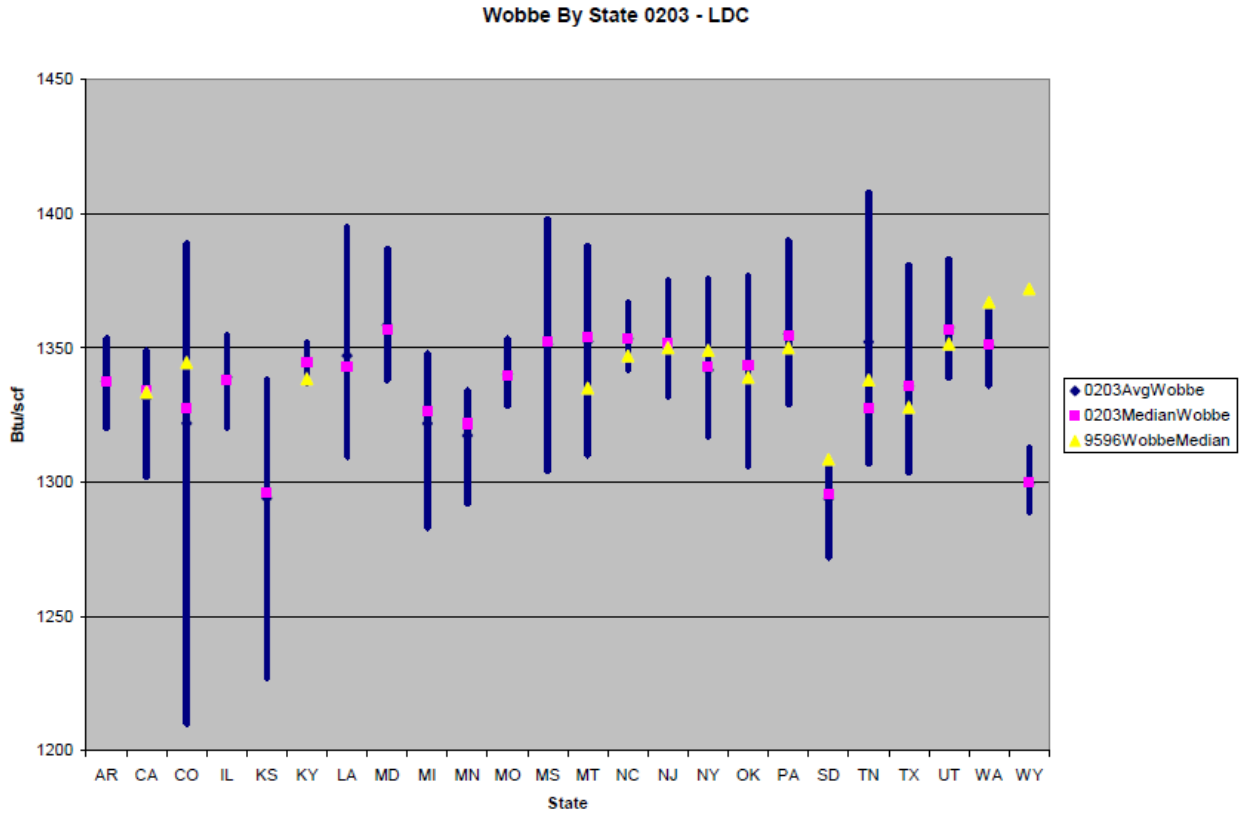
IV. Typical Gas Quality Specifications

Gas Quality in the United States

There appears to be variation in both the gas qualities being distributed and the specifications used. Figure 1 (taken from Appendix A of [1]) shows the variation in Wobbe Index from LDCs in the period 2002/2003 in different US states. The width of the band distributed and the value of Wobbe Index varies considerably. Some LDCs cite interchangeability parameters, such as ranges for AGA indices, in their tariffs. Since this report illustrates possible specifications for biogases using assumptions regarding local distribution data, it is not necessary to consider these variations at present; performing the analysis for any set of local specifications is straightforward.

Noteworthy for this report are the recommendations for interchangeability specifications given in the NGC+ White Paper [1], particularly the proposed acceptable range of Wobbe Index (± 4%). The assumptions made and their consequences for acceptable biogas shall be discussed in detail below.

Figure 1: Variation in Wobbe Index in Various US States in 2002/2003 (Appendix A of [1]).



Gas Quality in Europe

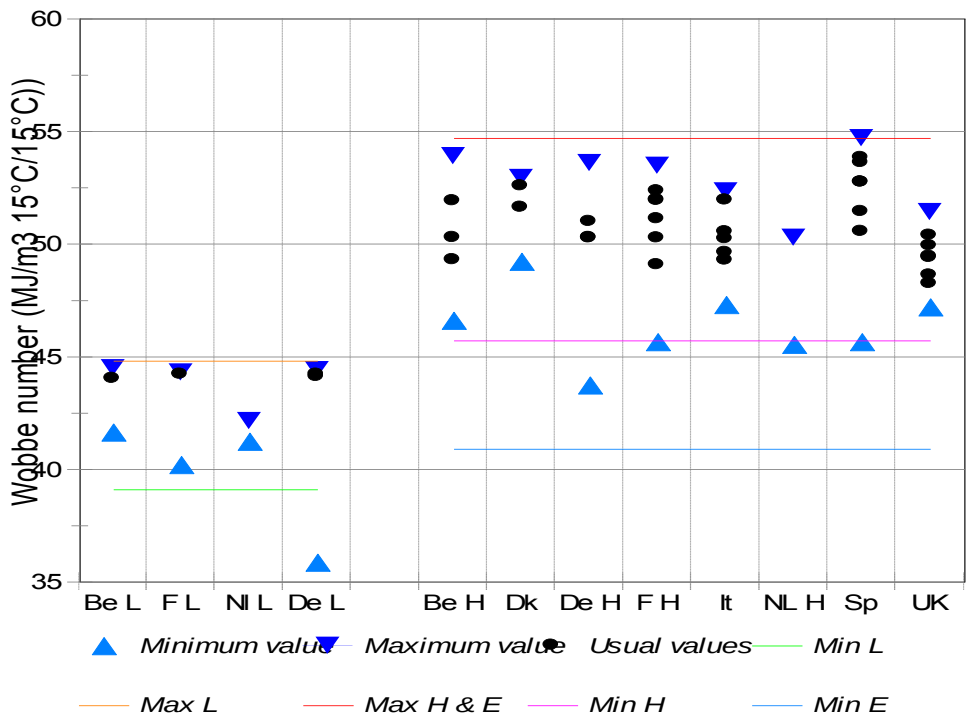
For interchangeability purposes in domestic appliances, with little exception the Wobbe Index is used in the EU to characterize interchangeability. The specified ranges of Wobbe Index, as well

as “usual values” of the Wobbe Index distributed for a number of EU countries is shown in Figure 2 (taken from [21]). The figure also indicates a significant difference with the US, i.e., that appliances are tested using “limit” gases, following the scheme given in the European Norm EN437 [22]: “Max. H” is the maximum Wobbe test gas, for incomplete combustion, for high calorific value gases (the designation H) and “Min. H” is the minimum Wobbe test gas, used for flame lift. The range of gases tested is ± 8% in Wobbe Index. However, the tests at the extreme are only for a short period, and this range is not intended as a distribution range.

For natural gases, only UK has additional specifications, in the GS(M)R [12]. In addition to a Wobbe range, there are additional parameters related to CO emissions (“Incomplete Combustion Factor”) and soot formation (“Soot Index”). The lower Wobbe limit is used to specify flame lift.

Regarding specifications for biogases, Germany, Sweden and Netherlands have additional specifications for CO_2 in such gases: 6%, 3%, 6%, respectively. The German limit is interesting since 6% CO_2 is actually outside the usual distribution band for high calorific gases in the EU. The technical basis of these specifications is unclear. The Netherlands is peculiar because it produces and distributes low calorific value gases (~14% nitrogen). This also leads to complications in lift behavior, outside of scope of this report. Other countries are discussing possible limitations on CO_2-containing gases, but for the time being it seems that the lower Wobbe limit is considered acceptable.

Figure 2: Ranges of Wobbe Index in Different EU Countries (ref. [21]). “H” refers to the band of high calorific value gases (H-gases) used in most of the EU, and “L” refers to the low calorific value gases produced in the Netherlands.



V. Gas Quality Simulations

Introduction

In this section, the interchangeability is assessed of biogases with natural gases for a number of situations. Here, the only biogases that are considered are straight CH_4/CO_2 mixtures; the extension to other compositions is straightforward. Two situations are considered which are illustrative of the behavior of biogases. First is considered a narrow distribution band of gas composition, taking the example of [4] used to illustrate the Washington Gas and Light LNG study. Then a wider band of gases is examined, using the NGC+ guideline [1] of ±4% variation in Wobbe Index with a maximum of 1400 Btu/scf. Two cases are of note: (a) one in which the biogas is to be distributed to the end user directly, without dilution, and (b) the other in which a biogas containing 10% CO_2 is mixed with a natural gas within the distribution band. There are actually four possible limits for acceptable biogas composition. One is the Lift Index as just discussed. The second is the lower Wobbe limit of the distribution range. Since CO_2 decreases the Wobbe Index of methane, increasing CO_2 fractions ultimately result in being outside the acceptable Wobbe band. The third limitation is given by the limiting CO_2 fraction based on pipeline integrity, usually 2-4%. Lastly, the CO_2 fraction will contribute significantly to the 4% maximum on inert composition in the NGC+ guidelines. Each of these limitations is discussed below.

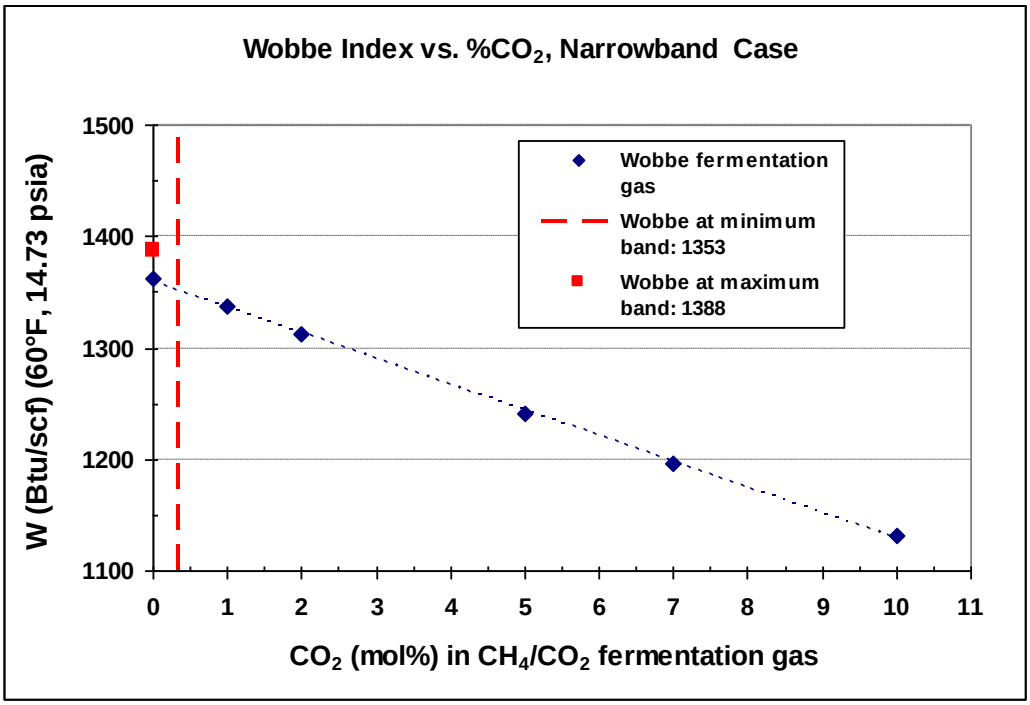
To emphasize, the analysis below only pertains to burners having some degree of premixing, such as domestic appliances. The lift behavior of other combustion principles, such as the non-premixed flames used in large scale equipment, e.g. for commercial heating/hot water and industrial processes, is not a priori addressed by this method. This is the subject of current research.

Narrow Distribution Band

As mentioned above, for this case an example provided in reference [4] is reviewed. Here, the Wobbe Index in the band is considered to vary between ~1352 Btu/scf (WG1033 in [4]) and 1388 Btu/scf (WG1066). Following [4], lowest Wobbe gas (1352) is chosen as the "adjust" gas: the assumption is that appliances can burn safely with the lowest Wobbe gas, but that their behavior is no longer "guaranteed" for an even lower value. That is, the lift behavior of the substitute gas must be identical to or better than the gas at 1352. The percentage of CO_2 in the biogas is then varied while computing the burning velocity and forming the lift index (LI) for each case. As mentioned above, when the Wobbe Index of the biogas is different than that for the average gas the equivalence ratio is shifted according to the ratio of the Wobbe Indices.

Changes in Wobbe Index with CO_2 fraction are shown in Figure 3. Since the Wobbe range of these gases is rather high (pure methane is close to the lower limit), the Wobbe Index itself will be a severe limitation on the allowable fraction of CO_2. In this case, roughly 0.35% CO_2 is enough to bring the gas to the edge of the Wobbe band. The Wobbe Index as a function of CO_2 fraction decreases more rapidly than for the equivalent fraction of nitrogen, due to the fact that CO_2 has a higher density than does nitrogen.

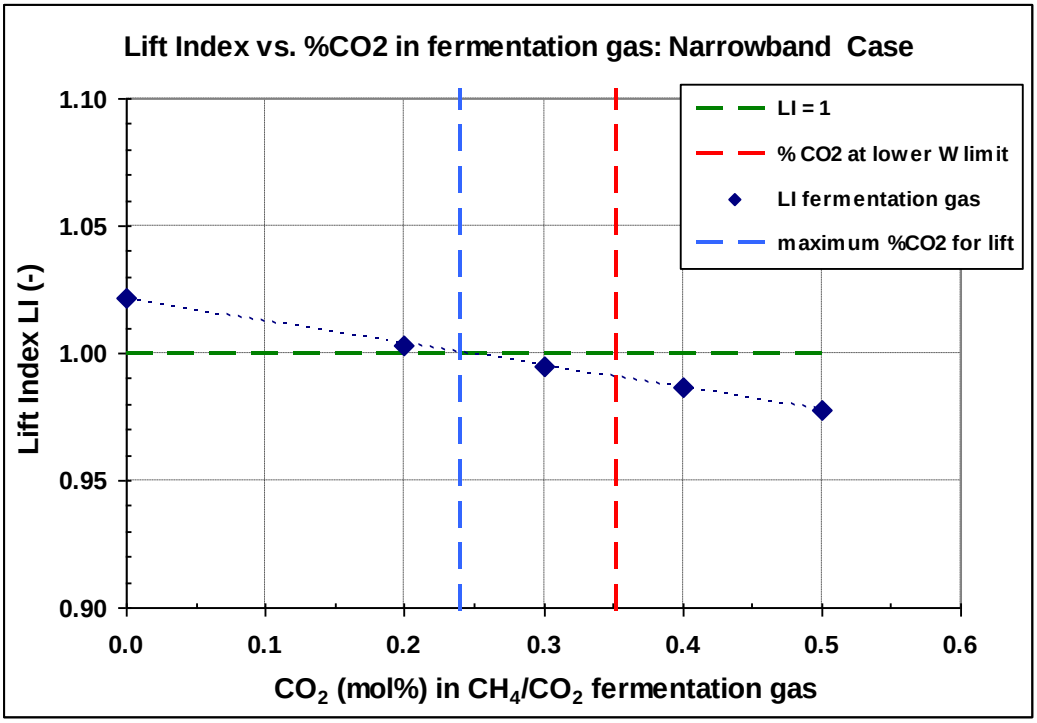
Figure 3: Wobbe Index vs. %CO_2 in Biogas.[2]



The result for lift is shown in Figure 4, as well as the Wobbe limit, at magnified scale. The lift limit, although very close (~0.25% CO_2) is still more stringent than the Wobbe limit. Such small fractions place severe limits on the degree of CO_2 removal for the biogases.

[2] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 4: Lift Index vs. CO_2 Fraction in Biogas. Indicated are the maximum CO_2 fractions allowed by the lower Wobbe Index of the band and by the Lift Index.[3]

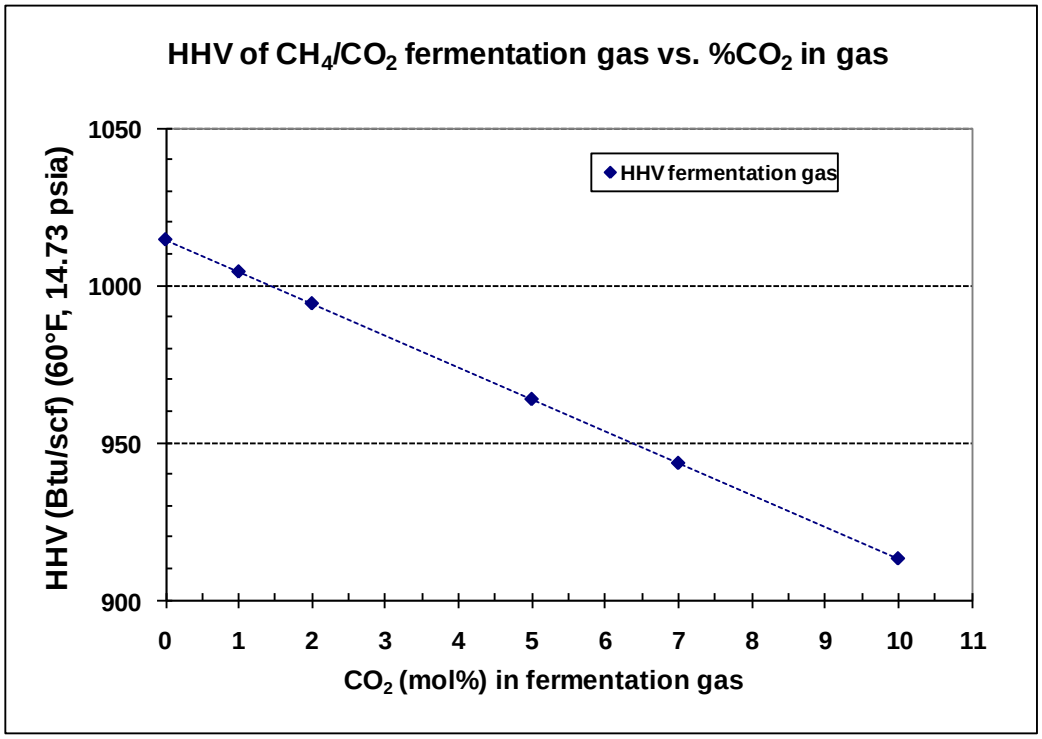


Inherent in the use of interchangeability indices is that, depending on reliability of the underlying data, they are apparently capable of resolving very small differences, as seen in Figure 4. However, when translating this to real situations, one must consider the practice of gas quality. An error of 0.2% in the determination of the Wobbe Index is as large as the differences in allowable CO_2 fraction between Lift and Wobbe limits for biogas in this distribution band. One must ascertain the relevance of such small differences in the actual context of biogas injection.

One interesting aspect of these results is that while the gas with 0.25% CO_2 satisfies both the lift and Wobbe requirements, the heating value is substantially outside that usually distributed in this band [4]. That is, HHV = 1012 Btu/scf for this biogas, while the lowest HHV for the distribution band is 1033 Btu/scf; note that pure methane is also outside the range of HHV. Although not relevant for interchangeability reasons, introduction of this biogas could result in complications regarding billing. For illustrative purposes, the change in HHV with CO_2 fraction in biogas is shown in Figure 5.

[3] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 5: Higher Heating Value vs. %CO_2 in Biogas.[4]

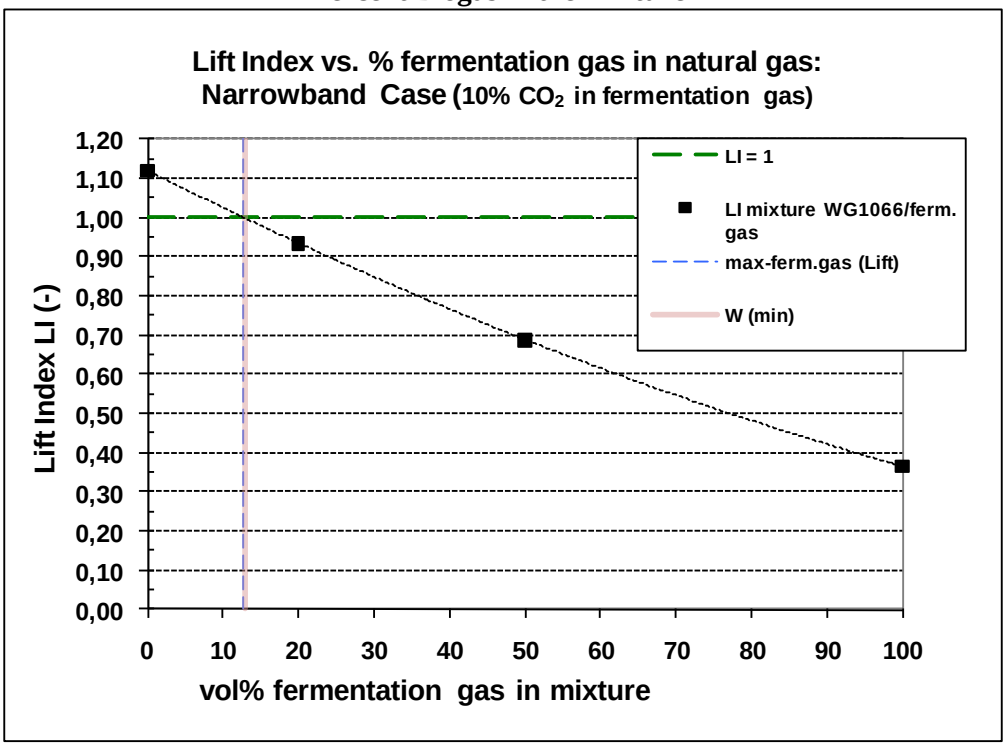


The possibility exists that a biogas could be blended at the highest Wobbe Index, which would allow a wider range of compositions. As an illustration, the results for blending a biogas with 10% CO_2 in WG1066 is shown in Figure 6. Here, roughly 12.5% of this gas can be mixed in the natural gas stream before lift risks are expected to increase. The Wobbe limitation is at 12.9% biogas in the mixture, only marginally different. But, here too, the lift limit is slightly more stringent than the Wobbe limit; this is related to the fact that CO_2 disproportionately lowers the burning velocity. However, it is unclear whether the injection of biogases into the gas grid is capable of such precision. Regardless of which limit is chosen, even in a narrow Wobbe band, there is significant room to relax the demands on the purity of the biogas without violating the limits on lift set by the distribution band.

Given the modest net amounts of CO_2 being injected into the pipeline, and the low fraction of inerts in the natural gas to which the biogas is being added (<1%), the fraction CO_2 does not approach the 2-4% assumed for pipeline integrity, nor the 4% inert maximum in the NGC+ guideline.

[4] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 6: Lift Index for Mixtures of Biogas (10% CO_2) in WG1066 vs. Percent Biogas in the Mixture[5]

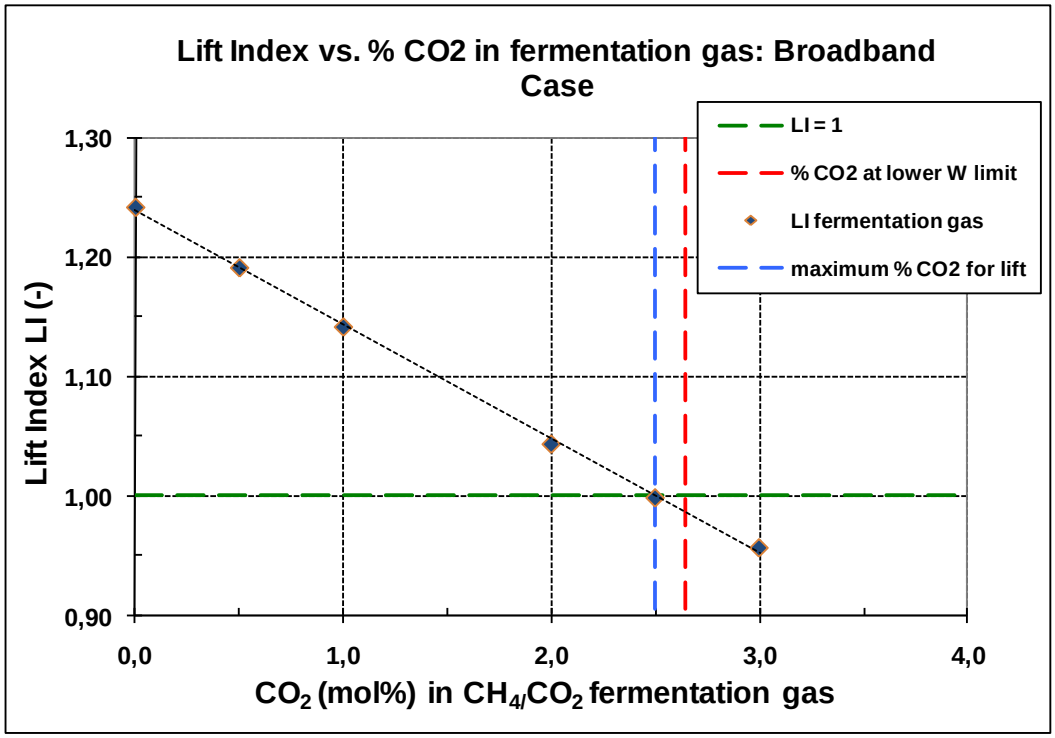


Wide Distribution Band

In this case, a band that is 8% wide in Wobbe index is considered, with a maximum at the top of the NGC+ range, i.e., 1296-1400 Btu/scf. As used in the narrow band case, it will be assumed that the equivalence ratio was set for the middle of the band and that the lower limit of the Wobbe band (1296) formed the "adjust" gas for flame lift. The results are shown in Figure 7, where both the lift and Wobbe limits are given.

[5] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 7: Lift and Wobbe Limits for Biogases.[6]



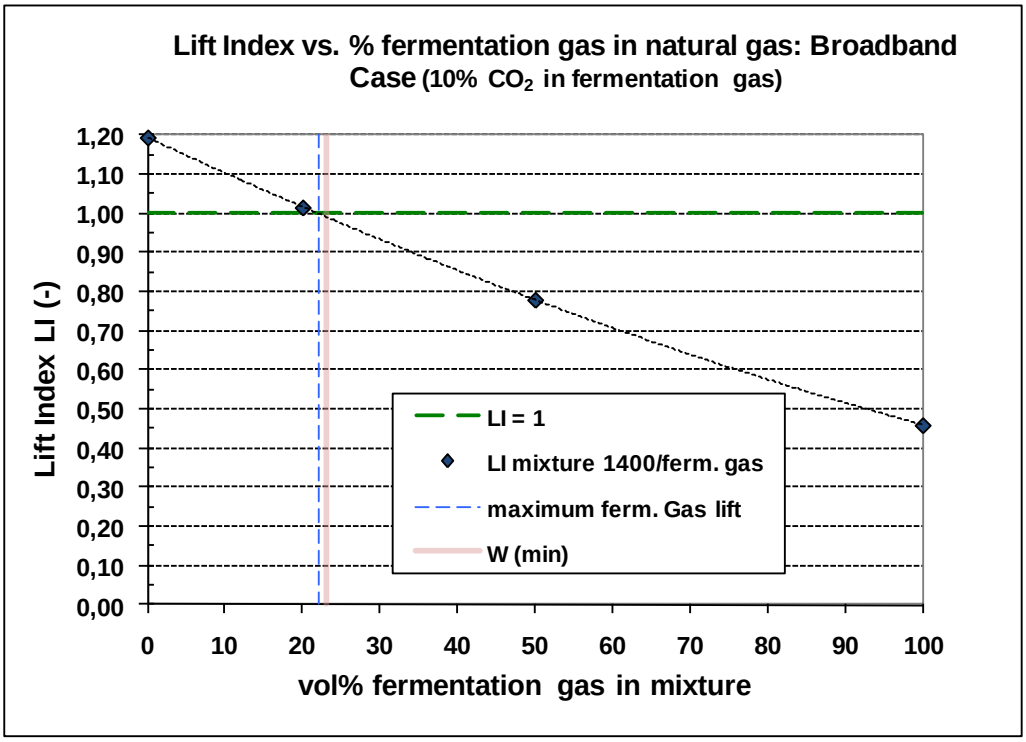
Although the lift-limited maximum CO_2 percentage is still modest (~2.5%), this is a factor of 10 higher than the narrow band case. Here too, the Wobbe limitation is only slightly higher than the lift limit (just above 2.6% CO_2). The HHV at 2.5% CO_2 is 989 Btu/scf, and the fraction of inerts is below the 4% cited in the guidelines of the NGC+ group [4]. However, for a pipeline with a CO_2 specification for pipeline integrity of 2%, the pipeline integrity limit itself will form the most stringent specification on the biogas. *In this case, if the biogas satisfies the integrity limit, it will automatically satisfy the interchangeability limitations*.

The case of blending a biogas with 10% CO_2 in a gas at Wobbe 1400 Btu/scf in this wide band is shown in Figure 8. The wide band allows nearly twice as much biogas to be blended and remain within the limits for both lift (~22% admixture) and Wobbe Index (~23% admixture). Once again, the limitation placed on the flame stability is slightly more stringent than that based on Wobbe Index alone. In this case, the extant CO_2 fraction is still above 2%, and possible limitations arising from pipeline integrity must be considered as well. Since the CO_2 fraction from the biogas is significant, substantial amounts of nitrogen in the natural gas can result in exceeding the maximum recommended inert fraction of 4%. For this specification, the details of the natural gas composition are necessary.

Analysis of the maximum admixture for biogases with different CO_2 fractions is straightforward; clearly, a higher CO_2 fraction in the biogas will result in a lower allowable admixture, while a lower CO_2 allows a greater blended fraction.

[6] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 8: Lift Index for Mixtures of Biogas (10% CO_2) in Natural Gas Having Wobbe 1400 Btu/scf vs. Percent Biogas in the Mixture.[7]

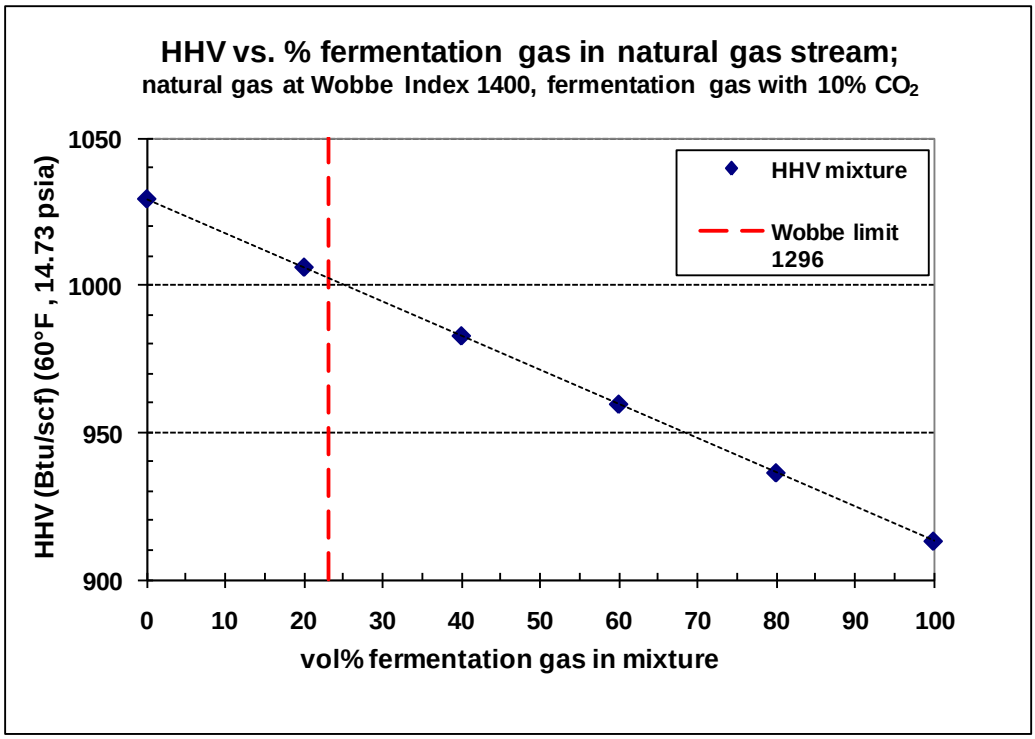


This relatively liberal fraction of biogas seen in Figure 8 is also the result of the choice of natural gas for blending, i.e., the maximum of the Wobbe band has been chosen. Here too, a natural gas of lower Wobbe Index will tolerate a lower admixture fraction, itself being closer to the composition of the "adjust" gas for lift. At the same time, one could conceivably mix substantial quantities of biogas with a gas with a Wobbe Index above the maximum of the distribution band. In this sense, provided the maximum CO_2 fraction for pipeline integrity is respected, biogases can be used instead of nitrogen to "ballast" high calorific gases such as LNG.

The change in HHV in this case is shown in Figure 9. At the minimum Wobbe Index of the band (1296 Btu/scf, 23% admixture of biogas), the HHV is still above 1000 Btu/scf.

[7] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

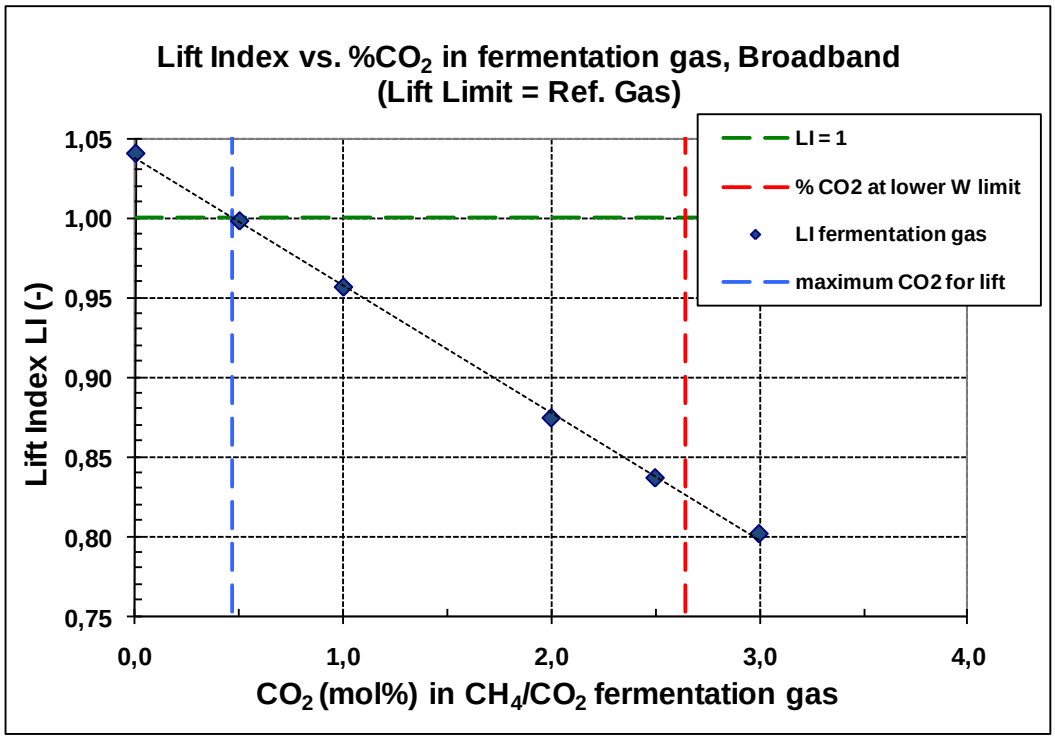
Figure 9: Higher Heating Value vs. Percent Biogas in Natural Gas/Biogas Mixture. Natural Gas is at Wobbe 1400 Btu/scf; Biogas is 10% CO_2 in Methane.[8]



One caveat that must be given here regards the choice of "adjust" gases. In the cases above, the lowest Wobbe gas has been chosen for comparison with biogases, de facto assuming that these gases are acceptable for all appliances. Suppose that there has been a long period during which only the "middle" gas in the wide band example, above, had been distributed (~1350 Btu/scf). In this case, it is possible that appliances could have been adjusted to be marginally stable with this gas, rather than the nominally lowest Wobbe gas (1296 Btu/scf). In this case, the 1350 gas could, or should, be considered the "adjust" gas for flame lift. The resulting maximum CO_2 fraction is shown in Figure 10. Here, rather than 2.5% CO_2 only 0.5% CO_2 can be present in the biogas, and the results, as should be expected from the analysis presented thus far, resemble the narrow-band case discussed above.

[8] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 10: Lift Limited Maximum CO_2 Fraction in Biogas if the Adjust Gas has a Wobbe Index of 1350 Btu/scf.[9]



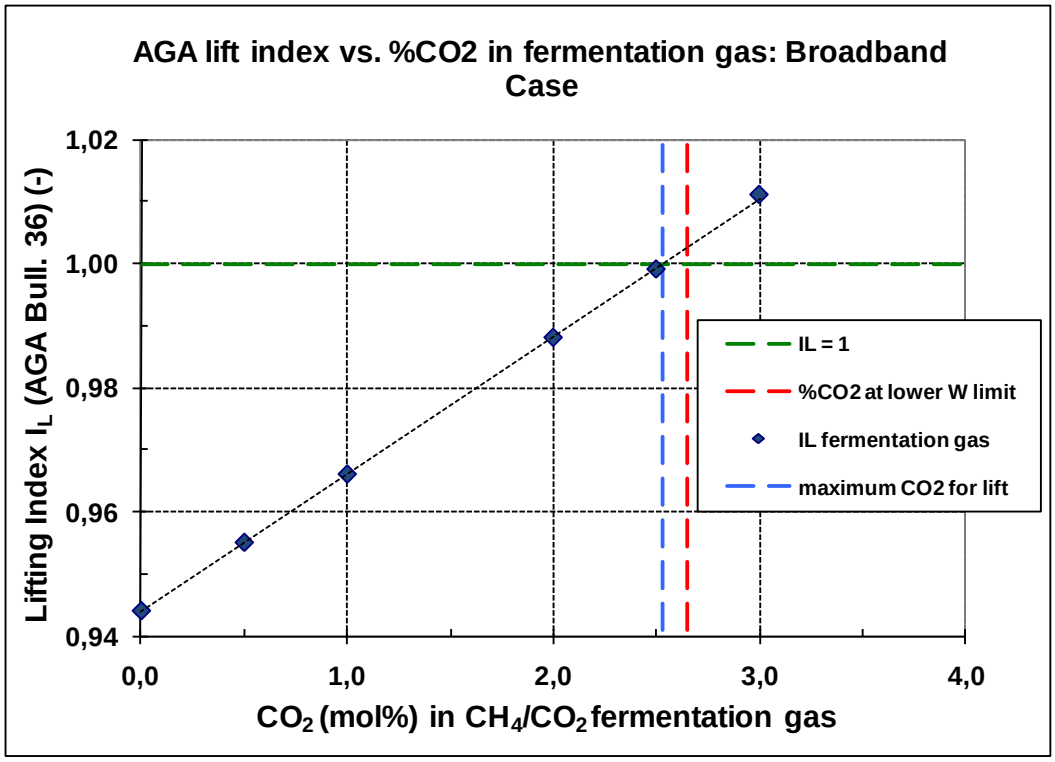
Comparison with AGA Lift Index

In order to compare the fundamental lift index (LI) which appears in this report and which is based on burning velocities to a simpler method for assessing flame lift, the AGA lift index for these gases was also computed. Since the AGA method was based on a Bunsen-type burner, and the experimental verification of the method used here was performed using Bunsen tubes, good agreement between the methods is expected. The result using the AGA index for the same conditions studied in Figure 7is shown in Figure 11. The difference in maximum allowable CO_2 fraction based on flame lift is less than 2% (relative) from that using the physically more correct, but more complex to use, LI based on burning velocities.

This promising result prompted a plot of the AGA lift index vs. the fundamentally based LI, shown in Figure 12. Although the correlation is slightly curved, a very good correspondence between the methods is observed, with both indices being very close (better than 0.5%) in the neighboorhood of LI, AGA=1. This suggest that the AGA index may be sufficient for this purpose. A caveat on this suggestion is that for very low CO_2 fractions, as in the narrow-band case discussed above, the maximum fractions given by the AGA method were 40% higher than those from the fundamental method. Since the AGA indices were not tested for such relatively subtle differences, they should be used with caution under such circumstances.

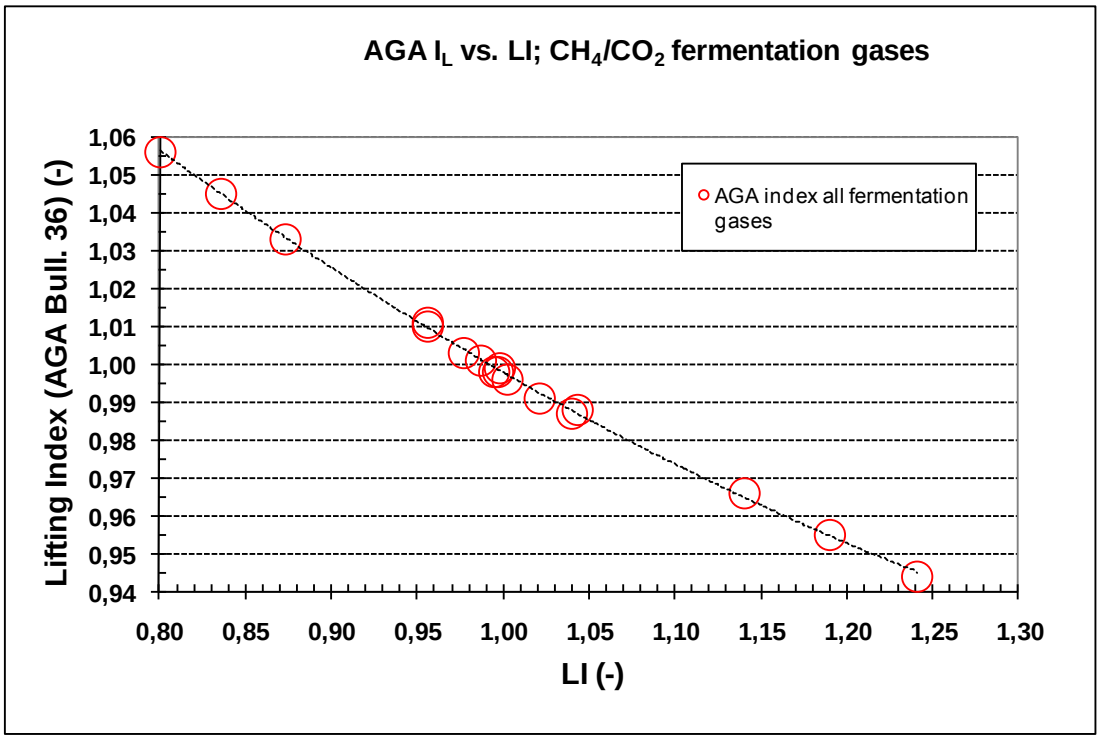
[9] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 11: AGA Lift Index vs. Fraction CO_2 in Biogas, Analogous to Figure 7, Above.[10]



[10] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

Figure 12: AGA Lift Index vs. LI Using Burning Velocities.[11]



At the same time, the limiting composition for a given biogas in the cases studied based solely on the lower Wobbe limit in a band (the adjust gas for lift) yields nearly the same result as the analysis using LI. A study on comparatively low-calorific gases, such as the Netherlands has[9], shows that at higher inert fractions (~14% N_2) the CO_2 fraction obtained from LI and that corresponding to lower Wobbe limit yield substantially different results, and that the lift limit is significantly more rigid than Wobbe. If general, the results here for relatively high calorific value gases (having modest inert fractions) suggest that the lower Wobbe limit could be used to asses interchangeability in case of lift caused by biogases.

[11] The term *fermentation gas* used in the figure is an alternate term for biogas or RNG.

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VII. List of Acronyms

Acronym	Description
AGA	American Gas Association
BTU	British Thermal Unit
CBM	Compressed Biomethane
CH_4	Methane
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
DOT	Department of Transportation
EU	European Union
FERC	Federal Energy Regulatory Commission
GHG	Greenhouse Gas
GTI	Gas Technology Institute
GWh	Gigawatt Hours
HC	Hydrocarbon
HHC	Halogenated Hydrocarbons
H_2S	Hydrogen Sulfide
kW	Kilowatt
LBM	Liquefied Biomethane
LFG	Landfill Gas
LI	Lifting Index
LMOP	Landfill Methane Outreach Program
LNG	Liquefied Natural Gas
MD	Modular Plant
MGD	Millions of Gallons per Day
mm	Millimeter
MW	Megawatt
N_2	Nitrogen
NGV	Natural Gas Vehicle
NYSERDA	New York State Energy Research and Development Authority
O_2	Oxygen
ppm	Parts Per Million
psi	Pounds per square inch
REC	Renewable Energy Credit
RSP	Renewable Portfolio Standards
scf	Standard Cubic Feet
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant

TASK 4 REPORT

GTI PROJECT NUMBER 20736

Pipeline Quality Biogas: Guidance Document for Dairy Waste, Wastewater Treatment Sludge and Landfill Conversion

Task 4: Conditioning Process Review

Report Issued:
July 2009

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I. Executive Summary

This Task 4 Report has compiled representative and documented landfill gas compositions, including major, minor, and trace components. The list has been compiled from available information in the literature and does not include results of testing from other Tasks associated with this project. Most data is representative of raw landfill gas. Although the major and minor components (those with fractional content ≈ 1% or greater) number only a few, the potential trace components number more than 500, and typically number more than 100 for any given landfill. That number includes organics, halogenated organics, and volatile organic-inorganic compounds. If landfill gas is to be cleaned and utilized for fuel, some of these compounds require close consideration because they have the potential to impact pipeline infrastructure, end use equipment, and human health when concentrations become significant. Methods of gas cleanup and conditioning are reviewed that are applicable to upgrading landfill gas to typical pipeline quality. Methane percentages into the high 90's can be achieved, and, on some categories of trace compounds, reduction factors ranging from a few to more than a factor of 10 in concentration are possible.

II. Introduction

Project Background

Local gas distribution companies (LDCs) are increasingly asked to purchase and take delivery of (interchange) biogas from anaerobic biomass digesters for co-mingling into their existing lines for general distribution. Although some cases exist to the contrary, biogas is a relatively new fuel and has not been routinely accepted into existing pipeline systems. The potential effects of biogas constituents on human health and safety, gas transmission and distribution components (including corrosion and deterioration), and combustion systems have not been quantified. The quality of geologically-derived natural gas is currently specified in gas transportation tariffs, through the Federal Energy Regulatory Commission (FERC). However, biogas quality is not covered in these tariff requirements. Based upon biomass source (landfill, wastewater sludge, dairy waste, agricultural waste, etc.), produced biogas may contain constituents, compounds, and other particulate matter not found in natural gas supplies. These constituents may compromise or affect pipeline integrity and system operations and may impact pipeline safety.

A document that bounds the analytical and safety requirements of this new fuel, by biomass source, is necessary. This project is relevant to PHMSA's mission in the area of New Fuels Transportation. Biogas holds potential as a significant "green" renewable energy source. Within the last year, there has been great enthusiasm and investment in bioconversion of waste products to quality fuel, supported by political and public pressure to create and use renewable energy products. However, due to problematic constituents within this new fuel, transportation of biogas through existing pipeline networks may ultimately impart risks to people, the environment, and the pipeline network itself. A document providing analytical specifications for biogas to transmission and distribution companies detailing is needed.

Project Objectives

The overall objective of the project is to develop Guidance on analytical criteria necessary for the introduction of biogas from wastewater treatment and landfills facilities into existing pipeline networks. This Guidance Document will be developed through laboratory testing of raw (before cleanup) and post-cleanup biogas from wastewater sludge and landfills in order to assess their quality, safety, and compatibility with existing supplies and pipeline delivery infrastructure. The Guidance Document will serve as a foundation onto which additional and specific gas requirements may be added, based upon LDC and end user requirements. Identification and potential for removal of problematic components and determination of acceptable analytical biogas specifications per biomass source will be the goal. In addition, the anticipated heating value ranges of the resulting clean biomethane will be investigated and appropriate conditioning units, suitable for cleanup of landfill and wastewater treatment biogas will be compiled. This proposal will not address interchangeability of other fuels, such as hydrogen, syngas or LNG.

Project Structure

The task structure of the project reflects its objectives. Task 1 entails field sampling and analytic laboratory testing of biogas samples. Task 2 involves the preparation of the draft national guidance document. Task 3 work includes a review of the thermal heating value of biogas, with specific attention to the Wobbe index. Finally, in Task 4 a review of cleanup and conditioning of

biogas to pipeline quality is performed. Table 1 contains a summary of the task structure and the associated deliverables.

Table 1: Project Task Structure

Task #	Task Name	Deliverables
1	Laboratory Testing and Analysis of Biogas	Report of all analytical findings
2	Draft National Guidance Document Preparation	Final draft guidance document
3	Review of Thermal Heating Value	Report of findings
4	Conditioning Process Review	Report of findings

Objective of This Report

The purpose of this report is to meet the goals of Task 4 Many parallels exist between the upgrading requirements for biogas derived from the anaerobic digestion of dairy farm manure and landfill gas. A previous GTI project[1] provides input and co-funding to the resent work for PHMSA. The Task 1 report for that project was comprised of a broad introduction to: the issues involved in producing biogas from dairy manure, expected biogas constituents, and the cleanup processes which can upgrade the biogas to pipeline quality levels. The present report contained in this document follows a similar pattern with its emphasis centered on landfill gas. This document provides a broad introduction to: the issues involved in the production of landfill gas, expected landfill gas components, and the cleanup processes required for upgrading landfill gas to typical pipeline quality specifications, including the removal of the plethora of trace constituents which landfill gas can contain.

[1] GTI Project 20614. That project was entitled *Pipeline Quality Biomethane: North American Guidance Document for Introduction of Dairy Waste Derived Biomethane into Existing Natural Gas Networks*.

III. Introduction to Landfills and Municipal Solid Waste

An urban society of concentrated population generates a considerable amount of waste. Properly to dispose of the generated waste requires that a wide range of issues be considered:

- What waste is produced and how?
- With what frequency should it be collected?
- What components may be hazardous or non-hazardous?
- Where will collected waste be managed and stored?

Collecting and containing solid waste in a land area has a long history. In fact, Roman signposts have been found which advised: *Take your refuse farther or you will be fined* (American Public Works Association, 1970). In the United States, the primary federal law currently controlling the disposal of solid and hazardous waste in the United States is the Resource Conservation and Recovery Act (RCRA, 1976). RCRA sets criteria under which landfills can accept municipal solid waste and nonhazardous industrial solid waste. Additionally, it prohibits open dumping of waste, and under RCRA, hazardous waste is managed from the time of its creation to the time of its disposal (USEPA, 2009). While the detailed design, operation, and long term maintenance of a landfill is beyond the scope of this report, the following section will provide an introduction that will set the context for the discussion of landfill gas in later sections.

Waste Properties

The United States Environmental Protection Agency (USEPA) has been investigating the generation and disposal of waste for more than 30 years. Figure 1 shows the variation over time of the amount of municipal solid waste (MSW) generated, in total and per person-day. In approximately the last 50 years, the amount of MSW generated has risen from roughly 2.7 lbs/person-day to roughly 4.6 lbs/person-day. Figure 2 displays some recent USEPA data on the distribution of material content of 254 million tons (before recycling) of municipal solid waste (MSW). The largest typical components by weight are paper (32.7%), yard trimming (12.8%), and food scraps (12.5%), the three of which comprise nearly 60% of all MSW.

Table 2 shows how the ranges of the components of MSW may vary. The variation can be as little as a few percentage points to nearly as much as 12 percentage points. The data in Table 2 are not fully consistent with the data in Figure 2. Several systematic effects probably contribute to this observation. The largest effect is probably that the data sets from which the fractional contents derive are separated by nearly 30 years in time, during which significant changes have occurred in manufacturing, buying, and consumer lifestyles. Changes in MSW composition over this period and perhaps additional systematic effects lead to the differences. However, taken jointly Figure 2 and Table 2 do seem to indicate typical values. While these data may show expected content fractions, the composition of solid wastes across the country is certainly not uniform, either in space or in time. It may vary by region of the country, by season even within a fixed region, and by the distribution of sources that are located within a given region (industrial, commercial, construction and demolition, and residential solid wastes, for example).

Although most surveys indicate the material composition of all landfill constituents, the important components of MSW for the production of landfill gas are the organic fractions. They form the substrates that undergo decomposition within the landfill through the anaerobic

digestion process. Typical or approximate contents of the organic fractions of MSW appear in Table 3. The chemical composition of MSW will again vary as the contents vary by material type, by season, and by the distribution of available sources feeding the landfill.

Figure 1: Total and Specific Generation Rates for MSW (USEPA, 2008)

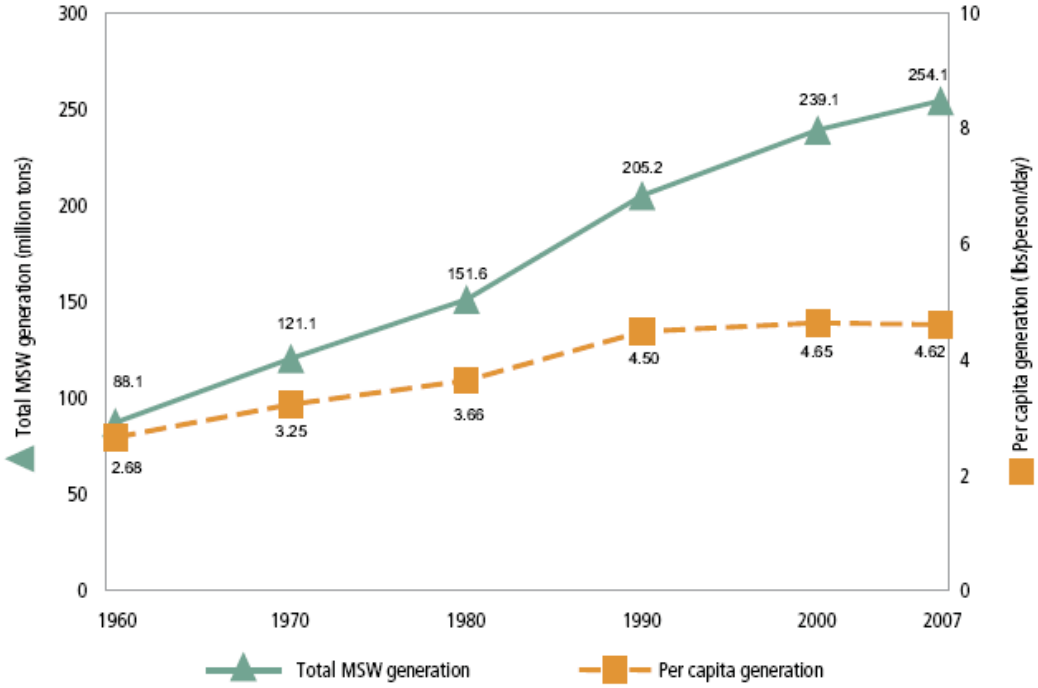


Figure 2: Municipal Solid Waste by Material, 2007 (before recycling) (USEPA, 2008)

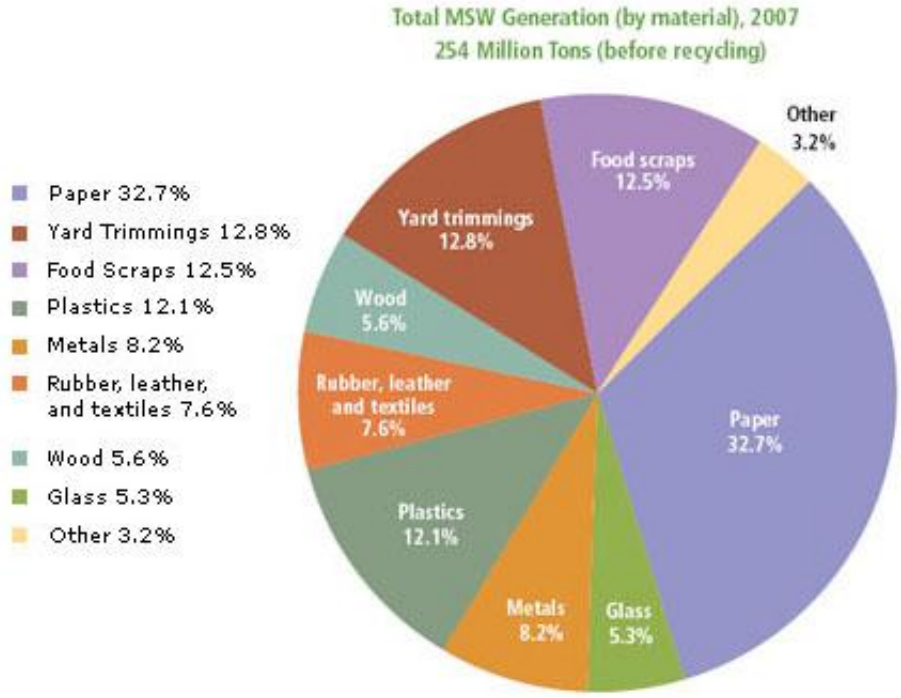


Table 2: Typical Ranges of MSW Component Fractions (Bagchi, 1994)

Component Type	Fractional Range (% of wet weight)
Food waste	4.4-15.3
Garden waste	12.5-24.2
Glass	6.5-10.9
Metals (iron and aluminum)	4.0-9.0
Moisture	27.1-35.0
Other combustibles	1.6-12.1
Other noncombustibles	1.8-11.1
Paper	41.6-53.5
Plastics	0.76-5.7

Table 3: Components of the Organic Portion of Municipal Solid Waste (Cheremisinoff, et al., 1976)

Component	Fraction
Moisture	20.73%
Cellulose, Sugar, Starch	46.63%
Lipids	4.5%
Protein	2.06%
Other Organics	1.15%
Inerts	24.93%

Landfills and Their Operation

The sanitary, containment landfill is a means of employing engineering design and processes to deposit solid waste on land so that neither the waste itself nor the landfill pose an ongoing hazard to environmental or public health and safety. The design of a containment landfill must take into consideration not only the MSW itself but also byproducts of MSW that have been contained in a landfill for an extended period of time. Both liquid (leachate) and gaseous (landfill gas) byproducts will result. Leachate arises from the percolation of rain water into and through the MSW within the landfill; it also arises from the biochemical reactions occurring inside the landfill. Landfill gas, which in rough terms is approximately 50% methane (CH_4) and 50% (CO_2), will also result from such reactions and represent some of the final byproducts of the anaerobic decomposition of the volatile fractions of MSW that enter the landfill.

In order to preserve the public safety, both the leachate and the landfill gas must be managed for an extended period, even after the closure of the landfill to further MSW deposition. To prevent the leachate from entering ground waters requires a collection system consisting of one or more impermeable layers of clay soil and/or synthetic liners placed at the bottom of the landfill, drainage gradients built into the landfill, plumbing through which the leachate is routed, and a collection tank. An analogous collection system for the landfill gas consists of extraction wells driven vertically into the landfill and underground plumbing for routing the landfill gas.

The basic operational steps which comprise the disposal of MSW are:

- Preparation of a portion of the landfill site
- Deposition and compaction of the MSW
- Regular (usually daily) placement of covering over the MSW
- Compaction of the cover material.

Preparing a portion of the site entails making a “cell” within a limited, confined area of the landfill site. MSW is deposited within the defined cell. The MSW is then compacted by heavy tractors that run over it repeatedly. At the end of a day’s operations, soil is usually placed as a cover over the day’s deposit into the landfill, and then the covering material is itself compacted. The density of compacted refuse within the cell will typically be in the neighborhood of 1000 lbs/yd^3 or more, roughly 2/3 of the density of water; however, this density will vary with the composition of the MSW and the effectiveness of compaction during cell preparation.

Figure 3: Installation of Synthetic Landfill Liner (Barlaz, 2004)

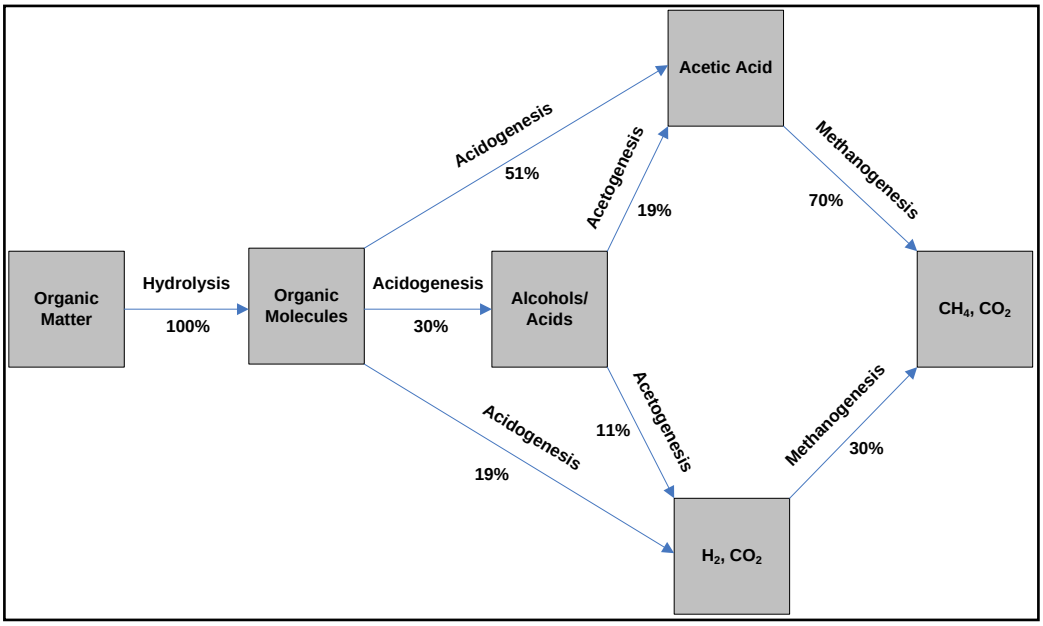
Figure 4: Deposition and Compaction of MSW into a Cell (Barlaz, 2004)

IV. Landfill Gas Production

Anaerobic Digestion Process

Biogas is produced from a process known as anaerobic digestion (AD). In anaerobic digestion, organic material is degraded through microbial action in an environment lacking oxygen. The degradation process can occur in some form of tank, called a digester or reactor, or within the anaerobic conditions which eventually obtain when MSW is buried in a landfill. This process can be carried out by two types of bacteria: mesophilic and thermophilic bacteria. Mesophilic bacteria grow and thrive in a moderate temperature range between 20° C and 45°C, while thermophilic bacteria grow and thrive at a relatively high temperature range between 49°C and 70°C (Burke, Dennis A., 2001). The anaerobic digestion process consists of four main phases. In the initial stage, *hydrolysis*, the bacteria liquefy and break down organic matter comprised of complex organic polymers and cell structures. The end products of this first stage are organic molecules that consist primarily of sugars, amino acids, peptides, and fatty acids. The second stage of the AD process is *acideogenesis*. In this stage, acid-forming bacteria break down the products yielded from the hydrolytic stage. The resultant compounds formed primarily include volatile organic acids, carbon dioxide, hydrogen, and ammonia. The penultimate step is *acetogenesis*. Bacteria convert volatile organic acids from the previous step into acetic acid and acetate, carbon dioxide, and hydrogen. In the final stage of the AD process, methanogenic (methane-producing) bacteria transform the end results of the acidogenic and acetogenic stages into methane. The resultant gas yield consists primarily of methane (CH_4), carbon dioxide (CO_2), and other trace gases. This mixture of gases is referred to generally as "biogas" or specifically as "landfill gas" when it derives from a landfill. Anaerobic digestion also results in both solid (fixed or undigestible solids) and liquid (leachate) byproducts of the process. Figure 5 shows a simplified AD process schematic (Microbiology of Anerobic Digestion, 1984), (Poulsen, 2003).

Figure 5: Process Schematic of Anaerobic Digestion (Microbiology of Anerobic Digestion, 1984), (Poulsen, 2003).



V. Landfill Gas Composition

Raw Landfill Gas Composition

The composition of raw landfill gas (LFG) can vary widely depending on the materials being digested. Landfill biogas can, for instance, contain significant amounts of hydrogen sulfide, H_2S, as well as trace amounts of ammonia, mercury, chlorine, fluorine, siloxanes, and volatile metallic compounds (United Kingdom Environment Agency, 2002), (Association, 2008).Typical compounds and their reported concentration ranges are shown in Table 4. Methane concentration is generally reported as being around 55%. Carbon dioxide is often measured at 40%. Nitrogen, hydrogen, oxygen, and hydrogen sulfide are found in smaller but significant quantities. Variation in source MSW, its organic contents, temperature conditions, moisture conditions, compaction densities, and other landfill attributes account for the variation in LFG content

Table 4: Landfill Gas Composition (Tchobanoglous, et al., 1993)**.**

	Compound	Concentration[2]
CH_4	Methane	45-60%
CO_2	Carbon Dioxide	40-60%
N_2	Nitrogen	2-5%
H_2	Hydrogen	0-0.2%
CO	Carbon Monoxide	0-0.2%
O_2	Oxygen	0.1-1%
	Sulfides, disulfides, mercaptans, etc.	0-1%
NH_3	Ammonia	0.1-1%
	Trace elements, amines, sulfur compounds, non-methane volatile organic carbons (NMVOC), halocarbons	0.01-0.6%

Raw Natural Gas Composition

As LFG composition varies by MSW composition and landfill conditions, raw natural gas composition varies by the well from which it is produced. Raw natural gas can be classified into three categories. Raw natural gas that is extracted from oil wells is called “associated” or casing head gas. “Gas well gas” is removed from natural gas wells. The third type of raw natural gas is mixed with liquid hydrocarbons, found in condensate wells, and is known as condensate well

[2] See reference (Bagchi, 1994), which contains a slightly different list of fractional LFG content.

gas. (Gas Technology Institute, 2005). Typical compositions of the three types of raw natural gas are shown in Table 5, in which each component is reported by percentage.

Table 5: Raw Natural Gas Composition (Foss, 2004).

Compound	Casing head (Wet) Gas Mol%	Gas Well (Dry) Gas Mol%	Condensate Well Gas Mol%
Carbon Dioxide	0.63	-	-
Nitrogen	3.73	1.25	0.53
Hydrogen Sulfide	0.57	-	-
Methane	64.48	91.01	94.87
Ethane	11.98	4.88	2.89
Propane	8.75	1.69	0.92
Iso-Butane	0.93	0.14	0.31
n-Butane	2.91	0.52	0.22
Iso-Pentane	0.54	0.09	0.09
n-Pentane	0.80	0.18	0.06
Hexanes	0.37	0.13	0.05
Heptanes plus	0.31	0.11	0.06
Total	100	100	100

FERC Tariffs and Quality

The Federal Energy Regulatory Commission (FERC), which regulates the interstate transmission of electricity, natural gas, and oil, requires natural gas transmission companies to file tariffs. Although FERC has no generic quality policy (United States, 2006), it has the authority under section 5 of the Natural Gas Act to require a pipeline company to include "just and reasonable gas quality and interchangeability standards" in their tariffs (United States, 2007).

Typical Tariff Quality

In Report No. 4A, the American Gas Association's Transmission Measurement Committee reported on variations in pipeline tariffs (American Gas Association, 2001). Table 6 shows their findings of the threshold and typical values of gas properties specified in tariffs.

Table 6: Pipeline Quality Composition (American Gas Association, 2001).

Gas Property	Contract Limits	Typical Values
Water Content	7lb./MMscf, Maximum	2 – 7 lb./MMscf
Heat Content (dry)	967 – 1120 Btu/scf	1010 – 1060 Btu/scf
Temperature	32 – 120 °F	40 - 60°F

Hydrocarbon Dew Point - °F	15°F Maximum at Pipeline Pressures	0 - 15°F at 550 psig
Sulfur Compounds – Hydrogen Sulfide (H_2S)	¼ - 0.3 grains per 100 scf, Maximum (5)	0 – 1/8 grains per 100 scf
Mercaptans (RSH)	No Specification	Highly Variable 0 – 40ppm(1)
Total Sulfur Compounds, as sulfur	5 – 20 grains per 100 scf – Maximum	0 – 1 grains per 100 scf
Diluent Gases Total	4 – 5% Maximum	0.5 – 3%
Oxygen (O_2)	0.2% Maximum(6) 0.001% Desirable	0 – 0.001%
Helium (He)	0.2% Maximum	0 – 0.1%
Nitrogen (N_2)(2)	3% Maximum (4)	0 – 2%
Carbon Dioxide (CO_2)	2 – 3% Maximum(4)	0 – 2%
Mercury (Hg)	No Specification	0 – 1ppb(3)
Solid Particles	3 – 15 microns, Maximum	3 – 15 microns

(1) Parts per million (10^{-6}), molar basis
(2) This is free, gaseous nitrogen, nitrogen compounds are not known to occur in most gas.
(3) Parts per billion (10^{-9}), molar basis
(4) The carbon dioxide and nitrogen are sometimes limited to combined maximum content of 3%.
(5) NFPA 54-1999, ANSI Z223.1, Natural Fuel Gas Code, section 2.6 lists pipe material restrictions if more than 0.3 gr. H_2S/100 scf. Where H_2S cannot be limited to 0.3 gr. /100 scf or less, notify end-users, LDCs, and/or state agencies, which can affect the use of appropriate pipe materials for high H_2S gas.
(6) To limit pipeline corrosion effects, the desirable O_2 contract limit is 0.001% but the maximum contract limit may be specified up to 0.2% in dry or processed gas with no H_2O present in liquid form.

Gas property values extracted from company FERC tariffs were analyzed. GTI created ranges for each property and determined the number of companies that specified a value in that range. Properties and the percentage of companies requiring a value which fell in a particular range are shown in Table 7.

Using maximum heating value as an example, GTI determined the minimum and maximum posted values and created bins within those extremes, 900 and 1100 Btu/scf. The ranges used were ≤900, 901-925, 926-950, 951-1000, 1001-1050, 1051-1099, and ≥1100. Of the 170 posted values, two were equal to 900 and counted in the ≤900 bin resulting in 1.18%. The largest group

was the 951-1000 bin with 101 companies, 59.41%, specifying a minimum heating value in this range. Zero companies reported minimum heating values between 901 and 925 or 1001 and 1099 and therefore are not shown.

Table 7: FERC Tariff Survey Values.

Gas Property	Value	% Respondents
Water Content (lb./MMscf)	=3 =4 =5 =6 =7	0.64% 13.03% 15.38% 3.21% 64.10%
Maximum Heating Value (Btu/scf)	≤1018 1051-1150 1151-1250 ≥1600	3.30% 73.74% 21.21% 1.01%
Minimum Heating Value (Btu/scf)	≤900 926-950 951-1000 ≥1100	1.18% 38.82% 59.41% 0.59%
Maximum Temperature (°F)	≤80 100-119 120-128 ≥129	0.68% 10.14% 87.84% 1.35%
Minimum Temperature (°F)	≤20 26-35 36-50 ≥65	15.79% 10.53% 69.74% 2.63%
Hydrogen Sulfide-H_2S (grains / 100 scf)	0.01-0.09 0.20-0.25 0.26-0.50 0.75-1.0 ≥1.1	0.57% 66.67% 8.05% 22.99% 1.68%
Total Sulfur Compounds, as sulfur (grains / 100 scf)	≤1 1.1-5.0 5.1-10 =20	7.6% 25.73% 14.04% 52.05%
Hydrogen (%)	0.01-0.05 0.051-0.1	90.91% 9.09%
Oxygen - O_2 (%)	0.0001-0.001 0.0011-0.005	17.76% 5.26%

	0.011-0.1 0.11-0.2 0.21-0.5 0.51-1.0	7.24% 40.79% 15.13% 13.82%
Nitrogen - N_2 (%)	≤1.0 1.0-1.9 2.0-2.9 3.0-3.9 ≥4.0	1.85% 3.70% 12.96% 72.22% 9.26%
Carbon Dioxide - CO_2 (%)	.001-.0019 1.0-1.9 2.0-2.9 3.0-3.9 ≥4.0	0.70% 9.86% 50.70% 38.03% 0.7%

In some scenarios, the energy contained in the methane portion of biogas can be harnessed without any cleanup processes. However, in introducing biogas into a natural gas pipeline, the biogas will need to be cleaned and upgraded to meet quality requirements for the end user. Table 8 displays the fractional components in raw landfill gas and representative pipeline quality natural gas. The quantity of methane in biogas will need to increase substantially by decreasing the carbon dioxide content. A very crucial part of the upgrade will be the removal of hydrogen, oxygen, and hydrogen sulfide. Typical nitrogen and carbon monoxide levels may be acceptable.

Table 8: Composition of Biogas vs. Pipeline Quality Gas.

	Compound	Landfill Gas[3]	Representative Pipeline Quality Natural Gas[4]
CH_4	Methane	45-60%	75%+
CO_2	Carbon Dioxide	40-60%	3 – 4%
N_2	Nitrogen	2-5%	3 – 4%
H_2	Hydrogen	0-0.2%	0
CO	Carbon Monoxide	0-0.2%	Not specified
O_2	Oxygen	0.1 - 1%	0.2 - 1.0 ppmv
H_2S	Hydrogen Sulfide	0-1%	0.25 - 1.0 gr/100scf

[3] These values are copied from Table 4.
[4] See reference (Foss, 2004).

	Total Sulfur	Not specified	5 - 20 gr/100scf
	Trace elements, amines, non-methane volatile organic carbons (NMVOC, Halocarbons)	0.01-0.6%	Not Specified

Trace Components

The information in Table 4 and in Table 8 is based upon available information not associated with the other Tasks in this project. The listed major and minor components of landfill gas consist of methane, carbon dioxide, and a few other component gases.[5] The list of such components is small. On the other hand, the trace gases present in landfill gas are comprised literally of a plethora of different gases. More than 500 compounds have been identified (Parker, et al., 2002) as components of landfill gases.[6] The number of such trace constituents is typically in the range of 120-150 compounds in a given landfill gas, and in total, trace compounds constitute nominally less than 1% by volume (Parker, et al., 2002).[7]

The trace components in landfill gas arise due to anthropogenic causes and to natural causes. Anthropogenic causes include volatilization from waste inserted directly into the landfill – both out-gassing of solids and vaporization of liquids. The natural causes are the chemical reactions in

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[5] "Major and minor components" I have designated as those that have fractional content ≈ 1% or greater. "Trace components" are those with fractional content smaller (often much smaller) than that.

[6] See also (Bagchi, 1994), Appendix I, for a long list of hazardous constituents that appear in landfills and which may appear in landfill gases.

[7] References (Parker, et al., 2002) and (Scott, et al., 1988) pertain to studies done in the United Kingdom for the Department of Environment. That such studies are appropriately applied to the US depends on whether landfill gases in the US and the UK are similar. The landfill gases would be similar to the degree that they derive from the same source material and undergo biological and chemical transformations under similar conditions. First, that the composition of MSW in the UK is very similar to that in the US does not seem to be a poor approximation given the UK data in (White, et al., 1999) and the data in Figure 2 of this report, viz.:

MSW Component	UK Percentage	US Percentage
Paper	34.8	32.7
Plastics	11.3	12.1
Glass	9.1	5.3
Metals	7.3	8.2
Food/Garden	19.8	25.3
Textiles	2.2	7.6
Other	15.5	8.8

Second, the similarity of climates (pressure, temperature, humidity, and precipitation conditions) between the US and the UK would, of course, not hold true when comparing the entire US to the UK --- anymore than would the comparison of climates between different parts of the US. However, enough similarities exist to consider the UK studies pertinent to US landfill gases, at least in general conclusions. Additionally, US studies dating back to the 1980s exhibit similar findings concerning the variety of trace compounds. See, for example, (Lytwynyshyn, et al., 1981).

which the MSW participates after deposition within a cell at the landfill site. Natural causes include microbial degradation, corrosion of metals, and chemical reactions between organics and inorganics within the landfill. Controlled studies of the concentrations of landfill gas components have shown that trace constituents are produced at different times. As would be expected, the concentrations and times of emergence depend on the source composition of the MSW deposited into the landfill, the depth of the MSW contained therein, its moisture content, the landfill covering material, temperature and other climatic conditions, and geological circumstances (Parker, et al., 2002) (Scott, et al., 1988).

Parker (Parker, et al., 2002), Scott (Scott, et al., 1988), and to a lesser degree other authors have categorized the general chemical groups into which the trace constituents may be divided. These groups consist of:

- Hydrogen sulfide
- Alkanes
- Alkenes
- Cyclic organic compounds
- Halogenated compounds
- Alcohols
- Esters
- Carboxylic acids
- Amines
- Ethers
- Organosulfur compounds
- Other oxygenated compounds

Typical concentrations of the component gases in each of these categories can be found in (Parker, et al., 2002), (Scott, et al., 1988), (Lytwynyshyn, et al., 1981), and references therein. Although the typical volume contribution of these groups to landfill gas is small, a number of issues for trace gases exist in considering the use of landfill gas for fuel. The member compounds of the trace gases have the potential for:

- Strong, offensive odors
- Public safety concerns from inhalation
- Public safety concerns from incomplete combustion byproducts
- Environmental concerns of GHGs and ozone depleters.
- Corrosive or chemical interaction with gas infrastructure components
- Corrosive combustion byproducts

Thus, the efforts to characterize and quantify them have been driven significantly by concerns over the emissions of such compounds directly from the landfill into the air near neighboring communities. But additional concerns exist over the presence of these trace constituents in fuel gas and their potential effects on gas utility infrastructure and end use equipment.

High concentrations of halogenated hydrocarbons (HHCs) can lead to multiple concerns for infrastructure, end use equipment, and health and safety. HHCs can lead to the emissions of polyaromatic hydrocarbons during combustion, a number of which can be toxic and long-lived. Similarly, the formation of hydrogen chloride (HCl) and hydrogen fluoride (HF) during combustion can lead to corrosion in engines and to emissions rising above regulatory thresholds. The HHCs along with the presence of siloxanes can lead to the poisoning of catalysts in engines

and other process equipment. Significant concentrations of siloxanes can lead to significant wear and fouling of engines and other end use equipment (Henning, et al., 1996).

VI. Gas Cleanup

Introduction: The Need for Gas Cleanup

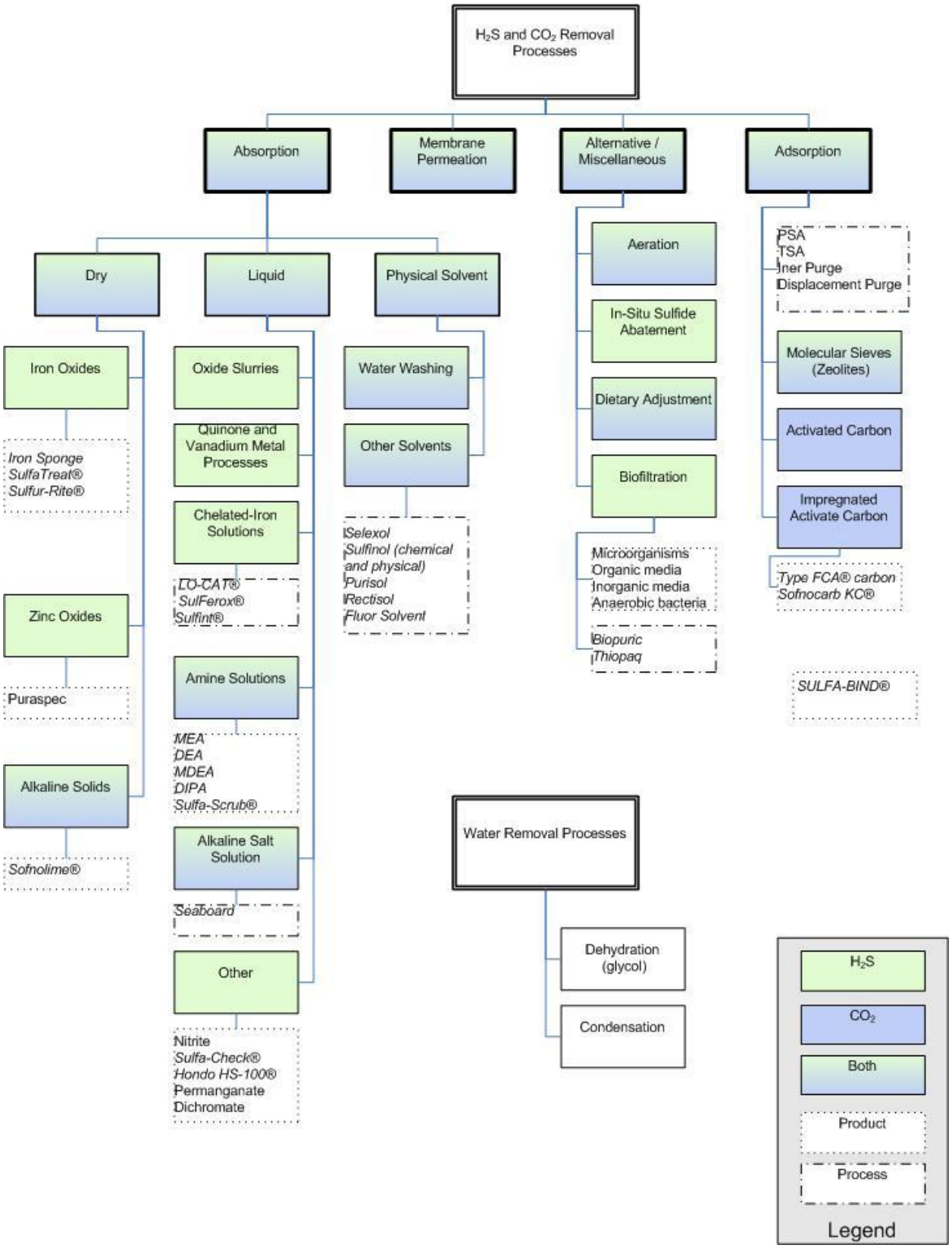
Natural gas produced from traditional wells requires processing in order to be suitable for transport and delivery to end users. Some processing, oil, and condensate removal can take place at the well head, but gas is typically piped through low pressure gathering lines to a processing facility for removal of natural gas liquids (NGLs), hydrogen sulfide, and carbon dioxide. Most NGLs are removed by absorption or cryogenic expansion. Amine processes account for more than 95% of U.S. hydrogen sulfide removal operations (Natural Gas Supply Association, 2008).

Similarly to natural gas extracted from wells, biogas derived from the anaerobic digestion of manure or from the capture of landfill gas will require cleanup. Assessing the cleanup needs requires consideration of health and human safety, of the needs of gas transport and delivery infrastructure, and of the gas quality needs of the end-user. Practical issues that will dictate selection and scale of a cleanup method include the gas composition defined in the regional tariff, the biogas volume flow rate, multi-phase flows, biogas delivery temperature, drying needs, the desired heating value, the desired Wobbe number, the removal of H_2S and CO_2, the removal of trace components, mixing fractions with natural gas or other fuel gases, and the need for compression. Many of these criteria are inter-related.

In order for biogas to be suitable for natural gas pipelines and end-users, it will need enrichment. It will have to go through one or more selected cleanup processes to remove high levels of unwanted components. The largest fractional, unwanted component in biogas derived from anaerobic digestion or from landfill gas will be CO_2. High levels of hydrogen sulfide will also be unwanted. Depending on the source of the biogas, removal of other trace components may also be required. Once the gas is sufficiently cleaned up, it can be referred to as biomethane. Some level of quality control needs to be in effect to prevent biogas of specifications outside of requirements or less than pipeline quality biomethane from entering the natural gas pipeline.

There are an abundance of methods and processes available that can be used to remove contaminants in gas streams. Figure 6 demonstrates a nearly exhaustive, color-coded organizational chart of processes to remove hydrogen sulfide and/or carbon dioxide and water. Included are named examples of products and processes. A number of them are well established while others are not as developed. Some are appropriate for use on farms and others are only economical at gas flows measured in Million Standard Cubic Feet per Day (MMSCFD) and where sulfur removal rates are measured in tons per day. The ability of a process to remove unwanted compounds is highly dependent on a number of factors and assessment of the true practicality of any given method for a given application requires considered evaluation of the final needs involved.

Figure 6: Gas Cleanup Methods.



Physico-Chemical Methods and Performance on Major Components

Carbon dioxide and hydrogen sulfide are very often the two components of biogas that dominate cleanup considerations. Because many of the hydrogen sulfide removal methods can also be used for carbon dioxide removal, they are not separated in the organizational chart in Figure 6. The methods were instead divided into four main divisions that include absorption, membrane permeation, alternative or miscellaneous, and adsorption. Absorption is further divided into three major categories and contains the largest number of processes and products. The boxes containing categories of processes are color coded for ease of reading. Solid green boxes are processes used to remove hydrogen sulfide only. Solid blue boxes represent processes used only for carbon dioxide removal. Boxes with a green to blue color gradient correspond to methods that can be utilized for carbon dioxide and hydrogen sulfide removal. To decipher between commercially available products and named processes, dotted line and dot-dashed line boxes were used, respectively. Where a commercial product is used to name the process, the name is shown in italics.

Absorption

Oxides

Commercially available iron oxide products used for removal of sulfur typically consist of iron oxide compounds distributed within or over a separate material. An iron oxide product is placed in a reaction bed through which the gas is passed. Sulfur compounds react with the iron oxides and form insoluble iron sulfides. Some iron oxide processes are regenerable with air, meaning they can be used repeatedly without a chemical change out.

The conventional iron oxide product is known as “iron sponge” which originally consisted of steel wool coated with rust. It has evolved to iron impregnated wood chips which provide a better surface to volume ratio and can be purchased from multiple commercial outfitters. A typical setup is to place two beds in series with a down-flow of gas at 140kPa and an empty bed residence time greater than 60 seconds. Residence time is the amount of time the gas is in contact with the bed of media and is determined by the flow rate, cross-sectional area of the bed, and the depth of the media. A reduction from 3600 ppm to less than 1 ppm has been reported using “iron sponge.” (Zicari, 2003)

“Iron sponge” has a number of drawbacks. Special care must be taken during regeneration to prevent ignition of the sponge from heat buildup. Each regeneration of the media reduces the effectiveness by 33%. This reduction creates the need to change out old media and results in waste material that must be disposed. A complication of the amount of spent product is that it is considered hazardous in some instances and should not be put into a landfill without remediation. The change out process can be labor intensive and the overall use of “iron sponge” can create high operating costs (Zicari, 2003).

In addition to “iron sponge” a number of other iron oxide products are available. Information from company literature and the Zicari report are compiled in Table 9 which is meant to compare four iron oxide products. SULFA-BIND® is considered an adsorption process but is included here because it is an iron oxide removal product.

Table 9: Iron Oxide Products.

	Iron Sponge	*SulfaTreat®*	*Sulfur-Rite®*	SULFA-BIND®
Substrate containing iron oxide material	Wood chips	Proprietary granules	Ceramic base	Calcinated, inorganic, natural material
Coated or Impregnated	Impregnated	Coated	Impregnated	Coated
Primary Constituent	Fe_2O_3, Fe_3O_4	Fe_2O_3, Fe_3O_4	Not known	$Fe(OH)_3$
Regenerable?	Y, up to 3x	N	N	Y, up to 15x
Pyrophoric?	Y	N	N	N
H_2S Removed per Kilogram of Product	2.5 kg H_2S / kg Fe_2O_3	0.55 – 0.72 kg H_2S / kg Fe_2O_3	Not known	0.5 kg H_2S / kg media
Spent Media Hazardous?	Y	N	N	N
Reduction of H_2S	3600 ppm to < 1ppm	Not known	Down to < 1 ppm	60 - 100 ppm to < 0.2 ppm
Cost per removed kg of H_2S	$0.35 – 1.55	$4.85 – 5.00	$7.95 – 8.50	$2.90 – 3.00
Annual Product Cost? (100 ppm – 400 ppm loading)[8]	$250 – 4,300	$3,400 – 13,500	$5,560 – 23,840	$2,050 - $8,290

Iron oxides are not as selective as zinc oxides which are more favorable for removing only trace amounts of hydrogen sulfide. Zinc oxides remove hydrogen sulfide from gas streams by a reaction that forms insoluble zinc sulfide. A potentially major drawback of zinc oxides for biogas cleanup is that the temperature requirement for effective performance is around 200°C (Zicari, 2003).

Chelated-Iron Solutions

The two major chelated-iron processes are LO-CAT® trademarked by Gas Technology Products and Sulferox® service marked by Shell Oil Company. Both marketed processes operate on reduction/oxidation (redox) reactions. During a redox reaction, oxidation numbers are changed. In both processes, the iron oxidation number is reduced and hydrogen sulfide is

[8] See reference (Zicari, 2003).

separated into elemental sulfur by an increase of its oxidation number. Regeneration is possible with both processes and is accomplished by an oxidation reaction. Sulferox® is recommended for use with gas flows less than 10 MM m^3/day that contain between 100 kg and 5 ton of sulfur per day. LO-CAT® has a typical range of 150 lbs to 20 long tons (22.4 tons) of sulfur per day at flow rates up to 10,000 SCFM. Sulferox® claims removal of hydrogen sulfide to less than 1ppmv. LO-CAT® asserts their units can be designed to achieve better than 99.9% hydrogen sulfide removal efficiency. Gas Technology Products also offers MINI-CATTM units which use the same catalyst as LO-CAT® but are designed to remove 100 – 1,000 kg sulfur per day. MINI-CATTM units are prefabricated, skid-mounted, and have a smaller footprint than the LO-CAT® units (GTP Merichem, 2008), (Le Gaz Integral, 2000-2006).

Amine Solutions

Large scale cleanup of natural gas is typically done by the 'amine process' which can also be called the Girdler process. Amine processing units can be designed for high removal rates of hydrogen sulfide and carbon dioxide or hydrogen sulfide only. In the amine process, sour gas is passed through a column containing the amine which absorbs the undesirable components. The reaction is depicted in the following equation where the amine is R3N.

$$H_2S + R_3N \rightarrow R_3N.H_2S(aqueous)$$

Once the reaction has taken place, the amine can be regenerated by dropping the pressure and increasing the temperature. The regeneration reaction is shown below.

$$R_3N.H_2S(aqueous) \rightarrow H_2S + R_3N$$

At this point, the hydrogen sulfide is in a concentrated form which is either flared or converted to elemental sulfur using air in a sulfur recovery unit (SRU) represented by the following equation (Natural Gas Supply Association, 2008), (Gas Research Institute, 1997):

$$H_2S + \frac{1}{2}O_2 \rightarrow S^0 + H_2O$$

Amine solvents have also been used for carbon dioxide removal from power plant flue gases. Scaled down versions have been successfully applied for landfill applications. Regeneration of the amine is done by the same method above, consisting of a drop in pressure and an increase in temperature. The equations corresponding to carbon dioxide removal and amine regeneration are shown below (Krich, 2005):

$$RNH_2 + H_2O + CO_2 \rightarrow RNH_3^+HCO_3^-$$

$$RNH_3^+HCO_3^- \rightarrow RNH_2 + H_2O + CO_2$$

Drawbacks of amine processes on a small scale include high energy needs for regeneration, stringent safety measures regarding concentrated hydrogen sulfide gas streams, complicated flows, and foaming issues associated with liquid absorption procedures (Zicari, 2003). Removal of carbon dioxide via amines has disadvantages that include corrosion, breakdown of the amine, and buildup of contaminants (Krich, 2005). Table 10 lists commonly used amines. Table 11 lists proprietary amine processes and their descriptions.

Table 10: Generic Amines.

Common Name	Name
MEA	Monoethanol Amine
DEA	Diethanol Amine
MDEA	Methyl Diethanol Amine
DIPA	Diisopropanol Amine
DGA	Diglycolamine

Table 11: Proprietary Amines.

Process Name	Description
Sulfa-Scrub® (Quaker Chemical)	Hexahydrotriazine
Sulfinol-X (Shell)	A mixture of two or more alkanolamines – generally a base amine such as MDEA or Sulfinol-X (diisopropanolamine) and an accelerator.
ADIP-X (Shell)	A mixture of two or more alkanolamines – generally a base amine such as MDEA and an accelerator.
The ELIMINATOR™ (Gas Technology Products)	A high molecular weight hexahydrotriazine-based chemical
COOAB™ (Cirmac)	Special amine composition

Water and Solvent Scrubbing

Water scrubbing is a cheap and simple method for cleanup and is most appropriate for an operation where water is easily accessible, such as a water treatment facility. One advantage of water scrubbing is the simultaneous removal of hydrogen sulfide and carbon dioxide. Biogas cleaning by water scrubbing loses about 2% methane during processing but results in a gas that contains roughly 95% methane.

Water scrubbing is accomplished by pressurizing the biogas and injecting it into the bottom of a packed column containing water flowing from the top. The water dissolves the carbon dioxide and passes out of the bottom of the column. The "cleaned" gas leaves the top of the column. The water can be circulated into an air column for regeneration, i.e. CO_2 removal, and then passed back into the column. However, regeneration is not recommended for gas streams containing large amounts of hydrogen sulfide.

Solvents, including amines, can replace water in the packed column to improve the scrubbing process. Solvent scrubbing is more efficient than water washing since carbon dioxide and hydrogen sulfide are more soluble in solvent than water. This results in lower solvent and pumping requirements. Solvents also have the ability to upgrade the methane content to above 95%. The most well known solvent is Selexol, which is licensed by UOP, and can be used to selectively remove hydrogen sulfide or carbon dioxide individually. Sour gas feeds composed from 5 – 60% carbon dioxide and hydrogen sulfide can be cleaned to ppmv or percent volume as applicable. Regeneration of the solvent is done through steam stripping.

Table 12 lists a number of processes used for solvent scrubbing as well as the process owner/licensor and the solvent used. Sulfinol is listed here as it is a physical absorption process although it also enlists amine agents to improve acid gas (H_2S) removal.

Table 12: Scrubbing Solvents.

Process Name	Owner	Solvent
Selexol	UOP	Dimethyl ether of polyethylene glycol
Sulfinol	Shell	Sulfolane, DIPA or MDEA and water
Purisol	Lurgi AG	Normal methyl pyrrolidone
Rectisol	Lurgi AG	Methanol
Fluor Solvent™	Fluor Corporation	Propylene carbonate

Membrane Permeation

Membrane separation processes, which are primarily used for carbon dioxide removal, are accomplished by utilizing pressure and a membrane which is selective to a particular gas. Pressurized gas is passed along one side of the membrane which, utilizing the pressure differential, allows specific molecules to permeate to the other side. Gas streams containing high levels of hydrogen sulfide can degrade the membrane and shorten its useful life. To extend membrane life, cleanup units can be employed to pre-clean the gas before entering the membrane process. Membranes can be highly selective or highly permeable but rarely both. The process efficiency is therefore less than ideal as multiple passes are needed and gas is lost. However, membranes are highly reliable, easy to operate, and can be used for gas dehydration.

Air Products manufactures PRISM® membranes which offer separation of carbon dioxide, hydrogen sulfide, and nitrogen as well as air drying and gas dehydration (Air Products, 2008). According to Freemantle, odor removal studies conducted at Imperial College London using a specialized membrane indicate that low hydrogen sulfide levels can be removed from nitrogen gas streams effectively and economically. Other attempts to remove hydrogen sulfide using membranes include the use of a liquid adsorbent on the exit side of the membrane. This method has a lower pressure requirement than the membrane process above but is far less developed. Positive results have been realized using sodium hydroxide or a coral solution as the liquid sorbent (Freemantle, 2005), (Zicari, 2003).

Adsorption Processes

Sour gas is passed through a bed of adsorbate which likely exhibits a high surface area to unit weight ratio. The adsorbent is typically a microporous solid that attracts and holds onto selective components (adsorbate) from the gas stream. The force which binds the gas components to the solid is quite weak, making regeneration easily attainable by decreasing gas pressure, increasing temperature, and gas purges. Regeneration of adsorbents can be accomplished through one of the four following cycles: Temperature Swing Adsorption, Inert Purge Adsorption, Displacement Purge Adsorption, or Pressure Swing Adsorption (Kohl, et al., 1997).

Temperature Swing Adsorption (TSA)

TSA is used primarily for dehydration and removal of small concentrations of impurities. The gas is passed through the adsorbent but at a low temperature. Once the bed becomes saturated, the temperature is raised and the gas continues to pass through the bed until saturation occurs at the raised temperature. Adsorption and regeneration is accomplished through a heating and cooling cycle which is both time and energy intensive (Kohl, et al., 1997).

Inert Purge Adsorption Cycle

Gas is passed through the adsorbent bed until saturation at partial pressure occurs. A non-adsorbing gas is then fed through the bed causing desorption by reducing the partial pressure of the adsorbate. It is the heat of adsorption that causes the temperature difference. There is an increase during adsorption and a decrease during desorption eliminating the need for externally created heating and cooling as with TSA. The Inert Purge Adsorption Cycle occurs quickly but is limited to low concentration changes and is usually employed for hydrocarbon separation (Kohl, et al., 1997).

Displacement Purge Adsorption Cycle

The Displacement Purge Cycle is similar to the Inert Purge cycle. The major difference occurs in the desorption approach. In Displacement Purge, a purge gas which is more strongly adsorbed than the removed component is passed through the bed. Though Displacement Purge and Inert Purge have short cycle times and are used for hydrocarbon separation, Displacement Purge can realize greater removal amounts. The major drawback of Displacement Purge is the necessity of the separation of the purge gas from the purge stream and from the adsorbent (Kohl, et al., 1997).

Pressure Swing Adsorption (PSA) Cycle

Rapid cycling is also possible with PSA. This cycle relies on pressure changes to adsorb contaminants from the gas stream. Desorption occurs by lowering the pressure. Application of PSA to biogas has been performed in the United States and Europe. Pretreatment is recommended prior to employing this process for carbon dioxide adsorption. This includes reducing hydrogen sulfide levels and dehydrating the gas.

A typical PSA configuration includes four pressurized vessels, each containing the adsorbent. The gas is fed through one vessel and the methane rich, cleaned gas exits the top. When the adsorbent in this vessel becomes saturated, raw gas is sent to another vessel. Regeneration of the first vessel is accomplished through depressurization. The gas released in

this step is recycled back to the inlet for methane recovery. The vessel is then evacuated using a vacuum and is ready to absorb more carbon dioxide. The use of four vessels allows energy savings from the need for less gas compression and depressurization between the vessels. The operation is continuous in a similar manner to a four cylinder engine in which each piston is in a different position in the cycle and will fire in sequence (Kohl, et al., 1997), (Persson, et al., 2006).

Adsorbents

Although Pressure Swing Adsorption, Temperature Swing Adsorption, Inert Purge, and Displacement Purge cycles make regeneration of adsorbents possible, not all adsorbents are economically regenerable. There are a number of options for cleanup using adsorbents. Silica or alumina based adsorbents are preferred for gas dehydration operations. Gas cleanup adsorption methods would employ molecular sieves or carbon-based adsorbents. Carbon-based adsorbents can be activated making them capable of organic vapor adsorption. Molecular sieves are unique in that they are capable of dehydration and selective adsorption (Kohl, et al., 1997).

Molecular Sieves

Molecular sieves used as adsorbents occur in nature but the most commonly used sieves are synthetic. They are commonly referred to as zeolites. Molecular sieves are capable of adsorbing or excluding a molecule based on size. Having high adsorption capacity at low concentrations and possessing a high affinity for polar compounds (H_2S, H_2O, NH_3, etc) make it an attractive product for gas purification. The four most widely used are type 3A, 4A, 5A, and 13X. The type name refers to the size of molecules it will absorb. For instance, type 4A will not absorb any molecule larger than 4 Ångströms (1 Ångström = 1×10^{-10} meters). Type 13X has a pore size of 10 Ångströms.

In regard to gas processing, pore size limitations of 4A and 5A sieves can only adsorb light mercaptans making a 13X a preferred adsorbent for complete sulfur removal. With size 13X, preferential adsorption of polar compounds allows for selective removal of water and hydrogen sulfide over carbon dioxide (Kohl, et al., 1997).

Activated Carbon

Carbon-based materials with the ability to adsorb have been dubbed ‘active carbon’ or ‘activated carbon’. A significant number of source materials have been used to produce them including wood, nutshells, rice hulls, bones, petroleum coke, and coal to name a few. In order to ‘activate’ the carbon material, source materials are ground, mixed with a binder, extruded, and heated. Additional steps like adding chemicals or using oxidizing gases can increase adsorption properties. Active carbons are preferred adsorbents for removal and recovery of volatile organic compounds and odor abatement as a form of air pollution control (Kohl, et al., 1997).

Impregnated Activated Carbon

To adapt active carbons to remove hydrogen sulfide, they can be impregnated. Carbons impregnated with compounds like sodium hydroxide or sodium carbonate can attract and keep sulfur compounds through an acid-base reaction. This has been shown to increase hydrogen sulfide and methyl mercaptan adsorption by 40 – 60 times that of the original carbon. Metal oxide impregnated carbons contain sulfur as metal sulfates or sulfides (Kohl, et al., 1997).

Summary of Hydrogen Sulfide Removal Processes

Table 13 contains a summary of H_2S removal processes after reference (Zicari, 2003). Part of the purpose of Zicari's report is to examine the applicability of the removal process for farm biogas production. However, the characteristics of particular technologies for gas cleanup are applicable whatever the origin of the biogas that requires conditioning.

Table 13: Rating of H_2S Removal Processes (Zicari, 2003).

Table 5.3: Summary of H_2S Removal Process Characteristics

Removal Technique	Applicability for farm biogas	Capital Costs	Operating/ Media Costs	Ease of operation	Regen-erable	H_2S < 250 ppm	Environ-mental impact
	(+=high)	*(+=low)*	*(+=low)*	*(+=easy)*	*(+=yes)*	*(+=yes)*	*(+=low)*
Iron Oxides	+	+	+/-	+/-	+/-	+	-
Zinc Oxides	-	+	-	+/-	-	+	-
Alkaline Solids	-	+	-	+/-	-	+	-
Impregnated Activated Carbons	+	+	+/-	+/-	-	+	-
Molecular Sieves	+/-	+/-	-	-	+	+	-
Chelated Iron Solutions	+/-	-	-	-	+/-	+	+/-
Nitrite Solutions	+/-	+	-	+	-	+	-
Alkaline Salt Solutions	-	-	-	-	-	+	-
Amine Solutions	-	-	-	-	+	+	-
Water Scrubbing	+/-	+/-	+/-	+/-	+	+/-	-
Physical Solvent Scrubbing	+/-	+/-	+/-	+/-	+	+/-	-
Membrane: Low Pressure	+/-	-	-	-	+/-	+/-	+/-
Membrane: High Pressure	-	-	-	+/-	n/a	+/-	+
Digester pH Control	+/-	+	+/-	+/-	n/a	-	+/-
Digester Iron Addition	+	+	+	+	n/a	-	+/-
Dietary Adjustment	+/-	+	+	+/-	n/a	-	+
Air Dosing to Biogas	+	+	+	+	n/a	+/-	+
Commercial Biological Processes	+/-	-	+/-	+/-	+/-	+	+
Estimate Cow-Manure Compost Processes	+	+	+	+	n/a	+	+

n/a = not applicable *desirable*
+/- = neutral *- = undesirable*

Biogas Clean Up Systems

This section provides an overview of a handful of companies offering gas cleanup technologies. The list of companies is representative, not exhaustive, but is used to illustrate

available options and market competitiveness for processing biogas. Most of the companies listed here offer the full range of services for gas cleanup. Companies exist outside of this list that provide any and all services for biogas cleanup, be it design, construction, operation, or maintenance. Overall, the options are nearly endless for anyone wishing to upgrade biogas. Systems can be built on-site or pre-fabricated and delivered on a skid. They can be purchased or leased. Systems can be designed for a large range of flow rates. Additional filters can be implemented for biogas with higher acid gas content. Off-gases can be upgraded and sold or simply flared. Controls and operation can be automated.

Example Companies that Manufacture Biogas Cleanup Systems

CarboTech Engineering GmbH

CarboTech, a subsidiary of Schmack Biogas AG, and located in Germany offers a complete biogas upgrading service through their Mobile Adsorber Rental Systems (MAMS). CarboTech also transports, replaces, and reactivates spent carbon materials. The MAMS-G, which is used for gas applications, utilizes carbon molecular sieves and a pressure swing adsorption process. In short, the cleanup process steps are:

1. Compression of the gas
2. Water removal by cooling
3. Desulphurization by activated carbon
4. Impurity removal by PSA using carbon molecular sieves

Table 14: Cleaned Gas Content – CarboTech.

Compound	Cleaned
CH_4	Up to 99%
H_2S	< 3.59 ppm (<5 mg/m^3)

Advantages include a programmable logic controller (PLC) for fully automatic operation, no process water, no wastewater handling, no chemicals, no corrosion issues, low energy requirements, low operation and maintenance requirements, and a compact and safe design. The CarboTech process also offers the ZETECH4® system as an option, which prevents methane and hydrogen sulfide emissions (Schmack Biogas AG, 2008).

Purac

Lackeby Water Group, which operates on three continents and in 70 countries is an independent, privately owned Swedish group. Its expertise in water treatment and biogas production lies with its contracting group Purac. Purac supplies, builds, and commissions plants specially designed to meet client needs. A specially composed amine called Cooab is the absorption liquid employed to remove carbon dioxide from the biogas and is considered the core

segment of the cleanup process, which as a whole is called the LP Cooab process. The upgrading process is accomplished by:

1. Optional - H_2S removal by caustic scrubber and bioreactor system (for H_2S concentrations >500ppm)
2. H_2S removal by activated carbon (Air added at inlet, if needed)
3. CO_2 removal by amine scrubbing
4. Drying of upgraded gas by PSA or TSA
5. Gas quality analysis (gas not to specification is reprocessed)
6. Addition of odorant

Table 15: Cleaned Gas Content – Purac.

Compound	Cleaned
CH_4	> 99%
H_2S	Typically <0.5 ppm

Company literature lists the following benefits: less than 0.1% methane lost to the atmosphere, operational costs that are proportional to the actual capacity, high purity CO_2 that can be re-used and output gas, which is of pipeline quality (Purac, 2008).

NESI

Located in Massachusetts, USA, New Energy Solutions, Inc., NESI has been in green energy for 5 years. NESI's technical team supports the design and operation of the BioGas Clean-Up Unit which serves as the base unit for the NEO-Hydrogen™ and NEO-Gas™ plant. The unit cleans via two adsorption beds. The bed media is supplied and changed out by US Filter. The NEO-Gas™ plant cleanup process is as follows:

1. Removal of moisture, particulates, H_2S, and siloxanes by adsorption
2. Compression of the gas
3. Further cleanup and drying of the gas by PSA

Table 16: Cleaned Gas Content – NESI.

Compound	Cleaned
CH_4	≥ 98.5%
H_2S	2-6 ppm
Siloxanes	2-6 ppm

The NEO-Gas™ plant is capable of producing 1,200 scfh of pipeline quality gas. The system comes with a fully automated control feature. It uses the Allen Bradley SLC 500 series PLC. This is used to feed information to the Human Machine Interface (HMI), which is a laptop style datalogger. The HMI provides information regarding the operation of the unit, including details about inputs and outputs on a flow diagram and any error or warning messages (New Energy Solutions, Inc., 2008), (New Energy Solutions, Inc., 2008b).

Applied Filter Technology

Since early 1996 Applied Filter Technology (AFT) has been a leader in removal of siloxanes from gas streams and has developed many technologies that are in use in 80 different countries. Most recently they have developed the SWOP process that has efficiently removed siloxanes, volatile organic compounds, organosilicons, and sulfur compounds from landfill biogas. The most recent technological advancement of AFT is their SWOP™ Process with SAG™ Final Polishing. The SWOP™ process involves:

1. Removal siloxanes and VOCs in the concentrator vessel
2. "Polishing" of the gas in 1 or 2 SAG™ vessels
3. Cleaned gas used by power generation equipment

Table 17: Cleaned Gas Content – AFT.

Compound	Cleaned
CH_4	Not Specified
H_2S	Not Specified
Siloxanes	Not Specified

Regeneration of the SWOP™ process is continuous and self supported. The SWOP™ process operates using treated gas, which is about 0.5-1.0% of the total gas flow. The entire system draws about 8kW of electricity (Applied Filter Technology, 2008).

Guild

For over 5 years, Guild has fabricated and installed over 2-dozen biogas upgrading systems, and services various markets. Guild provides an easy-to-use system that is reliable, requires little attention and is environmentally friendly.

1. Compression of the gas to 60-100 psig
2. Removal of H_2O, CO_2, and H_2S by PSA

Table 18: Cleaned Gas Content – Guild.

Compound	Cleaned
CH_4	As required by pipeline company
H_2S	Typically to 4ppm
CO_2	Typically to 1-3%
Water	>7 lbs per MMSCF

The raw biogas is first compressed to 60-100 psig before entering the biogas upgrading system. Guild uses a PSA adsorption system for the removal of water, CO_2, and H_2S in a single step. This system is customized to meet the specification of pipeline quality as defined by its customer. Afterwards, the adsorbent vessel is regenerated by the removal of water, CO_2, and H_2S by depressurization and desorbing though a vacuum pump. The contaminants and a small feed of methane leave the vessel as a form of tail gas that can be flared or used as a local fuel.

Cleaned biogas is prepared under the specifications outlined by the local distribution or pipeline company. However, typically Guild removes water to less than 7lbs per MMCSF, H_2S to 4ppm, and CO_2 to 1-3% (Guild Associates, Inc., 2008).

QuestAir Technologies Inc.

Founded in 1996 and based in Burnaby, British Columbia, QuestAir develops, manufactures, and supplies gas purification systems for hydrogen recovery, hydrogen purification, helium purification, and methane recovery from biogas. QuestAir offers skid mounted PSA systems, M-3100 and M-3200 for gas purification. Varying the adsorbent material and valve design, the systems can be reconfigured to clean different gases.

1. Removal of contaminants by an integrated fast-cycle PSA using proprietary structured adsorbent material

Table 19: Cleaned Gas Content – QuestAir.

Compound	Cleaned
CH_4	Up to 99%
H_2S	Not Specified

The M-3100 and M-3200 can remove CO_2 and H_2O as well as other trace gases to meet pipeline specification. This is accomplished by using a specially structured adsorbent material that reduces the amount of adsorbent needed and allows higher cycle speeds than traditional PSA systems. QuestAir also employs a proprietary rotary valve, which is more compact than typical PSA systems and reduces capital and installation costs (QuestAir Technologies, 2008).

Example Companies that Provide Biogas Cleanup Equipment and Services

Flotech

Based in New Zealand, Flotech is known internationally as an industrial equipment supplier, providing solutions in heat exchange, gas compression, and gas purification. Flotech offers modular pre-engineered plants as well as custom solutions. Biogas cleanup is accomplished via Greenlane™, Flotech's "Compression – Scrubbing – Flash – Recovery" system. The system operates on an advanced water scrubbing technique which employs the use of a regenerating water system. The process in a basic form is:

1. Removal of moisture and particulates
2. 2 stage compression of the gas
3. H_2S and CO_2 removal by a specially design water scrubber
4. Drying of the gas by PSA/TSA
5. Gas quality analysis (gas not to specification is reprocessed)
6. Recovery of CH_4 from process water in a flashing tank
7. Stripping of CO_2 from process water for re-use

Table 20: Cleaned Gas Content – Flotech.

Compound	Cleaned
CH_4	≈ 97%
H_2S	Not Specified

The Greenlane™process removes almost all siloxanes. This is more critical in non-dairy manure derived biogas as dairy manure derived biogas typically does not contain siloxanes. The process is optimized to control methane losses to about 0.1%. In order to maintain the efficiency of the system, Flotech offers an automatic washing solution for Greenlane™ plants that removes biological debris that accumulates throughout the system. GE Ro-Flo compressors were selected for the system because they are capable of standing up to H_2S concentrations of 90% (Flotech, 2006).

SouthTex Treaters

SouthTex has been providing contract gas treating services and equipment since 1986. Their more than 70 employees work in four states and services include design, construction, and start-up of plants to process gas. Processing options include acid gas removal, amine treatment, gas dehydration, NGL recovery, and landfill gas treatment. SouthTex designed and constructed their first manure to methane plant in 2006. Specific information of their cleanup processes were not readily available. The plants that they currently operate employ the following clean up processes:

1. Amine Treatment
2. Sulfinol
3. Physical Solvent
4. Dehydration

Table 21: Cleaned Gas Content – SouthTex Treaters.

Compound	Cleaned
CH_4	950-970 BTU/scf
H_2S	< 4 ppm
Siloxanes	Not Specified

Since 2001 SouthTex Treaters has been treating landfill gas in Kansas City. The plant treats about 3850 scfm and cleans the gas to pipeline specifications. The maximum CO_2 content of the treated gas is 2%. Water content is less than 7 Lb/MMSCF and O_2 is less than 50 ppm. Since the treated gas is being piped to and used by residential customers, shutdowns have been installed for each quality constraint (SouthTex, 2008).

Other Companies Providing Upgrading Services

Table 22: Additional Biogas Processing Companies.

Company	Location	Website
Cirmac International bv	Apeldoorn, The Netherlands	http://www.cirmac.nl/?url=products_biogas.php
FirmGreen®	Newport Beach, CA	http://www.firmgreen.com
HAASE Energietechnik AG	Neumuenster, Germany	http://www.haase-energietechnik.de/en/Home/
Malmberg	Åhus, Sweden	http://www.malmberg.se/module.asp?XModuleId=14136
Phase 3 Renvewables	Cincinnati, OH	http://phase3dev.com
R.C. Costello & Assoc., Inc.	Redondo Beach, CA	http://www.rccostello.com/naturalgas.html
Unison Solutions	Dubuque, IA	http://www.unisonsolutions.com

Table 23: Summary of Biogas Upgrading Technologies.

	CarboTech	Purac	Flotech	NESI	AFT	Guild	SouthTex	QuestAir
Source(s)	Digester gas	Wastewater	Wastewater sludge with food and organic waste	Digester gas	Landfill gas, digester gas	Digester gas	Landfill gas	Landfill gas, digester gas
Processes	Adsorption, PSA	Activated carbon, Amine scrubbing, PSA	Water scrubbing, PSA/TSA (CSFR system)	Adsoprtion, PSA	Adsorption	PSA	Amine, sulfinol, or physical solvent scrubbing	PSA
Typical Raw Biogas Content	55-70% CH_4 30-45% CO_2 <2% nitrogen <0.5% oxygen <500 ppmv H_2S water saturated	Not Specified	55-65% CH_4 45-36% CO_2	55-60% CH_4 40-45% CO_2, Up to 4000ppm of H_2S and siloxanes	46-48% CH_4 36-38% CO_2 10-12% nitrogen 1.5-1.8% oxygen 624 ppmv VOCs 3.17 ppmv organosilicon	60 % CH_4 40% CO_2 3-4,000 H_2S water saturated	Not Specified	25-90 % CH_4
Cleaned Methane Content	Up to 99%	> 99%	≈ 97%	≥ 98.5%	Not Specified	As required by pipeline company	Not Specified	Up to 99%
Cleaned Hydrogen Sulfide Content	< 3.59 ppm	Typically <0.5 ppm	Not Specified	2-6 ppm	Not Specified	Typically to 4 ppm	< 4 ppm	Not Specified
Utilization	Natural gas substitute Vehicle fuel	Natural gas network Vehicle fuel	Vehicle fuel	CNG vehicle fuel Electrical use	Power generation	Natural gas network	Natural gas network	Natural gas network Vehicle fuel Power Generation

Cleanup Methods and Performance on Trace Components

Removal of many of the trace components of landfill gas can occur through the same physico-chemical processes and techniques detailed previously. Multiple stages with differing technologies may be employed in the gas cleanup processing. An example of the use of absorption and adsorption in a two-stage process is found in (Henning, et al., 1996), which discusses the production of fuel gas from landfills at two sites in Germany. Table 24 shows the data reported to demonstrate the performance of each stage of a two-stage process of water scrubbing (WS) of landfill gas (LFG) followed by activated carbon adsorption (ACA). The typical reduction from water scrubbing alone ranged from 2-10, depending on the targeted trace component. A further reduction of roughly 2-3 resulted from the activated carbon adsorption. The overall concentration reduction factor was in range from 6-16 depending on the component in question. The final concentrations achieved targeted levels.

Table 24: Performance of Water Scrubbing (Henning, et al., 1996)

Components(s)	Raw LFG Concentration	LFG + WS	LFG + WS + ACA	Target Specification
HHCs [mg Cl/m^3]	111	49	17	< 25
Higher HCs [C_{5+} ppm]	50-250	25-125	----	No Spec.
Aromatics [ppm]	50-80	5-10	< 5	< 200

Studies at a landfill in Germany have also been done on the removal of chlorinated hydrocarbon components through purely an adsorption process. Table 25 shows the results of varying the absorbent. No information is given on the concentration in the input gas stream, but presumably it is largely constant since these tests were being conducted at the same landfill.

Table 25: Adsorption Testing Results (Henning, et al., 1996)

Adsorbent	Cl Conc in Clean Gas [mg/m^3]	Removal Rate [%]
Activated carbon	5-20	96-99
Lignite coke	20	96
Aluminum oxide	40	92
Adsorber resins	10-30	93-98

Henning (Henning, et al., 1996) reports on tests of catalytic processes for removing halogenated carbon compounds from landfill gas. The catalysts enable the formation of hydrogen chloride (HCl) in a reaction that strips chlorine from the halogenated compound. The resultant HCl is reacted with CaO to form salt and water, each of which can be removed from the processing

stream. In tests which examined four halogenated compounds, the average reduction was over 99.7%. Each of the four compounds was reduced by more than 99%.

Henning describes a design example of a two-stage process that involves catalytic conversion in the first stage and adsorption in the second stage. In the catalytic process, H_2S is removed by impregnated activated carbon and aromatics/halogenated hydrocarbons are removed via adsorption.

Table 26: Performance of a Two-Stage Catalytic and Adsorption Cleanup Process (Henning, et al., 1996)

Component	LFG	LFG + Processing
H_2S [mg/m^3]	< 150	< 5
Chlorinated hydrocarbons [mg Cl/m^3]	30-150	< 25
Fluorocarbons [mg F/m^3]	10-50	< 25
Aromatic compounds [mg/m^3]	< 500	< 25

Effectiveness in removing H_2S, halogenated compounds, and higher hydrocarbons can be obtained using several avenues of gas processing. However, "no standard method for treating landfill gas to eliminate or minimise [sic] siloxanes" currently is used (Deed, et al., 2004). Gas cooling, adsorption onto activated carbon, and solvent washing are all potential methods which may be applied to the removal of siloxanes from a gas stream. Depending on the siloxane compound(s) entrained in the landfill gas and the cleanup process involved, removal efficiency for a single stage ranges from approximately 26% (cooling to -25^{0}C) to 99.1% (activated carbon adsorption). While the activated carbon technique appears to achieve a high degree of siloxane removal, media costs are apparently high since the activated carbon cannot be regenerated and must be replaced (Deed, et al., 2004).

Biogas Standards and Cleanup Targets

The biogas industry is just beginning to develop within the U.S. Only a handful of biogas technologies can provide a complete package for implementing an entire biogas facility. The newness of the biogas industry means that the U.S. has not created any national or regional standards for the utilization of biogas. Several European countries have already developed national standards for biogas use in vehicles and for injection into the natural gas grid. EU Directive 98/30/EG in 2003 (referred to as the Gas Directive) requires that biogas be allowed full access to the NG grid provided that the national specifications for gas quality are met (Westart-Calstart, 2004). Marcogaz, the technical association of the European Natural Gas Industry, recently developed a recommendation for the injection of gases from non-conventional sources into gas networks. This document also addresses the introduction of biogas into the grid (Marcogaz Working Group, December 2006).

Table 27 lists the requirements for the injection of biogas and other nonconventional gases into natural gas networks in selected European countries.

Table 27: European Requirements for the Injection of Biogas and Other Nonconventional Gases into Natural Gas Networks (Marcogaz Working Group, December 2006). †

	Autria	France	Germany	Netherlands	Sweden	Switzerland	
Property						**Unlimited Injection**	**Limited Injection**
CH_4	> 96%	/	-	85%	> 97%	> 96%	> 50%
CO_2	< 3%	< 2.5%	# 6%	/	< 3%	< 4%	< 6%
CO		<2%	/	/	/	/	/
Total S	< 10 mg/m^3	< 30 mg/m^3	# 30 mg/m^3	< 45 mg/m^3	< 23 mg/m^3	< 30 mg/m^3	< 30 mg/m^3
H_2S	< 5 mg/m^3	< 5 mg/m^3 (H_2S + COS)	# 5 mg/m^3	< 5 mg/m^3	10 ppm	< 5 mg/m^3	< 5 mg/m^3
Mercaptans	< 6 mg/m^3	< 6 mg/m^3	15 mg/m^3	/	/	/	/
O_2	< 0.5%	< 0.01%	< 0.5%	< 0.5%	< 1%	< 0.5%	< 0.5%
H_2	< 4%	< 6%	# 5%	/	< 0.5%	< 5%	< 5%
H_2O	Water dew pt: -8C, 40 bar	Water dew pt < -5C at MOP	Water dew pt: ground temperature	< 32 mg/m^3	< 32 mg/m^3	< 60%	< 60%
Hydrocarbon dew point	0C at OP	< -2C (1-70 bar)	Ground temperature	/	/	/	/

Wobbe index	13.3-15.7 kWh/m^3	13.64-15.7 kWh/m^3 (H gas) 12.01-13 kWh/m^3 (B gas)	10.5-15.7 kWh/m^3	43.6-44.41 MJ/m^3	45.5-48.5 MJ/m^3	13.3-15.7 kWh/m^3	/
Pressure			Pressure of pipeline to be injected into				
Gross calorific value	10.7-12.8 kWh/m^3	10.7-12.8 kWh/m^3 (H gas) 9.5-10.5 kWh/m^3 (B gas)	/	35.1 MJ/m^3	/	10.7-13.1 kWh/m^3	/
Relative density	0.55-0.65	0.555-0.70	/	/	/	0.55-0.70	/
Odorant	Gas to be odorized at consumer	15-40 mg THT/m^3	Gas to be odorized at consumer	Gas to be odorized at consumer	/	15-25 mg THT/m^3	15-25 mg THT/m^3
Impurities	Technically pure	Technically pure				Technically pure	Technically pure
Halogenated compounds	0 mg/m^3	< 1 mg Cl/m^3 < 10 mg F/m^3	Nil	< 25 mg Cl/m^3	/	/	
Ammonia	Technically pure	/	/	< 3mg/Nm^3	< 20 mg/Nm^3	/	/

Dust	Technically pure	/	No dust	No dust			
Mercury		< 1 μg/m^3	/	/	/	/	/
Benzene							
Siloxanes	< 10 mg/m^3						

† The symbol # that appears in this table in the column labeled **Germany** is also in the original reference (Marcogaz Working Group, December 2006), but meaning is not attributed to it there. The symbol has been replicated here for the sake of completeness and accuracy in rendering this table.

Table 28: Typical Requirements to Remove Gaseous Components vs. Fuel Application (Bioenergy, 2000).

Application	H_2S	CO_2	H_2O
Gas Heater (boiler)	<1000 ppm	No	No
Kitchen Stove	Yes	No	No
Stationary Engine (CHP)	< 1000 ppm	No	No condensation
Vehicle Fuel	Yes	Recommended	Yes
Natural Gas Grid	Yes	Yes	Yes

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VII. List of Acronyms

Acronym	Description
AFT	Applied Filter Technology
AGA	American Gas Association
BTU	British Thermal Unit
CBM	Compressed Biomethane
CH_4	Methane
CHP	Combined Heat and Power
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
CO_2	Carbon Dioxide
CSFR	Compression Scrubbing Flash Recovery
DG	Distributed Generation
DOT	Department of Transportation
EU	European Union
FERC	Federal Energy Regulatory Commission
GHG	Greenhouse Gas
GTI	Gas Technology Institute
GWh	Gigawatt Hours
HC	Hydrocarbon
HHC	Halogenated Hydrocarbons
H_2S	Hydrogen Sulfide
HMI	Human Machine Interface
HRT	Hydraulic Retention Time
ITR	Intrepid Technology and Resources
kW	Kilowatt
LBM	Liquefied Biomethane
LFG	Landfill Gas
LMOP	Landfill Methane Outreach Program
LNG	Liquefied Natural Gas
MD	Modular Plant
MGD	Millions of Gallons per Day
mm	Millimeter
MW	Megawatt
N_2	Nitrogen
NGV	Natural Gas Vehicle
NYSERDA	New York State Energy Research and Development Authority
O_2	Oxygen
PLC	Programmable Logic Controller
ppm	Parts Per Million
PSA	Pressure Swing Adsorption
psi	Pounds per square inch
REC	Renewable Energy Credit
RSP	Renewable Portfolio Standards
scf	Standard Cubic Feet
THT	Tetrahydrothiophene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant