BIRMINGHAM
AIR TOXICS STUDY

Performed by

JEFFERSON COUNTY DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH SERVICES
AIR AND RADIATION PROTECTION DIVISION

1400 Sixth Avenue South
Birmingham, Alabama 35233

FEBRUARY 2009

TABLE OF CONTENTS

PART I: AIR TOXICS RISK ASSESSMENT

PART II: TABLES, FIGURES AND APPENDICES

PART I
Air Toxics Risk Assessment

EXECUTIVE SUMMARY

Between July 2005 and June 2006, the Jefferson County Department of Health (JCDH) conducted an air monitoring study of a large number of toxic air pollutants at four locations in the Jefferson County, Alabama, area. The four sites were East Thomas, North Birmingham, Providence and Shuttlesworth. The purpose of this study, designated the Birmingham Air Toxics Study (BATS), was to assess the potential health effects resulting from the local population's exposure to chemicals in ambient air. JCDH conducted a risk assessment of the air monitoring data collected in the BATS, and this report details the methods and findings of this assessment.

Data were collected from July 15, 2005, to June 26, 2006, then summarized and analyzed soon thereafter. The risk assessment portion of the project commenced during the summer of 2007. Chemicals of potential concern (COPCs) were selected at each monitoring location for detailed evaluation in the risk assessment. To be a COPC at a location, a chemical had to be detected in at least 10% of the samples collected at the monitor during the sampling period.[1] All of the monitors in the network included analyses of volatile organic chemicals (VOCs), semi-volatile organic compounds (SVOCs), carbonyls, metals and hexavalent chromium (Cr+6). The only difference in the monitoring data was at North Birmingham, where a sample was taken twice for all metals, once for total suspended particles (TSP) and once for particulate matter smaller than 10 microns in diameter (PM10). Because the TSP and PM10 values collected at North Birmingham were similar in most cases for individual chemicals, an average was taken for use in further analyses.

Potential risks and hazards to human health were assessed for 102 air pollutants collected at four monitoring locations in the Birmingham, Alabama, area. Both chronic (long-term) and acute (short-term) evaluations were developed, with chronic exposures assuming an individual being exposed to the observed air concentrations continuously for 24 hours per day over a 70-year period and acute exposures typically representing a one-hour period. The 95% Upper Confidence Level (UCL_{95}) exposure concentration was used as a conservative estimate of the magnitude of chronic exposure at each monitor.[2] Depending on the distribution pattern of the data, this method is based on the UCL_{95} on the mean of the chemical concentrations in air at a given monitor. For the acute risk assessment, maximum air concentrations at each monitor location were compared to existing screening levels to determine the potential for human health impacts. Toxicity criteria were derived from the Office of Air Quality, Planning and Standards (OAQPS). OAQPS is an office under the authority of the United States Environmental Protection Agency (USEPA).

The Clean Air Act directs EPA to manage risks under Section 112 according to the criteria specified in the 1989 National Emission Standard (NESHAP) for benzene. In short, the Benzene NESHAP identified a cancer risk level of one in ten thousand (1×10^{-4}) as the approximate upper limit of acceptability and a cancer risk level of one in one million (1×10^{-6}) to be safe with an ample margin.[3] This value translates to "one in a million" additional chance of experiencing a health impact. The results for the chronic risk assessment indicated that all of the monitors in the BATS monitoring program exceeded a 1×10^{-6} lifetime cancer risk for cumulative risk and some chemicals individually. The cumulative cancer risks ranged from a high of 1.66×10^{-4} at Shuttlesworth, to a low of 3.36×10^{-5} at Providence. A total of fourteen chemicals exceeded the threshold for the UCL_{95} exposure case at a minimum of one of the monitoring sites. The highest risk for a single chemical at a single site was 6.40×10^{-5} for benzene at Shuttlesworth. Benzene also had the highest individual risks recorded at East Thomas (2.76×10^{-5}) and North Birmingham (3.47×10^{-5}). The highest individual risk at Providence was for carbon tetrachloride (1.05×10^{-5}).

The non-cancer health hazards were evaluated by calculating a hazard quotient (HQ) for each COPC, and then summing the HQs at each location to determine a Hazard Index (HI). If an HQ was less than 1, then adverse

health impacts were considered unlikely at that location for that specific chemical. Similarly, if the HI for a monitor location was below 1, the potential for health effects from all of the COPCs was unlikely.[4] In the case of HI that exceeded a value of 1, a single chemical (acrolein) typically dominated the HI (e.g., HI = 36.5 at Providence and 127.0 at Shuttlesworth, with acrolein accounting for 97.4 percent and 94.2 percent of the HI, respectively). In addition to acrolein, manganese and acetonitrile also contributed significantly at these sites. Removing these three COPCs from the calculation yields HI's ranging from 0.52 at Providence to 1.23 at Shuttlesworth.

The acute analysis was conducted by calculating an acute HQ for each of the COPCs at each monitor location and then summing the acute HQs to derive an acute HI. There was one instance in which the HQ for a chemical exceeded the USEPA threshold of 1 at a site. Benzene, at the Shuttlesworth monitor, had an acute hazard quotient of 1.09, based on the maximum observed concentration at that monitor of 31.54 $\mu g/m^3$ on February 4, 2006. The acute benchmark concentration for benzene used in this study is 0.029 mg/m^3, which comes from the Agency for Toxic Substances and Disease Registry (ATSDR) minimum risk level for no adverse effects for 1- to 14-day exposures. There were no other concentrations of benzene observed as high as 31.54 $\mu g/m^3$ at any time during the sampling period. The second highest concentration, 12.94 $\mu g/m^3$ on October 19, 2005, yields an acute hazard of 0.45. The highest acute hazards at each of the other monitoring locations were as follows: East Thomas, acrolein, 0.38; North Birmingham, benzene, 0.44; and Providence, formaldehyde, 0.69.

The results, from the above risk characterization, exceed the cancer risk of 1×10^{-6} and the chronic risk of 1×10^{-4}. The hazard quotients/indices (noncancer, acute and chronic) were calculated and found to be greater than 1. The Department's risk management strategy will consist of continued implementation and enforcement of the existing MACT standards and existing GACT standards, both of which control emissions of air toxics pollutants from industrial sources and area sources (e.g., gasoline stations, dry cleaners, autobody refinishing shops, etc.). Most of the chemicals that are risk drivers are quite ubiquitous in nature, emanating from a variety of sources including industrial, area, and, most notably, mobile sources, that make direct control of most sources implausible. The one exception is the Shuttlesworth site, where the Department is working with a very proximate coke by-products plant to reduce concentrations of several chemicals that are risk drivers.

1.0 INTRODUCTION

Between July 2005 and June 2006, the Jefferson County Department of Health (JCDH) conducted an air monitoring study of a large number of toxic air pollutants in a number of communities in the Jefferson County, Alabama, area. The purpose of this study, designated the Birmingham Air Toxics Study (BATS), was to provide information to decision-makers regarding the following areas of concern:

- What is the potential cancer risk and noncancer hazard (generically referred here as "risk") posed by chemicals present in ambient air exposures?
- Which chemicals pose the most risk to humans through inhalation?
- What are potential sources of these chemicals?
- Do potential problem areas need to be addressed and what are the potential next steps?

This risk assessment will not address the following topics:

- Past or present health outcomes associated with current or previous exposures;
- Potential risks through exposure pathways other than inhalation;
- Potential risks to ecosystems in the vicinity of the monitors.

This report presents the methodologies and findings of the risk assessment. The risk assessment is followed by an analysis of risk management recommendations.

1.1 Monitoring, Site Selection and Analytical Parameters

The BATS monitoring program was designed to collect ambient air data that characterized the airborne concentrations of toxic air pollutants in various areas of Jefferson County, Alabama. Four monitoring site locations were selected for the study. Table 1-1 identifies the name and location of each monitoring site in this study, and Figure 1-1 depicts the general geographic location in the study area. Figure 1-2 provides a close-up of the monitoring locations. Each of the four monitoring sites was selected to represent a unique area with unique pollution sources. Two locations, Shuttlesworth and North Birmingham, were selected for their proximity to industrial facilities with adjacent neighborhoods. The East Thomas site was selected for its proximity to mobile sources, namely, railroads and highways. The Providence site was selected to establish rural, background concentrations, as it is primarily in a wooded area that is significantly separated from the urban area under study.

At these four sites, five monitors were sited to test for different groups of chemicals. Monitoring at all locations was conducted over a one-year period. To account for potential seasonal variability, the monitoring program consisted of collecting samples over one year every twelfth day, resulting in approximately thirty sampling events at each location. To account for potential temporal/diurnal variability, each sample was collected over a 24-hour period (from midnight to midnight).

A complete list of all chemicals selected for analysis in the monitoring program is presented in Table 1-2. More volatile organic compounds (VOCs) were monitored in BATS due to potential contributions to ozone, which is a significant concern in the Birmingham area. Additionally, semi-volatile organic compounds (SVOCs), metals, and carbonyls were routinely monitored at all sites.

1.2 Organization of This Report

The remainder of this report is organized into the following principal sections:

- Section 2, **Exposure Assessment**, presents an analysis of the monitoring data and selects chemicals of potential concern (COPCs). The exposure concentrations (EC) are then calculated for COPCs by finding the UCL_{95} of the annual average concentration. This UCL_{95} is then used as a surrogate to represent long-term (i.e., lifetime) exposure.

- Section 3, **Toxicity Assessment**, outlines the toxicological health effects of each COPC.

- Section 4, **Risk Characterization**, characterizes the health risks and hazards associated with the COPCs for chronic and acute potential exposures.

- Section 5, **Uncertainty Analysis**, summarizes important sources of uncertainty in this assessment and their potential impact on the risk estimates.

- Section 6, **Conclusions**, summarizes the important findings of the risk assessment.

- Section 7, **Risk Management Plan**, summarizes the Department's plan to mitigate the effects of air toxics pollutant exposure.

- Section 8, **Glossary**, provides terms used in this risk assessment.

- Section 9, **References**

- **PART II: Tables, Figures and Appendices**, includes full validated data, detailed monitor-specific data summaries and risk calculation results, and brief toxicological fact sheets for chemicals that were associated with the highest risks and hazards.

2.0 EXPOSURE ASSESSMENT

2.1 Overview of Exposure Assessment

Exposure assessment is the process that characterizes the route, duration, intensity, and frequency of contact with a chemical. Two exposure scenarios were evaluated in this study: chronic inhalation and acute inhalation. For chronic scenarios, exposure to relatively low levels of pollutants repeatedly over a prolonged period of time is evaluated. For acute scenarios, short-term exposure to high-level concentrations is evaluated.

The monitoring sites were used to collect data for several different types of pollutants. These different types are defined by unique characteristics that are outlined in the following paragraphs.

Volatile Organic Compounds (VOCs)

VOCs are organic chemicals that have a high vapor pressure and tend to have low water solubility. Simply put, VOCs have a high propensity to evaporate and remain airborne. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, pharmaceuticals, and refrigerants, as industrial solvents, such as trichloroethylene, or produced as by-products, such as chloroform produced by chlorination in water treatment. VOCs also are often components of petroleum fuels (e.g., benzene), hydraulic fluids, paint thinners, and dry cleaning agents.

Due to the past non-attainment status with the National Ambient Air Quality Standard for ozone, the role of VOCs in ozone production is particularly important to Birmingham and surrounding areas. When combined with ultraviolet light from the sun, VOCs, particularly hydrocarbons, react to form ground-level ozone (O_3). This ozone can cause respiratory health problems in humans and damage agricultural production in affected areas.

Some of the most prominent examples of VOCs included in the BATS study are benzene, toluene, xylene and butadiene.

Semi-Volatile Organic Compounds (SVOCs)

SVOCs are organic chemicals that have a lower vapor pressure than VOCs and, thus, have a lower propensity to evaporate from the liquid or solid form. Once airborne, they also tend to condense out of the gas phase more readily. Examples of SVOCs include most organic pesticides (e.g., chlordane), and certain components of petroleum, such as polycyclic aromatic hydrocarbons. Note that the demarcation between SVOCs and VOCs is not exact. For example, the two separate air sampling and analytical methods for VOCs and SVOCs will both usually detect naphthalene when present, indicating that this chemical is on the lower end of the VOC scale of volatility and on the higher end of the SVOC scale of volatility. In general, as chemicals increase in molecular weight and/or polarity, they become more SVOC-like.

Metals

Metals are a large group of elements with a set of distinct characteristics that can be found across much of the periodic chart. Metals can exist in particle form as a contributor to particulate matter (PM) levels or react with gases in the atmosphere to form pollutant compounds.

Several metals were detected at each monitor at each sampling date, a total of 124 detections each. Among these were lead, transition metals such as manganese and mercury; metalloids antimony and arsenic, alkaline earth metal-beryllium and selenium, a non-metal that can come from coal-burning and smelting operations.

Carbonyls

The carbonyl compounds evaluated in this study are a subgroup of VOCs and include chemicals such as formaldehyde and acetaldehyde. While such chemicals are themselves VOCs due to their high vapor pressure, they are often grouped as a separate class from the VOCs because of the special sampling and analytical methods necessary to measure them in air.

Hexavalent Chromium (Cr+6)

Chromium exits in three valence states (0, +3, and +6). Typically, monitoring analytical programs measure for "total" chromium (i.e., the sum of all three valence states). However, in the BATS, an analytical program was pursued to measure both the total amount of chromium present (in any valence state) as well as the amount of chromium (+6) present in ambient air. This more extensive analysis was undertaken in order to determine whether local emission sources were resulting in high levels of the carcinogenic Cr(+6) species. Cr+6 can be emitted from sources with chrome plating and primer painting operations.

2.2 Study Area Conceptual Model

2.2.1 Physical Characteristics

The terrain of the Birmingham area in Jefferson County, Alabama, is defined by the foothills of the Appalachian Mountains. This location results in a predominantly hilly terrain across most of Jefferson County, with the ridges being oriented primarily in a southwest-to-northeast direction. The East Thomas, North Birmingham and Shuttlesworth monitors lie in essentially level terrain. The land around each of these monitors is generally flat and defined by objects such as roads, highways, neighborhoods and industry. Each of these will generally contribute to level or lightly graded terrain. The Providence monitor, however, is located at a high point among hills in western Jefferson County in a predominantly wooded area, and is not expected to be highly influenced by local mobile or stationary air pollution sources. A more complete description of each of the monitoring sites is provided below.

Jefferson County covers an area of 1,112 square miles, with three of the four monitors being centrally located in a relatively small area on the northern edge of downtown Birmingham. The Providence monitor is located in the far western portion of Jefferson County, near both Tuscaloosa and Walker Counties.

See Figures 1-1 and 1-2 for aerial view of monitoring area.

2.2.2 Local Meteorology

The local meteorology in the Birmingham area has a significant influence in determining where chemicals in the atmosphere are carried and their airborne concentrations. Wind speed and wind direction are two of the

most important meteorological factors. Airborne chemicals are carried along in the direction that the wind is blowing. In general, as wind speeds increase, the airborne concentrations will decrease because of more air being available to mix with the chemicals and dilute their concentrations. In areas like the locations of the BATS monitors, the vertical obstacles to air flow, such as buildings and trees, increase the mixing in the atmosphere as the wind goes over and around the obstacles. The atmospheric stability is another critical meteorological factor in determining the amount of mixing that can occur in the air. On hot sunny days, the sun's energy warms the air in contact with the earth's surface. This warm air then rises upward, potentially causing an "unstable" atmosphere. The rising air causes increased motion in the atmosphere, which increases the amount of air that is available to dilute chemicals in the atmosphere. In contrast, on cloudless nights with low winds, the air near the earth's surface cools faster than the air above, which leads to a stable atmospheric condition where vertical motion and resulting dilution of chemicals in the atmosphere are limited.

A wind rose provides a graphical display of the percentage of times the wind blows in a particular direction and the range of wind speeds in each direction. This information is useful to interpreting the results of a monitoring program, as it shows the direction from which chemicals found in a monitor may have come. However, it contains no information about the atmospheric stability, and thus the wind rose cannot always be used alone as a means to identify the source of chemicals in a particular monitor. Frequently, a more robust source apportionment analysis is done using air dispersion modeling that includes, among other things, both the information displayed in the wind rose, as well as information on the atmospheric stability. For informational purposes, a wind rose has been developed for the Birmingham area for the time during the monitoring program (June 2005 to July 2006). This wind rose was based on data collected at the National Weather Service (NWS) station at the Birmingham International Airport. The NWS station is approximately 6.3, 3.9 and 2.7 miles from the East Thomas, North Birmingham and Shuttlesworth monitors, respectively. The Providence monitor is significantly farther away, approximately 32.9 miles.

The wind rose for the Birmingham area during the period of June 2005 to July 2006 is presented in Figure 2-1. A wind from the north implies that airborne chemicals will predominantly move from north to south across the BATS monitoring area. The wind rose for the period shows calm conditions about 26% of the time and winds from all directions (with some peak directions of north and south at 10% and 6% of the time, respectively).

The Birmingham meteorology collected at the airport's weather station recorded fairly typical temperatures over the full year of monitoring. On average, the warmest month was August 2005, with an average daily temperature of 81.28 degrees Fahrenheit (ºF). The lowest average monthly temperature was 44.93ºF, measured in February 2006. A full listing of observed air temperatures, historical average temperatures, and deviations from historical average temperatures can be found in Tables 2-1, 2-2, and 2-3, respectively.

2.2.3 Air Emission Sources and Characteristics

This risk assessment primarily reflects concerns from pollutants emitted from stationary sources, such as industrial facilities and other businesses, and mobile sources, such as car and truck traffic. The locations of the monitors were selected to determine concentrations near these various sources. The East Thomas monitor is located very close to significant mobile sources, along with some industry. The North Birmingham monitor is fairly balanced with regard to proximity to both stationary and mobile sources. The Shuttlesworth monitor is located in very close proximity to a large industrial area featuring two coke plants, a pipe mill, a mineral wool plant and quarries. Finally, the Providence monitor is located in an undeveloped area, separated from most

mobile and stationary sources by dense woodland. Background environmental air toxics concentrations could potentially be best identified at this location.

The industrial profile of Birmingham and surrounding areas has long been associated with steel production. This is certainly the case when defining the type of industrial sources located near the Shuttlesworth and North Birmingham monitors in particular. The Shuttlesworth monitor is located immediately adjacent to a coke plant, mineral wool plant and quarrying operations. Within a few miles of Shuttlesworth is another coke plant, a pipe mill, a steel mini-mill and other heavy industrial operations. Despite this being located near a small two-lane road, there is a significant amount of vehicle traffic, especially large transport trucks. The North Birmingham monitor is near most of the same industrial sources as Shuttlesworth, but closest to the large pipe mill in the area. North Birmingham is also located closer to interstate and highway vehicle traffic than Shuttlesworth. In addition to the above listed industries, Jefferson County is home to a wide range of other sources that have been shown to emit many of the chemicals monitored in this study, including gasoline terminals, scrap yards, paint booths and surface coating operations.

2.2.4 Population Characteristics

The population of Jefferson County, Alabama, was 662,047 according to the 2000 census. This indicates an average population density of almost 600 people per square mile. Much of this population is centered around the city of Birmingham, which lies near the center of the county. The suburban population of Birmingham extends primarily in the southern and eastern directions, making these the most populous quadrants of the county.

The age groups most often associated with sensitivity to chemical exposures are the young, elderly, physically compromised (e.g., hospital patients), and environmental justice communities. Approximately 25% of Jefferson County's population is under 18, while almost 14% is over 65. While the other 60% might not be as often associated with vulnerable health, there is potential for health effects for all age groups. Additional population characteristics follow for each monitoring site.

For a demographic breakdown of Jefferson County's population, see Tables 2-4 and 2-5.

2.2.5 Potential Exposure Pathways

In this study, concentrations of various chemicals in ambient (outdoor) air were measured repeatedly over the course of one year. These concentrations were then assumed to be available for persons in the vicinity of each of the monitors to breath in. This inhalation exposure pathway was the only exposure pathway evaluated in this study. Other exposure pathways (dermal exposure to chemicals and ingestion of chemicals) were not evaluated. In addition, exposure to chemicals by plants and animals in the local ecosystem was also not evaluated.

In this study, each monitor was considered to represent a separate exposure scenario. Specifically, the concentrations measured at each monitor are considered to represent potential exposure conditions for the people in the immediate vicinity of that monitor. As such, the data from the four separate monitors were not combined to represent the city of Birmingham or Jefferson County as a whole.

2.3 Description of the Monitoring and Analytical Program and Data Reporting Process

This section summarizes the analytical data collected during the BATS monitoring program and selects chemicals of potential concern for detailed analysis in the risk assessment. Data are summarized for each monitor by identifying the chemicals that were detected at least once at a level above the detection limit of the monitor. The remainder of this section provides a description of the monitoring activities at each of the BATS monitoring program sites and identifies the chemicals that were detected and the associated detection frequency.

The section concludes with a summary of the COPCs selected for this assessment, followed by two tables. Table 2-6 presents a list of all chemicals that were detected at least once in any of the four BATS monitors evaluated. Table 2-7 provides a list of the COPCs for each of the BATS monitors evaluated.

Appendix B presents detailed summaries of the analytical data for each monitoring site.

2.4 Monitoring Data Analysis and Data Reduction

2.4.1 Assessment of Data Quality

Complete data results for all chemicals on all dates can be found in Appendix A, Tables 1-4.

In general, samples at each monitoring site were collected every 12 days over a 24-hour period (midnight to midnight). All of the monitoring sites collected samples on the exact same monitoring schedule.

Rigorous data validation and quality assurance/quality control procedures were implemented for both sample collection and sample analyses. All samples were validated by checking monitoring parameters, including sampling flowrates. Samples were invalidated if the samplers did not run continuously over the 24-hour monitoring period, there were equipment malfunctions, and/or the monitors did not maintain proper flows. All invalid samples, however, were rerun on a six-day schedule. Duplicate samples were completed for carbonyls, Cr+6, and VOCs at all sites. Duplicates were run randomly and were in tolerance with original samples. Sample analyses were completed by Eastern Research Group (ERG), an EPA contractor. Duplicate samples were all processed for sample precision.

2.4.1.1 East Thomas Monitoring Site

The East Thomas site, located at 841 Finley Avenue Bypass W, Birmingham, Alabama 35204, near the intersection of major highways (Highway 78 and Finley Boulevard), was selected for its proximity to emissions from large numbers of mobile sources consisting of mostly large tractor trailers and passenger automobiles. This site is also very proximate to a large railyard. The area around the site consists mostly of a residential/commercial mixture. Per Calendar Year 2000 census, for the zip code in which this monitor is located, the approximate population was 15,144, consisting of approximately 89% Black or African American and a median household income of $17,999 (in 1999 dollars). There are no schools, day care facilities, hospitals, nursing homes, etc., that are proximate to this monitoring site.

At this site, monitoring was conducted for VOCs, SVOCs, metals, carbonyls and Cr+6.

VOCs

Samples were taken at East Thomas for 59 different VOCs. Samples were taken on 31 days, with many days registering no detection for various VOCs. A total of 37 VOCs were detected in at least one sample date from this monitor. Twenty-nine of the chemicals detected were found in at least 50% of the samples collected.

SVOCs

Results for 19 SVOCs at East Thomas were reported on 31 sampling dates during the monitoring period. The number of sample dates reported for individual chemicals ranged from 9 to 31. The missing sample dates are unlikely to affect the ability of the monitor results to reflect chronic exposures, as every month had at least one sample date reported. All 19 SVOCs were detected at least once at this site, with 17 of the chemicals detected in more than 50% of the samples reported.

Metals

Monitoring for 11 metals was reported for 31 sampling dates. Ten of these 11 metals were detected on all 31 sampling dates. Only mercury was not detected 31 times, as it was detected 20 times.

Carbonyls

Monitoring for carbonyls was reported for 31 sampling dates, with 11 different carbonyls being detected. All of these 11 were detected on all 31 sampling dates, except isovaleraldehyde, which was detected 23 times during the study and dimethylbenzaldehyde, which was not detected at all. While no individual carbonyl had its highest single concentration detected at East Thomas, overall concentrations were higher at the East Thomas site compared to overall concentrations at the other sites for all but two carbonyls.

Cr+6

Hexavalent chromium was sampled 31 times during the BATS study at East Thomas, with 26 detections.

2.4.1.2 North Birmingham Monitoring Site

The North Birmingham site, located at 3009 28th Street North, Birmingham, Alabama 35207, was selected for its proximity to emissions from several large industrial sources, including a pipe manufacturer. The area around the site consists primarily of a residential/industrial commercial mixture, with several neighborhoods and houses located within very proximate distances to the monitoring site. Per Calendar Year 2000 census, for the zip code in which this monitor is located, the approximate population was 11,218 , consisting of approximately 93% Black or African American and a median household income of $17, 192 (in 1999 dollars). There are several schools, day care facilities, and nursing homes that are fairly proximate to this monitoring site.

At this site, monitoring was conducted for VOCs, SVOCs, metals (TSP & PM10), carbonyls and Cr+6.

VOCs

Samples were taken at North Birmingham for 59 different VOCs. Samples were taken on 31 days, with many days registering no detection for various VOCs. Thirty-nine of the 59 VOCs were detected in at least one sampling date from this monitor. Twenty-nine of the chemicals detected were found in at least 50% of the samples collected.

SVOCs

Results for 19 SVOCs at North Birmingham were reported on 31 sampling dates during the monitoring period. The number of sample dates reported for individual chemicals ranged from 9 to 31. The missing sample dates are unlikely to affect the ability of the monitor results to reflect chronic exposures, as every month had at least one sample date reported. All 19 SVOCs were detected at least once at this site, with 17 of the chemicals detected in more than 50% of the samples reported.

Metals

Monitoring for 11 metals was reported for 31 sampling dates. Ten of these 11 metals were detected on all 31 sampling dates. Only mercury was detected less than 31 times. The North Birmingham site took two samples for each metal on each sampling date, one for total suspended particles (TSP) and one for particulate matter smaller than 10 microns in diameter (PM10). The results for each of these samples were very similar and were averaged together for simplification purposes.

Carbonyls

Monitoring for carbonyls was reported for 29 sampling dates, with 11 different carbonyls being detected at least once. All were detected on all 29 sampling dates, except isovaleraldehyde, which was detected 23 times during the study and dimethylbenzaldehyde, which was not detected at all.

Cr+6

Hexavalent Chromium was sampled 30 times during the BATS study at North Birmingham, with 22 detections.

2.4.1.3 Providence Monitoring Site

The Providence site, located at 1801 Bruce Shaw Road, Jefferson County, Alabama 35006, was selected as a determinant for rural, background air toxics concentration levels. The area has negligible mobile and industrial sources, but may still reflect naturally occurring concentrations, particularly those found in regional soil, water and air. The area around the site consists of several sparsely populated rural communities. Per Calendar Year 2000 census, for the zip code in which this monitor is located, the approximate population was 3,109, consisting of approximately 92% White and a median household income of $34,856 (in 1999 dollars).

The types of air toxics monitored at Providence were VOCs, SVOCs, metals, carbonyls and Cr+6.

VOCs

Samples were taken at Providence for 59 different VOCs. Samples were taken on 32 days, with many days registering no detection for various VOCs. A total of 37 VOCs were detected in at least one sample date from this monitor. Twenty-one of the chemicals detected were found in at least 50% of the samples collected.

SVOCs

Results for 19 SVOCs at Providence were reported on 31 sampling dates during the monitoring period. The number of sample dates reported for individual chemicals ranged from 23 to 26. The missing sample dates are unlikely to affect the ability of the monitor results to reflect chronic exposures, as every month had at least one sample date reported. A total of 18 SVOCs were detected at least once at this site. Half of the chemicals detected at this site were found in more than 50% of the samples reported.

Metals

Monitoring for 11 metals at Providence was reported for 31 sampling dates. Ten of these 11 metals were detected on all 31 sampling dates. Only mercury was not detected all 31 times, as it was detected 21 times. Overall, metal concentrations at Providence were far below the other three sites. Not a single metal had its highest single day concentration at this site.

Carbonyls

Monitoring for carbonyls was reported for 31 sampling dates, with 11 different carbonyls being monitored. Most of these 11 were detected on all 31 sampling dates, but some were detected fewer times, even as low as 8 times for isovaleraldehyde. As with the other sites, dimethylbenzaldehyde was not detected a single time. For all eleven carbonyls, the highest single day reading was detected at Providence. However, only isovaleraldehyde and crotonaldehyde had the highest overall concentrations at Providence.

Cr+6

Hexavalent Chromium was sampled 31 times during the BATS study at Providence, with 20 detections.

2.4.1.4 Shuttlesworth Monitoring Site

The Shuttlesworth site, located at 4113 Shuttlesworth Drive, Birmingham, Alabama 35207, was selected for its proximity to emissions from several large industrial sources, including coke by-product manufacturing facilities, pipe manufacturing facilities, one mineral wool production facility, asphalt batch plants and quarrying operations. In addition, this monitor is located alongside a road that serves as a major thoroughfare for both industrial and residential vehicular traffic. The area around the site consists mostly of a residential/industrial mixture, with several neighborhoods and houses located within very proximate distances to the monitoring site. Per Calendar Year 2000 census, for the zip code in which this monitor is located, the approximate population was 11,218, consisting of approximately 93% Black or African American and a median household income of $17, 192 (in 1999 dollars). There are several schools, day care facilities, and nursing homes that are fairly proximate to this monitoring site.

The types of air toxics monitored at Shuttlesworth were VOCs, SVOCs, metals, carbonyls and Cr+6.

VOCs

There were 31 VOC samples taken at Shuttlesworth, with many samples registering no detection. There were several anomalies at Shuttlesworth, compared to the other sites. Only 16 of 59 VOC analytes were detected on all 31 sampling days. However, 43 different VOCs were detected at least once, which is more than at the other sites. Additionally, 28 of the chemicals were found in over 50% of the samples collected. Two VOCs, ethyl tert-butyl ether and methyl methacrylate, were detected at only the Shuttlesworth monitor. However, each was detected only once.

SVOCs

Results for 19 SVOCs at Shuttlesworth were reported on 30 sampling dates during the monitoring period. All of the SVOCs were detected, with most being detected on most or all the 30 dates. Perylene had the fewest detections, nineteen. The missing sample dates are unlikely to affect the ability of the monitor results to reflect chronic exposures, as every month had at least one sample date reported. This site had a higher frequency of SVOC detection than any other site, with the highest concentration for 11 of the 19 analytes being found at Shuttlesworth.

Metals

Monitoring for 11 metals at Shuttlesworth was reported for 31 sampling dates. Ten of these 11 metals were detected on all 31 sampling dates. Only mercury was not detected 31 times, as it was detected 23 times. As with SVOCs, the concentrations of metals in the samples at Shuttlesworth were high relative to the other sites. Eight of the 11 metals had the highest concentrations at Shuttlesworth, with most being significantly higher than those at any other site.

Carbonyls

Monitoring for carbonyls was reported for 31 sampling dates, with 11 different carbonyls being monitored. All but two of these 11 were detected on all 31 sampling dates, with isovaleraldehyde and dimethylbenzaldehyde being detected 22 and zero times, respectively.

Cr+6

Hexavalent chromium was sampled 32 times during the BATS study at Shuttlesworth, with 24 detections.

2.4.2 Statistical Summaries of Monitoring Data

2.4.2.1 Averaging Procedures

The monitoring data provided concentrations of air pollutants for 102 different air toxics, with samples collected at scheduled intervals over a period of twelve months. In most cases, 31 samples were taken during

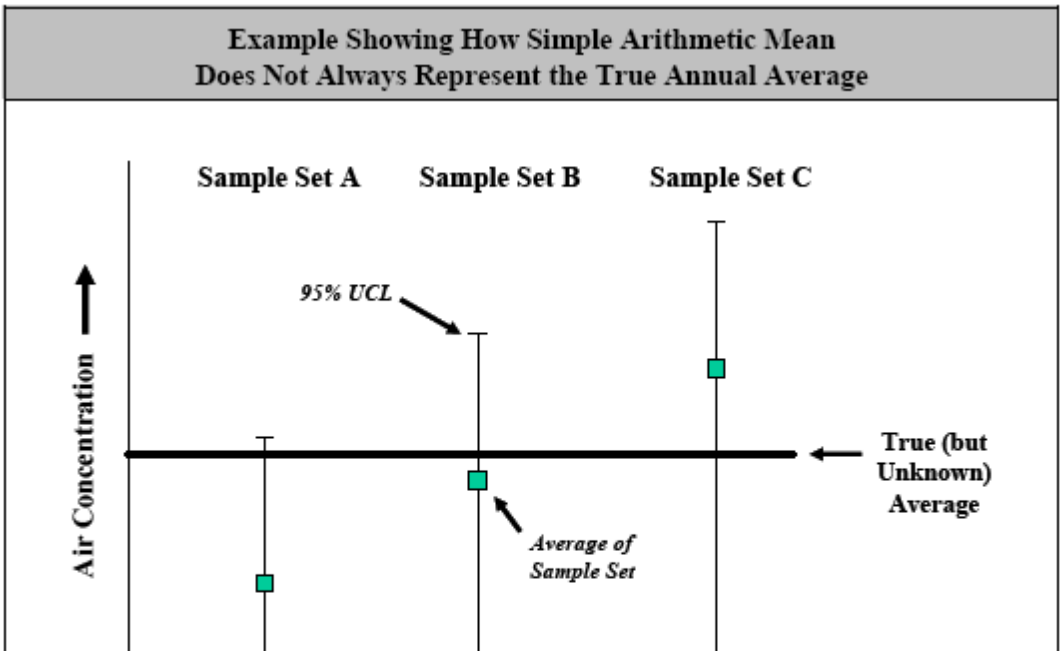
this time. These samples were used to develop an estimate of annual average concentration. This annual average concentration was then used as a surrogate for long term (i.e., lifetime) exposure.

One method to estimate the long-term annual average concentration would be to calculate a simple arithmetic mean for each analyte/monitor combination. The arithmetic mean, or average, is constructed from discrete sample measurements taken at each monitor over time. Constraints on resources almost always place limits on the amount of sampling possible (e.g., air toxic samples usually cannot be collected every day). In the case of the BATS, monitoring sites were sampled every 12th day. This results in sampling in a manner that helps to eliminate obvious sources of bias (e.g., samples are not uniformly collected on the same day of the week, or only on weekdays or only on weekends). In addition, collecting samples for a year allows for an evaluation of seasonal variability.

All factors being equal, one would expect the sampling results from the BATS monitoring program to contain equal probabilities of sampling on days when pollutant concentrations may have been relatively high as on days when pollutant concentrations may have been relatively low (or on days when meteorological conditions were conducive to high ground-level concentrations and days when they were not). Since samples were not collected every single day, however, one cannot be absolutely certain that all possible conditions were sampled equally. The arithmetic mean concentration is thus subject to uncertainty due to a number of factors, including:

- Daily variability in concentrations;
- The ability to measure only a finite number of instances from the distribution of concentrations over time; and
- Potential inaccuracy in individual measurements of concentrations.

This uncertainty produces a result in which the simple arithmetic mean of sampling results may underestimate, approach, or overestimate the true annual average. (The example below illustrates how three different monitoring data sets taken at the same monitor may result in an average concentration that underestimates, overestimates, or is close to the true long term average concentration.) Given this uncertainty in the use of the arithmetic mean concentration to describe "average" exposure concentration, the 95% Upper Confidence Limit of the mean (UCL_{95}) is commonly used as a public health protective estimate of the true annual average. Proceeding in this manner is likely to overestimate the true long-term average exposure; however, this method virtually obviates the risk of underestimating the true exposure. EPA's Superfund program has routinely used this procedure to evaluate exposures at hazardous sites, and this process has garnered long term acceptance as a public health protective approach, in light of the uncertainties. EPA's air toxics program also promotes this approach in its Air Toxics Risk Assessment Reference Library.[5]



To calculate the 95% UCL for a chemical data set from a monitor, it is necessary to understand its underlying statistical distribution, including whether the sampling results are normally or lognormally distributed. Once the analysis goes beyond these commonly understood distributional types, the level of statistical sophistication can increase substantially. In the BATS, EPA's software called ProUCL was used to automate this process and is described in more detail below.

In the event that the ambient air concentration present at a monitor was less than the minimum detectable amount for the monitoring device (i.e. "detection limit"), this sampling event was recorded as a "non-detect." At all sites for all analytes, a non-detect on a particular date was entered into the analysis as one-half of the minimum detection limit assigned to a particular chemical. This method is a conservative means of mitigating the impact of monitoring limitations as a result of detection limits. By factoring one half of the detection limit, there is some tangible concentration value for all analytes, even if no detection was present due to equipment limitations.[6] It should be noted, however, that the USEPA-approved method for accounting for non-detects utilizes the Sample Quantitation Limitation (SQL), as opposed to the minimum detection limit. In its guidance, it recommends that ½ of the SQL for each chemical be used for non-detects.

The following 15 chemicals were not detected a single time at any of the four monitoring sites during the duration of this study. Since the detection limit was never reached for these chemicals, it is reasonable to assume that these chemicals had little to no concentration present when any of the samples were collected over the course of one year. Accordingly, these chemicals did not factor in any of the analyses performed beyond this point:

2,5-Dimethylbenzaldehyde
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane

1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dibromoethane
1,2-Dichloropropane
Bromochloromethane
Bromodichloromethane
Bromoform
Chloroprene
cis-1,3-Dichloropropene
Dibromochloromethane
Trans-1,2-Dichloroethylene
Trans-1,3-Dichloropropene

With the exception of 2,5-Dimethylbenzaldehyde, a carbonyl, all of these are VOCs.

The following four chemicals were detected at only one monitoring location and on only one occasion during the year of periodic sampling:

1,2 Dichloroethane (1 detection at North Birmingham)
Ethyl Acrylate (1, East Thomas)
Ethyl tert-Butyl Ether (1, Shuttlesworth)
Methyl Methacrylate (1, Shuttlesworth)

These isolated occurrences were on different dates and none was of high concentrations relative to other chemicals detected at the monitor on those dates. These chemicals were removed from further study.

2.4.2.2 Descriptive Statistical Summaries by Chemical by Monitoring Location

The statistical information derived from the validated data for each monitoring location is provided in Appendix B, Tables 1-4. The tables contain listings of the following measures for each of 102 analytes monitored during this study, over a one-year period:

- **Mean (average) Concentration** – As noted above, the UCL_{95} is being used here to provide a conservative surrogate for long term exposure (see below). That said, the arithmetic average (the mean) is also provided to provide risk managers with one metric of the potential range of exposure concentrations (in this case, average versus higher end average).

- **Standard Deviation** – It is a measure of the distribution of the variables in a sample. In this case it explains the consistency of concentrations observed for a particular chemical. A small standard deviation indicates the data collected are generally close to the mean of the sample.

- **Minimum Concentration** – This value does not factor into a particular calculation, but does indicate how low concentrations were observed. In many cases, the minimum concentration occurred as a non-detect.

- **Maximum Concentration –** When the maximum concentration was greater than the UCL_{95}, the maximum concentration was used as a surrogate for long-term exposure per EPA guidance.[7] Acute screening levels are compared directly to the maximum detected concentration of a particular chemical.

- **UCL_{95} Concentration –** As noted above, the UCL_{95} was used as a conservative surrogate for long term exposure.

2.4.3 Selection of Chemicals of Potential Concern

This section summarizes the analytical data collected during the BATS monitoring program and presents chemicals of potential concern for detailed analysis in the risk assessment. The data analysis and selection of chemicals of potential concern (COPCs) are presented individually for each monitor. After the data were filtered at each monitor to remove the chemicals not detected at least once above the detection limit (DL), the remaining chemicals (detected in 10% or more of the samples) were selected as COPCs. These COPCs were carried forward for further evaluation in the risk assessment.

In general, the COPCs at the four monitoring sites were consistent, with a few exceptions. There were no instances in which an analyte was tagged as a COPC at only one site. There were, however, several instances in which an analyte was a COPC at only two or three of the four sites.

2.4.3.1 East Thomas Monitoring Site

At East Thomas, 26 of 59 VOCs, zero of 19 SVOCs, zero of 11 metals, and 1 of 12 carbonyls fell below the 10% detection quantity and were not considered COPCs. All other analytes in these groups were detected in more than 10% of all samples and were considered COPCs for further analysis. Additionally, hexavalent chromium (Cr+6) was detected in greater than 10% of samples from the East Thomas monitor and thus considered a COPC.

2.4.3.2 North Birmingham Monitoring Site

At North Birmingham, 25 of 59 VOCs, zero of 19 SVOCs, zero of 11 metals, and 1 of 12 carbonyls fell below the 10% detection quantity and were not considered COPCs. All other analytes in these groups were detected in more than 10% of all samples and were considered COPCs for further analysis. Additionally, hexavalent chromium (Cr+6) was detected in greater than 10% of samples from the North Birmingham monitor and thus considered a COPC.

2.4.3.3 Providence Monitoring Site

At Providence, 27 of 59 VOCs, 3 of 19 SVOCs, zero of 11 metals, and 1 of 12 carbonyls fell below the 10% detection quantity and were not considered COPCs. All other analytes in these groups were detected in more than 10% of all samples and were considered COPCs for further analysis. Additionally, hexavalent chromium (Cr+6) was detected in greater than 10% of samples from the Providence monitor and thus considered a COPC.

2.4.3.4 Shuttlesworth Monitoring Site

At Shuttlesworth, 26 of 59 VOCs, zero of 19 SVOCs, zero of 11 metals, and 1 of 12 carbonyls fell below the 10% detection quantity and were not considered COPCs. All other analytes in these groups were detected in more than 10% of all samples and were considered COPCs for further analysis. Additionally, hexavalent chromium (Cr+6) was detected in greater than 10% of samples from the Shuttlesworth monitor and thus considered a COPC.

2.4.4 Chronic Exposure Concentrations

2.4.4.1 Procedures for Calculating Chronic Exposure Concentrations (EC)

In this assessment, chronic exposure was computed as the UCL_{95} of the long–term (yearly) average concentration for each COPC. The UCL_{95} is selected to reflect a conservative estimate of chronic exposure. The following exposure assumptions are inherent in a high-end exposure assessment:

- A person lives, works, and otherwise stays near a given monitoring location for a full lifetime (usually considered to be 70 years).
- The air that the person breathes, both while indoors and outdoors, contains the same concentrations of pollutants measured in the BATS study.
- Air quality, as reflected by the BATS monitoring results, is assumed to remain relatively constant over the entire 70-year lifetime of a person living in the area.

In the screening step, raw data from the monitors, namely non-detects were processed. A non-detect indicates that the measurement equipment could not positively identify the chemical. This does not mean the chemical is not present; rather, if it is present, it is at a concentration lower than the method of analysis can detect. All samples reported as non-detects were assigned a value of one half of the minimum detection limit for each chemical. After treatment of non-detects was completed, descriptive statistics were calculated for each monitor.

Next, ProUCL Version 4.0, a computer software program was used to obtain the 95% upper confidence limit value for each of the chemical concentrations at each location. ProUCL is available directly from the USEPA website: http://www.epa.gov/esd/tsc/software.htm. Using this program required entering all of the concentrations for a particular chemical at a particular site collected over the year of sampling. ProUCL returns a value for the UCL_{95}, along with the method used to obtain this value and the distribution of the data.

For each chemical reported at a monitor, the following information was determined:

- The frequency at which the chemical was detected at the monitor.
- The maximum and minimum detected concentrations.
- The arithmetic mean, median and standard deviation of the chemical data were calculated as follows:

The arithmetic mean was calculated as:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{n}$$

where:

$\bar{c}$: the arithmetic mean concentration;
c_i: an individual sample measurement; and
n: the total number of sample measurements.

The standard deviation was calculated as:

$$s = \sqrt{\frac{\sum_{i=1}^{n} (c_i - \bar{c})^2}{n-1}}$$

where:

s: the standard deviation of the concentration data;
$\bar{c}$: the arithmetic mean concentration;
c_i: an individual sample measurement; and
n: the total number of sample measurements.

2.4.4.2 Chronic Concentrations for each COPC

The calculated values for chronic exposure concentration of all COPCs at all locations are presented in Appendix B, Tables 1 through 4, under the column heading "95% UCL Conc (µg/m^3)." This value is the representative concentration of each pollutant over the course of one year, expressed in micrograms-per-cubic-meter.

2.4.5 Acute Exposure Concentrations

2.4.5.1 Procedures for Calculating Acute Exposures

Acute exposures are short in duration, but relatively high in concentration and may result in immediate health outcomes or longer-term health effects. Acute exposure times, which may vary from a few minutes to several days, are critical because acute dose-response values vary greatly for some chemicals. In BATS, the samples were taken over 24-hour periods from midnight to midnight on the sampling dates.

Methods to assess acute health effects, however, are not well-defined in terms of the dose/response relationship. As a conservative approach for this study, the highest 24 hour concentrations of pollutants measured during the year of monitoring at each location were compared to appropriate acute benchmark concentrations. Reliance on maximum measured concentrations to evaluate the potential for adverse effects from acute exposures, as opposed to upper confidence limits of means, treats each sample independently, and thus averts the potential to "average out" spikes in concentration.

2.4.5.2 COPC Acute Concentrations

The concentration values for acute exposure of all COPCs at all locations are shown in Appendix B, Tables 1 through 4, under the column heading “Max.” The “Max” value represents the highest recorded concentration of each pollutant over the course of one year (expressed in micrograms-per-cubic-meter). In essence, this high-end exposure is then compared to acute screening levels.

3.0 TOXICITY ASSESSMENT

3.1 Overview

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for toxicity in exposed individuals (hazard identification) and to quantify the toxicity by deriving an appropriate dose-response value (dose-response assessment). Toxicity assessment is the second part of the general risk analysis evaluation (exposure assessment being the first). Although the toxicity assessment is an integral and important part of the overall air toxics risk assessment, it is usually accomplished prior to the risk assessment. EPA has completed this toxicity assessment for many air toxics and has made available the resulting toxicity information and dose-response values, which have undergone extensive peer review (see http://www.epa.gov/ttn/atw/toxsource/summary.html). The latest EPA screening-level toxicity values available at the time of preparation of this report were used in the BATS.

The basic objective of a toxicity assessment is to identify what adverse health effects a chemical causes and how the appearance of these adverse effects depends on exposure level (dose). The toxic effects of a chemical depend on the route of exposure (inhalation for this study), the frequency of exposure, and the duration of exposure (acute/chronic).

The toxicity assessment usually results in toxicity values that represent the potential for a chemical to cause either cancer health effects or a variety of other noncancer health effects. Typically, the toxicity value used to represent cancer potency is called an Inhalation Unit Risk (IUR) value, while the toxicity value used to represent noncancer hazard is called a Reference Concentration (RfC). That said, the potency of certain cancer agents is represented by an RfC as well. A brief discussion of typical derivation of IURs and RfCs is provided below. A full discussion of this topic can be found in ATRA Volume 1, Chapter 12.[8]

Non-Cancer Effects

Essentially all chemicals have the potential to cause non-cancer adverse health effects if given at a high enough dose. However, when the dose is sufficiently low, typically no adverse effect is observed. Thus, in characterizing the non-cancer effects of a chemical, the key parameter is the threshold dose at which an adverse effect first becomes evident. Doses below the threshold are considered to be safe, while doses above the threshold are more likely to cause an effect.

The threshold dose is typically estimated from toxicological data (derived from studies of humans and/or animals) by determining the highest observed dose that does not produce an observable adverse effect and the lowest dose which does produce an effect. These are referred to as the "No-observed-adverse-effect-level" (NOAEL) and the "Lowest-observed-adverse-effect-level" (LOAEL), respectively. The threshold is presumed to lie in the interval between the NOAEL and the LOAEL.

However, in order to be conservative (protective), non-cancer inhalation risk evaluations are not based directly on the threshold exposure level, but on a value referred to as the Reference Concentration (RfC). The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

The RfC is typically derived from the NOAEL (or the LOAEL if a reliable NOAEL is not available) by dividing by various "uncertainty factors." If the data are from studies in humans and if the observations are considered to be very reliable, the uncertainty factors may be as small as 1.0. However, the uncertainty factors are normally at least 10 and can be much higher if data are limited. The purpose of dividing the NOAEL or the LOAEL by an uncertainty factor is to ensure that the RfC is not higher than the true threshold level for adverse effects in humans. Thus, there is always a "margin of safety" built into an RfC, and concentrations equal to or less than the RfC are nearly certain to be without any risk of adverse effect. Concentrations higher than the RfC may carry some risk, but because of the margin of safety, a concentration above the RfC is likely to be without any appreciable risk.

Cancer Effects

For cancer effects, the toxicity assessment process has two components. The first is a qualitative evaluation of the weight of evidence (WOE) that the chemical does or does not cause cancer in humans. For chemicals that are believed to be capable of causing cancer in humans, the second part of the toxicity assessment is to describe the carcinogenic potency of the chemical. This is typically done by quantifying how the number of cancers observed in exposed animals or humans increases as the EC increases. Typically, it is assumed that the dose-response curve for cancer has no threshold (i.e., there is no dose other than zero that does not increase the risk of cancer). Thus, the most convenient descriptor of cancer potency is the slope of the dose-response curve at low doses (where the slope is considered). This slope factor is referred to as the IUR, which has dimensions of risk of cancer per unit concentration (typically given as risk per microgram per cubic meter). Estimating the cancer Slope Factor is often complicated by the fact that observable increases in cancer incidence usually occur only at relatively high doses, frequently in the part of the dose-response curve that is no longer linear. Thus, it is necessary to use mathematical models to extrapolate from the observed high dose data to the desired (but immeasurable) slope at low dose. In order to account for the uncertainty in this extrapolation process, EPA typically chooses to employ the upper 95th confidence limit of the slope as the Slope Factor. That is, there is a 95 percent probability that the true cancer potency is lower than the value chosen for the Slope Factor. This approach ensures that there is a margin of safety in cancer as well as non-cancer risk estimates.[9]

3.2 Chronic Toxicity Values for BATS COPCs

Appendix C – Table 1 contains the chronic toxicity estimates for inhalation exposures for the COPCs. Note that "Chronic Inhalation" toxicity numerical estimates for both cancer and non-cancer responses were applied in this analysis. A full description of sources for chronic dose-response values can be found at http://www.epa.gov/ttn/atw/toxsource/summary.html.

Hazard identification and dose-response assessment information for chronic exposure was obtained by EPA from various sources and prioritized according to (1) conceptual consistency with EPA risk assessment guidelines and (2) level of review received. EPA revises this information regularly to keep it as current as possible. The prioritization process was aimed at incorporating into EPA assessments the best available science with respect to dose-response information. The following sources were used:

US Environmental Protection Agency (EPA)

EPA has developed dose-response assessments for chronic exposure to many of the pollutants in this study. These assessments typically specify an RfC (to protect against effects other than cancer) and/or IUR (to estimate the probability of contracting cancer).

EPA disseminates dose-response assessment information in several forms, based on the level of review. Dose-response assessments that have achieved full intra-agency consensus are incorporated in the Integrated Risk Information System (IRIS), which is regularly updated and available on-line (www.epa.gov/iris). All IRIS assessments since 1996 have also undergone independent external peer review. Dose-response assessments for some substances were prepared by the EPA Office of Research and Development, but never submitted for EPA consensus. EPA has assembled the results of many such assessments in the Health Effects Assessment Summary Tables (HEAST), which EPA's chronic inhalation toxicity table uses as a source.

US Agency for Toxic Substances and Disease Registry (ATSDR)

ATSDR, which is part of the US Department of Health and Human Services, develops and publishes Minimum Risk Levels (MRLs) for many toxic substances. The MRL is defined as an estimate of daily human exposure to a substance that is likely to be without an appreciable risk of adverse effects (other than cancer) over a specified duration of exposure. MRLs can be derived for chronic exposures by the inhalation and oral routes. ATSDR describes MRLs as substance-specific estimates to be used by health assessors to select environmental contaminants for further evaluation. MRLs are considered to be levels below which contaminants are unlikely to pose a health threat. Exposures above an MRL do not necessarily represent a threat, and MRLs are therefore not intended for use as predictors of adverse health effects or for setting cleanup levels.

EPA's chronic toxicity table shows the ATSDR chronic MRL where no IRIS RfC or RfD is available, because the MRL's concept, definition, and derivation are philosophically consistent (though not identical) with EPA's guidelines for assessing noncancer effects. ATSDR publishes MRLs as part of pollutant-specific toxicological profile documents, and also in a regularly-updated on-line table. EPA's chronic toxicity table also includes ATSDR draft MRLs, labeled "D-ATSDR."

California Environmental Protection Agency (CalEPA)

The CalEPA Office of Environmental Health Hazard Assessment has developed dose-response assessments for many substances, based both on carcinogenicity and health effects other than cancer. The process for developing these assessments is similar to that used by EPA to develop IRIS values and incorporates significant external scientific peer review. The non-cancer information includes available inhalation health risk guidance values expressed as chronic inhalation and oral reference exposure levels (RELs). CalEPA defines the REL as a concentration level at (or below) which no health effects are anticipated, a concept that is substantially similar to EPA's non-cancer dose-response assessment perspective. EPA's chronic toxicity table shows the chronic REL (including both final and proposed values) where no IRIS RfC/RfD or ATSDR MRL exists.

CalEPA's quantitative dose-response information on carcinogenicity by inhalation exposure is expressed in terms of the URE, defined similarly to EPA's URE. EPA's chronic toxicity table shows specific CalEPA UREs where no IRIS values exist. CalEPA's dose response assessments for carcinogens and noncarcinogens are available on-line.

International Agency for Research on Cancer (IARC)

The IARC, a branch of the World Health Organization, coordinates and conducts research on the causes of human cancer and develops scientific strategies for cancer control. The IARC sponsors both epidemiological and laboratory research, and disseminates scientific information through meetings, publications, courses and fellowships.

As part of its mission, the IARC assembles evidence that substances cause cancer in humans and issues judgments on the strength of evidence. IARC's "degrees of evidence" categories are Group 1 (carcinogenic in humans), Group 2A (probably carcinogenic), Group 2B (possibly carcinogenic), Group 3 (not classifiable), and Group 4 (probably not carcinogenic). The categorization scheme may be applied to either single chemicals or mixtures. The IARC does not develop quantitative dose-response metrics such as IURs, however.

IARC's WOE determinations for substances are included as supporting information for this assessment as a backup to EPA's WOE determinations, which do not cover all substances and in some cases may be out-of-date. The list of IARC evaluations to date is available on-line.

3.3 Acute Toxicity Values for BATS COPCs

The process by which most acute inhalation dose-response assessment values are derived differs from the chronic RfC methodology in two important ways. First, “acute” may connote exposure times varying from a few minutes to two weeks. The time frame for the value is critical, because the safe dose (or the dose that produces some defined effect) may vary substantially with the length of exposure. Second, some acute dose-response assessments include more than one level of severity. A typical assessment may have values at which only mild, transient effects may occur, levels above which irreversible or other serious effects may occur, and levels above which life-threatening effects may occur. Therefore, many acute assessments present dose-response assessment values as a matrix, with one dimension being length of exposure and the other a severity-of-effect category. The full list of acute dose-response values can be found in Appendix C.

EPA’s hazard identification and dose-response assessment information for acute exposure was obtained from various sources, and is presented in Table 2 at http://www.epa.gov/ttn/atw/toxsource/summary.html. However, in contrast to the presentation of chronic information in EPA’s chronic toxicity table, no prioritization scheme has been applied and no oral values have been included. That is, Table 2 presents acute inhalation values from multiple sources. EPA included multiple sources because the various assessments used methods that were different enough that, in their judgment, many are not directly comparable. Therefore, EPA judged that Table 2 would better serve risk assessors by providing a range of values. The following sources were used:

US Agency for Toxic Substances and Disease Registry (ATSDR)

In addition to its chronic minimum risk levels (MRLs), ATSDR also develops MRLs for acute inhalation exposure, which ATSDR defines as 1-14 days. As with ATSDR's chronic MRLs, acute MRLs are estimates of human exposure to a substance that is likely to be without an appreciable risk of adverse effects (other than cancer). Acute inhalation MRLs are published as part of pollutant-specific toxicological profile documents, and also in a table of "comparison values" that ATSDR regularly updates and distributes (available on-line at http://www.atsdr.cdc.gov/mrls.html).

California Environmental Protection Agency (CalEPA)

CalEPA has developed acute dose-response assessments for many substances, expressing the results as acute inhalation reference exposure levels (RELs). As with its chronic RELs, CalEPA defines the acute REL as a concentration level at (or below) which no health effects are anticipated. CalEPA's acute RELs are available on-line at: http://www.oehha.ca.gov/air/acute_rels/index.html.

National Advisory Committee for Acute Exposure Guideline Levels (NAC)

EPA's Office of Prevention, Pesticides and Toxic Substances established the NAC in 1995 to develop Acute Exposure Guideline Levels (AEGLs) and supplementary information on hazardous substances for federal, state, and local agencies and organizations in the private sector concerned with emergency planning, prevention, and response. The NAC is a discretionary Federal advisory committee that combines the efforts of stakeholders from the public and private sectors to promote efficiency and utilize sound science.

Since it began AEGL development with an initial priority list of 85 chemicals in May 1997, the NAC has produced AEGLs for 146 substances (available on EPA's website at http://www.epa.gov/oppt/aegl/chemlist.htm). The AEGLs for a substance take the form of a matrix, with separate levels for mild (AEGL-1), moderate (AEGL-2), and severe (AEGL-3) effects. Each of the effect levels are provided for as many as five different exposure periods, typically 10 and 30 minutes and 1, 4, and 8 hours. Table 2 provides the 1-and 8-hour concentrations for the AEGL-1 and -2, with a superscript that identifies whether the value is final, interim, or proposed.

American Industrial Hygiene Association (AIHA)

AIHA has developed emergency response planning guidelines (ERPGs) for acute exposures at three different levels of severity. These guidelines (available on-line through the US Department of Energy at http://www.aiha.org/Committees/documents/erpglevels.pdf) represent concentrations for exposure of the general population for up to 1 hour associated with effects expected to be mild or transient (ERPG-1), irreversible or serious (ERPG-2), and potentially life-threatening (ERPG-3). Table 2 provides the ERPG-1 and -2 values.

National Institute for Occupational Safety and Health (NIOSH)

As part of its mission to study and protect worker health, NIOSH determines concentrations of substances that are immediately dangerous to life or health (IDLHs). IDLHs were originally determined for 387 substances in the mid-1970's as part of the Standards Completion Program (SCP), a joint project by NIOSH and the Occupational Safety and Health Administration (OSHA), for use in assigning respiratory protection equipment. NIOSH is currently evaluating the scientific adequacy of the criteria and procedures used during the SCP for establishing IDLHs. In the interim, the IDLHs have been reviewed and revised. NIOSH maintains an on-line database (http://www.cdc.gov/niosh/idlh/idlh-1.html) of IDLHs, including the basis and references for both the current and original IDLH values (as paraphrased from the SCP draft technical standards). Table 2 provides IDLH values divided by 10 to more closely match the mild-effect levels developed by other sources, consistent with methodology used to develop levels of concern under Title III of the Superfund Amendments and Reauthorization Act, and their use in the accidental release prevention requirements under section 112(r) of the Clean Air Act.

U.S. Department of Energy (DOE)

DOE has defined Temporary Emergency Exposure Limits (TEELs), which are temporary levels of concern (LOCs) derived according to a tiered, formula-like methodology (described at http://www.orau.gov/emi/scapa/Method_for_deriving_TEELs.pdf and available on-line at http://www.atlintl.com/DOE/teels/teel/teel_pdf.html). DOE has developed TEELs with the intention of providing a reference when no other LOC is available. DOE describes TEELs as "approximations of potential

values" and "subject to change." The EPA's emergency planning program (Section 112(r)) does not generally rely on them, and they are provided in Table 2 purely to inform situations in which no other acute values are available. For example, a finding of an acute exposure near a TEEL may indicate the need for a more in-depth investigation into health effects literature. TEELs are not recommended as the basis of regulatory decision-making. Like ERPGs, TEELs are multiple-tiered, representing concentrations associated with no effects (TEEL-0), mild, transient effects (TEEL-1), irreversible or serious effects (TEEL-2), and potentially life-threatening (TEEL-3). Consistent with DOE's intent, Table 2 provides the TEEL-0 and -1 concentrations for substances that lack acute values from other sources.

4.0 RISK CHARACTERIZATION

The risk characterization integrates the information from the exposure assessment (Section 2) and toxicity assessment (Section 3) steps in the risk assessment to provide an estimate of the magnitude of potential risks and hazards, and the strength of the conclusions based on the uncertainty in the information used to generate these estimates. For this risk assessment, the risk characterization means combining the exposure concentrations with the chronic and acute toxicity data to provide a quantitative estimate of the potential health impacts. Both chronic and acute exposures are evaluated in this risk characterization. The remainder of this section is divided into three subsections: 1) details of the risk characterization for chronic (cancer and non-cancer) exposure, 2) the evaluation of acute exposures, and 3) a risk summary section. A detailed assessment of the uncertainty in the risk characterization is provided in Section 5.

4.1 Risk Characterization for Chronic Exposures

The risk characterization for the chronic exposures was conducted by combining the relevant toxicity data (Section 3) with the exposure concentrations (Section 2) estimated from the BATS monitoring data. The UCL_{95} exposure value was selected to represent a conservative estimate of the COPC concentration in ambient air for long-term exposure. The chronic evaluation addresses both cancer and non-cancer health effects.

4.1.1 Cancer Risk

Estimated individual cancer risk is expressed as the upper bound probability that a person may develop cancer over the course of his/her lifetime as a result of conservative lifetime exposures. This predicted risk is the incremental risk of cancer from the exposure being analyzed that is above the risk that the individuals in the population have already (i.e., due to non-air toxics related issues such as genetic predisposition and lifestyle choices such as smoking). Due to the nature of the assumptions in their derivation, inhalation unit risks (IURs) are generally considered to be plausible upper-bound estimates of potency. As such, the calculated risks are usually a conservative estimate (i.e., the true risk may be lower).

Cancer risk characterization typically is performed first for individual air toxics, and then summed for all of the air toxics to which a person may be exposed at the same time. These steps are described in separate subsections below.

For inhalation exposures, chronic cancer risks for individual air toxics are typically estimated by multiplying the estimate of long-term exposure concentration by the corresponding IUR for each pollutant to estimate the potential incremental cancer risk for an individual:

$$\mathbf{Risk = EC \times IUR}$$

where:

Risk: Cancer risk to an individual (expressed as an upper-bound risk of contracting cancer over a lifetime);

EC: Estimate of long-term inhalation exposure concentration for a specific air toxic; and
IUR: the corresponding inhalation unit risk estimate for that air toxic.

Performing the estimate in this way provides an estimate of the probability of developing cancer over a lifetime due to the exposure in question. The underlying presumption is that a person is exposed continuously to the exposure concentration for his or her full lifetime (usually assumed to be 70 years). The exposure concentration is an estimate of this long-term exposure even though it is, in the case of BATS, based on only one year's worth of monitoring data.[10]

Estimates of cancer risk are usually expressed as a statistical probability represented in scientific notation as a negative exponent of 10. For example, an additional risk of contracting cancer of one chance in 10,000 (or one additional person in 10,000) is written as 1×10^{-4}. This notation means that for every 10,000 people that are exposed, in the way this study has presumed, one of those people may develop cancer over his or her lifetime. Likewise, a risk of one person in one million contracting cancer is written as 1×10^{-6}, and a risk of one in one hundred thousand is written as 1×10^{-5}.

Because IURs are typically upper-bound estimates, actual risks may be lower than predicted, and the true value of the risk may be as low as zero. These statistical projections of hypothetical risk are intended as screening tools for risk managers and cannot make realistic predictions of biological effects. Such risk estimates also cannot be used to determine whether someone who already has cancer is ill because of a past exposure.

People may receive exposure to multiple chemicals, rather than a single chemical, at the same time. The concurrent exposure to multiple carcinogens may occur through the same pathway or across several pathways. With a few exceptions (e.g., coke oven emissions), cancer dose-response values (e.g., IURs) are usually available only for individual compounds within a mixture. The following equation estimates the predicted cumulative incremental individual cancer risk from simultaneous exposure to multiple substances, and assumes the risk is additive:

$$\mathbf{Risk_T = Risk_1 + Risk_2 + ... + Risk_i}$$

Where:

$Risk_T$: total cumulative inhalation cancer risk (expressed as an upper-bound risk of contracting cancer over a lifetime); and
$Risk_i$: individual risk estimate for the i_{th} substance in the inhalation pathway.

In screening-level assessment of carcinogens for which there is an assumption of a linear dose-response, the cancer risks predicted for individual chemicals may be added to estimate cumulative cancer risk. This approach assumes that the risks associated with individual chemicals in the mixture are additive. In more refined assessments, the chemicals under assessment may be evaluated to determine whether effects from multiple chemicals are synergistic (greater than additive) or antagonistic (less than additive), although sufficient data for this evaluation are usually lacking. In those cases where IURs are available for a chemical mixture of concern, risk characterization can be conducted on the mixture using the same procedures used for a single compound. When more than one pathway is involved, the pathway specific risks are generally summed first, and then summed across pathways.

The magnitude and relationship of chronic cancer risk estimates can be misleading due to the influence of scientific notation. The difference between 1×10^{-6} and 3×10^{-6} is not nearly the same as the difference

between 1×10^{-5} and 3×10^{-5}. Further, the difference between 9×10^{-6} and 1×10^{-5} is ten times smaller than the difference between 1×10^{-5} and 2×10^{-5}. Furthermore, as stated earlier, the 2000 census of Jefferson County was 662,047. Since the population of the entire county is less than one million, it distorts the magnitude of some of the data expressed in "per million" probabilities. For instance, a 1.5×10^{-6} cancer risk would translate to slightly less than one full additional case of cancer at a specific site in Jefferson County beyond background environment conditions.

4.1.2 Non-Cancer Hazard

For inhalation exposures, non-cancer hazards are estimated by dividing the estimate of the chronic inhalation exposure concentration by the RfC to yield a hazard quotient (HQ) for individual chemicals:

$$\mathbf{HQ = EC \div RfC}$$

Where:

HQ: the hazard quotient for an individual air toxic;
EC: estimate of chronic inhalation exposure to that air toxic; and
RfC: the corresponding chronic reference concentration for that air toxic.

In screening inhalation risk assessments, which in BATS is built around a particular year's estimate of emissions, the exposure estimate is based on an assumption of continuous long-term exposure using an estimate of exposure concentration in the form of UCL_{95}. Based on the definition of the RfC, an HQ less than or equal to one indicates that adverse non-cancer effects are not likely to occur, and thus can be considered to have negligible hazard on a per-chemical basis.

Unlike cancer risks, however, HQs are not statistical probabilities of harm occurring. Instead, they are a simple statement of whether (and by how much) an exposure concentration exceeds the RfC.

Thus, we can only say that with exposures increasingly greater than the RfC, (i.e., HQ's increasingly greater than 1), the potential for adverse effects increases, but we do not know by how much. An HQ of 100 does not mean that the hazard is 10 times greater than an HQ of 10. Also an HQ of 10 for one substance may not have the same meaning (in terms of hazard) as another substance with the same HQ.

Non-cancer health effects data are usually calculated first for individual compounds within a mixture. The individual HQs can be summed together to calculate a multiple-pollutant hazard index (HI):

$$\mathbf{HI = HQ_1 + HQ_2 + ...+ HQ_i}$$

Where:

HI: hazard index; and
HQ: hazard quotient for the ith air toxic.

For screening-level assessments, a simple HI may first be calculated for all chemicals of concern within the inhalation pathway. If the HI is less than 1.0, additional analysis would not typically be performed. Adding HQ's is based on the assumption that even when individual pollutant levels are lower than the corresponding reference levels, some pollutants may work together such that their potential for harm is additive and the

combined exposure to the group of chemicals poses greater likelihood of harm. Some groups of chemicals can also behave antagonistically, such that combined exposure poses less likelihood of harm, or synergistically, such that combined exposure poses harm in greater than additive manner. Where the HI exceeds 1.0, a more refined analysis is usually warranted.

It is important to note that application of the HI equation to compounds that may produce different effects, or that act by different toxicological mechanisms, could overestimate the potential for effects. When the initial sum of HQs for all chemicals present is greater than one, it is appropriate to calculate a separate HI for each endpoint of concern for which effects or mechanisms of action are known to be similar. This approach was not completed for this study due to the relatively significant (greater than 95%) impact/effect of one particular pollutant, acrolein, at each monitoring site.

Individual chemicals with calculated chronic cancer risk totals or individual monitoring sites with calculated cumulative chronic cancer risk totals above 1×10^{-6} were considered potential risk drivers. In addition, for individual or cumulative chronic, non-cancer chemicals, hazards quotients and indices above 1.0 were considered potential risk drivers. Likewise, for acute exposure, individual or cumulative hazards quotients and indices above 1.0 were considered potential risk drivers.

Appendix D presents the risk and hazard estimates for all compounds considered risk drivers for each site. The tables in Appendix D provide the basic data information and resulting risk estimates for each of the COPCs at all four monitoring locations.

4.1.3 East Thomas Monitoring Site

For the East Thomas monitor, there were nine potential risk drivers for chronic cancer risk: 1,3- butadiene, acetaldehyde, arsenic, benzene, cadmium, carbon tetrachloride, naphthalene, p-dichlorobenzene and tetrachloroethylene. The cumulative chronic cancer risk for COPCs at East Thomas was calculated to be 8.83×10^{-5}, which equates to an increased likelihood of 88 additional cases of cancer per one million chronic exposures. This cumulative chronic cancer risk approaches the 1×10^{-4} threshold for a chemical of concern. The largest contributor to the overall risk was benzene, at 2.76×10^{-5}, which accounted for approximately 33% of the total risk.

There were seven potential risk drivers for chronic non-cancer exposure hazard at East Thomas: 1,3-butadiene, acetaldehyde, acetonitrile, acrolein, benzene, manganese and naphthalene. The highest HQ was 88.5, for acrolein, which was detected in 55% of the samples. The second highest hazard quotient was acetonitrile, at 1.59, which was detected in only 29% of the samples. The highest HQ for a chemical detected 100% of the time was manganese's 1.34, third highest overall.

4.1.4 North Birmingham Monitoring Site

For the North Birmingham monitor, there were twelve potential risk drivers for chronic cancer risk: 1,3-butadiene, acetaldehyde, arsenic, benzene, benzo(a)anthracene, benzo(a)pyrene, cadmium, carbon tetrachloride, dibenz(a,h)anthracene, naphthalene, p-dichlorobenzene and tetrachloroethylene. The cumulative chronic cancer risk for COPCs at North Birmingham was calculated to be 9.92×10^{-5}, which equates to an increased likelihood

of 99 additional cases of cancer per one million chronic exposures. This cumulative risk is virtually equivalent to the $1x10^{-4}$ threshold for significant cancer risk. Of this overall risk, the largest contributor was benzene, with a risk of 3.47×10^{-5}, which accounted for 35% of the total risk.

There were seven potential risk drivers for chronic non-cancer exposure hazard at North Birmingham: 1,3-butadiene, acetaldehyde, acetonitrile, acrolein, benzene, manganese and naphthalene. The highest hazard quotient was 55.3 for acrolein, which was detected in 71% of the samples. The second highest hazard quotient was manganese, at 1.40, which was detected in 100% of the samples.

4.1.5 Providence Monitoring Site

For the Providence monitor, there were six potential risk drivers for chronic cancer risk: 1,3-butadiene, acetaldehyde, arsenic, benzene, carbon tetrachloride and p-dichlorobenzene. The cumulative chronic cancer risk for COPCs at Providence was calculated to be 3.36×10^{-5}, which equates to an increased likelihood of 34 additional cases of cancer per one million chronic exposures. Of this overall risk, the largest contributor was carbon tetrachloride, with a risk of 1.05×10^{-5}, which accounted for 31% of the total risk.

There were four potential risk drivers for chronic non-cancer exposure hazard at Providence: acetaldehyde, acetonitrile, acrolein and manganese. The highest hazard quotient was associated with acrolein at 35.6, but acrolein was detected in only 32% of the samples. The second highest hazard was acetaldehyde, at 0.37, which was detected in 100% of the samples.

4.1.6 Shuttlesworth Monitoring Site

For the Shuttlesworth monitor, there were eleven potential risk drivers for chronic cancer risk: 1,3-butadiene, acetaldehyde, arsenic, benzene, benzo(a)pyrene, beryllium, carbon tetrachloride, hexavalent chromium, naphthalene, p-dichlorobenzene and tetrachloroethylene. The cumulative chronic cancer risk for COPCs at Shuttlesworth was calculated to be 1.66×10^{-4}, which equates to an increased likelihood of 166 additional cases of cancer per one million chronic exposures and exceeds the 1×10^{-4} threshold for a risk driver. This is the only instance in which such a threshold is exceeded for any exposure in this study. Of this overall risk, the largest contributor was benzene, with a risk of 6.40×10^{-5}, accounting for 34% of total risk and which is the highest cancer risk value obtained for any single pollutant at a single monitoring location.

There were eight potential risk drivers for chronic non-cancer exposure hazard at Shuttlesworth: 1,3-butadiene, acetaldehyde, acetonitrile, acrolein, arsenic, benzene, manganese and naphthalene. The highest hazard quotient was 119.8 for acrolein, which was detected in 61% of the samples. The second highest hazard quotient was manganese, at 3.74, which was detected in 100% of the samples.

4.2 Risk Characterization for Acute Exposures

Estimates of acute non-cancer hazard for each HAP is found by combining the applicable short-term exposure concentration (EC) and acute dose-response value (AV) for the HAP to obtain the acute Hazard Quotient[11] (HQ) for the HAP using the following equation:

$$\mathbf{HQ = EC \div AV}$$

where:

HQ: the acute hazard quotient for an individual HAP;
EC: estimate of short-term inhalation exposure to that HAP; and
AV: the corresponding acute comparison value for that HAP.

Note that ambient air concentrations (represented by 24-h composite samples in the BATS) are compared to the available acute reference values (described in Section 3.3 above) with preference given to acute values with exposure duration compatible with 24-h sampling methodology used. In the case of BATS, a 24-h acute reference value is preferred for acute calculations. Thus, the most relevant acute toxicity value available is the ATSDR acute MRL since it is for exposures lasting 24-h to 2 weeks. If no acute MRL was available for a given chemical, then the maximum value found was compared to other available acute reference values and, when a resulting HQ exceeded one, an evaluation of the relevance of the comparison was made.

It is also possible to combine the individual acute HQs to calculate a multi-pollutant acute hazard index (HI) using the following formula:

$$HI = HQ_1 + HQ_2 + ...+ HQ_i$$

where:

HI: acute hazard index; and
HQi: acute hazard quotient for the ith HAP

Although this approach appears similar to the process for combining chronic HQ's, the summing of acute HQ's is complicated by several issues that do not pertain to chronic HQ's. First, acute dose-response values have been developed for purposes that vary more widely than chronic values. Some sources of acute values define exposures at which adverse effects actually occur, while other sources develop only no-effect acute values. Second, some acute values are expressed as concentration-time matrices, while others are expressed as single concentrations for a set exposure duration. Third, some acute values may specifically consider multiple exposures, whereas others consider exposure as a one-time event. Fourth, some sources of acute values are intended to regulate workplace exposures, assuming a population of healthy workers (i.e., without children, seniors, or other sensitive individuals). Such occupational values may also consider cost and feasibility, factors that EPA considers the province of the risk manager rather than the risk assessor.

A complete listing of the HQ's for each COPC at every monitor location, along with other relevant details on the acute risk assessment, is presented in Appendix D.

4.2.1 East Thomas Monitoring Site

There were no hazard quotients that exceeded a threshold of 1.0 for acute exposures at the East Thomas monitoring site. The highest hazard quotients observed at East Thomas were acrolein (0.38) and benzene (0.29).

4.2.2 North Birmingham Monitoring Site

There were no hazard quotients that exceeded a threshold of 1.0 for acute exposures at the North Birmingham monitoring site. The highest hazard quotients observed at North Birmingham were benzene (0.44) and acrolein (0.31).

4.2.3 Providence Monitoring Site

There were no hazard quotients that exceeded a threshold of 1.0 for acute exposures at the Providence monitoring site. The highest hazard quotients observed at Providence were acrolein (0.40) and benzene (0.06).

4.2.4 Shuttlesworth Monitoring Site

There was one hazard quotient that exceeded a threshold of 1.0 for acute exposures at the Shuttlesworth monitoring site. This was benzene, at 1.09, which resulted from a maximum concentration of 31.54 $\mu g/m^3$ on February 4, 2006. The highest hazard quotients other than benzene observed at Shuttlesworth were acrolein (0.49) and arsenic (0.18).

4.3 Risk Characterization Summary

4.3.1 Summary of Results

For both chronic and acute exposures, there were chemicals that exceeded risk/hazard thresholds established by USEPA and other agencies. Most of the exceedances followed similar trends, particularly by location, chemical and date of sampling.

4.3.1.1 Chronic Exposures

The following six chemicals were potential risk drivers for chronic cancer risk at all four monitoring sites: 1,3-butadiene, acetaldehyde, arsenic, benzene, carbon tetrachloride and p-dichlorobenzene. The following four chemicals were potential hazard drivers for chronic non-cancer hazard at all four monitoring sites: acetaldehyde, acetonitrile, acrolein and manganese.

Two additional chemicals, naphthalene and tetrachloroethylene, were potential risk drivers at East Thomas, North Birmingham and Shuttlesworth, but not Providence, which was considered a background monitoring location.

Benzo(a)pyrene was a potential risk driver at North Birmingham and Shuttlesworth, which are the two geographically closest monitors in the study. The concentrations at these two sites were noticeably higher than the concentrations at the other two sites.

Other than arsenic, there were relatively few instances of a metal being a potential cancer risk driver at any particular monitoring location. The only occurrences were beryllium at Shuttlesworth (1.35×10^{-6}) and cadmium at East Thomas (1.01×10^{-6}) and North Birmingham (1.82×10^{-6}).

With respect to non-cancer risk drivers, acrolein, by far, was the most significant with HQs ranging from 35.55 (Providence) to 120 (Shuttlesworth). Other non-cancer risk drivers included acetonitrile (East Thomas, Shuttlesworth) and manganese (East Thomas, North Birmingham, and Shuttlesworth).

4.3.1.2 Acute Exposures

There was only one instance of a chemical exceeding the acute hazard quotient (HQ) threshold of 1.0 during the study. The highest HQ observed was 1.09 for benzene at the Shuttlesworth monitor. Benzene, acrolein and formaldehyde typically had the highest acute HQ among the monitoring sites. Benzene and formaldehyde were detected in nearly all samples at all four locations, but acrolein was detected only 32-71% of the time among the four locations. While formaldehyde did have relatively high acute hazards compared to other chemicals, it was never above any risk/hazard thresholds at any monitoring location.

All results of the risk characterization for both chronic and acute exposures are presented in Appendix D.

4.3.2 Threshold-Exceeding Pollutants

The data and description for each pollutant below were obtained from the EPA IRIS health assessment summaries available at the following URL:
http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList.

Acetaldehyde

Acetaldehyde, a carbonyl, was found to have threshold-exceeding chronic cancer risks and non-cancer hazards at all four sites. Acetaldehyde was detected on every sampling date at three sites, the only exception being North Birmingham, which had a 94% detection rate. As opposed to most chemicals observed, the highest chronic cancer risk (7.37×10^{-6}), non-cancer hazard (0.37) and acute hazard (0.0000287) were at Providence, while the lowest of each (3.76×10^{-6}; 0.19; 0.00000574) occurred at Shuttlesworth. This anomaly exists in spite of both sites detecting acetaldehyde 100% of the time. However, Providence experienced much higher isolated maximum concentrations than the other sites, which could potentially skew overall results, even though UCL_{95} was used instead of a simple mean.

That acetaldehyde can be a byproduct of plant metabolism might explain some of Providence's relatively high concentration. However, acetaldehyde also is emitted from combustion sources such as industrial operations, automobiles and cigarettes.

Acetonitrile

Acetonitrile is a recognized non-carcinogenic VOC commonly produced as a byproduct from acrylonitrile manufacturing, leading to the concentrations of these chemicals being closely related. In BATS, however, acetonitrile exceeded thresholds for chronic non-cancer hazard at three sites (not Providence), while acrylonitrile had no exceedances. Additionally, acetonitrile can be produced independently of acrylonitrile in the reactions of carbon monoxide, ammonia and hydrogen. The highest UCL concentration was at the Shuttlesworth monitor, where it was detected in 87% of samples, while the highest individual concentration reading occurred at East Thomas, where the rate of detection was only 29%.

As related to the BATS area, sources of acetonitrile include industrial facilities, automobile exhaust and tobacco smoke.

Acrolein

Acrolein is very toxic to humans via inhalation, but no link to cancer formation has been discovered. Acute and chronic effects of inhalation are typically identified by respiratory problems. All four sites had non-cancer hazards well above the USEPA exposure threshold for chronic exposures, with Shuttlesworth measuring highest at 119.75. Detection percentages were relatively low for acrolein at all sites, with the highest being 71% at North Birmingham.

The primary sources of acrolein are activities that involve burning gasoline or tobacco. Lesser amounts can be emitted by common activities such as cooking food and roasting coffee.

Arsenic

Arsenic is a metalloid often found in organic and inorganic compounds that have varying effects on human health. Typically, organic compounds, such as those naturally occurring in many food items, are less harmful than the inorganic compounds that come from industrial sources. Operations that can contribute to inorganic arsenic emissions include wood preserving, pesticide use, metal alloying and coking.

Exposure to inorganic arsenic has been classified as a human carcinogen by USEPA, strongly associated with lung cancer. Non-cancer effects of chronic exposure to arsenic are linked to the gastrointestinal and nervous systems. All four sites had chronic cancer risks above the USEPA threshold: from 4.04×10^{-6} at Providence to 3.39×10^{-5} at Shuttlesworth. Additionally, the chronic non-cancer hazard at Shuttlesworth (0.26) was much higher than the threshold for acceptable additional hazard from exposure.

Benzene

Benzene is a carcinogenic hydrocarbon that is one of the most prominent pollutants observed in the BATS monitoring. Benzene exceeded risk/hazard thresholds for chronic cancer and non-cancer, and acute exposures at the Shuttlesworth monitor. This is the only occurrence of a specific chemical exceeding the 1.0 acute hazard quotient threshold at any monitor during the study. East Thomas and North Birmingham both exceeded for chronic cancer risk and non-cancer hazard, while Providence exceeded for only chronic cancer risk. For all observed chemicals, benzene posed the highest chronic cancer risk for the following sites: East Thomas, North Birmingham and Shuttlesworth. In most cases, there was a significant different between benzene's risk and the

second highest. Shuttlesworth's benzene cancer risk of 6.40×10^{-5} was by far the highest individual risk for any chemical at any monitor.

Inhaled benzene emissions come from automobile exhaust, gasoline stations, cigarette smoke and virtually any industry that burns coal and/or crude oil, including steel-making and coking. A wide range of potential health risks from benzene exists, from dizziness and nausea for acute exposures to increased risk of leukemia for chronic exposures. Non-cancer chronic health impacts include blood disorders and immune system damage.

Benzo(a)anthracene

Benzo(a)anthracene is a polycyclic aromatic hydrocarbon (PAH) that marginally exceeded the chronic cancer risk for North Birmingham only. The risk value was at 1.4×10^{-6}, which is slightly above the threshold of 1.0×10^{-6}. This compound is classified as a Group 2A carcinogen by IARC. As with other PAHs, benzo(a)anthracene results from the burning of fuel in combustion operations.

The primary cancer risk of benzo(a)anthracene is associated with the lungs from inhalation of coal tar, soot, coke oven emissions and cigarette smoke.

Benzo(a)pyrene

Benzo(a)pyrene is a polycyclic aromatic hydrocarbon (PAH) that exceeded the chronic cancer risk at North Birmingham and Shuttlesworth. This compound is highly carcinogenic and its emissions are closely associated with coal tar, automobile exhaust, cigarette smoke and wood-burning.

The primary cancer risk of benzo(a)pyrene is in the lungs, particularly in cases of cigarette smoke inhalation. In addition to causing cancer, chronic exposure to benzo(a)pyrene can lead to developmental and reproductive problems.

Beryllium

Beryllium is an elemental metal that is commonly used for structural components, as an additive in metal alloys and other industrial uses. Chronic exposure health effects of beryllium include an increased risk of lung cancer.

The chronic cancer risk of exposure at the Shuttlesworth monitor signaled the only time a USEPA-recommended threshold was exceeded by beryllium. The risk value was 1.35×10^{-6}, which falls just above the threshold of 1×10^{-6}.

1,3-Butadiene

Butadiene was one of the few risk drivers which had its highest chronic cancer risk, chronic non-cancer hazard and acute hazard quotient at the same monitoring location (East Thomas). These values were 9.42×10^{-6}, 0.16 and 0.0000000535, respectively. The chronic cancer values were above recommended levels, while the acute and chronic hazard values were below unacceptable levels.

Butadiene, like most pollutants found to exceed chronic thresholds, is emitted from many different combustion sources, including industrial operations, automobile exhaust and cigarette smoke. Butadiene is also commonly linked to rubber and plastic plants, but these types of facilities are not found in the monitoring area. Acute exposures to butadiene via inhalation can result in respiratory and neurological irritation and discomfort.

Studies have linked chronic non-cancer exposure to increases in heart disease and other cardiologic problems. While a direct cancer-causing link has not been established, the USEPA considers butadiene a "probable carcinogen" for chronic human exposures. However, this classification is currently under review by USEPA.

Cadmium

Cadmium is a transitional metal element that exceeded the risk/hazard threshold at the East Thomas and North Birmingham monitors. These elevated levels of cancer risk were 1.01×10^{-6} and 1.82×10^{-6}, respectively, which are only marginally higher than the threshold of 1×10^{-6}.

Burning fossil fuels and waste matter are the main sources of cadmium emissions. Chronic inhalation exposure can lead to kidney disease and lung conditions such as bronchitis and emphysema. The link between cadmium and cancer has been proven to be inconclusive, although USEPA still considered cadmium a "probable human carcinogen."

Carbon Tetrachloride

In 1970, carbon tetrachloride was banned from consumer use in the United States, leaving industrial uses as a refrigerant and solvent as the current primary sources of exposure. The primary targets of chronic and acute exposure are the liver and kidneys, with carbon tetrachloride being considered a probable carcinogen by USEPA.

This compound was unique in this study for several reasons. Particularly unique is the consistency in concentrations among the four monitoring sites. There is very little variation in the UCL_{95} concentration levels, which translates to very homogeneous risk/hazard values. For example, the highest chronic cancer risk calculated for carbon tetrachloride was 1.09×10^{-5} and the lowest was 1.03×10^{-5}, a difference of only about 5%. The same is true for chronic non-cancer and acute hazard as well. Also unique is that the Shuttlesworth monitor had the lowest UCL_{95} concentration, giving it the lowest risk/hazard values.

Dibenz(a,h)anthracene

Dibenz(a,h)anthracene is a polycyclic aromatic hydrocarbon (PAH) that marginally exceeded the chronic cancer risk for North Birmingham only (1.2×10^{-6}). This compound is classified as a Group 2A carcinogen by IARC. As with other PAHs, dibenz(a,h)anthracene often results from the incomplete combustion of fossil fuels.

The primary cancer risk of dibenz(a,h)anthracene is in the lungs from inhalation of emissions from sources of incomplete combustion.

p-Dichlorobenzene

This compound, also known as "para-dichlorobenzene" and "1,4-dichlorobenzene," is considered a "possible human carcinogen" by USEPA. No information is available on human cancer effects of this chemical. The poor Weight of Evidence (WOE) for increased risk diminishes the significance of the risk/hazard values obtained, as no specific research has been done to link exposure to cancer in humans.

It is commonly found as an indoor air pollutant in pest controls, deodorizers and disinfectants. Para-dichlorobenzene can also be produced as an intermediate in the production of other chemicals, which is more likely to explain the elevated air concentrations in Jefferson County than the sources listed above.

Hexavalent Chromium

Hexavalent Chromium (Cr+6) is a carcinogenic compound that contains the element chromium in the +6 oxidation state. These compounds eventually form trivalent chromium (Cr3) after combining with dust particles and other pollutants in the atmosphere. Hexavalent chromium marginally exceeded the potential risk driver cancer risk at only the Shuttlesworth monitor (1.38×10^{-6}).

The primary sources of hexavalent chromium in the atmosphere are chromate chemicals used as rust inhibitors in cooling towers and emitting as mists, particulate matter emitted during manufacture and use of metal chromates, and chromic acid mist from the plating industry.

Manganese

Manganese is an elemental metal which is essential for human life, but only in small amounts. Detrimental effects to the nervous system have been shown to result from chronic exposure, while there have been no reports of the effects of acute exposure. Since there are no studies to determine the carcinogenicity of manganese, the USEPA deems it "not classifiable" in terms of carcinogenicity in humans. That manganese is used in the steel-making process as an additive to harden, stiffen and strengthen steel supports its potential prevalence in Jefferson County, specifically in the immediate Birmingham area.

The non-cancer hazard for manganese exceeded the 1.0 threshold at three monitoring sites, Providence being the exception. Without any known connection to cancer, manganese does not have a chronic cancer risk.

Naphthalene

Naphthalene is a large component of coal tar; therefore, it can be commonly associated with the burning of coal, along with oil and tobacco. Chronic exposure to naphthalene from these sources can cause respiratory inflammation and diseases of the eye, such as cataracts. Naphthalene is considered a possible human carcinogen. In some studies, it has been linked to throat cancer, but the conditions of the study were inadequate to make an absolute determination of carcinogenicity in humans.

Naphthalene was calculated to be above chronic cancer risk and non-cancer hazard levels at East Thomas, North Birmingham and Shuttlesworth. At these locations, the values for chronic cancer risk were over 1×10^{-5}, significantly above the "one-in-a-million" threshold.

Tetrachloroethylene

The chronic cancer risk for tetrachloroethylene was above 1×10^{-6} at East Thomas, North Birmingham and Shuttlesworth, but well below at Providence. The highest value was at North Birmingham, 3.75×10^{-6}, but Shuttlesworth was similar at 3.71×10^{-6}.

Tetrachloroethylene, more commonly known as "perchloroethylene" or "perc," is most often associated with the dry-cleaning industry. It can also be used as a metal degreaser. Chronic inhalation exposure of tetrachloroethylene can cause neurological effects such as headaches and heart, liver and possibly kidney

damage. Several forms of cancer were connected to perc by studying dry cleaning workers, but the findings are not conclusive because other cancer-causing factors were not considered in the workers. As a result, USEPA currently does not have a classification for perc's carcinogenicity, as findings are being reassessed. The IARC considers it "probably carcinogenic."

5.0 UNCERTAINTY ANALYSIS

Risk assessment is based on a series of questions that the assessor asks about available scientific information that is relevant to human health and/or ecological risk. Each question calls for analysis and interpretation of the studies, selection of the concepts and data that are most scientifically reliable and most relevant to the problem at hand, and conclusions regarding the question presented. For example, in the exposure assessment, through the use of modeling and/or monitoring, the risk assessor asks what is known about the principal environmental fate and transport of contaminants and the patterns and magnitudes of human or ecosystem exposures. The toxicity assessment asks what is known about the ability of an air toxic to cause cancer or other adverse health effects in humans, laboratory animals, or wildlife species and what is known about the biological mechanisms and dose-response relationships underlying any effects observed in the laboratory or in epidemiology studies. The risk characterization integrates information from the preceding components of the risk assessment and synthesizes an overall conclusion about estimated risk that is complete, informative, and useful for risk managers.

Air toxics risk assessments make use of many different kinds of scientific concepts and data (e.g., exposure, toxicity, epidemiology, ecology), all of which are used to characterize the estimated risk in a particular environmental context. Informed use of scientific information from many different sources is a central feature of the risk assessment process. Highly accurate information is often not available for many aspects of a risk assessment. However, since scientific uncertainty is inherent in the risk assessment process, and risk managers often must make decisions using assessments that are not as definitive in all important areas as would be desirable, it is important that the most current and complete information that is available be used to support decision making. Risk assessors and decision makers must understand that it may be necessary to revise risk estimates and to alter decisions in light of new information.

Risk assessments also incorporate a variety of professional judgments (e.g., which models to use, where to locate monitors, which toxicity studies to use as the basis of developing dose/response values). Risk managers therefore need to understand the strengths and the limitations of each assessment and to communicate this information to all participants and the public.

The remainder of this section will discuss the uncertainties associated with each of the major sections of the risk assessment presented thus far.

5.1 Monitoring and Analytical Program

One of the primary uncertainties in this study was the use of monitoring data to estimate the potential human health exposures and risks. The uncertainty stems from the inability to realistically monitor continuously at all places of interest. Thus a decision is made to monitor a specific portion of time in specific locations and use these results in an attempt to establish conclusions for a wider range of time and location. For BATS, the large number of chemicals being monitored required the sampling locations to be existing JCDH monitoring stations. However, these monitors are placed strategically throughout the county to collect valid and representative ambient air data. One way to reduce the uncertainty in monitor placement is to conduct air dispersion modeling to identify the most relevant locations based on local meteorology and information about the sources of the airborne chemicals. This information could be used in future risk assessment projects to better assess the risk posed to the community.

Although a large number of chemicals were selected for monitoring in the BATS program, it is possible that important chemicals were not evaluated because of a lack of resources or because test procedures were not available for the chemicals. Clearly, limiting the number of chemicals analyzed in the monitoring program can result in an underestimation of risk, which could in some cases be reduced by monitoring for a larger group of chemicals. Many of the chemicals selected for monitoring were based on an assessment of likely or known chemicals released into the air from major sources in the Birmingham area. This approach helps to reduce the uncertainty associated with selecting the set of chemicals to be evaluated.

A validated dataset of analytical results for the monitors in the BATS program was provided as the basis for the risk assessment. This dataset contained the airborne concentrations for various chemicals detected for the duration of monitoring. The frequency at which positively identified chemicals in the dataset were detected at a monitor was calculated and used as a means to focus the risk assessment on the most significant chemicals. Any chemical that was not detected in at least 10% of the samples reported for a location was removed from further analysis in the risk assessment. Application of this 10% rule for each monitor location led to the selection of the COPCs for evaluation in the chronic cancer and non-cancer assessments. Eliminating chemicals that were infrequently detected could lead to an underestimate of the health impacts. A total of 11 chemicals positively detected in at least one monitor in the BATS network were eliminated from the risk evaluation because they were found in less than 10% of the samples. Another 15 chemicals were not detected at any of the four sites at any time during the monitoring period of July 2005 through June 2006.

The potential to underestimate the health impacts may be reduced if all of the chemicals detected in the monitoring program were included in the risk assessment. Then a decision must be made whether to use only the detected concentrations to estimate what people could be exposed to, or to assume some value for all cases in which the concentration was not detected and then combine these with the detected concentrations to calculate an exposure concentration using all of the samples. Using only the detected concentrations would tend to overestimate the potential health impacts associated with the true exposure. For the purposes of this study, when there was no detection recorded, a value of one-half the minimum detection limit was used in the analysis. Without further precise testing, there is no way to know if this is an accurate value, or potentially an under- or overestimate of the concentration at that time.

A full year of sampling was completed between July 2005 and June 2006 in order to give a year-round perspective of atmospheric conditions, weather patterns, industrial trends, traffic density, etc. However, the possibility exists for potentially atypical conditions in the area during this time, as related to weather and emission sources, among other things. This potential misrepresentation of atmospheric conditions and contributing factors could under- or overestimate the concentration of air toxics in Jefferson County during other year-long periods. If the sampling had been conducted a year earlier or later, the results might have been different, leading to a different course of action in response.

5.2 Exposure Assessment

For this risk assessment, the exposure assessment consisted of conducting statistical tests on the dataset and then calculating exposure concentrations using the most appropriate method as defined by the statistical characteristics of the data.

The distribution of data collected for each chemical was not assumed to follow a specific pattern. Rather, through use of ProUCL, a unique data distribution and method for obtaining the UCL were obtained. While many chemical concentrations followed a normal distribution, many others followed gamma distribution and some were non-parametric.

In calculating the air concentrations for the UCL_{95} exposure cases for COPCs, a value of half the minimum detection limit was used for samples where the actual concentration was not detectable. As discussed previously, the potential impact of this uncertainty on the risk estimates could be to over- or underestimate the actual health impacts.

The use of a UCL_{95} of the mean for the exposure concentrations was designed to reflect a reasonably conservative estimate of the true exposure. The UCL_{95} of the mean may, in fact, be an overestimate. By definition, the UCL_{95} of the mean implies that there is a 95% probability that the true mean of the air concentration is lower, and only a 5% probability that the true mean is higher.

A standard component of an exposure assessment is the analysis that determines all of the routes of exposure associated with air toxics released to the atmosphere. This risk assessment evaluated the inhalation exposure route for the airborne chemicals detected in the BATS monitors. There is little doubt that people in the vicinity of the BATS monitoring program are breathing the chemicals found in the air monitors. Therefore, this is an actual exposure pathway. There may be other exposure pathways that are also complete in the sense that people could be exposed to the chemicals by other means. For example, airborne chemicals could deposit onto soil or surface water and lead to exposures via dermal or ingestion pathways. The multimedia cumulative health impacts may be higher by an unknown amount as a result of not evaluating these pathways. A more thorough multi-pathway risk assessment based on additional monitoring and/or modeling data could reduce this uncertainty.

Another typical aspect of an exposure assessment is calculating a more realistic exposure that an individual could receive. Factors such as the frequency and duration of the exposure are selected to match the behavior of the population being modeled. For this risk assessment, it was assumed that an individual was exposed for 24 hours per day, 365 days a year, for 70 years.[12] These assumptions likely overestimate potential health impacts as their movements in and out of the area would reduce the exposure over time. Conducting an analysis of the behaviors and activity patterns of the residents and developing more site-specific values for the frequency and duration of the exposure could reduce this uncertainty. (Note that an individual can move from the exposure environment being evaluated into an area with even higher concentrations. The analysis of these more realistic individual risks is beyond the scope of this analysis.)

5.3 Toxicity Assessment

Uncertainties in the toxicity values used for this risk assessment stem from a number of sources. The first area of uncertainty is in the thoroughness of the information available to assess the dose-response relationship. That toxicity values did not exist for some COPCs meant that the chemicals were eliminated from further evaluation in the risk assessment. Following this procedure introduces another degree of uncertainty into the risk assessment.

The need for an adequate toxicity database from which to develop the dose-relationship is essential for deriving a representative toxicity value. In many cases, dose-response data is not available for human exposures. Therefore, animal studies are used to represent the potential effects in humans. In addition, the number of studies available for a chemical may not be sufficient to provide a clear picture of the true dose-response, especially in the region where the exposure is to low doses. Often, the toxicity studies are based on exposures to animals at high doses of the chemical, doses that are less than a chronic duration, or doses that do not reach a

no-effect level. Regardless of whether the dose is in animals or humans, there is uncertainty regarding the effect on especially sensitive populations that are not always considered in the dosing study. For non-cancer toxicity values, uncertainty and modifying factors are used to account for these factors. For cancer toxicity values, which are estimates of the probability to develop cancer as a result of a given exposure, values are typically based on a linear extrapolation to zero, from a point of departure on the dose-response curve, or values are based on the use of uncertainty and modifying factors similar to the method used for non-carcinogens (which is the case for carcinogens that display a threshold response). The intent in both cases is to provide toxicity values that tend to avoid underestimation of the risks in the face of uncertainty in the derivation of the value.

5.4 Risk Characterization

In the risk characterization, the toxicity and exposure assessments were combined to develop a quantitative description of the potential for adverse human health effects. Thus all of the uncertainties related to the steps in the exposure and toxicity assessments affect these risk estimates. In addition, there are uncertainties related to how the risk characterization is presented and interpreted. For example, for both carcinogenic and non-cancer risk estimates, the cancer risk and HQs for individual COPCs were added to obtain an indication of the total health impact at a monitor location. This assumption ignores the potential for synergisms or antagonisms among chemicals, effectively assuming that all of the chemicals have a similar mechanism of action and metabolism in the human body. This assumption would tend to overestimate true risks if antagonistic effects occurred, and would underestimate risks if synergistic effects were to occur. Information to evaluate these effects for carcinogens is generally lacking. For non-carcinogens, it is possible to develop HIs that group together chemicals with similar target organs for the critical health effect. For this risk assessment, most HIs calculated without regard to target organ were less than 1, indicating that an adverse health effect was unlikely. Thus, summing the HI on the basis of target organ would not be necessarily useful.

The risk estimates for exposure to the airborne concentrations found in the BATS monitoring programs assume that an individual is continuously exposed at the same location for 70 years. As discussed earlier, the actual behaviors and activities of the residents may result in lower exposures, in which case the risk estimates may overestimate the true risks. Information on the actual population of interest or a more focused scope of those residents directly affected could reduce this uncertainty. That said, the ubiquitous nature of several of the chemicals found in this study (e.g., benzene, acrolein) make it unlikely that an individual could effectively remove him/herself to an area of zero risk.

The BATS monitoring data used in the risk assessment reflects a single year of chemical concentrations in air. It is uncertain how well this dataset reflects the lifetime exposure assumed in this risk assessment, as changes in meteorology and chemical emissions could lead to lower or higher concentrations in air from year to year. To reduce this uncertainty would require monitoring over several years, or modeling based on changes in meteorology and chemical emissions.

The risk estimates provided in this assessment were based on monitoring results from 4 locations in the Birmingham area. It is not clear how well these locations represent any other receptors in the Birmingham area. An inspection of the total risk values shows the variability across the monitoring network. Assuming that a monitor was representative of any location beyond where it was sited would introduce an uncertainty that may over- or underestimate true health impacts at unmonitored locations.

6.0 CONCLUSIONS

A risk assessment of the potential human health impacts from inhalation of air toxics has been conducted using data collected during the BATS air-monitoring program in the Birmingham, Alabama, area. In general, this risk assessment can be considered a conservative estimate on the basis of the exposure assessment. For example, for the chronic risk estimates it was assumed that an individual would be exposed to the monitored concentrations over 70 years, for 24 hours per day. The potential human health implications of these chronic exposures were characterized for both cancer and non-cancer health effects. In addition, an acute risk characterization, representing a short-term exposure to elevated concentrations in air, was performed by comparing the maximum concentrations measured at each monitor location to relevant acute toxicity criteria. The remainder of this section provides the conclusions of the chronic risk assessment, followed by the acute risk assessment.

6.1 Chronic Risk Characterization

6.1.1 Cancer Risk

There were a total of thirty-eight instances in which the chronic cancer risk exceeded the one-in-a-million (1×10^{-6}) threshold. These events involved fourteen different chemicals, with many exceeding the threshold at three or even all four of the monitoring sites. The cumulative cancer risk of COPCs was highest at Shuttlesworth, with a value of 1.66×10^{-4}. The other three sites' cumulative risks of COPCs were as follows: North Birmingham, 9.92×10^{-5}; East Thomas, 8.33×10^{-5}; Providence, 3.36×10^{-5}.

The consistency of the chemicals classified as potential chronic cancer risk drivers at each of the four monitors indicates predominantly similar conditions across Jefferson County. Of the 14 different chemicals identified as potential cancer risk drivers, six were listed at all four sites, including the Providence monitor, which was intended to be a background location. If the Providence monitor is removed from the equation, an additional two chemicals (naphthalene and tetrachloroethylene) are potential risk drivers at the other three monitoring locations. While the concentrations indicate many elevated risk levels in the general vicinities of the North Birmingham, Shuttlesworth and East Thomas monitors, the risk values observed at Providence show potential issues to be more widespread than just one concentrated part of Jefferson County.

There was a great deal of consistency in the percentage of the total risk that individual chemicals represented among the four monitoring sites. Many of the chemicals ranked high at each site in percentage of total cancer risk. Benzene was among the top three, percentage-wise, at all four monitoring sites. Carbon tetrachloride was among the top four at all sites. On the opposite end of the spectrum, acetaldehyde was ranked second highest at Providence and Shuttlesworth, but sixth and seventh at East Thomas and North Birmingham, respectively.

6.1.2 Non-Cancer Hazard

There were a total of nine instances in which the chronic non-cancer hazard exceeded the 1.0 threshold. These events involved three different chemicals, with some exceeding the threshold at three or even all four of the monitoring sites. The cumulative non-cancer hazard of COPCs was highest at Shuttlesworth, with a value of

127.06. The other three sites' cumulative risks of COPCs were as follows: North Birmingham, 58.31; East Thomas, 92.25; Providence, 36.48. As discussed in the Executive Summary and Section 4.0 of this report, these elevated numbers can be prominently attributed to the individual values for acrolein.

6.2 Acute Risk Characterization

There was one instance in which an acute hazard quotient (HQ) exceeded 1.0, which has been established as the threshold for significance by USEPA. This was benzene at the Shuttlesworth location, which had HQ = 1.09. This value was obtained due to an irregularly high concentration, along with the use of 24-hour exposure values from OAQPS' *Table 2*. Since each sampling event lasted a 24-hour period, these values provide a more accurate indication of acute risk rather than for shorter durations, such as 1 or 8 hours. Some other chemicals had relatively high readings, but no others came very close to exceeding the 1.0 threshold. The second highest value, formaldehyde at Providence, was only 0.69.

7.0 RISK MANAGEMENT PLAN

7.1 Threshold Evaluation

Based upon the results of the risk assessment, the Department's strategy for developing a risk management plan consisted of the following:

Identification of Chemicals at Individual Monitoring Sites with Risk above 1×10^{-6} (chronic, cancer);

Identification of Chemicals at Individual Monitoring Sites with Risk above 1×10^{-4} (chronic, cancer);

Identification of Monitoring Sites with Cumulative Chemical risks above 1×10^{-6} (chronic, cancer);

Identification of Monitoring Sites with Cumulative Chemical risks above 1×10^{-4} (chronic, cancer);

Identification of Chemicals at Individual Monitoring Sites with Hazard Quotients above 1 (chronic, noncancer);

Identification of Monitoring Sites with Cumulative Chemical Hazard Indices above 1 (chronic, noncancer);

Identification of Chemicals at Individual Monitoring Sites with Hazard Quotient above 1 (acute, noncancer); and

Identification of Monitoring Sites with Cumulative Chemicals with Hazard Index above 1 (acute, noncancer)

The USEPA has identified the acceptable risk level range of 1×10^{-6} to 1×10^{-4} for cancer (chronic).[13] For chronic, noncancer evaluation, the USEPA has specified that an acceptable hazards index/quotient of less than 1. For acute, noncancer evaluation, hazard quotients/indices were compared to 1. However, caution must be taken due to diversity of acute dose-response value development.

See Table 7-1 for a summary of chemicals and sites risks and hazards comparison with EPA benchmark levels.

7.1.1 Cancer (Chronic) Evaluation

Chemicals with risks and hazards above USEPA benchmarks levels were compared among the four monitoring sites. 1,3 Butadiene, acetaldehyde, arsenic, benzene, carbon tetrachloride, p-dichlorobenzene, and tetrachloroethylene had risks consistently above the 1×10^{-6} risk level, but below the 1×10^{-4} risk level, at all four sites. Napthalene had risks consistently above the 1×10^{-6} risk level, but below the 1×10^{-4} risk level, for all sites with the exception of the Providence site. Benzo(a)pyrene had risks above the 1×10^{-6} risk level, but below the 1×10^{-4} risk level, at two sites, North Birmingham and Shuttlesworth. Similarly, cadmium had risks above the 1×10^{-6} risk level, but below the 1×10^{-4} risk level, at two sites, East Thomas and North Birmingham. The risks for dibenz(a,h) anthracene (North Birmingham), benzo(a)anthracene (North Birmingham), berrylium

(Shuttlesworth), and hexavalent chromium (Shuttlesworth) exceeded the 1×10^{-6} risk level, but remained below the 1×10^{-4} risk level, at one site only.

Cumulative risks for chemical totals at each of the sites exceeded the risk level of 1×10^{-6} at all sites. However, cumulative risks exceeded the 1×10^{-4} risk level at the Shuttlesworth site only.

7.1.2 Noncancer (Chronic) Evaluation

Regarding noncancer, chronic effects, acrolein was the only chemical at all sites with a hazard quotient greater than the acceptable index of 1. Conclusively, all sites had a cumulative hazard index above 1, due primarily to acrolein.

7.1.3 Noncancer (Acute) Evaluation

Regarding noncancer, acute effects, two sites, (Providence and Shuttlesworth) had cumulative hazard indices above 1. In addition, individual benzene concentrations at the Shuttlesworth site exceeded 1.

7.2 Source/Origin and Exposure

Specific information for each of the chemicals with elevated risks/hazards is listed below, as taken from the chemical profiles by the Agency for Toxic Substances and Disease Registry:

Acetaldehyde

This is ubiquitous in the ambient environment. It is an intermediate product of higher plant respiration and formed as a product of incomplete wood combustion in fireplaces and woodstoves, coffee roasting, burning of tobacco, vehicle exhaust fumes, and coal refining and waste processing. Hence, many individuals are exposed to acetaldehyde by breathing ambient air. It should be noted that residential fireplaces and woodstoves are the two highest sources of emissions, followed by various industrial emissions. In Los Angeles, California, levels of acetaldehyde up to 32 parts per billion (ppb) have been measured in the ambient environment. Exposure may also occur in individuals occupationally exposed to acetaldehyde during its manufacture and use. In addition, acetaldehyde is formed in the body from the breakdown of ethanol; this result would be a source of acetaldehyde among those who consume alcoholic beverages.

Acetonitrile

Acetonitrile is predominantly used as a solvent in the manufacture of pharmaceuticals, for spinning fibers and for casting and molding of plastic materials, for use in manufacturing lithium batteries, for the extraction of fatty acids from animal and vegetable oils, and in chemical laboratories for the detection of materials such as pesticide residues. Acetonitrile is also used in dyeing textiles and in coating compositions as a stabilizer for chlorinated solvents and in perfume production as a chemical intermediate. Sources of acetonitrile emissions into the air include manufacturing and industrial facilities, automobile exhaust, and volatilization from aquatic environments. Individuals may be exposed to acetonitrile through breathing contaminated air, from smoking tobacco or proximity to someone who is smoking, or through skin contact in the workplace.

Acrolein

Acrolein can be formed from the breakdown of certain pollutants found in outdoor air, from burning tobacco, or from burning gasoline. Airborne exposure to acrolein may occur from breathing contaminated air, from smoking tobacco or proximity to someone who is smoking, or from being near automobiles or oil or coal power plants. In several large cities, acrolein has been measured at 9 parts per billion (ppb). Occupational exposure to acrolein could occur in industries that use acrolein to make other chemicals. Small amounts of acrolein may be found in some foods, such as fried foods, cooking oils, and roasted coffee. Acrolein has not been detected in drinking water, and is not commonly found in surface water.

Benzene

Individuals employed in industries that manufacture or use benzene may be exposed to the highest levels of benzene. Benzene is found in emissions from burning coal and oil, motor vehicle exhaust, and evaporation from gasoline service stations and in industrial solvents. These sources contribute to elevated levels of benzene in the ambient air, which subsequently may be breathed by the public. Tobacco smoke contains benzene and accounts for nearly half the national exposure to benzene. Individuals may also be exposed to benzene by consuming contaminated water.

Berrylium

The greatest exposures to beryllium occur in the workplace (i.e., where it is mined, processed, or converted into alloys and chemicals). Individuals may also be exposed by inhalation of beryllium dust or fumes from the burning of coal or fuel oil and in tobacco smoke, by the ingestion of many fruits and vegetables and water, or through natural occurrence in soils. The average concentration of beryllium measured in the air in the United States during the 1980s was 0.03 nanograms per cubic meter (ng/m^3). Ambient concentrations measured in fifty cities between 1977 and 1981 were 0.1-0.4 ng/m^3.

1,3-butadiene

This chemical is released into the air by motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke. 1,3-butadiene was detected in ambient air of cities and suburban areas from 1970 to 1982 at an average level of 0.3 parts per billion (ppb). Higher levels of 1,3-butadiene may be found in highly industrialized cities or near oil refineries, chemical manufacturing plants, and plastic and rubber factories. 1,3-butadiene has been found in drinking water and in plastic or rubber food containers, but not in food samples. Occupational exposure to 1,3-butadiene may occur in the rubber, plastics, and resins industries.

Cadmium

The largest sources of airborne cadmium in the environment are the burning of fossil fuels such as coal or oil, and incineration of municipal waste materials. Cadmium may also be emitted into the air from zinc, lead, or copper smelters. For nonsmokers, food is generally the largest source of cadmium exposure. Cadmium levels in some foods can be increased by the application of phosphate fertilizers or sewage sludge to farm fields. Smoking is another important source of cadmium exposure. Smokers have about twice as much cadmium in their bodies as do nonsmokers.

Carbon Tetrachloride

Individuals may be exposed to carbon tetrachloride in the air from accidental releases from production and uses, and from its disposal in landfills where it may evaporate into the air or leach into groundwater. Carbon tetrachloride is also a common contaminant of indoor air; the sources of exposure appear to be building materials or products, such as cleaning agents, used in the home. Workers directly involved in the manufacture or use of carbon tetrachloride are most likely to have significant exposures to carbon tetrachloride. Individuals may also be exposed to carbon tetrachloride by drinking contaminated water. The general population is mainly exposed to 1,4-dichlorobenzene through breathing vapors from 1,4-dichlorobenzene products used in the home, such as mothballs and toilet deodorizer blocks. The median indoor air concentration of 1,4-dichlorobenzene detected at 2,121 sites was 0.283 parts per billion (ppb).

Chromium

Chromium is a naturally occurring element in rocks, animals, plants, soil, and volcanic dust and gases. Chromium occurs in the environment predominantly in one of two valence states: trivalent chromium (Cr III), which occurs naturally and is an essential nutrient, and hexavalent chromium (Cr VI), which, along with the less common metallic chromium (Cr 0), is most commonly produced by industrial processes. Chromium (III) is essential to normal glucose, protein, and fat metabolism and is thus an essential dietary element. The body has several systems for reducing chromium (VI) to chromium (III). This chromium (VI) detoxification leads to increased levels of chromium (III). Air emissions of chromium are predominantly of trivalent chromium, and in the form of small particles or aerosols. The most important industrial sources of chromium in the atmosphere are those related to ferrochrome production. Ore refining, chemical and refractory processing, cement-producing plants, automobile brake lining and catalytic converters for automobiles, leather tanneries, and chrome pigments also contribute to the atmospheric burden of chromium. The general population is exposed to chromium (generally chromium [III]) by eating food, drinking water, and inhaling air that contains the chemical. The average daily intake from air, water, and food is estimated to be less than 0.2 to 0.4 micrograms (µg), 2.0 µg, and 60 µg, respectively. Dermal exposure to chromium may occur during the use of consumer products that contain chromium, such as wood treated with copper dichromate or leather tanned with chromic sulfate. Occupational exposure to chromium occurs from chromate production, stainless-steel production, chrome plating, and working in tanning industries; occupational exposure can be two orders of magnitude higher than exposure to the general population. People who live in the vicinity of chromium waste disposal sites or chromium manufacturing and processing plants have a greater probability of elevated chromium exposure than the general population. These exposures are generally to mixed chromium (VI) and chromium (III).

1,4-dichlorobenzene

Ambient air levels of 1,4-dichlorobenzene are very low; another study with 1,447 samples reported the majority of levels below the detection limit. 1,4-dichlorobenzene has been detected in drinking water at levels ranging from 0.01 to 1.54 ppb. Occupational exposure to 1,4-dichlorobenzene may occur in factories that produce or process 1,4-dichlorobenzene products.

Inorganic arsenic

This element is found throughout the environment, and it is released into the air by volcanoes, weathering of arsenic-containing minerals and ores, and by commercial or industrial processes. For most people, food is the largest source of arsenic exposure (about 25 to 50 micrograms per day [µg/d]), with lower amounts coming

from drinking water and air. Among foods, some of the highest levels are found in fish and shelfish; however, this arsenic exists primarily as organic compounds, which are essentially nontoxic. Elevated levels of inorganic arsenic may be present in soil, either from natural mineral deposits or contamination from human activities, which may lead to dermal or ingestion exposure. Workers in metal smelters and nearby residents may be exposed to above-average inorganic arsenic levels from arsenic released into the air. Other sources of inorganic arsenic exposure include burning plywood treated with an arsenic wood preservative or dermal contact with wood treated with arsenic.

Managanese

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese can also be combined with carbon to make organic manganese compounds. Common organic manganese compounds include pesticides, such as maneb or mancozeb, and methylcyclopentadienyl manganese tricarbonyl (MMT), a fuel additive in some gasolines. Manganese is an essential trace element and is necessary for good health. Manganese can be found in several food items, including grains and cereals, and is found in high amounts in other foods, such as tea.

Napthalene

Individuals may be exposed to naphthalene through the use of mothballs. Workers may be occupationally exposed to naphthalene during its manufacture and use, especially in coal-tar production, wood preserving, tanning, or ink and dye production. Naphthalene is released to the air from the burning of coal and oil and from the use of mothballs. Coal tar production, wood preserving, and other industries release small amounts. Typical air concentrations of naphthalene in cities are about 0.18 parts per billion (ppb). Naphthalene has also been detected in tobacco smoke.

Tetrachloroethylene

Prior to 1981, tetrachloroethylene was detected in ambient air at average levels of 0.16 parts per billion (ppb) in rural and remote areas, 0.79 ppb in urban and suburban areas, and 1.3 ppb in areas near emission sources. Tetrachloroethylene has also been detected in drinking water. One survey prior to 1984 of water supplies from groundwater sources reported a median concentration of 0.75 ppb for the samples in which tetrachloroethylene was detected, with a maximum level of 69 ppb. Occupational exposure to tetrachloroethylene may occur, primarily in dry cleaning establishments and at industries manufacturing or using the chemical.

7.3 Risk Management Strategy

7.3.1 Risk (Chronic, Cancer) Level of 1 x 10^{-6}

While there are several individual chemicals and monitoring sites (cumulative chemical totals) with risks (chronic, cancer) above the risk level of 1 x 10^{-6}, the Department has determined that actions are not necessarily warranted due to the following:

- Ubiquitous, wide-spread nature of pollutants/chemicals from multiple sources, mostly combustion of fuels, including industrial facilities (coal, natural gas) and mobile sources (gasoline) and area sources (i.e., gasoline stations, autobody shops, dry cleaning facilities, etc.).

- Inherent uncertainties/limitations in the calculation of risks including:

    - Exposure - Within a census tract, all individuals were assigned the same ambient air concentration, chosen to represent a typical ambient air concentration, not accounting for time activity patterns that reflect variations between individuals. As a result, the exposures and risks should be interpreted as being only typical values rather than as means, medians, etc.

    - Missing data and the use of ½ of the minimum detection limit to replace missing data.

    - Estimates of cancers risks are uncertain based on the following:

        - Some air toxics are known to be carcinogens in animals but lack data in humans. These have been assumed to be human carcinogens.

        - All the air toxics in this assessment were assumed to have linear relationships between exposure and the probability of cancer (i.e., effects at low exposures were extrapolated from higher, measurable, exposures by a straight line)

        - Major sources of uncertainty in the noncancer risk estimates are described here. Sources of uncertainty in the development of reference concentrations (RfCs) generally are intraspecies extrapolation (animal to human), and interspecies extrapolation (average human to sensitive human). Additional sources of uncertainty can be the use of a lowest-observed-adverse effect-level in place of a no observed adverse effect level (the latter is preferred), and for other data deficiencies. Theses uncertainties are taken into account in the derivation of the RfCs. As the RfCs used in the assessment in estimating a hazard quotient (HQ) are conservative, meaning that they represent exposures at which no appreciable risk is expected to occur +/- an order of magnitude uncertainty, a value of HQ greater than 1 should not necessarily be taken to indicate that a health effect is expected.

In the comprehensive Residual Risk Report to Congress by the USEPA (1999)[14] establishing the benzene NESHAP, the 1×10^{-4} threshold was selected as the maximum individual risk and represents the upper-end of the acceptability range. The 1×10^{-6} threshold was chosen to provide an ample margin of safety. In the same report to Congress, the Commission on Risk Assessment and Risk Management recommended that only voluntary actions be taken when residual risk assessments are completed for MACT standards when resultant risks are between 1×10^{-6} and 1×10^{-4}.

Irrespective of thresholds, the Department will continue to reduce air toxics concentrations and exposure, and in concert with USEPA, will mitigate those air toxics having elevated risk/hazard levels by taking the following actions:

-

- Assuring compliance with and enforcing the numerous MACT (Maximum Achievable Control Technology) standards that apply to 80+ industrial source categories, including coke oven by-products plants, steel mills, surface-coating operations, etc., and

- Assuring compliance with and enforcing the numerous GACT (Generally Achievable Control Technology) standards that apply to the numerous area source categories including dry cleaners, gasoline stations, autobody refinishing operations, etc.

7.3.2 Risk (Chronic, Cancer) Level of 10^{-4}

To mitigate and reduce the cumulative risks at the Shuttlesworth site, the Department is currently working closely with several industrial facilities/sources located very proximate to this site. Benzene, arsenic, and naphthalene account for the largest percentages of total chronic, cancer risks at the Shuttlesworth site. Since the monitoring time period of this study (July 2005 to June 2006), several plants around this site have installed pollution control equipment and have implemented work practice standards (2006 and 2007), in accordance with federal air toxics regulations, resulting in direct reductions in air toxics emissions and concentrations. Additional planned strategies include continued compliance assurance with several federal air toxics regulations that apply to industrial sources. In addition, the Department will ensure compliance and enforcement of several relatively new USEPA regulations that apply to area sources such as autobody shops, gasoline service stations, etc. It is expected that the implementation of these regulations will result in direct emissions/concentrations reductions.

7.3.3 Hazard (Chronic, Noncancer) Level of 1

The Department has determined that no immediate actions to limit or reduce acrolein emissions/concentrations, the only chemical with a hazard quotient (chronic, noncancer) above 1 at all four sites, are warranted at this time. This determination is due to the ubiquitous nature of acrolein, primarily emanating from combustion sources, including vehicle fuel combustion.

In February 2007, EPA finalized a rule to reduce hazardous air pollutants from mobile sources (Control of Hazardous Air Pollutants from Mobile Sources, February 9, 2007). EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and PM2.5) by over one million tons.

By 2010, EPA's existing programs will reduce mobile source air toxics by over one million tons from 1999 levels. In addition to controlling pollutants such as hydrocarbons, particulate matter, and nitrogen oxides, EPA's recent regulations controlling emissions from highway vehicles and nonroad equipment should also result in large air toxic reductions. Furthermore, EPA has programs under development that would provide additional benefits from further controls for small nonroad gasoline engines and diesel locomotive and marine engines. Finally, EPA has developed a variety of programs to reduce risk in communities, such as Clean School Bus USA, the Voluntary Diesel Retrofit Program, and National Clean Diesel Campaign.

Unlike cancer risks, hazard quotients greater than one are not statistical probabilities of harm occurring. Instead, they are a simple statement of whether (and by how much) an exposure concentration exceeds the reference concentration. Moreover, the level of concern does not increase linearly or to the same extent as hazards quotients increase above one for different chemicals, because reference concentrations do not generally have equal accuracy or precision and are generally not based on the same severity of effect. Thus, it can only be said that with exposures increasingly greater than the reference concentrations, (i.e., hazard quotients increasingly greater than 1), the potential for adverse effects increases, but to what extent is unknown. A hazard quotient of 100 does not mean that the hazard is 10 times greater than a hazard quotient of 10. Also a hazard quotient of 10 for one substance may not have the same meaning (in terms of hazard) as another substance resulting in the same hazard quotient.[15]

7.3.4 Hazard (Acute, Noncancer) Level of 1

To mitigate and reduce the individual and/or cumulative hazards at the Providence and Shuttlesworth site, the Department is currently working closely with several industrial facilities/sources located very proximate to the Shuttlesworth site. Since the monitoring time period of this study (July 2005 to June 2006), several plants around this site have installed pollution control equipment and have implemented work practice standards (2006 and 2007), in accordance with federal air toxics regulations, resulting in direct reductions in air toxics emissions and concentrations. Additional planned strategies include continued compliance assurance with several federal air toxics regulations that apply to industrial sources. In addition, the Department will ensure compliance and enforcement of several relatively new USEPA regulations that apply to area sources such as autobody shops, gasoline service stations, etc. It is expected that the implementation of these regulations will result in direct emissions/concentrations reductions.

With respect to the Providence site, which has a marginal hazard index of 1.16, no immediate actions are planned due to the ubiquitous nature of acrolein and formaldehyde, accounting for approximately 34% and 60% of the total hazard index at this site, respectively.

For cumulative concentrations of chemicals, when making hazard index comparisons with 1, the summing of hazard quotients is complicated due to acute dose-response values. First, acute dose-response values have been developed for purposes that vary more widely than chronic values. Some sources of acute values define exposures at which adverse effects actually occur, while other sources develop only no-effect acute values. Second, some acute values are expressed as concentration-time matrices, while others are expressed as single concentrations for a set exposure duration. Third, some acute values may specifically consider multiple exposures, whereas others consider exposure as a one-time event. Fourth, some sources of acute values are intended to regulate workplace exposures, assuming a population of healthy workers (i.e., without children, seniors, or other sensitive individuals). Such occupational values may also consider cost and feasibility, factors that EPA considers the province of the risk manager rather than the risk assessor.[16]

8.0 GLOSSARY

95% Upper Confidence Level (UCL_{95}) - A conservative alternative to simply using the average concentration over the course of a year for analysis. This statistic implies that there is 95% certainty that a random observation will fall below the UCL value. Under the assumption of normal distribution, simply using a mean for this purpose would imply only a 50% likelihood of the same. The use of UCL_{95} also imparts more confidence into the validity of the data, since samples were not taken on a daily basis.

Adverse effect - A biochemical change, functional impairment, or pathological lesion that either singly or in combination adversely affects the performance of the whole organism or reduces an organism's ability to respond to an additional environmental challenge.

Agent - A chemical, radiological, mineralogical, or biological entity that may cause deleterious effects in an organism after the organism is exposed to it.

Aggregate exposure - The combined exposure of an individual (or defined population) to a specific agent or stressor via relevant routes, pathways, and sources.

Aggregate risk - The risk resulting from aggregate exposure to a single agent or stressor.

Cumulative risk - The combined risks from aggregate exposures to multiple agents or stressors.

Cumulative risk assessment - An analysis, characterization, and possible quantification of the combined risks to health or the environment from multiple agents or stressors.

Dose-response relationship - A relationship between (1) the dose, either "administered dose" or absorbed dose, and (2) the extent of toxic injury produced by that chemical or agent. Response can be expressed either as the severity of injury or proportion of exposed subjects affected.

Endpoint - An observable or measurable biological or chemical event used as an index of the effect of a stressor on a cell, tissue, organ, organism, etc.

GACT – Generally Achievable Control Technology – Regulatory control technologies and/or work practices promulgated by the USEPA to control and reduce emissions of air toxics pollutants from area sources such as dry cleaners, gasoline stations, and autobody refinishing operations.

Lowest Observed Adverse Effect Level (LOAEL) - The lowest dose or exposure level in a study in which there is a statistically or biologically significant increase in the frequency or severity of an adverse effect in the exposed population as compared with an appropriate, unexposed control group.

MACT – Maximum Achievable Control Technology – Regulatory control technologies and/or work practices promulgated by the USEPA to control and reduce emissions of air toxics pollutants from industrial sources such as power plants, coke by-products plants, and pipe-making/steel plants.

NESHAP – National Emissions Standards for Hazardous Air Pollutants – Standards promulgated by the USEPA to control and reduce emissions of air toxics pollutants.

No Observed Adverse Effect Level (NOAEL) - An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered to be adverse or precursors to adverse effects. In an experiment with several NOAELs, the common usage of the term NOAEL is the highest exposure without adverse effects.

Reference Concentration (RfC) - An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious non-cancer effects during a lifetime.

Reference Dose (RfD) - An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious non-cancer effects during a lifetime.

Risk – *Absolute risk:* The probability of injury, disease, or death under specific circumstances. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that there is no chance of harm), to one (representing the certainty that harm will occur). *Incremental risk:* The probability of injury, disease, or death under specific circumstances, relative to the background probability. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that the probability of harm is no greater than the background probability), to one (representing the certainty that harm will occur).

9.0 REFERENCES

1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16 U.S. EPA. 2004. *Air Toxics Risk Assessment (ATRA) Reference Library, Volume 1, Technical Resource Manual*. EPA Office of Air Quality Planning and Standards. EPA-453-K-04-001 A. April 2004

3, 14 U.S. EPA. 1999. Residual Risk Report to Congress.

PART II

Tables, Figures and Appendices

Table 1-1: Location coordinates of four monitoring sites, along with distances (miles)

Site	East Thomas	North Birmingham	Providence	Shuttlesworth
East Thomas 33º31'46", -86º51'01"	---	2.59	26.70	3.96
North Birmingham 33º33'10", -86º48'54"	2.59	---	29.01	1.37
Providence 33º27'35", -87º18'20"	26.70	29.01	---	30.24
Shuttlesworth 33º33'55", -86º47'47"	3.96	1.37	30.24	---

Source: Google Earth

Table 1-2: Complete list of chemicals monitored and analyzed, including type and CAS number

Acenaphthene	SVOC	83329
Acenaphthylene	SVOC	208968
Acetaldehyde	Carb	75070
Acetone	Carb	67641
Acetonitrile	VOC	75058
Acetylene	VOC	74862
Acrolein	VOC	107028
Acrylonitrile	VOC	107131
Anthracene	SVOC	120127
Antimony	Metals	7440360
Arsenic	Metals	7440382
Benzaldehyde	Carb	100527
Benzene	VOC	71432
Benzo (a) anthracene	SVOC	56553
Benzo (a) pyrene	SVOC	50328
Benzo (b) fluoranthene	SVOC	205992
Benzo (e) pyrene	SVOC	192972
Benzo (g,h,i) perylene	SVOC	191242
Benzo (k) fluoranthene	SVOC	207089
Beryllium	Metals	7440417
Bromochloromethane	VOC	74975
Bromodichloromethane	VOC	75274
Bromoform	VOC	75252
Bromomethane	VOC	74839
1,3-Butadiene	VOC	106990
Butyraldehyde	Carb	123728
Cadmium	Metals	7440439
Carbon Tetrachloride	VOC	56235
Chlorobenzene	VOC	108907
Chloroethane	VOC	75003
Chloroform	VOC	67663
Chloromethane	VOC	74873
Chloromethylbenzene	VOC	100447
Chloroprene	VOC	126998
Chromium	Metals	7440473
Chrysene	SVOC	218019
1,2-Dibromoethane	VOC	106934
1,1-Dichloroethane	VOC	75343
1,2-Dichloroethane	VOC	107062
1,1-Dichloroethene	VOC	75354
cis-1,2-Dichloroethylene	VOC	156594
1,2-Dichloropropane	VOC	78875
cis-1,3-Dichloropropene	VOC	10061015
2,5-Dimethylbenzaldehyde	Carb	5779942
Cobalt	Metals	7440484
Coronene	SVOC	191071
Crotonaldehyde	Carb	123739
Dibenz (a,h) anthracene	SVOC	53703
Dibromochloromethane	VOC	124481
m-Dichlorobenzene	VOC	541731
o-Dichlorobenzene	VOC	95501
p-Dichlorobenzene	VOC	106467
Dichlorodifluoromethane	VOC	75718
trans-1,2-Dichloroethylene	VOC	156605
Dichloromethane	VOC	75092
trans-1,3-Dichloropropene	VOC	10061026
Dichlorotetrafluoroethane	VOC	76142
Ethyl Acrylate	VOC	140885
Ethyl tert-Butyl Ether	VOC	637923
Ethylbenzene	VOC	100414
Fluoranthene	SVOC	206440
Fluorene	SVOC	86737
Formaldehyde	Carb	50000
Hexachloro-1,3-butadiene	VOC	87683
Hexaldehyde	Carb	66251
Hexavalent Chromium	Cr6	18540299

Indeno(1,2,3-cd)pyrene	SVOC	193395
Isovaleraldehyde	Carb	590863
Lead	Metals	7439921
Manganese	Metals	7439965
Mercury	Metals	7439976
Methyl Ethyl Ketone	VOC	78933
Methyl Isobutyl Ketone	VOC	108101
Methyl Methacrylate	VOC	80626
Methyl tert-Butyl Ether	VOC	1634044
Naphthalene	SVOC	91203
Nickel	Metals	7440020
n-Octane	VOC	111659
Perylene	SVOC	198550
Phenanthrene	SVOC	85018
Propionaldehyde	Carb	123386
Propylene	VOC	115071
Pyrene	SVOC	129000
Selenium	Metals	7782492
Styrene	VOC	100425
tert-Amyl Methyl Ether	VOC	994058
Tetrachloroethylene	VOC	127184
Tolualdehydes	Carb	NA
Toluene	VOC	108883
1,1,2,2-Tetrachloroethane	VOC	79345
1,2,4-Trichlorobenzene	VOC	120821
1,1,1-Trichloroethane	VOC	71556
1,1,2-Trichloroethane	VOC	79005
Trichloroethylene	VOC	79016
Trichlorofluoromethane	VOC	75694
Trichlorotrifluoroethane	VOC	76131
1,2,4-Trimethylbenzene	VOC	95636
1,3,5-Trimethylbenzene	VOC	108678
Valeraldehyde	Carb	110623
Vinyl chloride	VOC	75014
m,p-Xylene	VOC	100016
o-Xylene	VOC	95476

Figure 1-1: Aerial view of monitoring area, including 4 monitors and surrounding counties

Figure 1-2: Aerial view of BATS monitoring area, close-up of 3 sites, Downtown Birmingham and National Weather Service Station at Birmingham Airport

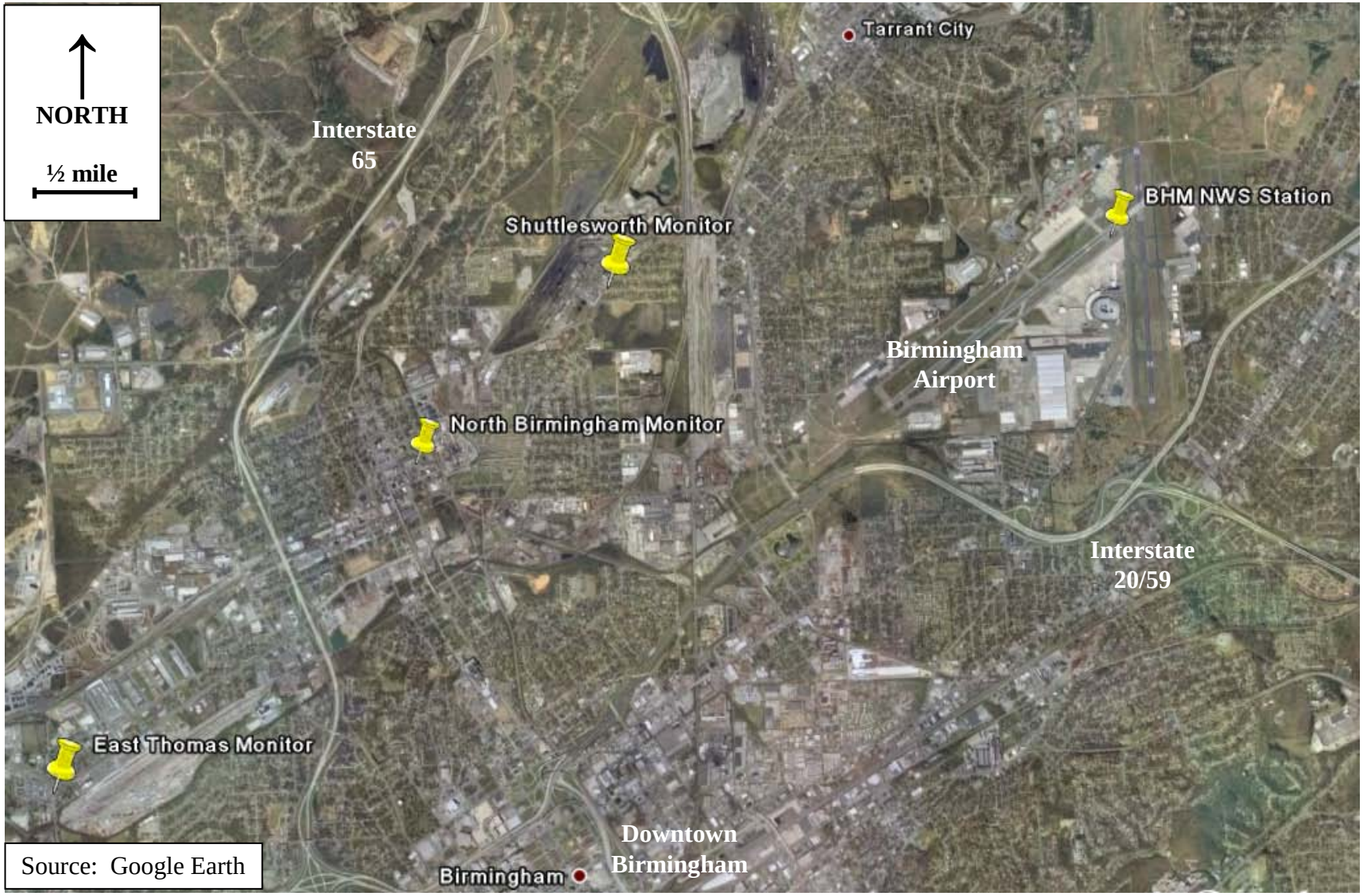
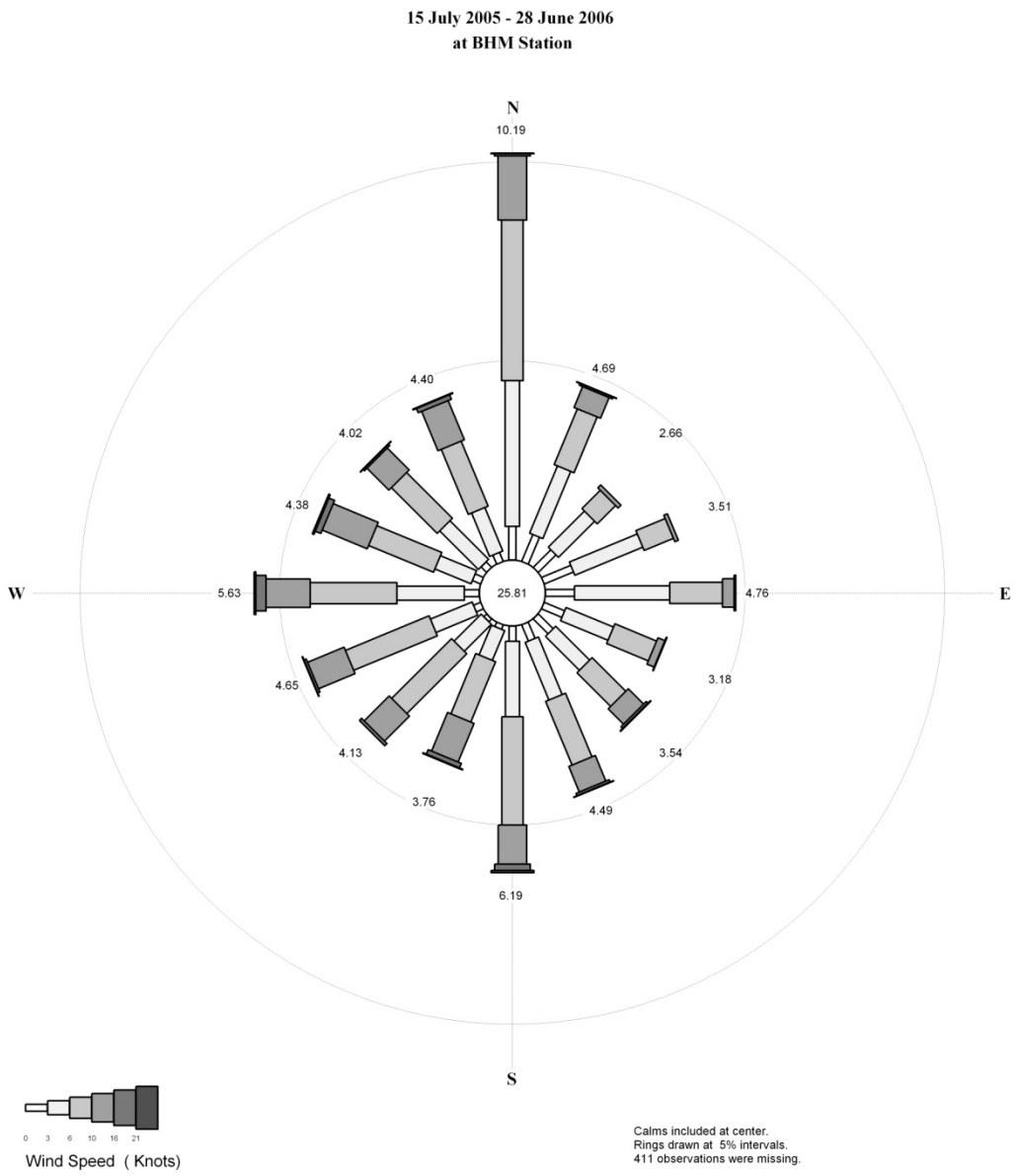


Figure 2-1: Wind Rose for BATS monitoring period, July 2005-June 2006



Source: National Weather Service

Table 2-1: Temperature readings for weather station at Birmingham Airport, July 2005-June 2006

Month	Avg High (ºF)	Avg Low (ºF)	Avg Temp (ºF)
July 2005	88.48	72.42	80.45
August 2005	89.97	72.58	81.28
September 2005	89.13	66.30	77.72
October 2005	75.29	51.90	63.60
November 2005	67.73	44.97	56.35
December 2005	52.77	31.94	42.36
January 2006	61.16	40.23	50.70
February 2006	54.50	35.36	44.93
March 2006	67.61	44.65	56.13
April 2006	79.73	55.83	67.78
May 2006	81.45	60.84	71.15
June 2006	91.30	67.03	79.17

Table 2-2: Historical temperature data for Birmingham area

Month	Avg High (ºF)	Avg Low (ºF)	Avg Temp (ºF)
July	90.6	69.7	80.15
August	90.2	68.9	79.55
September	84.6	63.0	73.80
October	74.9	50.9	62.90
November	64.5	41.8	53.15
December	56.0	35.2	45.60
January	52.8	32.3	42.55
February	58.3	35.4	46.85
March	66.5	42.4	54.45
April	74.1	48.4	61.25
May	81.0	57.6	69.30
June	87.5	65.4	76.45

Table 2-3: Deviation from historical temperature data, July 2005-June 2006

Month	Avg High (ºF)	Avg Low (ºF)	Avg Temp (ºF)
July 2005	-2.12	+2.72	+0.30
August 2005	-0.23	+3.68	+1.73
September 2005	+4.53	+3.30	+3.92
October 2005	+0.39	+1.00	+0.70
November 2005	+3.23	+3.17	+3.20
December 2005	-3.23	-3.26	-3.24
January 2006	+8.36	+7.93	+8.15
February 2006	-3.80	-0.04	-1.92
March 2006	+1.11	+2.25	+1.68
April 2006	+5.63	+7.43	+6.53
May 2006	+0.45	+3.24	+1.85
June 2006	+3.80	+1.63	+2.72

Source: National Weather Service

Table 2-4: Jefferson County population demographics, by racial group

Racial Group*	% of Total Population
White	58.10
Black	39.36
Asian/Pacific Islander	0.93
Native American	0.21
Other/Multiple	1.93

* Residents of Hispanic or Latin descent are included in their appropriate racial category listed above.

Table 2-5: Jefferson County population demographics, by age group

Age Group	% of Total Population
Under 18	24.8
18-24	9.6
25-44	29.7
45-64	22.3
65 or over	13.6

Source: United States Census (http://quickfacts.census.gov/qfd/states/01/01073.html)

Table 2-6: Chemicals detected at least once, sorted by total detects (at all sites)

ANALYTE	Type	Total Detections
1,1,1-Trichloroethane	VOC	124
Acetylene	VOC	124
Benzene	VOC	124
Carbon Tetrachloride	VOC	124
Chloromethane	VOC	124
Dichlorodifluoromethane	VOC	124
Ethylbenzene	VOC	124
m,p-Xylene	VOC	124
o-Xylene	VOC	124
Propylene	VOC	124
Toluene	VOC	124
Trichlorofluoromethane	VOC	124
Trichlorotrifluoroethane	VOC	124
Antimony	Metals	124
Arsenic	Metals	124
Beryllium	Metals	124
Cadmium	Metals	124
Chromium	Metals	124
Cobalt	Metals	124
Lead	Metals	124
Manganese	Metals	124
Nickel	Metals	124
Selenium	Metals	124
Acenaphthene	SVOC	123
Fluoranthene	SVOC	123
Fluorene	SVOC	123
Naphthalene	SVOC	123
Phenanthrene	SVOC	123
Pyrene	SVOC	123
Acetaldehyde	Carbonyl	122
Acetone	Carbonyl	122
Benzaldehyde	Carbonyl	122
Butyraldehyde	Carbonyl	122
Formaldehyde	Carbonyl	122
Hexaldehyde	Carbonyl	122
Propionaldehyde	Carbonyl	122
Valeraldehyde	Carbonyl	122
1,2,4-Trimethylbenzene	VOC	122
Crotonaldehyde	Carbonyl	121
Dichlorotetrafluoroethane	VOC	120
Tolualdehydes	Carbonyl	119
Dichloromethane	VOC	119
p-Dichlorobenzene	VOC	118
Chrysene	SVOC	117

ANALYTE	Type	Total Detections
1,3,5-Trimethylbenzene	VOC	116
Styrene	VOC	116
Acenaphthylene	SVOC	107
Benzo (k) fluoranthene	SVOC	105
Bromomethane	VOC	105
n-Octane	VOC	103
Benzo (a) anthracene	SVOC	100
Benzo (b) fluoranthene	SVOC	95
Hexavalent Chromium	Cr6	92
Anthracene	SVOC	92
1,3-Butadiene	VOC	92
Benzo (e) pyrene	SVOC	86
Methyl Ethyl Ketone	VOC	86
Benzo (a) pyrene	SVOC	84
Benzo (g,h,i) perylene	SVOC	84
Mercury	Metals	83
Chloroethane	VOC	81
Indeno(1,2,3-cd)pyrene	SVOC	79
Tetrachloroethylene	VOC	76
Methyl Isobutyl Ketone	VOC	74
Isovaleraldehyde	Carbonyl	70
Acrolein	VOC	68
Coronene	SVOC	66
Acetonitrile	VOC	65
Chloroform	VOC	58
Trichloroethylene	VOC	48
Perylene	SVOC	44
Dibenz (a,h) anthracene	SVOC	43
Hexachloro-1,3-butadiene	VOC	27
1,2,4-Trichlorobenzene	VOC	20
Methyl tert-Butyl Ether	VOC	20
Chlorobenzene	VOC	19
m-Dichlorobenzene	VOC	9
Vinyl chloride	VOC	6
Acrylonitrile	VOC	3
cis-1,2-Dichloroethylene	VOC	3
Chloromethylbenzene	VOC	2
o-Dichlorobenzene	VOC	2
tert-Amyl Methyl Ether	VOC	2
1,2-Dichloroethane	VOC	1
Ethyl Acrylate	VOC	1
Ethyl tert-Butyl Ether	VOC	1
Methyl Methacrylate	VOC	1

Table 2-7: Chemicals of Potential Concern (COPC) by monitoring site ("X" denotes a chemical observed in 10% or greater of samples at a particular site)

Type	Chemical	East Thomas	North Birmingham	Providence	Shuttlesworth
Carbonyl	Acetaldehyde	X	X	X	X
Carbonyl	Acetone	X	X	X	X
Carbonyl	Benzaldehyde	X	X	X	X
Carbonyl	Butyraldehyde	X	X	X	X
Carbonyl	Crotonaldehyde	X	X	X	X
Carbonyl	Formaldehyde	X	X	X	X
Carbonyl	Hexaldehyde	X	X	X	X
Carbonyl	Isovaleraldehyde	X	X	X	X
Carbonyl	Propionaldehyde	X	X	X	X
Carbonyl	Tolualdehydes	X	X	X	X
Carbonyl	Valeraldehyde	X	X	X	X
Cr6	Hexavalent Chromium	X	X	X	X
Metals	Antimony	X	X	X	X
Metals	Arsenic	X	X	X	X
Metals	Beryllium	X	X	X	X
Metals	Cadmium	X	X	X	X
Metals	Chromium	X	X	X	X
Metals	Cobalt	X	X	X	X
Metals	Lead	X	X	X	X
Metals	Manganese	X	X	X	X
Metals	Mercury	X	X	X	X
Metals	Nickel	X	X	X	X
Metals	Selenium	X	X	X	X
SVOC	Acenaphthene	X	X	X	X
SVOC	Acenaphthylene	X	X	X	X
SVOC	Anthracene	X	X	X	X
SVOC	Benzo (a) anthracene	X	X	X	X
SVOC	Benzo (a) pyrene	X	X	X	X
SVOC	Benzo (b) fluoranthene	X	X	X	X
SVOC	Benzo (e) pyrene	X	X	X	X
SVOC	Benzo (g,h,i) perylene	X	X	X	X
SVOC	Benzo (k) fluoranthene	X	X	X	X
SVOC	Chrysene	X	X	X	X
SVOC	Coronene	X	X		X
SVOC	Dibenz (a,h) anthracene	X	X		X
SVOC	Fluoranthene	X	X	X	X
SVOC	Fluorene	X	X	X	X
SVOC	Indeno(1,2,3-cd)pyrene	X	X	X	X
SVOC	Naphthalene	X	X	X	X
SVOC	Perylene	X	X		X
SVOC	Phenanthrene	X	X	X	X
SVOC	Pyrene	X	X	X	X

Type	Chemical	East Thomas	North Birmingham	Providence	Shuttlesworth
VOC	1,1,1-Trichloroethane	X	X	X	X
VOC	1,2,4-Trichlorobenzene	X	X	X	
VOC	1,2,4-Trimethylbenzene	X	X	X	X
VOC	1,3,5-Trimethylbenzene	X	X	X	X
VOC	1,3-Butadiene	X	X	X	X
VOC	Acetonitrile	X	X	X	X
VOC	Acetylene	X	X	X	X
VOC	Acrolein	X	X	X	X
VOC	Benzene	X	X	X	X
VOC	Bromomethane	X	X	X	X
VOC	Carbon Tetrachloride	X	X	X	X
VOC	Chlorobenzene		X		X
VOC	Chloroethane	X	X	X	X
VOC	Chloroform	X	X	X	X
VOC	Chloromethane	X	X	X	X
VOC	Dichlorodifluoromethane	X	X	X	X
VOC	Dichloromethane	X	X	X	X
VOC	Dichlorotetrafluoroethane	X	X	X	X
VOC	Ethylbenzene	X	X	X	X
VOC	Hexachloro-1,3-butadiene	X	X	X	X
VOC	m,p-Xylene	X	X	X	X
VOC	Methyl Ethyl Ketone	X	X	X	X
VOC	Methyl Isobutyl Ketone	X	X	X	X
VOC	Methyl tert-Butyl Ether	X	X		X
VOC	n-Octane	X	X	X	X
VOC	o-Xylene	X	X	X	X
VOC	p-Dichlorobenzene	X	X	X	X
VOC	Propylene	X	X	X	X
VOC	Styrene	X	X	X	X
VOC	Tetrachloroethylene	X	X	X	X
VOC	Toluene	X	X	X	X
VOC	Trichloroethylene	X	X	X	X
VOC	Trichlorofluoromethane	X	X	X	X
VOC	Trichlorotrifluoroethane	X	X	X	X

Table 7-1: Individual Chemicals and Monitoring Sites Risks and Hazards Evaluation

Threshold	East Thomas	North Birmingham	Providence	Shuttlesworth
Greater than 1 x 10^{-6}, but less than 1 x10^{-4}(Risk, Chronic)	1,3 Butadiene, Acetaldehyde, Arsenic, Benzene, Cadmium, Carbon Tetrachloride, Naphthalene, p-Dichlorobenzene, Tetrachloroethylene	1,3 Butadiene, Acetaldehyde, Arsenic, Benzene, Benzo(a)anthracene, Benzo (a) pyrene, Cadmium, Carbon Tetrachloride, Dibenz(a,h) anthracene, Naphthalene, p-Dichlorobenzene, Tetrachloroethylene	1,3 Butadiene, Acetaldehyde, Arsenic, Benzene, Carbon Tetrachloride, p-Dichlorobenzene	1,3 Butadiene, Acetaldehyde, Arsenic, Benzene, Benzo (a) pyrene, Berrylium, Carbon Tetrachloride, Hexavalent Chromium, Naphthalene, p-Dichlorobenzene, Tetrachloroethylene
Greater than or equal to 1 x 10^{-4} (Risk,Chronic)	None	None	None	None
Site, Greater than 1 x 10^{-6} but less than 1 x 10^{-4}(Risk, Chronic)	Yes	Yes	Yes	Yes
Site, Greater than or equal to 1 x 10^{-4} (Risk, Chronic)	No	No	No	Yes
Greater than 1 (Hazard, Chronic)	Acrolein, Acetonitrile, Manganese	Acrolein, Manganese	Acrolein	Acrolein, Acetonitrile, Manganese
Site, Greater than 1 (Hazard, Chronic)	Yes	Yes	Yes	Yes
Greater than 1 (Hazard, Acute)	No	No	No	Yes
Cumulative, Greater than 1 (Hazard, Acute)	No	No	Yes	Yes

Appendix A

Monitoring Data, As Reported

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
Carbonyl	Acetaldehyde	75070	0.007206544	1.3350	2.1620	1.7422	1.2539	2.8286	2.5043	3.1348	0.8486	1.1765	4.2879	2.5043	2.0719	1.7440	---	2.2160	1.4215	1.6467	1.6683	0.9567
Carbonyl	Acetone	67641	0.016628221	0.6913	1.1901	1.5821	0.9739	1.7745	1.9883	2.7318	0.4703	1.0119	3.0406	2.2757	2.5180	2.6130	---	5.6298	2.8030	2.3992	4.4896	0.7316
Carbonyl	Benzaldehyde	100527	0.008680573	0.1866	0.2474	0.1693	0.2040	0.2951	0.2604	0.2821	0.1302	0.1345	0.4123	0.2127	0.1953	0.1476	---	0.2517	0.1519	0.1866	0.2561	0.1606
Carbonyl	Butyraldehyde	123728	0.002949284	0.2153	0.3510	0.2448	0.2831	0.5545	0.4041	0.4660	0.1681	0.1150	0.6400	0.4689	0.2684	0.2802	---	0.5220	0.2536	0.3097	0.4424	0.1475
Carbonyl	Crotonaldehyde	123739	0.002866667	1.1696	2.1987	1.6139	1.2843	3.4400	1.2929	1.5136	0.8055	0.2035	0.7625	0.2981	0.1978	0.1290	---	0.1835	0.1032	0.1491	0.1663	0.1319
Carbonyl	Formaldehyde	50000	0.006141104	3.9794	6.3867	5.2445	3.8075	8.8923	5.3796	6.8043	2.6775	1.7318	6.9763	4.3847	3.5987	3.7952	---	3.2916	2.7758	3.2548	3.1320	1.8669
Carbonyl	Hexaldehyde	66251	0.008193047	0.1229	0.1884	0.1065	0.2007	0.2458	0.2704	0.3523	0.1188	0.0819	0.4301	0.2007	0.1475	0.1106	---	0.1065	0.0860	0.1229	0.1475	0.0655
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	0.0634	ND	ND	0.0634	0.0986	0.0845	ND	ND	0.0916	0.0458	0.0423	0.0458	---	0.0564	0.0387	ND	0.0599	ND
Carbonyl	Propionaldehyde	123386	0.00475092	0.2803	0.4513	0.3064	0.2399	0.6057	0.5179	0.6841	0.1829	0.1924	0.8694	0.4751	0.4300	0.3231	---	0.2993	0.2661	0.2969	0.2779	0.1615
Carbonyl	Tolualdehydes	NA	0.009828221	0.1573	0.8010	0.4619	0.1769	0.2555	0.2899	0.4177	0.1376	0.1179	0.5209	0.3391	0.2162	0.1966	---	0.4226	0.1622	0.3145	0.3096	0.1917
Carbonyl	Valeraldehyde	110623	0.003522699	0.1233	0.1726	0.1162	0.2184	0.2360	0.2431	0.2783	0.1092	0.0740	0.4051	0.1937	0.2431	0.1268	---	0.1585	0.1656	0.1233	0.1550	0.0775
Cr6	Hexavalent Chromium	18540299	0.0111	0.0215	0.0591	0.0276	0.0450	0.0256	ND	0.0553	ND	0.0253	ND	ND*	0.0499	0.0150	---	0.0405	0.0301		0.0463	
Metals	Antimony	7440360	0.029	1.4000	1.4500	1.7900	1.2000	2.1800	1.7700	2.4000	0.2900	0.9600	3.7400	1.8700	1.1400	1.0900	---	2.1900	1.2900	1.4300	4.0400	0.8430
Metals	Arsenic	7440382	0.022	0.9600	1.9900	2.0200	1.4100	3.0100	2.7300	3.2500	0.4900	1.3700	2.3900	1.9600	0.7600	0.4600	---	2.7700	1.2900	1.2000	2.3000	0.5580
Metals	Beryllium	7440417	0.025	0.0200	0.0300	0.0400	0.0200	0.0300	0.0300	0.0600	0.0080	0.0400	0.0700	0.0500	0.0200	0.0100	---	0.0900	0.0200	0.0200	0.0300	0.0080
Metals	Cadmium	7440439	0.019	0.1500	1.2100	0.8300	0.2800	0.3000	0.7200	0.6300	0.1400	0.2000	1.0700	0.6700	0.2000	0.1800	---	0.8800	0.4800	0.2700	0.4900	0.2710
Metals	Chromium	7440473	0.509	3.3600	4.1700	5.0200	3.4200	5.0400	5.1200	4.2600	2.2700	4.0200	8.5300	5.5100	2.9400	2.7000	---	5.2100	3.2400	4.0400	5.6800	4.5500
Metals	Cobalt	7440484	0.022	0.1800	0.2400	0.3000	0.1700	0.2800	0.3500	0.4300	0.1000	0.2400	0.6100	0.3700	0.1800	0.1400	---	0.4000	0.1600	0.1800	0.3000	0.0870
Metals	Lead	7439921	0.068	6.8600	16.5000	24.9000	11.0000	35.1000	12.1000	12.1000	5.2000	7.2900	37.7000	14.8000	7.0800	3.3300	---	27.6000	15.7000	12.0000	12.5000	4.5700
Metals	Manganese	7439965	0.125	28.3000	49.9000	92.4000	45.5000	62.1000	72.3000	57.5000	13.0000	49.6000	127.0000	81.3000	28.7000	15.6000	---	103.0000	30.0000	37.7000	46.6000	14.1000
Metals	Mercury	7439976	0.212	0.0300	ND	ND	ND	ND	ND	0.0100	0.0500	0.1600	1.0100	0.0200	0.0100	0.0100	---	0.0100	0.0100	ND	ND	ND
Metals	Nickel	7440020	0.184	2.5700	1.8400	2.1700	1.6200	1.9600	2.3500	2.4700	2.7500	4.9800	4.2600	3.0800	1.6600	1.5900	---	2.4100	1.5600	1.9400	1.8100	0.9870
Metals	Selenium	7782492	0.027	0.4300	0.5800	1.1200	0.6400	1.0600	0.5700	1.4200	0.2900	0.7900	1.2900	0.9400	0.5400	0.4800	---	1.0600	1.1500	0.4700	0.6000	0.2580
SVOC	Acenaphthene	83329	0.000188	8.0000	34.1000	---	14.0000	16.7000	22.6000	32.6000	5.8600	3.7300	44.0000	19.7000	45.1000	2.7800	4.6200	9.5100	---	4.3300	9.2400	---
SVOC	Acenaphthylene	208968	0.000206	4.1000	8.4500	---	2.1500	6.0900	10.8000	11.3000	1.7100	3.0000	15.0000	17.8000	6.9500	4.1600	12.0000	41.0000	---	3.2200	12.4000	---
SVOC	Anthracene	120127	0.00013	0.8000	2.0400	---	0.8170	0.9490	2.6100	1.5400	0.4270	0.4490	3.9600	6.6200	27.4000	10.6000	2.3500	13.3000	---	0.9120	2.9600	---
SVOC	Benzo (a) anthracene	56553	0.000114	0.0667	0.3620	---	0.1480	0.0982	0.5630	0.1710	0.0388	0.0690	0.1300	7.4200	0.2080	0.1170	0.5680	0.0604	---	0.3580	1.9100	---
SVOC	Benzo (a) pyrene	50328	0.000161	0.0333	0.2300	---	0.1110	0.0655	0.3870	0.1030	ND	0.0690	ND	3.5300	0.0832	0.0878	0.3410	0.0302	---	0.1950	0.9750	---
SVOC	Benzo (b) fluoranthene	205992	0.000124	0.0667	0.4270	---	0.1860	0.0982	0.5630	0.1370	ND	0.0690	ND	6.0500	ND	0.1460	0.3410	ND	---	0.3580	1.0100	---
SVOC	Benzo (e) pyrene	192972	0.0000809	0.1000	0.3940	---	0.2230	0.0982	0.5280	0.1710	ND	0.1040	ND	4.7700	ND	0.1170	0.2650	ND	---	0.2610	0.6500	---
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	0.2330	0.3290	---	0.1860	0.1310	0.2820	0.2390	ND	0.2070	ND	2.6900	ND	0.1760	0.4920	ND	---	0.4230	0.8300	---
SVOC	Benzo (k) fluoranthene	207089	0.0000893	0.2330	0.4930	---	0.3710	0.1310	0.6690	0.2730	0.0776	0.1380	ND	5.7800	0.0416	0.1170	0.3410	ND	---	0.3260	0.9390	---
SVOC	Chrysene	218019	0.000109	0.2000	0.7560	---	0.4080	0.2290	0.9150	0.4100	0.1550	0.1730	0.3040	11.3000	0.5410	0.2930	0.7950	0.1210	---	0.7160	2.1700	---

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/18/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/28/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
Carbonyl	Acetaldehyde	75070	0.007206544	1.2161	1.6143	2.0899	1.1008	---	1.5008	2.6664	---	2.1620	1.6917	1.5530	---	3.3330	---	---	1.9638	2.8466	2.3782
Carbonyl	Acetone	67641	0.016628221	1.6011	1.3374	1.7222	0.7388	---	2.5893	6.3900	---	1.4490	2.0001	1.9099	---	2.2211	---	---	1.4514	1.9503	2.6130
Carbonyl	Benzaldehyde	100527	0.008680573	0.1649	0.1693	0.1910	0.1128	---	0.1997	0.3472	---	0.2517	0.1649	0.1780	---	0.3689	---	---	0.2300	0.2474	0.3082
Carbonyl	Butyraldehyde	123728	0.002949284	0.1829	0.2536	0.3185	0.1740	---	0.2507	0.4896	---	0.3805	0.2684	0.1770	---	0.5840	---	---	0.3185	0.3598	0.4217
Carbonyl	Crotonaldehyde	123739	0.002866667	0.1519	0.1118	0.1319	0.0889	---	0.1577	0.2265	---	0.7339	0.6020	0.4042	---	1.8261	---	---	1.0893	2.3679	1.3359
Carbonyl	Formaldehyde	50000	0.006141104	3.2793	4.2005	4.8392	2.6652	---	4.7532	5.7849	---	5.1708	4.7164	5.0848	---	8.8555	---	---	5.5270	11.6313	7.4921
Carbonyl	Hexaldehyde	66251	0.008193047	0.0655	0.0860	0.1188	0.0983	---	0.0737	0.2704	---	0.2048	0.1106	0.1024	---	0.3482	---	---	0.2130	0.1762	0.1843
Carbonyl	Isovaleraldehyde	590863	0.003522699	0.0387	0.0423	0.0352	0.0282	---	0.0317	0.0599	---	0.0669	0.0458	ND	---	0.1127	---	---	0.1092	0.0599	0.0528
Carbonyl	Propionaldehyde	123386	0.00475092	0.2043	0.2827	0.3896	0.1995	---	0.2661	0.4751	---	0.3872	0.3136	0.2518	---	0.6437	---	---	0.3991	0.5060	0.4276
Carbonyl	Tolualdehydes	NA	0.009828221	0.2211	0.1720	0.2752	0.1376	---	0.2359	0.3784	---	0.1523	0.2260	0.1573	---	0.4963	---	---	0.4030	0.7715	0.5111
Carbonyl	Valeraldehyde	110623	0.003522699	0.1127	0.1268	0.1127	0.0951	---	0.1057	0.4403	---	0.2290	0.1480	0.0881	---	0.2783	---	---	0.2043	0.2642	0.2889
Cr6	Hexavalent Chromium	18540299	0.0111	0.0033	0.0271	0.0468	ND	---	0.0172	0.0633	0.0144	0.0452	0.0156	0.0194	0.0468	0.0645	---	---	0.0168	0.0433	0.1450
Metals	Antimony	7440360	0.029	0.6830	0.8990	2.5600	0.9340	---	1.8000	3.5800	---	1.4700	0.7860	1.1400	---	3.1600	---	---	2.6300	1.6900	1.8800
Metals	Arsenic	7440382	0.022	0.5720	0.6450	1.0900	0.3180	---	1.1300	2.3600	---	0.8140	1.1500	0.5230	---	2.3300	---	---	1.8100	2.1800	2.3600
Metals	Beryllium	7440417	0.025	0.0090	0.0220	0.0370	0.0100	---	0.0350	0.0390	---	0.0310	0.0290	0.0340	---	0.0400	---	---	0.0260	0.0610	0.0590
Metals	Cadmium	7440439	0.019	0.1420	0.1560	0.5080	0.1050	---	0.2620	0.6270	---	0.5550	0.3720	0.3370	---	0.4150	---	---	0.2840	0.5420	0.8530
Metals	Chromium	7440473	0.509	4.5400	5.0100	7.6400	3.8400	---	5.8600	7.7800	---	6.5400	5.6900	5.9400	---	5.7700	---	---	5.5200	5.3200	6.3700
Metals	Cobalt	7440484	0.022	0.1020	0.1950	0.3730	0.1080	---	0.2960	0.4000	---	0.2880	0.2570	0.2430	---	0.3940	---	---	0.2080	0.5120	0.4110
Metals	Lead	7439921	0.068	3.5300	8.4600	12.1000	3.3400	---	9.4200	12.5000	---	23.4000	9.3900	11.0000	---	41.3000	---	---	11.1000	17.0000	28.4000
Metals	Manganese	7439965	0.125	13.7000	33.9000	57.5000	11.3000	---	33.5000	65.3000	---	67.4000	43.8000	40.7000	---	142.0000	---	---	41.8000	105.0000	82.7000
Metals	Mercury	7439976	0.212	ND	ND	0.0120	0.2320	---	0.1210	0.0470	---	0.0610	0.6860	ND	---	0.2980	---	---	0.2900	0.2040	0.0050
Metals	Nickel	7440020	0.184	0.8710	1.6600	1.7300	1.4000	---	1.3900	3.0100	---	1.8400	1.4900	1.0900	---	1.9500	---	---	1.6100	1.4800	2.4300
Metals	Selenium	7782492	0.027	0.8760	0.3520	0.6930	0.4460	---	0.5340	0.9600	---	0.6930	1.5000	0.3510	---	1.0500	---	---	0.6640	1.4300	0.6280
SVOC	Acenaphthene	83329	0.000188	1.6100	7.2800	6.7700	12.6000	---	1.7400	32.5000	---	7.7700	10.1000	1.1100	2.9200	---	24.1000	30.7000	7.3400	16.1000	13.5000
SVOC	Acenaphthylene	208968	0.000206	2.2900	0.8500	5.5700	1.3700	---	3.7500	11.5000	---	1.3900	0.3140	0.4360	2.0500	---	6.1400	4.9100	1.3100	0.7800	3.2600
SVOC	Anthracene	120127	0.00013	14.2000	ND	1.1100	0.7440	---	1.1400	3.2700	---	0.8430	0.3770	ND	ND	---	87.2000	ND	0.6740	0.7020	1.6500
SVOC	Benzo (a) anthracene	56553	0.000114	0.1790	0.1210	0.3000	0.0392	---	0.2010	1.6900	---	0.0733	0.0628	0.0793	0.1190	---	2.1300	0.3840	0.0397	0.1170	0.6720
SVOC	Benzo (a) pyrene	50328	0.000161	ND	ND	0.2140	ND	---	0.7040	1.6200	---	0.4030	0.6280	0.0793	0.1190	---	1.5400	0.3840	0.1590	0.1170	0.4030
SVOC	Benzo (b) fluoranthene	205992	0.000124	0.2150	0.1620	0.3860	0.0783	---	0.2680	2.2300	---	0.0733	0.1260	0.0793	0.1190	---	2.6400	0.5380	0.0793	0.1170	0.5380
SVOC	Benzo (e) pyrene	192972	0.0000809	0.1790	0.1210	0.3000	ND	---	0.2350	1.5800	---	0.0733	0.1260	0.0793	0.1190	---	2.0000	0.4220	0.0793	0.1170	0.4370
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	0.2860	0.2020	0.4290	0.0783	---	0.5360	1.2600	---	0.1470	0.1260	0.0793	0.1580	---	1.0700	0.2690	0.1190	0.1170	0.3360
SVOC	Benzo (k) fluoranthene	207089	0.0000893	0.1790	0.1620	0.3860	0.0392	---	0.1680	1.6900	---	0.0733	0.0628	0.0397	0.0790	---	2.2600	0.3840	0.0793	0.0780	0.4710
SVOC	Chrysene	218019	0.000109	0.3220	0.2830	0.6000	0.1960	---	0.3350	3.2000	---	0.2200	0.1880	0.1590	0.1980	---	3.5000	1.0400	0.1980	0.3120	1.0800

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
SVOC	Coronene	191071	0.0000738	0.2000	0.1640	---	0.1110	0.0982	ND	ND	ND	ND	ND	0.6180	ND	0.0878	0.2650	ND	---	0.1950	0.3970	---
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	ND	---	ND	ND	ND	ND	ND	ND	ND	0.7950	ND	0.0293	0.0379	ND	---	0.0651	0.1440	---
SVOC	Fluoranthene	206440	0.000132	5.0700	13.0000	---	8.2000	6.7100	8.1000	10.3000	4.1500	2.3100	11.3000	20.2000	6.4900	1.7900	2.1600	5.8900	---	2.3400	3.3200	---
SVOC	Fluorene	86737	0.000318	6.5300	23.2000	---	11.1000	12.3000	17.0000	23.3000	4.9700	5.1100	33.3000	25.3000	18.9000	5.0300	6.8900	18.6000	---	5.0500	9.4900	---
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	ND	0.3290	---	0.1860	0.0982	0.3520	ND	ND	ND	ND	3.4000	0.0416	0.1460	0.3410	0.0302	---	0.3580	0.8660	---
SVOC	Naphthalene	91203	0.000682	80.8000	425.0000	---	97.5000	100.0000	175.0000	330.0000	45.1000	74.4000	776.0000	1280.0000	316.0000	116.0000	258.0000	295.0000	---	227.0000	373.0000	---
SVOC	Perylene	198550	0.000107	ND	0.0329	---	ND	ND	0.0704	ND	ND	ND	ND	1.4600	ND	ND	0.0757	ND	---	0.0651	0.2890	---
SVOC	Phenanthrene	85018	0.000124	13.7000	53.2000	---	26.8000	22.8000	27.6000	31.6000	11.2000	8.1800	48.0000	53.5000	18.6000	7.2000	9.8100	40.5000	---	10.5000	15.2000	---
SVOC	Pyrene	129000	0.000161	3.6700	9.5000	---	4.6400	4.3900	5.2100	6.7300	2.4500	2.1100	7.8700	13.6000	4.4500	1.7900	2.5000	3.5000	---	1.9500	3.0300	---
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1637	0.2183	0.1091	0.1091	0.2183	0.2183	0.2728	0.1091	0.1637	0.2183	0.1637	0.1637	0.1637	---	0.1637	0.2183	0.1637	0.1091	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	0.1484	ND	ND	0.0742	0.1484	0.1484	0.2226	ND	---	ND	0.1484	ND	ND	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.9340	2.0646	0.7865	0.3441	2.0646	1.5239	2.5070	0.2458	0.9340	3.5393	1.6222	0.8848	0.5407	---	1.1798	0.6882	1.1306	2.9494	0.7865
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.2949	0.5407	0.1966	0.0983	0.4916	0.2949	0.5899	0.0983	0.1966	0.8848	0.4916	0.1966	0.1475	---	0.3441	0.1966	0.3441	0.8357	0.1475
VOC	1,3-Butadiene	106990	0.01327362	0.2655	0.2433	0.1770	0.0664	0.3540	0.1991	0.3540	0.0221	0.1106	0.6416	0.4203	0.1327	0.1549	---	0.3318	0.1106	0.3318	0.5752	0.1106
VOC	Acetonitrile	75058	0.166214724	ND	ND	90.4947	250.1616	ND	ND	ND	ND	ND	ND	1.7125	1.4439	ND	---	2.5688	2.2666	ND	ND	ND
VOC	Acetylene	74862	0.024495706	2.4176	15.5494	2.5561	0.4367	4.3773	28.8623	9.1912	0.3302	9.2019	7.0612	3.8980	7.6895	2.5454	---	42.8142	2.1727	5.7512	5.3039	5.1228
VOC	Acrolein	107028	0.245334151		ND	2.6138	0.7108	ND	ND	ND	ND	ND	ND	1.7655	1.4674	ND	---	1.9031	1.4445	0.3669	0.1834	ND
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Benzene	71432	0.015977505	1.9173	4.4098	2.1410	0.9906	4.1222	5.2087	5.2726	0.5432	2.2049	6.9342	8.5000	2.2049	1.2782	---	5.2726	1.7256	2.3327	4.1542	1.8214
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Bromomethane	74839	0.038830266	ND	ND	0.0388	0.0388	0.0777	0.0388	0.0388	ND	0.0388	0.0777	0.0388	0.0388	0.0388	---	0.0388	0.0388	0.0388	ND	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.8808	0.6920	0.6920	0.6291	0.6920	0.5662	0.6291	0.8808	0.6291	0.6291	0.6291	0.6291	0.8808	---	0.6920	0.8179	0.6920	0.5662	0.4404
VOC	Chlorobenzene	108907	0.023018405	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0460	0.0460	ND	---	ND	ND	ND	ND	ND
VOC	Chloroethane	75003	0.021110838	ND	ND	0.0264	ND	0.0528	0.0528	0.0528	ND	0.0264	0.0264	0.0264	0.0264	0.0264	---	0.0264	0.0264	0.0264	ND	ND
VOC	Chloroform	67663	0.01953047	ND	ND	0.0977	ND	0.2441	0.2441	0.3906	ND	0.0977	0.2930	0.1465	0.0977	ND	---	0.0977	0.0977	ND	0.0977	0.0488

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/18/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/28/2006
SVOC	Coronene	191071	0.0000738	0.1430	0.0809	0.1290	ND	---	0.3020	0.4310	---	0.1100	ND	0.0793	0.1190	---	0.3410	0.1540	0.1190	ND	0.1680
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	ND	ND	ND	---	ND	0.2510	---	ND	ND	ND	ND	---	0.2990	0.0768	ND	ND	0.0672
SVOC	Fluoranthene	206440	0.000132	1.5800	3.2000	3.4700	4.6200	---	1.6100	8.4000	---	3.2300	3.8900	0.7930	1.1100	---	9.6400	8.4900	3.1300	6.8600	5.2800
SVOC	Fluorene	86737	0.000318	4.6500	6.5600	7.3300	9.7100	---	4.2600	18.8000	---	7.1900	8.1000	2.0600	2.9200	---	18.7000	21.5000	6.0300	12.6000	11.3000
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	0.2150	0.2430	0.3860	ND	---	0.3690	1.2600	---	0.1470	0.1880	0.0793	0.1190	---	1.2800	0.2690	0.0793	0.1170	0.3030
SVOC	Naphthalene	91203	0.000682	154.0000	103.0000	204.0000	89.0000	---	128.0000	459.0000	---	185.0000	96.2000	63.4000	113.0000	---	509.0000	569.0000	181.0000	152.0000	257.0000
SVOC	Perylene	198550	0.000107	ND	ND	0.0857	ND	---	ND	0.2150	---	ND	ND	ND	ND	---	0.4690	0.0768	ND	ND	0.1680
SVOC	Phenanthrene	85018	0.000124	9.4500	11.1000	12.9000	13.7000	---	8.7800	36.7000	---	14.8000	18.1000	4.6400	7.3900	---	63.9000	64.7000	14.6000	35.0000	25.0000
SVOC	Pyrene	129000	0.000161	2.1100	2.3900	3.3900	2.6200	---	2.0100	5.4200	---	2.0900	1.7600	0.8330	1.0700	---	4.6500	4.4900	1.8200	3.4300	3.2900
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1091	0.1091	0.1637	---	0.1091	0.1091	0.1637	---	0.1637	0.1637	0.1091	---	0.1637	---	---	0.1637	0.1637	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	0.1484	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.9831	0.6390	1.0323	---	0.4424	1.1798	1.4747	---	1.1798	0.2458	0.8848	---	1.8188	---	---	1.0815	0.4916	0.4916
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.2949	0.1475	0.2949	---	0.1475	0.3441	0.3933	---	0.2949	0.0492	0.1966	---	0.5407	---	---	0.2458	0.0983	0.0983
VOC	1,3-Butadiene	106990	0.01327362	0.2655	0.1770	0.3097	---	0.1327	0.3097	0.5309	---	0.1991	ND	0.1991	---	0.5309	---	---	0.1770	0.0885	0.0885
VOC	Acetonitrile	75058	0.166214724	ND	ND	ND	---	ND	0.2183	0.3526	---	ND	ND	ND	---	ND	---	---	ND	0.4197	ND
VOC	Acetylene	74862	0.024495706	1.6614	1.3739	2.5135	---	1.7467	4.7181	14.4844	---	1.4484	0.5006	1.7467	---	11.9283	---	---	5.9216	0.9585	42.2817
VOC	Acrolein	107028	0.245334151	ND	ND	0.4586	---	0.3669	0.5961	0.6420	---	ND	ND	0.8254	---	1.0547	---	---	0.6649	0.7566	0.3439
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Benzene	71432	0.015977505	1.5978	1.8214	3.2275	---	1.4699	2.0451	4.0263	---	2.5884	0.6071	1.2782	---	4.0263	---	---	2.2049	1.4060	2.5884
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Bromomethane	74839	0.038830266	0.0388	0.0777	0.0388	---	0.0388	0.0388	0.0388	---	0.0777	0.0777	0.0388	---	0.0777	---	---	0.0388	0.0777	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.5662	0.5033	0.6291	---	0.7549	0.6291	0.5662	---	0.6920	0.7549	0.5662	---	0.6291	---	---	0.8808	1.0695	0.6920
VOC	Chlorobenzene	108907	0.023018405	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Chloroethane	75003	0.021110838	ND	ND	0.0528	---	0.0528	0.0264	0.0264	---	ND	ND	ND	---	ND	---	---	0.0264	ND	0.0264
VOC	Chloroform	67663	0.01953047	0.0488	0.0488	0.0977	---	ND	ND	0.1465	---	ND	ND	ND	---	ND	---	---	0.2441	0.1465	ND

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
VOC	Chloromethane	74873	0.028910429	1.5075	1.4662	1.6727	1.5075	1.7140	1.5075	1.3836	1.8172	1.1771	1.3836	1.2803	1.2597	1.4455	---	1.2184	1.3629	1.2390	1.0532	0.9912
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	3.2144	3.4122	2.8188	2.9671	3.2144	3.2638	3.1649	3.2144	2.9177	3.3133	3.2144	3.2638	3.2144	---	3.8573	4.0551	2.9177	3.0166	2.5715
VOC	Dichloromethane	75092	0.059051534	0.3126	0.3821	0.2432	0.2432	0.4168	0.7989	0.5905	0.2432	0.2432	1.0768	0.3474	0.2779	ND	---	0.2084	0.1389	0.2779	0.2432	0.1389
VOC	Dichlorotetrafluoroethane	76142	0.020971779	ND	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.1398	0.1398	0.1398	0.0699
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	0.1228	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Ethylbenzene	100414	0.021711656	0.8250	2.1277	0.8685	0.5211	2.1712	2.1712	2.9094	0.2605	1.3027	3.5173	1.4764	1.3461	0.5211	---	1.6935	0.6513	0.9119	1.6935	0.6948
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	ND	ND	ND	ND	ND	0.1067	ND	ND	0.1067	0.1067	0.2133	0.2133	ND	---	0.2133	0.2133	ND	0.2133	0.2133
VOC	m,p-Xylene	100016	0.039080982	1.9106	5.2108	1.7369	0.8250	4.7766	4.8200	6.8609	0.4777	3.2133	9.1623	4.1686	3.3436	1.2159	---	5.4713	1.7804	2.8659	5.6016	1.9540
VOC	m-Dichlorobenzene	541731	0.02404908	ND	ND	ND	ND	ND	ND	ND	ND	0.0601	ND	ND	ND	ND	---	ND	ND	ND	0.0601	ND
VOC	Methyl Ethyl Ketone	78933	0.129768507	2.4184	1.8875	3.6571	2.5954	1.7696	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	0.9733	1.5041	1.1207
VOC	Methyl Isobutyl Ketone	108101	0.028675665	ND	ND	0.2048	ND	ND	ND	ND	ND	ND	0.4506	ND	ND	ND	---	ND	ND	0.2868	0.4916	0.2048
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	2.6679	2.4516	2.9203	0.5769	3.7135	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	0.2163	ND
VOC	n-Octane	111659	0.028031902	0.2336	2.1958	0.3270	0.2336	0.7475	2.7098	1.4950	ND	0.9344	1.6352	1.0746	1.0746	0.1869	---	5.6531	0.5139	0.3270	1.7754	0.4672
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	0.1804	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	o-Xylene	95476	0.017369325	0.9987	2.4317	0.7816	0.4342	2.3883	2.3883	3.4739	0.2605	1.5198	4.1686	1.8238	1.4764	0.6079	---	2.2146	0.8685	1.1290	2.1712	0.8250
VOC	p-Dichlorobenzene	106467	0.03607362	0.2405	0.4810	ND	0.1804	0.5411	0.4810	0.6012	0.2405	0.2405	0.8417	0.6012	0.3006	0.1202	---	0.1804	0.1202	0.3006	0.3006	0.1804
VOC	Propylene	115071	0.015489571	1.4285	2.3406	1.4113	0.6712	2.5644	2.6504	3.7519	0.3442	0.9122	4.3027	3.0979	1.5317	1.0843	---	3.4249	1.3424	1.7899	3.0291	0.8089
VOC	Styrene	100425	0.042597137	0.4686	0.6390	0.2982	0.1704	0.5538	0.4686	0.4686	0.1278	0.2982	1.6187	1.3205	0.4260	0.1704	---	0.9797	0.2130	0.5112	1.3205	0.2130
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	0.0836	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Tetrachloroethylene	127184	0.074606544	0.2035	0.5426	0.6782	0.0678	0.2713	0.5426	0.8139	ND	0.2035	1.0852	0.2713	0.5426	0.1356	---	0.4069	ND	0.2713	0.8139	0.6104
VOC	Toluene	108883	0.018842536	3.2032	8.9690	3.7308	2.3365	11.1925	9.7604	13.6420	1.0929	6.5949	16.5437	8.1777	5.0121	2.1857	---	6.3688	2.6380	3.9569	7.0848	3.0902
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
VOC	Trichloroethylene	79016	0.053738241	ND	0.2150	ND	ND	ND	0.3762	0.1612	ND	0.1075	0.1612	0.1075	0.2150	ND	---	0.3762	0.1612	0.1612	0.2687	0.1075
VOC	Trichlorofluoromethane	75694	0.039328834	1.6855	2.0226	1.4608	1.6293	1.5170	1.9664	1.5170	1.5170	1.4046	1.5170	1.6293	1.6855	1.8541	---	2.3035	2.2474	1.6855	1.5170	1.4046
VOC	Trichlorotrifluoroethane	76131	0.091965644	2.1459	1.8393	0.8430	0.9197	1.7627	1.7627	1.7627	1.9926	1.6860	2.0692	2.2991	1.8393	2.3758	---	1.8393	1.6094	2.3758	1.3795	1.6094
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND

Table A-1: Analytical Data
East Thomas Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/18/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/28/2006
VOC	Chloromethane	74873	0.028910429	1.2390	1.2184	1.4868	---	1.4662	0.9706	1.1151	---	1.0945	0.8880	1.3216	---	1.3216	---	---	1.2390	1.4042	1.3423
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	2.9177	2.7199	3.1155	---	3.2144	2.3737	2.7199	---	2.6704	3.3133	3.0660	---	4.0056	---	---	2.8682	3.6100	2.7199
VOC	Dichloromethane	75092	0.059051534	0.1737	0.2084	0.3474	---	0.2779	0.2084	0.4168	---	0.2432	0.3126	0.2432	---	0.5210	---	---	0.4863	0.5905	0.2432
VOC	Dichlorotetrafluoroethane	76142	0.020971779	0.1398	0.1398	0.1398	---	0.1398	0.1398	0.1398	---	0.1398	0.1398	0.1398	---	0.1398	---	---	0.1398	0.1398	0.1398
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Ethylbenzene	100414	0.021711656	0.6079	0.4777	0.7816	---	0.4342	0.7816	1.1290	---	0.9553	0.2605	0.6079	---	2.5186	---	---	0.8250	0.3908	0.6079
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	0.1067	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	m,p-Xylene	100016	0.039080982	1.8672	1.4330	2.4751	---	1.1290	1.9540	2.8659	---	2.5620	0.6513	1.6501	---	8.9452	---	---	2.1277	0.9119	1.6935
VOC	m-Dichlorobenzene	541731	0.02404908	0.0601	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Methyl Ethyl Ketone	78933	0.129768507	0.6488	0.9143	1.2682	---	1.3272	0.8553	1.2682	---	1.1797	ND	1.6221	---	5.7216	---	---	1.2977	1.3567	1.6221
VOC	Methyl Isobutyl Ketone	108101	0.028675665	0.1639	0.1229	0.9422	---	0.2048	ND	0.3277	---	0.4506	ND	0.2458	---	0.6554	---	---	0.2458	0.2048	0.2458
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	ND	ND	0.3245	---	ND	ND	0.1442	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	n-Octane	111659	0.028031902	0.2336	0.1869	0.4672	---	ND	0.4205	0.6074	---	0.4672	ND	0.2336	---	3.0835	---	---	0.1869	0.1402	1.1213
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	o-Xylene	95476	0.017369325	0.7816	0.5645	0.9987	---	0.5211	0.9987	1.3461	---	1.0856	0.2605	0.7382	---	2.6488	---	---	0.9987	0.4342	0.6948
VOC	p-Dichlorobenzene	106467	0.03607362	0.1202	0.1202	0.1202	---	0.1202	0.1202	0.3006	---	0.1804	ND	0.1202	---	0.2405	---	---	0.4209	0.1804	0.1804
VOC	Propylene	115071	0.015489571	1.3769	0.7573	1.5834	---	1.2564	1.5317	3.3905	---	1.0154	0.3270	1.1359	---	3.3905	---	---	1.2392	0.6884	0.7917
VOC	Styrene	100425	0.042597137	0.2130	0.2130	0.2130	---	0.1278	0.2556	0.3408	---	0.3408	ND	0.1278	---	0.6390	---	---	0.1704	0.1278	0.1278
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	0.1356	0.1356	---	ND	1.2887	0.8139	---	ND	ND	0.3391	---	0.3391	---	---	0.3391	0.1356	0.3391
VOC	Toluene	108883	0.018842536	2.9018	2.2988	3.9192	---	2.0350	3.2409	5.1629	---	3.8439	0.9044	2.9771	---	6.7079	---	---	4.9744	2.2988	3.8816
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND
VOC	Trichloroethylene	79016	0.053738241	ND	ND	ND	---	ND	0.0537	0.2150	---	ND	ND	ND	---	ND	---	---	ND	0.1075	0.1075
VOC	Trichlorofluoromethane	75694	0.039328834	1.5732	1.4608	1.7417	---	1.8541	1.2360	1.5170	---	1.4608	1.8541	1.7979	---	2.6968	---	---	1.6293	1.9103	1.5170
VOC	Trichlorotrifluoroethane	76131	0.091965644	0.8430	0.9197	2.1459	---	1.6860	1.3795	1.8393	---	1.9926	1.8393	2.2225	---	2.3758	---	---	1.9160	2.1459	1.6094
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	---	ND	ND	ND	---	ND	ND	ND	---	ND	---	---	ND	ND	ND

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/25/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	ND	ND
Carbonyl	Acetaldehyde	75070	0.007206544	1.2828	1.9638	1.9097	1.2521	2.7925	---	3.1889	0.9062	---	---	0.8612	2.0358	1.6089	1.5008	---	1.4467	1.1783	1.4125	1.0954	0.5261
Carbonyl	Acetone	67641	0.016628221	0.5939	1.1782	1.3374	0.9312	1.6248	---	2.8268	0.4608	---	---	1.4989	2.3992	1.1592	2.8030	---	5.8199	3.3969	2.2852	6.3662	0.7126
Carbonyl	Benzaldehyde	100527	0.008680573	0.1519	0.2300	0.2431	0.1085	0.2561	---	0.3038	0.1215	---	---	0.1128	0.1736	0.1563	0.1172	---	0.1780	0.1389	0.1432	0.1519	0.0781
Carbonyl	Butyraldehyde	123728	0.002949284	0.2507	0.3598	0.3539	0.2300	0.4689	---	0.4306	0.1622	---	---	0.1180	0.4925	0.1976	0.2212	---	0.6370	0.2743	0.2920	0.6488	0.1386
Carbonyl	Crotonaldehyde	123739	0.002866667	1.0664	2.0353	2.3449	1.2527	3.2680	---	1.4075	0.7969	---	---	0.0917	0.2207	0.1462	0.0860	---	0.1204	0.0602	0.1204	0.0803	0.0430
Carbonyl	Formaldehyde	50000	0.006141104	3.5373	5.8218	6.5587	3.7461	8.5975	---	6.5464	2.7267	---	---	1.4125	3.6355	2.9723	2.7021	---	1.8423	1.5967	2.3459	1.7195	0.8254
Carbonyl	Hexaldehyde	66251	0.008193047	0.1639	0.2171	0.2212	0.1557	0.2868	---	0.3441	0.1147	---	---	0.0778	0.1352	0.1106	0.0860	---	0.1065	0.1065	0.1106	0.0983	0.0655
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	ND	ND	ND	0.0669	---	0.0951	ND	---	---	ND	0.0352	0.0317	0.0317	---	0.0493	ND	ND	0.0387	ND
Carbonyl	Propionaldehyde	123386	0.00475092	0.2779	0.4276	0.4110	0.2542	0.6200	---	0.6651	0.1853	---	---	0.1544	0.3658	0.2922	0.2257	---	0.2138	0.2185	0.2565	0.1853	0.0998
Carbonyl	Tolualdehydes	NA	0.009828221	0.1523	0.3243	0.1622	0.1425	0.5111	---	0.6831	0.1523	---	---	0.1720	0.1229	0.1425	0.1818	---	0.1818	ND	0.2408	0.1474	0.0934
Carbonyl	Valeraldehyde	110623	0.003522699	0.1444	0.1550	0.1691	0.1233	0.2395	---	0.2677	0.0986	---	---	0.0705	0.1339	0.1198	0.0669	---	0.0986	0.1268	0.0881	0.1092	0.0423
Cr6	Hexavalent Chromium	18540299	0.0111	0.0326	0.0582	0.0799	0.0635	0.0125	ND	0.024	ND	0.0131	0.0653	---	ND	0.0410	ND	---	0.0146	ND	0.0482	0.0417	0.0225
SVOC	Acenaphthene	83329	0.000188	6.6300	---	41.4000	14.3000	30.7000	61.6000	36.7000	17.5000	5.1000	82.9000	---	21.2000	9.9200	2.2400	5.9200	15.5000	3.8300	5.7300	10.6000	---
SVOC	Acenaphthylene	208968	0.000206	1.9000	---	2.8200	4.8200	3.0900	47.3000	15.4000	0.7980	0.6000	62.1000	---	36.3000	5.3400	1.4400	25.1000	124.0000	1.3700	5.5100	20.6000	---
SVOC	Anthracene	120127	0.00013	0.3000	---	5.3300	28.2000	2.5300	31.5000	7.1800	0.9500	0.4340	23.6000	---	15.1000	2.0200	0.4470	11.3000	46.8000	0.9760	1.8100	12.0000	---
SVOC	Benzo (a) anthracene	56553	0.000114	0.0333	---	1.8200	0.2640	0.4470	17.4000	2.4400	0.1140	0.0333	9.6200	---	19.3000	0.3320	0.0958	6.5300	0.1250	0.7590	1.8100	10.0000	---
SVOC	Benzo (a) pyrene	50328	0.000161	ND	---	0.786	0.151	0.186	13.6000	1.1000	ND	ND	ND	---	9.8600	0.0332	0.0639	3.0100	0.0312	0.4340	0.7830	3.9500	---
SVOC	Benzo (b) fluoranthene	205992	0.000124	0.0333	---	2.0000	0.3010	0.4840	15.6000	1.9100	ND	ND	0.9090	---	13.0000	0.0995	0.0958	2.8700	ND	0.6140	1.5300	4.1600	---
SVOC	Benzo (e) pyrene	192972	0.0000809	0.0333	---	1.5700	0.3010	0.4100	12.4000	1.4900	0.1140	ND	0.2650	---	9.8600	0.0332	0.0639	1.9200	ND	0.3980	0.8890	2.4900	---
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	0.0667	---	0.8580	0.2260	0.1860	6.6600	0.7780	ND	ND	ND	---	6.1600	ND	0.0958	1.5300	ND	0.3980	0.8890	2.0200	---
SVOC	Benzo (k) fluoranthene	207089	0.0000893	0.1330	---	1.9300	0.4140	0.6330	15.9000	1.9100	0.1900	0.1330	0.7950	---	11.9000	0.0332	0.0958	2.6200	ND	0.5780	1.2800	3.8600	---
SVOC	Chrysene	218019	0.000109	0.1330	---	2.6800	0.5650	0.7070	19.7000	3.5700	0.3420	0.1000	11.8000	---	24.5000	0.8630	0.2870	6.2400	0.4060	1.2300	2.9200	9.2300	---
SVOC	Coronene	191071	0.0000738	ND	---	0.2860	0.0753	ND	1.8500	0.2480	ND	ND	ND	---	1.2600	ND	0.0639	0.4610	ND	0.1450	0.2490	0.5150	---
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	---	0.2860	ND	ND	3.3800	0.3540	ND	ND	ND	---	2.0900	ND	0.0319	0.6380	ND	0.1080	0.2850	0.7300	---
SVOC	Fluoranthene	206440	0.000132	3.7300	---	16.9000	7.4900	10.1000	62.3000	16.8000	6.9900	1.9700	45.2000	---	37.6000	3.9800	1.5000	13.1000	21.3000	3.5100	5.7600	12.7000	---
SVOC	Fluorene	86737	0.000318	4.9300	---	31.5000	12.0000	21.1000	83.9000	30.5000	10.4000	4.3000	76.3000	---	34.8000	8.6300	2.9700	12.8000	40.5000	4.9200	7.8600	17.0000	---
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	ND	---	1.1400	0.2260	0.2230	10.7000	1.0600	ND	ND	ND	---	8.1300	ND	0.0639	1.9900	ND	0.5420	1.1700	2.6200	---
SVOC	Naphthalene	91203	0.000682	56.3000	---	497.0000	146.0000	228.0000	392.0000	350.0000	35.3000	41.1000	801.0000	---	574.0000	181.0000	52.6000	313.0000	404.0000	191.0000	353.0000	496.0000	---
SVOC	Perylene	198550	0.000107	ND	---	0.1790	ND	ND	3.0700	0.2480	ND	ND	ND	---	4.0600	ND	ND	0.8510	ND	0.1080	0.2490	1.0300	---
SVOC	Phenanthrene	85018	0.000124	11.0000	---	80.0000	26.0000	44.0000	186.0000	57.6000	20.3000	7.4700	158.0000	---	82.9000	13.4000	3.7700	24.2000	100.0000	10.1000	21.3000	31.8000	---
SVOC	Pyrene	129000	0.000161	2.0700	---	11.3000	4.2500	4.9500	41.8000	10.0000	3.4200	1.0700	32.8000	---	25.4000	2.4200	0.9260	9.1500	11.5000	2.1700	4.2000	8.5000	---
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1091	0.1637	0.1091	0.1091	0.1637	---	0.2183	0.1091	---	---	0.1637	0.1637	0.1637	0.1091	---	0.1637	0.1637	0.1091	---	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/31/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	---	ND	ND	---	---
Carbonyl	Acetaldehyde	75070	0.007206544	0.5585	1.4593	1.5999	1.0125	0.8990	---	3.1709	1.5260	1.6683	1.3837	0.9585	---	2.4322	---	---	1.5908	2.3962	---	---
Carbonyl	Acetone	67641	0.016628221	1.2851	1.4704	2.6368	0.7364	2.2234	---	5.3210	3.1356	1.5797	1.9503	1.8481	---	2.2852	---	---	1.4015	2.0809	---	---
Carbonyl	Benzaldehyde	100527	0.008680573	0.0781	0.1345	0.1866	0.0955	0.1042	---	0.4080	0.1389	0.1606	0.1519	0.0825	---	0.4470	---	---	0.1649	0.2604	---	---
Carbonyl	Butyraldehyde	123728	0.002949284	0.1180	0.2212	0.2949	0.1298	0.1622	---	1.3685	0.2979	0.2684	0.2271	0.1386	---	0.4984	---	---	0.2536	0.2949	---	---
Carbonyl	Crotonaldehyde	123739	0.002866667	0.0287	0.0688	0.0975	0.0573	0.0545	---	0.1835	0.1089	0.5791	0.4988	0.2523	---	1.5365	---	---	1.0177	1.8691	---	---
Carbonyl	Formaldehyde	50000	0.006141104	0.9592	3.4022	3.6601	2.0757	1.7072	---	5.5024	4.1023	4.6058	3.9549	2.3827	---	7.5904	---	---	4.2988	10.1451	---	---
Carbonyl	Hexaldehyde	66251	0.008193047	0.0451	0.1106	0.1147	0.1229	0.0614	---	0.2622	0.1475	0.1721	0.1024	0.0614	---	0.2499	---	---	0.1639	0.1721	---	---
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	0.0387	0.0423	0.0282	ND	---	0.0845	0.0352	0.0493	0.0387	ND	---	0.0916	---	---	0.0951	0.0423	---	---
Carbonyl	Propionaldehyde	123386	0.00475092	0.1069	0.2304	0.2993	0.1663	0.1568	---	0.5250	0.2898	0.3064	0.2565	0.1520	---	0.4680	---	---	0.3112	0.4300	---	---
Carbonyl	Tolualdehydes	NA	0.009828221	0.0983	0.1867	0.2162	0.0688	0.0688	---	0.2359	0.1720	0.1278	0.1474	0.0737	---	0.2948	---	---	0.2359	0.6437	---	---
Carbonyl	Valeraldehyde	110623	0.003522699	0.0493	0.1022	0.0951	0.0775	0.0564	---	0.2642	0.1480	0.1620	0.1162	0.0599	---	0.2219	---	---	0.1937	0.1937	---	---
Cr6	Hexavalent Chromium	18540299	0.0111	ND	0.0244	0.0324	ND	0.0129	---	0.1540	---	---	0.1310	0.0162	---	0.1010	---	---	0.0200	0.0748	---	0.0368
SVOC	Acenaphthene	83329	0.000188	0.5400	3.6000	9.3700	6.5700	0.8420	---	24.5000	---	10.4000	8.7000	0.6730	4.7600	---	21.5000	---	15.5000	14.2000	---	12.4000
SVOC	Acenaphthylene	208968	0.000206	0.0771	0.2300	4.5000	0.2160	0.8010	---	30.1000	---	1.5900	0.2010	ND	1.4500	---	10.0000	---	15.0000	0.9910	---	11.7000
SVOC	Anthracene	120127	0.00013	ND	ND	ND	0.6430	ND	0.1600	---	14.9000	---	0.6780	0.2010	ND	0.3180	---	4.3400	---	6.0100	1.0300	---	5.2700
SVOC	Benzo (a) anthracene	56553	0.000114	0.0386	0.1150	0.2300	0.0432	0.0401	---	13.3000	---	0.0797	0.0806	ND	0.1360	---	4.1500	---	5.3400	0.2390	---	4.3300
SVOC	Benzo (a) pyrene	50328	0.000161	ND	ND	0.2300	ND	0.5610	---	8.5000	---	0.2790	0.2820	ND	0.1360	---	3.6200	---	4.4700	0.1030	---	2.7200
SVOC	Benzo (b) fluoranthene	205992	0.000124	0.0386	0.2300	0.3680	0.0432	0.1200	---	10.3000	---	0.0797	0.1210	0.0421	0.2270	---	5.2100	---	7.3800	0.2730	---	3.0700
SVOC	Benzo (e) pyrene	192972	0.0000809	ND	0.1530	0.2760	ND	0.0801	---	7.8400	---	0.0797	0.0806	ND	0.1810	---	4.0500	---	5.4200	0.1710	---	2.4400
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	0.0386	0.1530	0.3220	ND	0.1600	---	5.2200	---	0.1990	0.0806	ND	0.1360	---	2.0800	---	3.3400	0.1030	---	1.5400
SVOC	Benzo (k) fluoranthene	207089	0.0000893	0.0386	0.1530	0.2760	0.0432	0.0801	---	8.7100	---	0.0399	0.0806	ND	0.1360	---	4.3400	---	5.3000	0.1710	---	2.5800
SVOC	Chrysene	218019	0.000109	0.0771	0.3440	0.5510	0.1300	0.1600	---	17.3000	---	0.2790	0.2420	0.0421	0.2720	---	6.9000	---	9.4600	0.8200	---	5.3400
SVOC	Coronene	191071	0.0000738	0.0386	0.0765	0.1380	ND	0.1200	---	1.2700	---	0.1200	ND	ND	0.0907	---	0.7720	---	0.9810	ND	---	0.5590
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	ND	ND	ND	ND	---	1.9300	---	ND	ND	ND	ND	---	0.6760	---	1.0600	ND	---	0.5240
SVOC	Fluoranthene	206440	0.000132	0.7330	2.6800	3.3500	2.7200	0.7210	---	32.9000	---	3.7500	3.7100	0.5050	1.3600	---	20.9000	---	16.5000	8.2400	---	10.8000
SVOC	Fluorene	86737	0.000318	1.3500	4.0900	7.5400	5.2300	1.7200	---	30.5000	---	8.0500	7.0100	0.8840	3.4900	---	24.6000	---	20.3000	12.3000	---	15.5000
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	ND	0.1910	0.3680	ND	0.2000	---	6.4900	---	0.1200	0.1210	ND	0.1360	---	2.8000	---	3.7300	0.1030	---	1.7500
SVOC	Naphthalene	91203	0.000682	37.3000	70.0000	132.0000	59.4000	45.2000	---	576.0000	---	142.0000	70.5000	28.8000	115.0000	---	577.0000	---	1050.0000	281.0000	---	583.0000
SVOC	Perylene	198550	0.000107	ND	ND	0.0460	ND	ND	---	1.8900	---	ND	ND	ND	0.0454	---	1.1100	---	1.4500	ND	---	1.0500
SVOC	Phenanthrene	85018	0.000124	2.0800	8.3400	13.4000	9.8200	2.6000	---	83.1000	---	17.6000	13.4000	1.7700	8.7500	---	82.6000	---	64.0000	33.6000	---	42.8000
SVOC	Pyrene	129000	0.000161	0.4240	1.5300	2.3900	1.1700	0.5210	---	21.6000	---	1.9500	1.4900	0.2100	0.9980	---	10.6000	---	8.7100	4.1000	---	6.4900
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1091	0.1091	0.1091	0.1091	0.1091	0.1091	0.1091	---	0.1091	0.1091	0.1091	0.2183	0.1091	---	0.1091	---	0.1637	0.1637	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/25/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	---	ND	ND	---	---	0.0742	0.1484	0.2226	ND	---	0.1484	0.1484	ND	---	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.9340	2.0155	0.9831	0.6882	1.5730	---	2.4579	0.2949	---	---	0.5899	1.4256	1.0323	0.2458	---	1.5730	0.5407	0.6882	---	0.5407
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	0.1214	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.3441	0.6390	0.2949	0.2949	0.4916	---	0.7865	0.0983	---	---	0.1966	0.4424	0.3933	0.0983	---	0.7374	0.1966	0.1966	---	0.1475
VOC	1,3-Butadiene	106990	0.01327362	ND	0.2433	0.1327	0.1106	0.2433	---	0.3097	ND	---	---	0.0664	0.3097	0.1327	0.0442	---	0.2876	ND	0.1549	---	0.0664
VOC	Acetonitrile	75058	0.166214724	ND	ND	ND	ND	ND	---	ND	ND	---	---	7.4713	1.6454	1.6789	0.6716	---	1.3264	1.8300	ND	---	38.6155
VOC	Acetylene	74862	0.024495706	1.3739	5.6021	5.1015	0.7242	3.5572	---	23.7502	0.4367	---	---	4.1217	4.3986	2.0875	1.2035	---	4.5690	1.8425	3.8980	---	0.6497
VOC	Acrolein	107028	0.245334151	ND	ND	ND	ND	ND	---	ND	ND	---	---	1.3528	2.1323	1.7426	ND	---	1.6508	1.2152	0.3898	---	0.3210
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	0.2604	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Benzene	71432	0.015977505	1.5978	4.5376	4.7293	1.4060	3.1635	---	6.9023	0.5432	---	---	1.2782	11.6955	3.0357	0.6071	---	4.8572	1.7895	2.5564	---	1.1823
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Bromomethane	74839	0.038830266	ND	ND	0.0388	0.0388	0.0777	---	0.0388	0.1165	---	---	0.0388	0.0388	0.0388	0.0388	---	0.0388	0.0388	0.0388	---	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.6291	0.6291	0.6291	0.6291	0.7549	---	0.6291	0.8808	---	---	0.6291	0.6291	0.6920	0.6920	---	0.7549	0.7549	0.6920	---	0.4404
VOC	Chlorobenzene	108907	0.023018405	ND	ND	0.2762	ND	ND	---	ND	ND	---	---	0.0460	0.0921	0.0460	ND	---	ND	0.0460	ND	---	ND
VOC	Chloroethane	75003	0.021110838	ND	ND	0.1056	0.0528	0.0792	---	0.0528	0.0528	---	---	0.0264	0.0264	0.0264	ND	---	0.0264	0.0264	ND	---	0.1319
VOC	Chloroform	67663	0.01953047	ND	ND	0.1953	ND	0.2441	---	ND	ND	---	---	ND	0.1953	0.0977	0.0977	---	0.0977	0.0977	0.0977	---	0.0488
VOC	Chloromethane	74873	0.028910429	1.8172	1.5281	1.5901	1.5694	1.7966	---	1.3836	1.9205	---	---	1.1151	1.2803	1.4249	1.0945	---	1.2184	1.3629	1.1151	---	1.0738
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	2.2253	3.3627	2.7693	3.0660	3.3627	---	3.2144	3.3133	---	---	2.9671	3.3627	3.4616	2.6704	---	3.9562	4.0551	2.8188	---	2.6210
VOC	Dichloromethane	75092	0.059051534	0.1042	0.3126	0.3474	0.3474	0.3126	---	0.4863	0.1389	---	---	0.1389	0.2432	0.2084	0.1737	---	0.2084	0.1389	0.2779	---	0.1737
VOC	Dichlorotetrafluoroethane	76142	0.020971779	ND	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.1398	---	---	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.1398	0.1398	---	0.1398
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Ethylbenzene	100414	0.021711656	1.2159	2.4751	1.9106	1.3895	1.8672	---	3.0831	0.3040	---	---	0.5211	1.5198	1.3461	0.2171	---	2.5186	0.5645	0.6079	---	1.0856
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	ND	ND	ND	ND	ND	---	ND	ND	---	---	0.1067	0.2133	0.2133	ND	---	0.2133	0.2133	ND	---	0.2133
VOC	m,p-Xylene	100016	0.039080982	2.9528	8.1636	7.5991	6.5569	4.9068	---	10.2479	0.6079	---	---	1.6935	4.9937	5.7319	0.5645	---	11.5506	1.8672	1.9975	---	1.6067
VOC	m-Dichlorobenzene	541731	0.02404908	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	0.0601
VOC	Methyl Ethyl Ketone	78933	0.129768507	4.6304	0.8848	5.6331	3.1557	3.0967	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	1.1207	---	1.0617
VOC	Methyl Isobutyl Ketone	108101	0.028675665	ND	0.6145	0.5325	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	0.2868	---	0.2868
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/31/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.4916	0.7374	0.7865	0.3933	0.4916	1.9663	1.3273	---	0.6882	0.6390	0.5407	0.5899	1.7697	---	0.6882	---	0.5899	0.6882	0.3933
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.1475	0.1966	0.2458	0.0983	0.1475	0.6882	0.4424	---	0.1966	0.1966	0.1475	0.1475	0.8357	---	0.2949	---	0.1966	0.1475	0.1966
VOC	1,3-Butadiene	106990	0.01327362	0.0442	0.1106	0.1770	ND	0.0664	0.4425	0.5531	---	ND	ND	0.0442	0.1327	0.2876	---	0.1549	---	0.1106	0.0664	0.0442
VOC	Acetonitrile	75058	0.166214724	44.1560	34.2503	55.0691	29.3814	27.1988	12.9614	34.9219	---	27.0309	27.3667	72.3622	ND	28.8777	---	ND	---	35.5935	3.3075	ND
VOC	Acetylene	74862	0.024495706	1.2461	0.8520	2.4709	0.3621	2.5774	1.8958	6.1346	---	1.6614	0.9585	2.7478	4.9417	3.0247	---	2.1940	---	1.6614	0.5964	0.7562
VOC	Acrolein	107028	0.245334151	0.6649	0.5044	0.8025	0.6649	0.5503	0.5044	0.9859	---	0.5503	ND	0.7566	0.3898	1.0547	---	0.7566	---	1.2381	1.2152	0.3669
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Benzene	71432	0.015977505	1.1823	1.2782	1.8214	0.6711	1.0226	12.1429	12.8459	---	1.4380	1.3421	0.6391	0.9587	4.6654	---	1.8534	---	2.8440	1.8214	1.9173
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Bromomethane	74839	0.038830266	0.0388	0.0777	0.0388	0.0388	0.0388	0.0777	0.0388	---	0.0388	ND	0.0388	0.0777	0.0777	---	0.0777	---	0.0777	0.0777	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.8808	0.5662	0.5662	0.4404	0.6291	0.6291	0.5662	---	0.6291	0.5662	0.6291	0.5662	0.6291	---	0.5662	---	1.0066	1.0066	0.8179
VOC	Chlorobenzene	108907	0.023018405	ND	ND	ND	ND	ND	0.3223	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Chloroethane	75003	0.021110838	0.1847	0.2111	0.2375	0.1847	0.2375	0.2375	0.3431	---	0.2111	ND	0.1847	0.0528	0.2111	---	0.0792	---	0.2903	0.0264	0.0528
VOC	Chloroform	67663	0.01953047	ND	0.0977	0.0977	ND	ND	0.1953	0.1953	---	ND	ND	ND	ND	ND	---	ND	---	0.1465	0.1465	ND
VOC	Chloromethane	74873	0.028910429	1.0532	1.3423	2.1476	1.2390	1.0325	1.1151	1.1358	---	1.0325	0.9293	1.4455	1.3010	1.4455	---	1.5488	---	1.4042	1.6107	1.3216
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	0.9119	ND	ND	---	ND	---	ND	ND	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	2.2748	3.1155	3.1649	2.2748	2.4231	2.9177	2.7199	---	2.5715	2.4726	3.2638	4.0551	4.2529	---	4.6485	---	3.6594	3.8078	2.7693
VOC	Dichloromethane	75092	0.059051534	0.2084	0.3474	0.4516	0.2084	0.2084	0.5210	0.4863	---	0.2432	0.2779	0.4516	0.2779	0.4168	---	0.3821	---	0.5210	0.3474	0.2084
VOC	Dichlorotetrafluoroethane	76142	0.020971779	0.0699	0.1398	0.1398	0.0699	0.0699	0.1398	0.1398	---	0.1398	0.1398	0.1398	0.1398	0.1398	---	0.1398	---	0.1398	0.1398	0.1398
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Ethylbenzene	100414	0.021711656	0.8250	1.2159	1.6067	1.7369	0.6948	3.2567	1.7369	---	1.2593	1.1724	0.8250	1.0856	2.4317	---	1.1290	---	1.2159	0.4342	0.6948
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	m,p-Xylene	100016	0.039080982	0.9553	1.3895	3.5173	0.9119	0.8685	11.6374	5.3411	---	2.3014	1.9106	1.2593	2.2146	12.4191	---	3.5607	---	2.3014	1.3027	3.2567
VOC	m-Dichlorobenzene	541731	0.02404908	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Methyl Ethyl Ketone	78933	0.129768507	0.7963	1.0617	1.5041	1.2092	1.0322	5.6331	6.6654	---	1.2092	1.4451	1.5926	ND	5.2792	---	3.3032	---	2.0055	2.7428	1.0912
VOC	Methyl Isobutyl Ketone	108101	0.028675665	0.1639	0.2048	0.8193	0.2048	0.2458	0.8603	0.6964	---	0.2868	0.2458	0.2458	0.2458	ND	---	0.3687	---	0.3277	0.2458	0.2868
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/25/2005	10/31/2005	11/12/2005	11/24/2005	11/30/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	1.1176	2.1632	2.2353	0.6850	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	n-Octane	111659	0.028031902	1.0278	10.3251	12.8947	15.7446	1.2614	---	12.8012	ND	---	---	ND	5.0457	10.2316	0.1869	---	17.8937	1.5885	0.6074	---	1.0746
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	o-Xylene	95476	0.017369325	1.2159	3.3436	2.4751	2.1712	1.9975	---	4.6029	0.2605	---	---	0.7382	2.0409	2.2580	0.2605	---	4.2121	0.8685	0.6948	---	0.5645
VOC	p-Dichlorobenzene	106467	0.03607362	0.3006	0.6613	0.4810	0.3006	0.6012	---	0.7215	0.2405	---	---	0.3607	0.5411	0.4209	0.3006	---	0.3607	0.3006	0.3607	---	0.2405
VOC	Propylene	115071	0.015489571	0.9466	1.9620	1.6866	0.8605	1.7555	---	2.9947	0.4475	---	---	0.5680	3.5282	1.2736	0.3958	---	3.1495	0.8777	1.2047	---	0.4303
VOC	Styrene	100425	0.042597137	0.4260	0.6390	0.3408	0.2556	0.4686	---	0.6816	0.1704	---	---	0.2130	0.7242	0.2556	0.0852	---	0.5538	0.1704	0.2556	---	0.6390
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	0.3391	0.4069	0.3391	0.2713	---	0.5426	ND	---	---	0.1356	0.4069	0.2035	0.0678	---	0.3391	ND	0.4748	---	ND
VOC	Toluene	108883	0.018842536	4.3715	8.8937	7.8385	4.7106	7.6124	---	13.3405	1.0175	---	---	3.4670	9.6851	7.0848	1.6205	---	8.3661	3.8439	3.2409	---	2.2611
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
VOC	Trichloroethylene	79016	0.053738241	ND	0.1612	0.1612	0.2687	ND	---	0.4836	ND	---	---	0.0537	0.1075	0.1075	0.6449	---	0.0537	0.0537	0.2150	---	ND
VOC	Trichlorofluoromethane	75694	0.039328834	1.2360	1.8541	1.5170	1.6293	1.7979	---	1.6293	1.6855	---	---	1.5732	1.6855	1.7417	1.6293	---	2.1912	2.1350	1.6293	---	1.4046
VOC	Trichlorotrifluoroethane	76131	0.091965644	1.9926	2.2991	2.2991	2.4524	3.9085	---	2.6057	2.6823	---	---	1.7627	1.8393	2.2225	2.0692	---	2.1459	1.9926	1.4561	---	1.4561
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	ND	ND	---	ND	ND	ND	---	ND
Metals (PM10)	Antimony	7440360	0.029	0.5500	1.1700	2.5900	0.7200	1.3600	3.3300	2.2900	0.3300	0.4600	4.2600	---	1.7000	0.9900	0.3000	---	1.0400	0.7690	1.1200	1.7300	0.4050
Metals (PM10)	Arsenic	7440382	0.022	0.8700	3.1800	3.7100	1.8200	2.2200	3.2000	2.8300	0.6300	0.8800	4.7000	---	3.0000	1.2700	0.4300	---	2.8200	1.5200	2.3500	4.3000	0.7640
Metals (PM10)	Beryllium	7440417	0.025	0.0040	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0.0040	0.0100	0.0700	---	0.0300	0.0200	0.0050	---	0.0200	0.0100	0.0150	0.0230	0.0030
Metals (PM10)	Cadmium	7440439	0.019	0.1300	1.5900	1.7800	0.5900	0.5200	2.1900	1.7600	0.4300	0.1500	2.8100	---	0.6400	0.5600	0.1300	---	0.3900	0.1730	0.3250	1.6600	0.4790
Metals (PM10)	Chromium	7440473	0.509	1.6300	2.6700	2.5700	2.2700	2.2600	1.3200	2.5300	2.1600	1.9600	5.0900	---	3.1200	3.5300	1.7300	---	2.0500	1.6500	2.8700	4.9000	3.9000
Metals (PM10)	Cobalt	7440484	0.022	0.0600	0.1300	0.1400	0.1000	0.1800	0.1800	0.2400	0.1100	0.0600	0.4900	---	0.2400	0.1400	0.0800	---	0.1400	0.0830	0.1170	0.1770	0.0300
Metals (PM10)	Lead	7439921	0.068	5.3900	12.6000	16.0000	21.5000	16.8000	25.2000	37.4000	12.0000	2.7200	67.7000	---	24.1000	21.3000	3.9100	---	19.8000	5.9400	15.8000	26.1000	5.6600
Metals (PM10)	Manganese	7439965	0.125	8.6200	25.8000	43.5000	44.8000	19.5000	29.7000	41.5000	56.1000	4.2700	104.0000	---	46.3000	81.2000	14.8000	---	25.2000	6.6100	22.0000	37.6000	5.4600
Metals (PM10)	Mercury	7439976	0.212	ND	ND	ND	ND	ND	ND	0.0200	0.1700	0.0300	0.6000	---	0.0300	0.0200	0.0070	---	0.0010	ND	ND	ND	ND
Metals (PM10)	Nickel	7440020	0.184	1.0500	1.4400	1.6700	1.0400	1.7500	0.9000	1.8100	2.0600	3.0400	2.6200	---	1.7100	1.3300	1.0200	---	0.9600	0.8120	1.3400	1.6600	0.7390
Metals (PM10)	Selenium	7782492	0.027	0.4000	1.1400	1.8600	0.8700	1.1200	0.9000	2.0100	0.3700	0.9700	2.0900	---	1.4100	0.8800	0.3600	---	1.4000	1.3800	0.6940	1.0300	0.2560
Metals (TSP)	Antimony	7440360	0.029	0.5900	1.0400	2.0400	0.7500	1.1600	4.4200	2.5300	0.4800	0.4000	3.3600	---	1.4900	0.8200	0.3100	---	1.1000	0.6900	1.2800	1.4500	0.3910
Metals (TSP)	Arsenic	7440382	0.022	0.9900	2.9100	3.3700	2.2600	1.8600	4.4900	2.9100	1.5000	1.0500	3.8300	---	2.5600	1.0400	0.4500	---	3.1400	1.3400	2.4400	3.8700	0.7960
Metals (TSP)	Beryllium	7440417	0.025	0.0100	0.0300	0.0300	0.0300	0.0300	0.0800	0.0500	0.0200	0.0100	0.1300	---	0.0600	0.0200	0.0020	---	0.0400	0.0130	0.0370	0.0450	0.0030
Metals (TSP)	Cadmium	7440439	0.019	0.2600	1.5400	1.5700	0.9700	0.3400	3.1900	1.9500	0.8200	0.2100	2.8200	---	0.9400	0.7000	0.2400	---	0.5600	0.2310	0.4460	1.3500	0.4140
Metals (TSP)	Chromium	7440473	0.509	2.0400	3.2000	2.7600	3.6500	2.5700	2.2800	3.2700	4.1600	1.7400	5.7600	---	4.5400	4.6300	1.7800	---	2.6900	2.0300	4.3600	4.8900	4.0700
Metals (TSP)	Cobalt	7440484	0.022	0.1100	0.2000	0.1600	0.1500	0.2000	0.3200	0.4000	0.2500	0.0800	0.5600	---	0.3700	0.2100	0.0600	---	0.2200	0.0970	0.2380	0.2430	0.0360
Metals (TSP)	Lead	7439921	0.068	9.5700	12.9000	14.7000	26.8000	18.4000	37.4000	42.1000	19.1000	3.6300	72.9000	---	34.7000	28.3000	3.6300	---	64.3000	7.7100	27.5000	25.8000	5.9600
Metals (TSP)	Manganese	7439965	0.125	26.5000	49.0000	58.6000	80.6000	39.8000	63.5000	69.9000	187.0000	7.4600	140.0000	---	87.3000	206.0000	9.2700	---	57.0000	10.6000	60.1000	58.9000	8.4000
Metals (TSP)	Mercury	7439976	0.212	ND	ND	ND	ND	ND	ND	0.0080	0.1300	0.0300	0.1200	---	0.0100	0.0100	0.0080	---	0.0600	ND	0.0940	ND	0.0390
Metals (TSP)	Nickel	7440020	0.184	1.5800	2.3100	1.6700	1.2000	1.7300	1.4200	1.9800	2.9200	6.0700	3.3600	---	2.6200	2.3500	1.5700	---	1.3400	1.0000	1.8800	1.7300	0.8290
Metals (TSP)	Selenium	7782492	0.027	0.4000	0.9600	1.5100	0.7400	0.8500	1.1700	1.8200	0.3800	0.9100	1.3700	---	0.9400	0.6500	0.4300	---	1.3500	1.2400	0.6790	0.8240	0.3290

Table A-2: Analytical Data
North Birmingham Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/31/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	ND	ND	ND	ND	ND	ND	0.180265849	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	n-Octane	111659	0.028031902	0.3270	0.2803	1.1213	0.2336	0.3270	12.9414	5.3261	---	1.6352	1.2147	0.8410	0.8877	19.0617	---	4.2048	---	1.8221	0.4672	6.4473
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	o-Xylene	95476	0.017369325	0.4342	0.5645	1.1724	0.3908	0.4342	3.4739	2.0843	---	0.7816	0.7816	0.4777	0.7816	3.9949	---	1.2159	---	0.9553	0.5645	1.0856
VOC	p-Dichlorobenzene	106467	0.03607362	0.1804	0.1804	0.1804	0.1804	0.1804	0.5411	0.3607	---	0.1804	0.1804	0.1202	0.1804	0.3006	---	0.1202	---	0.4810	0.1804	0.1202
VOC	Propylene	115071	0.015489571	0.3098	0.5852	1.0671	0.2926	0.4819	2.9258	4.5264	---	0.6024	0.4475	0.3958	1.1187	2.4611	---	1.1703	---	0.7056	0.8089	0.4647
VOC	Styrene	100425	0.042597137	0.5112	0.7667	0.4686	0.9797	0.3834	1.4483	1.0223	---	0.4260	0.5538	0.3834	0.1704	0.7242	---	0.3408	---	0.4686	0.0852	0.1704
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	0.1356	0.2035	ND	ND	0.5426	1.0852	---	ND	ND	0.0678	0.2035	0.3391	---	0.2035	---	0.2713	0.2035	0.1356
VOC	Toluene	108883	0.018842536	1.5828	2.1857	3.4293	1.4697	1.5074	9.1198	6.8210	---	2.4118	1.9973	1.6958	2.5249	8.4415	---	3.2032	---	2.7133	5.0498	3.0148
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	ND	ND	ND
VOC	Trichloroethylene	79016	0.053738241	ND	ND	ND	ND	ND	ND	0.1612	---	ND	ND	ND	0.1075	ND	---	ND	---	0.1075	ND	ND
VOC	Trichlorofluoromethane	75694	0.039328834	1.4046	1.5732	1.7417	1.2922	1.4046	1.7417	1.4046	---	1.4046	1.3484	1.9664	2.4721	2.3597	---	2.8654	---	1.9103	2.0226	1.3484
VOC	Trichlorotrifluoroethane	76131	0.091965644	1.7627	1.1496	1.6094	1.3795	1.2262	1.6860	1.2262	---	1.4561	1.4561	1.9926	1.4561	1.7627	---	2.0692	---	1.3795	1.0729	1.1496
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	ND	0.0256	---	ND	ND	ND	ND	ND	---	0.0256	---	ND	ND	ND
Metals (PM10)	Antimony	7440360	0.029	0.1720	0.7290	1.2500	0.4070	0.6340	---	4.5000	---	1.2800	1.4600	0.6450	---	2.0000	---	---	0.9370	2.0000	---	2.7700
Metals (PM10)	Arsenic	7440382	0.022	0.4500	0.6480	1.0400	0.2820	0.6820	---	4.4500	---	1.0300	1.8200	0.5430	---	3.6300	---	---	4.6700	2.5900	---	2.7600
Metals (PM10)	Beryllium	7440417	0.025	0.0020	0.0070	0.0100	0.0060	0.0090	---	0.0570	---	0.0100	0.0140	0.0060	---	0.0210	---	---	0.0130	0.0240	---	0.0680
Metals (PM10)	Cadmium	7440439	0.019	0.0580	0.2620	0.5930	0.0970	0.1650	---	0.8170	---	0.7790	0.9400	0.1580	---	0.5350	---	---	0.1930	0.5650	---	0.4440
Metals (PM10)	Chromium	7440473	0.509	4.1500	4.2200	4.9000	3.3500	3.6400	---	4.4300	---	4.0100	6.5000	4.5100	---	4.6500	---	---	4.4100	5.9600	---	4.2600
Metals (PM10)	Cobalt	7440484	0.022	0.0260	0.1300	0.1110	0.0700	0.0460	---	0.2910	---	0.1280	0.2290	0.0570	---	0.2030	---	---	0.1250	0.1950	---	0.3460
Metals (PM10)	Lead	7439921	0.068	1.0900	7.3700	15.8000	1.6900	4.8200	---	28.3000	---	31.8000	42.2000	18.4000	---	10.7000	---	---	14.4000	27.8000	---	42.8000
Metals (PM10)	Manganese	7439965	0.125	1.3900	55.9000	18.6000	4.2900	3.4600	---	46.0000	---	31.7000	77.0000	15.6000	---	89.1000	---	---	12.4000	84.1000	---	49.3000
Metals (PM10)	Mercury	7439976	0.212	0.0190	0.0710	0.0750	0.0470	0.0200	---	0.0040	---	0.0310	0.0610	0.0140	---	ND	---	---	0.0100	ND	---	0.6010
Metals (PM10)	Nickel	7440020	0.184	0.4580	1.3700	1.1200	1.3300	0.4970	---	1.4100	---	1.6700	2.2100	0.8690	---	1.3800	---	---	0.7880	1.4800	---	1.6600
Metals (PM10)	Selenium	7782492	0.027	0.6870	0.4350	0.8650	0.5080	0.3750	---	1.4500	---	0.9920	1.7600	0.4190	---	1.6800	---	---	1.5300	2.3000	---	0.8800
Metals (TSP)	Antimony	7440360	0.029	0.1990	0.7280	1.1800	0.4080	0.7670	---	2.7300	---	1.0300	1.5600	0.6640	---	1.7100	---	---	1.5000	2.0000	---	2.8300
Metals (TSP)	Arsenic	7440382	0.022	0.4710	0.7800	0.9580	0.4040	0.6770	---	4.5800	---	0.9870	2.4200	0.6820	---	3.0000	---	---	3.8300	2.7000	---	2.1600
Metals (TSP)	Beryllium	7440417	0.025	0.0030	0.0160	0.0170	0.0140	0.0130	---	0.1270	---	0.0230	0.0390	0.0120	---	0.0360	---	---	0.0220	0.0540	---	0.0220
Metals (TSP)	Cadmium	7440439	0.019	0.2820	0.3210	0.5270	0.1290	0.1990	---	1.0400	---	0.6740	1.4500	0.1950	---	0.6750	---	---	0.2270	0.8840	---	0.2550
Metals (TSP)	Chromium	7440473	0.509	3.9500	4.5600	5.2800	3.3700	4.5200	---	5.3000	---	4.8800	9.6800	4.5600	---	4.8500	---	---	4.3200	6.8500	---	3.6900
Metals (TSP)	Cobalt	7440484	0.022	0.0430	0.2640	0.1550	0.1270	0.0750	---	0.4320	---	0.2090	0.5690	0.1050	---	0.2850	---	---	0.1730	0.3540	---	0.1620
Metals (TSP)	Lead	7439921	0.068	2.0900	14.8000	20.0000	5.3700	5.6300	---	41.3000	---	27.5000	52.9000	16.9000	---	11.3000	---	---	13.6000	37.7000	---	36.7000
Metals (TSP)	Manganese	7439965	0.125	9.6800	155.0000	34.5000	28.5000	7.3500	---	79.5000	---	52.7000	229.0000	28.7000	---	134.0000	---	---	22.2000	130.0000	---	21.3000
Metals (TSP)	Mercury	7439976	0.212	0.0440	0.3450	0.0290	0.0730	0.0170	---	0.0080	---	0.5440	0.1270	0.0100	---	0.0230	---	---	0.0120	ND	---	0.1760
Metals (TSP)	Nickel	7440020	0.184	0.6590	1.4900	1.1000	1.3300	0.5640	---	2.1300	---	1.9800	3.8700	0.7070	---	1.5500	---	---	0.9240	2.2200	---	0.9950
Metals (TSP)	Selenium	7782492	0.027	0.6760	0.3930	0.7820	0.4410	0.5290	---	1.2900	---	0.7230	1.6200	0.4120	---	1.3000	---	---	1.2600	1.7800	---	0.9070

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/6/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
Carbonyl	Acetaldehyde	75070	0.007206544	0.6828	0.9747	1.1332	0.6378	1.6359	1.4035	1.4683	0.5459	0.8522	1.7746	---	1.2990	1.4990	1.5440	0.9819	1.1603	---	0.5063	0.2991
Carbonyl	Acetone	67641	0.016628221	0.6105	1.1093	1.2542	0.8148	1.2804	1.5369	2.3683	0.4395	0.9692	2.0334	---	0.9027	1.3896	2.8743	1.8624	2.5417	---	1.7103	0.6794
Carbonyl	Benzaldehyde	100527	0.008680573	0.1389	0.1085	0.1042	0.0694	0.1259	0.1128	0.1085	0.0868	0.0694	0.1042	---	0.1128	0.0998	0.0781	0.0651	0.0868	---	0.0477	0.0608
Carbonyl	Butyraldehyde	123728	0.002949284	0.1504	0.1091	0.1445	0.0649	0.2772	0.2330	0.1563	0.0649	0.0885	0.2212	---	0.1976	0.1504	0.2241	0.1475	0.1947	---	0.1357	0.0560
Carbonyl	Crotonaldehyde	123739	0.002866667	1.0607	2.4424	2.8237	1.0750	3.6980	1.4993	1.5623	0.4701	0.1835	0.6995	---	0.1290	0.1233	0.0917	0.0344	0.0487	---	0.0344	0.0229
Carbonyl	Formaldehyde	50000	0.006141104	2.4073	4.5321	5.1340	2.6038	7.4676	4.7532	5.3673	1.4125	1.0194	4.8515	---	2.1125	2.8618	2.8618	0.7345	1.1938	---	0.8696	0.4716
Carbonyl	Hexaldehyde	66251	0.008193047	0.1229	0.1229	0.1229	0.1557	0.1311	0.1270	0.1024	0.0655	0.0655	0.1065	---	0.0942	0.0737	0.0942	0.0492	0.0655	---	0.0533	0.0287
Carbonyl	Isovaleraldehyde	590863	0.003522699	0.0317	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	0.0705	ND	0.0528	0.0317	ND	---	0.0247	ND
Carbonyl	Propionaldehyde	123386	0.00475092	0.1259	0.2114	0.2661	0.1330	0.5440	0.3159	0.2447	0.0855	0.1425	0.2827	---	0.2233	0.2732	0.2613	0.1378	0.2067	---	0.0974	0.0428
Carbonyl	Tolualdehydes	NA	0.009828221	0.0639	0.1229	0.1573	0.0442	0.2310	0.2604	0.3833	ND	0.0491	0.2162	---	0.1229	0.0983	0.1229	0.0983	ND	---	0.0344	0.0295
Carbonyl	Valeraldehyde	110623	0.003522699	0.0881	0.0881	0.1268	0.0528	0.1198	0.1409	0.0951	0.0564	0.0458	0.1233	---	0.1480	0.1057	0.0845	0.0564	0.0775	---	0.0458	0.0211
Cr6	Hexavalent Chromium	18540299	0.0111	ND	0.0200	ND	0.0177	0.0150			0.0190	ND	ND	ND	---	0.0080	ND	0.0031	ND	0.0029	ND	0.0082
Metals	Antimony	7440360	0.029	0.0800	0.2300	0.2800	1.7700	0.3400	0.4800	0.7100	0.0900	0.3200	0.4900	0.5700	---	0.4300	0.3600	0.4100	0.6800	0.8500	0.1500	0.1240
Metals	Arsenic	7440382	0.022	1.2000	0.9500	1.0000	1.3800	0.7900	1.3600	1.2200	0.5100	0.6000	1.2900	0.7200	---	0.5900	0.7000	0.8400	1.9700	0.8800	0.3100	0.3170
Metals	Beryllium	7440417	0.025	0.0020	0.0040	0.0030	0.0040	0.0060	0.0070	0.0100	0.0020	0.0090	0.0080	0.0050	---	0.0070	0.0050	0.0060	0.0040	0.0040	0.0020	0.0010
Metals	Cadmium	7440439	0.019	0.0800	0.0800	0.1000	0.0900	0.1100	0.2100	0.2200	0.0300	0.1100	0.1400	0.1100	---	0.1400	0.1700	0.1300	0.1400	0.1800	0.0900	0.0490
Metals	Chromium	7440473	0.509	1.3400	1.4400	1.3000	1.2500	1.4300	1.5000	1.6200	1.2800	1.7600	1.2900	1.4100	---	1.4400	1.8200	1.6500	1.6100	1.8200	3.2100	3.1100
Metals	Cobalt	7440484	0.022	0.0400	0.0600	0.0600	0.0700	0.0900	0.1100	0.1600	0.0400	0.0500	0.0900	0.0700	---	0.0800	0.0700	0.0600	0.0600	0.0800	0.0500	0.0140
Metals	Lead	7439921	0.068	4.1000	3.2800	4.4200	2.8000	3.4600	3.7000	4.2200	1.4500	3.5000	4.0300	3.7800	---	5.9000	10.6000	3.3900	3.6000	5.2000	1.3100	2.2600
Metals	Manganese	7439965	0.125	3.5600	4.2700	4.1800	5.7700	6.1400	11.4000	11.2000	2.3900	4.2100	9.1400	5.7500	---	7.5000	6.2500	6.5100	3.0200	5.0700	2.1600	0.8480
Metals	Mercury	7439976	0.212	ND	ND	ND	ND	0.0600	ND	0.0080	0.0200	0.1500	0.0040	0.0100	---	0.0400	0.0100	0.0100	0.0200	0.0100	ND	ND
Metals	Nickel	7440020	0.184	0.9900	1.1000	0.7200	0.7500	1.3800	0.8400	1.5300	1.8100	1.0500	1.9200	1.0900	---	1.2400	1.1900	0.7000	2.0300	1.0600	0.7300	0.4620
Metals	Selenium	7782492	0.027	0.3400	0.4800	0.8800	0.7600	0.5300	1.3300	1.7800	0.3500	1.0400	0.9000	0.8200	---	0.7200	0.3500	1.4500	1.6600	0.6200	0.2800	0.2070
SVOC	Acenaphthene	83329	0.000188	2.7300	2.2800	4.4700	1.5200	1.5500	0.7860	0.3210	2.0100	0.6300	0.4330	0.6580	---	1.7800	0.1540	0.2950	0.2240	1.1200	0.2060	---
SVOC	Acenaphthylene	208968	0.000206	ND	ND	ND	0.5330	0.1080	ND	ND	0.0729	ND	0.0433	0.0411	---	0.1400	0.0616	0.2620	0.2610	1.3800	ND	---
SVOC	Anthracene	120127	0.00013	0.3670	ND	ND	4.0700	4.4700	ND	ND	ND	ND	ND	ND	---	0.1050	ND	1.8700	1.2700	5.6600	0.0686	---
SVOC	Benzo (a) anthracene	56553	0.000114	ND	0.0345	ND	0.0761	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0308	ND	0.0373	0.2300	ND	---
SVOC	Benzo (a) pyrene	50328	0.000161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	0.0698	0.0308	0.0327	0.0373	0.0658	ND	---
SVOC	Benzo (b) fluoranthene	205992	0.000124	ND	0.0345	ND	0.0381	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0308	ND	0.0746	0.1970	ND	---
SVOC	Benzo (e) pyrene	192972	0.0000809	ND	0.0345	ND	0.0381	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	0.0373	0.1320	ND	---
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0308	ND	0.0746	0.1320	ND	---
SVOC	Benzo (k) fluoranthene	207089	0.0000893	ND	0.1380	0.2410	0.1900	0.1080	0.0786	0.1430	0.0729	0.0995	ND	ND	---	ND	0.0308	ND	0.0746	0.1650	ND	---
SVOC	Chrysene	218019	0.000109	0.0333	0.1380	0.1030	0.0381	0.0361	0.0393	0.0357	ND	0.0332	0.0433	0.0411	---	0.0698	0.0308	0.0327	0.1120	0.4280	0.0343	---

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
Carbonyl	Acetaldehyde	75070	0.007206544	0.3585	0.8468	1.0215	0.6684	0.5801	1.0341	0.9747	14.0528	1.5890	---	0.5855	1.6377	---	---	1.0377	2.2340	---	1.1765
Carbonyl	Acetone	67641	0.016628221	1.2376	0.8599	1.5821	0.8314	2.2472	4.1808	2.8981	16.0581	1.8077	---	1.3991	1.7293	---	---	1.4348	2.2187	---	1.9740
Carbonyl	Benzaldehyde	100527	0.008680573	0.0521	0.0825	0.0998	0.1085	0.0564	0.0781	0.0694	1.3846	0.1519	---	0.0564	0.1563	---	---	0.0998	0.2344	---	0.0998
Carbonyl	Butyraldehyde	123728	0.002949284	0.0678	0.1032	0.1357	0.0885	0.1003	0.1622	0.1327	2.3417	0.2212	---	0.0590	0.2271	---	---	0.1327	0.2743	---	0.1445
Carbonyl	Crotonaldehyde	123739	0.002866667	ND	0.0573	0.0631	0.0659	0.0287	0.0717	0.1204	7.9407	0.6765	---	0.4701	2.3392	---	---	1.4305	3.2967	---	1.6627
Carbonyl	Formaldehyde	50000	0.006141104	0.5809	1.8300	2.0388	1.6090	1.0550	2.2968	2.6284	33.8989	3.7706	---	1.7809	6.2639	---	---	4.4462	9.9732	---	5.6253
Carbonyl	Hexaldehyde	66251	0.008193047	0.0246	0.0860	0.0614	0.0819	0.0328	0.0574	0.0614	1.8434	0.1188	---	0.0492	0.1393	---	---	0.0696	0.1721	---	0.0860
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	ND	0.0247	0.0317	ND	ND	ND	0.3241	ND	---	ND	ND	---	---	ND	ND	---	ND
Carbonyl	Propionaldehyde	123386	0.00475092	0.0499	0.1235	0.1520	0.0998	0.0926	0.1235	0.1259	2.1569	0.2589	---	0.0784	0.2637	---	---	0.1663	0.3444	---	0.1687
Carbonyl	Tolualdehydes	NA	0.009828221	0.0590	0.1474	0.0835	0.0688	0.0786	0.0639	0.1229	1.9509	0.2359	---	0.0639	0.3342	---	---	0.2850	0.7715	---	0.3833
Carbonyl	Valeraldehyde	110623	0.003522699	0.0247	0.0564	0.0564	0.0634	0.0317	0.1022	0.0845	1.1273	0.1127	---	0.0387	0.1902	---	---	0.1127	0.2466	---	0.0986
Cr6	Hexavalent Chromium	18540299	0.0111	ND	0.0199	ND	ND	0.0138*	0.0123	0.0105	0.0083	0.0201	0.0069	---	0.0254	---	0.0078	0.0069	0.0462	---	0.0245
Metals	Antimony	7440360	0.029	0.0680	0.2430	0.3650	0.1380	0.3240	0.5210	---	0.3180	0.4690	0.1180	---	---	1.4600	---	0.3310	1.8700	---	0.6510
Metals	Arsenic	7440382	0.022	0.0830	0.3590	0.6780	0.2720	0.2220	1.4100	---	0.4190	1.0300	0.2520	---	---	1.4200	---	0.8670	0.7450	---	0.5470
Metals	Beryllium	7440417	0.025	0.0005	0.0030	0.0050	0.0050	0.0080	0.0050	---	0.0050	0.0100	0.0050	---	---	0.0030	---	0.0050	0.0090	---	0.0060
Metals	Cadmium	7440439	0.019	0.0410	0.0730	0.1130	0.0710	0.0670	0.1240	---	0.0880	0.1720	0.0630	---	---	0.1560	---	0.0840	0.1520	---	0.0930
Metals	Chromium	7440473	0.509	3.5300	3.4600	3.8300	2.9400	3.5700	3.3700	---	2.8400	4.2500	3.6500	---	---	3.1700	---	3.8300	3.1500	---	2.6900
Metals	Cobalt	7440484	0.022	0.0180	0.0640	0.0640	0.0540	0.0530	0.0840	---	0.0710	0.1340	0.0470	---	---	0.1470	---	0.0700	0.1190	---	0.0900
Metals	Lead	7439921	0.068	1.1600	1.3800	2.8000	1.5300	2.1300	3.6300	---	3.4300	4.6000	1.8700	---	---	4.8900	---	2.9200	7.3300	---	2.6500
Metals	Manganese	7439965	0.125	1.6200	3.7400	6.6200	2.5600	3.2800	6.0000	---	8.6300	15.3000	6.2900	---	---	21.5000	---	8.3800	13.3000	---	6.1300
Metals	Mercury	7439976	0.212	ND	ND	0.0050	0.0480	0.0170	0.0100	---	0.0030	0.1030	ND	---	---	0.0670	---	0.0170	0.0130	---	0.1600
Metals	Nickel	7440020	0.184	0.5830	1.1000	0.7980	1.0800	0.6020	0.6690	---	1.0700	0.6600	0.4410	---	---	0.6950	---	0.5910	0.6780	---	0.5840
Metals	Selenium	7782492	0.027	0.0820	0.3950	0.5160	0.5560	0.3150	1.0400	---	0.6320	1.0500	0.2580	---	---	0.9410	---	0.7000	1.1300	---	0.5900
SVOC	Acenaphthene	83329	0.000188	0.1140	0.5790	0.5300	1.3600	0.1630	0.2460	---	---	1.1500	0.1920	---	---	1.0200	1.7600	0.3300	1.8500	0.9000	0.3980
SVOC	Acenaphthylene	208968	0.000206	ND	ND	ND	0.1020	0.0815	ND	---	---	0.2230	0.0767	---	---	ND	0.6130	ND	0.1320	0.1040	ND
SVOC	Anthracene	120127	0.00013	0.0763	ND	ND	ND	ND	ND	---	---	ND	ND	---	---	ND	ND	ND	ND	ND	ND
SVOC	Benzo (a) anthracene	56553	0.000114	ND	ND	ND	ND	ND	0.0352	---	---	0.0372	ND	---	---	0.0426	ND	ND	0.0331	ND	ND
SVOC	Benzo (a) pyrene	50328	0.000161	ND	ND	ND	ND	ND	ND	---	---	0.3340	0.0384	---	---	ND	0.1530	ND	0.0331	ND	ND
SVOC	Benzo (b) fluoranthene	205992	0.000124	ND	0.0362	0.0379	ND	0.0408	0.0703	---	---	0.1110	ND	---	---	0.0851	ND	ND	0.0662	ND	ND
SVOC	Benzo (e) pyrene	192972	0.0000809	ND	ND	ND	ND	0.0408	ND	---	---	0.0743	ND	---	---	ND	ND	ND	0.0331	ND	ND
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	ND	ND	ND	ND	0.0408	0.0352	---	---	0.0743	ND	---	---	ND	ND	ND	0.0331	ND	ND
SVOC	Benzo (k) fluoranthene	207089	0.0000893	ND	0.0362	0.0379	ND	0.0408	0.0352	---	---	0.0743	ND	---	---	0.0426	ND	ND	0.0331	ND	ND
SVOC	Chrysene	218019	0.000109	ND	0.0362	0.0379	0.0341	0.0408	0.0703	---	---	0.1860	ND	---	---	0.2130	0.0383	ND	0.1320	ND	ND

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/6/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
SVOC	Coronene	191071	0.0000738	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	0.0658	ND	---
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	0.0329	ND	---
SVOC	Fluoranthene	206440	0.000132	1.3700	2.4200	3.2700	1.0300	1.8400	0.5500	0.3210	0.6200	0.3320	0.7360	0.3290	---	0.6290	0.2160	0.2290	0.2610	0.9220	0.1030	---
SVOC	Fluorene	86737	0.000318	2.6000	3.0400	4.7800	1.7500	2.1600	1.1400	0.6780	1.5700	1.1900	1.9000	0.9870	---	2.0600	0.6160	0.8840	1.0800	2.3700	0.5140	---
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0308	0.0327	0.0746	0.1650	ND	---
SVOC	Naphthalene	91203	0.000682	15.9000	31.0000	25.0000	18.0000	18.8000	10.1000	5.8900	14.3000	16.7000	9.3100	15.0000	---	27.2000	6.1900	14.2000	38.5000	38.8000	12.9000	---
SVOC	Perylene	198550	0.000107	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	ND	---
SVOC	Phenanthrene	85018	0.000124	3.2300	5.9700	9.4300	3.7700	4.1500	2.0800	1.3200	2.8100	1.5600	0.9090	0.8630	---	1.7100	0.5550	1.2800	0.8580	3.8500	0.5490	---
SVOC	Pyrene	129000	0.000161	0.7670	1.5200	1.6500	0.6470	0.9740	0.3140	0.1780	0.3280	0.1990	0.3900	0.1230	---	0.2100	0.0924	0.1310	0.1490	0.5920	0.0686	---
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1637	0.1091	0.1091	0.1091	0.1091	0.1637	0.1637	0.1637	0.1091	0.1637	---	0.1091	0.1637	0.1091	0.1091	0.1637	---	0.1091	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	0.0742	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.2226	ND	0.0742	0.1484	---	ND	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.7865	0.3441	0.3441	0.3441	0.4424	0.3933	0.3441	0.1966	0.1966	0.2458	---	1.0323	0.4424	0.2458	0.3933	0.2949	---	0.1475	0.1966
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.2458	0.0983	0.0983	0.0983	0.1475	0.0983	0.0983	0.0492	0.0983	0.0983	---	0.2949	0.0983	0.0983	0.1475	0.0983	---	ND	0.0492
VOC	1,3-Butadiene	106990	0.01327362	ND	0.0221	ND	0.0221	0.0442	0.0221	ND	ND	ND	0.0221	---	ND	0.0221	ND	0.2433	0.0221	---	ND	ND
VOC	Acetonitrile	75058	0.166214724	ND	0.1343	ND	ND	ND	ND	ND	ND	ND	3.4754	---	13.1293	25.1840	10.8795	6.0945	24.5125	---	ND	ND
VOC	Acetylene	74862	0.024495706	0.2343	0.1278	0.4260	0.1598	0.5112	0.3834	0.5432	0.1278	0.1385	0.4154	---	0.2343	0.6177	0.3621	0.6816	0.8414	---	0.2769	0.2982
VOC	Acrolein	107028	0.245334151		0.5274	ND	ND	ND	ND	ND	ND	ND	2.7514	---	ND	ND	ND	0.9401	ND	---	ND	ND
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Benzene	71432	0.015977505	0.7350	0.5752	0.5752	0.5113	0.7669	0.5752	0.6071	0.3196	0.3835	0.7030	---	0.8308	0.8308	0.5432	1.1504	0.8947	---	0.3835	0.3835
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Bromomethane	74839	0.038830266	ND	0.0388	ND	0.0388	0.0388	0.0388	ND	0.1165	ND	0.1165	---	0.0777	0.0388	0.0388	0.0388	0.0388	---	0.0388	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.5662	0.6291	0.5662	0.6920	0.6920	0.5662	0.6291	0.9437	0.7549	0.6291	---	0.6291	0.6920	0.7549	0.6920	0.7549	---	0.4404	0.5033
VOC	Chlorobenzene	108907	0.023018405	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0460	ND	ND	ND	---	ND	ND
VOC	Chloroethane	75003	0.021110838	ND	0.0264	ND	0.0264	0.0264	0.0264	ND	ND	ND	0.0528	---	0.4486	0.2639	0.2903	0.5278	0.5278	---	ND	ND
VOC	Chloroform	67663	0.01953047	ND	ND	0.0977	ND	ND	ND	ND	ND	0.0488	0.0977	---	ND	0.0977	0.0488	ND	ND	---	ND	0.0488

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
SVOC	Coronene	191071	0.0000738	ND	ND	ND	ND	0.0408	0.0352	---	---	ND	ND	---	---	ND	ND	ND	ND	ND	ND
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	ND	ND	ND	ND	ND	---	---	ND	ND	---	---	ND	ND	ND	ND	ND	ND
SVOC	Fluoranthene	206440	0.000132	0.1140	0.3620	0.3030	0.4770	0.1220	0.3170	---	---	0.7800	0.0767	---	---	1.7000	0.6900	0.3300	1.3600	0.6920	0.2650
SVOC	Fluorene	86737	0.000318	1.2200	1.0500	1.1000	1.2300	0.8150	0.8440	---	---	2.1900	0.3070	---	---	1.7900	2.4500	0.5860	2.9500	1.4200	0.6630
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	ND	ND	ND	ND	0.0815	0.0703	---	---	0.1110	ND	---	---	ND	ND	ND	0.0331	ND	ND
SVOC	Naphthalene	91203	0.000682	9.2700	12.7000	15.6000	9.1400	7.5800	10.5000	---	---	36.6000	2.6900	---	---	21.7000	15.7000	7.8800	45.3000	9.5900	5.7300
SVOC	Perylene	198550	0.000107	ND	ND	ND	ND	ND	ND	---	---	ND	ND	---	---	ND	ND	ND	ND	ND	ND
SVOC	Phenanthrene	85018	0.000124	0.3430	1.2700	0.9840	1.4300	0.3260	0.7390	---	---	4.0500	0.3450	---	---	3.7000	2.9100	1.1000	4.4000	2.1500	1.0600
SVOC	Pyrene	129000	0.000161	0.0763	0.1450	0.1140	0.2050	0.0815	0.1410	---	---	0.4090	0.0384	---	---	0.6380	0.2680	0.1470	0.5300	0.2770	0.1330
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1091	0.1091	0.1091	0.1091	0.1091	0.1091	0.1637	0.1637	0.1091	---	0.1091	0.1091	---	---	0.1637	0.1637	---	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	0.1484	---	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.1475	0.1966	0.1475	0.1475	0.0983	0.0983	ND	0.0492	ND	---	0.0492	0.0983	---	---	0.0492	0.0983	---	0.0492
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	ND	ND	ND	---	ND	ND	---	---	ND	0.0492	---	ND
VOC	1,3-Butadiene	106990	0.01327362	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.0221	---	---	ND	ND	---	ND
VOC	Acetonitrile	75058	0.166214724	ND	ND	ND	ND	0.1343	ND	ND	ND	ND	---	ND	ND	---	---	ND	0.5876	---	ND
VOC	Acetylene	74862	0.024495706	0.4047	0.4154	0.6177	0.2343	0.4473	0.5645	0.2982	0.2343	0.4793	---	0.2024	0.6497	---	---	0.1704	0.3302	---	0.1917
VOC	Acrolein	107028	0.245334151	ND	ND	0.2751	ND	0.1605	0.1834	ND	ND	ND	---	0.2522	0.8942	---	---	0.3669	0.3898	---	ND
VOC	Acrylonitrile	107131	0.12369816	ND	ND	0.1085	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Benzene	71432	0.015977505	0.4474	0.4474	0.6391	0.3196	0.4154	0.4474	0.4474	1.6297	0.5113	---	0.3196	0.3515	---	---	0.2237	0.4793	---	0.1917
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Bromomethane	74839	0.038830266	0.0388	0.0388	0.0388	0.0388	0.0388	0.0388	0.0388	ND	ND	---	0.0388	0.0777	---	---	0.0388	0.0388	---	0.0388
VOC	Carbon Tetrachloride	56235	0.056620859	0.7549	0.5033	0.3146	0.4404	0.5033	0.6920	0.5662	0.5662	0.5662	---	0.7549	0.7549	---	---	1.0066	0.8808	---	0.7549
VOC	Chlorobenzene	108907	0.023018405	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Chloroethane	75003	0.021110838	ND	ND	ND	ND	ND	0.0264	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Chloroform	67663	0.01953047	ND	0.0488	0.0488	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	0.0977	0.0977	---	ND

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/6/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/23/2006
VOC	Chloromethane	74873	0.028910429	1.8172	1.2803	1.3216	1.5075	1.4249	1.3216	1.2803	2.2302	1.3010	1.4042	---	1.5488	1.4249	1.3010	1.2390	1.4042	---	0.8673	1.0738
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	2.1759	2.6704	2.5715	3.0660	2.9671	2.9177	3.0166	3.7089	2.9671	2.9671	---	3.1649	3.2638	2.9671	2.7199	4.0056	---	2.2253	2.7199
VOC	Dichloromethane	75092	0.059051534	ND	0.1042	0.1737	0.1737	0.1737	0.1389	0.2084	0.1389	0.1737	0.1389	---	0.3126	0.2779	0.2779	0.2084	0.1389	---	0.1042	0.1389
VOC	Dichlorotetrafluoroethane	76142	0.020971779	ND	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.1398	0.1398	0.1398	0.1398	---	0.0699	0.1398
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Ethylbenzene	100414	0.021711656	0.4342	0.3040	0.2605	0.2605	0.3474	0.2605	0.2171	0.1303	0.1303	0.1737	---	0.8250	0.3908	0.1737	0.3474	0.3474	---	0.0868	0.1303
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	0.2133	ND	ND	0.2133	---	0.1067	0.2133
VOC	m,p-Xylene	100016	0.039080982	1.0422	0.5645	0.4777	0.5645	0.7816	0.6948	0.6079	0.3040	0.3040	0.3908	---	2.2580	0.9553	0.3908	0.7816	0.8685	---	0.2171	0.3474
VOC	m-Dichlorobenzene	541731	0.02404908	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	0.0601	ND
VOC	Methyl Ethyl Ketone	78933	0.129768507	6.5769	3.3032	3.3917	1.9465	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	1.0617	ND	---	0.5014	0.4719
VOC	Methyl Isobutyl Ketone	108101	0.028675665	1.1470	0.2868	0.2458	ND	ND	ND	ND	ND	ND	ND	---	0.4506	ND	ND	0.2458	ND	---	0.0819	0.0819
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	n-Octane	111659	0.028031902	0.2803	0.1402	0.1402	ND	0.2336	0.0934	0.1869	ND	ND	ND	---	0.4672	0.3738	0.1869	0.3270	0.2336	---	ND	0.0934
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	o-Xylene	95476	0.017369325	0.5211	0.2605	0.2171	0.3040	0.3908	0.3040	0.3040	0.1303	0.1303	0.1737	---	1.9106	0.5211	0.2171	0.4342	0.4342	---	0.0868	0.1303
VOC	p-Dichlorobenzene	106467	0.03607362	1.0822	0.6012	0.4810	0.4810	0.4810	0.3607	0.3607	0.3006	0.2405	0.2405	---	0.2405	0.1804	0.1804	0.1804	0.1804	---	0.1202	0.1804
VOC	Propylene	115071	0.015489571	0.2926	0.2409	0.3270	0.2926	0.4303	0.2409	0.1893	0.2926	0.2065	0.2065	---	0.2926	0.3786	0.2237	0.4991	0.3786	---	0.0688	0.1205
VOC	Styrene	100425	0.042597137	0.1704	0.0852	0.1278	0.1278	0.1704	0.1278	0.1278	0.0852	0.0852	0.0852	---	1.4909	0.5112	0.2982	0.5112	0.3834	---	0.0852	0.1704
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	0.0678	0.0678	ND	ND	ND	ND	ND	ND	ND	---	ND	0.1356	ND	0.1356	0.0678	---	ND	ND
VOC	Toluene	108883	0.018842536	5.5397	3.3540	2.7887	2.8641	3.1279	3.0525	2.8264	1.3190	1.2436	1.8843	---	2.6380	1.4697	0.6783	1.2813	1.4320	---	0.7914	1.2059
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND
VOC	Trichloroethylene	79016	0.053738241	ND	0.0537	ND	0.0537	ND	ND	ND	ND	ND	0.0537	---	0.1075	0.0537	ND	ND	0.0537	---	ND	ND
VOC	Trichlorofluoromethane	75694	0.039328834	1.1237	1.4046	1.3484	1.6293	1.5732	1.5170	1.5170	2.0788	1.6293	1.4046	---	1.6293	1.6293	1.7417	1.5170	2.1350	---	1.2360	1.5170
VOC	Trichlorotrifluoroethane	76131	0.091965644	1.6860	1.5328	1.4561	1.6094	1.5328	1.5328	1.4561	1.8393	1.1496	1.5328	---	1.6860	1.9160	1.3028	1.5328	1.4561	---	0.6131	0.9197
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	0.0256	ND	---	0.0256	ND

Table A-3: Analytical Data
Providence Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/29/2006	6/4/2006	6/16/2006	6/22/2006	6/28/2006
VOC	Chloromethane	74873	0.028910429	1.1977	1.1564	1.4455	1.1771	0.8467	1.1771	0.7641	0.9499	0.9086	---	1.0738	1.4868	---	---	1.3216	1.0945	---	1.3836
VOC	Chloromethylbenzene	100447	0.025887526	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Chloroprene	126998	0.079667894	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	cis-1,2-Dichloroethylene	156594	0.063437219	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	0.3965	ND	---	---	ND	ND	---	ND
VOC	cis-1,3-Dichloropropene	10061015	0.063541104	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Dibromochloromethane	124481	0.085186094	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Dichlorodifluoromethane	75718	0.024725971	2.7199	2.5715	3.1155	2.3242	2.0770	2.7199	2.4726	2.4726	2.5220	---	2.6210	4.3023	---	---	3.0166	2.9177	---	2.9177
VOC	Dichloromethane	75092	0.059051534	0.1737	0.1737	0.2084	0.8684	0.1737	0.2084	ND	0.1389	ND	---	0.2084	0.2084	---	---	0.2084	0.2084	---	0.1042
VOC	Dichlorotetrafluoroethane	76142	0.020971779	0.1398	0.1398	0.1398	0.0699	0.0699	0.1398	0.1398	0.0699	0.1398	---	0.1398	0.1398	---	---	0.1398	0.1398	---	0.1398
VOC	Ethyl Acrylate	140885	0.045043763	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Ethyl tert-Butyl Ether	637923	0.029253988	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Ethylbenzene	100414	0.021711656	0.0868	0.0868	0.0868	0.0868	0.0868	0.0868	0.0434	0.0434	0.0868	---	0.0434	0.0868	---	---	0.0434	0.0868	---	0.0434
VOC	Hexachloro-1,3-butadiene	87683	0.138645399	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	0.2133	---	ND
VOC	m,p-Xylene	100016	0.039080982	0.1737	0.2605	0.2171	0.2171	0.1737	0.1303	0.1303	0.1737	0.1737	---	0.0868	0.1737	---	---	0.0868	0.1737	---	0.0868
VOC	m-Dichlorobenzene	541731	0.02404908	ND	0.1202	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	0.0601	---	ND
VOC	Methyl Ethyl Ketone	78933	0.129768507	0.4424	0.8258	0.9733	0.6783	0.5604	0.6193	ND	0.7963	1.0028	---	0.5899	5.3677	---	---	0.7963	1.0617	---	0.6488
VOC	Methyl Isobutyl Ketone	108101	0.028675665	0.0819	0.0819	0.1229	0.0819	0.0819	0.0819	ND	ND	ND	---	ND	0.4506	---	---	ND	0.0410	---	0.0410
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	ND	0.0361	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	n-Octane	111659	0.028031902	ND	ND	0.0934	ND	0.0934	0.0467	ND	ND	ND	---	ND	0.0467	---	---	ND	0.0467	---	ND
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	o-Xylene	95476	0.017369325	0.0868	0.0868	0.0868	0.0868	0.0868	0.0434	0.0434	0.0434	0.0868	---	0.0434	0.0868	---	---	0.0434	0.0868	---	0.0434
VOC	p-Dichlorobenzene	106467	0.03607362	0.1202	0.1804	0.0601	0.0601	0.0601	0.0601	ND	ND	ND	---	ND	0.0601	---	---	0.0601	0.0601	---	0.0601
VOC	Propylene	115071	0.015489571	0.1033	0.1205	0.2409	0.1205	0.1033	0.1549	0.1205	0.1205	0.2754	---	0.0861	0.4475	---	---	0.1033	0.1893	---	0.0861
VOC	Styrene	100425	0.042597137	0.0426	0.0852	0.0426	0.0852	0.0852	0.0426	ND	ND	ND	---	ND	0.0852	---	---	ND	0.0426	---	ND
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	0.0678	---	0.0678
VOC	Toluene	108883	0.018842536	0.7160	1.0552	0.7914	0.6783	0.4522	0.3769	0.3769	0.4899	0.6030	---	0.3392	0.6030	---	---	0.3015	0.5276	---	0.4145
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Trichloroethylene	79016	0.053738241	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND
VOC	Trichlorofluoromethane	75694	0.039328834	1.5170	1.4046	1.6855	1.3484	1.0675	1.4046	1.3484	1.2922	1.2922	---	1.4608	2.4721	---	---	1.6855	1.5732	---	1.4046
VOC	Trichlorotrifluoroethane	76131	0.091965644	0.9963	0.9963	1.0729	0.8430	0.6131	0.7664	0.8430	1.1496	1.1496	---	0.9197	1.3795	---	---	0.9963	0.6897	---	0.8430
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	---	---	ND	ND	---	ND

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/17/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	ND	ND	ND	---
Carbonyl	Acetaldehyde	75070	0.007206544	0.9729	1.4467	1.5584	0.9188	2.0719	1.8737	1.9818	0.6774	---	2.1620	1.4791	1.5548	1.3584	1.1945	1.2377	1.5602	1.1747	---
Carbonyl	Acetone	67641	0.016628221	0.6533	0.9953	1.2851	0.9597	1.4372	2.7318	2.8030	0.4798	---	2.8030	2.8268	1.3303	2.3992	4.8934	2.4942	2.1260	6.6988	---
Carbonyl	Benzaldehyde	100527	0.008680573	0.1519	0.1563	0.1606	0.1128	0.1649	0.1693	0.1606	0.1085	---	0.2387	0.1215	0.1476	0.0738	0.1432	0.1128	0.1476	0.1476	---
Carbonyl	Butyraldehyde	123728	0.002949284	0.2241	0.2566	0.3126	0.1563	0.3451	0.4630	0.3215	0.0944	---	0.4365	0.6724	0.2389	0.2448	0.4601	0.2802	0.3805	0.4394	---
Carbonyl	Crotonaldehyde	123739	0.002866667	0.8600	1.6082	1.9780	1.0091	2.4166	0.9489	1.1409	0.6737	---	0.4816	0.1921	0.1405	0.0745	0.0917	0.0745	0.1032	0.0889	---
Carbonyl	Formaldehyde	50000	0.006141104	2.7512	4.5444	5.6253	2.7512	5.7481	3.5618	4.4462	2.1617	---	4.1023	2.5793	2.2476	2.1985	1.6581	1.6335	2.9846	2.1740	---
Carbonyl	Hexaldehyde	66251	0.008193047	0.1434	0.1843	0.2294	0.1147	0.3113	0.2130	0.2540	0.1229	---	0.2499	0.1270	0.1229	0.0778	0.0860	0.0778	0.1352	0.1065	---
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	ND	0.0387	ND	0.0705	0.0705	0.0317	ND	---	0.0528	0.0387	0.0458	0.0247	0.0528	ND	0.0282	0.0387	---
Carbonyl	Propionaldehyde	123386	0.00475092	0.1924	0.2827	0.2637	0.1924	0.3587	0.3563	0.3991	0.1259	---	0.4228	0.2827	0.2898	0.2708	0.1972	0.2257	0.2756	0.1900	---
Carbonyl	Tolualdehydes	NA	0.009828221	0.1523	0.1573	0.1179	0.0934	0.2162	0.2457	0.3489	0.1229	---	0.2162	0.1130	0.1474	0.0541	0.1474	0.1081	0.1671	0.1523	---
Carbonyl	Valeraldehyde	110623	0.003522699	0.1057	0.1057	0.1303	0.0986	0.1937	0.1691	0.1691	0.0951	---	0.1937	0.1233	0.1409	0.0951	0.0951	0.1057	0.1480	0.1233	---
Cr6	Hexavalent Chromium	18540299	0.0111	ND	0.0354	0.0721	0.0344	0.0259	ND	0.0372	0.0227	ND	ND	ND	0.0335	ND	0.0819	ND	0.0268	0.0432	---
Metals	Antimony	7440360	0.029	0.6400	1.3500	2.0700	0.5500	1.0200	1.5000	1.6600	0.2900	3.8400	2.6900	1.0500	1.9900	0.4200	1.4900	1.5900	1.1900	---	0.7010
Metals	Arsenic	7440382	0.022	1.2200	3.5900	4.7900	1.5300	3.0500	6.9700	4.9600	0.9100	34.3000	3.1500	1.6800	1.1700	2.5000	4.8600	9.7600	1.7500	---	4.9500
Metals	Beryllium	7440417	0.025	0.0300	0.3700	0.2700	0.0500	0.2600	0.4800	0.5900	0.0300	1.4400	0.1900	0.0600	0.0800	0.0400	0.1900	0.2430	0.0480	---	0.0520
Metals	Cadmium	7440439	0.019	0.6300	0.5200	0.5900	0.0900	0.4300	0.3100	0.3700	0.1300	0.3000	0.4700	0.2200	0.1800	0.1500	0.1800	0.1930	0.3300	---	0.3130
Metals	Chromium	7440473	0.509	3.6000	5.1300	4.3200	1.9900	2.9700	1.5400	3.5600	2.5000	11.6000	5.0000	3.4400	3.3400	2.2200	3.0200	2.8400	4.3400	---	3.9200
Metals	Cobalt	7440484	0.022	0.1600	0.4100	0.4000	0.1200	0.3400	0.3600	0.6800	0.1300	3.0900	0.5800	0.3300	0.2100	0.1400	0.5400	0.6380	0.2320	---	0.1310
Metals	Lead	7439921	0.068	23.0000	21.1000	21.6000	5.0900	22.3000	49.6000	37.6000	7.3800	115.0000	27.5000	11.6000	7.5500	7.7200	25.1000	34.7000	14.3000	---	21.5000
Metals	Manganese	7439965	0.125	67.1000	156.0000	120.0000	28.2000	94.4000	90.2000	187.0000	23.4000	606.0000	136.0000	52.9000	52.2000	20.5000	110.0000	96.7000	61.4000	---	26.4000
Metals	Mercury	7439976	0.212	ND	ND	ND	0.0500	ND	ND	0.0500	0.2000	0.0800	0.1200	0.0100	0.3900	0.0100	0.0200	0.0480	ND	---	ND
Metals	Nickel	7440020	0.184	2.1400	2.0800	2.3800	1.0400	1.7700	2.3000	2.1700	2.2900	6.6400	2.7700	1.9600	1.7900	1.1500	1.6200	2.3000	1.6500	---	1.1400
Metals	Selenium	7782492	0.027	0.4200	2.0000	2.2800	0.8600	1.5200	2.5800	1.9200	0.4600	11.4000	1.4000	0.8600	0.6300	0.6600	1.9900	3.4300	0.6690	---	1.0800
SVOC	Acenaphthene	83329	0.000188	6.8700	31.0000	34.3000	9.2600	56.3000	25.2000	44.7000	6.6100	6.1600	21.5000	6.4200	19.0000	4.5900	6.1800	---	5.3700	12.3000	---
SVOC	Acenaphthylene	208968	0.000206	3.3700	19.2000	22.6000	4.1600	16.7000	27.4000	33.6000	1.2100	1.8900	27.8000	6.0700	7.3900	19.9000	26.2000	---	10.7000	22.1000	---
SVOC	Anthracene	120127	0.00013	0.9670	6.2700	10.4000	0.6180	12.9000	8.2800	13.4000	0.4720	13.2000	7.4000	2.6100	2.0700	49.9000	7.9700	---	3.2500	10.8000	---
SVOC	Benzo (a) anthracene	56553	0.000114	0.3000	3.0600	5.1900	0.3290	5.1500	3.5200	5.9700	0.1010	0.2610	1.2300	0.9730	0.2840	3.9800	0.0744	---	1.3700	7.7000	---
SVOC	Benzo (a) pyrene	50328	0.000161	0.1000	1.6900	2.7600	0.1650	2.4600	2.6400	2.9100	ND	0.0978	ND	0.4670	0.0406	2.1900	0.0372	---	0.5830	3.1800	---
SVOC	Benzo (b) fluoranthene	205992	0.000124	0.2670	3.0600	5.6600	0.3290	5.5900	3.2600	5.1300	ND	0.2280	0.2130	0.7400	0.0406	3.1800	ND	---	1.0800	5.0700	---
SVOC	Benzo (e) pyrene	192972	0.0000809	0.2330	2.4400	4.5200	0.2880	4.4500	2.7100	4.1500	ND	0.2610	0.0851	0.5840	0.0406	1.8700	ND	---	0.6660	3.1300	---
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	0.2000	1.3800	2.6000	0.1650	2.2400	1.2800	2.1100	ND	0.1960	ND	0.4280	ND	1.4400	ND	---	0.6250	3.0400	---
SVOC	Benzo (k) fluoranthene	207089	0.0000893	0.3670	2.7500	5.7000	0.4530	5.5500	3.7700	5.4200	0.1350	0.2280	0.1280	0.6620	0.0406	2.6400	ND	---	0.8740	4.3300	---
SVOC	Chrysene	218019	0.000109	0.5670	4.4100	7.3500	0.6590	7.2500	4.6200	8.0500	0.3370	0.5870	2.2600	1.4800	0.5690	4.9600	0.1860	---	2.1200	10.5000	---

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	1/23/2006	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/30/2006	6/4/2006	6/16/2006	6/28/2006
Carbonyl	2,5-Dimethylbenzaldehyde	5779942	0.004939141	ND	ND	ND	ND	ND	ND	---	ND	ND	ND	ND	ND	---	ND	---	---	ND	ND	ND
Carbonyl	Acetaldehyde	75070	0.007206544	0.7783	0.5999	1.5224	1.8197	1.0143	1.0431	---	2.5043	1.7674	1.8557	1.6233	1.1765	---	2.5403	---	---	1.7206	2.8106	1.8557
Carbonyl	Acetone	67641	0.016628221	0.7601	1.4514	2.0405	1.8742	0.7316	2.3992	---	4.2046	3.4444	1.0998	2.3755	1.9004	---	2.5180	---	---	1.1949	1.9764	2.9931
Carbonyl	Benzaldehyde	100527	0.008680573	0.0955	0.1042	0.1345	0.1780	0.1042	0.0781	---	0.2734	0.1563	0.2040	0.2300	0.0868	---	0.2951	---	---	0.1432	0.3212	0.2431
Carbonyl	Butyraldehyde	123728	0.002949284	0.1003	0.1209	0.2890	0.2713	0.1504	0.1622	---	0.6872	0.3126	0.2536	0.2743	0.1268	---	0.5427	---	---	0.2271	0.3539	0.3421
Carbonyl	Crotonaldehyde	123739	0.002866667	0.0516	0.0487	0.0889	0.1089	0.0659	0.0659	---	0.1605	0.1319	0.5332	0.6249	0.3239	---	1.6455	---	---	0.9833	2.6603	1.3473
Carbonyl	Formaldehyde	50000	0.006141104	1.3265	1.0194	3.6355	4.0408	2.5056	1.4739	---	3.8198	3.9549	4.8883	4.8392	3.2671	---	7.4799	---	---	4.2128	11.0908	5.5393
Carbonyl	Hexaldehyde	66251	0.008193047	0.0614	0.0410	0.1434	0.0983	0.1352	0.0492	---	0.2171	0.1966	0.1925	0.1557	0.0533	---	0.2499	---	---	0.1393	0.1925	0.2089
Carbonyl	Isovaleraldehyde	590863	0.003522699	ND	ND	0.0352	0.0352	0.0282	0.0211	---	0.0810	0.0317	0.0740	ND	ND	---	0.1092	---	---	0.0951	0.0599	0.0493
Carbonyl	Propionaldehyde	123386	0.00475092	0.1140	0.1021	0.2518	0.3183	0.1687	0.1544	---	0.3967	0.3254	0.3421	0.3017	0.1639	---	0.4513	---	---	0.2684	0.4775	0.3349
Carbonyl	Tolualdehydes	NA	0.009828221	0.1229	0.0983	0.2162	0.1622	0.0688	0.0786	---	0.2359	0.1769	0.1769	0.1867	0.0835	---	0.3735	---	---	0.2703	0.7568	0.4816
Carbonyl	Valeraldehyde	110623	0.003522699	0.0564	0.0387	0.1550	0.1022	0.0951	0.0528	---	0.2149	0.1973	0.1726	0.1339	0.0564	---	0.2219	---	---	0.1832	0.2466	0.1902
Cr6	Hexavalent Chromium	18540299	0.0111	0.0026	ND	0.0196	0.0527	ND	0.0458	---	0.0981	---	0.0409	0.1550	0.0327	0.0453	0.0971	---	---	0.0125	0.0843	0.1660
Metals	Antimony	7440360	0.029	1.4100	0.5200	0.8000	1.4500	1.1500	2.1500	---	2.8200	---	1.3900	0.7950	1.2400	---	1.1100	---	---	2.1000	0.8470	1.5300
Metals	Arsenic	7440382	0.022	9.6900	8.7800	1.2900	2.2900	0.4700	21.9000	---	5.1600	---	1.7800	1.2800	7.4700	---	2.1900	---	---	14.1000	1.9300	9.2200
Metals	Beryllium	7440417	0.025	0.3600	0.0590	0.0730	0.1130	0.0310	0.9780	---	0.3310	---	0.0760	0.0370	0.2340	---	0.1470	---	---	0.8930	0.3900	1.2300
Metals	Cadmium	7440439	0.019	0.1520	0.2620	0.3450	1.0500	0.1750	0.2700	---	0.2730	---	1.4800	0.2560	0.4810	---	0.3230	---	---	0.4550	0.1510	0.3070
Metals	Chromium	7440473	0.509	2.4700	3.5700	5.3100	7.4000	3.7300	10.9000	---	4.7500	---	5.6700	5.7300	4.4600	---	5.3300	---	---	9.9800	5.5100	13.3000
Metals	Cobalt	7440484	0.022	0.4580	0.1580	0.2680	0.4240	0.1170	2.3600	---	0.5840	---	0.3420	0.2000	0.4200	---	0.3860	---	---	1.8000	0.3770	1.5100
Metals	Lead	7439921	0.068	36.8000	33.5000	16.7000	58.9000	8.1100	61.3000	---	23.3000	---	56.7000	11.4000	42.1000	---	22.7000	---	---	58.1000	9.4400	44.4000
Metals	Manganese	7439965	0.125	82.1000	23.5000	72.7000	112.0000	31.2000	409.0000	---	103.0000	---	92.7000	39.5000	76.9000	---	194.0000	---	---	393.0000	146.0000	614.0000
Metals	Mercury	7439976	0.212	0.0380	0.0700	ND	0.0130	0.1360	0.0870	---	0.2410	---	0.0220	0.0450	0.0240	---	0.1140	---	---	0.2120	0.0240	0.0470
Metals	Nickel	7440020	0.184	1.7600	0.9220	1.8800	1.7000	1.3800	3.8400	---	2.0600	---	2.0100	1.1800	1.5600	---	1.4100	---	---	4.1500	1.7100	2.2300
Metals	Selenium	7782492	0.027	2.2700	1.2700	0.4180	0.7790	0.4260	7.3100	---	1.6100	---	0.7700	1.2200	1.5600	---	1.1000	---	---	4.6500	2.4800	3.0700
SVOC	Acenaphthene	83329	0.000188	---	12.9000	3.5400	6.1500	5.0900	5.0600	---	21.0000	---	---	6.0100	4.8000	5.5200	---	27.0000	22.3000	12.8000	11.6000	14.5000
SVOC	Acenaphthylene	208968	0.000206	---	6.7600	ND	16.8000	0.8210	8.6800	---	25.2000	---	---	0.1850	6.5600	13.1000	---	9.1300	11.3000	7.4700	0.5990	8.4500
SVOC	Anthracene	120127	0.00013	---	31.7000	ND	3.0800	0.2870	8.2800	---	9.5500	---	---	0.2310	5.3300	4.3600	---	5.4500	5.1600	3.6400	0.5590	4.8400
SVOC	Benzo (a) anthracene	56553	0.000114	---	21.9000	0.2190	1.1000	0.0821	4.6100	---	8.3900	---	---	0.0462	5.0400	1.9700	---	3.5500	2.7900	2.7400	0.3590	2.2900
SVOC	Benzo (a) pyrene	50328	0.000161	---	15.3000	ND	0.7690	ND	3.5800	---	6.0500	---	---	0.4620	3.0700	1.9200	---	3.0400	1.9900	2.6900	0.2390	1.2200
SVOC	Benzo (b) fluoranthene	205992	0.000124	---	22.1000	0.3060	1.2600	0.0821	4.7000	---	8.9500	---	---	0.0925	6.3100	2.6900	---	4.1000	3.5900	3.8800	0.3990	1.7500
SVOC	Benzo (e) pyrene	192972	0.0000809	---	13.7000	0.1750	0.8240	ND	3.1300	---	6.4400	---	---	0.0925	3.9300	2.1400	---	3.2500	2.5800	2.9800	0.2790	1.2200
SVOC	Benzo (g,h,i) perylene	191242	0.0000774	---	9.2100	0.1310	0.6590	0.0410	3.1300	---	3.6700	---	---	0.0925	2.7000	1.2400	---	1.5600	1.6500	1.8900	0.1600	0.7620
SVOC	Benzo (k) fluoranthene	207089	0.0000893	---	16.0000	0.1750	0.8790	0.0410	3.6700	---	6.3500	---	---	0.0462	4.4300	2.2700	---	3.5500	2.5800	2.6900	0.2390	1.2900
SVOC	Chrysene	218019	0.000109	---	25.0000	0.6560	1.8700	0.3690	6.0000	---	12.3000	---	---	0.2310	8.4800	3.3800	---	6.1300	5.4500	6.0500	1.0400	3.4300

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/17/2006
SVOC	Coronene	191071	0.0000738	0.1000	0.4480	0.7420	ND	0.6250	0.3660	0.5820	ND	ND	ND	0.1950	ND	0.3740	ND	---	0.2080	0.9220	---
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	ND	0.4820	0.9440	ND	0.8830	0.5500	0.9470	ND	ND	ND	0.1170	ND	0.4800	ND	---	0.1670	0.7830	---
SVOC	Fluoranthene	206440	0.000132	5.9000	20.8000	36.7000	6.0100	39.0000	15.9000	27.9000	3.9800	3.1600	18.0000	8.8000	8.4100	19.6000	4.5800	---	5.7000	23.2000	---
SVOC	Fluorene	86737	0.000318	6.2700	26.6000	38.2000	8.4000	51.2000	23.7000	42.4000	4.7900	6.0300	27.7000	9.5700	18.4000	13.7000	12.5000	---	8.6600	21.5000	---
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	0.2000	1.8600	3.6400	0.2060	3.2400	1.8000	3.1300	ND	ND	ND	0.5060	ND	2.0800	ND	---	0.7910	3.9600	---
SVOC	Naphthalene	91203	0.000682	97.9000	348.0000	508.0000	117.0000	441.0000	260.0000	792.0000	23.4000	56.5000	920.0000	812.0000	273.0000	409.0000	347.0000	---	297.0000	1220.0000	---
SVOC	Perylene	198550	0.000107	ND	0.3440	0.6740	ND	0.4780	0.4760	0.6920	ND	ND	ND	0.2340	ND	0.6940	ND	---	0.2080	1.0600	---
SVOC	Phenanthrene	85018	0.000124	13.2000	73.5000	86.3000	20.3000	103.0000	42.4000	71.8000	11.1000	12.2000	43.8000	19.0000	16.3000	33.8000	29.4000	---	16.6000	58.3000	---
SVOC	Pyrene	129000	0.000161	3.5300	13.9000	21.5000	3.5800	24.7000	10.6000	18.7000	1.9600	2.7100	10.8000	5.3300	5.2400	11.7000	2.9800	---	3.9100	13.1000	---
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.2183	0.2183	0.1091	0.1091	0.1637	---	0.2183	0.1091	---	0.2183	0.1637	0.1637	0.1091	0.1091	---	0.1091	0.1091	---
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	---	ND	ND	---	0.0742	0.1484	0.2226	ND	ND	---	ND	ND	---
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.9340	1.8188	1.2781	0.5899	1.4256	---	1.9663	0.1966	---	2.7528	1.3273	1.3764	0.3441	0.6390	---	1.1306	1.1798	---
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.2949	0.5407	0.3441	0.1966	0.3441	---	0.5407	0.0983	---	0.8848	0.3441	0.3441	0.1475	0.1966	---	0.2949	0.3441	---
VOC	1,3-Butadiene	106990	0.01327362	ND	0.2655	0.3097	0.0664	0.2655	---	0.3982	0.0442	---	0.4425	0.2876	0.2212	0.1549	0.3318	---	0.2212	0.3761	---
VOC	Acetonitrile	75058	0.166214724	80.5890	131.2928	101.9115	9.9897	ND	---	110.3061	ND	---	196.4356	159.1632	105.7730	139.0160	41.6376	---	1.3431	0.4533	---
VOC	Acetylene	74862	0.024495706	1.0331	2.5135	2.8330	0.8307	3.5679	---	3.7063	0.5325	---	5.3891	0.8627	2.8543	1.6082	1.2141	---	1.0224	2.0981	---
VOC	Acrolein	107028	0.245334151	ND	ND	3.2329	1.3069	ND	---	2.9578	ND	---	3.3476	ND	ND	ND	ND	---	0.8484	0.2293	---
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Benzene	71432	0.015977505	3.3872	7.1899	9.7782	2.0451	11.3440	---	11.8553	0.9906	---	12.9418	9.0113	5.4324	5.2726	2.7481	---	2.3647	8.2124	---
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Bromomethane	74839	0.038830266	ND	ND	ND	0.0388	0.0777	---	0.0388	0.0777	---	0.0777	0.0388	0.0777	0.0388	0.0388	---	0.0388	ND	---
VOC	Carbon Tetrachloride	71556	0.01887362	0.7549	0.6920	0.6291	0.6291	0.4404	---	0.6291	0.8808	---	0.6291	0.5662	0.6920	0.7549	0.6291	---	0.6920	0.4404	---
VOC	Chlorobenzene	79345	0.059847853	ND	ND	0.2762	ND	0.3223	---	0.2762	ND	---	ND	0.0460	0.1381	0.1841	ND	---	ND	ND	---
VOC	Chloroethane	79005	0.015833129	0.3694	0.3167	0.3167	0.1319	0.2639	---	0.2903	ND	---	0.2375	0.2375	0.3431	0.2375	0.6069	---	0.4486	ND	---
VOC	Chloroform	75343	0.029295706	ND	ND	0.1953	ND	0.1953	---	0.2441	ND	---	0.2930	0.1953	0.2930	ND	ND	---	0.1465	0.0977	---

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	1/23/2006	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/30/2006	6/4/2006	6/16/2006	6/28/2006
SVOC	Coronene	191071	0.0000738	---	1.9000	0.0437	0.1650	ND	0.8950	---	0.8210	---	---	ND	0.8200	0.4280	---	0.5070	0.5920	0.6620	0.0798	0.3050
SVOC	Dibenz (a,h) anthracene	53703	0.0000785	---	2.4500	ND	0.1100	ND	1.0300	---	1.3000	---	---	ND	0.7380	0.2990	---	0.5500	0.5920	0.5670	0.0798	0.2290
SVOC	Fluoranthene	206440	0.000132	---	73.1000	5.1600	9.3400	3.1600	19.8000	---	29.0000	---	---	2.3600	25.8000	14.5000	---	19.7000	16.0000	13.7000	6.3100	9.0300
SVOC	Fluorene	86737	0.000318	---	45.6000	4.1600	11.7000	4.7200	16.6000	---	27.4000	---	---	5.2200	23.2000	17.4000	---	26.8000	25.3000	15.9000	10.6000	14.2000
SVOC	Indeno(1,2,3-cd)pyrene	193395	0.000113	---	13.1000	0.2620	0.8240	ND	4.1200	---	4.6700	---	---	0.1390	3.8100	1.5400	---	2.1100	1.9900	2.1700	0.1600	0.8380
SVOC	Naphthalene	91203	0.000682	---	1070.0000	69.1000	750.0000	44.0000	212.0000	---	886.0000	---	---	66.1000	888.0000	725.0000	---	545.0000	1140.0000	717.0000	143.0000	522.0000
SVOC	Perylene	198550	0.000107	---	3.9800	ND	0.2200	ND	1.0300	---	1.3000	---	---	ND	1.1500	0.5990	---	0.8450	0.6770	0.7560	ND	0.4950
SVOC	Phenanthrene	85018	0.000124	---	157.0000	10.2000	20.4000	8.0900	42.0000	---	67.9000	---	---	9.2900	60.6000	41.2000	---	76.3000	71.0000	47.4000	21.5000	36.9000
SVOC	Pyrene	129000	0.000161	---	46.4000	2.5400	5.6600	1.4400	13.2000	---	18.1000	---	---	0.9710	14.6000	7.5300	---	10.0000	8.4600	8.0400	2.8700	5.7100
VOC	1,1,1-Trichloroethane	71556	0.016369325	0.1091	0.1091	0.1091	0.1091	0.1091	0.1091	0.1091	0.1637	0.1637	0.1637	0.1091	0.1091	0.1637	0.1091	---	---	0.1091	0.1637	0.1091
VOC	1,1,2,2-Tetrachloroethane	79345	0.089245399	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,1,2-Trichloroethane	79005	0.03273865	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,1-Dichloroethane	75343	0.024284663	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,1-Dichloroethene	75354	0.055507566	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,2,4-Trichlorobenzene	120821	0.111319018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,2,4-Trimethylbenzene	95636	0.014747239	0.4424	0.7374	0.4916	0.7374	0.2949	0.5407	0.8357	1.1306	0.8848	0.9831	0.2458	0.5407	0.7374	0.8357	---	---	0.6390	0.3441	1.2289
VOC	1,2-Dibromoethane	106934	0.13830184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,2-Dichloroethane	107062	0.060711656	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,2-Dichloropropane	78875	0.15250184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	1,3,5-Trimethylbenzene	108678	0.019662986	0.0983	0.2949	0.1475	0.2458	0.0983	0.1966	0.2458	0.3441	0.2458	0.2949	0.0492	0.1966	0.1966	0.1966	---	---	0.1475	0.0983	0.2949
VOC	1,3-Butadiene	106990	0.01327362	0.0885	0.5531	0.0664	0.1549	ND	0.1549	0.2433	0.4867	0.1549	0.2212	ND	0.2876	0.2433	0.1991	---	---	0.1327	0.0442	0.0664
VOC	Acetonitrile	75058	0.166214724	1.7293	2.0483	2.5688	3.3243	2.6024	0.5373	ND	2.8542	1.9308	4.4324	0.9570	2.5520	ND	7.4881	---	---	7.2026	5.2719	4.7010
VOC	Acetylene	74862	0.024495706	0.6284	1.3526	0.7029	2.0342	0.2982	1.3739	1.2461	4.4412	1.1289	1.5443	0.3089	1.4271	4.8139	1.7999	---	---	1.2141	0.4580	0.8627
VOC	Acrolein	107028	0.245334151	0.2981	0.3210	0.4127	0.6649	0.4127	0.5274	ND	1.3986	ND	1.6967	ND	0.5503	ND	0.9630	---	---	1.1006	0.9859	0.5732
VOC	Acrylonitrile	107131	0.12369816	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	0.3472	ND	ND
VOC	Benzene	71432	0.015977505	1.6297	31.5396	1.0226	5.2726	0.5432	3.6748	7.4136	11.3121	2.4286	3.6109	0.6071	9.9700	6.0075	3.0357	---	---	6.9981	1.4060	2.7801
VOC	Bromochloromethane	74975	0.100548466	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Bromodichloromethane	75274	0.046904294	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Bromoform	75252	0.17572229	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Bromomethane	74839	0.038830266	0.0388	ND	0.0777	0.0388	0.0388	0.0388	0.0388	0.0388	0.0777	0.0777	0.0777	0.0388	0.0777	0.0777	---	---	ND	0.0777	0.0777
VOC	Carbon Tetrachloride	71556	0.01887362	0.4404	0.6291	0.5033	0.5662	0.5033	0.7549	0.5033	0.8808	0.6291	0.6920	0.6291	0.5662	0.6291	0.6291	---	---	0.8179	0.9437	0.6920
VOC	Chlorobenzene	79345	0.059847853	ND	ND	ND	0.0921	ND	ND	ND	0.1381	ND	ND	ND	0.1381	ND	ND	---	---	0.0921	ND	ND
VOC	Chloroethane	79005	0.015833129	0.2639	0.3431	0.3167	0.3431	0.1583	0.1847	ND	0.6069	0.4486	0.7653	ND	0.1847	ND	0.3958	---	---	0.5278	0.3958	0.5542
VOC	Chloroform	75343	0.029295706	0.0488	0.0488	0.0977	0.0977	ND	ND	0.1465	0.2441	ND	ND	ND	ND	ND	ND	---	---	0.2441	ND	ND

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	7/15/2005	7/21/2005	7/27/2005	8/8/2005	8/20/2005	9/1/2005	9/13/2005	9/25/2005	10/7/2005	10/19/2005	10/31/2005	11/12/2005	11/24/2005	12/6/2005	12/18/2005	12/30/2005	1/11/2006	1/17/2006
VOC	Chloromethylbenzene	120821	0.077662577	ND	ND	0.1036	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Chloroprene	95636	0.010863804	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	cis-1,2-Dichloroethylene	106934	0.071366871	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	cis-1,3-Dichloropropene	107062	0.068079755	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Dibromochloromethane	78875	0.28111411	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Dichlorodifluoromethane	108678	0.019780777	3.1155	3.2638	2.7693	2.8188	3.1649	---	3.2144	3.2638	---	3.4122	3.1155	3.4616	2.9177	3.3133	---	2.9671	2.2253	---
VOC	Dichloromethane	106990	0.020841718	0.3821	0.3821	0.5210	0.2779	0.3126	---	0.5210	0.1737	---	0.6600	0.3474	0.3821	ND	0.3821	---	0.3126	0.2432	---
VOC	Dichlorotetrafluoroethane	75058	0.692068712	ND	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.1398	---	0.1398	0.1398	0.1398	0.1398	0.1398	---	0.1398	0.0699	---
VOC	Ethyl Acrylate	74862	0.094182413	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Ethyl tert-Butyl Ether	107028	0.447168098	ND	ND	0.0418	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Ethylbenzene	107131	0.247512883	1.5198	2.2146	1.7369	0.7816	1.6067	---	2.0843	0.2171	---	2.9962	1.3027	1.6067	0.3474	0.8250	---	0.9119	0.9553	---
VOC	Hexachloro-1,3-butadiene	71432	0.053325153	ND	ND	ND	ND	ND	---	ND	ND	---	0.1067	0.1067	0.2133	ND	ND	---	ND	0.2133	---
VOC	m,p-Xylene	74975	0.082504294	2.3883	4.4292	3.6476	1.4764	3.8647	---	5.6450	0.3908	---	8.1636	3.4739	4.1252	1.0856	2.0843	---	2.9528	3.2133	---
VOC	m-Dichlorobenzene	75274	0.04208589	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	0.0601	---	ND	ND	---
VOC	Methyl Ethyl Ketone	75252	0.050137832	4.0110	3.6276	6.8128	3.8931	4.2470	---	ND	ND	---	ND	ND	ND	ND	ND	---	1.5631	1.4746	---
VOC	Methyl Isobutyl Ketone	74839	0.040965235	ND	0.9422	0.5325	0.2048	0.3277	---	ND	ND	---	ND	ND	ND	ND	ND	---	0.6145	0.6554	---
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	0.1228	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	0.9374	2.0550	2.1992	0.8292	2.0911	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	n-Octane	111659	0.028031902	0.9344	1.5885	1.2614	0.4672	1.1680	---	1.8688	ND	---	1.9155	0.7475	0.6541	0.4205	0.2803	---	0.4205	0.6541	---
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	0.0601	---	ND	ND	---
VOC	o-Xylene	95476	0.017369325	1.1724	2.1712	1.5632	0.7816	1.8238	---	2.5186	0.1737	---	3.6910	1.5632	1.7804	0.4777	0.9119	---	1.0422	1.1724	---
VOC	p-Dichlorobenzene	106467	0.03607362	0.4209	0.6012	0.6613	0.2405	0.5411	---	0.9018	0.0601	---	1.6233	0.8417	0.6012	0.1804	0.3006	---	0.4209	0.2405	---
VOC	Propylene	115071	0.015489571	1.0326	2.4267	2.8570	0.8433	6.4196	---	4.1133	0.5335	---	3.4938	2.6676	2.3406	1.5317	2.1858	---	1.4629	2.1169	---
VOC	Styrene	100425	0.042597137	1.9595	2.8540	1.7891	0.6390	1.1501	---	1.7891	0.1278	---	1.4909	1.1927	1.1075	0.3408	0.7242	---	0.8093	1.1501	---
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	0.1254	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Tetrachloroethylene	127184	0.074606544	ND	0.4069	0.4748	ND	0.2713	---	0.4748	ND	---	0.8817	0.2713	0.6782	0.0678	0.5426	---	0.2713	0.2713	---
VOC	Toluene	108883	0.018842536	6.0296	9.7604	10.0242	3.9569	9.8735	---	11.7954	0.8291	---	9.2705	7.8385	7.3863	2.4872	4.2961	---	3.6178	5.0121	---
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---
VOC	Trichloroethylene	79016	0.053738241	ND	0.1612	0.1075	0.0537	0.1612	---	0.1612	ND	---	0.1612	0.0537	0.2150	0.1075	ND	---	ND	ND	---
VOC	Trichlorofluoromethane	75694	0.039328834	1.7417	1.5732	1.5170	1.5170	1.5732	---	1.6293	1.6293	---	1.6855	1.6293	1.7417	1.6855	1.9664	---	1.6293	1.2360	---
VOC	Trichlorotrifluoroethane	76131	0.091965644	2.9889	2.3758	2.3758	1.6860	1.9926	---	1.9926	0.6897	---	2.0692	2.0692	2.4524	1.8393	4.2917	---	2.1459	1.2262	---
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	---	ND	ND	---	ND	ND	ND	ND	ND	---	ND	ND	---

Table A-4: Analytical Data
Shuttlesworth Monitoring Site (µg/m^3)

Type	ANALYTE	CAS #	DETECTION LIMIT	1/23/2006	2/4/2006	2/16/2006	2/28/2006	3/12/2006	3/24/2006	3/30/2006	4/5/2006	4/11/2006	4/17/2006	4/29/2006	5/11/2006	5/17/2006	5/23/2006	5/24/2006	5/30/2006	6/4/2006	6/16/2006	6/28/2006
VOC	Chloromethylbenzene	120821	0.077662577	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	0.0518	ND	ND
VOC	Chloroprene	95636	0.010863804	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	cis-1,2-Dichloroethylene	106934	0.071366871	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6344	ND	ND	---	---	ND	ND	ND
VOC	cis-1,3-Dichloropropene	107062	0.068079755	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Dibromochloromethane	78875	0.28111411	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Dichlorodifluoromethane	108678	0.019780777	2.5715	2.9177	2.6210	2.7199	2.4231	3.0660	2.6210	3.6100	2.8188	2.7199	3.0166	3.0166	4.3023	4.1045	---	---	2.9177	3.1649	2.7693
VOC	Dichloromethane	106990	0.020841718	0.3474	0.1737	0.2432	0.2432	0.2084	0.2084	0.4516	0.5210	0.2779	0.2779	0.2779	0.1737	0.2432	0.3821	---	---	0.4516	0.4863	0.2432
VOC	Dichlorotetrafluoroethane	75058	0.692068712	0.1398	0.1398	0.1398	0.1398	0.0699	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	0.1398	---	---	0.1398	0.0699	0.1398
VOC	Ethyl Acrylate	74862	0.094182413	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Ethyl tert-Butyl Ether	107028	0.447168098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Ethylbenzene	107131	0.247512883	0.3474	0.4342	0.3908	0.6513	0.2605	0.3908	1.2159	1.3027	0.8250	0.9553	0.2171	0.3474	0.5645	0.8685	---	---	0.6079	0.2605	0.9119
VOC	Hexachloro-1,3-butadiene	71432	0.053325153	0.2133	0.2133	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	m,p-Xylene	74975	0.082504294	0.9987	2.3014	1.1724	2.3449	0.6948	0.9119	3.7344	3.1699	2.2580	3.2567	0.6079	1.3895	1.9975	2.5620	---	---	1.6935	0.6513	3.0831
VOC	m-Dichlorobenzene	75274	0.04208589	0.0601	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Methyl Ethyl Ketone	75252	0.050137832	0.8258	1.0912	1.6811	1.3862	0.9143	1.2092	5.2202	5.4562	1.6221	2.0645	0.7373	1.2092	1.1502	6.0165	---	---	2.2709	1.6516	2.0940
VOC	Methyl Isobutyl Ketone	74839	0.040965235	0.2458	0.2868	0.3687	0.3687	0.2048	0.2868	0.5735	0.6554	0.3277	0.5735	0.1229	0.1639	0.2458	0.8193	---	---	0.3277	0.1639	0.2458
VOC	Methyl Methacrylate	80626	0.024569325	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Methyl tert-Butyl Ether	1634044	0.007210634	ND	ND	ND	ND	ND	ND	ND	0.1442	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	n-Octane	111659	0.028031902	0.1869	0.3270	0.3738	1.1680	0.1402	0.2803	0.3738	0.4672	0.8410	2.8966	ND	0.2336	0.5606	0.2803	---	---	0.1869	0.1402	0.5139
VOC	o-Dichlorobenzene	95501	0.03006135	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	o-Xylene	95476	0.017369325	0.3908	0.7382	0.4342	0.8685	0.2605	0.4342	1.1724	1.3461	0.9119	1.2159	0.2605	0.5211	0.7382	0.9119	---	---	0.6948	0.3040	1.3895
VOC	p-Dichlorobenzene	106467	0.03607362	0.2405	0.2405	0.2405	0.1804	0.1804	0.1804	0.1804	0.3607	0.7816	0.4810	0.1202	0.1202	0.1804	0.3006	---	---	0.3006	0.1804	0.3607
VOC	Propylene	115071	0.015489571	0.4991	3.2528	0.3958	0.9982	0.2237	0.9810	1.9104	4.3371	0.8261	0.9122	0.2582	1.8415	1.8760	2.0309	---	---	1.2736	0.3614	0.7745
VOC	Styrene	100425	0.042597137	0.2982	0.8945	0.3834	0.2982	0.1704	0.2556	0.6816	1.4909	0.2982	0.6816	ND	0.3408	0.1704	0.5964	---	---	0.2130	0.0852	0.2130
VOC	tert-Amyl Methyl Ether	994058	0.050149693	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Tetrachloroethylene	127184	0.074606544	ND	ND	0.1356	0.2035	0.1356	ND	0.4069	0.5426	ND	ND	ND	0.0678	0.1356	0.2713	---	---	0.2035	0.1356	0.1356
VOC	Toluene	108883	0.018842536	1.8466	7.6124	1.8089	3.8439	1.0929	1.6205	4.0323	5.5397	3.2409	4.4845	0.8291	3.8439	3.7308	3.5801	---	---	3.3163	1.5451	2.6003
VOC	trans-1,2-Dichloroethylene	156605	0.071366871	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	trans-1,3-Dichloropropene	10061026	0.040847853	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	---	---	ND	ND	ND
VOC	Trichloroethylene	79016	0.053738241	ND	ND	ND	ND	ND	ND	ND	0.1075	ND	ND	ND	ND	0.1075	ND	---	---	0.1612	ND	ND
VOC	Trichlorofluoromethane	75694	0.039328834	1.4608	1.6293	1.4046	1.5170	1.4046	1.5732	1.5170	1.9103	1.5732	1.4608	1.6293	1.7417	3.4834	2.4721	---	---	1.6855	1.6855	1.3484
VOC	Trichlorotrifluoroethane	76131	0.091965644	0.8430	1.0729	1.4561	1.8393	1.4561	1.6094	1.3795	1.9160	1.5328	2.1459	1.3028	1.3028	1.3028	1.6094	---	---	1.3795	1.1496	1.5328
VOC	Vinyl chloride	75014	0.020449898	ND	ND	ND	ND	ND	ND	ND	0.0256	ND	ND	ND	ND	ND	0.0256	---	---	ND	ND	ND

Appendix B

Data Summaries

Table B-1: Data Summary for All Chemicals (µg/m^3) – East Thomas Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
1,1,1-Trichloroethane	0.016369325	100%	0.0440	0.1091	0.2728	0.1637	0.1567	N	**0.1611**
1,1,2,2-Tetrachloroethane	0.089245399	0%	0.0000	0.0446	0.0446	0.0446	0.0446		**---**
1,1,2-Trichloroethane	0.03273865	0%	0.0000	0.0164	0.0164	0.0164	0.0164		**---**
1,1-Dichloroethane	0.024284663	0%	0.0000	0.0121	0.0121	0.0121	0.0121		**---**
1,1-Dichloroethene	0.055507566	0%	0.0000	0.0278	0.0278	0.0278	0.0278		**---**
1,2,4-Trichlorobenzene	0.111319018	23%	0.0438	0.0557	0.2226	0.0557	0.0766	N	**0.0859**
1,2,4-Trimethylbenzene	0.014747239	100%	0.7829	0.2458	3.5393	0.9831	1.1830	G	**1.3681**
1,2-Dibromoethane	0.13830184	0%	0.0000	0.0692	0.0692	0.0692	0.0692		**---**
1,2-Dichloroethane	0.060711656	0%	0.0000	0.0304	0.0304	0.0304	0.0304		**---**
1,2-Dichloropropane	0.15250184	0%	0.0000	0.0763	0.0763	0.0763	0.0763		**---**
1,3,5-Trimethylbenzene	0.019662986	100%	0.2074	0.0492	0.8848	0.2949	0.3076	G	**0.3573**
1,3-Butadiene	0.01327362	97%	0.1637	0.0066	0.6416	0.1991	0.2457	G	**0.2846**
2,5-Dimethylbenzaldehyde	0.004939141	0%	0.0000	0.0025	0.0025	0.0025	0.0025		**---**
Acenaphthene	0.000188	100%	0.0126	0.0011	0.0451	0.0095	0.0146	G	**0.0182**
Acenaphthylene	0.000206	100%	0.0079	0.0003	0.0410	0.0041	0.0066	G	**0.0093**
Acetaldehyde	0.007206544	100%	0.7706	0.8486	4.2879	1.7440	1.9877	N	**2.1019**
Acetone	0.016628221	100%	1.3322	0.4703	6.3900	1.9503	2.1577	G	**2.4569**
Acetonitrile	0.166214724	29%	47.1885	0.0831	250.1616	0.0831	11.3376	NP	**33.3629**
Acetylene	0.024495706	100%	10.9363	0.3302	42.8142	4.3773	7.9537	G	**11.8263**
Acrolein	0.245334151	55%	0.6488	0.1227	2.6138	0.3554	0.5920	NP	**0.7988**
Acrylonitrile	0.12369816	0%	0.0000	0.0618	0.0618	0.0618	0.0618		**---**
Anthracene	0.00013	87%	0.0161	0.0000	0.0872	0.0011	0.0061	NP	**0.0131**
Antimony	0.029	100%	0.0009	0.0003	0.0040	0.0015	0.0018	G	**0.0019**
Arsenic	0.022	100%	0.0009	0.0003	0.0033	0.0014	0.0016	N	**0.0017**
Benzaldehyde	0.008680573	100%	0.0723	0.1128	0.4123	0.1997	0.2200	N	**0.2289**
Benzene	0.015977505	100%	1.8784	0.5432	8.5000	2.2049	2.9007	G	**3.3378**
Benzo (a) anthracene	0.000114	100%	0.0014	0.0000	0.0074	0.0001	0.0006	NP	**0.0012**
Benzo (a) pyrene	0.000161	84%	0.0007	0.0000	0.0035	0.0001	0.0004	G	**0.0007**
Benzo (b) fluoranthene	0.000124	87%	0.0012	0.0000	0.0061	0.0001	0.0006	NP	**0.0010**
Benzo (e) pyrene	0.0000809	84%	0.0009	0.0000	0.0048	0.0001	0.0004	NP	**0.0008**
Benzo (g,h,i) perylene	0.0000774	87%	0.0005	0.0000	0.0027	0.0002	0.0004	NP	**0.0006**
Benzo (k) fluoranthene	0.0000893	94%	0.0011	0.0000	0.0058	0.0002	0.0005	NP	**0.0010**
Beryllium	0.025	100%	0.0000	0.0000	0.0001	0.0000	0.0000	G	**0.0000**
Bromochloromethane	0.100548466	0%	0.0000	0.0503	0.0503	0.0503	0.0503		**---**
Bromodichloromethane	0.046904294	0%	0.0000	0.0235	0.0235	0.0235	0.0235		**---**
Bromoform	0.17572229	0%	0.0000	0.0879	0.0879	0.0879	0.0879		**---**
Bromomethane	0.038830266	87%	0.0190	0.0194	0.0777	0.0388	0.0451	N	**0.0482**
Butyraldehyde	0.002949284	100%	0.1376	0.1150	0.6400	0.3097	0.3327	N	**0.3545**
Cadmium	0.019	100%	0.0003	0.0001	0.0012	0.0004	0.0005	G	**0.0005**
Carbon Tetrachloride	0.056620859	100%	0.1317	0.4404	1.0695	0.6291	0.6839	N	**0.6909**
Chlorobenzene	0.023018405	6%	0.0086	0.0115	0.0460	0.0115	0.0137		**---**
Chloroethane	0.021110838	58%	0.0148	0.0106	0.0528	0.0264	0.0240	NP	**0.0273**
Chloroform	0.01953047	58%	0.1003	0.0098	0.3906	0.0488	0.0907	NP	**0.1230**
Chloromethane	0.028910429	100%	0.2146	0.8880	1.8172	1.3216	1.3256	N	**1.3326**
Chloromethylbenzene	0.025887526	0%	0.0000	0.0129	0.0129	0.0129	0.0129		**---**
Chloroprene	0.079667894	0%	0.0000	0.0398	0.0398	0.0398	0.0398		**---**
Chromium	0.509	100%	0.0015	0.0023	0.0085	0.0050	0.0050	N	**0.0052**
Chrysene	0.000109	100%	0.0021	0.0001	0.0113	0.0003	0.0010	NP	**0.0019**
cis-1,2-Dichloroethylene	0.063437219	0%	0.0000	0.0317	0.0317	0.0317	0.0317		**---**
cis-1,3-Dichloropropene	0.063541104	0%	0.0000	0.0318	0.0318	0.0318	0.0318		**---**
Cobalt	0.022	100%	0.0001	0.0001	0.0006	0.0003	0.0003	N	**0.0003**
Coronene	0.0000738	68%	0.0002	0.0000	0.0006	0.0001	0.0001	NP	**0.0002**
Crotonaldehyde	0.002866667	100%	0.8355	0.0889	3.4400	0.4042	0.8023	NP	**1.0631**
Dibenz (a,h) anthracene	0.0000785	29%	0.0002	0.0000	0.0008	0.0000	0.0001	NP	**0.0001**
Dibromochloromethane	0.085186094	0%	0.0000	0.0426	0.0426	0.0426	0.0426		**---**
Dichlorodifluoromethane	0.024725971	100%	0.3895	2.3737	4.0551	3.1649	3.1266	N	**3.1278**
Dichloromethane	0.059051534	97%	0.2075	0.0295	1.0768	0.2779	0.3382	NP	**0.3846**

Table B-1: Data Summary for All Chemicals (µg/m^3) – East Thomas Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
Dichlorotetrafluoroethane	0.020971779	97%	0.0260	0.0105	0.1398	0.1398	0.1334	N	**0.1348**
Ethyl Acrylate	0.045043763	3%	0.0180	0.0225	0.1228	0.0225	0.0258		**---**
Ethyl tert-Butyl Ether	0.029253988	0%	0.0000	0.0146	0.0146	0.0146	0.0146		**---**
Ethylbenzene	0.021711656	100%	0.8221	0.2605	3.5173	0.8250	1.1626	G	**1.3663**
Fluoranthene	0.000132	100%	0.0042	0.0008	0.0202	0.0046	0.0057	G	**0.0068**
Fluorene	0.000318	100%	0.0079	0.0021	0.0333	0.0095	0.0119	G	**0.0137**
Formaldehyde	0.006141104	100%	2.2052	1.7318	11.6313	4.7164	4.9026	G	**5.2811**
Hexachloro-1,3-butadiene	0.138645399	32%	0.0568	0.0693	0.2133	0.0693	0.1020	N	**0.1138**
Hexaldehyde	0.008193047	100%	0.0917	0.0655	0.4301	0.1229	0.1664	G	**0.1852**
Hexavalent Chromium	0.0111	84%	0.0000	0.0000	0.0001	0.0000	0.0000	G	**0.0000**
Indeno(1,2,3-cd)pyrene	0.000113	81%	0.0007	0.0000	0.0034	0.0002	0.0004	NP	**0.0006**
Isovaleraldehyde	0.003522699	74%	0.0331	0.0018	0.1127	0.0458	0.0448	NP	**0.0532**
Lead	0.068	100%	0.0102	0.0033	0.0413	0.0121	0.0148	G	**0.0172**
m,p-Xylene	0.039080982	100%	2.2833	0.4777	9.1623	2.1277	3.0859	G	**3.6692**
Manganese	0.125	100%	0.0335	0.0113	0.1420	0.0466	0.0546	G	**0.0621**
m-Dichlorobenzene	0.02404908	10%	0.0145	0.0120	0.0601	0.0120	0.0167		**---**
Mercury	0.212	65%	0.0002	0.0000	0.0010	0.0001	0.0001	NP	**0.0002**
Methyl Ethyl Ketone	0.129768507	65%	1.2367	0.0649	5.7216	1.1207	1.1523	NP	**1.5443**
Methyl Isobutyl Ketone	0.028675665	52%	0.2247	0.0143	0.9422	0.1229	0.1827	NP	**0.2586**
Methyl Methacrylate	0.024569325	0%	0.0000	0.0123	0.0123	0.0123	0.0123		**---**
Methyl tert-Butyl Ether	0.007210634	26%	1.0069	0.0036	3.7135	0.0036	0.4225	NP	**0.8464**
Naphthalene	0.000682	100%	0.2544	0.0451	1.2800	0.1810	0.2655	G	**0.3415**
Nickel	0.184	100%	0.0009	0.0009	0.0050	0.0018	0.0021	G	**0.0022**
n-Octane	0.028031902	90%	1.1832	0.0140	5.6531	0.4672	0.9282	G	**1.3343**
o-Dichlorobenzene	0.03006135	3%	0.0297	0.0150	0.1804	0.0150	0.0204		**---**
o-Xylene	0.017369325	100%	0.9598	0.2605	4.1686	0.9987	1.3559	G	**1.5939**
p-Dichlorobenzene	0.03607362	94%	0.1908	0.0180	0.8417	0.1804	0.2649	G	**0.3128**
Perylene	0.000107	35%	0.0003	0.0000	0.0015	0.0000	0.0001	NP	**0.0002**
Phenanthrene	0.000124	100%	0.0175	0.0046	0.0647	0.0152	0.0238	G	**0.0283**
Propionaldehyde	0.00475092	100%	0.1652	0.1615	0.8694	0.3136	0.3744	G	**0.4022**
Propylene	0.015489571	100%	1.0995	0.3270	4.3027	1.4113	1.7733	G	**2.0210**
Pyrene	0.000161	100%	0.0027	0.0008	0.0136	0.0033	0.0038	G	**0.0045**
Selenium	0.027	100%	0.0004	0.0003	0.0015	0.0007	0.0008	N	**0.0008**
Styrene	0.042597137	97%	0.3897	0.0213	1.6187	0.2982	0.4253	G	**0.5389**
tert-Amyl Methyl Ether	0.050149693	3%	0.0105	0.0251	0.0836	0.0251	0.0270		**---**
Tetrachloroethylene	0.074606544	81%	0.3293	0.0373	1.2887	0.2713	0.3726	G	**0.4666**
Tolualdehydes	0.009828221	100%	0.1753	0.1179	0.8010	0.2555	0.3105	G	**0.3473**
Toluene	0.018842536	100%	3.6805	0.9044	16.5437	3.8816	5.1847	G	**6.0991**
trans-1,2-Dichloroethylene	0.071366871	0%	0.0000	0.0357	0.0357	0.0357	0.0357		**---**
trans-1,3-Dichloropropene	0.040847853	0%	0.0000	0.0204	0.0204	0.0204	0.0204		**---**
Trichloroethylene	0.053738241	52%	0.1028	0.0269	0.3762	0.0537	0.1066	NP	**0.1374**
Trichlorofluoromethane	0.039328834	100%	0.3048	1.2360	2.6968	1.6293	1.7036	G	**1.7171**
Trichlorotrifluoroethane	0.091965644	100%	0.4399	0.8430	2.3758	1.8393	1.7750	N	**1.8121**
Valeraldehyde	0.003522699	100%	0.0908	0.0740	0.4403	0.1585	0.1843	G	**0.2013**
Vinyl chloride	0.020449898	0%	0.0000	0.0102	0.0102	0.0102	0.0102		**---**

Table B-2: Data Summary for All Chemicals (µg/m^3) – North Birmingham Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
1,1,1-Trichloroethane	0.016369325	100%	0.0339	0.1091	0.2183	0.1091	0.1320	NP	**0.1350**
1,1,2,2-Tetrachloroethane	0.089245399	0%	0.0000	0.0446	0.0446	0.0446	0.0446		**---**
1,1,2-Trichloroethane	0.03273865	0%	0.0000	0.0164	0.0164	0.0164	0.0164		**---**
1,1-Dichloroethane	0.024284663	0%	0.0000	0.0121	0.0121	0.0121	0.0121		**---**
1,1-Dichloroethene	0.055507566	0%	0.0000	0.0278	0.0278	0.0278	0.0278		**---**
1,2,4-Trichlorobenzene	0.111319018	16%	0.0396	0.0557	0.2226	0.0557	0.0706	NP	**0.0789**
1,2,4-Trimethylbenzene	0.014747239	100%	0.5656	0.2458	2.4579	0.6882	0.9150	LN	**1.0421**
1,2-Dibromoethane	0.13830184	0%	0.0000	0.0692	0.0692	0.0692	0.0692		**---**
1,2-Dichloroethane	0.060711656	3%	0.0164	0.0304	0.1214	0.0304	0.0333		**---**
1,2-Dichloropropane	0.15250184	0%	0.0000	0.0763	0.0763	0.0763	0.0763		**---**
1,3,5-Trimethylbenzene	0.019662986	100%	0.2171	0.0983	0.8357	0.1966	0.3124	NP	**0.3655**
1,3-Butadiene	0.01327362	81%	0.1359	0.0066	0.5531	0.1106	0.1412	G	**0.1819**
2,5-Dimethylbenzaldehyde	0.004939141	0%	0.0000	0.0025	0.0025	0.0025	0.0025		**---**
Acenaphthene	0.000188	100%	0.0183	0.0005	0.0829	0.0104	0.0163	G	**0.0222**
Acenaphthylene	0.000206	97%	0.0255	0.0000	0.1240	0.0031	0.0140	G	**0.0240**
Acetaldehyde	0.007206544	94%	0.6931	0.5261	3.1889	1.4593	1.5730	G	**1.6832**
Acetone	0.016628221	94%	1.4803	0.4608	6.3662	1.8481	2.1844	G	**2.5313**
Acetonitrile	0.166214724	65%	19.9105	0.0831	72.3622	1.8300	15.6978	NP	**22.5157**
Acetylene	0.024495706	100%	4.1731	0.3621	23.7502	2.0875	3.1418	G	**4.5989**
Acrolein	0.245334151	71%	0.5497	0.1227	2.1323	0.5503	0.6747	NP	**0.8241**
Acrylonitrile	0.12369816	3%	0.0357	0.0618	0.2604	0.0618	0.0683		**---**
Anthracene	0.00013	87%	0.0113	0.0000	0.0468	0.0018	0.0072	G	**0.0114**
Antimony	0.029	100%	0.0010	0.0002	0.0039	0.0012	0.0014	G	**0.0016**
Arsenic	0.022	100%	0.0013	0.0003	0.0045	0.0020	0.0021	G	**0.0024**
Benzaldehyde	0.008680573	94%	0.0901	0.0781	0.4470	0.1519	0.1751	G	**0.1918**
Benzene	0.015977505	100%	3.3768	0.5432	12.8459	1.8214	3.1718	LN	**4.2377**
Benzo (a) anthracene	0.000114	97%	0.0053	0.0000	0.0193	0.0003	0.0032	NP	**0.0052**
Benzo (a) pyrene	0.000161	74%	0.0033	0.0000	0.0136	0.0002	0.0018	G	**0.0031**
Benzo (b) fluoranthene	0.000124	90%	0.0040	0.0000	0.0156	0.0003	0.0023	G	**0.0038**
Benzo (e) pyrene	0.0000809	84%	0.0031	0.0000	0.0124	0.0003	0.0017	NP	**0.0029**
Benzo (g,h,i) perylene	0.0000774	77%	0.0018	0.0000	0.0067	0.0002	0.0011	NP	**0.0018**
Benzo (k) fluoranthene	0.0000893	94%	0.0038	0.0000	0.0159	0.0003	0.0021	NP	**0.0035**
Beryllium	0.025	100%	0.0000	0.0000	0.0001	0.0000	0.0000	G	**0.0000**
Bromochloromethane	0.100548466	0%	0.0000	0.0503	0.0503	0.0503	0.0503		**---**
Bromodichloromethane	0.046904294	0%	0.0000	0.0235	0.0235	0.0235	0.0235		**---**
Bromoform	0.17572229	0%	0.0000	0.0879	0.0879	0.0879	0.0879		**---**
Bromomethane	0.038830266	90%	0.0229	0.0194	0.1165	0.0388	0.0495	NP	**0.0535**
Butyraldehyde	0.002949284	94%	0.2468	0.1180	1.3685	0.2684	0.3293	G	**0.3915**
Cadmium	0.019	100%	0.0007	0.0001	0.0028	0.0006	0.0008	G	**0.0010**
Carbon Tetrachloride	0.056620859	100%	0.1355	0.4404	1.0066	0.6291	0.6697	NP	**0.6777**
Chlorobenzene	0.023018405	19%	0.0726	0.0115	0.3223	0.0115	0.0360	NP	**0.0653**
Chloroethane	0.021110838	84%	0.0989	0.0106	0.3431	0.0528	0.1098	NP	**0.1383**
Chloroform	0.01953047	48%	0.0750	0.0098	0.2441	0.0098	0.0712	NP	**0.0947**
Chloromethane	0.028910429	100%	0.2887	0.9293	2.1476	1.3423	1.3676	N	**1.3861**
Chloromethylbenzene	0.025887526	0%	0.0000	0.0129	0.0129	0.0129	0.0129		**---**
Chloroprene	0.079667894	0%	0.0000	0.0398	0.0398	0.0398	0.0398		**---**
Chromium	0.509	100%	0.0014	0.0018	0.0081	0.0040	0.0038	N	**0.0040**
Chrysene	0.000109	100%	0.0064	0.0000	0.0245	0.0007	0.0041	NP	**0.0065**
cis-1,2-Dichloroethylene	0.063437219	3%	0.1581	0.0317	0.9119	0.0317	0.0601		**---**
cis-1,3-Dichloropropene	0.063541104	0%	0.0000	0.0318	0.0318	0.0318	0.0318		**---**
Cobalt	0.022	100%	0.0001	0.0000	0.0005	0.0002	0.0002	G	**0.0002**
Coronene	0.0000738	65%	0.0005	0.0000	0.0019	0.0001	0.0003	NP	**0.0005**
Crotonaldehyde	0.002866667	94%	0.8509	0.0287	3.2680	0.1835	0.6722	NP	**0.9614**
Dibenz (a,h) anthracene	0.0000785	42%	0.0008	0.0000	0.0034	0.0000	0.0004	NP	**0.0007**
Dibromochloromethane	0.085186094	0%	0.0000	0.0426	0.0426	0.0426	0.0426		**---**
Dichlorodifluoromethane	0.024725971	100%	0.6223	2.2253	4.6485	3.1155	3.1490	N	**3.1838**
Dichloromethane	0.059051534	100%	0.1223	0.1042	0.5210	0.2779	0.2958	N	**0.3152**

Table B-2: Data Summary for All Chemicals (µg/m^3) – North Birmingham Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
Dichlorotetrafluoroethane	0.020971779	97%	0.0304	0.0105	0.1398	0.1398	0.1289	NP	**0.1312**
Ethyl Acrylate	0.045043763	0%	0.0000	0.0225	0.0225	0.0225	0.0225		**---**
Ethyl tert-Butyl Ether	0.029253988	0%	0.0000	0.0146	0.0146	0.0146	0.0146		**---**
Ethylbenzene	0.021711656	100%	0.7785	0.2171	3.2567	1.2159	1.3531	N	**1.5186**
Fluoranthene	0.000132	100%	0.0146	0.0005	0.0623	0.0070	0.0123	G	**0.0171**
Fluorene	0.000318	100%	0.0199	0.0009	0.0839	0.0104	0.0176	G	**0.0241**
Formaldehyde	0.006141104	94%	2.3238	0.8254	10.1451	3.5373	3.8267	G	**4.3259**
Hexachloro-1,3-butadiene	0.138645399	19%	0.0537	0.0693	0.2133	0.0693	0.0937	NP	**0.1051**
Hexaldehyde	0.008193047	94%	0.0729	0.0451	0.3441	0.1147	0.1444	G	**0.1577**
Hexavalent Chromium	0.0111	74%	0.0000	0.0000	0.0002	0.0000	0.0000	G	**0.0000**
Indeno(1,2,3-cd)pyrene	0.000113	71%	0.0026	0.0000	0.0107	0.0002	0.0014	NP	**0.0024**
Isovaleraldehyde	0.003522699	55%	0.0313	0.0018	0.0951	0.0317	0.0316	NP	**0.0410**
Lead	0.068	100%	0.0158	0.0016	0.0703	0.0177	0.0214	G	**0.0254**
m,p-Xylene	0.039080982	100%	3.5453	0.5645	12.4191	2.3014	4.0706	G	**5.0739**
Manganese	0.125	100%	0.0435	0.0054	0.1530	0.0411	0.0526	G	**0.0645**
m-Dichlorobenzene	0.02404908	3%	0.0086	0.0120	0.0601	0.0120	0.0136		**---**
Mercury	0.212	61%	0.0001	0.0000	0.0004	0.0001	0.0001	G	**0.0001**
Methyl Ethyl Ketone	0.129768507	71%	1.9356	0.0649	6.6654	1.1207	1.8303	NP	**2.4392**
Methyl Isobutyl Ketone	0.028675665	61%	0.2454	0.0143	0.8603	0.2458	0.2368	NP	**0.3132**
Methyl Methacrylate	0.024569325	0%	0.0000	0.0123	0.0123	0.0123	0.0123		**---**
Methyl tert-Butyl Ether	0.007210634	16%	0.5795	0.0036	2.2353	0.0036	0.2089	NP	**0.4612**
Naphthalene	0.000682	100%	0.2575	0.0288	1.0500	0.1910	0.2864	G	**0.3606**
Nickel	0.184	100%	0.0008	0.0005	0.0046	0.0015	0.0016	G	**0.0018**
n-Octane	0.028031902	94%	5.9604	0.0140	19.0617	1.2614	4.7693	G	**6.7973**
o-Dichlorobenzene	0.03006135	0%	0.0000	0.0150	0.0150	0.0150	0.0150		**---**
o-Xylene	0.017369325	100%	1.2585	0.2605	4.6029	0.9553	1.5128	G	**1.8593**
p-Dichlorobenzene	0.03607362	100%	0.1666	0.1202	0.7215	0.3006	0.3181	LN	**0.3508**
Perylene	0.000107	45%	0.0010	0.0000	0.0041	0.0000	0.0005	NP	**0.0009**
Phenanthrene	0.000124	100%	0.0455	0.0018	0.1860	0.0213	0.0407	G	**0.0554**
Propionaldehyde	0.00475092	94%	0.1439	0.0998	0.6651	0.2565	0.2949	G	**0.3203**
Propylene	0.015489571	100%	1.1015	0.2926	4.5264	0.8777	1.3047	G	**1.6107**
Pyrene	0.000161	100%	0.0100	0.0002	0.0418	0.0041	0.0077	G	**0.0111**
Selenium	0.027	100%	0.0005	0.0003	0.0020	0.0009	0.0010	N	**0.0011**
Styrene	0.042597137	100%	0.3037	0.0852	1.4483	0.4260	0.4768	G	**0.5466**
tert-Amyl Methyl Ether	0.050149693	0%	0.0000	0.0251	0.0251	0.0251	0.0251		**---**
Tetrachloroethylene	0.074606544	71%	0.2249	0.0373	1.0852	0.2035	0.2340	NP	**0.3013**
Tolualdehydes	0.009828221	90%	0.1577	0.0049	0.6831	0.1622	0.2064	G	**0.2467**
Toluene	0.018842536	100%	3.1610	1.0175	13.3405	3.4293	4.6620	G	**5.4225**
trans-1,2-Dichloroethylene	0.071366871	0%	0.0000	0.0357	0.0357	0.0357	0.0357		**---**
trans-1,3-Dichloropropene	0.040847853	0%	0.0000	0.0204	0.0204	0.0204	0.0204		**---**
Trichloroethylene	0.053738241	45%	0.1408	0.0269	0.6449	0.0269	0.1014	NP	**0.1515**
Trichlorofluoromethane	0.039328834	100%	0.3743	1.2360	2.8654	1.6293	1.7290	G	**1.7541**
Trichlorotrifluoroethane	0.091965644	100%	0.5870	1.0729	3.9085	1.7627	1.8393	G	**1.9092**
Valeraldehyde	0.003522699	94%	0.0628	0.0423	0.2677	0.1198	0.1308	N	**0.1417**
Vinyl chloride	0.020449898	6%	0.0038	0.0102	0.0256	0.0102	0.0112		**---**

Table B-3: Data Summary for All Chemicals (µg/m^3) – Providence Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
1,1,1-Trichloroethane	0.016369325	100%	0.0265	0.1091	0.1637	0.1091	0.1285	NP	**0.1301**
1,1,2,2-Tetrachloroethane	0.089245399	0%	0.0000	0.0446	0.0446	0.0446	0.0446		**---**
1,1,2-Trichloroethane	0.03273865	0%	0.0000	0.0164	0.0164	0.0164	0.0164		**---**
1,1-Dichloroethane	0.024284663	0%	0.0000	0.0121	0.0121	0.0121	0.0121		**---**
1,1-Dichloroethene	0.055507566	0%	0.0000	0.0278	0.0278	0.0278	0.0278		**---**
1,2,4-Trichlorobenzene	0.111319018	16%	0.0369	0.0557	0.2226	0.0557	0.0682	NP	**0.0757**
1,2,4-Trimethylbenzene	0.014747239	94%	0.2219	0.0074	1.0323	0.1966	0.2463	G	**0.3103**
1,2-Dibromoethane	0.13830184	0%	0.0000	0.0692	0.0692	0.0692	0.0692		**---**
1,2-Dichloroethane	0.060711656	0%	0.0000	0.0304	0.0304	0.0304	0.0304		**---**
1,2-Dichloropropane	0.15250184	0%	0.0000	0.0763	0.0763	0.0763	0.0763		**---**
1,3,5-Trimethylbenzene	0.019662986	74%	0.0667	0.0098	0.2949	0.0492	0.0755	NP	**0.0945**
1,3-Butadiene	0.01327362	29%	0.0426	0.0066	0.2433	0.0066	0.0190	NP	**0.0366**
2,5-Dimethylbenzaldehyde	0.004939141	0%	0.0000	0.0025	0.0025	0.0025	0.0025		**---**
Acenaphthene	0.000188	100%	0.0010	0.0001	0.0045	0.0007	0.0010	G	**0.0013**
Acenaphthylene	0.000206	55%	0.0003	0.0000	0.0014	0.0000	0.0001	NP	**0.0002**
Acetaldehyde	0.007206544	100%	2.3762	0.2991	14.0528	1.0341	1.4902	NP	**2.3797**
Acetone	0.016628221	100%	2.7129	0.4395	16.0581	1.5369	2.0915	NP	**3.0293**
Acetonitrile	0.166214724	29%	6.6764	0.0831	25.1840	0.0831	2.7729	NP	**5.5904**
Acetylene	0.024495706	100%	0.1865	0.1278	0.8414	0.3621	0.3748	N	**0.4099**
Acrolein	0.245334151	32%	0.5085	0.1227	2.7514	0.1227	0.3065	NP	**0.4994**
Acrylonitrile	0.12369816	3%	0.0084	0.0618	0.1085	0.0618	0.0634		**---**
Anthracene	0.00013	29%	0.0015	0.0000	0.0057	0.0000	0.0006	NP	**0.0012**
Antimony	0.029	100%	0.0005	0.0001	0.0019	0.0004	0.0005	G	**0.0006**
Arsenic	0.022	100%	0.0004	0.0001	0.0020	0.0007	0.0008	N	**0.0009**
Benzaldehyde	0.008680573	100%	0.2342	0.0477	1.3846	0.0998	0.1390	NP	**0.2284**
Benzene	0.015977505	100%	0.2884	0.1917	1.6297	0.5113	0.5690	G	**0.6241**
Benzo (a) anthracene	0.000114	29%	0.0000	0.0000	0.0002	0.0000	0.0000	NP	**0.0000**
Benzo (a) pyrene	0.000161	29%	0.0001	0.0000	0.0003	0.0000	0.0000	NP	**0.0001**
Benzo (b) fluoranthene	0.000124	39%	0.0000	0.0000	0.0002	0.0000	0.0000	NP	**0.0000**
Benzo (e) pyrene	0.0000809	23%	0.0000	0.0000	0.0001	0.0000	0.0000	NP	**0.0000**
Benzo (g,h,i) perylene	0.0000774	23%	0.0000	0.0000	0.0001	0.0000	0.0000	NP	**0.0000**
Benzo (k) fluoranthene	0.0000893	58%	0.0001	0.0000	0.0002	0.0000	0.0001	NP	**0.0001**
Beryllium	0.025	100%	0.0000	0.0000	0.0000	0.0000	0.0000	N	**0.0000**
Bromochloromethane	0.100548466	0%	0.0000	0.0503	0.0503	0.0503	0.0503		**---**
Bromodichloromethane	0.046904294	0%	0.0000	0.0235	0.0235	0.0235	0.0235		**---**
Bromoform	0.17572229	0%	0.0000	0.0879	0.0879	0.0879	0.0879		**---**
Bromomethane	0.038830266	81%	0.0237	0.0194	0.1165	0.0388	0.0426	NP	**0.0475**
Butyraldehyde	0.002949284	100%	0.3988	0.0560	2.3417	0.1445	0.2196	NP	**0.3754**
Cadmium	0.019	100%	0.0000	0.0000	0.0002	0.0001	0.0001	N	**0.0001**
Carbon Tetrachloride	0.056620859	100%	0.1485	0.3146	1.0066	0.6291	0.6514	N	**0.6623**
Chlorobenzene	0.023018405	3%	0.0062	0.0115	0.0460	0.0115	0.0126		**---**
Chloroethane	0.021110838	35%	0.1556	0.0106	0.5278	0.0106	0.0792	NP	**0.1415**
Chloroform	0.01953047	32%	0.0333	0.0098	0.0977	0.0098	0.0302	NP	**0.0409**
Chloromethane	0.028910429	100%	0.2893	0.7641	2.2302	1.3010	1.2817	G	**1.3026**
Chloromethylbenzene	0.025887526	0%	0.0000	0.0129	0.0129	0.0129	0.0129		**---**
Chloroprene	0.079667894	0%	0.0000	0.0398	0.0398	0.0398	0.0398		**---**
Chromium	0.509	100%	0.0010	0.0013	0.0043	0.0018	0.0024	N	**0.0026**
Chrysene	0.000109	81%	0.0001	0.0000	0.0004	0.0000	0.0001	NP	**0.0001**
cis-1,2-Dichloroethylene	0.063437219	3%	0.0655	0.0317	0.3965	0.0317	0.0435		**---**
cis-1,3-Dichloropropene	0.063541104	0%	0.0000	0.0318	0.0318	0.0318	0.0318		**---**
Cobalt	0.022	100%	0.0000	0.0000	0.0002	0.0001	0.0001	**G**	**0.0001**
Coronene	0.0000738	10%	0.0000	0.0000	0.0001	0.0000	0.0000		**0.0000**
Crotonaldehyde	0.002866667	97%	1.6584	0.0014	7.9407	0.4701	1.1040	G	**1.7116**
Dibenz (a,h) anthracene	0.0000785	3%	0.0000	0.0000	0.0000	0.0000	0.0000		**---**

Dibromochloromethane	0.085186094	0%	0.0000	0.0426	0.0426	0.0426	0.0426		**---**
Dichlorodifluoromethane	0.024725971	100%	0.4866	2.0770	4.3023	2.9177	2.8666	G	**2.8851**
Dichloromethane	0.059051534	90%	0.1426	0.0295	0.8684	0.1737	0.1889	NP	**0.2258**

Table B-3: Data Summary for All Chemicals (µg/m^3) – Providence Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
Dichlorotetrafluoroethane	0.020971779	97%	0.0321	0.0105	0.1398	0.1398	0.1266	NP	**0.1294**
Ethyl Acrylate	0.045043763	0%	0.0000	0.0225	0.0225	0.0225	0.0225		**---**
Ethyl tert-Butyl Ether	0.029253988	0%	0.0000	0.0146	0.0146	0.0146	0.0146		**---**
Ethylbenzene	0.021711656	100%	0.1664	0.0434	0.8250	0.1303	0.1877	NP	**0.2353**
Fluoranthene	0.000132	100%	0.0007	0.0001	0.0033	0.0005	0.0007	G	**0.0010**
Fluorene	0.000318	100%	0.0010	0.0003	0.0048	0.0012	0.0015	G	**0.0018**
Formaldehyde	0.006141104	100%	5.9585	0.4716	33.8989	2.6038	4.1436	G	**6.2910**
Hexachloro-1,3-butadiene	0.138645399	16%	0.0491	0.0693	0.2133	0.0693	0.0891	NP	**0.0992**
Hexaldehyde	0.008193047	100%	0.3176	0.0246	1.8434	0.0860	0.1440	NP	**0.2752**
Hexavalent Chromium	0.0111	65%	0.0000	0.0000	0.0000	0.0000	0.0000	NP	**0.0000**
Indeno(1,2,3-cd)pyrene	0.000113	26%	0.0000	0.0000	0.0002	0.0000	0.0000	NP	**0.0000**
Isovaleraldehyde	0.003522699	26%	0.0589	0.0018	0.3241	0.0018	0.0204	NP	**0.0463**
Lead	0.068	100%	0.0019	0.0012	0.0106	0.0035	0.0036	G	**0.0040**
m,p-Xylene	0.039080982	100%	0.4358	0.0868	2.2580	0.3040	0.4454	G	**0.5993**
Manganese	0.125	100%	0.0044	0.0008	0.0215	0.0060	0.0065	**G**	**0.0076**
m-Dichlorobenzene	0.02404908	10%	0.0224	0.0120	0.1202	0.0120	0.0186		**---**
Mercury	0.212	68%	0.0001	0.0000	0.0002	0.0000	0.0001	NP	**0.0001**
Methyl Ethyl Ketone	0.129768507	65%	1.5637	0.0649	6.5769	0.5899	1.0429	NP	**1.6154**
Methyl Isobutyl Ketone	0.028675665	52%	0.2253	0.0143	1.1470	0.0410	0.1232	NP	**0.2114**
Methyl Methacrylate	0.024569325	0%	0.0000	0.0123	0.0123	0.0123	0.0123		**---**
Methyl tert-Butyl Ether	0.007210634	3%	0.0058	0.0036	0.0361	0.0036	0.0047		**---**
Naphthalene	0.000682	100%	0.0110	0.0027	0.0453	0.0143	0.0170	G	**0.0196**
Nickel	0.184	100%	0.0004	0.0004	0.0020	0.0008	0.0010	G	**0.0010**
n-Octane	0.028031902	55%	0.1237	0.0140	0.4672	0.0467	0.1058	NP	**0.1466**
o-Dichlorobenzene	0.03006135	0%	0.0000	0.0150	0.0150	0.0150	0.0150		**---**
o-Xylene	0.017369325	100%	0.3437	0.0434	1.9106	0.1303	0.2395	NP	**0.3633**
p-Dichlorobenzene	0.03607362	87%	0.2264	0.0180	1.0822	0.1804	0.2176	G	**0.2882**
Perylene	0.000107	0%	0.0000	0.0000	0.0000	0.0000	0.0000		**---**
Phenanthrene	0.000124	100%	0.0020	0.0003	0.0094	0.0014	0.0022	G	**0.0028**
Propionaldehyde	0.00475092	100%	0.3686	0.0428	2.1569	0.1663	0.2516	NP	**0.3854**
Propylene	0.015489571	100%	0.1178	0.0688	0.4991	0.2065	0.2243	G	**0.2475**
Pyrene	0.000161	100%	0.0004	0.0000	0.0017	0.0002	0.0004	LN	**0.0005**
Selenium	0.027	100%	0.0004	0.0001	0.0018	0.0006	0.0007	N	**0.0008**
Styrene	0.042597137	81%	0.2774	0.0213	1.4909	0.0852	0.1704	NP	**0.2750**
tert-Amyl Methyl Ether	0.050149693	0%	0.0000	0.0251	0.0251	0.0251	0.0251		**---**
Tetrachloroethylene	0.074606544	23%	0.0259	0.0373	0.1356	0.0373	0.0486	NP	**0.0537**
Tolualdehydes	0.009828221	94%	0.3574	0.0049	1.9509	0.1229	0.2159	G	**0.3515**
Toluene	0.018842536	100%	1.2390	0.3015	5.5397	1.0552	1.4588	LN	**1.8042**
trans-1,2-Dichloroethylene	0.071366871	0%	0.0000	0.0357	0.0357	0.0357	0.0357		**---**
trans-1,3-Dichloropropene	0.040847853	0%	0.0000	0.0204	0.0204	0.0204	0.0204		**---**
Trichloroethylene	0.053738241	19%	0.0169	0.0269	0.1075	0.0269	0.0338	NP	**0.0370**
Trichlorofluoromethane	0.039328834	100%	0.2859	1.0675	2.4721	1.5170	1.5351	G	**1.5491**
Trichlorotrifluoroethane	0.091965644	100%	0.3723	0.6131	1.9160	1.1496	1.2262	N	**1.2679**
Valeraldehyde	0.003522699	100%	0.1926	0.0211	1.1273	0.0881	0.1233	NP	**0.1949**
Vinyl chloride	0.020449898	6%	0.0038	0.0102	0.0256	0.0102	0.0112		**---**

Table B-4: Data Summary for All Chemicals (µg/m^3) – Shuttlesworth Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
1,1,1-Trichloroethane	0.016369325	100%	0.0395	0.1091	0.2183	0.1091	0.1373	NP	**0.1414**
1,1,2,2-Tetrachloroethane	0.089245399	0%	0.0000	0.0446	0.0446	0.0446	0.0446		**---**
1,1,2-Trichloroethane	0.03273865	0%	0.0000	0.0164	0.0164	0.0164	0.0164		**---**
1,1-Dichloroethane	0.024284663	0%	0.0000	0.0121	0.0121	0.0121	0.0121		**---**
1,1-Dichloroethene	0.055507566	0%	0.0000	0.0278	0.0278	0.0278	0.0278		**---**
1,2,4-Trichlorobenzene	0.111319018	10%	0.0338	0.0557	0.2226	0.0557	0.0646		**---**
1,2,4-Trimethylbenzene	0.014747239	100%	0.5594	0.1966	2.7528	0.8357	0.9229	G	**1.0468**
1,2-Dibromoethane	0.13830184	0%	0.0000	0.0692	0.0692	0.0692	0.0692		**---**
1,2-Dichloroethane	0.060711656	0%	0.0000	0.0304	0.0304	0.0304	0.0304		**---**
1,2-Dichloropropane	0.15250184	0%	0.0000	0.0763	0.0763	0.0763	0.0763		**---**
1,3,5-Trimethylbenzene	0.019662986	100%	0.1639	0.0492	0.8848	0.2458	0.2680	G	**0.3045**
1,3-Butadiene	0.01327362	90%	0.1450	0.0066	0.5531	0.2212	0.2097	N	**0.2451**
2,5-Dimethylbenzaldehyde	0.004939141	0%	0.0000	0.0025	0.0025	0.0025	0.0025		**---**
Acenaphthene	0.000188	97%	0.0130	0.0035	0.0563	0.0104	0.0151	NP	**0.0184**
Acenaphthylene	0.000206	94%	0.0098	0.0000	0.0336	0.0089	0.0122	NP	**0.0145**
Acetaldehyde	0.007206544	100%	0.5432	0.5999	2.8106	1.5548	1.5437	N	**1.6162**
Acetone	0.016628221	100%	1.3315	0.4798	6.6988	2.0405	2.1897	G	**2.4853**
Acetonitrile	0.166214724	87%	58.2255	0.0831	196.4356	3.3243	36.4014	NP	**58.2217**
Acetylene	0.024495706	100%	1.3534	0.2982	5.3891	1.3526	1.7968	G	**2.1467**
Acrolein	0.245334151	61%	0.9199	0.1227	3.3476	0.4127	0.7516	NP	**1.0617**
Acrylonitrile	0.12369816	3%	0.0513	0.0618	0.3472	0.0618	0.0711		**---**
Anthracene	0.00013	94%	0.0102	0.0000	0.0499	0.0052	0.0078	G	**0.0110**
Antimony	0.029	100%	0.0008	0.0003	0.0038	0.0014	0.0014	G	**0.0016**
Arsenic	0.022	100%	0.0070	0.0005	0.0343	0.0032	0.0058	G	**0.0081**
Benzaldehyde	0.008680573	100%	0.0626	0.0738	0.3212	0.1476	0.1602	G	**0.1695**
Benzene	0.015977505	100%	5.9956	0.5432	31.5396	5.2726	6.1879	G	**7.9900**
Benzo (a) anthracene	0.000114	97%	0.0043	0.0000	0.0219	0.0021	0.0032	G	**0.0046**
Benzo (a) pyrene	0.000161	84%	0.0029	0.0000	0.0153	0.0015	0.0020	NP	**0.0030**
Benzo (b) fluoranthene	0.000124	90%	0.0043	0.0000	0.0221	0.0022	0.0031	G	**0.0046**
Benzo (e) pyrene	0.0000809	87%	0.0028	0.0000	0.0137	0.0015	0.0022	NP	**0.0031**
Benzo (g,h,i) perylene	0.0000774	84%	0.0018	0.0000	0.0092	0.0010	0.0014	NP	**0.0020**
Benzo (k) fluoranthene	0.0000893	94%	0.0033	0.0000	0.0160	0.0018	0.0026	NP	**0.0036**
Beryllium	0.025	100%	0.0004	0.0000	0.0014	0.0002	0.0003	LN	**0.0004**
Bromochloromethane	0.100548466	0%	0.0000	0.0503	0.0503	0.0503	0.0503		**---**
Bromodichloromethane	0.046904294	0%	0.0000	0.0235	0.0235	0.0235	0.0235		**---**
Bromoform	0.17572229	0%	0.0000	0.0879	0.0879	0.0879	0.0879		**---**
Bromomethane	0.038830266	81%	0.0234	0.0194	0.0777	0.0388	0.0501	NP	**0.0543**
Butyraldehyde	0.002949284	100%	0.1506	0.0944	0.6872	0.2802	0.3078	N	**0.3357**
Cadmium	0.019	100%	0.0003	0.0001	0.0015	0.0003	0.0004	G	**0.0004**
Carbon Tetrachloride	0.056620859	100%	0.1271	0.4404	0.9437	0.6291	0.6474	N	**0.6544**
Chlorobenzene	0.023018405	32%	0.0837	0.0299	0.3223	0.0299	0.0752	NP	**0.1022**
Chloroethane	0.021110838	84%	0.1924	0.0079	0.7653	0.3167	0.3009	N	**0.3453**
Chloroform	0.01953047	48%	0.0979	0.0146	0.2930	0.0146	0.0910	NP	**0.1221**
Chloromethane	0.028910429	100%	0.2606	0.7847	1.7966	1.3216	1.3556	N	**1.3693**
Chloromethylbenzene	0.025887526	6%	0.0118	0.0388	0.1036	0.0388	0.0413		**---**
Chloroprene	0.079667894	0%	0.0000	0.0054	0.0054	0.0054	0.0054		**---**
Chromium	0.509	100%	0.0029	0.0015	0.0133	0.0043	0.0049	LN	**0.0056**
Chrysene	0.000109	97%	0.0051	0.0002	0.0250	0.0034	0.0045	G	**0.0061**
cis-1,2-Dichloroethylene	0.063437219	3%	0.1075	0.0357	0.6344	0.0357	0.0550		**---**
cis-1,3-Dichloropropene	0.063541104	0%	0.0000	0.0340	0.0340	0.0340	0.0340		**---**
Cobalt	0.022	100%	0.0007	0.0001	0.0031	0.0004	0.0006	NP	**0.0008**
Coronene	0.0000738	71%	0.0004	0.0000	0.0019	0.0003	0.0004	NP	**0.0005**
Crotonaldehyde	0.002866667	100%	0.7450	0.0487	2.6603	0.3239	0.6685	NP	**0.9090**
Dibenz (a,h) anthracene	0.0000785	65%	0.0005	0.0000	0.0025	0.0003	0.0004	NP	**0.0006**
Dibromochloromethane	0.085186094	0%	0.0000	0.1406	0.1406	0.1406	0.1406		**---**
Dichlorodifluoromethane	0.024725971	100%	0.4371	2.2253	4.3023	3.0166	3.0453	N	**3.0535**
Dichloromethane	0.059051534	97%	0.1342	0.0104	0.6600	0.3126	0.3264	N	**0.3475**

Table B-4: Data Summary for All Chemicals (µg/m^3) – Shuttlesworth Site (non-COPCs shaded; N=normal, LN=log-normal, G=gamma, NP=non-parametric)

Analyte	Detect. Limit	Detect. Freq.	Std. Dev.	Min	Max	Median	Mean	Data Distr.	95% UCL
Dichlorotetrafluoroethane	0.020971779	97%	0.0437	0.0699	0.3460	0.1398	0.1397	N	**0.1448**
Ethyl Acrylate	0.045043763	0%	0.0000	0.0471	0.0471	0.0471	0.0471		**---**
Ethyl tert-Butyl Ether	0.029253988	3%	0.0327	0.0418	0.2236	0.2236	0.2177		**---**
Ethylbenzene	0.021711656	100%	0.6740	0.2171	2.9962	0.8250	0.9567	G	**1.1233**
Fluoranthene	0.000132	97%	0.0147	0.0024	0.0731	0.0141	0.0165	G	**0.0203**
Fluorene	0.000318	97%	0.0127	0.0042	0.0512	0.0163	0.0189	G	**0.0216**
Formaldehyde	0.006141104	100%	2.0434	1.0194	11.0908	3.5618	3.6859	G	**4.1074**
Hexachloro-1,3-butadiene	0.138645399	19%	0.0647	0.0267	0.2133	0.0267	0.0559	NP	**0.0772**
Hexaldehyde	0.008193047	100%	0.0693	0.0410	0.3113	0.1393	0.1513	N	**0.1634**
Hexavalent Chromium	0.0111	74%	0.0000	0.0000	0.0002	0.0000	0.0000	NP	**0.0001**
Indeno(1,2,3-cd)pyrene	0.000113	77%	0.0026	0.0000	0.0131	0.0012	0.0019	NP	**0.0028**
Isovaleraldehyde	0.003522699	71%	0.0301	0.0018	0.1092	0.0352	0.0364	NP	**0.0447**
Lead	0.068	100%	0.0231	0.0051	0.1150	0.0230	0.0302	G	**0.0362**
m,p-Xylene	0.039080982	100%	1.6596	0.3908	8.1636	2.3449	2.5732	G	**2.9583**
Manganese	0.125	100%	0.1553	0.0205	0.6140	0.0927	0.1393	G	**0.1894**
m-Dichlorobenzene	0.02404908	6%	0.0098	0.0210	0.0601	0.0210	0.0236		**---**
Mercury	0.212	74%	0.0001	0.0000	0.0004	0.0001	0.0001	G	**0.0001**
Methyl Ethyl Ketone	0.129768507	77%	1.9363	0.0251	6.8128	1.4746	2.0131	NP	**2.5928**
Methyl Isobutyl Ketone	0.028675665	74%	0.2562	0.0205	0.9422	0.2458	0.3039	NP	**0.3750**
Methyl Methacrylate	0.024569325	3%	0.0199	0.0123	0.1228	0.0123	0.0159		**---**
Methyl tert-Butyl Ether	0.007210634	19%	0.6525	0.0036	2.1992	0.0036	0.2692	NP	**0.5450**
Naphthalene	0.000682	97%	0.3622	0.0234	1.2200	0.4250	0.4900	G	**0.5707**
Nickel	0.184	100%	0.0011	0.0009	0.0066	0.0019	0.0021	LN	**0.0023**
n-Octane	0.028031902	94%	0.6532	0.0140	2.8966	0.4672	0.6896	G	**0.8836**
o-Dichlorobenzene	0.03006135	3%	0.0081	0.0150	0.0601	0.0150	0.0165		**---**
o-Xylene	0.017369325	100%	0.7561	0.1737	3.6910	0.9119	1.0786	G	**1.2648**
p-Dichlorobenzene	0.03607362	100%	0.3181	0.0601	1.6233	0.3006	0.3956	G	**0.4814**
Perylene	0.000107	61%	0.0008	0.0000	0.0040	0.0004	0.0005	NP	**0.0008**
Phenanthrene	0.000124	97%	0.0339	0.0081	0.1570	0.0391	0.0440	G	**0.0518**
Propionaldehyde	0.00475092	100%	0.0996	0.1021	0.4775	0.2756	0.2741	N	**0.2879**
Propylene	0.015489571	100%	1.4050	0.2237	6.4196	1.5317	1.8315	G	**2.1992**
Pyrene	0.000161	97%	0.0093	0.0010	0.0464	0.0078	0.0100	G	**0.0125**
Selenium	0.027	100%	0.0023	0.0004	0.0114	0.0014	0.0020	G	**0.0028**
Styrene	0.042597137	97%	0.6774	0.0213	2.8540	0.6390	0.7812	G	**0.9724**
tert-Amyl Methyl Ether	0.050149693	3%	0.0180	0.0251	0.1254	0.0251	0.0283		**---**
Tetrachloroethylene	0.074606544	71%	0.2194	0.0373	0.8817	0.1356	0.2362	NP	**0.3006**
Tolualdehydes	0.009828221	100%	0.1401	0.0541	0.7568	0.1573	0.1951	G	**0.2302**
Toluene	0.018842536	100%	3.0460	0.8291	11.7954	3.8439	4.7337	G	**5.4393**
trans-1,2-Dichloroethylene	0.071366871	0%	0.0000	0.0357	0.0357	0.0357	0.0357		**---**
trans-1,3-Dichloropropene	0.040847853	0%	0.0000	0.0204	0.0204	0.0204	0.0204		**---**
Trichloroethylene	0.053738241	39%	0.0588	0.0269	0.2150	0.0269	0.0667	NP	**0.0835**
Trichlorofluoromethane	0.039328834	100%	0.3978	1.2360	3.4834	1.6293	1.6855	NP	**1.7165**
Trichlorotrifluoroethane	0.091965644	100%	0.6869	0.6897	4.2917	1.6094	1.7750	G	**1.8766**
Valeraldehyde	0.003522699	100%	0.0538	0.0387	0.2466	0.1303	0.1358	N	**0.1439**
Vinyl chloride	0.020449898	6%	0.0040	0.0102	0.0256	0.0102	0.0112		**---**

Appendix C

Chronic and Acute Toxicity Values

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m³
Acetaldehyde	75-07-0	9.E-01	4.5E-01	4.5E-01
Acetamide	60-35-5		5.E-02	5.E-02
Acetonitrile	75-05-8	6.E+00		6.E+00
Acetophenone	98-86-2			No Value
Acrolein	107-02-8	2.E-03		2.E-03
Acrylamide	79-06-1	7.E-02	7.7E-04	7.7E-04
Acrylic acid	79-10-7	1.E-01		1.E-01
Acrylonitrile	107-13-1	2.E-01	1.5E-02	1.5E-02
Allyl chloride	107-05-1	1.E-01	2.E-01	1.E-01
Aniline	62-53-3	1.E-01	6.3E-01	1.E-01
Antimony compounds (1)	Various	2.E-02		2.E-02
Arsenic compounds	7440-38-2	3.E-03	2.3E-04	2.3E-04
Arsine	7784-42-1	5.E-03		5.E-03
Benzene	71-43-2	3.E+00	1.3E-01	1.3E-01
Benzidine	92-87-5	1.E+00	1.5E-05	1.5E-05
Benzotrichloride	98-07-7		2.7E-04	2.7E-04
Benzyl chloride	100-44-7		2.0E-02	2.0E-02
Beryllium compounds	7440-41-7	2.E-03	4.2E-04	4.2E-04
Biphenyl	92-52-4			No Value
Bis(2-ethylhexyl)phthalate	117-81-7	1.E+00	4.2E-01	4.2E-01
Bis(chloromethyl)ether	542-88-1		1.6E-05	1.6E-05
Bromoform	75-25-2		9.1E-01	9.1E-01
1,3-Butadiene	106-99-0	2.E-01	3.E-02	3.E-02
Cadmium compounds	7440-43-9	2.E-03	5.6E-04	5.6E-04
Captan	133-06-2		1.E+00	1.E+00
Carbaryl	63-25-2			No Value
Carbon disulfide	75-15-0	7.E+01		7.E+01
Carbon tetrachloride	56-23-5	1.9E+01	6.7E-02	6.7E-02
Chloramben	133-90-4			No Value
Chlordane	57-74-9	7.E-02	1.E-02	1.E-02
Chlorine	7782-50-5	2.E-02		2.E-02
Chloroacetic acid	79-11-8			No Value
2-Chloroacetophenone	532-27-4	3.E-03		3.E-03
Chlorobenzene	108-90-7	1.E+02		1.E+02
Chlorobenzilate	510-15-6		1.3E-02	1.3E-02
Chloroform	67-66-3	9.8E+00		9.8E+00

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summary.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m³
Chloroprene	126-99-8	7.E-01		7.E-01
Chromium Compounds (2)	Various	1.E-02	8.3E-05	8.3E-05
Chromium (VI) trioxide, chromic acid mist	11115-74-5	8.E-04		8.E-04
Cobalt compounds	7440-48-4	1.E-02		1.E-02
Coke Oven Emissions	8007-45-2		1.6E-03	1.6E-03
m-Cresol (3)	108-39-4	6.E+01		6.E+01
o-Cresol (3)	95-48-7	6.E+01		6.E+01
p-Cresol (3)	106-44-5	6.E+01		6.E+01
Cresols (mixed)	1319-77-3	6.E+01		6.E+01
Cumene	98-82-8	4.E+01		4.E+01
Cyanazine	21725-46-2		4.2E-03	4.2E-03
Cyanide Compounds (4)	Various	3.E-01		3.E-01
Acetone cyanohydrin	75-86-5	1.E+00		1.E+00
Cyanogen	460-19-5			No Value
Cyanogen bromide	506-68-3			No Value
Cyanogen chloride	506-77-4			No Value
Ethylene cyanohydrin	109-78-4			No Value
Thiocyanic acid, 2-(benzothiazolylthio) methyl est	21564-17-0			No Value
2,4-D, salts and esters	94-75-7			No Value
DDE	72-55-9		1.0E-02	1.0E-02
1,2-Dibromo-3-chloropropane	96-12-8	2.E-02	5.E-04	5.E-04
Dibutylphthalate	84-74-2			No Value
p-Dichlorobenzene	106-46-7	8.E+01	9.1E-02	9.1E-02
3,3'-Dichlorobenzidine	91-94-1		2.9E-03	2.9E-03
Dichloroethyl ether	111-44-4		3.0E-03	3.0E-03
1,3-dichloropropene	542-75-6	2.E+00	3.E-01	3.E-01
Dichlorvos	62-73-7	5.E-02	1.2E-02	1.2E-02
Diesel engine emissions	DIESEL EMIS.	5.E-01		5.E-01
Diethanolamine	111-42-2	3.E-01		3.E-01
3,3'-Dimethoxybenzidine	119-90-4		3.E-01	3.E-01
p-Dimethylaminoazobenzene	60-11-7		7.7E-04	7.7E-04

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m^3
3,3'-Dimethylbenzidine	119-93-7		3.8E-04	3.8E-04
Dimethyl formamide	68-12-2	3.E+00		3.E+00
N,N-dimethylaniline	121-69-7			No Value
1,1-Dimethylhydrazine	57-14-7			No Value
2,4-dinitrophenol	51-28-5			No Value
2,4-Dinitrotoluene	121-14-2	7.E-01	1.1E-02	1.1E-02
2,4/2,6-Dinitrotoluene (mixture)	25321-14-6		5.3E-03	5.3E-03
1,4-Dioxane	123-91-1	3.6E+02	3.2E-01	3.2E-01
1,2-Diphenylhydrazine	122-66-7		4.5E-03	4.5E-03
Epichlorohydrin	106-89-8	1.E-01	8.3E-01	1.E-01
1,2-Epoxybutane	106-88-7	2.E+00		2.E+00
Ethyl acrylate	140-88-5		7.1E-02	7.1E-02
Ethyl benzene	100-41-4	1.E+02		1.E+02
Ethyl carbamate	51-79-6		3.4E-03	3.4E-03
Ethyl chloride	75-00-3	1.E+03		1.E+03
Ethylene dibromide	106-93-4	9.E-01	2.E-03	2.E-03
Ethylene dichloride	107-06-2	2.4E+02	3.8E-02	3.8E-02
Ethylene glycol	107-21-1	4.E+01		4.E+01
Ethylene oxide	75-21-8	3.E+00	1.1E 02	1.1E-02
Ethylene thiourea	96-45-7	3.E-01	7.7E-02	7.7E-02
Ethylidene dichloride (1,1-Dichloroethane)	75-34-3	5.E+01	6.3E-01	6.3E-01
Formaldehyde	50-00-0	9.8E-01	1.8E+02	9.8E-01
Diethylene glycol monobutyl ether	112-34-5	2.E+00		2.E+00
Diethylene glycol monoethyl ether	111-90-0			No Value
Ethylene glycol butyl ether (5)	111-76-2	1.3E+03		1.3E+03
Ethylene glycol ethyl ether	110-80-5	2.E+01		2.E+01
Ethylene glycol ethyl ether acetate	111-15-9	3.E+01		3.E+01
Ethylene glycol methyl ether	109-86-4	2.E+00		2.E+00
Ethylene glycol methyl ether acetate	110-49-6	9.E+00		9.E+00
Heptachlor	76-44-8		7.7E-04	7.7E-04
Hexachlorobenzene	118-74-1	3.E-01	2.2E-03	2.2E-03
Hexachlorobutadiene	87-68-3	9.E+00	4.5E-02	4.5E-02

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m^3
Hexachlorocyclohexane (HCH) (6)	Various	3.E-02	5.6E-04	**5.6E-04**
Hexachlorocyclopentadiene	77-47-4	2.E-02		**2.E-02**
Hexachlorodibenzo-p-dioxin, mixture	19408-74-3		7.7E-07	**7.7E-07**
Hexachloroethane	67-72-1	8.E+00	3.E-01	**3.E-01**
Hexamethylene-1,6-diisocyanate	822-06-0	1.E-03		**1.E-03**
n-Hexane	110-54-3	2.E+01		**2.E+01**
Hydrazine	302-01-2	2.E-02	2.0E-04	**2.0E-04**
Hydrochloric acid	7647-01-0	2.E+00		**2.E+00**
Hydrofluoric acid	7664-39-3	1.4E+00		**1.4E+00**
Hydrogen sulfide	7783-06-4	2.E-01		**2.E-01**
Hydroquinone	123-31-9			**No Value**
Isophorone	78-59-1	2.E+02	3.7E+00	**3.7E+00**
Lead compounds (7)	7439-92-1	1.5E-01		**1.5E-01**
Tetraethyl lead	78-00-2			**No Value**
Maleic anhydride	108-31-6	7.E-02		**7.E-02**
Manganese compounds	7439-96-5	5.E-03		**5.E-03**
Mercury compounds (8)	Various	3.E-02		**3.E-02**
Methanol	67-56-1	4.E+02		**4.E+02**
Methoxychlor	72-43-5			**No Value**
Methyl bromide	74-83-9	5.E-01		**5.E-01**
Methyl chloride	74-87-3	9.E+00		**9.E+00**
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	1.E+02		**1.E+02**
Methyl ethyl ketone	78-93-3	5.E+02		**5.E+02**
Methyl isobutyl ketone	108-10-1	3.E+02		**3.E+02**
Methyl isocyanate	624-83-9	1.E-01		**1.E-01**
Methyl methacrylate	80-62-6	7.E+01		**7.E+01**
Methyl tert-butyl ether	1634-04-4	3.E+02	3.8E+00	**3.8E+00**
4,4'-Methylene bis(2-chloroaniline)	101-14-4		2.3E-03	**2.3E-03**
Methylene chloride	75-09-2	1.E+02	2.1E+00	**2.1E+00**
Methylene diphenyl diisocyanate	101-68-8	6.E-02		**6.E-02**
4,4'-Methylenedianiline	101-77-9	2.E+00	2.2E-03	**2.2E-03**
Nickel compounds (9)	Various	9.E-03	2.1E-03	**2.1E-03**
Nitrobenzene	98-95-3	3.E+00		**3.E+00**

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m³
2-Nitropropane	79-46-9	2.E+00	1.8E-01	1.8E-01
Nitrosodimethylamine	62-75-9		7.1E-05	7.1E-05
N-Nitrosomorpholine	59-89-2		5.3E-04	5.3E-04
Parathion	56-38-2			No Value
Polychlorinated biphenyls	1336-36-3		1.E-02	1.E-02
Aroclor 1016	12674-11-2			No Value
Aroclor 1254	11097-69-1			No Value
Pentachloronitrobenzene	82-68-8		1.4E-02	1.4E-02
Pentachlorophenol	87-86-5	1.E+01	2.0E-01	2.0E-01
Phenol	108-95-2	2.E+01		2.E+01
p-Phenylenediamine	106-50-3			No Value
Phosgene	75-44-5	3.E-02		3.E-02
Phosphine	7803-51-2	3.E-02		3.E-02
Phosphorus, white	7723-14-0	7.E-03		7.E-03
Phthalic anhydride	85-44-9	2.E+00		2.E+00
Begin Polycyclic Aromatic Hydrocarbons (PAHs) (10)				
Acenaphthene	83-32-9	3.E-01		3.E-01
Acenaphthylene	206-96-8	3.E-01		3.E-01
Anthracene	120-12-7	3.E-01		3.E-01
Benzo(a)anthracene	56-55-3	3.E-01	9.1E-03	9.1E-03
Benzo(b)fluoranthene	205-99-2	3.E-01	9.1E-03	9.1E-03
Benzo[j]fluoranthene	205-82-3	3.E-01	9.1E-03	9.1E-03
Benzo(k)fluoranthene	207-08-9	3.E-01	9.1E-03	9.1E-03
Benzo(g,h,i)perylene	191-24-2	3.E-01		3.E-01
Benzo(a)pyrene	50-32-8	3.E-01	9.1E-04	9.1E-04
Benzo(e)pyrene	192-97-2	3.E-01		3.E-01
Carbazole	86-74-8	3.E-01	1.8E-01	1.8E-01
beta-Chloronaphthalene	91-58-7	3.E-01		3.E-01
Chrysene	218-01-9	3.E-01	9.1E-02	9.1E-02
Dibenz[a,h]acridine	226-36-8	3.E-01	9.1E-03	9.1E-03
Dibenz[a,j]acridine	224-42-0	3.E-01	9.1E-03	9.1E-03
Dibenz(a,h)anthracene	53-70-3	3.E-01	8.3E-04	8.3E-04
7H-Dibenzo[c,g]carbazole	194-59-2	3.E-01	9.1E-04	9.1E-04

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m^3
Dibenzo[a,e]pyrene	192-65-4	3.E-01	9.1E-04	**9.1E-04**
Dibenzo[a,h]pyrene	189-64-0	3.E-01	9.1E-05	**9.1E-05**
Dibenzo[a,i]pyrene	189-55-9	3.E-01	9.1E-05	**9.1E-05**
Dibenzo[a,l]pyrene	191-30-0	3.E-01	9.1E-05	**9.1E-05**
7,12-Dimethylbenz(a)anthracene	57-97-6	3.E-01	1.4E-05	**1.4E-05**
1,6-Dinitropyrene	42397-64-8	3.E-01	9.1E-05	**9.1E-05**
1,8-Dinitropyrene	42397-65-9	3.E-01	9.1E-04	**9.1E-04**
Fluoranthene	206-44-0	3.E-01		**3.E-01**
Fluorene	86-73-7	3.E-01		**3.E-01**
Indeno(1,2,3-cd)pyrene	193-39-5	3.E-01	9.1E-03	**9.1E-03**
3-Methylcholanthrene	56-49-5	3.E-01	1.6E-04	**1.6E-04**
5-Methylchrysene	3697-24-3	3.E-01	9.1E-04	**9.1E-04**
1-Methylnaphthalene	90-12-0	3.E-01		**3.E-01**
2-Methylnaphthalene	91-57-6	3.E-01		**3.E-01**
Naphthalene	91-20-3	3.E-01	2.9E-02	**2.9E-02**
5-Nitroacenaphthene	602-87-9	3.E-01	2.7E-02	**2.7E-02**
6-Nitrochrysene	7496-02-8	3.E-01	9.1E-05	**9.1E-05**
2-Nitrofluorene	607-57-8	3.E-01	9.1E-02	**9.1E-02**
1-Nitropyrene	5522-43-0	3.E-01	9.1E-03	**9.1E-03**
4-Nitropyrene	57835-92-4	3.E-01	9.1E-03	**9.1E-03**
Phenanthrene	85-01-8	3.E-01		**3.E-01**
Pyrene	129-00-0	3.E-01		**3.E-01**
End PAH Listings				
1,3-Propane sultone	1120-71-4		1.4E-03	**1.4E-03**
Propoxur	114-26-1			**No Value**
Propylene dichloride	78-87-5	4.E-01	5.3E-02	**5.3E-02**
Propylene oxide	75-56-9	3.E+00	2.7E-01	**2.7E-01**
Quinoline	91-22-5			**No Value**
Selenium compounds (11)	Various	2.E+00		**2.E+00**
Hydrogen selenide	7783-07-5	8.E-03		**8.E-03**
Styrene	100-42-5	1.E+02		**1.E+02**
Styrene oxide	96-09-3	6.E-01		**6.E-01**
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	4.E-06	3.0E-08	**3.0E-08**
1,1,2,2-Tetrachloroethane	79-34-5		1.7E-02	**1.7E-02**
Tetrachloroethene	127-18-4	2.7E+01	1.7E-01	**1.7E-01**
Titanium tetrachloride	7550-45-0	1.E-02		**1.E-02**
Toluene	108-88-3	4.E+01		**4.E+01**

Appendix A Chronic Inhalation Screening Values Based on OAQPS Toxicity Table 1 www.epa.gov/ttn/atw/toxsource/summarg.html (2/28/05)		Noncancer at HQ = 0.1	Cancer at 1 x 10^{-6} Risk Level	FINAL SCREENING VALUE
		ug/m³	ug/m³	ug/m^3
2,4-Toluene diamine	95-80-7		9.1E-04	9.1E-04
2,4/2,6-Toluene diisocyanate mixture (TDI)	26471-62-5	7.E-03	9.1E-02	7.E-03
o-Toluidine	95-53-4		2.0E-02	2.0E-02
Toxaphene	8001-35-2		3.1E-03	3.1E-03
1,2,4-Trichlorobenzene	120-82-1	2.E+01		2.E+01
1,1,2-Trichloroethane	79-00-5	4.E+01	6.3E-02	6.3E-02
Trichloroethylene	79-01-6	6.E+01	5.E-01	5.E-01
2,4,5-Trichlorophenol	95-95-4			No Value
2,4,6-Trichlorophenol	88-06-2		3.2E-01	3.2E-01
Triethylamine	121-44-8	7.E-01		7.E-01
Trifluralin	1582-09-8		4.5E-01	4.5E-01
Uranium compounds	7440-61-1	3.E-02		3.E-02
Uranium, soluble salts	URANSOLS			No Value
Vinyl acetate	108-05-4	2.E+01		2.E+01
Vinyl bromide	593-60-2	3.E-01	3.1E-02	3.1E-02
Vinyl chloride	75-01-4	1.E+01	1.1E-01	1.1E-01
Vinylidene chloride	75-35-4	2.E+01		2.E+01
m-Xylene (12)	108-38-3	1.E+01		1.E+01
o-Xylene (12)	95-47-6	1.E+01		1.E+01
Xylenes (mixed)	1330-20-7	1.E+01		1.E+01

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Acetaldehyde	75-07-0					18	360			360		
Acetamide	60-35-5										25	75
Acetonitrile	75-05-8	22 [P]	22 [P]	390 [P]	170 [P]					84		
Acetophenone	98-86-2										10	30
2-Acetylaminofluorene	53-96-3										0.25	0.75
Acrolein	107-02-8	0.069 [I]	0.069 [I]	0.23 [I]	0.23 [I]	0.23	1.1	0.00011	0.00019	0.46		
Acrylamide	79-06-1									6		
Acrylic acid	79-10-7	4.4 [I]	4.4 [I]	140 [I]	41 [I]	5.9	150		6			
Acrylonitrile	107-13-1					22	77	0.22		19		
Allyl chloride	107-05-1					9.4	130			78		
4-Aminobiphenyl	92-67-1										0.5	1.5
Aniline	62-53-3	30 [I]	3.8 [I]	46 [I]	5.7 [I]					38		
Anisidine	90-04-0									5		
Antimony compounds	7440-36-0									5		
Antimony pentafluoride	7783-70-2										0.75	0.75
Antimony potassium tartrate	304-61-0										1.3	4
Antimony trihydride	7803-52-3										0.51	0.51
Antimony trioxide	1309-64-4										0.6	1.5
Arsenic chloride	7784-34-1										0.19	0.56
Arsenic compounds	7440-38-2								0.00019	0.5		
Arsenic oxide	1327-53-3											
Arsenic pentoxide	1303-28-2										0.015	0.045
Arsine	7784-42-1		[I]	0.54 [I]	0.064 [I]		1.6		0.16	0.96		
Benzene	71-43-2	170 [P]	29 [P]	2600 [P]	640 [P]	160	480	0.16	1.3	160		
Benzidine	92-87-5										0.15	0.5
Benzotrichloride	98-07-7										0.1	0.1
Benzyl chloride	100-44-7					5.2	52		0.24	5.2		
Beryllium chloride	7787-47-5										0.015	0.04
Beryllium compounds	7440-41-7						0.025			0.4		
Beryllium fluoride	7787-49-7										0.01	0.025
Beryllium nitrate	13597-99-4										0.03	0.075
Beryllium oxide	1304-56-9										0.005	
Biphenyl	92-52-4										1	3.9
Bis(2-ethylhexyl)phthalate	117-81-7										5	10
Bis(chloromethyl)ether	542-88-1						0.47					
Bromoform	75-25-2									880		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
1,3 Butadiene	106 00 0					22	440			440		
Cadmium compounds	7440-43-9									0.9		
Cadmium oxide	1306-19-0										0.005	0.035
Cadmium stearate	2223-93-0										0.03	0.15
Calcium cyanamide	156-62-7										0.5	1.5
Captan	133-06-2										5	15
Carbaryl	63-25-2									10		
Carbon disulfide	75-15-0	12 [i]	6.2 [i]	500 [i]	160 [i]	3.1	160		6.2	160		
Carbon tetrachloride	56-23-5	75 [i]	33 [i]	350 [i]	150 [i]	130	630		1.9	130		
Carbonyl sulfide	463-58-1										3.1	9.8
Catechol	120-80-9										23	68
Chloramben	133-90-4										35	100
Chlordane	57-74-9									10		
Chlorine	7782-50-5	1.5 [i]	1.5 [i]	5.8 [i]	2.1 [i]	2.9	8.7		0.21	2.9		
Chloroacetic acid	79-11-8			26 [i]	3.2 [i]							
2-Chloroacetophenone	532-27-4											
Chlorobenzene	108-90-7									460		
Chlorobenzilate	510-15-6										0.075	0.25
Chloroform	67-66-3		[p]	310 [p]	140 [p]		240	0.49	0.15	240		
Chloromethyl methyl ether	107-30-2		[i]	0.2 [i]	0.083 [i]		3.3					
Chloroprene	126-99-8									110		
Chromium (II) compounds	16065-83-1											
Chromium (VI) compounds	18540-29-9									1.5		
Chromium (VI) trioxide, chromic acid mist	11115-74-5									1.5		
Chromium chloride	10025-73-7										1.5	4
Chromium compounds	7440-47-3										1	1.5
Cobalt bromide	7789-43-7										0.2	0.2
Cobalt carbonate	513-79-1										0.13	0.13
Cobalt carbonyl	10210-68-1										0.27	0.27
Cobalt chloride	7646-79-9										0.13	0.13
Cobalt compounds	7440-48-4									2		
Cobalt nitrate	Co Nitrate										0.15	0.15
Cobalt oxides (mixed)	COBOXIDES										0.075	0.075
Coke Oven Emissions	0007-45-2										0.1	1.3
m-Cresol	108-39-4									110		
o-Cresol	95-48-7									110		
p-Cresol	106-44-5									110		
Cresols (mixed)	1319-77-3									110		
Cumene	98-82-8									440		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Cyanophos	2636 26 2										1.3	3.6
Cyanuric fluoride	675-14-9										0.17	0.17
Cyanide compounds	57-12-5									2.5		
Acetone cyanohydrin	75-86-5	5.9 [I]	2.4 [I]	25 [I]	8.7 [I]							
Barium cyanide	542-62-1										0.6	2
Calcium cyanide	592-01-8											
Copper cyanide	544-92-3										1.3	4
Cyanogen	460-19-5										21	21
Cyanogen bromide	506-68-3										20	44
Cyanogen chloride	506-77-4						1					
Cyanogen iodide	506-78-5										35	100
Hydrogen cyanide	74-90-8	2.2 [I]	[I]	7.8 [I]	2.8 [I]		11		0.34	5.5		
Potassium cyanide	151-50-8										5	5
Potassium silver cyanide	506-61-6										1	3
Potassium thiocyanate	333-20-0										10	35
Silver cyanide	506-64-9										25	25
Sodium cyanide	143-33-9										5	5
Zinc cyanide	557-21-1										20	20
2,4-D, salts and esters	94-75-7									10		
DDE	72-55-9										10	30
Diazomethane	334-88-3										0.34	1
Dibenzofuran	132-64-9										10	30
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4										0.000025	0.000075
1,2-Dibromo-3-chloropropane	96-12-8										0.0097	0.029
Dibutylphthalate	84-74-2									400		
p-Dichlorobenzene	106-46-7							4.8		90		
3,3'-Dichlorobenzidine	91-94-1										2.1	6.2
Dichloroethyl ether	111-44-4									58		
1,3-dichloropropene	542-75-6										4.5	14
Dichlorvos	62-73-7							0.018		10		
Diesel engine emissions	BMIS.										35	100
Diethanolamine	111-42-2										2	6
Diethyl sulfate	64-67-5										1.9	4.7
N,N-diethyl/dimethylaniline	Dialks											
3,3'-Dimethoxybenzidine	119-90-4										1.5	5
p-Dimethylaminoazobenzene	60-11-7										15	50
3,3'-Dimethylbenzidine	119-93-7										0.1	0.3
Dimethyl carbamoyl chloride	79-44-7										0.88	2.6
Dimethyl formamide	68-12-2		[I]	270 [I]	110 [I]	6	300			150		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Dimethyl phthalate	131-11-3									200		
Dimethyl sulfate	77-78-1	0.12 [P]	0.045 [P]	0.62 [P]	0.22 [P]					3.6		
N,N-dimethylaniline	121-69-7									50		
1,1-Dimethylhydrazine	57-14-7		[I]	7.4 [I]	0.93 [I]					3.7		
4,6-Dinitro-o-cresol	534-52-1									0.5		
2,4-dinitrophenol	51-28-5										3	7.5
2,4-Dinitrotoluene	121-14-2									5		
2,4/2,6-Dinitrotoluene (mixture)	25321-14-6										0.2	0.6
1,4-Dioxane	123-91-1	61 [P]	61 [P]	1200 [P]	360 [P]				3	180		
1,2-Diphenylhydrazine	122-66-7										10	30
Epichlorohydrin	106-89-8	19 [P]	19 [P]	91 [P]	38 [P]	7.6	76		1.3	28		
1,2-Epoxybutane	106-88-7										120	290
Ethyl acrylate	140-88-5	34 [P]	34 [P]	150 [P]	38 [P]	0.041	120			120		
Ethyl benzene	100-41-4									350		
Ethyl carbamate	51-79-6										500	500
Ethyl chloride	75-00-3							40		1000		
Ethylene dibromide	106-93-4									77		
Ethylene dichloride	107-06-2					200	810			20		
Ethylene glycol	107-21-1							1.3				
Ethylene imine (Aziridine)	151-56-4		[I]	8.1 [I]	0.83 [I]							
Ethylene oxide	75-21-8		[I]	81 [I]	14 [I]		90			140		
Ethylene thiourea	96-45-7										3.5	10
Ethylidene dichloride (1,1-Dichloroethane)	75-34-3									1200		
Formaldehyde	50-00-0	1.1 [P]	1.1 [P]	17 [P]	17 [P]	1.2	12	0.049	0.094	2.5		
Diethylene glycol monobutyl ether	112-34-5										100	150
Diethylene glycol monoethyl ether	111-90-0										140	410
Ethylene glycol ethyl ether	110-80-5								0.37	180		
Ethylene glycol ethyl ether acetate	111-15-9								0.14			
Ethylene glycol methyl ether	109-86-4								0.093			
Ethylene glycol methyl ether acetate	110-49-6											
Heptachlor	76-44-8									3.5		
Hexachlorobenzene	118-74-1										0.002	0.006
Hexachlorobutadiene	87-68-3					11	32					
Hexachlorocyclopentadiene	77-47-4										0.11	0.2
Hexachlorodibenzo-p-dioxin, mixture	19408-74-3										0.005	0.015
Hexachloroethane	67-72-1							58				
Hexamethylene-1,6-diisocyanate	822-06-0										0.034	0.1
Hexamethylphosphoramide	680-31-9										0.29	0.92
n-Hexane	110-54-3									390		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Hydrazine	302-01-2	0.13 [I]	0.13 [I]	17 [I]	2.1 [I]	0.66	6.6			6.6		
Hydrochloric acid	7647-01-0	2.7 [I]	2.7 [I]	33 [I]	16 [I]	4.5	30		2.1	7.5		
Hydrofluoric acid	7664-39-3	0.82 [I]	0.82 [I]	20 [I]	9.8 [I]	1.6	16	0.025	0.24	2.5		
Hydrogen sulfide	7783-06-4	0.71 [I]	0.46 [I]	38 [I]	24 [I]	0.14	42	0.28	0.042			
Hydroquinone	123-31-9									5		
Isophorone	78-59-1										28	28
Lead acetate	301-04-2										0.075	0.2
Lead chloride	7758-95-4										0.06	0.2
Lead compounds	7439-92-1									10		
Lead nitrate	10099-74-8										0.075	0.23
Lead subacetate	1335-32-6										0.06	0.2
Tetraethyl lead	78-00-2									4		
Tetramethyl lead	75-74-1									4		
Lindane (gamma-HCH)	58-89-9									5		
alpha-Hexachlorocyclohexane (a-HCH)	319-84-6										0.5	1.5
beta-Hexachlorocyclohexane (b-HCH)	319-85-7										0.5	1.5
technical Hexachlorocyclohexane (HCH)	608-73-1										0.15	0.5
Maleic anhydride	108-31-6									1		
Manganese chloride	7773-01-5										0.4	6
Manganese compounds	7439-96-5									50		
Manganese dioxide	1313-13-9										0.3	4
Manganese oxide	1317-35-7										0.25	0.75
Manganese sulfate	7785-87-7										0.5	7.5
Manganese tricarbonyl methylcyclopentadienyl	12108-13-3										0.6	0.6
Mercuric acetate	1600-27-7										0.01	0.03
Mercuric chloride	7487-94-7										0.035	0.13
Mercuric nitrate	10045-94-0										0.04	0.15
Mercuric oxide	21908-53-2										0.025	0.1
Mercury (elemental)	7439-97-6						2.1		0.0018			
Methylmercuric dicyanamide	502-39-6										0.015	0.04
Mercury compounds	HG_CMPDS									1		
Methoxyethylmercuric acetate	151-38-2										0.015	0.05
Methyl mercury	22967-92-6									0.2		
Phenylmercuric acetate	62-38-4										0.1	0.1
Methanol	67-56-1	690 [I]	350 [I]	2700 [I]	670 [I]	260	1300		28	790		
Methoxychlor	72-43-5									500		
Methyl bromide	74-83-9		[I]	820 [I]	260 [I]		190	0.19	3.9	97		
Methyl chloride	74-87-3						830	1		410		
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	1300 [I]	1300 [I]	3300 [I]	1700 [I]	1900	3800	11	68	380		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Methyl ethyl ketone	78-93-3	600 [P]	600 [P]	8000 [P]	6000 [P]				13			
Methyl hydrazine	60-34-4			3.2 [I]	0.39 [I]					7.2		
Methyl iodide	74-88-4					150	290			58		
Methyl isobutyl ketone	108-10-1										310	310
Methyl isocyanate	624-83-9		[I]	0.16 [I]	0.019 [I]	0.058	1.2			0.7		
Methyl methacrylate	80-62-6	70 [P]	70 [P]	490 [P]	200 [P]					410		
Methyl tert-butyl ether	1634-04-4							7.2				
4,4-Methylene bis(2-chloroaniline)	101-14-4										0.11	0.33
Methylene chloride	75-09-2					690	2600	2.1	14	800		
Methylene diphenyl diisocyanate	101-68-8					0.2	2			7.5		
4,4-Methylenedianiline	101-77-9										0.081	0.81
Naphthalene	91-20-3									130		
Nickel acetate	373-02-4											
Nickel carbonyl	13463-39-3		[I]	0.25 [I]						1.4		
Nickel chloride	7718-54-9										0.6	0.6
Nickel compounds	7440-02-0								0.006	1		
Nickel nitrate	13138-45-9										3	3
Nickel oxide	1313-99-1										0.75	0.75
Nickel refinery dust	NI DUST											
Nickel subsulfide	12035-72-2											
Nickel sulfate	7786-81-4										2.5	2.5
Nitrobenzene	98-95-3									100		
4-Nitrobiphenyl	92-93-3										0.25	0.75
4-Nitrophenol	100-02-7										0.75	2.5
2-Nitropropane	79-46-9									36		
Nitrosodimethylamine	62-75-9										3.5	10
N-Nitrosomorpholine	59-89-2										13	30
N-Nitroso-N-methylurea	684-93-5										0.015	0.05
Parathion	56-38-2									1		
Polychlorinated biphenyls	1336-36-3										1	3
Aroclor 1016	12674-11-2										0.2	0.6
Aroclor 1221	11104-28-2										0.2	0.6
Aroclor 1242	53469-21-9										1	3
Aroclor 1248	12672-29-6										0.2	0.6
Aroclor 1254	11097-69-1										0.5	1.5
Aroclor 1260	11096-82-5										0.3	0.75
Pentachloronitrobenzene	82-68-8										0.5	1.5
Pentachlorophenol	87-86-5									0.25		
Phenol	108-95-2	58 [I]	24 [I]	89 [I]	46 [I]	38	190		5.8	96		

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
p Phenylenediamine	106 50 3										0.1	0.3
Phosgene	75-44-5			1.2	0.16		0.81		0.004	0.81		
Phosphine	7803-51-2			2.8	0.35		0.7					
Phosphorus, white	7723-14-0							0.02				
Phthalic anhydride	85-44-9									6		
Acenaphthene	83-32-9										0.4	1.3
Anthracene	120-12-7										2	6
Benzo(a)anthracene	56-55-3										0.1	0.3
Benzo(b)fluoranthene	205-99-2										0.2	0.6
Benzo(k)fluoranthene	207-08-9										0.2	0.6
Benzo(g,h,i)perylene	191-24-2										10	30
Benzo(a)pyrene	50-32-8										0.2	0.6
Carbazole	86-74-8										0.75	2.5
beta-Chloronaphthalene	91-58-7										0.2	0.6
Chrysene	218-01-9										0.2	0.6
Dibenz(a,h)anthracene	53-70-3										10	30
Dibenzo[a,e]pyrene	192-65-4										0.035	0.1
Fluoranthene	206-44-0										0.005	0.015
Fluorene	86-73-7										7.5	25
Indeno(1,2,3-cd)pyrene	193-39-5										0.15	0.5
3-Methylcholanthrene	56-49-5										0.2	0.6
1-Methylnaphthalene	90-12-0										6	20
2-Methylnaphthalene	91-57-6										6	20
2-Naphthylamine	91-59-8										2.5	7.5
1-Nitropyrene	5522-43-0										0.1	0.3
Phenanthrene	85-01-8										0.4	1
Pyrene	129-00-0										15	15
1,3- Propane sultone	1120-71-4										0.4	1.3
beta-Propiolactone	57-57-8										1.5	1.5
Propionaldehyde	123-38-6										30	75
Propoxur	114-26-1										0.5	1.5
Propylene dichloride	78-87-5							0.23		180		
Propylene oxide	75-56-9	140	26	690	120	120	590		3.1	95		
1,2- Propyleneimine	75-55-0			20	2.0							
Quinoline	91-22-5										1.1	3.2
Quinone	106-51-4									10		
Selenium compounds	7782-49-2									0.1		
Hydrogen selenide	7783-07-5			2.4	0.86		0.66		0.005	0.33		
Potassium selenate	7790-59-2										0.5	1.5

Acute Dose-Response Values for Screening Risk Assessments (Based on OAQPS Toxicity Table 2; 6/02/2005)		AEGL-1 (1-h)	AEGL-1 (8-h)	AEGL-2 (1-h)	AEGL-2 (8-h)	ERPG-1	ERPG-2	MRL	REL	IDLH/10	TEEL-0	TEEL-1
CHEMICAL NAME	CAS NO.	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
Selenious acid	7783-00-8										0.3	1
Selenium dioxide	7446-08-4										0.25	0.75
Selenium disulfide	7488-56-4										0.35	1
Selenium oxychloride	7791-23-3										0.4	1.3
Selenium sulfide	7446-34-6										0.25	0.75
Sodium selenate	13410-01-0										0.5	1.5
Sodium selenite	10102-18-8										0.4	1.3
Styrene	100-42-5	85 P	85 P	550 P	550 P	210	1100		21	300		
Styrene oxide	96-09-3										20	61
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6										0.0006	0.0015
1,1,2,2-Tetrachloroethane	79-34-5									69		
Tetrachloroethene	127-18-4	240 I	240 I	1600 I	550 I	680	1400	1.4	20	100		
Titanium tetrachloride	7550-45-0	0.54 P	0.54 P	7.8 P	0.73 P	5	20					
Toluene	108-88-3	750 I	750 I	1900 I	1900 I	190	1100	3.8	37	190		
2,4 Toluene diamine	95-80-7										4	13
2,4/2,6-Toluene diisocyanate mixture (TDI)	26471-62-5										1.8	5.3
2,4 Toluene diisocyanate	584-84-9	0.14 I	0.071 I	0.59 I	0.15 I	0.071	1.1			1.8		
o-Toluidine	95-53-4									22		
Toxaphene	8001-35-2										0.5	1
1,2,4-Trichlorobenzene	120-82-1										37	37
1,1,2-Trichloroethane	79-00-5									55		
Trichloroethylene	79-01-6	700 P	410 P	2400 P	1300 P	540	2700	11				
2,4,5-Trichlorophenol	95-95-4										10	30
2,4,6-Trichlorophenol	88-06-2										10	30
Triethylamine	121-44-8								2.8			
Trifluralin	1582-09-8										0.025	0.075
2,2,4-trimethylpentane	540-84-1										350	350
Uranium compounds	7440-61-1									1		
Uranium hexafluoride	7783-81-5	3.6 I	I	9.6 I	1.2 I	5	15					
Uranium, soluble salts	URANSOLS										0.05	0.6
Uranyl acetate dihydrate	541-09-3										0.075	1
Uranyl nitrate hexahydrate	13520-83-7										0.1	1.3
Vinyl acetate	108-05-4					18	260					
Vinyl bromide	593-60-2										22	66
Vinyl chloride	75-01-4	640 P	180 P	3100 P	2100 P	130	13000	1.3	180			
Vinylidene chloride	75-35-4										20	79
m-Xylene	108-38-3									390		
o-Xylene	95-47-6									390		
p-Xylene	106-42-3									390		
Xylenes (mixed)	1330-20-7	560 I	560 I	1700 I	1700 I			4.3	22	390		

Appendix D

Risk/Hazard Calculation Tables

Table D-1: Risk/Hazard Summary for Chemicals of Potential Concern (COPC) – East Thomas site (X=threshold exceedence)

AT Type	ANALYTE	IUR (cancer) (1/(µg/m^3))	RfC (non-cancer) (µg/m^3)	Acute Benchmark Conc (µg/m^3)	% Detects	95% UCL Conc (µg/m^3)	Acute Max Conc (µg/m^3)	Chronic Cancer Risk	Exceed?	Chronic Non-cancer Hazard	Exceed?	HQacute	Exceed?
VOC	1,1,1-Trichloroethane		1	11,000	100%	0.1611	0.2728			0.000161		0.00	
VOC	1,2,4-Trichlorobenzene		0.2	37,000	23%	0.0859	0.2226			0.000429		0.00	
VOC	1,2,4-Trimethylbenzene				100%	1.3681	3.5393						
VOC	1,3,5-Trimethylbenzene				100%	0.3573	0.8848						
Carbonyl	1,3-Butadiene	0.00003	0.002	6,000,000	97%	0.2846	0.6416	8.54E-06	X	0.142	X	0.00	
SVOC	Acenaphthene				100%	0.0182	0.0451						
SVOC	Acenaphthylene				100%	0.0093	0.0410						
Carbonyl	Acetaldehyde	0.0000022	0.009	490,000	100%	2.1019	4.2879	4.62E-06	X	0.234	X	0.00	
Carbonyl	Acetone				100%	2.4569	6.3900						
VOC	Acetonitrile		0.06	140,000	29%	33.3629	250.1616			0.556	X	0.00	
VOC	Acetylene				100%	11.8263	42.8142						
VOC	Acrolein		0.00002	6.9	55%	0.7988	2.6138			39.9	X	0.38	
SVOC	Anthracene				87%	0.0131	0.0872						
Metals	Antimony				100%	0.0019	0.0040						
Metals	Arsenic	0.0043	0.00003	0.19	100%	0.0017	0.0033	7.44E-06	X	0.0577		0.02	
Carbonyl	Benzaldehyde				100%	0.2289	0.4123						
VOC	Benzene	0.0000078	0.03	29	100%	3.3378	8.5000	2.60E-05	X	0.111	X	0.29	
SVOC	Benzo (a) anthracene	0.00011		300	100%	0.0012	0.0074	1.29E-07				0.00	
SVOC	Benzo (a) pyrene	0.0011		600	84%	0.0007	0.0035	7.49E-07				0.00	
SVOC	Benzo (b) fluoranthene	0.00011		600	87%	0.0010	0.0061	1.14E-07				0.00	
SVOC	Benzo (e) pyrene				84%	0.0008	0.0048						
SVOC	Benzo (g,h,i) perylene			30,000	87%	0.0006	0.0027					0.00	
SVOC	Benzo (k) fluoranthene	0.00011		600	94%	0.0010	0.0058	1.06E-07				0.00	
Metals	Beryllium	0.0024	0.00002	25	100%	0.0000	0.0001	8.96E-08		0.00187		0.00	
VOC	Bromomethane				87%	0.0482	0.0777						
Carbonyl	Butyraldehyde				100%	0.3545	0.6400						
Metals	Cadmium	0.0018	0.00002	900	100%	0.0005	0.0012	9.41E-07		0.0261		0.00	
VOC	Carbon Tetrachloride	0.000015	0.019	1,900	100%	0.6909	1.0695	1.04E-05	X	0.0364		0.00	
VOC	Chloroethane		1	690,000	58%	0.0273	0.0528						
VOC	Chloroform				58%	0.1230	0.3906			0.00125			
VOC	Chloromethane		0.098	150	100%	1.3326	1.8172					0.00	
Metals	Chromium				100%	0.0052	0.0085						
SVOC	Chrysene				100%	0.0019	0.0113	2.04E-08					
Metals	Cobalt	0.000011		600	100%	0.0003	0.0006			0.00297		0.00	
SVOC	Coronene		0.0001	2,000	68%	0.0002	0.0006					0.00	
Carbonyl	Crotonaldehyde				100%	1.0631	3.4400						

SVOC	Dibenz (a,h) anthracene				29%	0.0001	0.0008	1.49E-07					
VOC	Dichlorodifluoromethane	0.0012		30,000	100%	3.1278	4.0551					0.00	
VOC	Dichloromethane				97%	0.3846	1.0768						
VOC	Dichlorotetrafluoroethane				97%	0.1348	0.1398						
VOC	Ethylbenzene				100%	1.3663	3.5173			0.00137			
SVOC	Fluoranthene		1		100%	0.0068	0.0202						
SVOC	Fluorene				100%	0.0137	0.0333						
Carbonyl	Formaldehyde				100%	5.2811	11.6313	2.90E-08					
VOC	Hexachloro-1,3-butadiene	5.5E-09		49	32%	0.1138	0.2133					0.24	
Carbonyl	Hexaldehyde				100%	0.1852	0.4301						
Cr6	Hexavalent Chromium				84%	0.0000	0.0001	4.95E-07					
SVOC	Indeno(1,2,3-cd)pyrene	0.012		1,500	81%	0.0006	0.0034	6.76E-08				0.00	
Carbonyl	Isovaleraldehyde	0.00011		500	74%	0.0532	0.1127					0.00	
Metals	Lead				100%	0.0172	0.0413			0.0115			
VOC	m,p-Xylene		0.0015	10,000	100%	3.6692	9.1623					0.00	
Metals	Manganese				100%	0.0621	0.1420			1.24	X		
VOC	m-Dichlorobenzene		0.00005	50,000	10%	0.0208	0.0601					0.00	
Metals	Mercury		0.0003	1.8	65%	0.0002	0.0010			0.000728		0.00	
VOC	Methyl Ethyl Ketone				65%	1.5443	5.7216						
VOC	Methyl Isobutyl Ketone		3	310,000	52%	0.2586	0.9422			0.0000862		0.00	
VOC	Methyl tert-Butyl Ether	0.00000026	3	7,200	26%	0.8464	3.7135	2.20E-07		0.000282		0.00	
SVOC	Naphthalene	0.000034	0.003	130,000	100%	0.3415	1.2800	1.16E-05	X	0.114	X	0.00	
Metals	Nickel		0.00009	6	100%	0.0022	0.0050			0.0245		0.00	
VOC	n-Octane				90%	1.3343	5.6531						
VOC	o-Xylene				100%	1.5939	4.1686						
VOC	p-Dichlorobenzene	0.000011	0.8	12,000	94%	0.3128	0.8417	3.44E-06	X	0.000391		0.00	
SVOC	Perylene				35%	0.0002	0.0015						
SVOC	Phenanthrene				100%	0.0283	0.0647						
Carbonyl	Propionaldehyde				100%	0.4022	0.8694						
VOC	Propylene				100%	2.0210	4.3027						
SVOC	Pyrene				100%	0.0045	0.0136						
Metals	Selenium		0.02	100	100%	0.0008	0.0015			0.0000416		0.00	
VOC	Styrene		1	21,000	97%	0.5389	1.6187			0.000539		0.00	
VOC	Tetrachloroethylene	0.0000059	0.27	1,400	81%	0.4666	1.2887	2.75E-06	X	0.00173		0.00	
Carbonyl	Tolualdehydes				100%	0.3473	0.8010						
VOC	Toluene		5	3,800	100%	6.0991	16.5437			0.00122		0.00	
VOC	Trichloroethylene				52%	0.1374	0.3762						
VOC	Trichlorofluoromethane				100%	1.7171	2.6968						
VOC	Trichlorotrifluoroethane				100%	1.8121	2.3758						
Carbonyl	Valeraldehyde				100%	0.2013	0.4403						

Table D-2: Risk/Hazard Summary for Chemicals of Potential Concern (COPC) – North Birmingham site (X=threshold exceedence)

AT Type	ANALYTE	IUR (cancer) (1/(µg/m^3))	RfC (non-cancer) (µg/m^3)	Acute Benchmark Conc (µg/m^3)	% Detects	95% UCL Conc (µg/m^3)	Acute Max Conc (µg/m^3)	Chronic Cancer Risk	Exceed ?	Chronic Non-cancer Hazard	Exceed ?	HQacute	Exceed ?
VOC	1,1,1-Trichloroethane		1	11,000	100%	0.1350	0.2183			0.000135		0.00	
VOC	1,2,4-Trichlorobenzene		0.2	37,000	16%	0.0789	0.2226			0.000394		0.00	
VOC	1,2,4-Trimethylbenzene				100%	1.0421	2.4579						
VOC	1,3,5-Trimethylbenzene				100%	0.3655	0.8357						
Carbonyl	1,3-Butadiene	0.00003	0.002	6,000,000	81%	0.1819	0.5531	5.46E-06	X	0.0909		0.00	
SVOC	Acenaphthene				100%	0.0222	0.0829						
SVOC	Acenaphthylene				97%	0.0240	0.1240						
Carbonyl	Acetaldehyde	0.0000022	0.009	490,000	94%	1.6832	3.1889	3.70E-06	X	0.187	X	0.00	
Carbonyl	Acetone				94%	2.5313	6.3662						
VOC	Acetonitrile		0.06	140,000	65%	22.5157	72.3622			0.375	X	0.00	
VOC	Acetylene				100%	4.5989	23.7502						
VOC	Acrolein		0.00002	6.9	71%	0.8241	2.1323			41.2	X	0.31	
SVOC	Anthracene				87%	0.0114	0.0468						
Metals	Antimony				100%	0.0016	0.0045						
Metals	Arsenic	0.0043	0.00003	0.19	100%	0.0024	0.0046	1.03E-05	X	0.0798		0.02	
Carbonyl	Benzaldehyde				94%	0.1918	0.4470						
VOC	Benzene	0.0000078	0.03	29	100%	4.2377	12.8459	3.31E-05	X	0.141	X	0.44	
SVOC	Benzo (a) anthracene	0.00011		300	97%	0.0052	0.0193	5.74E-07				0.00	
SVOC	Benzo (a) pyrene	0.0011		600	74%	0.0031	0.0136	3.37E-06	X			0.00	
SVOC	Benzo (b) fluoranthene	0.00011		600	90%	0.0038	0.0156	4.23E-07				0.00	
SVOC	Benzo (e) pyrene				84%	0.0029	0.0124						
SVOC	Benzo (g,h,i) perylene			30,000	77%	0.0018	0.0067					0.00	
SVOC	Benzo (k) fluoranthene	0.00011		600	94%	0.0035	0.0159	3.89E-07				0.00	
Metals	Beryllium	0.0024	0.00002	25	100%	0.0000	0.0001	7.80E-08		0.00163		0.00	
VOC	Bromomethane				90%	0.0535	0.1165						
Carbonyl	Butyraldehyde				94%	0.3915	1.3685						
Metals	Cadmium	0.0018	0.00002	900	100%	0.0010	0.0030	1.75E-06	X	0.0487		0.00	
VOC	Carbon Tetrachloride	0.000015	0.019	1,900	100%	0.6777	1.0066	1.02E-05	X	0.0357		0.00	
VOC	Chlorobenzene		1	690,000	19%	0.0653	0.3223			0.0000653		0.00	
VOC	Chloroethane				84%	0.1383	0.3431						
VOC	Chloroform		0.098	150	48%	0.0947	0.2441			0.000967		0.00	
VOC	Chloromethane				100%	1.3861	2.1476						
Metals	Chromium				100%	0.0040	0.0081						
SVOC	Chrysene	0.000011		600	100%	0.0065	0.0245	7.12E-08				0.00	
Metals	Cobalt		0.0001	2,000	100%	0.0002	0.0005			0.00211		0.00	
SVOC	Coronene				65%	0.0005	0.0019						
Carbonyl	Crotonaldehyde				94%	0.9614	3.2680						
SVOC	Dibenz (a,h) anthracene	0.0012		30,000	42%	0.0007	0.0034	8.41E-07				0.00	
VOC	Dichlorodifluoromethane				100%	3.1838	4.6485						

VOC	Dichloromethane				100%	0.3152	0.5210						
VOC	Dichlorotetrafluoroethane				97%	0.1312	0.1398						
VOC	Ethylbenzene		1		100%	1.5186	3.2567			0.00152			
SVOC	Fluoranthene				100%	0.0171	0.0623						
SVOC	Fluorene				100%	0.0241	0.0839						
Carbonyl	Formaldehyde	5.5E-09		49	94%	4.3259	10.1451	2.38E-08				0.21	
VOC	Hexachloro-1,3-butadiene				19%	0.1051	0.2133						
Carbonyl	Hexaldehyde				94%	0.1577	0.3441						
Cr6	Hexavalent Chromium	0.012		1,500	74%	0.0000	0.0002	5.91E-07				0.00	
SVOC	Indeno(1,2,3-cd)pyrene	0.00011		500	71%	0.0024	0.0107	2.67E-07				0.00	
Carbonyl	Isovaleraldehyde				55%	0.0410	0.0951						
Metals	Lead		0.0015	10,000	100%	0.0254	0.0703			0.017		0.00	
VOC	m,p-Xylene				100%	5.0739	12.4191						
Metals	Manganese		0.00005	50,000	100%	0.0645	0.1665			1.29	X	0.00	
Metals	Mercury		0.0003	1.8	61%	0.0001	0.0006			0.00042		0.00	
VOC	Methyl Ethyl Ketone				71%	2.4392	6.6654						
VOC	Methyl Isobutyl Ketone		3	310,000	61%	0.3132	0.8603			0.000104		0.00	
VOC	Methyl tert-Butyl Ether	0.00000026	3	7,200	16%	0.4612	2.2353	1.20E-07		0.000154		0.00	
SVOC	Naphthalene	0.000034	0.003	130,000	100%	0.3606	1.0500	1.23E-05	X	.12	X	0.00	
Metals	Nickel		0.00009	6	100%	0.0018	0.0046			0.0197		0.00	
VOC	n-Octane				94%	6.7973	19.0617						
VOC	o-Xylene				100%	1.8593	4.6029						
VOC	p-Dichlorobenzene	0.000011	0.8	12,000	100%	0.3508	0.7215	3.86E-06	X	0.000439		0.00	
SVOC	Perylene				45%	0.0009	0.0041						
SVOC	Phenanthrene				100%	0.0554	0.1860						
Carbonyl	Propionaldehyde				94%	0.3203	0.6651						
VOC	Propylene				100%	1.6107	4.5264						
SVOC	Pyrene				100%	0.0111	0.0418						
Metals	Selenium		0.02	100	100%	0.0011	0.0021			0.0000545		0.00	
VOC	Styrene		1	21,000	100%	0.5466	1.4483			0.000547		0.00	
VOC	Tetrachloroethylene	0.0000059	0.27	1,400	71%	0.3013	1.0852	1.78E-06	X	0.00112		0.00	
Carbonyl	Tolualdehydes				90%	0.2467	0.6831						
VOC	Toluene		5	3,800	100%	5.4225	13.3405			0.00108		0.00	
VOC	Trichloroethylene				45%	0.1515	0.6449						
VOC	Trichlorofluoromethane				100%	1.7541	2.8654						
VOC	Trichlorotrifluoroethane				100%	1.9092	3.9085						
Carbonyl	Valeraldehyde				94%	0.1417	0.2677						

Table D-3: Risk/Hazard Summary for Chemicals of Potential Concern (COPC) – Providence site (X=threshold exceedence)

AT Type	ANALYTE	IUR (cancer) (1/(µg/m^3))	RfC (non-cancer) (µg/m^3)	Acute Benchmark Conc (µg/m^3)	% Detects	95% UCL Conc (µg/m^3)	Acute Max Conc (µg/m^3)	Chronic Cancer Risk	Exceed?	Chronic Non-cancer Hazard	Exceed?	HQacute	Exceed?
VOC	1,1,1-Trichloroethane		1	11,000	100%	0.1301	0.1637			0.00013		0.00	
VOC	1,2,4-Trichlorobenzene		0.2	37,000	16%	0.0757	0.2226			0.000379		0.00	
VOC	1,2,4-Trimethylbenzene				94%	0.3103	1.0323						
VOC	1,3,5-Trimethylbenzene				74%	0.0945	0.2949						
Carbonyl	1,3-Butadiene	0.00003	0.002	6,000,000	29%	0.0366	0.2433	1.10E-06	X	0.0183		0.00	
SVOC	Acenaphthene				100%	0.0013	0.0045						
SVOC	Acenaphthylene				55%	0.0002	0.0014						
Carbonyl	Acetaldehyde	0.0000022	0.009	490,000	100%	2.3797	14.0528	5.24E-06	X	0.264	X	0.00	
Carbonyl	Acetone				100%	3.0293	16.0581						
VOC	Acetonitrile		0.06	140,000	29%	5.5904	25.1840			0.0932		0.00	
VOC	Acetylene				100%	0.4099	0.8414						
VOC	Acrolein		0.00002	6.9	32%	0.4994	2.7514			25	X	0.40	
SVOC	Anthracene				29%	0.0012	0.0057						
Metals	Antimony				100%	0.0006	0.0019						
Metals	Arsenic	0.0043	0.00003	0.19	100%	0.0009	0.0020	3.86E-06	X	0.0299		0.01	
Carbonyl	Benzaldehyde				100%	0.2284	1.3846						
VOC	Benzene	0.0000078	0.03	29	100%	0.6241	1.6297	4.87E-06	X	0.0208		0.06	
SVOC	Benzo (a) anthracene	0.00011		300	29%	0.0000	0.0002	4.02E-09				0.00	
SVOC	Benzo (a) pyrene	0.0011		600	29%	0.0001	0.0003	5.92E-08				0.00	
SVOC	Benzo (b) fluoranthene	0.00011		600	39%	0.0000	0.0002	4.79E-09				0.00	
SVOC	Benzo (e) pyrene				23%	0.0000	0.0001						
SVOC	Benzo (g,h,i) perylene			30,000	23%	0.0000	0.0001					0.00	
SVOC	Benzo (k) fluoranthene	0.00011		600	58%	0.0001	0.0002	8.25E-09				0.00	
Metals	Beryllium	0.0024	0.00002	25	100%	0.0000	0.0000	1.34E-08		0.000279		0.00	
VOC	Bromomethane				81%	0.0475	0.1165						
Carbonyl	Butyraldehyde				100%	0.3754	2.3417						
Metals	Cadmium	0.0018	0.00002	900	100%	0.0001	0.0002	2.16E-07		0.00599		0.00	
VOC	Carbon Tetrachloride	0.000015	0.019	1,900	100%	0.6623	1.0066	9.94E-06	X	0.0349		0.00	
VOC	Chloroethane		1	690,000	35%	0.1415	0.5278						
VOC	Chloroform				32%	0.0409	0.0977			0.000418			
VOC	Chloromethane		0.098	150	100%	1.3026	2.2302					0.00	
Metals	Chromium				100%	0.0026	0.0043						
SVOC	Chrysene				81%	0.0001	0.0004	1.05E-09					
Metals	Cobalt	0.000011		600	100%	0.0001	0.0002			0.00079		0.00	
SVOC	Coronene		0.0001	2,000	10%	0.0000	0.0001					0.00	
Carbonyl	Crotonaldehyde				97%	1.7116	7.9407						
VOC	Dichlorodifluoromethane				100%	2.8851	4.3023						
VOC	Dichloromethane	0.0012		30,000	90%	0.2258	0.8684						

VOC	Dichlorotetrafluoroethane				97%	0.1294	0.1398						
VOC	Ethylbenzene				100%	0.2353	0.8250			0.000235			
SVOC	Fluoranthene				100%	0.0010	0.0033						
SVOC	Fluorene		1		100%	0.0018	0.0048						
Carbonyl	Formaldehyde				100%	6.2910	33.8989	3.46E-08					
VOC	Hexachloro-1,3-butadiene				16%	0.0992	0.2133						
Carbonyl	Hexaldehyde	5.5E-09		49	100%	0.2752	1.8434					0.69	
Cr6	Hexavalent Chromium				65%	0.0000	0.0000	1.68E-07					
SVOC	Indeno(1,2,3-cd)pyrene				26%	0.0000	0.0002	3.92E-09					
Carbonyl	Isovaleraldehyde	0.012		1,500	26%	0.0463	0.3241					0.00	
Metals	Lead	0.00011		500	100%	0.0040	0.0106			0.00265		0.00	
VOC	m,p-Xylene				100%	0.5993	2.2580						
Metals	Manganese		0.0015	10,000	100%	0.0076	0.0215			0.152	X	0.00	
VOC	m-Dichlorobenzene				10%	0.0261	0.1202						
Metals	Mercury		0.00005	50,000	68%	0.0001	0.0002			0.000245		0.00	
VOC	Methyl Ethyl Ketone		0.0003	1.8	65%	1.6154	6.5769					0.00	
VOC	Methyl Isobutyl Ketone				52%	0.2114	1.1470			0.0000705			
SVOC	Naphthalene		3	310,000	100%	0.0196	0.0453	6.66E-07		0.00653		0.00	
Metals	Nickel	0.00000026	3	7,200	100%	0.0010	0.0020			0.0116			
VOC	n-Octane	0.000034	0.003	130,000	55%	0.1466	0.4672					0.00	
VOC	o-Xylene		0.00009	6	100%	0.3633	1.9106					0.00	
VOC	p-Dichlorobenzene				87%	0.2882	1.0822	3.17E-06	X	0.00036			
SVOC	Phenanthrene				100%	0.0028	0.0094						
Carbonyl	Propionaldehyde	0.000011	0.8	12,000	100%	0.3854	2.1569					0.00	
VOC	Propylene				100%	0.2475	0.4991						
SVOC	Pyrene				100%	0.0005	0.0017						
Metals	Selenium				100%	0.0008	0.0018			0.0000412			
VOC	Styrene				81%	0.2750	1.4909			0.000275			
VOC	Tetrachloroethylene				23%	0.0537	0.1356	3.17E-07		0.000199			
Carbonyl	Tolualdehydes		0.02	100	94%	0.3515	1.9509					0.00	
VOC	Toluene		1	21,000	100%	1.8042	5.5397			0.000361		0.00	
VOC	Trichloroethylene	0.0000059	0.27	1,400	19%	0.0370	0.1075					0.00	
VOC	Trichlorofluoromethane				100%	1.5491	2.4721						
VOC	Trichlorotrifluoroethane		5	3,800	100%	1.2679	1.9160					0.00	
Carbonyl	Valeraldehyde				100%	0.1949	1.1273						

Table D-4: Risk/Hazard Summary for Chemicals of Potential Concern (COPC) – Shuttlesworth site (X=threshold exceedence)

AT Type	ANALYTE	IUR (cancer) (1/(µg/m^3))	RfC (non-cancer) (µg/m^3)	Acute Benchmark Conc (µg/m^3)	% Detects	95% UCL Conc (µg/m^3)	Acute Max Conc (µg/m^3)	Chronic Cancer Risk	Exceed?	Chronic Non-cancer Hazard	Exceed?	HQacute	Exceed?
VOC	1,1,1-Trichloroethane		1	11,000	100%	0.1414	0.2183			0.000141		0.00	
VOC	1,2,4-Trichlorobenzene		0.2	37,000	10%	0.0713	0.2226			0.000357		0.00	
VOC	1,2,4-Trimethylbenzene				100%	1.0468	2.7528						
VOC	1,3,5-Trimethylbenzene				100%	0.3045	0.8848						
Carbonyl	1,3-Butadiene	0.00003	0.002	6,000,000	90%	0.2451	0.5531	7.35E-06	X	0.123	X	0.00	
SVOC	Acenaphthene				97%	0.0184	0.0563						
SVOC	Acenaphthylene				94%	0.0145	0.0336						
Carbonyl	Acetaldehyde	0.0000022	0.009	490,000	100%	1.6162	2.8106	3.56E-06	X	0.18	X	0.00	
Carbonyl	Acetone				100%	2.4853	6.6988						
VOC	Acetonitrile		0.06	140,000	87%	58.2217	196.4356			0.97	X	0.00	
VOC	Acetylene				100%	2.1467	5.3891						
VOC	Acrolein		0.00002	6.9	61%	1.0617	3.3476			53.1	X	0.49	
SVOC	Anthracene				94%	0.0110	0.0499						
Metals	Antimony				100%	0.0016	0.0038						
Metals	Arsenic	0.0043	0.00003	0.19	100%	0.0081	0.0343	3.49E-05	X	0.271	X	0.18	
Carbonyl	Benzaldehyde				100%	0.1695	0.3212						
VOC	Benzene	0.0000078	0.03	29	100%	7.9900	31.5396	6.23E-05	X	0.266	X	1.09	X
SVOC	Benzo (a) anthracene	0.00011		300	97%	0.0046	0.0219	5.01E-07				0.00	
SVOC	Benzo (a) pyrene	0.0011		600	84%	0.0030	0.0153	3.29E-06	X			0.00	
SVOC	Benzo (b) fluoranthene	0.00011		600	90%	0.0046	0.0221	5.02E-07				0.00	
SVOC	Benzo (e) pyrene				87%	0.0031	0.0137						
SVOC	Benzo (g,h,i) perylene			30,000	84%	0.0020	0.0092					0.00	
SVOC	Benzo (k) fluoranthene	0.00011		600	94%	0.0036	0.0160	3.97E-07				0.00	
Metals	Beryllium	0.0024	0.00002	25	100%	0.0004	0.0014	1.02E-06	X	0.0213		0.00	
VOC	Bromomethane				81%	0.0543	0.0777						
Carbonyl	Butyraldehyde				100%	0.3357	0.6872						
Metals	Cadmium	0.0018	0.00002	900	100%	0.0004	0.0015	7.93E-07		0.022		0.00	
VOC	Carbon Tetrachloride	0.000015	0.019	1,900	100%	0.6544	0.9437	9.82E-06	X	0.0344		0.00	
VOC	Chlorobenzene		1	690,000	32%	0.1022	0.3223			0.000102		0.00	
VOC	Chloroethane				84%	0.3453	0.7653						
VOC	Chloroform		0.098	150	48%	0.1221	0.2930			0.00125		0.00	
VOC	Chloromethane				100%	1.3693	1.7966						
Metals	Chromium				100%	0.0056	0.0133						
SVOC	Chrysene	0.000011		600	97%	0.0061	0.0250	6.68E-08				0.00	
Metals	Cobalt		0.0001	2,000	100%	0.0008	0.0031			0.00806		0.00	
SVOC	Coronene				71%	0.0005	0.0019						

Carbonyl	Crotonaldehyde				100%	0.9090	2.6603						
SVOC	Dibenz (a,h) anthracene	0.0012		30,000	65%	0.0006	0.0025	7.35E-07				0.00	
VOC	Dichlorodifluoromethane				100%	3.0535	4.3023						
VOC	Dichloromethane				97%	0.3475	0.6600						
VOC	Dichlorotetrafluoroethane				97%	0.1448	0.3460						
VOC	Ethylbenzene		1		100%	1.1233	2.9962			0.00112			
SVOC	Fluoranthene				97%	0.0203	0.0731						
SVOC	Fluorene				97%	0.0216	0.0512						
Carbonyl	Formaldehyde	5.5E-09		49	100%	4.1074	11.0908	2.26E-08				0.23	
VOC	Hexachloro-1,3-butadiene				19%	0.0772	0.2133						
Carbonyl	Hexaldehyde				100%	0.1634	0.3113						
Cr6	Hexavalent Chromium	0.012		1,500	74%	0.0001	0.0002	6.63E-07				0.00	
SVOC	Indeno(1,2,3-cd)pyrene	0.00011		500	77%	0.0028	0.0131	3.03E-07				0.00	
Carbonyl	Isovaleraldehyde				71%	0.0447	0.1092						
Metals	Lead		0.0015	10,000	100%	0.0362	0.1150			0.0242		0.00	
VOC	m,p-Xylene				100%	2.9583	8.1636						
Metals	Manganese		0.00005	50,000	100%	0.1894	0.6140			3.79	X	0.00	
Metals	Mercury		0.0003	1.8	74%	0.0001	0.0004			0.000387		0.00	
VOC	Methyl Ethyl Ketone				77%	2.5928	6.8128						
VOC	Methyl Isobutyl Ketone		3	310,000	74%	0.3750	0.9422			0.000125		0.00	
VOC	Methyl tert-Butyl Ether	0.00000026	3	7,200	19%	0.5450	2.1992	1.42E-07		0.000182		0.00	
SVOC	Naphthalene	0.000034	0.003	130,000	97%	0.5707	1.2200	1.94E-05	X	.19	X	0.00	
Metals	Nickel		0.00009	6	100%	0.0023	0.0066			0.0257		0.00	
VOC	n-Octane				94%	0.8836	2.8966						
VOC	o-Xylene				100%	1.2648	3.6910						
VOC	p-Dichlorobenzene	0.000011	0.8	12,000	100%	0.4814	1.6233	5.30E-06	X	0.000602		0.00	
SVOC	Perylene				61%	0.0008	0.0040						
SVOC	Phenanthrene				97%	0.0518	0.1570						
Carbonyl	Propionaldehyde				100%	0.2879	0.4775						
VOC	Propylene				100%	2.1992	6.4196						
SVOC	Pyrene				97%	0.0125	0.0464						
Metals	Selenium		0.02	100	100%	0.0028	0.0114			0.000138		0.00	
VOC	Styrene		1	21,000	97%	0.9724	2.8540			0.000972		0.00	
VOC	Tetrachloroethylene	0.0000059	0.27	1,400	71%	0.3006	0.8817	1.77E-06	X	0.00111		0.00	
Carbonyl	Tolualdehydes				100%	0.2302	0.7568						
VOC	Toluene		5	3,800	100%	5.4393	11.7954			0.00109		0.00	
VOC	Trichloroethylene				39%	0.0835	0.2150						
VOC	Trichlorofluoromethane				100%	1.7165	3.4834						
VOC	Trichlorotrifluoroethane				100%	1.8766	4.2917						
Carbonyl	Valeraldehyde				100%	0.1439	0.2466						

Appendix E

Links

EPA Toxic Air Pollutants Homepage:
http://www.epa.gov/air/toxicair/index.html

EPA Risk Assessment and Modeling – Air Toxics Risk Assessment Reference Library:
http://www.epa.gov/ttn/fera/risk_atra_main.html

EPA Air Pollution and Health Risk Publication, March 1991:
http://www.epa.gov/air/oaqps/air_risc/3_90_022.html

EPA Evaluating Exposures to Toxic Air Pollutants: A Citizen's Guide, March 1991:
http://www.epa.gov/air/oaqps/air_risc/3_90_023.html

EPA Risk Assessment for Toxic Air Pollutants: A Citizen's Guide, March 1991:
http://www.epa.gov/air/oaqps/air_risc/3_90_024.html

EPA 1996 National-Scale Air Toxics Assessment:
http://www.epa.gov/ttn/atw/nata/

EPA 1999 National-Scale Air Toxics Assessment:
http://www.epa.gov/ttn/atw/nata1999/