Indiana Harbor and Canal Ambient Air Monitoring Program: Construction Phase Annual Report 2007

U.S. Army Corps of Engineers
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Executive Summary

Ambient air monitoring data, including polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), volatile organic compounds (VOC), and metals, are currently being collected as part of the Indiana Harbor and Canal Confined Disposal Facility construction project. The construction project is located on the former Energy Cooperative, Inc. refinery site. Two monitoring locations are used: the south site (adjacent to the Indiana Harbor Canal just south of the ECI property), and the East Chicago High School.

This report presents as summary of the mean concentrations for both monitoring sites, for a number of compounds. Data are analyzed based on the location of the monitoring station, the season (corresponding to the average temperature), and whether construction activities are occurring on site.

Based on a statistical analysis of the data, there is no indication that construction activities at the ECI site are causing degradation of the ambient air at either the south monitoring site or at the high school. It is recommended that an adequate level of monitoring continue during construction activities at the ECI site, and that the data be re-evaluated on an annual basis.

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Introduction

In November 2001, the U.S. Army Corps of Engineers (USACE) implemented an ambient air monitoring program at the property known as the Energy Cooperative, Inc. (ECI) site, located in East Chicago, Indiana. The ECI site is the location of a confined disposal facility (CDF), which is currently being constructed to hold sediment dredged from the Indiana Harbor and Canal. In May 2004, the construction phase of the ambient air monitoring program was implemented. The ambient air monitoring program results, including the construction phase monitoring through 2006 are presented in four reports:

1. Indiana Harbor and Canal Air Monitoring: Background Phase Ambient Summary & Construction Phase Ambient Air Monitoring Program, USACE Chicago District, November 2003.

2. Indiana Harbor and Canal Ambient Air Monitoring Program: Construction Phase Annual Report 2004, USACE Chicago District, June 2005.

3. Indiana Harbor and Canal Ambient Air Monitoring Program: Construction Phase Annual Report 2005, USACE Chicago District, June 2006.

4. Indiana Harbor and Canal Ambient Air Monitoring Program: Construction Phase Annual Report 2006, USACE Chicago District, July 2007.

These reports include detailed information on the selection of the monitoring sites, the handling of non-detectable data, an evaluation of meteorological data, and statistical analyses of the previous air monitoring data. Because the monitoring locations, physical conditions, and data handling have not changed, that information will not be repeated in this report. Interested readers are referred to the above referenced documents for details.

The purpose of this report is to present an updated statistical analysis of the ambient air monitoring data. Air monitoring data will be compared by location, season, and parameter. The entire ambient air monitoring dataset is used for this analysis, including data from 2001 through 2007.

Air Monitoring Data

<u>Locations and Parameters</u>

The air monitoring data used for the statistical analysis were collected at two locations, referred to as the "south" site and as the "high school" site. These two locations are shown in Figure 1. The south site is located adjacent to the Lake George Branch of the Indiana Harbor Canal. The high school (HS) site is located approximately 1700 feet south of the south sampler, on the East Chicago High School property. The rational for these monitoring locations is discussed in previous reports.

The air sampling stations operate in tandem, on a 6-day rotational schedule. Each sample is a 24 hour sample. Parameters measured and used in the statistical analysis include the analytes listed in Table 1. The parameters fall into several chemical groups: polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and metals.

Figure 1: Location of Ambient Air Sampling Stations and the ECI site in East Chicago, Indiana.

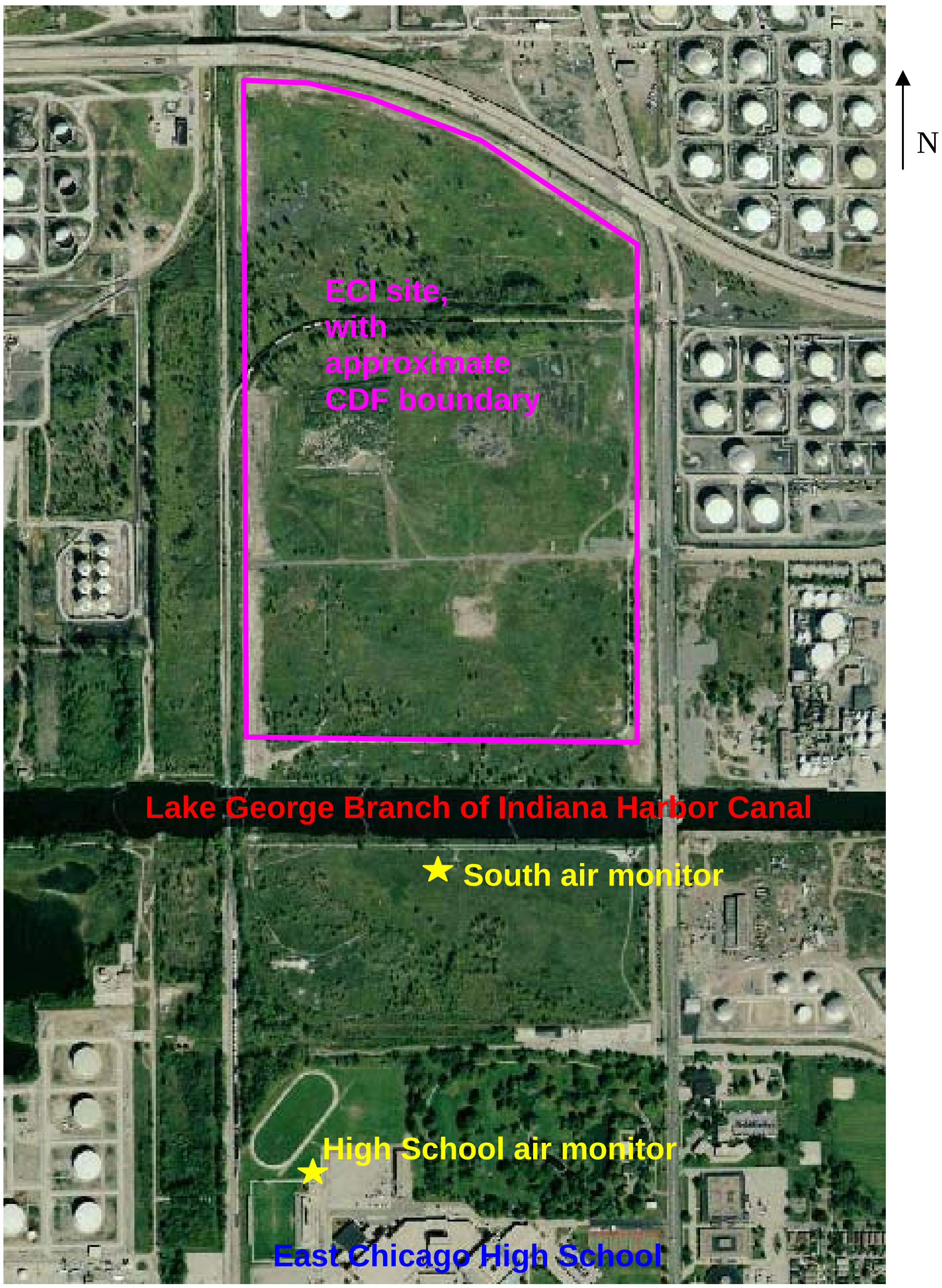

Table 1: Air Monitoring Analytes

PAHs Acenaphthene Acenaphthylene Fluoranthene Fluorene Naphthalene Phenanthrene Pyrene	**Metals** Aluminum Arsenic Barium Chromium Cobalt Copper Iron Lead Manganese Nickel Selenium Zinc
PCBs Congener 8 Congener 15 Congener 18 Congener 28 Congener 31	
VOCs Benzene Toluene	Total Suspended Particulates (TSP)

The PAH and PCB samples are obtained using a high-volume vacuum pump air sampler, with a glass fiber filter, a polyurethane foam (PUF) and adsorbent resin (XAD-2) media. Total suspended particulates and metals are collected using a separate high-volume vacuum pump air sampler, with a glass fiber filter medium. VOCs are collected using specially treated stainless steel canisters, which utilize a bellows-type pump to draw in air.

Data Organization

For analyzing the ambient air monitoring data, the data are subdivided into two main groups: Active and Idle. Active refers to data collected while construction activities were occurring on the ECI site. Various types of construction have occurred and will continue during the next few years, including excavations, obstruction removal, grading, embankment (dike) construction, cut-off wall construction, well installation, construction of a treatment plant and various other structures. This construction work occurs at various times of the year. Idle refers to data collected while no construction activities are occurring. This includes the initial years of data collection, before construction started on the ECI site, as well as data from more recent years when construction activities were not occurring.

Air data, particularly for volatile compounds, show temperature related trends. For this reason, the data were broken down by season: spring/fall (March, April, May, October, November), summer (June, July, August, September), and winter (December, January, February). These groups correspond to mean monthly temperatures of $<40^{o}$F (winter), 40

– 60^{o}F (spring/fall), and >60^{o}F. Thus, based on seasonal subgroups and also the status of construction activities, there are a total of twelve data subsets for each parameter:

- South site, Active, spring/fall
- South site, Active, summer
- South site, Active, winter
- South site, Idle, spring/fall
- South site, Idle, summer
- South site, Idle, winter
- HS site, Active, spring/fall
- HS site, Active, summer
- HS site, Active, winter
- HS site, Idle, spring/fall
- HS site, Idle, summer
- HS site, Idle, winter

Statistical Analysis

The ambient air monitoring data were compared using a non-parametric comparison of means, the Mann-Whitney test. Non-parametric tests are used when a normal distribution of the data cannot be assumed or when there are small numbers of data points. The handling of non-detectable data and other details of the statistical analysis can be found in previous reports.

Results

Appendix A contains the results of comparisons of means. These tables give the updated means and the results of statistical comparisons of the data sets. The continued primary objective of this analysis is to evaluate the potential impacts of construction activities at the ECI site on the ambient air quality near the facility. To facilitate this evaluation, the data have been compared based on location and activity (or lack of activity). The data presentation follows the format used in previous Indiana Harbor and Canal ambient air monitoring reports. The results are discussed further, below.

South Site versus High School Site

The ambient concentrations of each analyte were compared between locations (south monitoring site versus the high school monitoring site) for both idle (no construction) and active (construction) periods. Data were broken down into seasonal groups for comparison, and the overall data group was also used for comparison. Tables A1 through A8 show the mean concentrations and also the statistical significance of each comparison.

For PAHs (shown in Tables A1 and A2), acenaphthene, acenaphthylene, and fluorene were significantly different between the south site and the high school for idle conditions, with the south site having a higher acenaphthene and fluorene concentration than the high school in the spring/fall, winter, and overall; and the south site having higher acenaphthylene concentration than the high school in the spring/fall, summer, and overall. For the active period, overall acenaphthylene concentration was also higher at the south site than at the high school site. The remaining data show no seasonal or overall differences. The higher acenaphthene and acenaphthylene concentrations at the south site for the spring/fall idle periods, the higher overall acenaphthene concentration at the south site during idle conditions, and the higher overall acenaphthylene concentration at the south site during active conditions were new trends; the addition of new information has lead to the identification of new trends in the data. The higher concentrations of acenaphthene, acenaphthylene, and fluorene at the south site during idle conditions and higher acenaphthylene concentration at the south site during active conditions are attributed to the known concentrations of PAHs in the canal sediment and water column.

For PCBs (shown in Tables A3 and A4), there were differences between the south site and the high school for all seasons and overall, for both idle and active periods. Congeners 15, 18, 28, 31, and the total PCB concentration were statistically different, with concentrations at the south site being higher than the concentrations at the high school site in the spring/fall, summer, and overall for both the idle and active periods. Congeners 18, 28, 31, and total PCBs were also statistically higher at the south site for the winter, idle conditions than at the high school. Congener 8 did not show any statistically significant differences between the two monitoring locations for any season for both idle and active periods. The higher concentrations of PCBs at the south site are attributed to the known concentrations of PCBs in the canal sediment and water column. Total PCBs being statistically higher at the south site than the high school site for the winter idle period and the summer active period are new trends with the latest data. All other PCB trends are consistent with previously reported results.

Except for benzene concentration being higher at the high school site than the south site during the spring/fall and overall for the idle period, the concentrations of VOCs (benzene and toluene) were statistically similar for all seasons, for both idle and active conditions. Concentrations are very similar for all seasons, and do not appear to show strong seasonality. It is not known why the high school site has higher benzene concentration in the spring/fall idle period and the overall idle period, however it is possible that there is a local source of benzene emissions nearer the high school than the south monitoring site. Benzene was higher for the spring/fall idle period but not for the overall idle period for data collected through 2006; the addition of new information has lead to the identification of a new trend in the data. VOC data are summarized in Tables A5 and A6.

Only one metal, copper, showed any statistical differences between the two monitoring sites. During idle conditions, the copper concentration is higher at the high school during the summer. It is not known why the high school site has higher concentration in the summer idle period, however it is possible that there is a local source of copper emissions nearer the high school than the south monitoring site. The higher copper concentrations at the high school were also reported in previous studies. There were no statistical differences in any metal concentrations between the two monitoring sites during the active period. Metals data are summarized in Tables A7 and A8.

Idle versus Active

Data for each monitoring site, the south site and the high school, were compared between idle (no construction) and active (construction) periods. The intent of this comparison is to evaluate differences in ambient air conditions that may be attributed to construction activities. The data were analyzed as seasonal groups and also as an overall data group. The data are presented in Appendix A, Tables A9 through A16.

Several PAHs (Table A9 and A10) showed seasonal and overall differences between active and idle conditions. At the south site, acenaphthylene and naphthalene were statistically higher in the summer during idle conditions. However, naphthalene was higher during active conditions in the winter. Phenanthrene was higher overall during active conditions. Fluoranthene and pyrene were higher overall during active conditions. Most of these trends are consistent with previously reported results, the only new trend is of naphthalene being higher in the winter during the active conditions than the idle conditions. Two trends that were observed previously were not observed with incorporation of the latest data: higher phenanthrene concentrations during summer active conditions, and higher overall naphthalene during idle conditions. Higher concentrations during idle conditions and summer months may indicate that these compounds are originating from other local sources, possibly seasonal sources such as warm weather maintenance or operations, rather than from the ECI site. Higher active overall concentrations of some PAHs (fluoranthene, phenanthrene, and pyrene) are attributed to the prevalence of summer data (when most PAH concentrations are highest – see Tables A17 and A18 and the Seasonal Dependence discussion below) in the active period data set, rather than actual impact from construction activities. This is confirmed by the fact that the active vs. idle comparisons by season do not show statistical differences.

At the school, naphthalene was higher during idle conditions in the summer. Compounds which have higher concentrations during idle conditions may be emitted from industry or other local sources. Acenaphthene, fluoranthene, fluorene, phenanthrene, and pyrene were higher overall during the active conditions. Acenaphthylene was higher during active conditions in the spring/fall in previous years' reports, but were not observed with incorporation of the latest data. Higher overall acenaphthene and fluorene during active conditions are new trends observed with the latest data. As discussed in the previous paragraph, the higher active overall concentrations of most of the PAHs are attributed to the prevalence of summer data (when most PAH concentrations are highest – see Tables A17 and A18 and the Seasonal Dependence discussion below) in the active period data set, rather than actual impact from construction activities. This is confirmed by the fact the active vs. idle comparisons of these PAHs by season do not show statistical differences.

For PCBs at the south site (Table A11), the overall concentrations of congeners 8, 15, 18, 28, 31, and total PCBs were all statistically higher during active periods. Previous years' report results (except for last year's report results which showed that only congener 15 was statistically higher during active conditions than idle conditions) had indicated overall concentrations of several congeners (congener 15, 18, and 28) as well as total PCBs as being higher during the active conditions at the south site. At the school (Table A12), the overall concentrations of congeners 8, 15, 18, 28, 31, and total PCBs were all statistically higher during active periods. This is consistent with last year's report results. However, as discussed in the previous paragraphs about PAHs, the higher active overall concentrations of these PCBs are attributed to the prevalence of summer data (when the PCB concentrations are highest – see Tables A19 and A20 and the Seasonal Dependence discussion below) in the active period data set, rather than actual impact from construction activities. This is confirmed by the fact the active vs. idle comparisons of PCBs by season do not show any statistical differences.

Also, it should be noted that although the PCB concentrations were found to be higher during active concentrations at both the south site and the high school site, the mean total PCB concentrations are 0.000137 ug/m^3 and 0.000099 ug/m^3 (at the south site and high school site, respectively) during idle conditions and 0.000204 ug/m^3 (south site) and 0.000132 ug/m^3 (high school site) during active conditions. These concentrations are more than 10 times *less* than the USEPA Region 3 risk based concentration for total PCBs in ambient air. The risk based concentration for total PCBs in ambient air is 0.0031 ug/m^3, which corresponds to a lifetime cancer risk of 1×10^{-6}. The PCB concentrations measured at the south site and high school represent an even lower risk.

There were no statistical differences between VOC (benzene and toluene) concentrations during idle and active periods for any season or overall at either the south or the high school sites. VOC data are summarized in Tables A13 and A14. These results are consistent with previous years' report results.

Concentrations of some metals showed statistically significant differences between active and idle conditions (Tables A15 and A16). At the south site (Table A15), aluminum (winter and overall), barium (summer and overall), chromium (winter and overall), the overall iron, overall lead, overall manganese, overall nickel, and overall total suspended particulates (TSP) concentrations were statistically higher during active conditions than during idle conditions. The south site summer cobalt and summer copper concentrations were statistically higher during idle than active conditions. Most of the seasonal trends were identified previously, except for the higher chromium concentration during active winter conditions. Several new trends were identified with the overall metals (aluminum, chromium, iron, manganese, nickel) and TSP concentrations being higher during active than idle periods with the latest data. The overall cobalt concentration was previously identified as statistically higher during the active than idle periods, but this trend was not confirmed with the latest data. As with PAHs and PCBs, the higher active overall concentrations of some metals and TSP are attributed to the prevalence of summer data (when metal and TSP concentrations are higher – see Tables A23 and A24 and the Seasonal Dependence discussion below) in the active period data set, rather than actual impact from construction activities. This is generally confirmed by the fact that the active vs. idle comparisons of metals and TSP at the south site by season do not show any statistical differences.

At the high school site (Table A16), aluminum (winter and overall), barium (spring/fall and overall), the overall chromium, overall iron, overall lead, overall manganese, overall nickel, and overall TSP concentrations were statistically greater during active conditions. The high school site summer copper concentration was statistically higher during idle than active conditions. Spring/fall cobalt concentration, and winter barium and lead concentrations were previously identified as statistically higher during the active than idle periods, but these trends were not confirmed with the latest data. As with the south site data, several new trends were identified with the overall metals (aluminum, chromium, manganese, nickel) and TSP concentrations being higher during active than idle periods with the latest data. Again, as with PAHs, PCBs, and metals and TSP at the south site, the higher active overall concentrations of some metals and TSP at the high school site are attributed to the prevalence of summer data (when metal and TSP concentrations are higher – see Tables A23 and A24 and the Seasonal Dependence discussion below) in the active period data set, rather than actual impact from construction activities. This is generally confirmed by the fact that the active vs. idle comparisons of metals and TSP at the high school site by season do not show any statistical differences.

Seasonal Dependence of Concentration

Many factors, including air temperature and wind velocity, can impact the concentration of compounds in the ambient air. For this reason, the average concentrations for each compound during each period, and at each location were compared between seasons. The data are presented in Appendix A, Tables A17 through A24.

In general, the PAHs had statistically greater concentrations during the summer period than during the spring/fall or winter (Tables A17 and A18). Most of the PAHs also show a significant difference between the spring/fall concentration and the winter concentration. Although the concentrations may be different between location and period, the tendency for seasonally higher concentrations holds true for all the data except for naphthalene at the south site during active conditions. The winter naphthalene concentration is higher than the summer naphthalene concentration at the south site during the active period. This is not consistent with greater volatility of the compounds during warmer months and is difficult to explain. This trend was also observed in previous years' results.

The PCB data during idle conditions (Table A19) showed a similar expected trend, with the summer concentrations being statistically greater than the spring/fall concentrations, which were in turn statistically greater than the winter concentrations. This is the expected behavior of the compounds based on air temperature data. During active conditions (Table A20), the summer concentrations were also statistically greater than the spring/fall and winter concentrations. However, unlike the idle conditions, during the active conditions there was not a statistical difference between the spring/fall and winter data for the individual congeners' data. This is likely an artifact of the datasets; there are very few winter active data (most construction activities do not occur during the winter) so it is difficult to demonstrate the statistical significance of the numbers. It is expected that the data may follow the pattern shown by the idle data when more measurements are available. The total PCB concentrations during active conditions did follow the trend of being higher in the summer than in the spring/fall than in the winter.

The VOC data showed fewer trends based on temperature. The idle toluene data (Table A21) for both the south site and the high school were statistically greater during the summer than during the spring/fall and during the winter. The benzene concentration at the school during idle conditions was greater during the winter than during the spring/fall in previous years' results (which is the opposite result one would anticipate based on temperature alone). This trend was not confirmed with the latest data. During active conditions (Table A22), there were no significant statistical trends based on temperature, except for toluene being higher at the south site during the summer than the winter. This was a new trend based on the latest data. It is likely that the benzene and toluene data do not show as much seasonal trend for two reasons: first these compounds are quite volatile, even at lower temperatures and so are already in the air regardless of the air temperature, and second, there are probably many local sources of these ubiquitous compounds and the multiple emissions may have a greater impact than temperature or other climactic factors.

The metals data (Tables A23 and A24) showed some seasonal trends, more for the idle datasets than the active datasets. It should be noted that metals are not expected to show as much temperature dependent trends as organic compounds, since the atmospheric transport of metals is driven by particulate concentration (except for mercury) rather than volatilization. There is some seasonal correlation to metal concentrations in the air, which may be attributed to other factors such as more anthropogenic activity during the warm seasons, or to seasonal wind patterns. In general, the summer concentrations were statistically higher than the winter concentrations for idle conditions. There was a statistical difference between the spring/fall and winter concentrations and also between summer and spring/fall concentrations for some metals, but not for all. More seasonal trends were identified with the inclusion of the latest data than with previous years' data for both idle and active conditions. Selenium concentrations at both the south site and the high school site was greater during the spring/fall than during the summer for idle conditions. This trend is not consistent with other metals' results and is difficult to explain.

Conclusions

The air monitoring data presented were statistically analyzed based on location, season, and whether construction activities were occurring on the ECI site. The data and statistical significance are presented in tables. Based on a statistical analysis of the data, there is no indication that construction activities at the ECI site are causing degradation of the ambient air at either the south monitoring site or at the high school. It is recommended that an adequate level of monitoring continue for the purpose of expanding the dataset, and that the data and statistical analysis be revisited on an annual basis.

Appendix A Data Summary

Table A 1: Comparison of Mean Concentrations between Locations (South site vs. High School site) of PAHs during IDLE conditions

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*
Acenaphthene	South	9.099	yes	15.287		4.016	yes	9.398	yes
	HS	7.124		16.252		2.675		8.418	
Acenaphthylene	South	2.825	yes	2.864	yes	3.409		2.994	yes
	HS	2.313		2.156		3.018		2.458	
Fluoranthene	South	3.245		5.854		2.097		3.640	
	HS	3.049		6.620		2.163		3.782	
Fluorene	South	9.142	yes	14.633		5.511	yes	9.645	yes
	HS	7.032		15.008		4.101		8.417	
Naphthalene	South	89.296		96.984		74.434		87.357	
	HS	93.133		109.646		82.355		94.749	
Phenanthrene	South	14.944		27.603		9.427		16.874	
	HS	13.709		28.557		8.721		16.411	
Pyrene	South	2.149		3.330		1.977		2.422	
	HS	2.113		3.340		1.928		2.397	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 2: Comparison of Mean Concentrations between Locations (South site vs. High School site) of PAHs during ACTIVE conditions

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*
Acenaphthene	South	7.372		11.930		4.150		8.838	
	HS	6.657		13.467		2.871		9.046	
Acenaphthylene	South	3.268		1.840		4.234		2.793	yes
	HS	2.621		1.531		3.791		2.312	
Fluoranthene	South	3.406		5.700		2.443		4.243	
	HS	3.250		6.273		2.393		4.424	
Fluorene	South	8.869		13.878		5.731		10.531	
	HS	7.446		14.116		4.432		9.874	
Naphthalene	South	75.361		63.780		89.493		72.199	
	HS	82.893		74.663		91.559		80.405	
Phenanthrene	South	16.876		30.932		9.843		21.836	
	HS	15.240		31.183		8.811		21.167	
Pyrene	South	2.727		3.474		2.243		2.972	
	HS	2.301		3.256		2.139		2.684	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 3: Comparison of Mean Concentrations between Locations (South site vs. High School site) of PCBs during IDLE Conditions

Analyte & Location		Spring/Fall		Summer		Winter		Overall	
		pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*
Congener 8	South	36.591		75.926		19.407		42.578	
	HS	34.654		71.191		17.476		39.904	
Congener 15	South	6.531	yes	13.526	yes	2.632		7.368	yes
	HS	4.723		10.432		2.142		5.571	
Congener 18	South	33.949	yes	58.885	yes	12.947	yes	35.012	yes
	HS	19.378		39.873		8.340		31.943	
Congener 28	South	23.403	yes	45.874	yes	8.616	yes	25.480	yes
	HS	13.845		29.942		5.819		16.034	
Congener 31	South	24.931	yes	48.567	yes	9.272	yes	27.087	yes
	HS	14.330		30.236		5.933		16.366	
Sum PCBs	South	125.352	yes	243.651	yes	51.820	yes	137.451	yes
	HS	85.581		173.471		38.344		99.355	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 4: Comparison of Mean Concentrations between Locations (South site vs. High School site) of PCBs during ACTIVE Conditions

Analyte & Location		Spring/Fall		Summer		Winter		Overall	
		pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*
Congener 8	South	40.760		90.460		18.521		58.755	
	HS	38.752		78.511		21.373		53.824	
Congener 15	South	6.938	yes	17.612	yes	3.370		10.988	yes
	HS	4.867		10.853		3.156		7.260	
Congener 18	South	35.111	yes	74.541	yes	17.007		49.317	yes
	HS	20.223		39.376		15.251		27.949	
Congener 28	South	23.220	yes	72.995	yes	11.364		42.839	yes
	HS	14.101		32.319		9.815		21.510	
Congener 31	South	23.908	yes	67.622	yes	11.512		40.834	yes
	HS	14.306		31.718		10.138		21.378	
Sum PCBs	South	147.805	yes	307.319	yes	60.038		203.686	yes
	HS	92.061		194.367		57.462		132.229	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 5: Comparison of Mean Concentrations between Locations (South site vs. High School site) of VOCs during IDLE Conditions

Analyte & Location		Spring/Fall		Summer		Winter		Overall	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Benzene	South	1.1702	yes	1.3129		1.5383		1.3087	yes
	HS	1.3603		1.5192		1.6157		1.4701	
Toluene	South	1.7396		2.8654		2.3236		2.2155	
	HS	1.9744		3.1095		2.4381		2.3982	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 6: Comparison of Mean Concentrations between Locations (South site vs. High School site) of VOCs during ACTIVE Conditions

Analyte & Location		Spring/Fall		Summer		Winter		Overall	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Benzene	South	1.2491		1.5898		1.1379		1.3979	
	HS	1.3048		1.6227		1.6371		1.5032	
Toluene	South	2.4200		3.0382		1.6837		2.6298	
	HS	2.6683		3.5332		2.4204		3.0556	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 7: Comparison of Mean Concentrations between Locations (South site vs. High School site) of Metals during IDLE Conditions

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Aluminum	South	0.321		0.368		0.189		0.301	
	HS	0.323		0.375		0.184		0.302	
Arsenic	South	0.00162		0.00177		0.00132		0.00159	
	HS	0.00161		0.00174		0.00132		0.00157	
Barium	South	0.0173		0.0242		0.0160		0.0190	
	HS	0.0177		0.0257		0.0167		0.0197	
Chromium	South	0.00514		0.00558		0.00347		0.00485	
	HS	0.00493		0.00531		0.00341		0.00466	
Cobalt	South	0.00073		0.00090		0.00072		0.00078	
	HS	0.00073		0.00091		0.00065		0.00076	
Copper	South	0.0766		0.1175	yes	0.0894		0.0914	
	HS	0.0965		0.1565		0.0818		0.1093	
Iron	South	0.962		1.124		0.671		0.935	
	HS	0.941		1.069		0.673		0.910	
Lead	South	0.0190		0.0221		0.0143		0.0187	
	HS	0.0165		0.0183		0.0133		0.0162	
Manganese	South	0.0899		0.1066		0.0585		0.0868	
	HS	0.0853		0.0991		0.0571		0.0821	
Nickel	South	0.00187		0.00194		0.00160		0.00182	
	HS	0.00185		0.00186		0.00162		0.00180	
Selenium	South	0.00221		0.00180		0.00167		0.00196	
	HS	0.00239		0.00173		0.00165		0.00203	
Zinc	South	0.109		0.111		0.081		0.102	
	HS	0.101		0.098		0.074		0.093	
TSP (g/m^3)	South	4.65E-05		5.49E-05		3.70E-05		4.65E-05	
	HS	4.61E-05		5.53E-05		3.69E-05		4.63E-05	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 8: Comparison of Mean Concentrations between Locations (South site vs. High School) of Metals during ACTIVE Conditions

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Aluminum	South	0.340		0.404		0.212		0.353	
	HS	0.335		0.380		0.213		0.340	
Arsenic	South	0.00269		0.00166		0.00125		0.00202	
	HS	0.00244		0.00161		0.00158		0.00192	
Barium	South	0.0228		0.0229		0.0206		0.00226	
	HS	0.0225		0.0272		0.0219		0.0247	
Chromium	South	0.00611		0.00628		0.00435		0.00595	
	HS	0.00579		0.00591		0.00424		0.00564	
Cobalt	South	0.00169		0.00069		0.00061		0.00108	
	HS	0.00144		0.00071		0.00064		0.00098	
Copper	South	0.0668		0.0995		0.0730		0.0829	
	HS	0.0796		0.1505		0.0854		0.1145	
Iron	South	1.003		1.435		0.746		1.171	
	HS	0.941		1.346		0.718		1.105	
Lead	South	0.0278		0.0267		0.0170		0.0258	
	HS	0.0241		0.0240		0.0172		0.0231	
Manganese	South	0.0910		0.1233		0.0584		0.1017	
	HS	0.0862		0.1105		0.0539		0.0935	
Nickel	South	0.00313		0.00225		0.00157		0.00251	
	HS	0.00292		0.00231		0.00173		0.00247	
Selenium	South	0.00270		0.00183		0.00164		0.00215	
	HS	0.00239		0.00188		0.00166		0.00205	
Zinc	South	0.086		0.108		0.076		0.095	
	HS	0.078		0.101		0.069		0.088	
TSP (g/m^3)	South	5.03E-05		6.00E-05		3.66E-05		5.30E-05	
	HS	4.94E-05		5.64E-05		3.60E-05		5.10E-05	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 9: Comparison of Mean Concentrations between Periods (Idle vs. Active) of PAHs at the South Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*
Acenaphthene	Idle	9.099		15.287		4.016		9.398	
	Active	7.372		11.930		4.150		8.838	
Acenaphthylene	Idle	2.825		2.864	yes	3.409		2.994	
	Active	3.268		1.840		4.234		2.793	
Fluoranthene	Idle	3.245		5.854		2.097		3.640	yes
	Active	3.406		5.700		2.443		4.243	
Fluorene	Idle	9.142		14.633		5.511		9.645	
	Active	8.869		13.878		5.731		10.531	
Naphthalene	Idle	89.296		96.984	yes	74.434	yes	87.357	
	Active	75.361		63.780		89.493		72.199	
Phenanthrene	Idle	14.944		27.603		9.427		16.874	yes
	Active	16.876		30.932		9.843		21.836	
Pyrene	Idle	2.149		3.330		1.927		2.422	yes
	Active	2.727		3.474		2.243		2.972	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 10: Comparison of Mean Concentrations between Periods (Idle vs. Active) of PAHs at the High School Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*	ng/m^3	S/D*
Acenaphthene	Idle	7.124		16.252		2.675		8.418	yes
	Active	6.657		13.467		2.871		3.046	
Acenaphthylene	Idle	2.313		2.156		3.018		2.458	
	Active	2.621		1.531		3.791		2.312	
Fluoranthene	Idle	3.049		6.620		2.163		3.782	yes
	Active	3.250		6.273		2.393		4.424	
Fluorene	Idle	7.032		15.008		4.101		8.417	yes
	Active	7.446		14.116		4.432		9.874	
Naphthalene	Idle	93.133		109.646	yes	82.355		94.749	
	Active	82.893		74.663		91.559		80.405	
Phenanthrene	Idle	13.709		28.557		8.721		16.411	yes
	Active	15.240		31.183		8.811		21.167	
Pyrene	Idle	2.113		3.340		1.928		2.397	yes
	Active	2.301		3.256		2.139		2.684	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 11: Comparison of Mean Concentrations between Periods (Idle vs. Active) of PCBs at the South Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*
Congener 8	Idle	36.591		75.926		19.407		42.578	yes
	Active	40.760		90.460		18.521		58.755	
Congener 15	Idle	6.531		13.526		2.632		7.368	yes
	Active	6.938		17.612		3.370		10.988	
Congener 18	Idle	33.949		58.885		12.947		35.012	yes
	Active	35.111		74.541		17.007		49.317	
Congener 28	Idle	23.403		45.874		8.616		25.480	yes
	Active	23.220		72.995		11.364		42.839	
Congener 31	Idle	24.931		48.567		9.272		27.087	yes
	Active	23.908		67.622		11.512		40.834	
Sum PCBs	Idle	125.352		243.651		51.820		137.451	yes
	Active	147.805		307.319		60.038		203.686	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 12: Comparison of Mean Concentrations between Periods (Idle vs. Active) of PCBs at the High School Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*	pg/m^3	S/D*
Congener 8	Idle	34.654		71.191		17.476		39.904	yes
	Active	38.752		78.511		21.373		53.824	
Congener 15	Idle	4.723		10.432		2.142		5.571	yes
	Active	4.867		10.853		3.156		7.260	
Congener 18	Idle	19.378		39.873		8.340		21.943	yes
	Active	20.223		39.376		15.251		27.949	
Congener 28	Idle	13.845		29.942		5.819		16.034	yes
	Active	14.101		32.319		9.815		21.510	
Congener 31	Idle	14.330		30.236		5.933		16.366	yes
	Active	14.306		31.718		10.138		21.378	
Sum PCBs	Idle	85.581		173.471		38.344		99.355	yes
	Active	92.061		194.367		57.462		132.229	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 13: Comparison of Mean Concentrations between Periods (Idle vs. Active) of VOCs at the South Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Benzene	Idle	1.1702		1.3129		1.5383		1.3087	
	Active	1.2491		1.5898		1.1379		1.3790	
Toluene	Idle	1.7396		2.8654		2.3236		2.2155	
	Active	2.4200		3.0382		1.6837		2.6298	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 14: Comparison of Mean Concentrations between Periods (Idle vs. Active) of VOCs at the High School Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Benzene	Idle	1.3603		1.5192		1.6157		1.4701	
	Active	1.3048		1.6274		1.6371		1.5032	
Toluene	Idle	1.9744		3.1095		2.4381		2.3982	
	Active	2.6683		3.5332		2.4204		3.0556	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 15: Comparison of Mean Concentrations between Periods (Idle vs. Active) of Metals at the South Site

Analyte & Location		Spring/Fall		Summer		Winter		Overall	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Aluminum	Idle	0.321		0.368		0.189	yes	0.301	yes
	Active	0.340		0.404		0.212		0.353	
Arsenic	Idle	0.00162		0.00177		0.00132		0.00159	
	Active	0.00269		0.00166		0.01250		0.00202	
Barium	Idle	0.0173	yes	0.0242		0.0160		0.0190	yes
	Active	0.0228		0.0229		0.0206		0.0226	
Chromium	Idle	0.00514		0.00558		0.00347	yes	0.00485	yes
	Active	0.00611		0.00628		0.00435		0.00595	
Cobalt	Idle	0.00073		0.00090	yes	0.00072		0.00078	
	Active	0.00169		0.00069		0.00061		0.00108	
Copper	Idle	0.0766		0.1175	yes	0.0894		0.0914	
	Active	0.0668		0.0995		0.0730		0.0829	
Iron	Idle	0.962		1.124		0.671		0.935	yes
	Active	1.003		1.435		0.746		1.171	
Lead	Idle	0.0190		0.0221		0.0143		0.0187	yes
	Active	0.0278		0.0267		0.0170		0.0258	
Manganese	Idle	0.0899		0.1066		0.0585		0.0868	yes
	Active	0.0910		0.1233		0.0584		0.1017	
Nickel	Idle	0.00187		0.00194		0.00160		0.00182	yes
	Active	0.00313		0.00225		0.00157		0.00251	
Selenium	Idle	0.00221		0.00180		0.00167		0.00196	
	Active	0.00270		0.00183		0.00164		0.00215	
Zinc	Idle	0.109		0.111		0.081		0.102	
	Active	0.086		0.108		0.076		0.095	
TSP (g/m^3)	Idle	4.65E-05		5.49E-05		3.70E-05		4.65E-05	yes
	Active	5.03E-05		6.00E-05		3.66E-05		5.30E-05	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 16: Comparison of Mean Concentrations between Periods (Idle vs. Active) of Metals at the High School Site

Analyte & Location		**Spring/Fall**		**Summer**		**Winter**		**Overall**	
		ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*	ug/m^3	S/D*
Aluminum	Idle	0.323		0.375		0.184	yes	0.303	yes
	Active	0.335		0.380		0.213		0.340	
Arsenic	Idle	0.00161		0.00174		0.00132		0.00157	
	Active	0.00244		0.00161		0.00158		0.01920	
Barium	Idle	0.0177	yes	0.0257		0.0167		0.0197	yes
	Active	0.0225		0.0272		0.0219		0.0247	
Chromium	Idle	0.00493		0.00531		0.00341		0.00466	yes
	Active	0.00579		0.00591		0.00424		0.00564	
Cobalt	Idle	0.00073		0.00091		0.00065		0.00076	
	Active	0.00144		0.00071		0.00064		0.00098	
Copper	Idle	0.0965		0.1565	yes	0.0818		0.1093	
	Active	0.0796		0.1505		0.0854		0.1145	
Iron	Idle	0.941		1.069		0.673		0.910	yes
	Active	0.941		1.346		0.718		1.105	
Lead	Idle	0.0165		0.0183		0.0134		0.0162	yes
	Active	0.0241		0.0240		0.0172		0.0231	
Manganese	Idle	0.0853		0.0991		0.0571		0.0821	yes
	Active	0.0862		0.1105		0.0539		0.0935	
Nickel	Idle	0.00185		0.00186		0.00162		0.00180	yes
	Active	0.00292		0.00231		0.00173		0.00250	
Selenium	Idle	0.00239		0.00173		0.00165		0.00203	
	Active	0.00239		0.00188		0.00166		0.00205	
Zinc	Idle	0.101		0.098		0.074		0.093	
	Active	0.078		0.101		0.069		0.088	
TSP (g/m^3)	Idle	4.61E-05		5.64E-05		3.69E-05		4.63E-05	yes
	Active	4.94E-05		5.59E-05		3.60E-05		5.10E-05	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 17: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of PAHs during IDLE Conditions

Analyte & Location		Concentration (ng/m^3)			Statistical Significance*
		Spring/Fall	Summer	Winter	
Acenaphthene	South	9.099	15.287	4.016	Summer > Spring/Fall > Winter
	HS	7.124	16.252	2.675	Summer > Spring/Fall > Winter
Acenaphthylene	South	2.825	2.864	3.409	
	HS	2.313	2.156	3.018	
Fluoranthene	South	3.245	5.854	2.097	Summer > Spring/Fall > Winter
	HS	3.049	6.620	2.163	Summer > Spring/Fall > Winter
Fluorene	South	9.142	14.633	5.511	Summer > Spring/Fall > Winter
	HS	7.032	15.008	4.101	Summer > Spring/Fall > Winter
Naphthalene	South	89.296	96.984	74.434	
	HS	93.133	109.646	82.355	
Phenanthrene	South	14.944	27.603	9.427	Summer > Spring/Fall > Winter
	HS	13.709	28.557	8.721	Summer > Spring/Fall > Winter
Pyrene	South	2.149	3.330	1.977	Summer > Spring/Fall; Summer > Winter
	HS	2.113	3.340	1.928	Summer > Spring/Fall; Summer > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 18: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of PAHs during ACTIVE Conditions

Analyte & Location		Concentration (ng/m^3)			Statistical Significance*
		Spring/Fall	Summer	Winter	
Acenaphthene	South	7.372	11.930	4.150	Summer > Spring/Fall > Winter
	HS	6.657	13.467	2.871	Summer > Spring/Fall > Winter
Acenaphthylene	South	3.268	1.840	4.234	Summer > Spring/Fall; Summer > Winter
	HS	2.621	1.531	3.791	Summer > Spring/Fall; Summer > Winter
Fluoranthene	South	3.406	5.700	2.443	Summer > Spring/Fall; Summer > Winter
	HS	3.250	6.273	2.393	Summer > Spring/Fall; Summer > Winter
Fluorene	South	8.869	13.878	5.731	Summer > Spring/Fall; Summer > Winter
	HS	7.446	14.116	4.432	Summer > Spring/Fall > Winter
Naphthalene	South	75.361	63.780	89.493	Winter > Summer
	HS	82.893	74.663	91.559	
Phenanthrene	South	16.876	30.932	9.843	Summer > Spring/Fall > Winter
	HS	15.240	31.183	8.811	Summer > Spring/Fall > Winter
Pyrene	South	2.727	3.474	2.243	Summer > Spring/Fall; Summer > Winter
	HS	2.301	3.256	2.139	Summer > Spring/Fall; Summer > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 19: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of PCBs during IDLE Conditions

Analyte & Location		**Concentration (pg/m^3)**			**Statistical Significance***
		Spring/Fall	Summer	Winter	
Congener 8	South	36.591	75.926	19.407	Summer > Spring/Fall > Winter
	HS	34.654	71.191	17.476	Summer > Spring/Fall > Winter
Congener 15	South	6.531	13.526	2.632	Summer > Spring/Fall > Winter
	HS	4.723	10.432	2.142	Summer > Spring/Fall > Winter
Congener 18	South	33.949	58.885	12.947	Summer > Spring/Fall > Winter
	HS	19.378	39.873	8.340	Summer > Spring/Fall > Winter
Congener 28	South	23.403	45.874	8.616	Summer > Spring/Fall > Winter
	HS	13.845	29.942	5.819	Summer > Spring/Fall > Winter
Congener 31	South	24.931	48.567	9.272	Summer > Spring/Fall > Winter
	HS	14.330	30.236	5.933	Summer > Spring/Fall > Winter
Sum PCBs	South	125.352	243.651	51.820	Summer > Spring/Fall > Winter
	HS	85.581	173.471	38.344	Summer > Spring/Fall > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 20: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of PCBs during ACTIVE Conditions

Analyte & Location		**Concentration (pg/m^3)**			**Statistical Significance***
		Spring/Fall	Summer	Winter	
Congener 8	South	40.760	90.460	18.521	Summer > Spring/Fall; Summer > Winter
	HS	38.752	78.511	21.373	Summer > Spring/Fall; Summer > Winter
Congener 15	South	6.938	17.612	3.370	Summer > Spring/Fall; Summer > Winter
	HS	4.867	10.853	3.156	Summer > Spring/Fall; Summer > Winter
Congener 18	South	35.111	74.541	17.007	Summer > Spring/Fall; Summer > Winter
	HS	20.223	39.376	15.251	Summer > Spring/Fall; Summer > Winter
Congener 28	South	23.220	72.995	11.364	Summer > Spring/Fall; Summer > Winter
	HS	14.101	32.319	9.815	Summer > Spring/Fall; Summer > Winter
Congener 31	South	23.908	67.622	11.512	Summer > Spring/Fall; Summer > Winter
	HS	14.306	31.718	10.138	Summer > Spring/Fall; Summer > Winter
Sum PCBs	South	147.805	307.319	60.038	Summer > Spring/Fall > Winter
	HS	92.061	194.367	57.462	Summer > Spring/Fall > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 21: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of VOCs during IDLE Conditions

Analyte & Location		**Concentration (ug/m^3)**			**Statistical Significance***
		Spring/Fall	Summer	Winter	
Benzene	South	1.1702	1.3129	1.5383	
	HS	1.3603	1.5192	1.6157	
Toluene	South	1.7396	2.8654	2.3236	Summer > Spring/Fall; Summer > Winter
	HS	1.9744	3.1095	2.4381	Summer > Spring/Fall; Summer > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 22: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of VOCs during ACTIVE Conditions

Analyte & Location		**Concentration (ug/m^3)**			**Statistical Significance***
		Spring/Fall	Summer	Winter	
Benzene	South	1.2491	1.5898	1.1379	
	HS	1.3048	1.6227	1.6371	
Toluene	South	2.4200	3.0382	1.6837	Summer > Winter
	HS	2.6683	3.5332	2.4204	

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 23: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of Metals during IDLE Conditions

Analyte & Location		**Concentration (ug/m^3)**			**Statistical Significance***
		Spring/Fall	Summer	Winter	
Aluminum	South	0.321	0.368	0.189	Spring/Fall > Winter; Summer > Winter
	HS	0.323	0.375	0.184	Spring/Fall > Winter; Summer > Winter
Arsenic	South	0.00162	0.00177	0.00132	Summer > Winter; Spring/Fall > Winter
	HS	0.00161	0.00174	0.00132	Summer > Spring/Fall > Winter
Barium	South	0.0173	0.0242	0.0160	Summer > Spring/Fall; Summer > Winter
	HS	0.0177	0.0257	0.0167	Summer > Spring/Fall; Summer > Winter
Chromium	South	0.00514	0.00558	0.00347	Spring/Fall > Winter; Summer > Winter
	HS	0.00493	0.00531	0.00341	Spring/Fall > Winter; Summer > Winter
Cobalt	South	0.00073	0.00090	0.00072	Summer > Winter; Summer > Spring/Fall
	HS	0.00073	0.00091	0.00065	
Copper	South	0.0766	0.1175	0.0894	Summer > Spring/Fall; Summer > Winter
	HS	0.0965	0.1565	0.0818	Summer > Spring/Fall; Summer > Winter
Iron	South	0.962	1.124	0.671	Spring/Fall > Winter; Summer > Winter
	HS	0.941	1.069	0.673	Spring/Fall > Winter; Summer > Winter
Lead	South	0.0190	0.0221	0.0143	Summer > Winter; Summer > Spring/Fall
	HS	0.0165	0.0183	0.0133	Summer > Winter; Summer > Spring/Fall
Manganese	South	0.0899	0.1066	0.0585	Spring/Fall > Winter; Summer > Winter
	HS	0.0853	0.0991	0.0571	Spring/Fall > Winter; Summer > Winter
Nickel	South	0.00187	0.00194	0.00160	Summer > Winter
	HS	0.00185	0.00186	0.00162	Summer > Winter
Selenium	South	0.00221	0.00180	0.00167	Spring/Fall > Summer
	HS	0.00239	0.00173	0.00165	Spring/Fall > Summer
Zinc	South	0.109	0.111	0.081	Summer > Winter
	HS	0.101	0.098	0.074	Summer > Winter
TSP (g/m^3)	South	4.65E-05	5.49E-05	3.70E-05	Summer > Winter; Summer > Spring/Fall
	HS	4.61E-05	5.53E-05	3.69E-05	Summer > Spring/Fall; Summer > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval

Table A 24: Comparison of Mean Seasonal Concentrations between Locations (South site vs. High School) of Metals during ACTIVE Conditions

Analyte & Location		Concentration (ug/m^3)			Statistical Significance*
		Spring/Fall	Summer	Winter	
Aluminum	South	0.340	0.404	0.212	Summer > Winter
	HS	0.335	0.380	0.213	Summer > Winter; Spring/Fall > Winter
Arsenic	South	0.00269	0.00166	0.00125	Spring/Fall > Winter; Summer > Winter
	HS	0.00244	0.00161	0.00158	Summer > Winter
Barium	South	0.0228	0.0229	0.0206	
	HS	0.0225	0.0272	0.0219	
Chromium	South	0.00611	0.00628	0.00435	
	HS	0.00579	0.00591	0.00424	
Cobalt	South	0.00169	0.00069	0.00061	
	HS	0.00144	0.00071	0.00064	
Copper	South	0.0668	0.0995	0.0730	Summer > Spring/Fall
	HS	0.0796	0.1505	0.0854	Summer > Spring/Fall
Iron	South	1.003	1.435	0.746	Summer > Spring/Fall; Summer > Winter
	HS	0.941	1.346	0.718	Summer > Spring/Fall; Summer > Winter
Lead	South	0.0278	0.0267	0.0170	Summer > Winter
	HS	0.0241	0.0240	0.0172	Summer > Winter
Manganese	South	0.0910	0.1233	0.0584	Summer > Spring/Fall; Summer > Winter
	HS	0.0862	0.1105	0.0539	Summer > Spring/Fall; Summer > Winter
Nickel	South	0.00313	0.00225	0.00157	Summer > Winter
	HS	0.00292	0.00231	0.00173	
Selenium	South	0.00270	0.00183	0.00164	
	HS	0.00239	0.00188	0.00166	
Zinc	South	0.086	0.108	0.076	Summer > Spring/Fall
	HS	0.078	0.101	0.069	Summer > Spring/Fall
TSP (g/m^3)	South	5.03E-05	6.00E-05	3.66E-05	Summer > Winter
	HS	4.94E-05	5.64E-05	3.60E-05	Summer > Winter

*S/D indicates a statistically significant difference between the two values at a 95% confidence interval