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Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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Executive Summary

Routine volatile organic compound (VOC) monitoring began in the Midlothian area in 1994 as part of the establishment of the Community Air Toxics Monitoring Network (CATMN) mandated by the Texas Legislature. VOC monitoring at up to three sites in the Midlothian area has continued until present. Routine metals monitoring in the Midlothian area has been conducted for various periods of time from 1981 to present, depending, at least in part, on the particle size of federal regulatory emphasis at the time. Overall, the VOC and metals air monitoring data from the Midlothian area compose an impressively rich data set, even with data gaps. 2006 was the last year that there were three active sampling locations in Midlothian. As of January 1, 2006, three of TCEQ's approximately 57 VOC monitors at that time and one of TCEQ's approximately nine PM_{2.5} metals samplers at that time were located in Midlothian. The TCEQ has collected and validated approximately 907 VOC, 196 PM₁₀, and 461 PM_{2.5} samples in Midlothian spanning March, 1997, to July, 2009. Using the number of monitors per capita in 2006 as a measure, air quality in Midlothian has been far better monitored than most of the United States. Currently, there is only one monitoring location in Midlothian, which has been active since 1994. The current monitor, Community Air Monitoring Station (CAMS) 52, located in Midlothian is positioned predominantly downwind of TXI and Gerdau Ameristeel (formerly Chaparral Steel).

In December of 2007, the Texas Department of State Health Services (DSHS) released for public comment their Draft Health Consultation: *Midlothian Area Air Quality Part 1: Volatile Organic Compounds (VOCs) and Metals.* DSHS classified Midlothian air quality as an Indeterminate Public Health Hazard because they felt further information was needed to fully characterize the extent of any public health hazard posed by air contaminants in Midlothian.

On May 9, 2008, the TCEQ Toxicology Division (TD) issued a Request for Proposals (RFP) for the collection and analytical chemical analysis of ambient air samples in Midlothian, Texas. The contract was awarded to URS Corporation on August 22, 2008. The purpose of collecting these samples was to attempt to answer citizen questions and concerns with regard to air quality in their city, as well as potentially fill data gaps noted in the DSHS Draft Health Consultation.

Identified citizen questions include:

- ➢ How are Industries in Midlothian, TX affecting air quality?
- > Is the TCEQ every 6th day monitoring site an accurate representation of daily air concentrations?
- > What is the air quality close to schools and parks in Midlothian, TX?
- ➤ What percentage of total chromium does hexavalent chromium (Cr⁶⁺) represent in Midlothian, TX?

Sampling for this project consisted of four separate events (hereafter referred to as quarters) over a oneyear time span. For each sampling quarter, 24-hour samples were collected for five consecutive days at five different sampling locations. One sampling day each quarter coincided with the current every 6th day TCEQ sampling schedule at the TCEQ CAMS 52 sampling location in Midlothian, TX. There were two types of sampling locations for this project; stationary and mobile. Stationary sites were sampled each of the four quarters while mobile sites were only sampled one of the four quarters. Stationary sites included: Collocation with CAMS 52; Downwind of Gerdau Ameristeel; Jaycee Park; and North of Ash Grove. Mobile sites included: Triangle Park; Midlothian High School; J.A. Vitovsky Elementary School; and Mountain Peak Elementary School. The 1st, 2nd, 3rd, and 4th sampling quarters were completed December 6 - 10, 2008, February 26 – March 2, 2009, May 5 – 9, 2009, and July 3 – 7, 2009, respectively. Conclusions from the study are as follows:

- > All measured concentrations of VOCs and PM_{10} metals are not of a health concern.
- Measured concentrations of VOCs and PM₁₀ metals are likely typical for this area as compared with historical CAMS 52 and CAMS 302 monitor data, respectively.
- The TCEQ CAMS 52 monitor is accurately measuring VOC air concentrations at this location, as compared to the third-party collocated data.
- > There are no statistical differences between the regulatory every 6^{th} -day VOC and PM₁₀ samples and the other sixteen sampled days.
- Measured concentrations at the CAMS 52 monitor are a good indicator of VOC measurements across Midlothian and, while this site measures potentially worst-case concentrations of PM₁₀ metals, is a good indicator of air quality around Midlothian, including schools and parks.
- The majority of the data indicate that there are no seasonal differences for VOCs and PM₁₀ metals in this area.
- The highest VOC measurements do not correspond to days when winds put the monitors downwind of industry; therefore, the implication is that the sources of benzene, and VOCs in general, are likely not the identified industry in Midlothian.
- Nearby industry does have a measurable impact on the levels of PM₁₀ metals detected in the ambient air in Midlothian; however, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.
- The TCEQ CAMS 52 monitor is positioned downwind of TXI and Gerdau Ameristeel when winds are southerly (the predominant wind direction) and the measurable impact local industry has on the ambient levels of PM₁₀ metals detected in Midlothian can, and will be, measured by the TCEQ CAMS 52 monitor.
- Overall concentrations of VOCs and PM₁₀ metals measured at schools and parks are lower than, or similar to those measured closer to industry; all measured concentrations are not of health concern. Regarding differences in ambient air between weekend and weekdays at schools, due to the limited dataset collected at each school no clear discernable pattern can be observed for VOCs and PM₁₀ metals, and therefore no clear conclusions can be drawn for the school data.
- ▶ $PM_{10} Cr^{6+}$ represents a small percentage of the total chromium measured in the Midlothian area. The overall study average percent Cr^{6+} of total chromium was calculated to be 1.07%, which is well below the USEPA default assumption¹ of 34% as well as the DSHS assumption of 100% for their draft Health Consultation.

¹ USEPA. 1996. National Air Toxics Assessment (NATA) Appendix G: Health Effects Information used in Cancer and Noncancer Risk Characterization for the NATA 1996 National-Scale Assessment. United States Environmental Protection Agency, <u>http://earth1.epa.gov/ttn/atw/sab/appendix-g.pdf</u>.

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Summary of Citizen Questions and Concerns

The design of this study was centered on attempting to answer citizen questions and concerns, as well as to fill any data gaps DSHS identified in their draft Health Consultation. This section summarizes citizen questions and concerns and provides a summary of the conclusions in regards to the question/concern.

Is this study going to be able to capture levels typical of the fully operating cement kilns?

Just prior to the start of this study, TXI idled their two operating wet cement kilns indefinitely due to the economic downturn and less demand for cement while continuing to operate their dry cement kiln. This led the citizens to question whether or not this study would be able to capture the same levels of pollutants emitted by the facility during full operation. In order to address this concern, the Toxicology Division (TD) compared all collected study data to all available and relevant historical Texas Commission on Environmental Quality (TCEQ) volatile organic compound (VOC) and particulate matter less than 10 μ m (PM₁₀) metals data. Historical VOC data were available from the Community Air Monitoring Station (CAMS) 52 monitor from March 29, 1997 to May 31, 2009. Unfortunately, CAMS 52 does not have any historical PM₁₀ metals data available; therefore, in order to have an appropriate (i.e., apples-to-apples) comparison, PM₁₀ metals study data were compared to the former TCEQ CAMS 302 PM₁₀ metals data available from January 1, 2001 to June 26, 2004.

When comparing the new data to historical data, the data from this study indicate that the measured VOC and PM_{10} metals concentrations are typical of what has been observed previously at the TCEQ CAMS 52 and former TCEQ CAMS 302 monitoring sites. These data also indicate that CAMS 302 and CAMS 52 are good predictors of worst-case PM_{10} measurements across Midlothian.

Does industry change their operations for the TCEQ every 6th-day sampling schedule?

The TCEQ every 6th-day sampling schedule is a schedule pre-determined by EPA that can be accessed on EPA's website (more detail on this is given in the VOC Collocated Monitor Comparisons section). Since this schedule is readily available, there is skepticism that industry does not modify operations on known sampling days. In order to address this concern during the study, the study sampling dates were not made public.

The TD compared the every 6th-day samples to the surrounding Collocated monitor samples to help show if there are any differences between the two sets of data. No significant differences were found between the every 6th-day samples and the other study sampling days. This indicates that there is no difference between a regulatory every 6th-day sampling day and the other sampled days during this study. Since the sampling dates were not released publicly the assumption can be made that this is representative of typical conditions throughout the year.

How are Industries in Midlothian affecting the air quality?

One of the major concerns expressed by citizens of Midlothian is whether or not the local industry is affecting their air quality. There are three cement plants located to the north and south west of Midlothian, and it is therefore understandable that a public concern for air quality exits. All of the comparisons in this evaluation are designed to help answer this question.

When looking at all of the data collected during this study, the measured concentrations of VOCs are similar across Midlothian and are likely not due to emissions from the cement plants but from a combination of mobile sources. The measured concentrations of PM_{10} metals are, however, different across Midlothian, with relatively higher levels measured closer to industry and lower levels measured within the community. This indicates that nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in Midlothian; however, those contributions are slight, all measured levels are still well below their respective Air Monitoring Comparison Values (AMCVs), and both VOCs and PM_{10} metals are not at levels of health concern.

Is the TCEQ CAMS 52 monitor located appropriately?

The TCEQ CAMS 52 monitor is located approximately 1 mile north of TXI and Gerdau Ameristeel, which is predominately downwind of these two industries. However, the TCEQ monitor is not located in the middle of the city of Midlothian. The citizens are concerned that the location of the monitor is not appropriate for determining the air quality within the city. To answer this concern, the TD compared data from the Collocated monitor to the other study monitoring sites.

The Collocated monitor is approximately 1.1 miles north of TXI and 1.2 miles north, northeast of Gergau Ameristeel. The center of the city is offwind from TXI and Gerdau Ameristeel and upwind of Ash Grove and Holcim. The term offwind refers to the fact that the city center is located approximately 2.4 miles to the northeast of TXI and Gerdau Ameristeel, which is off the wind path from TXI and Gerdau Ameristeel when winds are coming from the south and southeast. The term upwind refers to the fact that the city center is located approximately 2.5 miles to the south, southwest of Ash Grove and Holcim, in which case winds would be traveling from the city center toward the industries when winds are out of the south and southeast. Looking at the Collocated monitor as compared to the other monitoring sites located within the city, the data suggest the CAMS 52 monitoring site is a good indicator of air quality in regards to VOCs in Midlothian, and potentially is a worst-case indicator of air quality in regards to PM₁₀ metals in the area. Since the TCEQ CAMS 52 monitor is positioned downwind of TXI and Gerdau Ameristeel, when winds are southerly the measurable impact of local industry on ambient levels of PM₁₀ metals will be detected.

What is the air quality close to schools and parks in Midlothian?

Children are potentially more susceptible to pollutants and therefore concern has been expressed by the citizens over areas where they spend a large part of their time; schools and parks. The study was designed to answer this question by locating three of the mobile sites at schools, one of the mobile sites at a park, and one of the stationary sites at a park.

When comparing all of the data for the study, the measured concentrations of VOCs are similar across Midlothian, which includes two park locations and three school locations, and are likely not due to emissions from the cement plants but from a combination of mobile sources. The measured concentrations of PM_{10} metals are, however, different across Midlothian, with relatively higher levels measured closer to industry and lower levels measured within the community, including the sites located at parks and schools. Except for Mountain Peak Elementary School, where higher levels of mercury were measured relative to the other schools. However, those levels were similar to other mercury leavels measured by monitors in that sampling quarter and could not be attributed to nearby industry when looking at the wind directions. Overall, these data indicate that nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in the Midlothian area; however, those

contributions are slight, all measured levels are still well below their respective AMCVs, and both VOCs and PM_{10} metals are not at levels of health concern.

The TD also looked specifically at each school and at the levels of detected pollutants to attempt to determine if pollutants were higher during school days. Since this was requested after the beginning of the study the original design of the study did not include this comparison; data for this comparison are limited. No clear discernable weekly pattern can be observed for VOCs and PM_{10} metals from this limited dataset and therefore no clear conclusions can be drawn between weekend and weekdays specific to the school data.

What percentage of total chromium does hexavalent chromium represent in Midlothian?

The question of what is the contribution of hexavalent chromium (Cr^{6+}) to total chromium was first brought up in the DSHS draft Health Consultation and has since become a concern for the citizens. Cr^{6+} is the most toxic form of chromium, but typically does not constitute a large percentage of ambient total chromium^{2,3,4,5} and is rapidly reduced to trivalent chromium (Cr III), a less toxic form, in the atmosphere^{6,7}.

Based on the study data, the actual average contribution of Cr^{6+} to total chromium in the Midlothian area is 1.07%, which is well below the assumption of 100% that DSHS used in their draft Health Consultation, as well below the USEPA default assumption of 34% used in the National-Scale Air Toxics Assessment (NATA). These analyses indicate that PM_{10} Cr^{6+} represents only a fraction of the total chromium measured in the Midlothain area.

² Battelle Memorial Institute. 2003. Phase II air toxics monitoring data: analyses and network design recommendations. Available at: <u>http://www.ladco.org/toxics.html</u>.

³ Bell, R.W. and J.C. Hipfner. 1997. Airborne Hexavalent chromium in southwestern Ontario. *J Air Waste Manage Assoc*, 47:905-910.

⁴ Potvin Air Management Consulting. 2006. Informal Consultation on Local Air Issues in Sault Ste. Marie, Ontario-Michigan under the Canada-United States Air Quality Agreement: Technical Support Document on Air Quality 2001-2003. Summary Report Prepared for Environment Canada, U.S. Environmental Protection Agency, Ontario Ministry of the Environment, Michigan Department of Environmental Quality and Inter-Tribal Council of Michigan. Accessed January 15, 2008. <u>http://www.epa.gov/ARD-R5/transboundary_air_quality_study-final07-30-07.pdf</u>

⁵ State of California Air Resources Board (ARB). 1986. Staff report: initial statement of reasons for proposed

rulemaking: Public hearing to consider the adoption of a regulatory amendment identifying hexavalent chromium as a toxic air contaminant. <u>http://www.arb.ca.gov/toxics/id/summary/hex.pdf</u>

⁶ ATSDR. 2000. Toxicological Profile for Chromium. Agency for Toxic Substances and Disease Registry, Atlanta, GA.

⁷ Werner Michelle L, Nico Peter S, Marcus Matthew A, and Anastasio Cort. 2007. Use of micro-XANES to speciate chromium in airborne fine particles in the Sacramento Valley. *Environ Sci Technol*, 41(14):4919-24.

Background

In December of 2007, the Texas Department of State Health Services (DSHS) released for public comment their Draft Health Consultation: *Midlothian Area Air Quality Part 1: Volatile Organic Compounds (VOCs) and Metals* (hereafter referred to as the draft Health Consultation). In their draft Health Consultation, DSHS classified Midlothian, Texas (hereafter referred to as Midlothian) as an Indeterminate Public Health Hazard. There were four main reasons given for this classification:

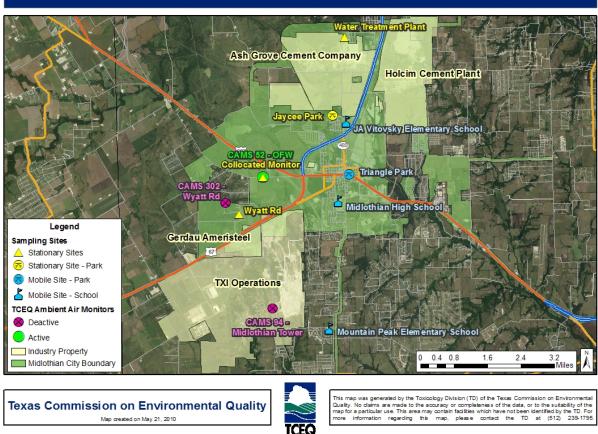
- 1) Health-based screening values were not available for sixteen volatile organic compounds (VOCs) and two metals;
- 2) Due to the lack of Midlothian-specific hexavalent chromium (Cr^{6+}) speciation data, all total chromium data was considered to be composed of 100% hexavalent chromium in the risk calculations;
- 3) The EPA National Ambient Air Quality Standards (NAAQS) compounds had not yet been evaluated by DSHS;
- 4) DSHS felt there were a limited number of monitors in Midlothian, and that their locations did not reflect community exposure.

Essentially DSHS felt further information was needed to fully characterize the extent of any public health hazard posed by air contaminants in Midlothian. To-date, the draft Health Consultation has not been finalized. Currently, the Agency for Toxics Substances and Disease Registry (ATDSR) and DSHS are reexamining the health concerns of the Midlothian community. The first draft of four reports is expected to be posted for public comment in the summer of 2010.

There is a large volume of data from Midlothian. DSHS acknowledged this in a 1995 presentation at a Texas Natural Resource Conservation Commission (TNRCC) (predecessor agency for the Texas Commission on Environmental Quality (TCEQ)) public meeting in Midlothian:

"Never before in history has the agency, or its predecessor, the Texas Air Control Board, collected so many environmental samples, from so many different media, from so many sampling locations, analyzing for so many different compounds, and finding so few indications of even the mildest of health concern...They have collected hundreds of air samples...Except for a few isolated and transient examples, these levels have all been below (and, for the most part, far below) their respective ESLs (Effects Screening Levels). The ESLs themselves are levels which are generally 100 fold (or more) lower than the lowest level known to cause the slightest adverse effect or 'Lowest Observable Adverse Effect Level' (LOAEL). Consequently, the contaminant levels observed have been far, far below the lowest level that might potentially cause any adverse health effects."

Routine VOC monitoring began in the Midlothian area in 1993 as part of the establishment of the Community Air Toxics Monitoring Network (CATMN) mandated by the Texas Legislature. VOC monitoring at up to three sites in the Midlothian area has continued until present. Routine metals monitoring in the Midlothian area has been conducted for various periods of time from 1981 to present, depending, at least in part, on the particle size of federal regulatory emphasis at the time. The VOC and metals air monitoring data from the Midlothian area compose an impressively rich data set, even with data gaps. The current monitor, CAMS 52, located in Midlothian is positioned predominantly downwind of TXI and Gerdau Ameristeel (formerly Chaparral Steel) (Figure 1).



Midlothian, Texas Ambient Air Monitoring Locations and Sampling Sites

Figure 1. Past and Current TCEQ CATMN and Midlothian Ambient Air Collection Monitor Locations.

There have also been several special studies conducted in Midlothian at various periods over the past twenty years. These special studies include the collection of ambient air data apart from the CATMN network (i.e., event triggered samples, mobile monitoring, stack samples) (Tables 1 and 2), soil sampling (Table 3), groundwater sampling (Table 2), and vegetation sampling (Table 2). Both the TCEQ (TNRCC at the time) and the United States Environmental Protection Agency (EPA) conducted Risk Assessments in Midlothian in 1995 and 1996, respectively.

- Critical Evaluation of the Potential Impact of Emissions from Midlothian Industries: A Summary Report. TNRCC AS-71, October 25, 1995.
- Screening Risk Analysis for the Texas Industries (TXI) Facility in Midlothian, Texas. TNRCC AS-72, November 2, 1995. Supplemental documents:
 - Appendices 1-4. TNRCC AS-72A, Rev. November 13, 1995.
 - Appendices 5-6. TNRCC AS-72B, November 2, 1995.
 - Executive Summary. TNRCC AS-72C, November 2, 1995.
- Midlothian Cumulative Risk Assessment. EPA-906-R-96-001, January 31, 1996.

Tuble 11 TOEX Stutionary Monitor Elocations in Multionnail, Texas, pust and presente					
Site Description	Street Address	Sampler Type	Activated	Deactivated	Duration
1 Auger Road Water Treatment Plant	1969 Auger Road	PM ₁₀	1991	1994	2 yrs
2 Auger Road	801 Auger Road	PM ₁₀	1991	1993	2 yrs
3 Box Crow Cement Co	2 Tar Rd. Box 485	PM ₁₀	1993	1995	1 yr
4 Cedar Drive	1120A Cedar Drive	PM ₁₀	1992	1994	2 yrs
5 Cement Valley Road	3330 Cement Valley Road	PM ₁₀	1992	1992	6 mo
6 Chaparral Steel Company	2060 S. Hwy. 67	TSP Lead, PM ₁₀	1993	1999	6 yrs
7 City Hall Roof	235 8th St.	TSP	1981	1984	4 yrs
8 Gorman Road	5050 Gorman Road	PM ₁₀	1992	1993	1 yr
9 Hidden Valley Trail	491 Hidden Valley Trail	PM ₁₀	1992	1993	1 yr
10 Midlothian OFW (CAMS 52)	2725 Old Fort Worth Road	CATMN, NOx, H ₂ S, O ₃ , Metals, SO ₂	1994	ACTIVE	15 + yrs
11 Midlothian Tower (CAMS 94)	4252 Waterworks Road	CATMN, NOx, H ₂ S, O ₃ , Metals, SO ₂	1994	2007	13 yrs
12 Midlothian Wyatt Rd (CAMS 302)	1241 East Wyatt Road	CATMN, NOx, H ₂ S, Metals, SO ₂	2000	2006	5 1/2 yrs
13 Mt. Creek Water Supply	462 Waterworks Road	PM ₁₀	1992	1993	1 yr
14 Tayman Drive Water Treatment Plant	440 Tayman Drive	PM ₁₀ , CATMN	1992	1997	5 yrs

*For sites with multiple sampler types, different samplers were activated at different times; activated date refers to when the site was first activated.

 PM_{10} - Particulate Matter less than 10 μm in size (inhalable fraction) Sampler

PMino - Particulate Matter less than 10 pm in size (initiable inaction) so TSP Lead - Total suspended particle lead Sampler CATMN - Community Air Toxics Monitoring Network Canister Sampler NOx - Nitrogen sulfide Monitor H_2S - Hydrogen sulfide Monitor O_3 - Ozone Monitor

Metals - Metal Sampler

SO₂ - Sulfur dioxide Monitor

Table 2. TCEQ Mobile Monitoring, Event-Triggered, and Miscellaneous Air Samples in Midlothian, Texas.

Mobile Monitoring Trips	# of Locations	Analysis
January 1991	19 Locations	H ₂ S & SO ₂
November 1991	27 Locations	VOCs, PAHs, PM ₁₀ , Metals, H ₂ S, & SO ₂
	Samples collected downwind of TXI & NTCC during trial	
June 1992	burns using waste derived fuel (WDF)	VOCs, PAHs, PM ₁₀ , & Metals
June 1994	12 Locations	H ₂ S & SO ₂
Event-Triggered Samples	# Collected	Analysis
1990 - 1995	~20	VOCs
Miscellaneous Air Samples		Analysis
Air samples near 'Slag Road' - To inve	estigate if levels of Cr would be elevated in ambient air near	
roads where slag had been used		Cr & CrVI
Dioxin/Furan Stack Sampling	Conditions	Analysis
	Sampling under conditions where coal is burned 100%; or	
	where waste derived fule (WDF) is burned 36%, 60%, or	
1991 - Honam, NTCC, & TXI	100%; or where tire derived fule (TDF) is burned 30%	Dioxins/Furans

 PM_{10} - Particulate Matter less than 10 μm in size (inhalable fraction)

VOCs - Volatile Organic Compounds PAHs - Polycyclic Aromatic Hydrocarbons Cr - Total chromium

CrVI - Hexavalent chromium

H₂S - Hydrogen sulfide Monitor

SO2 - Sulfur dioxide Monitor

NTCC - North Texas Cement Company

Soil Sampling	# of Locations	Analysis
1991 - Metals Study	23 Locations + 2 Bkgd	Metals
1992 - Metals Study	40 Locations + 2 Bkgd	Metals
1994 - Metals Study	45 Locations + 2 Bkgd	Metals
1995 - Metals Study	80 Locations + 8 Bkgd	Metals
		Metals - Agreed Order for Chaparral to further investigate soil, sediment, and water concentrations on their property and property they're leasing from TXI. Chaparral will also monitor ambient air north and south of their
1995 - Chaparral Steel Special Study	22 Locations near plant	facility.
1995 - Dioxin/Furan Study	54 Locations + 6 Bkgd	Dioxins & Furans
2005 - Residential Soil Study	Various location on residential property	Metals, SVOCs, TPH, Pesticides, Herbicides, Dioxins, & Furans
Groundwater Sampling		Analysis
2005 - Residential Soil Study	Measured in conjunction with Residential Soil	Metals, VOCs, SVOCs, TPH, Pesticides, Herbicides, Dioxins, & Furans
Miscellaneous Sampling		Analysis
1995 - Hay	2 Locations	Metals
1995 - Miscellaneous Vegetation	12 Locations	Metals
1995 - Wheat	8 Locations	Metals
1995 - Slag	International Mill Service	Metals, Cr VI

TPH - Total Petroleum Hydrocarbons

VOCs - Volatile Organic Compounds SVOCs - Semi-Volatile Organic Compounds

CrVI - Hexavalent chromium

Based on our current data, the TCEQ Toxicology Division (TD) does not have concerns regarding air quality in Midlothian. However, even though there is a very robust dataset for Midlothian, citizens of Midlothian are still concerned about the air quality in their city, especially with an Indeterminate Public Health Hazard finding from the draft Health Consultation. Therefore, in order to answer citizen questions and concerns with regard to air quality in their city since the release of the draft Health Consultation, as well as to potentially fill data gaps noted in the draft Health Consultation, the TCEQ funded a project for a third party to collect and analyze ambient air samples in Midlothian; *Ambient Air Sample Collection and Analytical Chemical Analysis*. The project was developed in conjunction with the citizens of Midlothian. A citizen advisory group, formed by the city, interacted with the TD to decide questions they wanted answered, what types of sampling they would like, what kinds of chemicals they would like analyzed, and where the sampling locations should be. DSHS was also included in these discussions to ensure necessary data gaps/concerns were addressed.

On May 9, 2008, the TCEQ TD issued a Request for Proposals (RFP) for the collection and analytical chemical analysis of ambient air samples in Midlothian. The contract was awarded to URS Corporation (hereafter referred to as URS) on August 22, 2008, and the sampling was completed by August 31, 2009.

Citizen questions/concerns identified by the focus group include:

- ➢ How are industries in Midlothian affecting air quality?
- Is the TCEQ every 6th day monitoring site an accurate representation of daily air concentrations in Midlothian?
- > What is the air quality near schools and parks in Midlothian?
- > What percentage of total chromium does hexavalent chromium represent in Midlothian?

Sampling for this project consisted of four separate events (quarters) over a one-year time span. For each sampling quarter, 24-hour samples were collected for five consecutive days at five different sampling locations. One sampling day each quarter coincided with the current every 6th day TCEQ sampling schedule at the TCEQ CAMS 52 sampling location in Midlothian. There were two types of sampling locations for this project; stationary and mobile. Stationary sites were sampled each of the four quarters while mobile sites were only sampled one of the four quarters.

Stationary sites included:

- Collocation with CAMS 52 (2725 Old Fort Worth Rd)
- Downwind of Gerdau Ameristeel (1291 E Wyatt Rd)
- Jaycee Park (1711 Meadow Ln)
- North of Ash Grove (Water Treatment Plant; 440 Tayman Dr)

Mobile sites included:

- ➤ Triangle Park (200 E Ave F)
- Midlothian High School (923 S 9th St)
- ➢ J.A. Vitovsky Elementary School (333 Church St)
- Mountain Peak Elementary School (5201 FM 663)

The original study design identified parks for all of the mobile sites; Triangle Park (200 E Ave G), Kimmel Park (801 W Ave F), Civic Center Park (224 S 11th St), and Hawkins Spring Park (1498 FM 1387). However, after the first sampling quarter, in which Triangle Park was sampled, the Midlothian School District Superintendent inquired about the possibility of changing sampling locations to include Midlothian area schools. With approval from the citizen advisory group the TCEQ authorized URS to replace the remaining mobile sites with three schools suggested by the Superintendent (listed above).

The 1st, 2nd, 3rd, and 4th sampling quarters were completed December 6 – 10, 2008, February 26 – March 2, 2009, May 5 – 9, 2009, and July 3 – 7, 2009, respectively. *Sampling dates were not pre-determined, and were not publicly announced so that industry would not be privy to when the sampling was taking place.*

Evaluation

For the purposes of this evaluation, the TD will only be evaluating and highlighting data collected during the *Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis* study. To maximize the amount of sampling for the available money, the study was bid by Tasks, in which the citizen advisory committee prioritized the sampling. The winning bid, by URS, was able to incorporate all Tasks requested. Table 4 shows each sampling site, they type of site it was, and the constituents that were measured. Ambient air concentrations of VOCs, aldehydes, and carbonyls (hereafter referred to collectively as VOCs) were measured at three of the four stationary sampling sites, as decided by the citizen advisory committee. The main concern of the citizen advisory committee for downwind of Gerdau Ameristeel was to measure metals; therefore, VOCs did not get bid in a Task for this location. Ambient air concentrations of metals were measured at all five of the stationary and all four of the mobile sampling sites.

			1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
Monitor	Туре	VOCs	Metals	VOCs	Metals	VOCs	Metals	VOCs	Metals	
Collocated with TCEQ CAMS 52	Stationary	✓	√	✓	√	✓	√	✓	√	
Wyatt Rd	Stationary	×	\checkmark	×	\checkmark	×	\checkmark	×	\checkmark	
Jaycee Park	Stationary	✓	\checkmark	\checkmark	✓	\checkmark	✓	\checkmark	✓	
Water Treatment Plant	Stationary	\checkmark	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Triangle Park	Mobile	✓	✓	×	×	×	×	×	×	
Mountain Peak Elementary School	Mobile	×	×	\checkmark	\checkmark	×	×	×	×	
JA Vitovsky Elementary School	Mobile	×	×	×	×	\checkmark	√	×	×	
Midlothian High School	Mobile	×	×	×	×	×	×	\checkmark	✓	

 Table 4. Constituents Measured at Each Monitoring Site During Each Sampling Quarter.

✓ = Sampled and Analyzed For

* = Not Sampled or Analyzed For

Stationary = Sampled All 4 Quarters

Mobile = Sampled Only 1 of the 4 Quarters

The VOC data were compared to historical and current data, where possible, collected by the TCEQ at the CAMS 52 (Old Fort Worth Rd) monitoring site. There is currently a particulate matter less than 2.5 μ m (PM_{2.5}) sampler at the CAMS 52 site. However, the metals data collected for this study were particulate matter less than 10 μ m (PM₁₀), which is the fraction size DSHS suggested because generally the historical metals data for Midlothian are PM₁₀. It is not technically accurate to compare PM₁₀ data to PM_{2.5}. Therefore, the metals data were compared to historical levels at the former TCEQ CAMS 302 (also referred to as the Wyatt Rd site) monitoring site. Data evaluations included:

- > Air Monitoring Comparison Value (AMCV) Screening
- Historical Data Comparisons
- Monitoring Site Comparisons
- Collocated Monitor Comparisons
- Directional Wind Rose Comparisons (metals only)
- School Comparisons
- Percent Hexavalent Chromium of Total Chromium (metals only)

For the purposes of this evaluation, only fifteen compounds will be highlighted below: 1,3-butadiene, benzene, ethylbenzene, toluene, o-xylene, p+m-xylene, acrolein, carbon disulfide, aluminum, total chromium, hexavalent chromium, manganese, lead, nickel, and mercury. The eight highlighted metals

represent the ones which citizens appear to be the most concerned about. The highlighted VOCs (i.e., BTEX compounds, 1,3-butadiene, acrolein, and carbon disulfide) represent the ones the public in general are concerned about, or the ones which showed slight exceedances of their respective AMCVs. Benzene is also a good benchmark chemical to use for all VOCs. Even though only fifteen compounds were highlighted, all compounds were evaluated from a health perspective.

For non-detected compounds, half the detection limit (DL) was used as a proxy value instead of zero (i.e., TD replaced all non-detects in the raw data with ½ their respective DL). It is important to note that field blanks, field duplicates, and laboratory blanks indicate some level of metals are inherently present on the filters, which may bias all metals results high. However, all metals results are well below TCEQ health-based AMCVs; therefore, any bias this may introduce is not relevant to this evaluation.

Volatile Organic Compounds (VOCs)

Air Monitoring Comparison Value (AMCV) Screening

For this study, the TD required a target compound list of 13 VOCs, based on the draft Health Consultation. However, URS subcontracted the analysis to Environmental Research Group (ERG), which analyzed the VOCs using EPA method TO-15, as required in the study contract. Since EPA method TO-15 analyzes for a full suite of 60 VOCs, the ERG lab reported all of the VOCs to URS. URS included all 60 analytes in the raw data given to TCEQ; therefore, even though only a few compounds are highlighted in this evaluation the TD did evaluate all 60 compounds. The full target analyte list can be found in Table 5 below. Ambient air concentrations of these 60 VOCs were measured at three of the four stationary sampling sites, as well as at all the mobile sites. All monitored concentrations were compared to TCEQ's health- and welfare-protective comparison values, including Effects Screening Levels (ESLs) and Reference Values (ReVs) or, collectively, air monitoring comparison values (AMCVs) where available. All measured concentrations of VOCs were well below their respective appropriate short- and long-term AMCVs, except for two short-term and three long-term exceedances of acrolein and one long-term exceedance of carbon disulfide.

VOCs						
1,1,1-Trichloroethane Acrylonitrile cis-1,3-Dichloropropene n-Octane						
1,1,2,2-Tetrachloroethane	Benzene	Dibromochloromethane	o-Dichlorobenzene			
1,1,2-Trichloroethane	Bromochloromethane	Dichlorodifluoromethane	o-Xylene			
1,1-Dichloroethane	Bromodichloromethane	Dichloromethane	p-Dichlorobenzene			
1,1-Dichloroethene	Bromoform	Dichlorotetrafluoroethane	Propylene			
1,2,4-Trichlorobenzene	Bromomethane	Ethyl Acrylate	Styrene			
1,2,4-Trimethylbenzene	Carbon Disulfide	Ethyl tert-Butyl Ether	tert-Amyl Methyl Ether			
1,2-Dibromoethane	Carbon Tetrachloride	Ethylbenzene	Tetrachloroethylene			
1,2-Dichloroethane	Chlorobenzene	Hexachloro-1,3-butadiene	Toluene			
1,2-Dichloropropane	Chloroethane	m,p-Xylene	trans-1,2-Dichloroethylene			
1,3,5-Trimethylbenzene	Chloroform	m-Dichlorobenzene	trans-1,3-Dichloropropene			
1,3-Butadiene	Chloromethane	Methyl Ethyl Ketone	Trichloroethylene			
Acetonitrile	Chloromethylbenzene	Methyl Isobutyl Ketone	Trichlorofluoromethane			
Acetylene	Acetylene Chloroprene		Trichlorotrifluoroethane			
Acrolein	cis-1,2-Dichloroethylene	Methyl tert-Butyl Ether	Vinyl chloride			
	PM ₁₀	Metals				
Aluminum	Chromium	Molybdenum	Uranium			
Antimony	Cobalt	Nickel	Vanadium			
Arsenic	Copper	Selenium	Zinc			
Barium	Lead	Silver				
Beryllium	Manganese	Thallium				
Cadmium	Mercury	Thorium				

Table 5. Analyte list for VOCs and PM₁₀ Metals.

The TD uses AMCVs as an initial screening tool to determine a chemical's potential to cause short- and long-term adverse health effects, adverse vegetation effects, or odorous conditions. In general, the healthbased AMCVs are set to provide a margin of safety, and are set well below levels at which adverse health effects are reported in the scientific literature. If a chemical concentration in ambient air is less than its comparison value, no adverse effects or odorous conditions are expected to occur. If a chemical concentration exceeds its comparison value, it does not necessarily mean that adverse effects will occur, but rather that further evaluation is warranted. Currently, AMCVs include interim ESLs, which are based on the generally conservative method of deriving health-protective air screening values historically used by TCEQ as well as some other states. However, in 2006 TCEQ adopted an updated ESL derivation process which incorporates the latest scientific methods and was peer reviewed by a panel of renowned external scientific experts. At some point in the future, updated ESLs will be derived for acrolein and carbon disulfide under that new process (www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg_442.html/at_download/file). More detailed informaiton on AMCVs may be accessed on the TCEQ public website: http://www.tceq.state.tx.us/implementation/tox/AirToxics.html#amcv.

Acrolein

The short-term AMCV for acrolein is 1 ppb_v. There were two exceedances of the short-term AMCV. At the CAMS 52 collocated monitor (herrafter referred to as the Collocated monitor) on February 26, 2009, and at the Water Treatment Plant monitor on July 3, 2009, acrolein had measurements of 2.47 ppb_v and 1.15 ppb_v, respectively. The long-term AMCV for acrolein is 0.1 ppb_v. There were three exceedances of the long-term AMCV when averaging all four quarters of data. At the Collocated monitor, at the Jaycee Park monitor, and at the Water Treatment Plant monitor, acrolein had overall study averages of 0.411 ppb_v, 0.33 ppb_v, and 0.314 ppb_v, respectively. Since the mobile sites only collected five days of data and 5-day VOC data are not representative of long-term concentrations (i.e., annual averages at a minimum), these data cannot be appropriately evaluated using long-term comparison levels.

Acrolein is a very reactive component of ambient air that is formed from the breakdown of other organic chemicals. It can be emitted by several different types of sources (e.g., automobiles, power plants, natural and manmade fires, cigarettes) and due to its reactivity it is very difficult to reliably measure analytically in ambient air. The TCEQ currently utilizes two methods to analyze acrolein: with a 2,4-dinitrophenylhydrazine (DNPH) cartridge and with a SUMMA canister. The DNPH cartridge method has a large negative bias in the numbers and has approximately 40% recovery, but it is a stable, more precise method. The SUMMA canister method is overall more accurate but not as precise (40% low to 100% high). With this method, a large data set is ideal so that the average can be calculated, which will likely be close to the true concentration/accurate. Acrolein could be produced by reactions with other compounds in the canister, or could degrade within the canister and be lost. Therefore, when attempting to interpret one canister measurement, it is important to note that it could be very high or it could be very low.

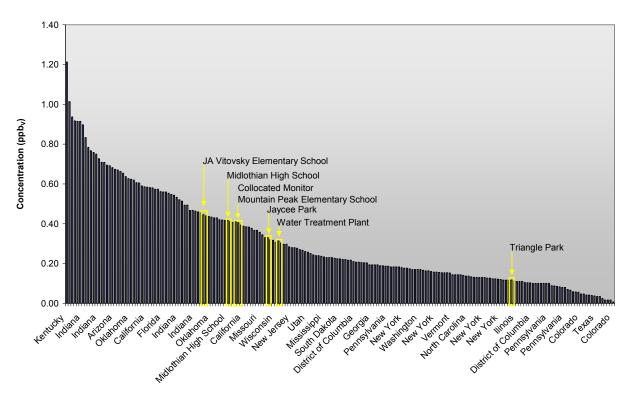
Acrolein degrades quickly in water, soil, and air, and is therefore not expected to be environmentally persistent. According to the ATSDR⁸, average concentrations of acrolein at various ambient monitors range from 0.5 - 3.186 ppb. Urban background is generally 0.2 ppb, while as much as 5.6 ppb has been measured in large cities, and concentrations in the home can range from <0.02 - 12 ppb. Acute (short-term) exposure to sufficiently high concentrations of acrolein can cause nasal irritation; however, levels at which nasal irritation occurs are 300 ppb or greater. The two short-term exceedances of acrolein measured, which were 2.47 and 1.15 times higher than its AMCV, respectively, are well below the level

⁸ ATSDR. 2007. Toxicological Profile for Acrolein. Agency for Toxic Substances and Disease Registry, Atlanta, GA.

at which a health effect would occur. Therefore, we would not expect short-term exposures to these concentrations to be of a health concern.

The EPA Schools Monitoring Initiative is also finding elevated levels of acrolein, relative to comparison levels, across the country. More information on acrolein from the EPA can be found here: <u>http://www.epa.gov/region09/air/schools-monitor/pdfs/Schools-Acrolein-Fact-Sheet.pdf</u>. The three long-term exceedances of acrolein measured, which were 4.11, 3.3, and 3.14 times higher than its AMCV, respectively, are within the range of average concentrations cited by ATSDR.

When compared to averages of acrolein measured across the nation, the averages of acrolein from this study were also within the range of what is observed (Figure 2).



2008 Average Acrolein Concentrations Measured Across the United States

Figure 2. 2008 Average Acrolein Concentrations (ppb_v) Measured Across the United States. Data are from EPA's Air Quality System (AQS).

Carbon Disulfide

The long-term AMCV for carbon disulfide is 1 ppb_v . There was one exceedance of the long-term AMCV at the Water Treatment Plant monitor, in which carbon disulfide had an overall study average of 1.69 ppb_v . Since the mobile sites only collected five days of data, and 5-day VOC data are not representative of long-term concentrations (i.e., annual averages at a minimum), these data cannot be appropriately evaluated using long-term comparison levels.

The TCEQ's long-term AMCV for carbon disulfide is very conservative. This is evident when the longterm AMCV is compared to other agencies' long-term comparison values for carbon disulfide. These other values were derived using standard scientific, human health hazard assessment methodologies, as well as known effects levels. Table 6 presents long-term, health-protective air concentration comparison values derived by four other agencies. While these values differ in regard to their inherent level of conservativeness, they are all considered health-protective values for public exposure and demonstrate the greater conservativeness of TCEQ's long-term AMCV. However, the greater conservativeness of TCEQ's long-term AMCV should not be thought of as conferring a greater degree of health protection. If adverse health effects do not occur as a result of exposure to any of these health-protective levels, they may all be viewed as being associated with an equal level of human health protection.

Agency	Long-Term Comparison Value Name	Long-Term Comparison Value (ppb) ^a	Point-of- Departure _{HEC} (ppb) ^b	Total Uncertainty Factor	Critical Study and Effect
ATSDR	Chronic Minimal Risk Level (MRL)	300	7,600 LOAEL [NOAEL (median) of 4,100 ppb]	30	Johnson et al. 1983 Nervous system/minimal decrease in nerve conduction velocity
CalEPA	Chronic Reference Exposure Level (REL)	300	2,540 BMCL₀₅	10	See above
USEPA	Reference Concentration (RfC)	224	6,304 BMC ₁₀ [NOAEL (mean) of 5,100 ppb]	30	See above
Health Canada	Tolerable Concentration (TC)	32	1,600 BMCL ₀₅ [NOEL of 4,160 ppb]	50	See above

Table 6. Long-Term Health-Protective Air Concentration Comparison Values for Carbon Disulfide Derived
by Agencies other than the TCEQ.

ATSDR = Agency for Toxic Substances and Disease Registry

CalEPA = California Environmental Protection Agency

USEPA = United States Environmental Protection Agency

LOAEL = lowest-observed-adverse-effect-level

 BMC_{10} = benchmark concentration at the 10% response level

 $\mathsf{BMCL}_{\mathsf{05}}$ = benchmark concentration lower bound at the 5% response level

^a Comparison values only given in μ g/m³ were converted to ppb using 1 μ g/m³ = 0.32 ppb.

^b Human equivalent concentration point-of-departure (POD _{HEC}) values only given in $\mu g/m^3$ were converted to ppb using 1 $\mu g/m^3 = 0.32$ ppb.

The long-term AMCV for carbon disulfide of 1 ppb is 32 - 300 times more conservative than the healthprotective comparison values used by these other agencies. Additionally, the long-term AMCV is approximately 4,000 - 5,000 times lower than the no-observed-adverse-effect-levels (NOAELs) or noobserved-effect-levels (NOELs) identified by these agencies. The one long-term exceedance of carbon disulfide, which was 1.69 times higher than its AMCV, is well below the level at which a health effect would occur. *Therefore, we would not expect long-term exposures to these concentrations to be of a health concern.*

Historical Data Comparisons

An important citizen question identified for this study includes: *How are industries in Midlothian affecting air quality*? During the course of the study, the TD was also made aware that citizens were concerned that the levels of chemicals released from the cement plant were much reduced as compared to what had been recently released due to the suspension of the operation of TXI's wet cement kilns. Just prior to the start of the study, TXI made the decision to idle their two operating wet cement kilns and continue to only operate their dry kiln. The decision, according to TXI, was due to the economic down turn, less demand for cement, and because the dry kiln produces larger yields and is more economical to operate.

In order to address the concerns of the citizens over the suspension of the operation of the two wet cement kilns, and to begin to answer the questions originally identified, the TD compared VOC levels to historical 24-hour every 6th-day VOC canister data from CAMS 52. Validated 24-hour canister data are currently available from March 29, 1997 to May 31, 2009. All historical VOC comparisons include this entire data range. Such a comparison can show if VOC levels at CAMS 52 have historically been higher than the measured levels for the study.

For this VOC evaluation, BTEX compounds (benzene, toluene, ethylbenzene, o-xylene, and p+m-xylene) and 1,3-butadiene were compared to their historical data. These six VOCs represent ones the public, in general, are concerned about, while benzene is also a good benchmark chemical to use for all VOCs because it's the national risk driver according to the USEPA National-Scale Air Toxics Assessment (NATA) as well as a multi-source chemical (i.e., mobile, industrial, natural). The TD conducted statistical comparisons (Figures 4 - 9; Appendix A) on all of the historical raw data versus all four quarters of the Collocated monitor raw data with Student's t-test using SigmaPlot v11.0 statistical graphing software. For an overview of the Student's t-test procedure, please see Figure 3.

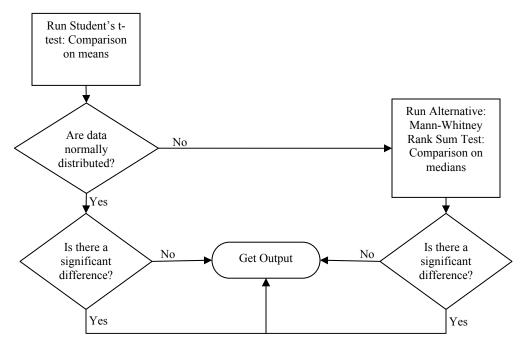


Figure 3. Flow-Chart of Student's t-test Statistical Comparisons.

When a Student's t-test is performed, if the data fails normality and/or the equal variance test (p < 0.05), as an alternative, a Mann-Whitney Rank Sum Test is conducted. For this analysis data medians are compared and significant differences are determined if the difference in the median values between the compared groups are greater than would be expected by chance (p < 0.05). If the data pass the normality test then data means are compared and significant differences are determined if the difference in the mean values between the compared groups are greater than would be expected by chance (p < 0.05).

Eventhough all data failed the normality test (p < 0.05) for this statistical comparison, which means there was not a normal distribution of the data, a non-parametric Mann-Whitney Rank Sum Test was used to determine statistical significance. According to this test, 1,3-butadiene and o-xylene historical data are significantly lower than the combined Collocated monitor data (Table 7). However, upon closer examination of the data the TCEQ method reporting limits (MRLs) for 1,3-butadiene and o-xylene are twice and 1.25 to 3 times higher, respectively, than the detection limits (DLs) achieved by the study's contract laboratory. For TCEQ data, a method detection limit (MDL) represents the point at which there is less than 99% confidence that the value is greater than background (or zero). The MRL is the value below which the instrument is not capable of measuring and reporting a value, and would be considered a nondetect. It is generally accepted that half of this value be used in place of zero for non-detected compounds (i.e., 0.005 ppb). Values below the MDL but above the MRL (i.e., "j-flagged" values) should be used without modification, because it is generally accepted that i-flagged values are better estimates than those provided by other methods. Approximately 91% and 53% of the TCEQ benzene and o-xylene data, repectively, are at or below the TCEQ MDLs. Essentially the comparisons between the data medians are unable to detect a true difference in data due to the majority of the TCEQ dataset being at or below the MDLs for these two chemicals

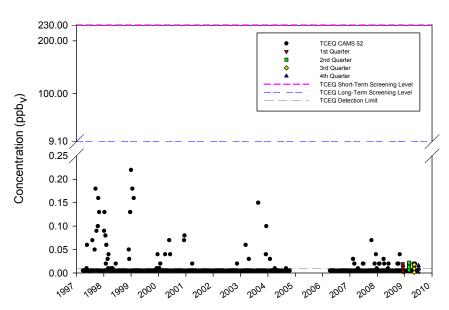
The TD also conducted statistical comparisons (Figure 10; Appendix A) of the averages of the historical CAMS 52 monitor and the averages of each of the seven VOC monitoring sites using a One-Way Analysis of Variance (ANOVA). Based on this analysis, differences in the mean values among all of the monitoring sites were not great enough to exclude the possibility that differences were due to random sampling variability ($\alpha = 0.05$), and therefore there were no significant differences observed between the CAMS 52 monitor and the seven VOC study monitors.

Ultimately there were no significant differences found from these comparisons. Therefore, these analyses indicate that the measured concentrations of VOCs for the study are typical for this area as compared with the historical CAMS 52 monitor data. Since no differences were found between the historical data and all seven of the VOC monitors across Midlothian, these data also indicate that CAMS 52 is a good indicator of VOC measurements across Midlothian (Figure 11).

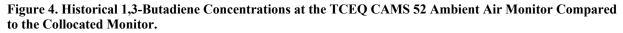
1 4010 11 111	ann vv meneg it		m rest comparing	1 OLQ
VOC	Monitor	Median	Significantly Different	P-value
	CAMS 52	0.005		
1,3-Butadiene	Collocated Monitor	0.011	Yes	<0.001
	CAMS 52	0.200		
Benzene	Collocated Monitor	0.206	No	0.770
	CAMS 52	0.160		
Toluene	Collocated Monitor	0.150	No	0.285
	CAMS 52	0.0200		
Ethylbenzene	Collocated Monitor	0.0245	No	0.148
	CAMS 52	0.0600		
p+m-Xylene	Collocated Monitor	0.0525	No	0.730
	CAMS 52	0.010		
o-Xylene	Collocated Monitor	0.026	Yes	0.022
Significance lev	el is P>0.05			

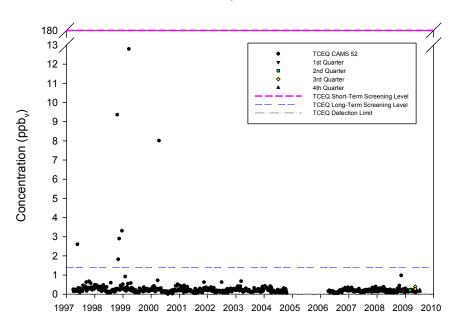
Table 7. Mann-Whitney Rank Sum Test comparing TCEQ CAMS 52 to the Collocated Study Monitor.

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data



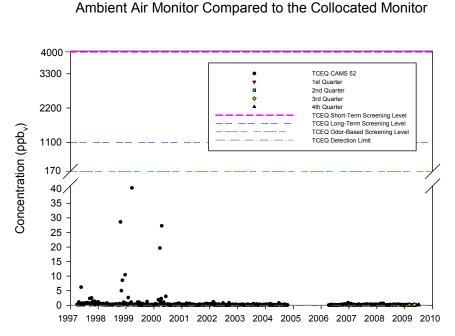
Historical 1,3-Butadiene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor





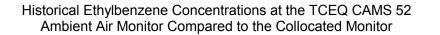
Historical Benzene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor

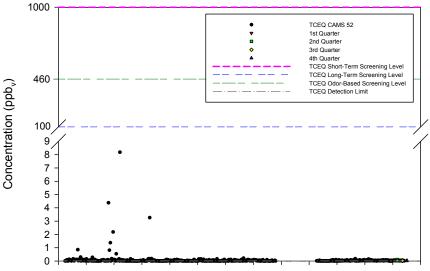
Figure 5. Historical Benzene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor.



Historical Toluene Concentrations at the TCEQ CAMS 52

Figure 6. Historical Toluene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor.



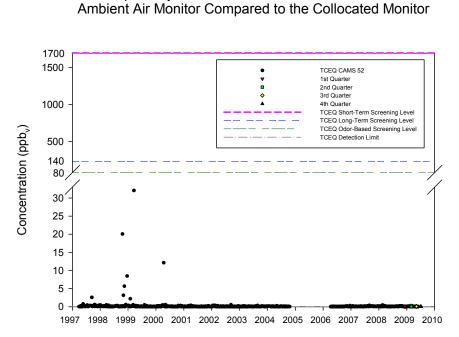


1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Figure 7. Historical Ethylbenzene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor.

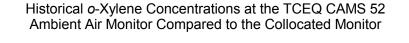
Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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Historical p+m-Xylene Concentrations at the TCEQ CAMS 52

Figure 8. Historical *p*+*m*-Xylene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor.



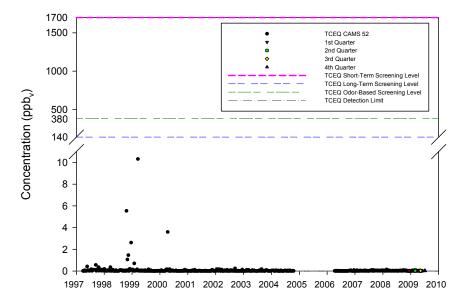
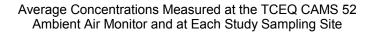


Figure 9. Historical *o*-Xylene Concentrations at the TCEQ CAMS 52 Ambient Air Monitor Compared to the Collocated Monitor.



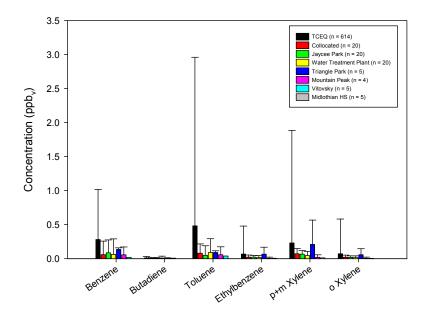
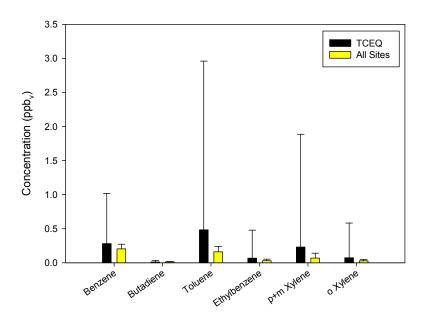


Figure 10. Average VOC Concentrations ± Standard Deviation Measured at the TCEQ CAMS 52 Ambient Air Monitor and at Each Study Sampling Site.



Average Concentration Measured at the TCEQ CAMS 52 Ambient Air Monitor and at All Sampling Sites in the Study

Figure 11. Average VOC Concentration ± Standard Deviation Measured at the TCEQ CAMS 52 Ambient Air Monitor and at All Sampling Sites in the Study.

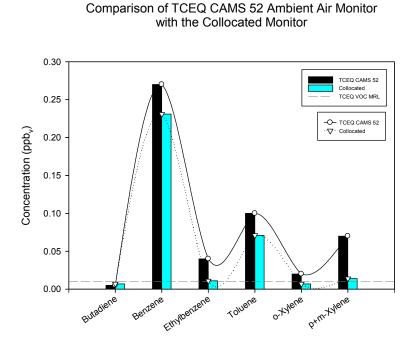
Collocated Monitor Comparisons

This comparison is designed to help answer, in regards to VOCs, the citizen question: *Is the TCEQ every* 6^{th} *day monitoring site an accurate representation of daily air concentrations in Midlothian?* There are two interpretations for this question. The first is, are the data from the TCEQ CAMS 52 monitor representative of concentrations in the city? The second is, are the industries increasing emissions on non-regulatory sampling days? For this study, a monitor was collocated with the TCEQ CAMS 52 monitor, which is predominately downwind of TXI and Gerdau Ameristeel. One day out of each sampling quarter overlapped with the existing TCEQ every 6^{th} -day ambient air monitoring schedule. The monitoring schedule is ongoing and predetermined by EPA; previous and current sampling calendars can be found here: <u>http://www.epa.gov/ttnamti1/calendar.html</u>. The overlapping sampling days and concentrations are listed in Table 8.

	December 8, 2008		March 2, 2009		May 7, 2	009	July 6, 2009	
	Concentration (ppb _v)		Concentration (ppb _v)		Concentratio	n (ppb _v)	Concentration (ppb _v)	
Compound	TCEQ CAMS 52	Collocated	TCEQ CAMS 52	Collocated	TCEQ CAMS 52	Collocated	TCEQ CAMS 52	Collocated
1,3-Butadiene	0.005	0.007	0.005	0.022	0.005	0.009	0.005	0.009
Benzene	0.27	0.231	0.21	0.21	0.18	0.246	0.13	0.227
Ethylbenzene	0.04	0.011	0.03	0.028	0.02	0.024	0.04	0.019
Toluene	0.1	0.071	0.17	0.173	0.1	0.142	0.19	0.11
o-Xylene	0.02	0.007	0.03	0.026	0.005	0.033	0.04	0.017
p+m-Xylene	0.07	0.014	0.08	0.06	0.04	0.056	0.09	0.012

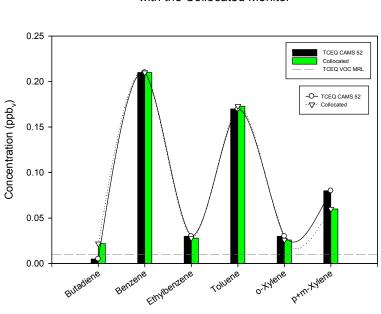
 Table 8. Overlapping TCEQ CAMS 52 and Collocated Monitor Sampling Days.

Since there were only two samples collected on the overlapping sampling day, one from each monitor, a statistical analysis of the individual data pairs could not be performed. However, a comparison could be conducted on a grouping of the four TCEO every 6th-day samples as compared to the corresponding four Collocated monitor samples. Such a comparison would help show if any statistical differences existed between the two sample sets. Therefore, the TD conducted this statistical comparison (Appendix B) using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. Only one out of the six data comparisons failed the normality test and/or the equal variance test (p < 0.05). The one that failed was run using the Mann-Whitney Rank Sum Test. Only one significant difference was found; according to the t-test the 1,3-butadiene Collocated monitor samples were significantly higher than the TCEQ samples. When looking closer at the data, all four TCEQ 1,3-butadiene samples were non-detect, in which case ¹/₂ the MRL was used for comparisons. Since all four TCEO 1,3-butadiene samples are below the MRL, there is no way to know if this detected difference is actually statistically significant or not. Qualitatively, the pattern and concentrations of the two samples are very similar (Figures 12 - 15). Since the only statistical difference was detected from a comparison on non-detect samples to detected samples, and all other comparisons found no statistical differences between the TCEO CAMS 52 every 6^{th} -day data and the corresponding Collocated monitor data, this indicates that the TCEO CAMS 52 ambient air monitor is an accurate representation of VOC air concentrations measured at this site. Also, the assumption can be made that the Collocated monitor is a good representation of what the CAMS 52 monitor would measure.



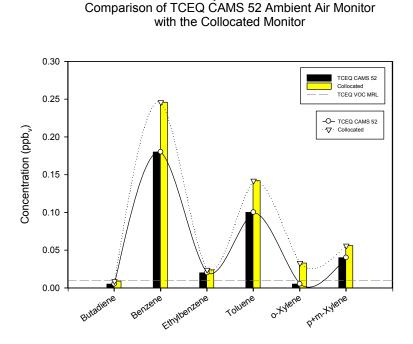
December 8, 2008

Figure 12. December 8, 2008 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Study Monitor.



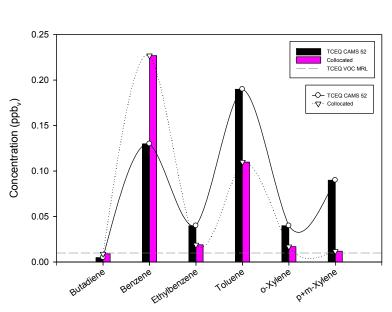
March 2, 2009 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Monitor

Figure 13. March 2, 2009 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Study Monitor.



May 7, 2009

Figure 14. May 7, 2009 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Study Monitor.



July 6, 2009 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Monitor

Figure 15. July 6, 2009 Comparison of TCEQ CAMS 52 Ambient Air Monitor with the Collocated Study Monitor.

Since there was only one every 6^{th} -day sample corresponding to the five Collocated monitor samples per quarter a statistical analysis of the individual 6^{th} -day sample paired with the surrounding four days of samlpes could not be performed. However, a comparison could be conducted on a grouping of the four TCEQ every 6^{th} -day samples as compared to the surounding sixteen Collocated monitor samples. Such a comparison would help show if any statistical differences existed between the two sample sets. Therefore, the TD conducted this statistical comparison (Appendix B) using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. All but one of the six data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. No significant differences were found between the *TCEQ every* 6^{th} -day samples and the other sixteen days of surrounding Collocated monitor samples indicates that there is no difference between a regulatory every 6^{th} -day sampling day and the other sampled days during this study. Since the sampling dates were not released publicly the assumption can be made that this is representative of typical conditions throughout the year.

Using the assumption from above that the TCEQ CAMS 52 and the Collocated monitor data are similar, the TD conducted statistical comparisons (Appendix B) between the Collocated monitor data and all of the other six study VOC monitoring sites using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. All but four data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. Significant differences are as follows:

➢ Benzene

• Collocated monitor *significantly higher than* Mountain Peak and Midlothian High School

When looking at the graphed data, the Mountain Peak and Midlothian High School data have a similar pattern to the Collocated monitor data, as well as similar daily wind patterns to the Collocated monitor data (Figure 16). Both the Mountain Peak and Midlothian High School benzene concentrations are lower than those measured at the Collocated monitor; the CAMS 52 monitoring site concentrations were significantly higher than at the other two monitoring sites. *Since only one VOC, benzene, showed any differences at two of the six sites compared to the Collocated monitor, these comparisons indicate that the CAMS 52 monitoring site is a good indicator of air quality in regards to VOCs in Midlothian.*

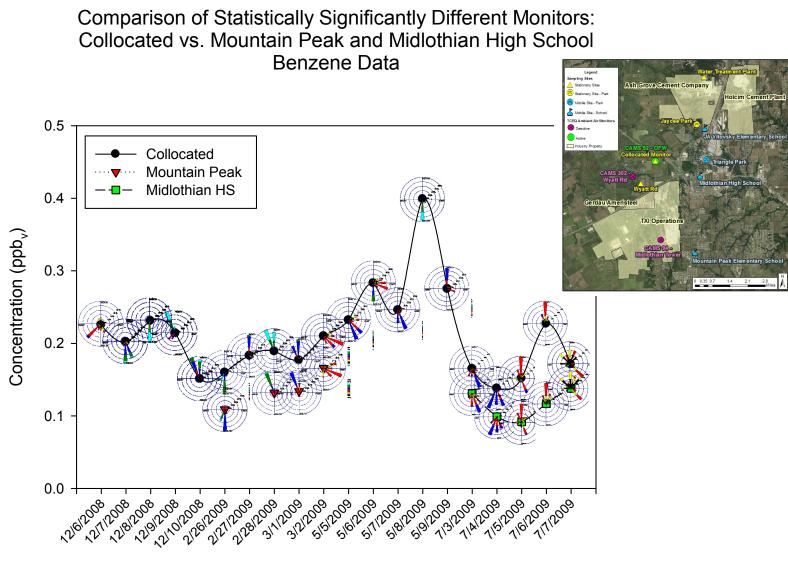


Figure 16. Observed Statistical Differences in Benzene Data for Collocated Monitor Comparisons with Daily Wind Rose Overlays.

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Monitoring Site Comparisons

Comparisons between the monitoring sites were designed to help answer, in regards to VOCs, the citizen question: *How are industries in Midlothian affecting air quality?* For this section, several different comparisons were conducted:

- > Comparisons with all four quarters of data
 - Stationary sites
 - Mobile sites
 - All sites
- Comparisons of individual quarterly data
- Seasonal variation comparisons

Comparisons with All Four Quarters of Data

Multiple comparisons with all four quarters of data were performed in order to identify statistical differences. The TD conducted statistical comparisons (Appendix C; Raw Data Figures K-1 – K-6) between the three stationary, four mobile, and all seven VOC monitoring sites using an ANOVA. For an overview of the ANOVA procedure, please see Figure 17.

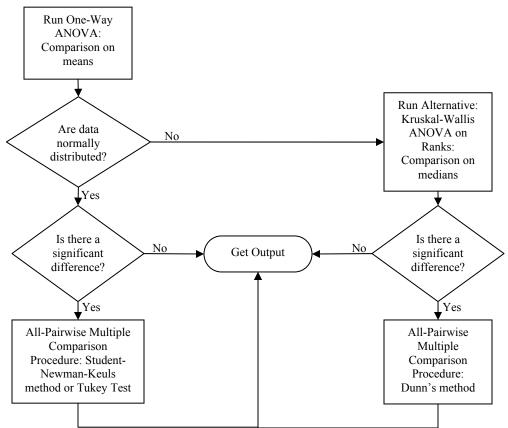


Figure 17. Flow-Chart of ANOVA Statistical Comparisons.

When an ANOVA is performed, if the data fails normality and/or the equal variance test (p < 0.05), as an alternative, an ANOVA on Ranks is conducted using the Kruskal-Wallis One-Way Analysis of Variance

on Ranks. For this analysis data medians are compared and significant differences are determined if the difference in the median values between the compared groups are greater than would be expected by chance (p < 0.05). If significant differences are found an All-Pairwise Multiple Comparison Procedure is performed using Dunn's Method. If the data pass the normality test then data means are compared and significant differences are determined if the difference in the mean values between the compared groups are greater than would be expected by chance (p < 0.05). If a significant difference is found, the Holm-Sidak, Student-Newman-Keuls, or the Tukey Test methods are used to perform an All-Pairwise Multiple Comparison Procedure.

All but two data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on ranks. Significant differences are as follows:

- Benzene (Mobile Sites)
 - Midlothian HS *significantly lower than* Triangle Park and JA Vitovsky
- Benzene (All Sites)
 - Midlothian HS significantly lower than JA Vitovsky

The only significant differences that were observed were between data from mobile sites. Mobile site data were collected in different sampling quarters and therefore also have different wind directions. Because these data don't have common sampling conditions a comparison between mobile sites is not an apples-to-apples comparison. While this is not an apples-to-apples comparison, the comparison was still conducted to illustrate that differences would likely exist. When looking at the graphed data (Figure 18), the daily wind patterns are very different for all three sites, as would be expected since sampling was conducted in different months. The benzene patterns are also different between these monitors, which would also be expected due to sampling being conducted at different times. *Since only one VOC showed a difference between the mobile sites (benzene), the majority of these data indicate that there are no differences between the stationary sites and the stationary and mobile sites for VOCs in this area. This indicates the sources of benzene, and VOCs in general, are likely not the identified industry in Midlothian, and are potentially due to mobile source contributions.*

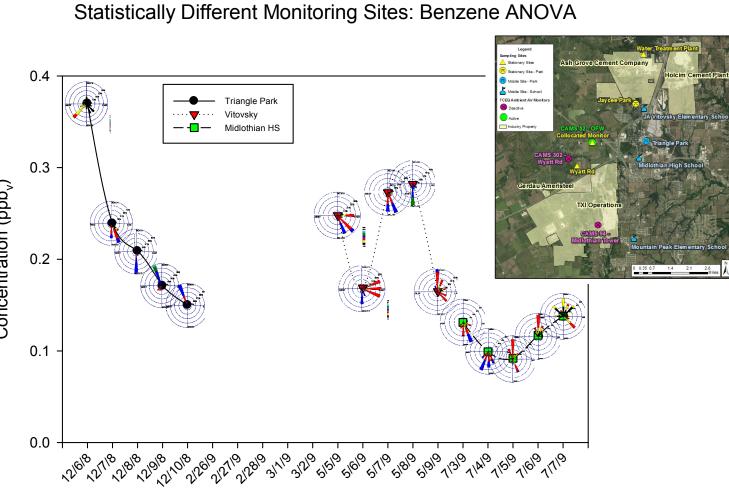


Figure 18. Observed Statistical Differences in Benzene Data ANOVA Analysis between Mobile and All Site Comparisons with Daily Wind Rose Overlays.

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Comparisons of Individual Quarterly Data

A comparison between all four sampling sites for each quarter was performed to determine any statistical differences. The TD conducted statistical comparisons (Appendix D; Raw Data Figures K-7 – K-30) between the four VOC monitoring sites for each quarter using an ANOVA. For an overview of the ANOVA procedure, please see Figure 17. Eleven of the twenty four data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences are as follows:

➢ Benzene (2nd Quarter)

 \triangleright

- Collocated monitor *significantly higher than* Water Treatment Plant and Mountain Peak Benzene (4th Quarter)
 - o Midlothian High School significantly lower than Collocated and Water Treatment Plant

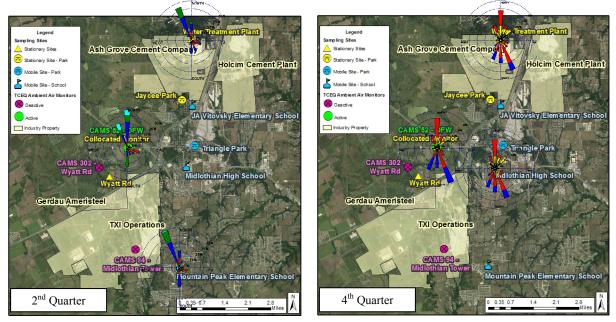


Figure 19. Maps Showing Quarterly Average Wind Directions for Significantly Different Monitoring Sites.

Figure 19 shows the quarterly average wind direction for the monitoring sites with significant differences. When looking at the graphed data for the second quarter (Figure 20), the Collocated, Water Treatment Plant and Mountain Peak monitors all have a similar pattern and daily wind patterns for this quarter. Both the Water Treatment Plant and the Mountain Peak Elementary School benzene concentrations are lower than those measured at the Collocated monitor. For the fourth quarter graphed data (Figure 21), the Midlothian High School benzene concentrations are lower than those measured at the Collocated monitors are lower than those measured at the Collocated and Water Treatment Plant monitors, which had a similar pattern in the data. While the benzene patterns at these monitors are similar, when looking at the wind direction the highest measurements do not necessarily correspond to days when the winds put the monitors downwind of industry. *This indicates the sources of benzene, and VOCs in general, are likely not the identified industry in Midlothian*.

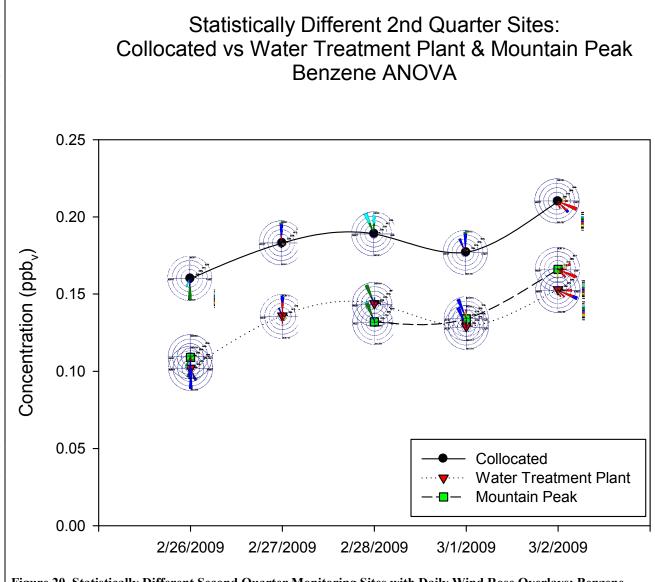


Figure 20. Statistically Different Second Quarter Monitoring Sites with Daily Wind Rose Overlays: Benzene.

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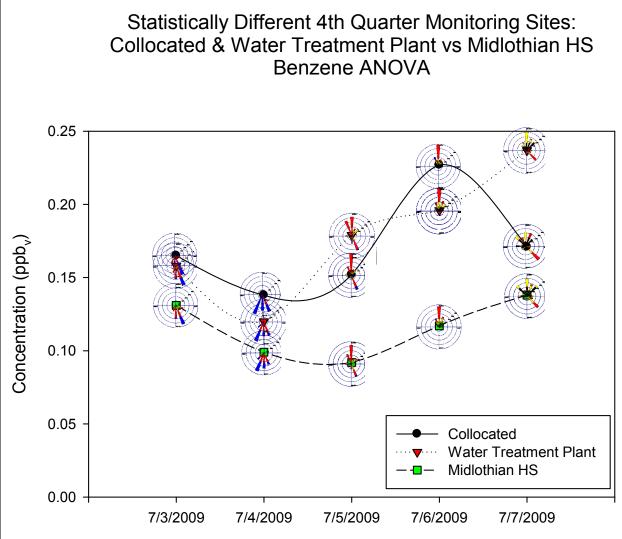


Figure 21. Statistically Different Fourth Quarter Monitoring Sites with Daily Wind Rose Overlays: Benzene.

Seasonal Variation

Since this study was conducted over four different samping quarters over the span of one year it stands to reason that wind direction may influence some observed differences in the data. Samples were collected in December, 2008 (1st quarter), February/March, 2009 (2nd quarter), May, 2009 (3rd Quarter), and July, 2009 (4th quarter). The span of the sampling months represents the winter, spring, and summer seasons. Typically, predominant wind directions in the summer are out of the southeast while in the winter more northerly winds are observed. The overall predominant wind direction for this area is out of the south. The question is, how does this affect the data comparisons; are there seasonal variations in the data due to differences in wind direction? This section is designed to provid insight into this question. The TD did a comparison of the quarterly data for each site to determine if there were any statistical differences observed between quarters using an ANOVA (Appendix E). For an overview of the ANOVA procedure, please see Figure 17. Nine of the eighteen data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences are as follows:

- Collocated monitor
 - Benzene:

• 3rd Quarter data *significantly higher than* 1st, 2nd, and 4th Quarter data

Jaycee Park

0

- o Benzene:
 - 3rd Quarter data *significantly higher than* 4th Quarter data
 - Ethylbenzene:
 - 2nd Quarter data *significantly higher than* 1st and 4th Quarter data
- Water Treatment Plant
 - o Benzene:
 - 3rd Quarter data *significantly higher than* 1st, 2nd, and 4th Quarter data

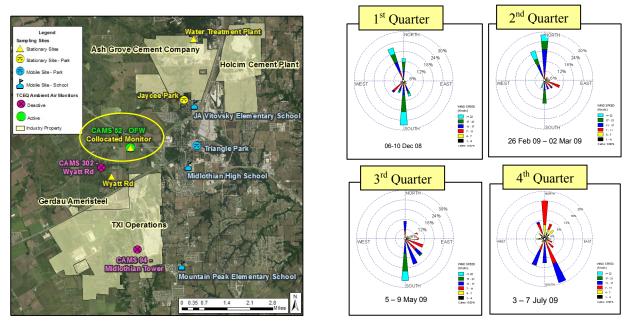


Figure 22. Map of Collocated Monitor Location and Quarterly Average Wind Directions.

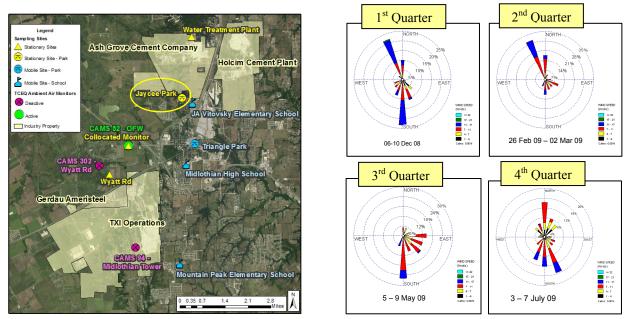


Figure 23. Map of Jaycee Park Monitor Location and Quarterly Average Wind Directions.

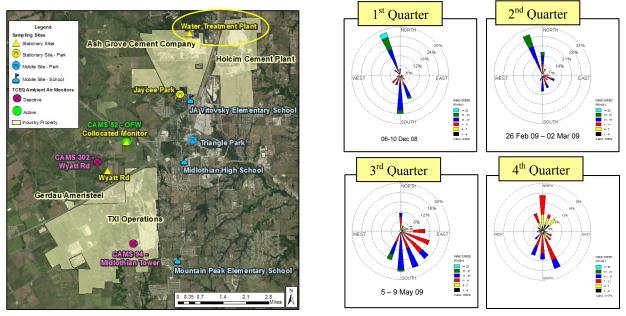


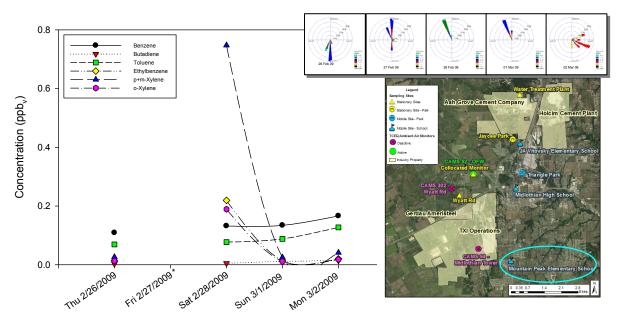
Figure 24. Map of Water Treatment Plant Monitor Location and Quarterly Average Wind Directions.

All three sites had statistical differences; out of eighteen comparisons, four showed statistical differences. Benzene was statistically higher in the 3^{rd} quarter at all three compared sites while ethylbenzene was higher in the 2^{nd} quarter. When looking at the average quarterly wind directions and the location of the monitors (Figures 22 – 24) the wind directions aren't what would be expected for the statistically higher quarters. The 3^{rd} quarter seems to be predominantly southerly winds, the 1^{st} and 2^{nd} quarters seem to be predominantly northerly winds, and the 4^{th} quarter seems to be predominantly southeast winds with northerly winds as well. Only two of the three monitors are located in a downwind position for southerly

winds, the Collocated monitor and the Water Treatment Plant. Since only one VOC showed a difference at all three sites (benzene) and one other VOC (ethylbenzene) showed a difference at only one of the three sites, the majority of these data indicate that there are no seasonal differences for VOCs in this area. This is likely due to mobile sources contributing to the ambient concentrations of VOCs in this area.

School Comparisons

Three of the mobile sites were located at Midlothian area schools: Mountain Peak Elementary School, JA Vitovsky Elementary School, and Midlothian High School. Once focus of the mobile sites was shifted from area parks to area schools a question the citizens expressed was whether or not emissions from school buses, or other idling vehicles, have an impact on air quality at the schools. In an attempt to answer this question in regards to VOCs, at least one sampling day was conducted over the weekend. Since there are only five samples, one for each sampling day at each site, a statistical comparison could not be conducted on this data. However, a qualitative look at the data may also be informative. Figures 25 - 27 show the daily measured concentrations for the highlighted VOCs in this evaluation at each school. Based on the limited sampling it is difficult to get a clear picture of the potential differences between the weekend and the weekdays. When looking at the graphical data, some measured concentrations of VOCs appear to decrease during the weekend, while others appear to increase. In looking at the location of the schools versus the wind direction, some of the higher concentrations appear to be associated with wind directions that put the location downwind of industry. Conversly, some of the higher concentrations also appear to be associated with wind directions that put the location upwind of industry. Due to the limited dataset no clear discernable pattern can be observed and therefore no clear conclusions can be drawn.



Daily Measured VOC Concentrations at Mountain Peak Elementary School

Figure 25. Daily Measured VOC Concentrations at Mountain Peak Elementary School with Daily Wind Direction.

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^{*}Sample voided after laboratory air leaked into the canister

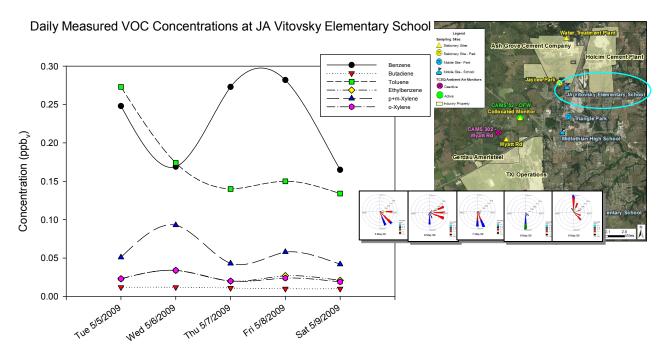


Figure 26. Daily Measured VOC Concentrations at JA Vitovsky Elementary School with Daily Wind Direction.



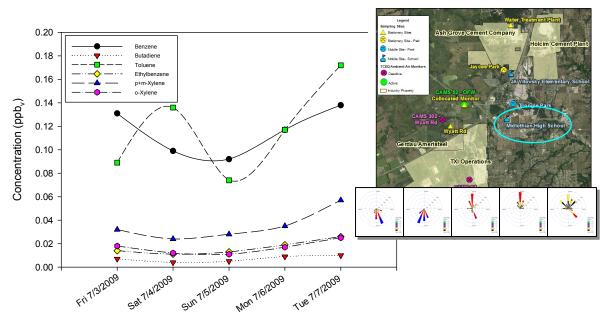


Figure 27. Daily Measured VOC Concentrations at Midlothian High School with Daily Wind Direction.

Metals

Air Monitoring Comparison Value (AMCV) Screening

For this study, the sample collection and analyses for metals were required to be representative of PM_{10} ; the required methods were method 40 CFR part 50 Appendix J for sample collection and ICP/MS method IO-3.5 for analysis, except for hexavalent chromium (chromium six, or CrVI or Cr⁶⁺), which was to be sampled and analyzed by California Air Resources Board (CARB) method 049. As stated in the beginning of the *Evaluation* section, PM_{10} is the size fraction that DSHS suggested and the citizen advisory committee agreed upon. A full target analyte list can be found in Table 4 (located in the VOC AMCV Screening section above). Ambient air concentrations of 21 metals were measured at all four of the stationary sampling sites, as well as at all the mobile sites. All monitored concentrations were compared to TCEQ's health- and welfare-protective comparison values, including ESLs and ReVs (where available) or, collectively, AMCVs. A discussion of AMCVs and their use can be found in the VOC AMCV Screening section above. All measured concentrations of PM_{10} metals were well below their respective appropriate short- and long-term AMCVs. *Therefore, we would not expect short- or long-term exposures to these concentrations to be of a health concern*.

Historical Data Comparisons

As mentioned above in the VOC Historical Data Comparisons section, an important citizen question identified for this study includes: *How are industries in Midlothian affecting air quality?* After the study began, citizens also had concerns on how the suspension of the operation of TXI's two operational wet kilns would affect the outcome of the study. In order to address these concerns, the TD compared PM_{10} metals concentrations to historical 24-hour every 6th day PM_{10} metals data. Since the metals fraction collected at CAMS 52 is $PM_{2.5}$, it is not technically accurate to compare PM_{10} data to $PM_{2.5}$ data; the only predominantly downwind PM_{10} metals data available in Midlothian is from the former TCEQ CAMS 302 monitoring site (1241 E Wyatt Road), which collected samples from January 1, 2001 to June 26, 2004. This comparison can show what the PM_{10} metals levels at CAMS 302 have historically been measured at compared to the measured levels for the study.

For this PM_{10} metals evaluation, aluminum, chromium (total), manganese, lead, and nickel were compared to their historical data. These five PM_{10} metals represent ones the public, in general, has shown concern for, and in which historical PM_{10} data are available for Midlothian. The TD conducted statistical comparisons (Figures 29 - 33; Appendix F) on the historical data versus the Collocated monitor data with Student's t-test using SigmaPlot v11.0 statistical graphing software. For an overview of the Student's t-test procedure, please see Figure 3. All data failed the normality test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. According to this test, chromium, manganese, lead, and nickel historical data are significantly higher than the Collocated monitor data. *The historical data are higher than the study data; however, the TCEQ CAMS 302 monitor is closer to industry than the TCEQ CAMS 52 and Collocated monitors. A difference in monitored values is expected due to the location and proximity to industry, and is observed between the Collocated and Wyatt Rd study monitors.*

The TD also conducted statistical comparisons (Figure 34; Appendix F) of the averages of the historical CAMS 302 monitor and the averages of each of the eight PM_{10} metals study monitoring sites using a oneway ANOVA. For an overview of the ANOVA procedure, please see Figure 17. Three of the five ANOVAs (aluminum, chromium, and lead) determined there was a significant difference; however, the All-Pairwise Multiple Comparison Procedures resulted in no significant differences or "do not test". A result of "do not test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. It is to be noted that not testing the enclosed means is a procedural rule, and a result of "do not test" should be treated as if there is no significant difference between the means, even though one may appear to exist. Significant differences are as follows:

- > Manganese
 - Wyatt Rd *significantly higher than* CAMS 302, Collocated monitor, Jaycee Park, Water Treatment Plant, Triangle Park, Mountain Peak, JA Vitovsky, and Midlothian HS (Figure 35)
- Nickel
 - CAMS 302 *significantly higher than* Collocated monitor, Wyatt Rd, Jaycee Park, Water Treatment Plant, Triangle Park, Mountain Peak, JA Vitovsky, and Midlothian HS (Figure 36)

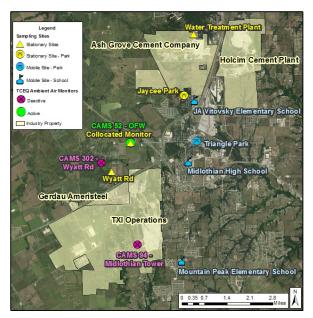
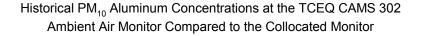


Figure 28. Map of Monitor Locations.

Figure 28 shows a map of the monitor locations in relation to the identified local industry. The difference in PM_{10} manganese observed between the averages of the CAMS 302 and the Wyatt Rd monitors (the closest monitor to the former CAMS 302 monitoring site) is 1.45 times; the Wyatt Rd site average is 1.45 times higher than the CAMS 302 historical average. For nickel, it is important to note that the TCEQ CAMS 302 data has a detection limit of 0.004 μ g/m³, which is well above the detection limit for the study. Only six of the 196 historical samples were detected. This statistical difference is due to the difference in detection limits and not necessarily representative of an actual difference in data. It is impossible to draw any conclusions from this set of data.

These data indicate the only real observed difference in PM_{10} metals data was for manganese; however, that difference is small, with the historical data still well below the AMCV. These analyses indicate that the measured concentrations of PM_{10} metals are likely typical for this area as compared with the historical CAMS 302 monitor data. This also indicates that CAMS 302 and CAMS 52 are good indicators of metals measurements across Midlothian (Figure 37).

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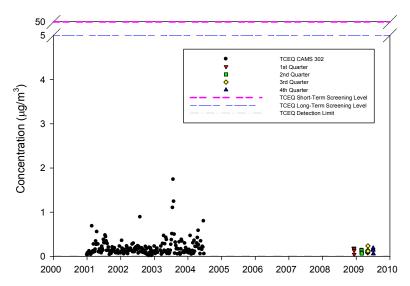
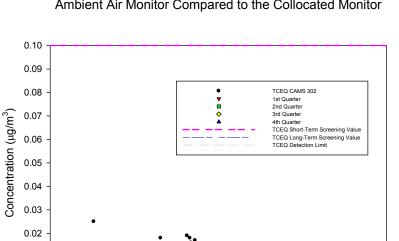


Figure 29. Historical PM₁₀ Aluminum Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor.



2005

2006

0.01

0.00

2000

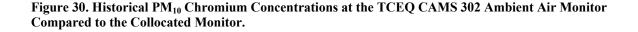
2001

2002

2003

2004

Historical PM₁₀ Chromium Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor



2007

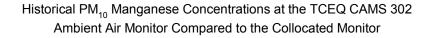
2008

¥ 🛯 🗞

2010

2009

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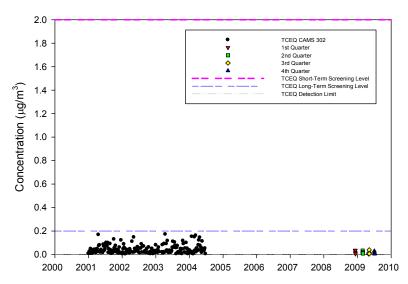
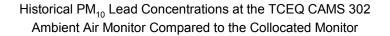


Figure 31. Historical PM₁₀ Manganese Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor.



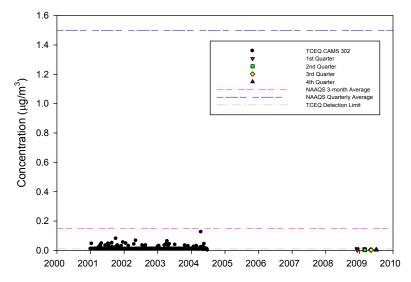
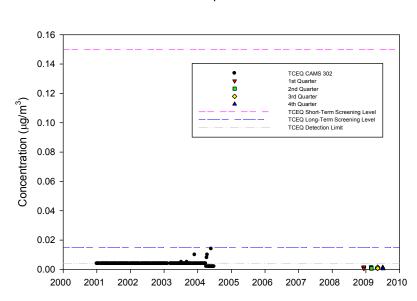
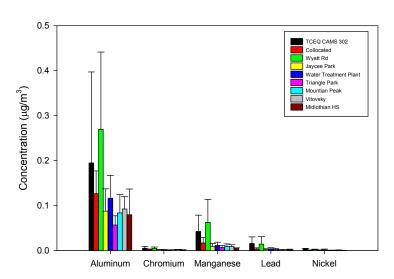


Figure 32. Historical PM₁₀ Lead Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor.



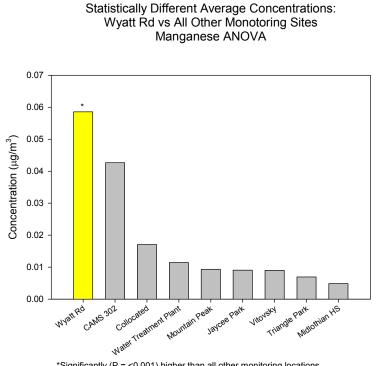
Historical PM₁₀ Nickel Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor

Figure 33. Historical PM₁₀ Nickel Concentrations at the TCEQ CAMS 302 Ambient Air Monitor Compared to the Collocated Monitor.



Average Concentration Measured at the TCEQ CAMS 302 Ambient Air Monitor and at Each Study Sampling Site

Figure 34. Average PM₁₀ Metals Concentrations Measured at the TCEQ CAMS 302 Ambient Air Monitor and at Each Sampling Site in the Study.



*Significantly (P = <0.001) higher than all other monitoring locations. **Figure 35. Statistically Different Average PM**₁₀ **Manganese Site Concentrations.**

Statistically Different Site Averages: CAMS 302 vs All Other Monitoring Sites

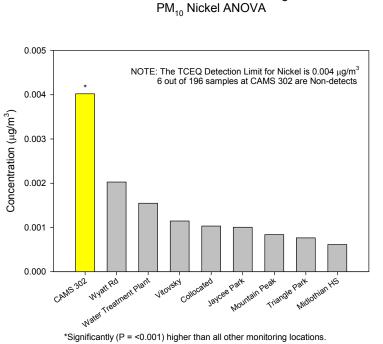


Figure 36. Statistically Different Average PM₁₀ Nickel Site Concentrations.

Average Concentration Measured at the TCEQ CAMS 302 Ambient Air Monitor and at All Sampling Sites in the Study

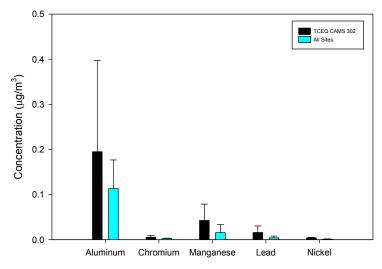


Figure 37. Average PM₁₀ Metals Concentrations Measured at the TCEQ CAMS 302 Ambient Air Monitor and at All Sampling Sites in the Study.

Collocated Monitor Comparisons

As with the VOC section above, this comparison is designed to help answer, in regards to PM_{10} metals, the citizen question: *Is the TCEQ every* 6th *day monitoring site an accurate representation of daily air concentrations in Midlothian?* There are two interpretations for this question. The first is, are the data from the TCEQ CAMS 52 monitor representative of concentrations in the city? The second is, are the industries increasing emissions on non-regulatory sampling days? For this study, a monitor was collocated with the TCEQ CAMS 52 monitor, the Collocated monitor; one day out of each sampling quarter overlapped with the existing TCEQ every 6th-day ambient air monitoring schedule. Information on the EPA monitoring schedule and the overlapping sampling days can be found in the VOC Collocated Monitor Comparisons section above.

In the VOC Collocated Monitor Comparisons section above a comparison was conducted on a grouping of the four TCEQ every 6^{th} -day samples as compared to the corresponding four Collocated monitor samples to show if any statistical differences existed between the two sample sets. Since the comparison indicated that the TCEQ CAMS 52 ambient air monitor is an accurate representation of VOC air concentrations measured at this site, the assumption can be made that the Collocated monitor is a good representation of what the CAMS 52 monitor would measure. Since comparisons in this section cannot be done with CAMS 52 PM₁₀ metals data, as none exist, the assumption is that the VOC findings extend to PM₁₀ metals, and therefore the Collocated monitor data may be used for these comparisons in leiu of CAMS 52 data since there are no CAMS 52 PM₁₀ metals data available. Therefore, in this section the Collocated monitor data will be used in statistical comparisons in leiu of TCEQ CAMS 52 data.

Since there was only one every 6th-day sample corresponding to the five Collocated monitor samples per quarter a statistical analysis of the individual 6th-day sample paired with the surrounding four days of samlpes could not be performed. However, a comparison could be conducted on a grouping of the four Collocated samples corresponding to the every 6th-day TCEQ samples as compared to the surounding

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sixteen Collocated monitor samples. Such a comparison would help show if any statistical differences existed between the two sample sets. Therefore, the TD conducted this statistical comparison (Appendix G) using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. All but two of the six data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. No significant differences were found between the every 6th-day samples and the other sampling days. *The lack of significant difference between the corresponding Collocated every* 6th-day samples and the other sixteen days of surrounding Collocated monitor samples indicates that there is no difference between a regulatory every 6th-day sampling day and the other sampling dates were not released publicly the assumption can be made that this is representative of typical conditions throughout the year.

The TD also conducted statistical comparisons (Appendix G) between the Collocated data and all of the other seven study PM_{10} metals monitoring sites using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. Only 13 out of the 42 data comparisons passed the normality test and the equal variance test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. Significant differences are as follows:

- ➢ Aluminum
 - Collocated monitor *significantly lower than* Wyatt Rd, Jaycee Park, and Triangle Park (Figure 38)
- > Chromium
 - Collocated monitor *significantly lower than* Wyatt Rd (Figure 39)
 - Collocated monitor *significantly higher than* Jaycee Park, Water Treatment Plant, Triangle Park, Mountain Peak, and Midlothian HS (Figure 39)
- Manganese
 - Collocated monitor *significantly lower than* Wyatt Rd (Figure 40)
 - Collocated monitor significantly higher than Jaycee Park, and Midlothian HS (Figure 40)
- ➤ Lead
 - Collocated monitor *significantly lower than* Wyatt Rd (Figure 41)
 - Collocated monitor *significantly higher than* Mountain Peak, and JA Vitovsky (Figure 41)
- Nickel
 - Collocated monitor *significantly lower than* Wyatt Rd (Figure 42)
 - Collocated monitor *significantly higher than* Midlothian HS (Figure 42)
- > Mercury
 - Collocated monitor *significantly lower than* Mountain Peak (Figure 43)
 - Collocated monitor *significantly higher than* Water Treatment Plant, JA Vitovsky, and Midlothian HS (Figure 43)

When looking at the graphed data, for all the data in which Wyatt Rd was significantly different than the Collocated monitor, Wyatt Rd was consistently higher than the Collocated monitor. However, for all the data other than Wyatt Rd that were significantly different than the Collocated monitor, those monitors were consistently lower than the Collocated monitor, with the exception of Jaycee Park and Triangle Park for aluminum. Wind patterns were similar for all sites during their respective sampling days. When the winds were such that the Wyatt Rd and the Collocated monitors were downwind of industry (south, southeast), those monitors typically measured higher concentrations of PM_{10} metals than the other monitors. When winds were such that these monitors were upwind (northerly), they typically measured similar or lower concentrations of PM_{10} metals than the other monitors. *While the concentrations varied*

across the city at the different moitors, the Collocated and Wyatt Rd monitors consistently meansured the highest levels when they were located downwind of industry as compared to the other monitors. Since the Collocated monitor is in the predominantly downwind location, and is generally measuring either higher concentrations than the other study monitors or similar concentrations, depending on wind, this site is a good indicator of air quality around Midlothian by measuring potentially worst-case concentrations that the other monitoring sites did not.

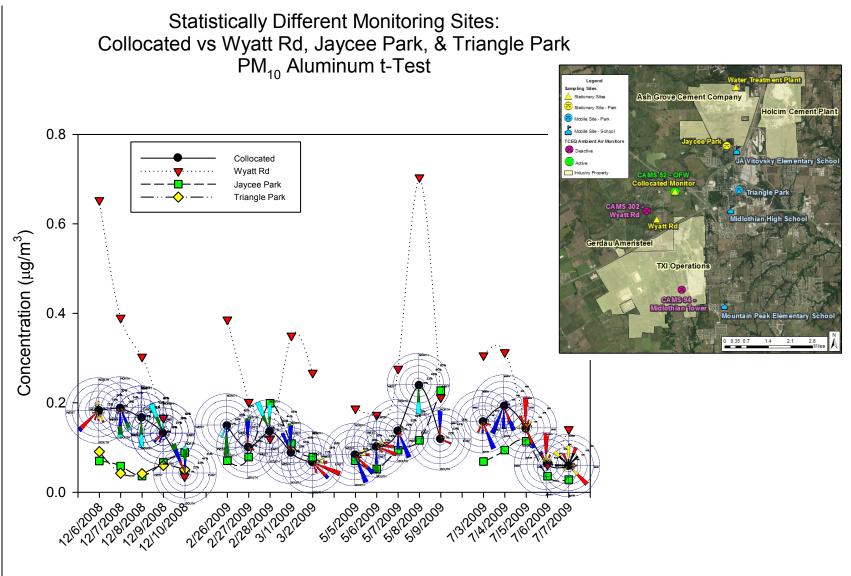


Figure 38. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Aluminum.

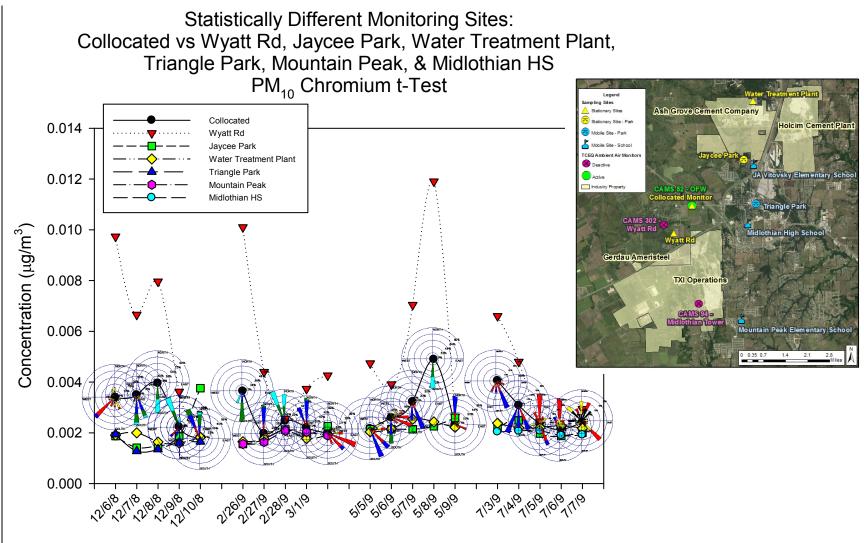


Figure 39. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Chromium.

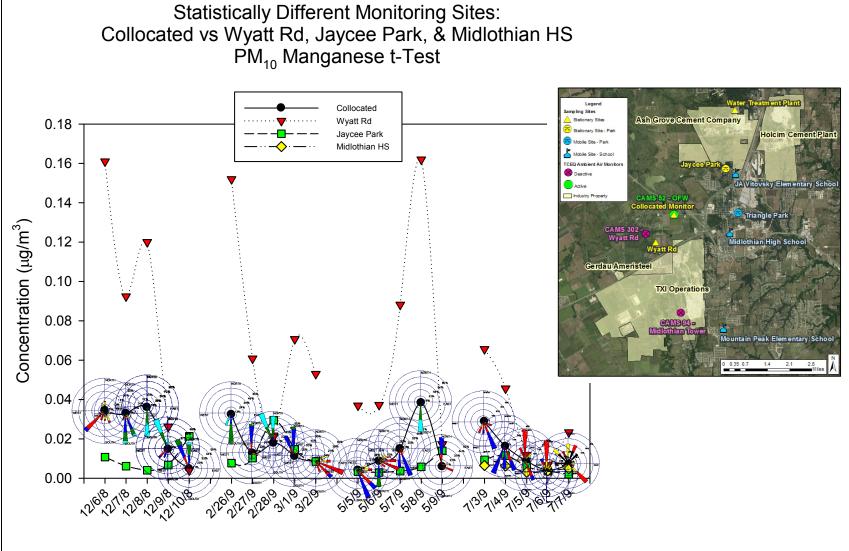


Figure 40. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Manganese.

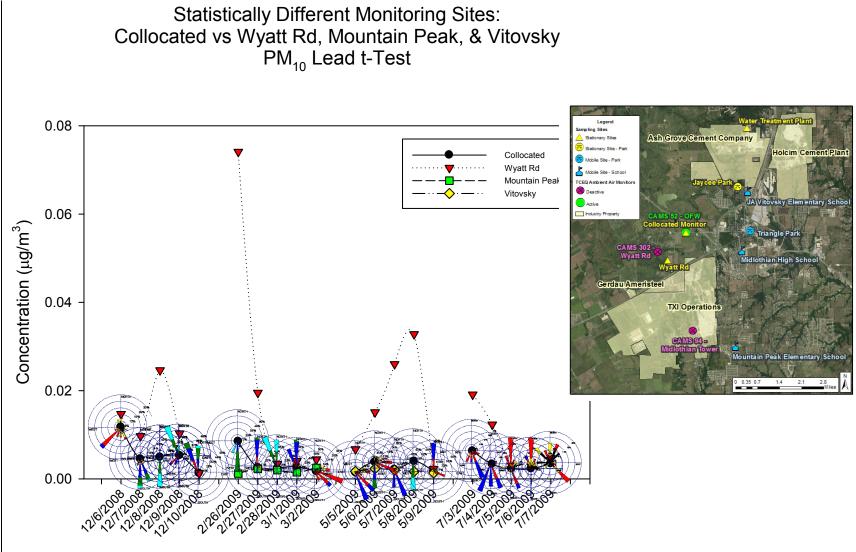


Figure 41. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Lead.

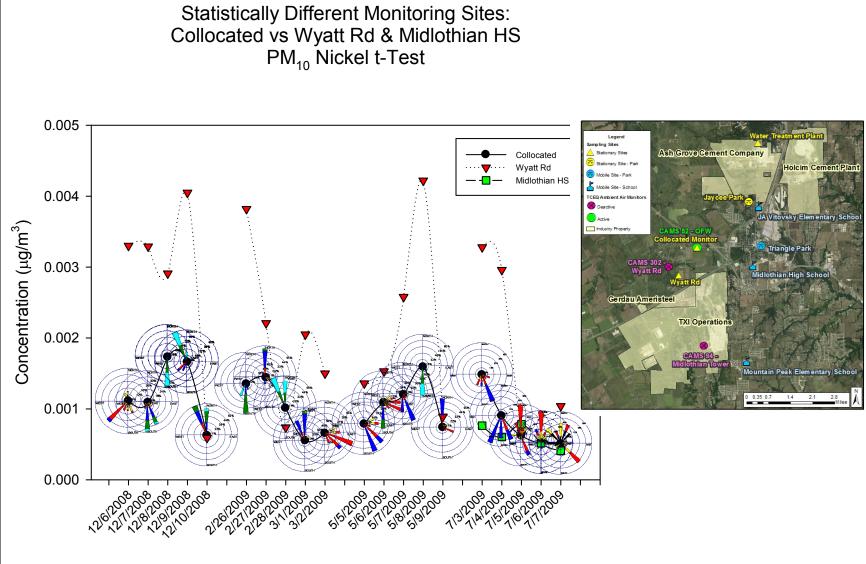


Figure 42. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Nickel.

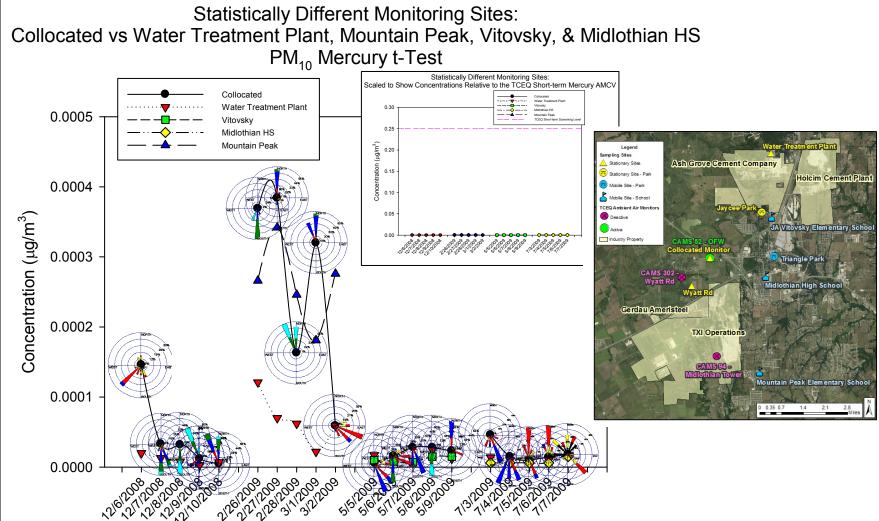


Figure 43. Statistically Different Sites as Compared to the Collocated Monitor: PM₁₀ Mercury. Inset graph shows monitored concentrations relative to the TCEQ mercury short-term AMCV of 0.25 µg/m³.

Monitoring Site Comparisons

As stated above, comparisons between the monitoring sites were designed to help answer, in regards to PM_{10} metals, the citizen question: *How are industries in Midlothian affecting air quality?* For this section, the same comparisons as stated in the VOC Monitoring Site Comparisons section above were conducted. While historical data for Midlothian are not available for mercury, which could not be included in the Historical Data Comparisons section above, mercury was included in this section as citizens have expressed concerns about this metal.

Comparisons with All Four Quarters of Data

Multiple comparisons with all four quarters of PM_{10} data were performed in order to determine statistical differences. The TD conducted statistical comparisons (Appendix H; Raw Data Figures K-31 – K-36) between the four stationary, four mobile, and all eight PM_{10} metals monitoring sites using a one-way ANOVA. For an overview of the ANOVA procedure, please see Figure 17. All but two data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences for mobile sites are as follows:

- Chromium (Figure 44)
 - o JA Vitovsky significantly higher than Triangle Park, Mountain Peak, and Midlothian HS
 - Midlothian HS *significantly higher than* Triangle Park
- > Nickel
 - JA Vitovsky *significantly higher than* Triangle Park and Midlothian HS (Figure 45)
- > Mercury
 - Mountain Peak *significantly higher than* Midlothian HS and JA Vitovsky (Figure 46)

Significant differences for mobile sites were observed between data from all four mobile sites. Mobile site data were collected in different sampling quarters and therefore also have different wind directions. Because these data don't have common sampling conditions a comparison between mobile sites is not an apples-to-apples comparison. While this is not an apples-to-apples comparison, the comparison was still conducted to illustrate that differences would likely exist. When looking at the graphed data, the daily wind patterns are very different for all three sites, as would be expected since sampling was conducted in different months. The PM_{10} metals patterns are also different between these monitors, which would also be expected due to sampling being conducted at different times. *Even though three* PM_{10} *metals showed differences between the mobile sites (chromium, nickel, and mercury), since these are not apples-to-apples comparisons the differences are likely attributed to the samples being collected on different dates, in different months, and with different wind directions.*

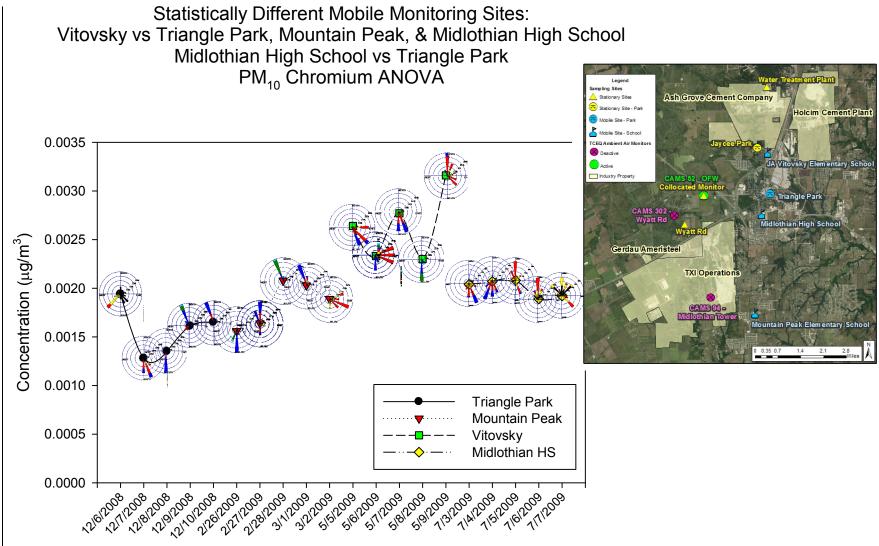


Figure 44. Observed Statistical Differences in PM₁₀ Chromium Data ANOVA Analysis between Mobile Site Comparisons.

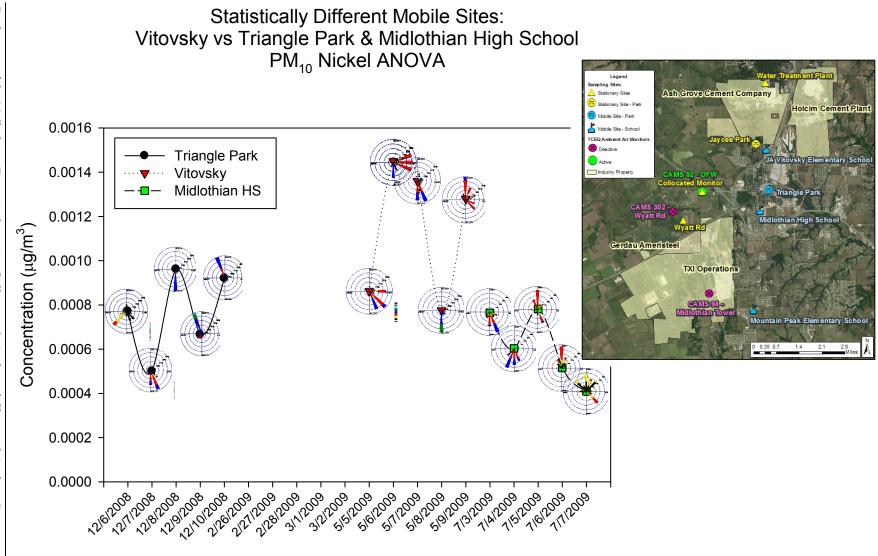


Figure 45. Observed Statistical Differences in PM₁₀ Nickel Data ANOVA Analysis between Mobile Site Comparisons.

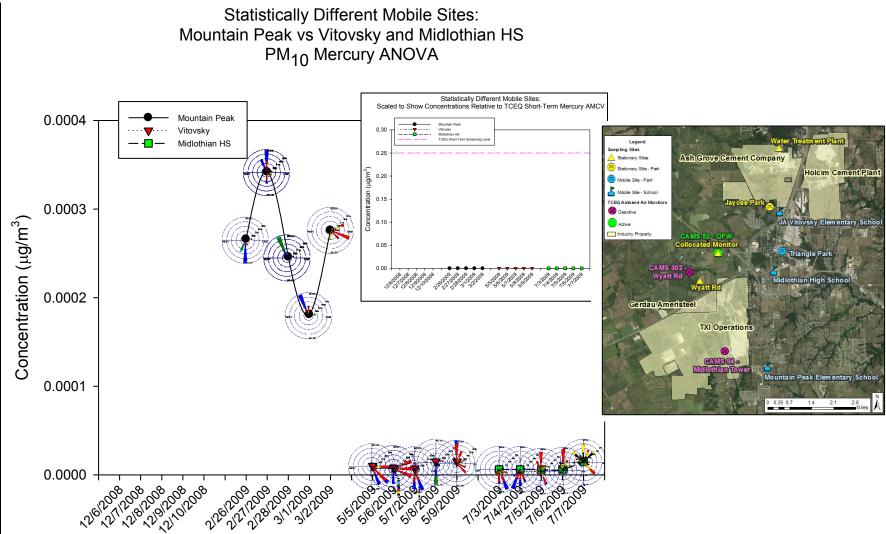


Figure 46. Observed Statistical Differences in PM₁₀ Mercury Data ANOVA Analysis between Mobile Site Comparisons. Inset graph shows monitored concentrations relative to the TCEQ mercury short-term AMCV of 0.25 µg/m³.

Significant differences for stationary sites are as follows:

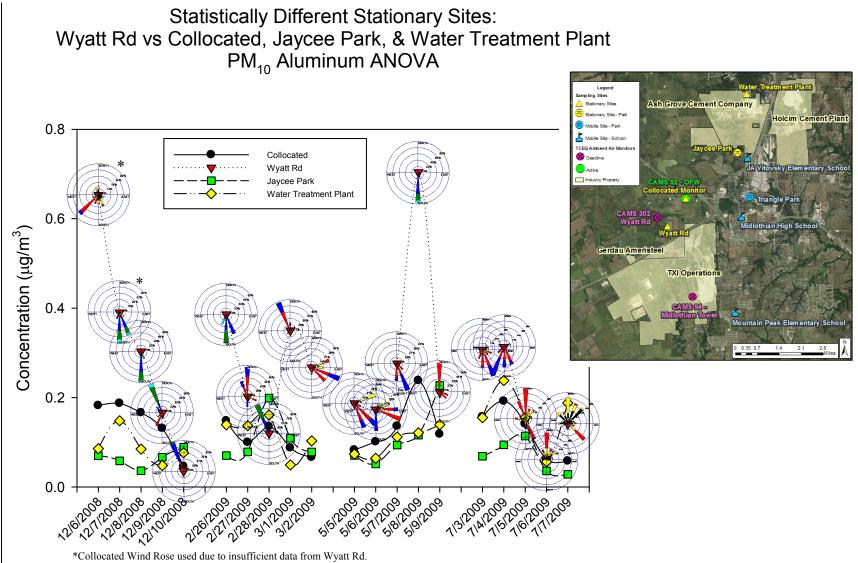
- > Aluminum
 - Wyatt Rd *significantly higher than* Collocated monitor, Jaycee Park, and Water Treatment Plant (Figure 47)
- Chromium (Figure 48)
 - Wyatt Rd significantly higher than Jaycee Park and Water Treatment Plant
 - o Collocated monitor significantly higher than Jaycee Park and Water Treatment Plant
- > Manganese
 - Wyatt Rd *significantly higher than* Collocated monitor, Jaycee Park, and Water Treatment Plant (Figure 49)
- ≻ Lead
 - Wyatt Rd *significantly higher than* Collocated monitor, Jaycee Park, and Water Treatment Plant (Figure 50)
- Nickel
 - Wyatt Rd *significantly higher than* Collocated monitor and Jaycee Park (Figures 51)

➢ Mercury

• Wyatt Rd *significantly higher than* Water Treatment Plant (Figures 52)

When looking at the graphed data, Wyatt Rd is consistently higher than other sites for all PM_{10} metals; for chromium the Collocated monitor is also consistently higher than the two other stationary sites. The Collocated monitor is approximately 1.1 miles north of TXI and 1.2 miles north, northeast of Gergau Ameristeel. The Wyatt Rd monitor is located closer to TXI (approximately 0.7 miles northwest) and Gerdau Ameristeel (approximately 0.5 miles north) than the Collocated monitor. It is expected that the levels measured at Wyatt Rd and at the Collocated monitor would be higher than levels in the community. This is because the center of the city is offwind from TXI and Gerdau Ameristeel and upwind of Ash Grove and Holcim. The term offwind refers to the fact that the city center is located approximately 2.4 miles to the northeast of TXI and Gerdau Ameristeel, which is off the wind path from TXI and Gerdau Ameristeel when winds are coming from the south and southeast. The term upwind refers to the fact that the city center is located approximately 2.5 miles to the south, southwest of Ash Grove and Holcim, in which case winds would be traveling from the city center toward the industries when winds are out of the south and southeast. Therefore, since the predominant wind direction is from the south and southeast in this area, and the city center is located northeast and southwest of the identified industries, the city is predominantly offwind or upwind of the local industries.

These analyses indicate that the measured concentrations of PM_{10} metals are different across Midlothian, with relatively higher levels measured closer to industry and lower levels measured within the community. This indicates that nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in Midlothian; however, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.



*Collocated Wind Rose used due to insufficient data from Wyatt Rd

Figure 47. Observed Statistical Differences in PM₁₀ Aluminum Data ANOVA Analysis between Stationary Site Comparisons.

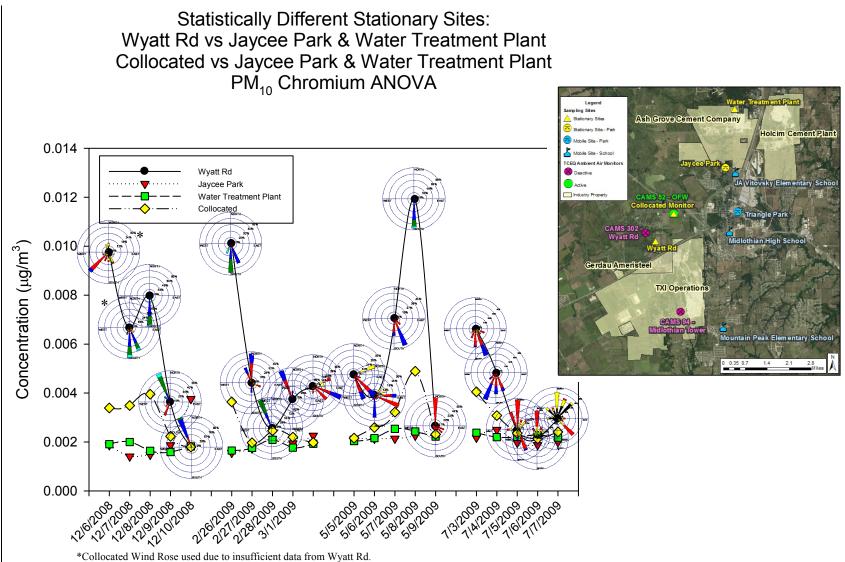


Figure 48. Observed Statistical Differences in PM₁₀ Chromium Data ANOVA Analysis between Stationary Site Comparisons.

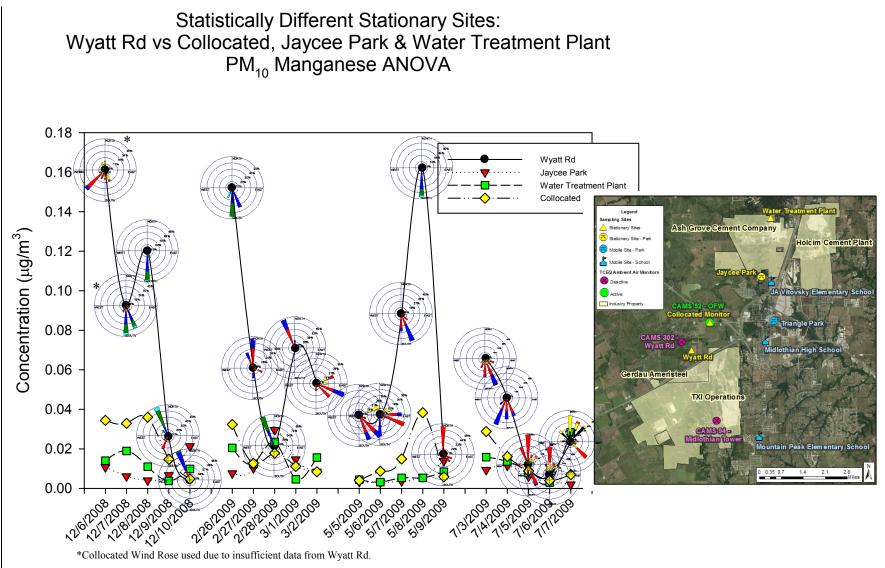


Figure 49. Observed Statistical Differences in PM₁₀ Manganese Data ANOVA Analysis between Stationary Site Comparisons.

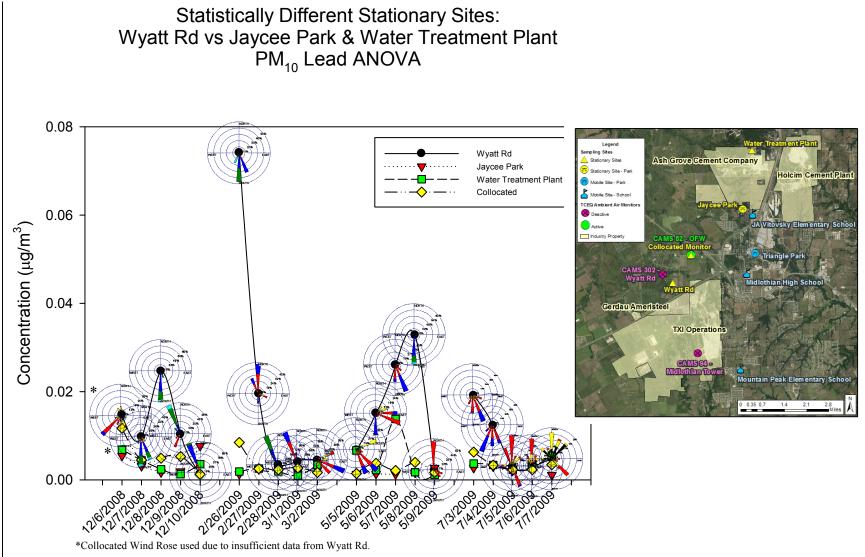


Figure 50. Observed Statistical Differences in PM₁₀ Lead Data ANOVA Analysis between Stationary Site Comparisons.

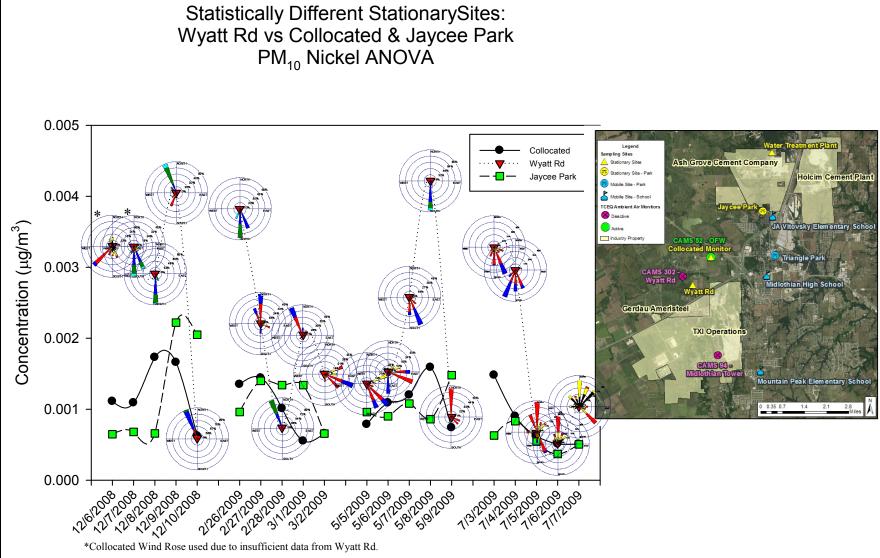


Figure 51. Observed Statistical Differences in PM₁₀ Nickel Data ANOVA Analysis between Stationary Site Comparisons.

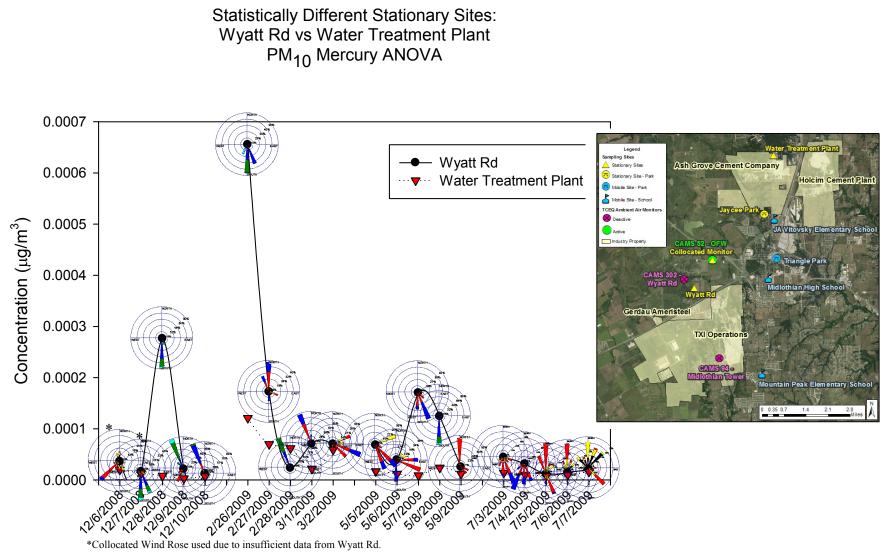


Figure 52. Observed Statistical Differences in PM₁₀ Mercury Data ANOVA Analysis between Stationary Site Comparisons.

Significant differences for all sites are as follows:

- > Aluminum
 - Wyatt Rd *significantly higher than* Triangle Park and Midlothian HS (Figure 53)
- > Chromium
 - Wyatt Rd *significantly higher than* Jaycee Park, Water Treatment Plant, Triangle Park, Mountain Peak, and Midlothian HS (Figure 54)
 - Triangle Park *significantly lower than* Collocated monitor and JA Vitovsky (Figure 55)
- ➤ Manganese
 - Wyatt Rd *significantly higher than* Jaycee Park, Triangle Park, and Midlothian HS (Figure 56)
- ≻ Lead
 - Wyatt Rd significantly higher than Mountain Peak and JA Vitovsky (Figure 57)
- Nickel
 - Wyatt Rd *significantly higher than* Midlothian HS (Figure 58)
- > Mercury
 - Mountain Peak *significantly higher than* Jaycee Park, Water Treatment Plant, JA Vitovsky, and Midlothian HS (Figure 59)

When looking at the graphed data, Wyatt Rd is consistently higher than other sites for all PM₁₀ metals; for chromium the Collocated monitor is also consistently higher. The Collocated monitor is approximately 1.1 miles north of TXI and 1.2 miles north, northeast of Gergau Ameristeel. The Wyatt Rd monitor is located closer to TXI (approximately 0.7 miles northwest) and Gerdau Ameristeel (approximately 0.5 miles north) than the Collocated monitor. It is expected that the levels measured at Wyatt Rd and at the Collocated monitor would be higher than levels in the community. This is because the center of the city is offwind from TXI and Gerdau Ameristeel and upwind of Ash Grove and Holcim. The term offwind refers to the fact that the city center is located approximately 2.4 miles to the northeast of TXI and Gerdau Ameristeel, which is off the wind path from TXI and Gerdau Ameristeel when winds are coming from the south and southeast. The term upwind refers to the fact that the city center is located approximately 2.5 miles to the south, southwest of Ash Grove and Holcim, in which case winds would be traveling from the city center toward the industries when winds are out of the south and southeast. Therefore, since the predominant wind direction is from the south and southeast in this area, and the city center is located northeast and southwest of the identified industries, the city is predominantly offwind or upwind of the local industries. However, Mountain Peak has relatively higher levels of mercury as compared to most other monitors. When looking at this graphically, all but two of the other monitors have differences due to different sampling days. While there were statistical differences observed on the same sampling days, Mountain Peak levels were similar to, or slightly below, those at Wyatt Rd and the Collocated monitor. Due to a large variance in wind direction those five days, there is no clear source for the relatively higher levels. Nonetheless, all measured levels were well below the short-term AMCV of 0.25 μ g/m³ for mercury and are not of a health concern.

These analyses indicate that the measured concentrations of PM_{10} metals are different across Midlothian, with relatively higher levels measured closer to industry and lower levels measured within the community. This indicates that nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in Midlothian; however, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

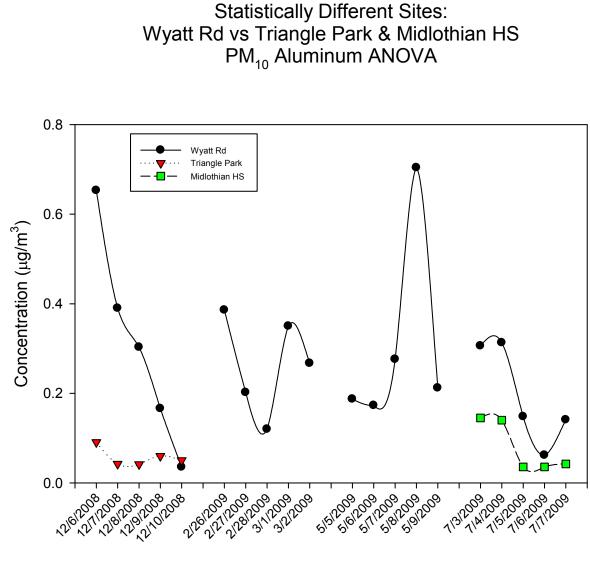


Figure 53. Observed Statistical Differences in PM₁₀ Aluminum Data ANOVA Analysis between All Site Comparisons.

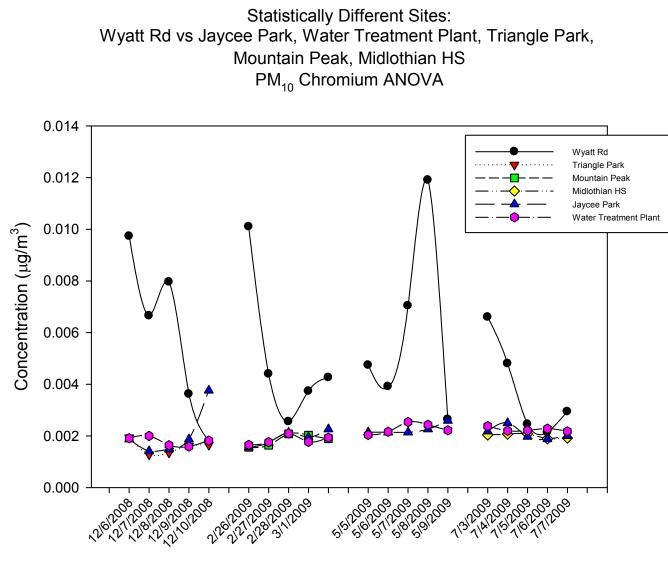


Figure 54. Observed Statistical Differences in PM₁₀ Chromium Data ANOVA Analysis between All Site Comparisons.

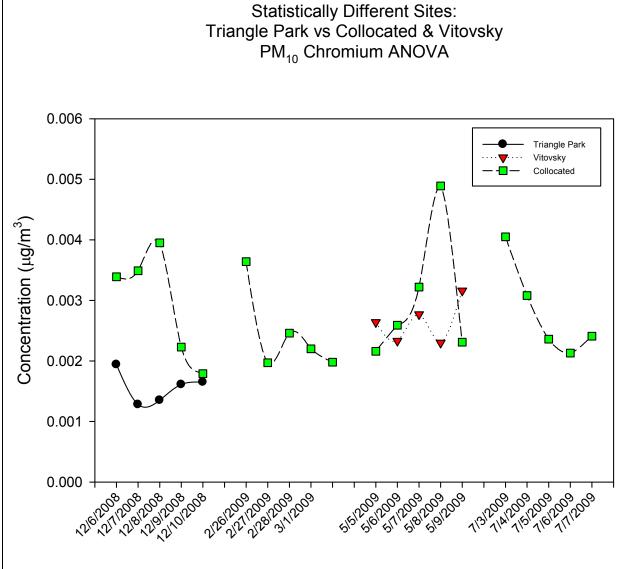


Figure 55. Observed Statistical Differences in PM₁₀ Chromium Data ANOVA Analysis between All Site Comparisons.

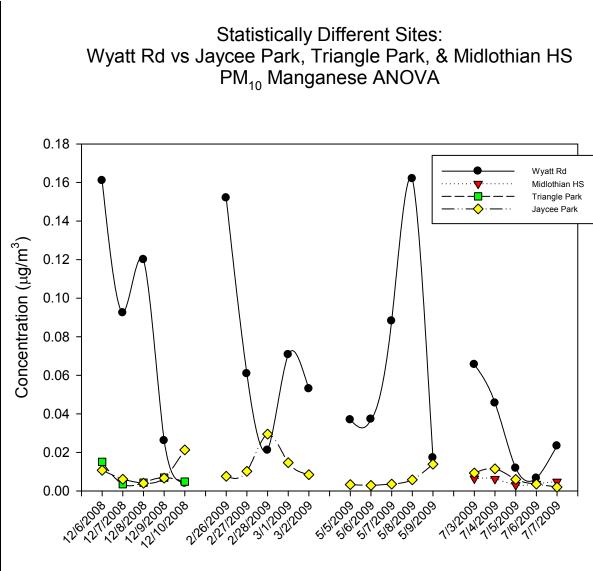


Figure 56. Observed Statistical Differences in PM₁₀ Manganese Data ANOVA Analysis between All Site Comparisons.

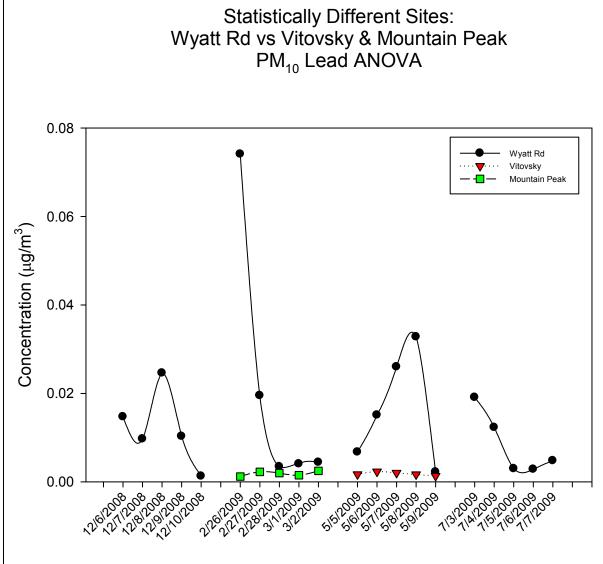


Figure 57. Observed Statistical Differences in PM₁₀ Lead Data ANOVA Analysis between All Site Comparisons.

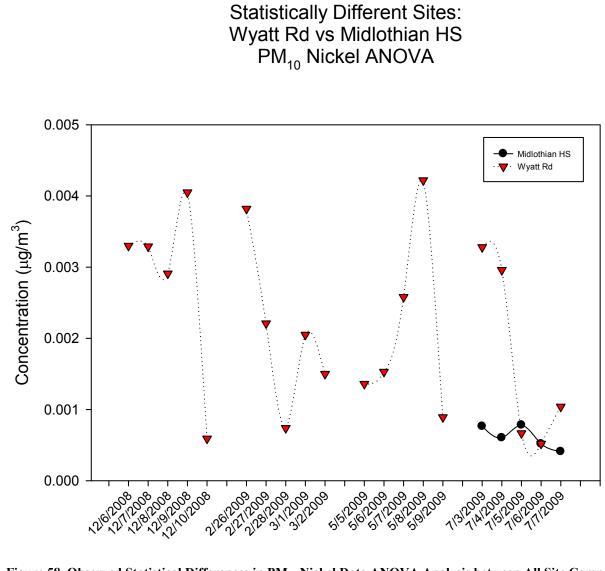


Figure 58. Observed Statistical Differences in PM₁₀ Nickel Data ANOVA Analysis between All Site Comparisons.

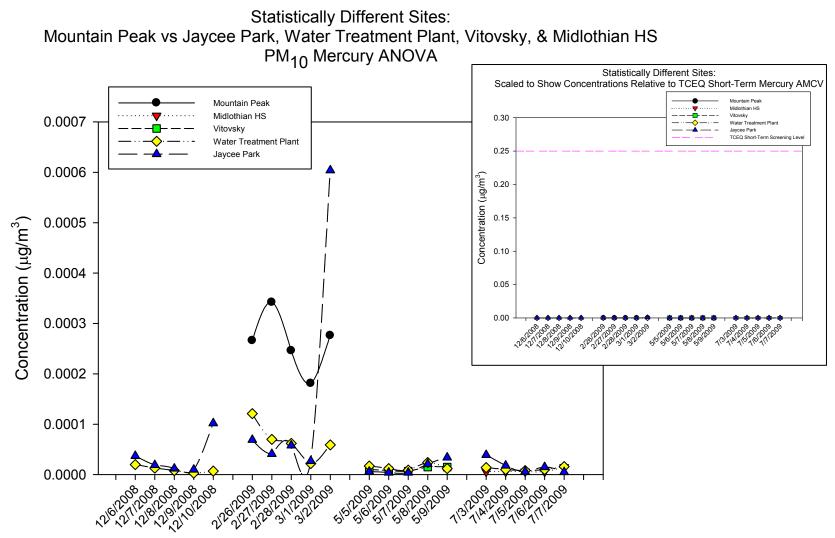


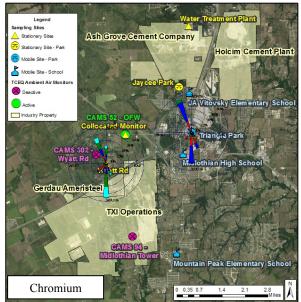
Figure 59. Observed Statistical Differences in PM₁₀ Mercury Data ANOVA Analysis between All Site Comparisons. Inset graph shows monitored concentrations relative to the TCEQ mercury short-term AMCV of 0.25 µg/m³.

Comparisons of Individual Quarterly Data

A comparison between all four sampling sites for each quarter was performed on the PM_{10} metals data to determine any statistical differences. The TD conducted statistical comparisons (Appendix I; Raw Data Figures K-37 – K-60) between the five PM_{10} metals monitoring sites for each quarter using a one-way ANOVA. For an overview of the ANOVA procedure, please see Figure 17. Only two of the twenty four data comparisons passed the normality test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences are as follows:

1st Quarter significant differences:

- > Chromium
 - Wyatt Rd *significantly higher than* Triangle Park (Figure 61)



CAMS 52 Wind data used for Wyatt Rd due to insufficient data collection at Wyatt Rd

Figure 60. Map Showing 1st Quarter Average Wind Directions for Significantly Different Monitoring Sites.

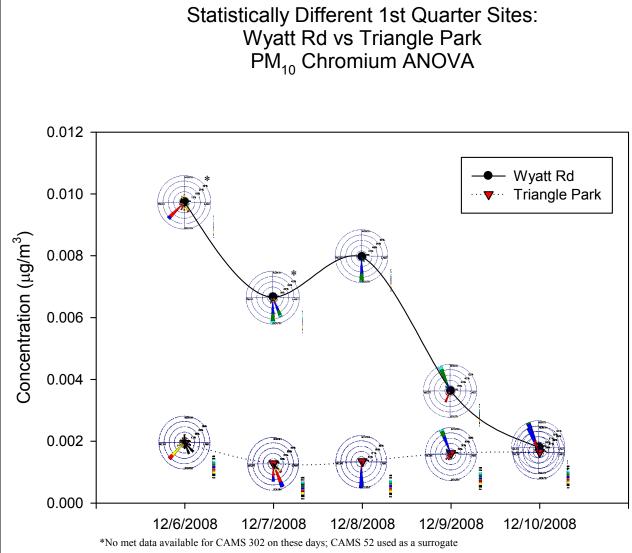


Figure 61. Statistically Different First Quarter Monitoring Sites with Daily Wind Rose Overlays: PM₁₀ Chromium

2nd Quarter significant differences:

- > Aluminum
 - Wyatt Rd *significantly higher than* Collocated monitor, Jaycee Park, Water Treatment Plant, and Mountain Peak (Figure 63)
- Chromium
 - Wyatt Rd *significantly higher than* Jaycee Park, Water Treatment Plant, and Mountain Peak (Figure 64)
- ➢ Manganese
 - Wyatt Rd significantly higher than Mountain Peak (Figure 65)
- Lead
 - Wyatt Rd *significantly higher than* Mountain Peak and Jaycee Park (Figure 66)

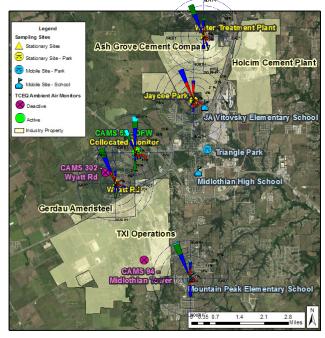


Figure 62. Map Showing 2nd Quarter Average Wind Directions for Significantly Different Monitoring Sites.

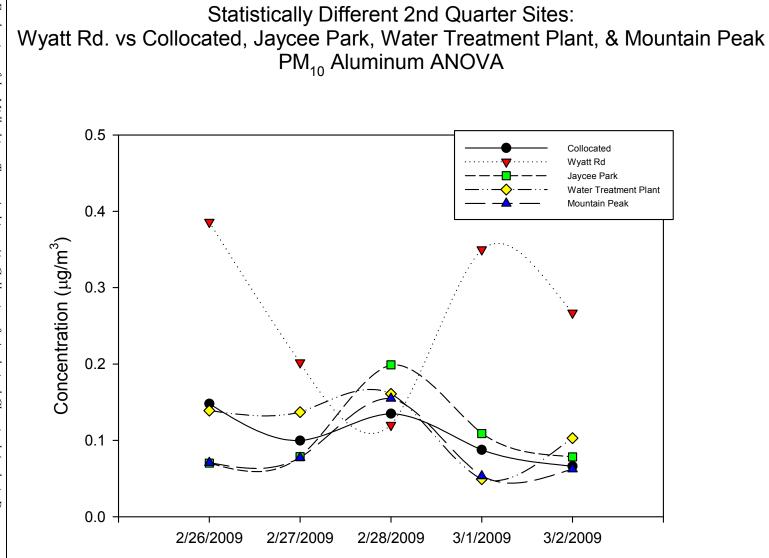
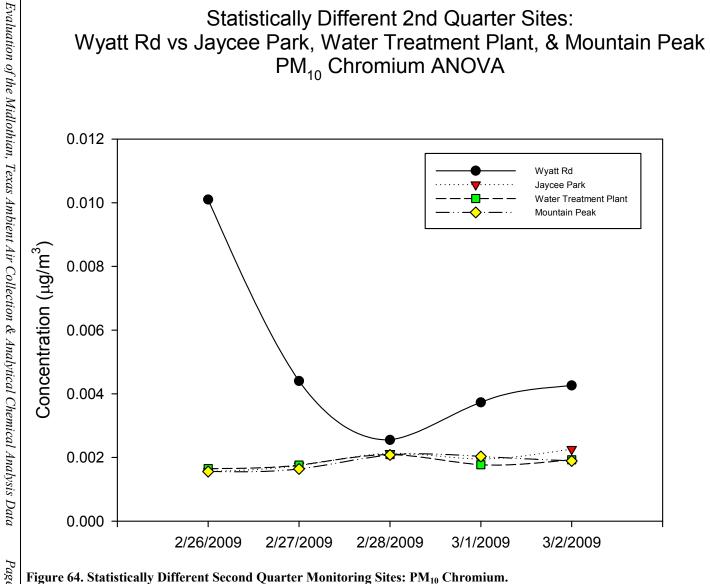


Figure 63. Statistically Different Second Quarter Monitoring Sites: PM₁₀ Aluminum.



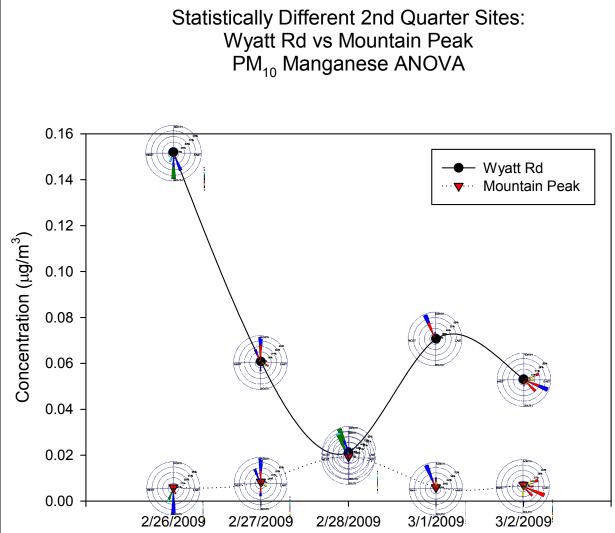


Figure 65. Statistically Different Second Quarter Monitoring Sites with Daily Wind Rose Overlays: PM₁₀ Manganese.

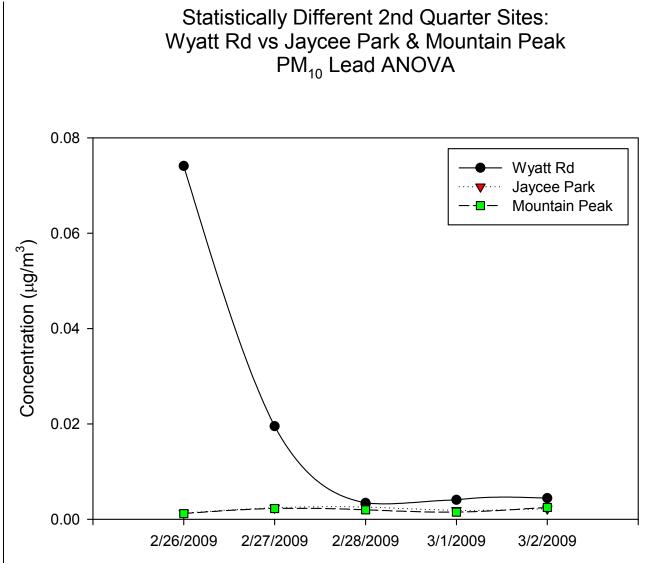


Figure 66. Statistically Different Second Quarter Monitoring Sites: PM₁₀ Lead.

<u>3rd</u> Quarter significant differences:

- > Aluminum
 - Wyatt Rd *significantly higher than* Vitovsky (Figure 68)
- > Chromium
 - Wyatt Rd *significantly higher than* Jaycee Park and Water Treatment Plant (Figure 69)
- Manganese
 - Wyatt Rd significantly higher than Jaycee Park and Water Treatment Plant (Figure 70)
- ► Lead
 - Wyatt Rd significantly higher than Jaycee Park (Figure 71)
- > Mercury
 - Wyatt Rd *significantly higher than* Jaycee Park and Vitovsky (Figure 72)

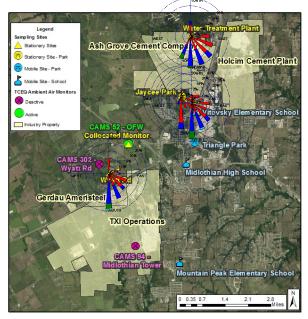


Figure 67. Map Showing 3rd Quarter Average Wind Directions for Significantly Different Monitoring Sites.

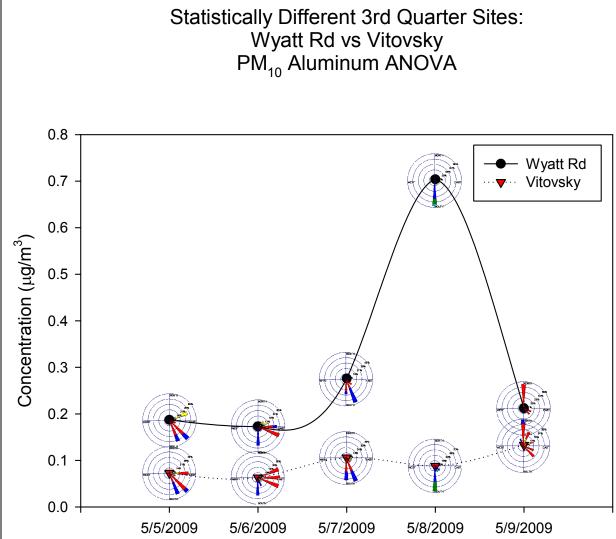


Figure 68. Statistically Different Third Quarter Monitoring Sites with Daily Wind Rose Overlays: PM₁₀ Aluminum.

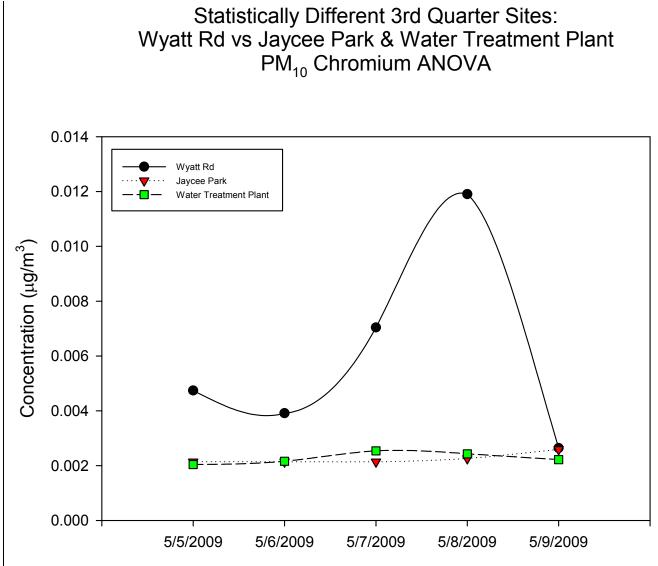


Figure 69. Statistically Different Third Quarter Monitoring Sites: PM₁₀ Chromium.

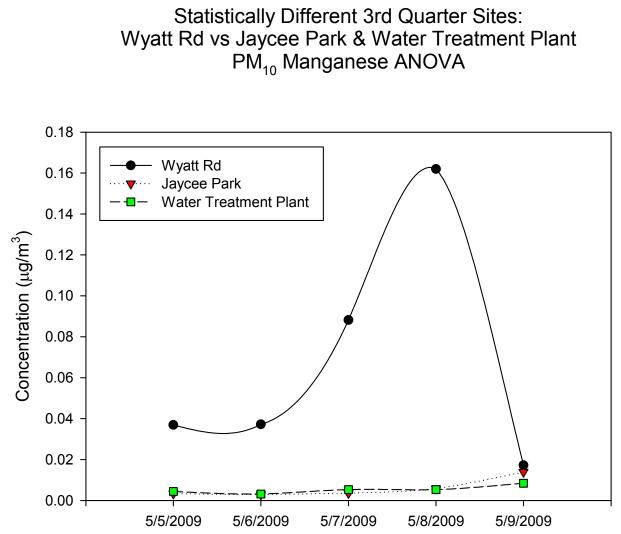


Figure 70. Statistically Different Third Quarter Monitoring Sites: PM₁₀ Manganese.

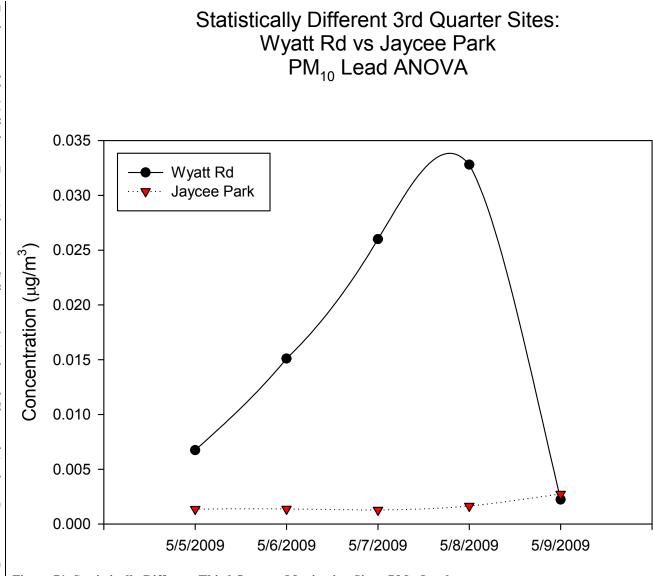


Figure 71. Statistically Different Third Quarter Monitoring Sites: PM₁₀ Lead.

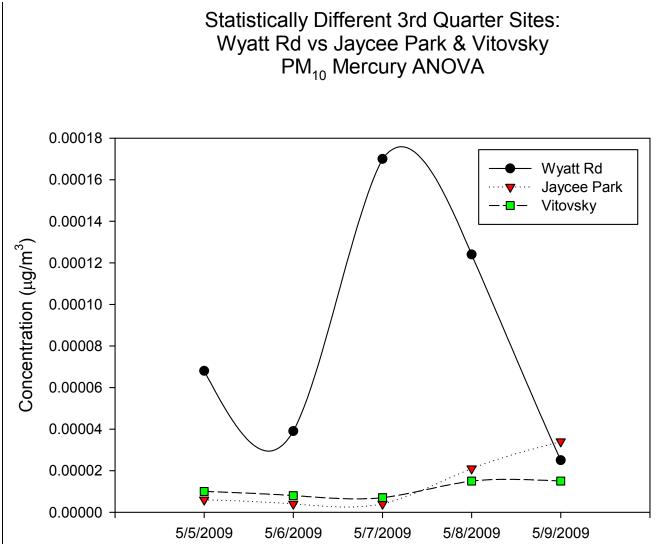


Figure 72. Statistically Different Third Quarter Monitoring Sites: PM₁₀ Mercury.

4th Quarter significant differences:

- Chromium
 - Wyatt Rd *significantly higher than* Midlothian High School (Figure 74)
- > Manganese
 - Wyatt Rd *significantly higher than* Midlothian High School (Figure 75)

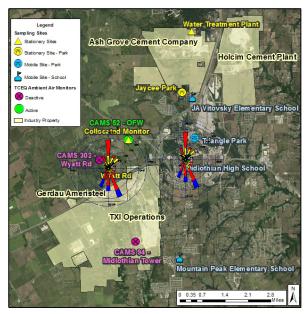


Figure 73. Map Showing 4th Quarter Average Wind Directions for Significantly Different Monitoring Sites.

Figures 60, 62, 67, and 73 show the quarterly average wind directions for monitoring sites with significant differences. When looking at the differences in all quarters graphically, Wyatt Rd typically has higher concentrations of PM₁₀ metals as compared to the monitors where significant differences were observed. The Collocated monitor is approximately 1.1 miles north of TXI and 1.2 miles north, northeast of Gergau Ameristeel. The Wyatt Rd monitor is located closer to TXI (approximately 0.7 miles northwest) and Gerdau Ameristeel (approximately 0.5 miles north) than the Collocated monitor. It is expected that the levels measured at Wyatt Rd and at the Collocated monitor would be higher than levels in the community. This is because the center of the city is offwind from TXI and Gerdau Ameristeel and upwind of Ash Grove and Holcim. The term offwind refers to the fact that the city center is located approximately 2.4 miles to the northeast of TXI and Gerdau Ameristeel, which is off the wind path from TXI and Gerdau Ameristeel when winds are coming from the south and southeast. The term upwind refers to the fact that the city center is located approximately 2.5 miles to the south, southwest of Ash Grove and Holcim, in which case winds would be traveling from the city center toward the industries when winds are out of the south and southeast. Therefore, since the predominant wind direction is from the south and southeast in this area, and the city center is located northeast and southwest of the identified industries, the city is predominantly offwind or upwind of the local industries. These analyses also indicate that the measured concentrations of PM_{10} are different across Midlothian, with relatively higher levels measured closer to industry and lower levels measured within the community. This indicates that nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in Midlothian; however, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.

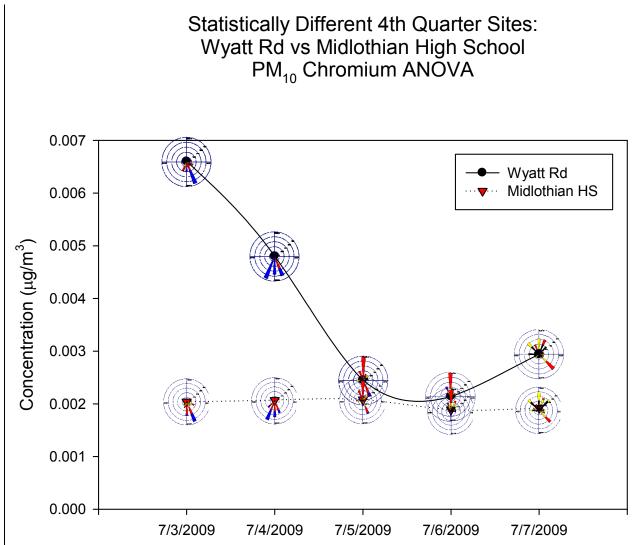


Figure 74. Statistically Different Fourth Quarter Monitoring Sites with Daily Wind Rose Overlays: PM₁₀ Chromium.

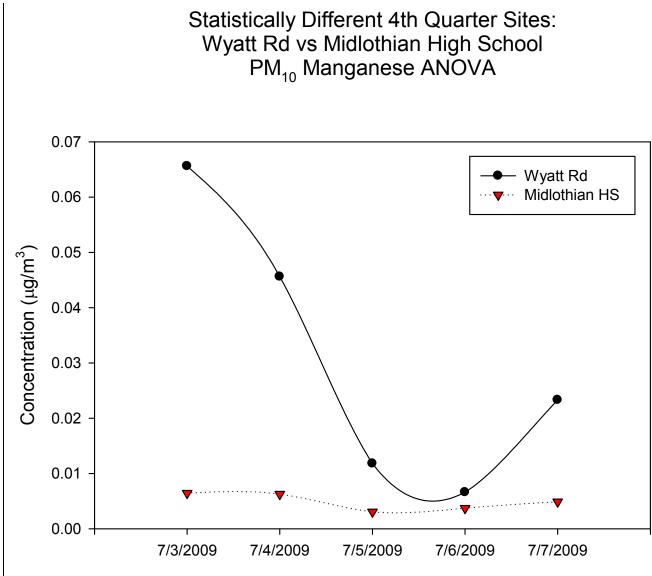


Figure 75. Statistically Different Fourth Quarter Monitoring Sites: PM₁₀ Manganese.

Seasonal Variation

Since this study was conducted over four different samping quarters over the span of one year it stands to reason that wind direction may influence some observed differences in the data. Samples were collected in December, 2008 (1st quarter), February/March, 2009 (2nd quarter), May, 2009 (3rd Quarter), and July, 2009 (4th quarter). The span of the sampling months represents the winter, spring, and summer seasons. Typically, predominant wind directions in the summer are out of the southeast while in the winter more northerly winds are observed. The overall predominant wind direction for this area is out of the south. The question is, how does this affect the data comparisons; are there seasonal variations in the data due to differences in wind direction? This section is designed to provid insight into this question. The TD did a comparison of the quarterly data for each site to determine if there were any statistical differences observed between quarters using an ANOVA (Appendix J). For an overview of the ANOVA procedure, please see Figure 17. Fourteen of the twenty four data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences are as follows:

- Collocated monitor
 - Mercury:

• 2nd Quarter data *significantly higher than* 3rd and 4th Quarter data

- Jaycee Park
 - Mercury:

• 2nd Quarter data *significantly higher than* 3rd Quarter data

- ➢ Water Treatment Plant
 - Chromium:
 - 3rd Quarter data *significantly higher than* 1st and 2nd Quarter data
 - 4th Quarter data *significantly higher than* 1st and 2nd Quarter data
 - Mercury:
 - 2nd Quarter data *significantly higher than* 1st and 4th Quarter data

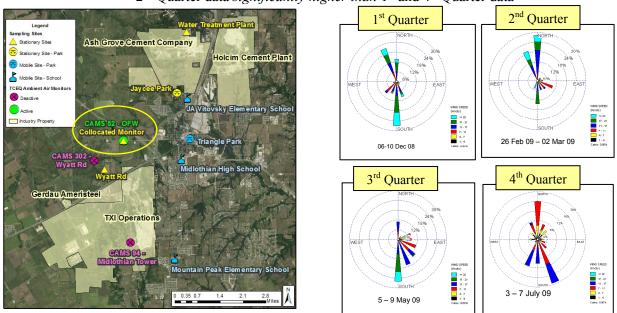


Figure 76. Map of Collocated Monitor Location and Quarterly Average Wind Directions.

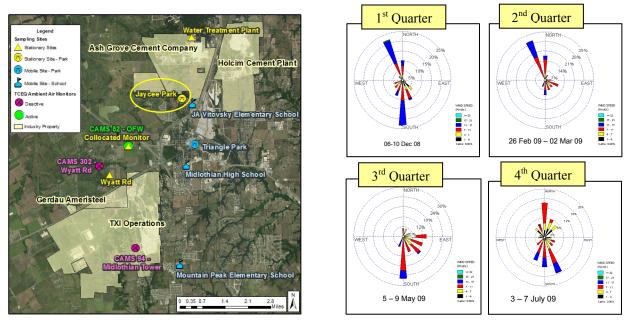


Figure 77. Map of Jaycee Park Monitor Location and Quarterly Average Wind Directions.

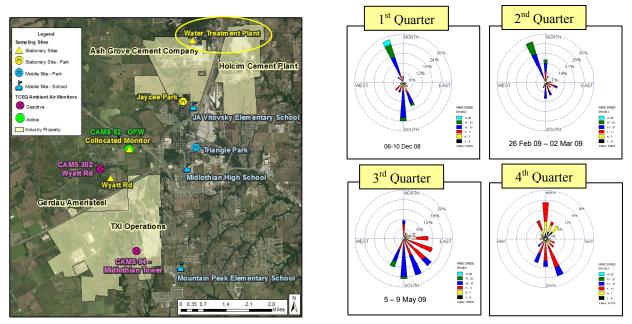


Figure 78. Map of Water Treatment Plant Monitor Location and Quarterly Average Wind Directions.

All three sites had statistical differences; out of twenty four comparisons, four showed statistical differences. Mercury was statistically higher in the 2^{nd} quarter at all three compared sites while chromium was higher in the 3^{rd} and 4^{th} quarters. When looking at the average quarterly wind directions and the location of the monitors (Figures 76 – 78) the wind directions aren't what would be expected for statistically higher mercury concentrations in the 2^{nd} quarter at the three locations. The 2^{nd} quarter is

predominantly north, northwesterly winds while the other quarters are predominantly northerly or mixed northerly and southerly winds. Based on the positions of the Collocated and Water Treatment Plant monitors they are offwind or upwind for northerly winds and are downwind for southerly winds; the Jaycee Park monitor is offwind of north westerly winds and downwind of south westerly winds. Therefore, it is not known why mercury would be measured at higher concentrations when winds put the monitors offwind or upwind of industry. The same is true when looking at the daily wind directions and measured concentrations, it appears as though the mercury concentrations may not be related to the identified industries. The chromium differences make sense based on wind direction and monitor location. The higher concentrations were measured in guarters where the average wind directions included southerly winds, which put the Water Treatment Plant in a downwind location from the surrounding identified industries. Even though one PM_{10} metal showed a difference at all three sites (mercury), the higher concentrations can not be attributed to the identified industry based on the wind direction and it is unknown why there is variation at all monitors in the 3^{rd} quarter. Chromium did show a difference that could be explained by wind direction; however, the difference was only observed at one of the three sites. The majority of these data indicate that there are no seasonal differences for PM_{10} metals in this area.

Directional Wind Rose Comparisons

Meteorological data is a very important component of any evaluation of ambient air data. Wind roses can help determine the direction from which the measured pollutants came. It is important to have a monitor in a predominantly downwind and upwind location in order to be able to make predictions of the directional source of a pollutant. However, it is important to note that such predictions with canister data alone are difficult and that auto gas chromatograph (auto GC) data are much better to handle such predictions. One of the questions raised by the citizens is whether or not the TCEQ stationary monitor is in an appropriate location for detecting pollutants from industry. For this study there were five canister monitors operating each of the four quarters, with a total of eight locations utilized during the study. Eventhough this data is canister data, since there were several monitors positioned throughout the area and representing upwind, downwind, and offwind locations, comparisons between the several different monitor locations should help show if the TCEQ stationary monitor is in an appropriate location. Since there were no statistical differences found among the detected VOCs, and the levels across Midlothian are similar, using that data for directional comparisons would not be as informative as using the PM₁₀ metals data, which showed some statistical differences and varied across Midlothian.

Monitoring sites measure wind direction and speed as the wind comes toward the monitor. Therefore, the meteorological information collected from the monitors indicates which direction the wind came from. Figure 79 shows a wind rose produced from the average of the resultant wind direction and speed for August, 1997 to March, 2010. This wind rose indicates the overall predominant wind direction in Midlothian is from the south, southeast. The TCEQ CAMS 52 is positioned in a predominantly downwind location with respect to TXI and Gerdau Ameristeel. The seasonal variation comparison concluded that overall there were no seasonal differences in the data. However, that data does not answer the same question as looking at individual sites and wind direction. The PM₁₀ metals data at the monitors closest to industry, when winds put them in the downwind category, clearly measure higher concentrations than monitors that are offwind or upwind. Figures 80 through 83 show the differences in detected concentrations of PM₁₀ total chromium at the four sampling sites for each of the four quarters as compared to the average Collocated monitor wind direction for each day. As expected, when the wind direction is predominantly out of the south, higher concentrations are measured at the Wyatt Rd and Collocated monitor sites. However, when the wind direction shifts to out of the north, the detected

concentrations at the Wyatt Rd and Collocated monitor sites decrease and are subsequently similar to the detected concentrations at the monitors located closer to/within the city, which are offwind or upwind of the identified industries when winds are from the south and southeast.

These comparisons indicate that the TCEQ CAMS 52 monitor is positioned downwind of TXI and Gerdau Ameristeel when winds are southerly (the predominant wind direction) and that the measurable impact local industry has on the ambient levels of PM_{10} metals detected in Midlothian can, and will be, measured by the TCEQ CAMS 52 monitor.

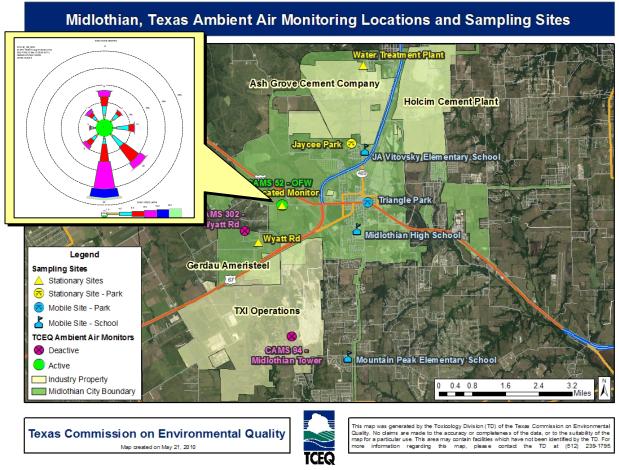


Figure 79. Wind Rose Showing the Predominant Wind Direction (S, SE) in Midlothian (CAMS 52) from August, 1997 to March, 2010.

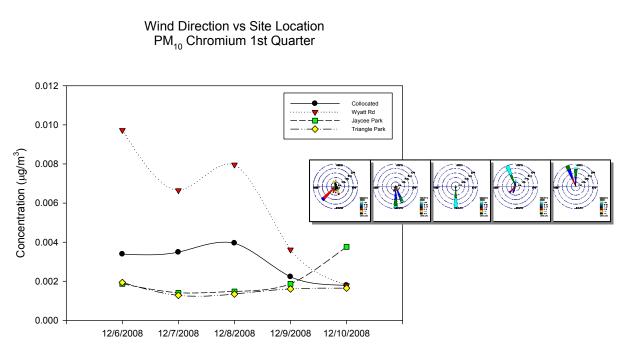


Figure 80. Wind Direction and Site Location: 1st Quarter Daily PM₁₀ Chromium Data with Daily Wind Averages.

Wind Direction vs Site Location PM_{10} Chromium 2nd Quarter

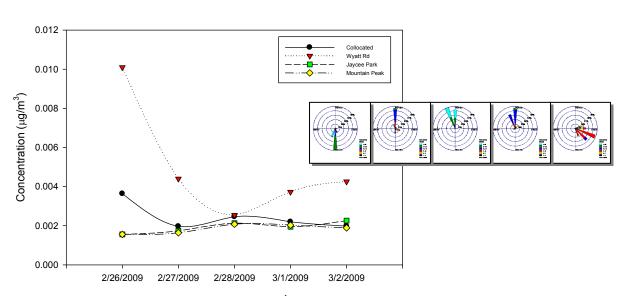


Figure 81. Wind Direction and Site Location: 2nd Quarter Daily PM₁₀ Chromium Data with Daily Wind Averages.

Wind Direction vs Site Location: PM₁₀ Chromium 3rd Quarter

Wind Direction vs Site Location PM₁₀ Chromium 4th Quarter

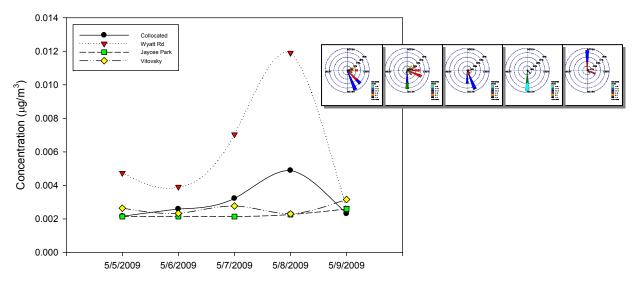


Figure 82. Wind Direction and Site Location: 3rd Quarter Daily PM₁₀ Chromium Data with Daily Wind Averages.

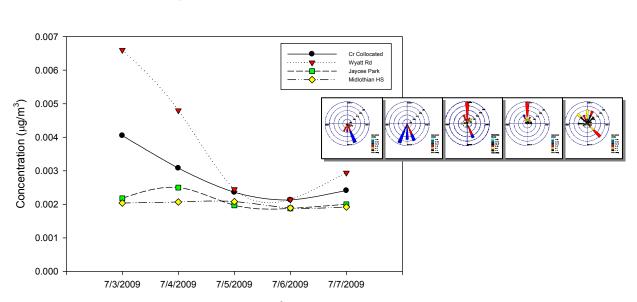


Figure 83. Wind Direction and Site Location: 4th Quarter Daily PM₁₀ Chromium Data with Daily Wind Averages.

School Comparisons

As stated in the VOC School Comparisons section above, three of the mobile sites were located at Midlothian area schools: Mountain Peak Elementary School, JA Vitovsky Elementary School, and Midlothian High School. The question this section is trying to address is whether or not emissions from school buses, or other idling vehicles, have an impact on air quality at the schools. In an attempt to answer this question in regards to PM_{10} metals, at least one sampling day was conducted over the weekend. Since there are only five samples, one for each sampling day at each site, a statistical comparison could not be conducted for this data. However, a qualitative look at the data may also be informative. Figures 84 – 86 show the daily measured concentrations of the PM_{10} metals highlighted in this report at each school. When looking at the graphical data, some measured concentrations of PM_{10} metals appear to increase over the weekend, particularly on Saturday. Based on location and wind direction, the days with the increased measurements do not appear to be coming from the direction of the identified industries.

 PM_{10} aluminum and manganese appear to have the most fluctuation; however, there is no clear discernable pattern observed at the schools for this very limited dataset of PM_{10} metals.

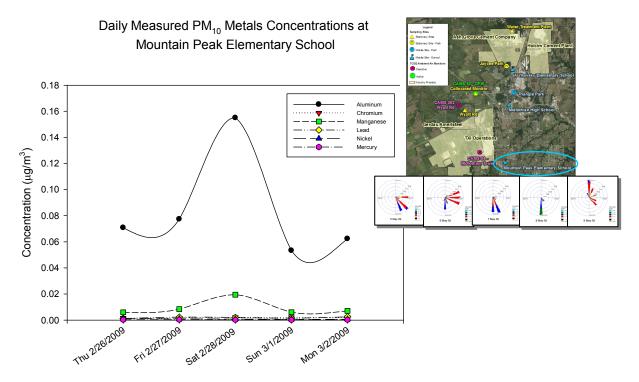


Figure 84. Daily Measured PM₁₀ Metals Concentrations at Mountain Peak Elementary School with Daily Wind Direction.

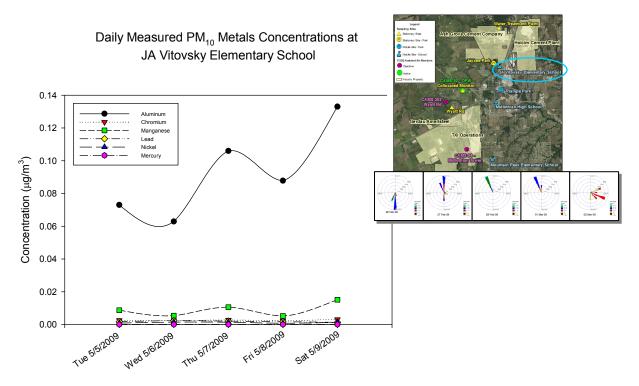


Figure 85. Daily Measured PM₁₀ Metals Concentrations at JA Vitovsky Elementary School with Daily Wind Direction.

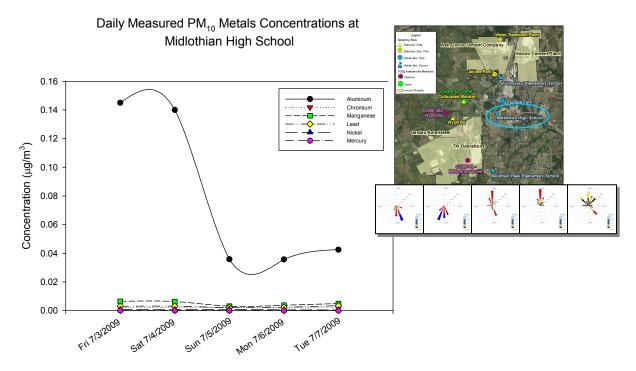


Figure 86. Daily Measured PM_{10} Metals Concentrations at Midlothian High School with Daily Wind Direction.

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Percent Hexavalent Chromium to Total Chromium Calculation

Hexavalent chromium (Cr^{6+}) is a PM₁₀ metal that the citizens of Midlothian showed concerned about. A lack of specific Cr^{6+} data for Midlothian is also one of the four reasons DSHS concluded an Indeterminate Public Health Hazard for their draft Health Consultation. One of the main goals of this study was to address any concerns and questions surrounding what levels of Cr^{6+} are present in Midlothian, as well as determine what percentage of total chromium Cr^{6+} represents in this area. It is important to note that there was a laboratory issue with the 3^{rd} Quarter Cr^{6+} data. Due to a mixup with the Chain of Custody form in the laboratory individual samples could not be matched to their respective sampling date. More detailed information may be found in the URS Memorandum: *Midlothian Third Quarter Hexavalent Chromium* (Cr^{6+}) and Total Unspeciated Chromium (Cr_T) Measurement Results (Appendix N) and the letter from ERG to Al Hendler with URS dated June 9, 2009 (Appendix O). Therefore, for comparisons in this section 3^{rd} Quarter Cr^{6+} samples were sorted from highest to lowest and were paired with 3^{rd} Quarter total chromium samples sorted from lowest to highest to get the most conservative % Cr^{6+} for the 3^{rd} Quarter dataset.

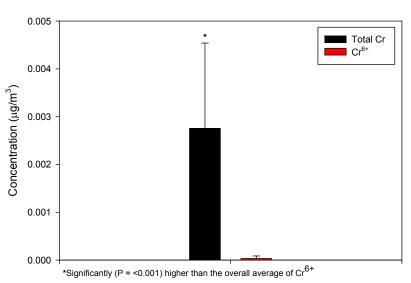
Comparisons with the Health Protective Values

Ambient air concentrations of total chromium and Cr^{6+} associated with PM_{10} were measured at each of the five sampling sites during all four quarters. The TCEQ short-term AMCV for Cr^{6+} is 0.1 µg/m³. All measured concentrations of Cr^{6+} were well below the short-term AMCV (range of $3x10^{-7}$ to $3.79x10^{-4}$ µg/m³). Although the most appropriate comparison to long-term health-protective values requires an average based on data for at least one year (or for multiple years if available), in this case valuable information is obtained from a comparison of these short-term measured values to the long-term health-protective value. The average as well as all measured concentrations of Cr^{6+} were well below the TCEQ long-term AMCV of 0.01 µg/m³, which protects over a lifetime of exposure. The Cr^{6+} short- and long-term AMCVs are currently under review; the TD is evaluating the most recent epidemiological data on Cr^{6+} and carcinogenicity. The USEPA has a long-term value of 0.0008 µg/m³, which is based on a 1 in 100,000 excess risk level. To meet or exceed this long-term (i.e., chronic) level, the daily concentration of Cr^{6+} would have to consistently be at or above 0.0008 µg/m³. All detected concentrations of Cr^{6+} are below the USEPA chronic value for Cr^{6+} .

A comparison with all four quarters of $PM_{10} Cr^{6+}$ and total Cr data were performed in order to determine if there were any statistical differences. The TD conducted statistical comparisons (Figure 87; Appendix L) between the overall average of $PM_{10} Cr^{6+}$ and the overall average of total Cr using a Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. According to this test, there was a significant difference observed between the Cr^{6+} and total Cr data averages (p < 0.001). When looking at the graphed data, the overall mean for Cr^{6+} (0.0000327 µg/m³) is very small compared to the overall mean for total Cr (0.00275 µg/m³).

Based on these data, we would not expect short-term exposures to these concentrations to be of a health concern. These short-term Cr^{6+} data also indicate that long-term comparison values are unlikely to be exceeded, and that when looking at the overall mean for total Cr as compared to Cr^{6+} , Cr^{6+} represents only a small part of total Cr in Midlothian (Figures 87 & 88).

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Average Measured Concentrations of Total Cr and $$\rm Cr^{6^+}$ at All Sampling Sites in the Study



Average Concentration of Measured PM₁₀ Total Cr Compared to Cr⁶⁺

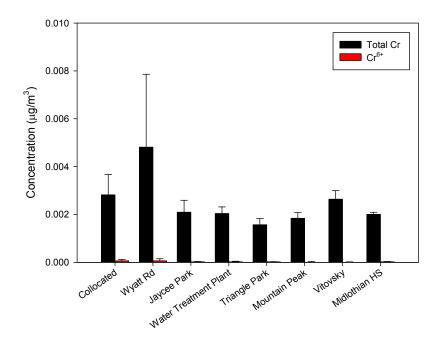


Figure 88. Site Average Concentrations of PM_{10} Total Cr Compared to Cr^{6^+} .

Collocated Monitor Comparisons

As with the VOC section above, this comparison is designed to help answer, in regards to PM_{10} metals, the citizen question: *Is the TCEQ every* 6th *day monitoring site an accurate representation of daily air concentrations in Midlothian?* As indicated in the VOC and Metals sections above, there are two interpretations for this question. The first is, are the data from the TCEQ CAMS 52 monitor representative of concentrations in the city? The second is, are the industries increasing emissions on non-regulatory sampling days? For this study, a monitor was collocated with the TCEQ CAMS 52 monitor, the Collocated monitor; one day out of each sampling quarter overlapped with the existing TCEQ every 6th-day ambient air monitoring schedule. Information on the EPA monitoring schedule and the overlapping sampling days can be found in the VOC Collocated Monitor Comparisons section above.

In the VOC Collocated Monitor Comparisons section above a comparison was conducted on a grouping of the four TCEQ every 6th-day samples as compared to the corresponding four Collocated monitor samples to show if any statistical differences existed between the two sample sets. Since the comparison indicated that the TCEQ CAMS 52 ambient air monitor is an accurate representation of VOC air concentrations measured at this site, the assumption can be made that the Collocated monitor is a good representation of what the CAMS 52 monitor would measure. Since comparisons in this section cannot be done with CAMS 52 PM₁₀ total Cr and Cr⁶⁺ data, as none exist, the assumption is that the VOC findings extend to these PM₁₀ metals, and therefore the Collocated monitor data may be used for these comparisons in leiu of CAMS 52 data since there are no CAMS 52 PM₁₀ metals data available. Therefore, in this section the Collocated monitor data will be used in statistical comparisons in leiu of TCEQ CAMS 52 data.

Since there was only one every 6th-day sample corresponding to the five Collocated monitor samples per quarter a statistical analysis of the individual 6th-day sample paired with the surrounding four days of samlpes could not be performed. However, a comparison could be conducted on a grouping of the four Collocated samples corresponding to the every 6th-day TCEQ samples as compared to the surrounding sixteen Collocated monitor samples. Such a comparison would help show if any statistical differences existed between the two sample sets. Therefore, the TD conducted this statistical comparison (Appendix L) using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. The Cr⁶⁺ data comparisons failed the normality test (p < 0.05). Therefore, it was run using the Mann-Whitney Rank Sum Test. No significant differences were found between the every 6th-day sample and the other sampling days. *The lack of significant difference between the corresponding Collocated every* 6th-day sample and the other sixteen days of surrounding Collocated monitor samples indicates that there is no difference between a regulatory every 6th-day sampling day and the other sampled days during this study. Since the sampling dates were not released publicly the assumption can be made that this is representative of typical conditions throughout the year.

The TD also conducted statistical comparisons (Appendix L) between the Collocated monitor data and all of the other seven study PM_{10} Cr⁶⁺ monitoring sites using Student's t-test. For an overview of the Student's t-test procedure, please see Figure 3. All seven data comparisons failed the normality test and the equal variance test (p < 0.05). Those that failed were run using the Mann-Whitney Rank Sum Test. According to these tests, no significant differences were observed between the Collocated monitor and compared sites.

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These analyses indicate that while the measured concentrations of $PM_{10} Cr^{6+}$ are different, there is no statistical difference between the study monitoring sites and the Collocated monitor. All measured levels are well below their respective AMCVs, and are not of health concern.

Comparisons with All Four Quarters of Data

Multiple comparisons with all four quarters of $PM_{10} Cr^{6+}$ data were performed in order to determine statistical differences. The TD conducted statistical comparisons (Appendix L; Raw Data Figure K-61) between the four stationary, four mobile, and all eight $PM_{10} Cr^{6+}$ monitoring sites using a one-way ANOVA. For an overview of the ANOVA procedure, please see Figure 17. All three data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. According to the ANOVA, no significant differences were observed between any of the stationary, mobile, or all sites combined (P = 0.051, 0.231, and 0.075, respectively). The differences in the median values among the groups were not great enough to exclude the possibility that the differences were due to random sampling variability; there is not a statistically significant difference.

These analyses indicate that while the measured concentrations of PM_{10} Cr⁶⁺ are different across Midlothian, with relatively higher levels typically measured closer to industry and lower levels typically measured within the community, there is no statistical difference between the detected levels. All measured levels are well below their respective AMCVs, and are not of health concern.

Comparisons with Individual Quarters of Data

A comparison between all four sampling sites for each quarter was performed on the PM_{10} Cr⁶⁺ data to determine any statistical differences. The TD conducted statistical comparisons (Appendix L; Raw Data Figures K-62 – K-65) between the five PM_{10} Cr⁶⁺ monitoring sites for each quarter using a one-way ANOVA. For an overview of the ANOVA procedure, please see Figure 17. None of the four data comparisons passed the normality test (p < 0.05). Those that failed were run using an ANOVA on Ranks. For the first, second, and fourth quarters, the ANOVA indicated there were no significant differences. The third quarter ANOVA indicated the differences in the median values among the sites were greater than would be expected by chance (p = 0.043); however, the All-Pairwise Multiple Comparison Procedures resulted in no significant differences or "do not test". A result of "do not test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. It is to be noted that not testing the enclosed means is a procedural rule, and a result of "do not test" should be treated as if there is no significant difference between the means, even though one may appear to exist.

These analyses also indicate that while the measured concentrations of $PM_{10} Cr^{6+}$ are different across Midlothian, with relatively higher levels typically measured closer to industry and lower levels typically measured within the community, there is no statistical difference between the detected levels. All measured levels are well below their respective AMCVs, and are not of health concern.

Seasonal Variation

As stated in the VOC and Metals sections above, since this study was conducted over four different samping quarters over the span of one year it stands to reason that wind direction may influence some observed differences in the data. Samples were collected in December, 2008 (1st quarter), February/March, 2009 (2nd quarter), May, 2009 (3rd Quarter), and July, 2009 (4th quarter). The span of the sampling months represents the winter, spring, and summer seasons. Typically, predominant wind directions in the summer are out of the southeast while in the winter more northerly winds are observed. The overall predominant wind direction for this area is out of the south. The question is, how does this

affect the data comparisons; are there seasonal variations in the data due to differences in wind direction? This section is designed to provid insight into this question. The TD did a comparison of the quarterly data for each site to determine if there were any statistical differences observed between quarters using an ANOVA (Appendix L). For an overview of the ANOVA procedure, please see Figure 17. Two of the four data comparisons failed the normality test and/or the equal variance test (p < 0.05). Those that failed were run using an ANOVA on Ranks. Significant differences are as follows:

- Water Treatment Plant
 - Hexavalent Chromium:
 - 4th Quarter data *significantly higher than* 2nd Quarter data
 - 1st Quarter data *significantly higher than* 2nd Quarter data

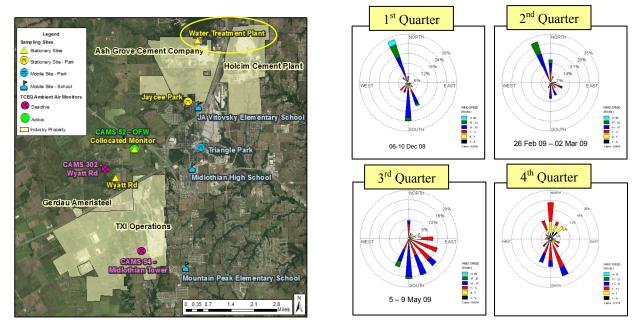


Figure 89. Map of Water Treatment Plant Monitor Location and Quarterly Average Wind Directions.

Only one site out of the four compared stationary sites showed a statistical difference. $Cr^{6+} 2^{nd}$ quarter data was statistically lower than the 1st and 4th quarters. When looking at the average quarterly wind directions and the location of the monitors (Figures 89) The Cr^{6+} differences make sense based on wind direction and monitor location. The higher concentrations were measured in quarters where the average wind directions included southerly winds, which put the Water Treatment Plant in a downwind location from the surrounding identified industries. These findings are similar to those observed in the Metals section above for Cr at this site. *However, only one* Cr^{6+} *comparison showed a difference at only one of the four stationary sites. This data combined with the* PM_{10} metals comparisons above show that the majority of these data indicate that there are no seasonal differences for PM_{10} metals in this area.

Hexavalent Chromium Percentage of Total Chromium

The TD calculated the percentage of total chromium that Cr^{6+} comprised for all four quarters of sampling data (Tables 9 & 10). The highest percentage of total chromium that Cr^{6+} represented for any one day measurement was 7.36% at the Collocated monitor on 12/7/2008. The highest daily average considering data from all sites was 2.81% for 7/4/2009. The highest average at any one site over the twenty monitored

days was 1.86% at the Collocated monitor. The overall average for all twenty sampling days over all eight sampling sites is 1.07% Cr^{6+} of total chromium. These values are all well below the 100% Cr^{6+} assumed by DSHS in their draft Health Consultation. They are also well below the suggested default assumption of 34%, which is used by USEPA in their National Air Toxics Assessment⁹ (NATA). The ATSDR¹⁰ estimates cement production to be associated with 0.2% of chromium emissions as Cr^{6+} in their Toxicological Profile for chromium.

These data indicate that while the ATSDR estimated percentage of chromium emission associated with Cr^{6+} for cement production is 0.2%, the actual contribution in the Midlothian area is 1.07%, which is well below the USEPA default assumption of 34% as well as the DSHS assumption of 100% for their draft Health Consultation. These analyses indicate that $PM_{10} Cr^{6+}$ represents a small percentage of the total chromium measured in the Midlothian area.

 Table 9. Highest Daily, Daily Average, and Site Average, and the Overall Average Percent Cr⁶⁺ Constitutes of Total Chromium.

	%Cr ⁶⁺ of Total Cr
Highest Daily	7.36%
Highest Daily Average	2.81%
Highest Site Average	1.86%
Overall Average	1.07%

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⁹ USEPA. 1996. National Air Toxics Assessment (NATA) Appendix G: Health Effects Information used in Cancer and Noncancer Risk Characterization for the NATA 1996 National-Scale Assessment. United States Environmental Protection Agency, <u>http://earthl.epa.gov/ttn/atw/sab/appendix-g.pdf</u>.

¹⁰ ATSDR. 2000. Toxicological Profile for Chromium. Agency for Toxic Substances and Disease Registry, Atlanta, GA.

Date	WD		CAMS 52	Wyatt Road		Water Treatment Plant		Mountain Peak Elem. School	Vitovsky Elem. School	Midlothian High School	DAILY AVERAGE
12/6/2008	SW	Cr ⁶⁺	0.0000677	0.000379	0.0000179	0.0000472	0.0000305				
		Cr _T	0.00339	0.00973	0.00187	0.00191	0.00194				
		%Cr ⁶⁺	2.00%	3.90%	0.96%	2.47%	1.57%				2.18
12/7/2008	S	Cr ⁶⁺	0.000257	0.00016	0.0000024	0.0000281	0.00000325				
		Cr _T	0.00349	0.00665	0.00141	0.002	0.00128				
		%Cr ⁶⁺	7.36%	2.41%	0.17%	1.41%	0.25%				2.32%
12/8/2008	S	Cr ⁶⁺	0.000152	0.0000192	0.0000024	0.000038	0.0000081				
		Cr _T	0.00395	0.00796	0.00148	0.00164	0.00135				
		%Cr ⁶⁺	3.85%	0.24%	0.16%	0.23%	0.60%				1.02%
12/9/2008	NNW	Cr ⁶⁺	0.0000043	0.0000003	0.0000226	0.000021	0.0000206				
		Cr _T	0.00223	0.00362	0.00187	0.00159	0.00161				
		%Cr ⁶⁺	0.19%	0.01%	1.21%	1.32%	1.28%				0.80%
12/10/2008	NNW	Cr ⁶⁺	0.0000015	0.00000325	0.0000638	0.00000325	0.0000209				
		Cr _T	0.00179	0.00179	0.00376	0.00182	0.00165				
		%Cr ⁶⁺	0.08%	0.18%	1.70%	0.18%	1.27%				0.68%
2/26/2009	S	Cr ⁶⁺	0.000106	0.0000609	0.00000215	0.00000215		0.00000215			
		Cr _T	0.00364	0.0101	0.00156	0.00165		0.00156	factor and any any any any annual and any any any any any any any any		1
		%Cr ⁶⁺	2.91%	0.60%	0.14%	0.13%	* *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***	0.14%			0.78%
2/27/2009 2/28/2009	N	Cr ⁶⁺	0.0000449	0.0000736	0.00000215	0.00000215		0.00000215			
		Cr _T	0.00197	0.0044	0.00174	0.00176		0.00164			1
		%Cr ⁶⁺	2.28%	1.67%	0.12%	0.12%		0.13%			0.87%
	NNW	Cr ⁶⁺	0.00000215	0.00000215	0.0000226	0.00000215		0.0000392			0107 /
2,20,2005		Cr _T	0.00246	0.00255	0.00213	0.00209		0.00208			1
		%Cr ⁶⁺	0.09%	0.08%	1.06%	0.10%		1.88%			0.64%
3/1/2009	N	Cr ⁶⁺	0.0000511	0.00000215	0.00000215	0.00000215		0.00000215			0.047
5/1/2005		Cr _T	0.0022	0.00373	0.00195	0.00177		0.00203			
		%Cr ⁶⁺	2.32%	0.06%	0.11%	0.12%		0.11%			0.54%
3/2/2009	ESE	Cr ⁶⁺	0.00000215	0.000138	0.0000246	0.00000215		0.0000257			0.547
5/2/2009	LOL	Cr _T	0.0000213	0.000138	0.000246	0.0000213		0.0000237			
		%Cr ⁶⁺	0.00198	3.24%	1.09%	0.00193		1.36%			1 1 0 0/
7/3/2009	SSE	Cr ⁶⁺	0.0000294	0.000103	0.0000342	0.0000128		1.30%		0.0000184	1.18%
	33L	Cr _T	0.0000294	0.000103	0.000342	0.000128				0.000184	
		%Cr ⁶⁺	0.73%	1.56%	1.57%	0.00238				0.00204	
7/4/2009	SSE	⁵⁶ Cl Cr ⁶⁺									1.06%
	SSE		0.000121	0.0000473	0.0000454	0.00012				0.0000389	
		Cr _T	0.00308	0.0048	0.0025	0.0022				0.00207	2.010/
7/5/2009		%Cr ⁶⁺ Cr ⁶⁺	3.93%	0.99%	1.82%	5.45%				1.88%	2.81%
	Ν		0.0000569	0.00000215	0.00000215	0.0000204				0.0000144	
		Cr _T	0.00236	0.00245	0.00197	0.00221				0.00208	
		%Cr ⁶⁺	2.41%	0.09%	0.11%	0.92%				0.69%	0.84%
7/6/2009	Ν	Cr ⁶⁺	0.00000215	0.00000215	0.00000215	0.0000296				0.0000203	
		Cr _T	0.00213	0.00214	0.00188	0.00228				0.00189	
		%Cr ⁶⁺	0.10%	0.10%	0.11%	1.30%				1.07%	0.54%
7/7/2009	SE	Cr ⁶⁺	0.0000141	0.0000361	0.0000115	0.0000119				0.0000148	
		Cr _T	0.00241	0.00294	0.002	0.00218				0.00192	
		%Cr ⁶⁺	0.59%	1.23%	0.58%	0.55%				0.77%	0.74%
3rd Quarter ^a 3rd Quarter		Cr ⁶⁺	0.0000941	0.0000525	0.0000204	0.0000201			0.0000211		ļ
		Cr _T	0.00216	0.00474	0.00214	0.00204			0.00264		
		%Cr ⁶⁺	4.36%	1.11%	0.95%	0.99%			0.80%		1.85%
		Cr ⁶⁺	0.0000626	0.0000395	0.0000177	0.0000197			0.00000215		ļ
		Cr _T	0.00231	0.00264	0.00214	0.00216			0.0023		
3rd Quarter		%Cr ⁶⁺	2.71%	1.50%	0.83%	0.91%			0.09%		1.49%
		Cr ⁶⁺	0.0000292	0.000034	0.0000169	0.00000215			0.00000215		
		Cr _T	0.00259	0.00391	0.00214	0.00222			0.00233		
	1	%Cr ⁶⁺	1.13%	0.87%	0.79%	0.10%			0.09%		0.72%
3rd Quarter		Cr ⁶⁺	0.00000215	0.0000292	0.00000215	0.00000215			0.00000215		
	1	Cr _T	0.00322	0.00704	0.00226	0.00243			0.00277		
	1	%Cr ⁶⁺	0.07%	0.41%	0.10%	0.09%			0.08%		0.17%
3rd Quarter	1	Cr ⁶⁺	0.00000215	0.0000199	0.00000215	0.00000215			0.00000215		
	1	Cr _T	0.00489	0.0119	0.00259	0.00254			0.00316		1
	1	%Cr ⁶⁺	0.04%	0.17%	0.08%	0.08%			0.07%		0.09%

Table 10. Daily, Daily Average, Site Average, and Overall Average Percent Cr⁶⁺ Constitutes of Total Chromium.

 OVERALL AVERAGE
 1.07%

 *3rd Quarter data individual samples could not be matched due to a mixup with the Chain of Custody form in the Lab. Cr^{b+} samples are sorted from highest to lowest and
 1.07%
 are paired with total chromium samples sorted from lowest to highest to get the most conservative %Cr⁶⁺

Measured Concentration units are $\mu g/m^3$

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WD = Wind Direction $Cr^{6+} = hexavalent chromium$

 $Cr_T = total chromium$

USA Today Report Summary

In December of 2008, USA Today released a special report, *The Smokestack Effect: Toxic Air and America's Schools*. Table 11 shows the ranks and chemicals identified by USA Today in their report for the three schools utilized in this study.

Table 11. USA Today Ranks and Chemicals of Concern for the Midlothian Area School Study Monitoring Sites.

		Rank	Chemical	%
School	Percentile	(of 127,809 schools)	of Concern	Contribution
			Sulfuric Acid	85%
Mountain Peak Elementary School	1st	175	Manganese	14%
JA Vitovsky Elementary School			Sulfuric Acid	82%
(999 Church Street)	6th	6,772	Manganese	16%
			Sulfuric Acid	79%
JA Vitovsky Elementary School			Manganese	19%
(333 Church Street)	1st	561	Chromiuim	2%
			Sulfuric Acid	84%
Midlothian High School	3rd	2,219	Manganese	15%

The USA Today report utilized the U.S. Environmental Protection Agency's (EPA's) Risk-Screening Environmental Indicators (RSEI) Model to determine the rankings and pollutants responsible. According to EPA, the RSEI model is not the right tool to determine the quality of the air outside of U.S. schools. The RSEI tool was designed to be the first step in a multi-step process to determine if potentially toxic emissions are released into the environment. RSEI was not intended to be used alone to determine the risk associated with these releases. Additional data and analysis would be necessary before an accurate assessment could be made, such as actual long-term ambient air data and a proper health effects evaluation.

As the state's environmental protection agency, the TCEQ takes its role in protecting public health very seriously, and knows of no schools in Texas where ambient concentrations of air toxics are unsafe. In order to conduct a thorough evaluation of the USA Today report, the TD requested the data that USA Today utilized in their article, but has not yet received that information. Based on the TD's preliminary evaluation, some concerns about the methodology utilized by USA Today have been identified. The rankings of Texas schools by USA Today are based on theoretical modeling results of emissions data, not on a health effects evaluation of actual measured ambient air concentrations from air monitors. The purpose of modeling is to attempt to predict air concentrations that a monitor actually measures. Since Texas has an extensive air monitoring network, Texas does not need to rely heavily on modeling results. The model developed by EPA was designed primarily for states without extensive monitoring capability. It also appears that USA Today did not attempt to validate the modeling results for Texas with any of the abundant and readily available ambient air data collected from monitors in Texas, even though some monitors are located at schools. The TCEQ has identified some schools in the Houston area which show significant differences between USA Today's results and agency staff conclusions based on actual air quality monitoring data. As a further example of why it appears USA Today neglected to ground-truth their modeling results for Texas, J.A. Vitovsky Elementary School is represented twice in the report (Table 11, Figure 90). First, it is represented as J A Vitovsky El (999 Church St) and ranked in the 6th percentile, while it is represented a second time as J A Vitovsky Elementary (333 Church St) and ranked in the 1st percentile. The distance between the two addresses amounts to 1/20th of a mile (264 feet);

however, one location is ranked in the 1st percentile while the second is ranked in the 6th percentile. There are also differences in the chemicals and industries USA Today reports as responsible and 6,211 schools are ranked in between the two representations. Further evidence showing no ground-truthing of the data; USA Today also identified Lyondell Chemical Co, Channelview, Texas as being one of the industries most responsible for pollution outside of JA Vitovsky Elementary (333 Church St. representation), Mountain Peak Elementary School, and Midlothian High School. The distance between Channelview, Texas and Midlothian, Texas is approximately 248 miles. Ironically, in USA Today's evaluations of these schools, Lyondell is not listed by USA Today as a polluter most responsible for toxics outside a Channelview school, which is less than 3 miles away from Lyondell and is in the predominant downwind direction. Clearly, USA Today's modeling results should not be relied upon exclusively to provide an accurate picture of air quality. Additional data and analyses are necessary for an accurate assessment (e.g., model validation with actual measurements, evaluation by environmental professionals who are knowledgeable about the areas, nearby sources, and toxicity of the chemicals being evaluated).

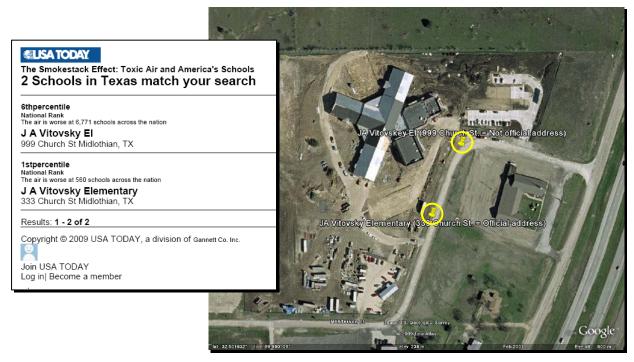
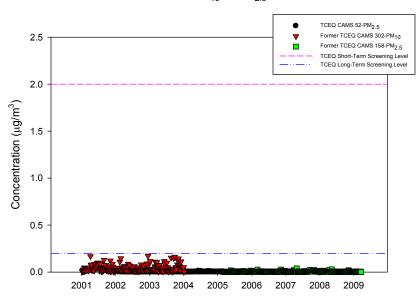
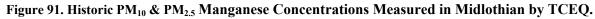


Figure 90. Map of the Two USA Today Locations for JA Vitovsky Elementary School.

The TCEQ CAMS 52 ambient air monitoring site is located approximately 3.9 miles northwest of Mountain Peak Elementary School, 2.4 miles southwest of JA Vitovsky Elementary School, and 1.9 miles northwest of Midlothian High School. Statistical analyses done on the VOCs (see previous sections) indicated CAMS 52 is a good representation of ambient air quality in the Midlothian area. While sulfuric acid is not monitored for, $PM_{2.5}$ manganese data collected at CAMS 52 from 1997 to 2009 indicate that levels of manganese are not of health concern in the Midlothian area (Figure 91). The data collected during this monitoring project also indicate that levels of PM_{10} manganese are well below the long-term, health-based AMCV of 2 μ g/m³ (Figure 92), and are not of health concern. Therefore, we would not expect to see a health impact due to $PM_{2.5}$ manganese at the school.



Measured Concentrations of PM₁₀ & PM_{2.5} Manganese in Midlothian



All Quarters of Data: PM_{10} Manganese Concentrations at All Sites

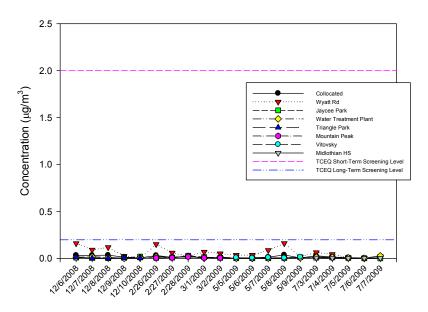


Figure 92. PM₁₀ Manganese Concentrations Measured at All Sites for All Four Quarters.

According to ATSDR (1998), sulfuric acid is formed in air as small droplets or attached to other small particles when sulfur dioxide is released from the burning of coal, oil, and gas. It is a very corrosive chemical and will cause irritation and local effects to the tissue that it directly comes in contact with (e.g.,

eyes, skin, respiratory tract, and gastrointestinal tract) when the tissue is exposed to sufficiently high concentrations. Effects of this chemical are thought to be a result of pH change rather than from the sulfate. Concentrated sulfuric acid has a pungent odor (odor threshold in air is 1,000 μ g/m³) and will irritate the nose. In the US, sulfuric acid levels in the atmosphere are generally below 5 μ g/m³, although higher concentrations can occur (up to 700 μ g/m³). Currently, epidemiological studies do not provide clear evidence linking environmental exposure to sulfuric acid aerosols alone to adverse health effects in humans. The TCEQ does have a state standard for sulfuric acid: in summary, 30 TAC Chapter 112 says sulfuric acid concentrations my not exceed 1) a 24-hour average concentration of 15 μ g/m³, 2) a 1-hour average concentration of 50 μ g/m³ not to be exceeded more than one time during 24-hours, or 3) a maximum of 100 μ g/m³ at any time. The air permitting process also has procedures in place to ensure that permitted emissions from a given facility are safe for the general public. Additionally, based on problems identified by TD with the USA Today modeling results, where TCEQ has data at or in close proximity to high-percentile ranking schools for some of the toxicity drivers identified, which show USA Today results to be unreliable in predicting air concentrations of health concern, we have no reason to believe the USA Today results for sulfuric acid would be any more reliable.

The levels of manganese in Midlothian, both historically ($PM_{2.5}$) and measured during this special study (PM_{10}), indicate manganese is well below the TCEQ AMCVs. Therefore, we would not expect to see a health impact from the measured levels of $PM_{2.5}$ or PM_{10} metals at the school. Since procedures are in place in the air permitting process to ensure permitted emissions are safe for the general public, and since the USA Today results are unreliable in cases where TCEQ has monitoring data at or in close proxicmity to schools, there is no reason to believe the USA Today results for sulfuric acid would be accurate or reliable in this case.

APPENDICES

Appendix A – TCEQ CAMS 52 VOC Historial Comparisons

A.	Comparisons (o Historical VOC	Concentrations at CAMS 52
-----------	----------------------	------------------	----------------------------------

t-test Data source: Normality Te	Data 1 i	n CAMS 52	cd and histor Comparisons (P < 0.050)		Monday, March 01, 2010, 2:36:24 PM
Test execution Mann-Whitn Data source:	n ended i ey Ranl	by user requ & Sum Test	est, Rank Sur	-	Monday, March 01, 2010, 2:36:24 PM
Group	Ν	Missing	Median	25%	75%
TCEQ	614	0	0.00500	0.00500	0.00500
All Quarters	20	0	0.0110	0.00750	0.0155
Mann-Whitne	y U Stat	istic= 2812.5	500		
T = 9677.500	n(small	= 20 n(big)	= 614 (P = <	0.001)	
				two groups is	greater than would be expected by chance; there is
statistically sig	gnifican	t difference	(P = < 0.001)		
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn	Data 2 i est: n ended	n CAMS 52 Failed by user reque	Comparisons $(P < 0.050)$	JNB	Monday, March 01, 2010, 2:40:32 PM Monday, March 01, 2010, 2:40:32 PM
Data source:			Comparisons	JNB	Monauy, March 01, 2010, 2. 10.32 1 M
Group	N	Missing	Median	25%	75%
TCEQ	614	0	0.200	0.140	0.270
All Quarters	20	0	0.206	0.168	0.232
Mann-Whitne	y U Stat	istic= 5904.0	000		
T = 6586.000				.770)	
					not great enough to exclude the possibility that the
difference is d	lue to ra	ndom sampli	ng variability	; there is not a	statistically significant difference $(P = 0.770)$
III Talaana	on betwo	een collocate	ed and histor	ical	Monday, March 01, 2010, 2:43:29 PM
a. Compariso			Comparisons	INB	11011au), 111au 011 0 1, 2010, 21 10 29 1 101
a. Compariso t-test	Data 3 i	n CAMS 52	Compansons	JIND	
a. Compariso t-test Data source:			(P < 0.050)	.5110	
a. Compariso t-test Data source: Normality Te	est:	Failed	(P < 0.050)		
III. Toluene a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn	e st: n ended [Failed by user requ	(P < 0.050)		Monday, March 01, 2010, 2:43:29 PM
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn	est: n ended i ney Ranl	Failed by user reque x Sum Test	(P < 0.050) est, Rank Sum	n Test begun	Monday, March 01, 2010, 2:43:29 PM
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn Data source:	est: n ended i ney Ranl	Failed by user reque x Sum Test	(P < 0.050) est, Rank Sum	n Test begun	Monday, March 01, 2010, 2:43:29 PM
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn Data source: Group	est: n ended ley Ranl Data 3 i N 614	Failed by user request s Sum Test n CAMS 52	(P < 0.050) est, Rank Sum Comparisons	n Test begun JNB	
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn Data source: Group TCEQ	est: n ended ney Ranl Data 3 i N	Failed by user reque x Sum Test n CAMS 52 Missing	(P < 0.050) est, Rank Sum Comparisons Median	n Test begun JNB 25%	75%
a. Compariso t-test Data source: Normality Te Test execution Mann-Whitn Data source: Group TCEQ All Quarters	est: n ended ney Ranl Data 3 i N 614 20	Failed by user reque a Sum Test n CAMS 52 Missing 0 0	(P < 0.050) est, Rank Sum Comparisons Median 0.160 0.150	n Test begun JNB 25% 0.1000	75% 0.280
a. Compariso t-test Data source: Normality Te Test execution	est: n ended ley Ranl Data 3 i N 614 20 ey U Stat	Failed by user request s Sum Test n CAMS 52 Missing 0 0 istic= 5278.0	(P < 0.050) est, Rank Sum Comparisons Median 0.160 0.150	n Test begun JNB 25% 0.1000 0.0940	75% 0.280

IV. Ethylbenzene

a. Comparison between collocated and historical t-test

Monday, March 01, 2010, 2:45:32 PM

Normality Te	est:	Failed	Comparisons $(P < 0.050)$			
Test execution			est, Rank Sun	n Test begun		
Mann-Whitn			G :	N ID	Monday, March 01, 2010, 2:45:32 PM	
Data source:			-			
Group	N	Missing	Median	25%	75%	
TCEQ	614 20	0	0.0200	0.00500	0.0500	
All Quarters	-	0	0.0245	0.0165	0.0315	
Mann-Whitne $T = 7477,000$				140)		
T = 7477.000					not great enough to exclude the possibility th	ot the
					statistically significant difference ($P = 0.148$	
unification is u		nuoni sampi	ing variability		statistically significant difference $(1 - 0.148)$	J
V. <i>p+m-</i> Xyler	ıe					
a. Compariso		een collocat	ed and histor	ical		
t-test					Monday, March 01, 2010, 2:47:12 PM	
Data source:	Data 5 i	in CAMS 52	Comparisons	.JNB		
Normality Te		Failed	(P < 0.050)			
Test execution			est, Rank Sun	n Test begun		
Mann-Whitn					Monday, March 01, 2010, 2:47:12 PM	
Data source:			*			
Group	Ν	Missing	Median	25%	75%	
TCEQ	614	0	0.0600	0.00500	0.130	
All Quarters	20	0	0.0525	0.0290	0.0715	
Mann-Whitne						
T = 6074.500						
					not great enough to exclude the possibility th	
difference is d	ue to ra	ndom sampl	ing variability	; there is not a	statistically significant difference ($P = 0.730$)
VI. o-Xylene						
a. Compariso	n hetw	een collocat	ed and histor	ical		
t-test	II Detwo	ch conocat	cu anu mstor	icai	Monday, March 01, 2010, 2:48:49 PM	
Data source:	Data 6 i	in CAMS 52	Comparisons	INB	Monday, March 01, 2010, 2.40.49 1 M	
Normality Te			(P < 0.050)			
Test execution				n Test begun		
					Monday, March 01, 2010, 2:48:49 PM	
Mann-Whitn			Comparisons	.JNB		
			Median	25%	75%	
Mann-Whitn Data source: Group	Ν	Missing	Witulali			
		Missing 0	0.01000	0.00500	0.0400	
Data source: Group	Ν					

T = 8095.500 n(small)= 20 n(big)= 614 (P = 0.022)

The difference in the median values between the two groups is greater than would be expected by chance; there is a statistically significant difference (P = 0.022)

B. Comparisons of Average Concentrations to Historical Average Concentrations

I. Each site average

a. Comparisor	ı of Be	enzene Site A	Averages			
One WayOne-	Way A	Analysis of `	Variance			Monday, March 01, 2010, 3:11:02 PM
Data source: A	Av Dat	a in CAMS	52 Compari	isons.JNB		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
TCEQ	614	0	0.282	0.737	0.0297	
Collocated	20	0	0.211	0.0600	0.0134	
Jaycee	20	0	0.197	0.0852	0.0191	
WTP	20	0	0.190	0.0628	0.0140	
Triangle	5	0	0.228	0.0866	0.0387	
Mountain Peak	4	0	0.135	0.0234	0.0117	
Vitovsky	5	0	0.227	0.0565	0.0253	
Midlothian HS	5	0	0.115	0.0198	0.00887	
Source of Var	iation	DF	SS	MS	F	Р
Between Group	os	7	0.597	0.0854	0.176	0.990
Residual		685	332.991	0.486		
Total		692	333.588			
The differences	in the	mean value	e among th	e treatment	arouns are	not great enough to exclude the possibility that

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.990). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

b. Comparison of 1,3-Butadiene Site Averages

D. Comparisoi	п от 1 ₉ ,	-Dutaultin	She merag			
One WayOne-	Way A	Analysis of `	Variance		Monday,	March 01, 2010, 3:14:36 PM
Data source: A	Av Dat	a in CAMS :	52 Comparis	ons.JNB	-	
Group Name	Ν	Missing	Mean	Std Dev	SEM	
TCEQ	614	0	0.0101	0.0220	0.000889	
Collocated	20	0	0.0111	0.00594	0.00133	
Jaycee	20	0	0.0117	0.00639	0.00143	
WTP	20	0	0.00985	0.00509	0.00114	
Triangle	5	0	0.0312	0.0363	0.0162	
Mountain Peak	4	0	0.00825	0.00512	0.00256	
Vitovsky	5	0	0.0110	0.001000	0.000447	
Midlothian HS	5	0	0.00700	0.00255	0.00114	
Source of Var	iation	DF	SS	MS	F P	
Between Group	os	7	0.00234	0.000334	0.750 0.629	
Residual		685	0.305	0.000445		
Total		692	0.307			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.629). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Comparison of To	oluene Site A	verages			
One WayOne-Way	Analysis of V	Variance			Monday, March 01, 2010, 3:16:55 PM
Data source: Av Dat	ta in CAMS 5	52 Compar	isons.JNB		-
Group Name N	Missing	Mean	Std Dev	SEM	

Row 1	614	0	0.483	2.478	0.100	
Row 2	20	0	0.160	0.0805	0.0180	
Row 3	20	0	0.136	0.0496	0.0111	
Row 4	20	0	0.140	0.0891	0.0199	
Row 5	5	0	0.204	0.151	0.0674	
Row 6	4	0	0.0902	0.0257	0.0129	
Row 7	5	0	0.174	0.0573	0.0256	
Row 8	5	0	0.118	0.0388	0.0173	
Source of V	Variation	DF	SS	MS	F	Р
Between Gi	roups	7	7.966	1.138	0.207	0.984
Residual		685	3764.984	5.496		
Total		692	3772.949			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.984). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Comparison of Ethylbenzene Site Averages

One WayOne-Way Analysis of Variance Data source: Av Data in CAMS 52 Comparisons JNB

Monday, March 01, 2010, 3:18:34 PM

Data source:	Av Dat	a in CAMS :	52 Comparı	sons.JNB				
Group Name	Ν	Missing	Mean	Std Dev	SEM			
Row 1	614	0	0.0672	0.412	0.0166			
Row 2	20	0	0.0296	0.0225	0.00503			
Row 3	20	0	0.0314	0.0221	0.00495			
Row 4	20	0	0.0254	0.0164	0.00367			
Row 5	5	0	0.0284	0.0176	0.00788			
Row 6	4	0	0.0663	0.102	0.0509			
Row 7	5	0	0.0250	0.00570	0.00255			
Row 8	5	0	0.0166	0.00602	0.00269			
Source of Van	riation	DF	SS	MS	F	Р		
Between Grou	ips	7	0.105	0.0150	0.0991	0.998		
Residual	-	685	103.880	0.152				
Total		692	103.985					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.998). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

e. Comparison of *p*+*m*-Xylene Site Averages WOno W ***

c. comparisor	101 p	m regione S	ite mitter ag	00		
One WayOne	-Way 4	Analysis of V	Variance			Monday, March 01, 2010, 3:20:03 PM
Data source: A	Av Dat	a in CAMS :	52 Compar	isons.JNB		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Row 1	614	0	0.230	1.656	0.0668	
Row 2	20	0	0.0684	0.0717	0.0160	
Row 3	20	0	0.0761	0.0668	0.0149	
Row 4	20	0	0.0508	0.0463	0.0104	
Row 5	5	0	0.0616	0.0457	0.0204	
Row 6	4	0	0.210	0.358	0.179	

Row 7	5	0	0.0574	0.0209	0.00936	
Row 8	5	0	0.0352	0.0129	0.00576	
Source of Va	ariation	DF	SS	MS	F	Р
Between Gro	ups	7	1.895	0.271	0.110	0.998
Residual		685	1681.428	2.455		
Total		692	1683.323			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.998). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

f. Comparison of o-Xylene Site Averages

One WayOne-Way Analysis of Variance Monday, March 01, 2010, 3:21:25 PM Data source: Av Data in CAMS 52 Comparisons. JNB **Group Name** Missing Std Dev SEM Ν Mean Row 1 614 0 0.0724 0.510 0.0206 Row 2 20 0 0.0288 0.0210 0.00470 20 Row 3 0 0.0302 0.0194 0.00433 20 Row 4 0 0.0223 0.0150 0.00336 5 Row 5 0 0.0260 0.0182 0.00814 4 Row 6 0 0.0578 0.0875 0.0438 5 Row 7 0 0.0240 0.00596 0.00266 Row 8 5 0 0.0166 0.00559 0.00250 Source of Variation DF MS Р SS F 0.0889 0.999 Between Groups 7 0.145 0.0207 Residual 685 159.370 0.233 Total 692 159.515

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.999). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

Page B-1

Comparison of TCEQ to Collocated Every 6th-Day Samples

I. Benzene			onocate	a Every 6	^h -Day Samj	ples
I. DUILLIIU						
t-test						Friday, June 04, 2010, 9:57:37 AM
Data source: E					on.JNB	
Normality Tes			(P = 0.6)	/		
Equal Varianc	e Test:	Passed	(P = 0.0)	99)		
Group Name	N I	Missing	Mean	Std Dev	SEM	
TCEQ	4	0	0.198	0.0585	0.0293	
Collocated	4	0	0.229	0.0148	0.00740	
Difference	-0.03					
t = -1.027 with						
95 percent conf						
						to reject the possibility that the difference is
	sampling	g variabilit	y. There is	not a statisti	cally signification	nt difference between the input groups (P =
<mark>0.344).</mark>						
Power of perfor						
The power of the						
			you are le	ss likely to d	etect a differen	nce when one actually exists. Negative results
should be interp	preted ca	utiously.				
II. 1,3-Butadie	ne					
t-test						Friday, June 04, 2010, 9:57:58 AM
Data source: E					ison.JNB	
Normality Tes		Failed		,		
Test execution			est, Rank	Sum Test beg	gun	
Mann-Whitne						Friday, June 04, 2010, 9:57:58 AM
Data source: E	Butadiene	e in TCEQ	to Colloca			
		0	Median	25%	75%	
· ·	4	0	0.00500	0.00500		
	4	0	0.00900	0.00800	0.0155	
Mann-Whitney						
T = 10.000 n(s)	mall)= 4	n(big)=4	P(est.)=			
T = 10.000 n(s) The difference	mall)= 4 in the m	n(big)=4 edian valu	P(est.)=	n the two grou		han would be expected by chance; there is a
T = 10.000 n(s)	mall)= 4 in the m	n(big)=4 edian valu	P(est.)=	n the two grou		han would be expected by chance; there is a
T = 10.000 n(s) The difference statistically sign	mall)= 4 in the m	n(big)=4 edian valu	P(est.)=	n the two grou		han would be expected by chance; there is a
T = 10.000 n(s) The difference	mall)= 4 in the m	n(big)=4 edian valu	P(est.)=	n the two grou		
T = 10.000 n(s The difference statistically sign III. Toluene t-test	mall)= 4 in the m nificant o	n(big)= 4 edian value difference	P(est.) = es between (P = 0.029)	n the two grou 9)	ups is greater t	han would be expected by chance; there is a Friday, June 04, 2010, 9:58:16 AM
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T	mall)= 4 in the m nificant o oluene i	n(big)= 4 edian value difference n TCEQ to	P(est.)= es between (P = 0.029) o Collocate	n the two grou) ed Compariso	ups is greater t	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes	mall)= 4 in the mo- nificant of Oluene i t:	 n(big)= 4 edian value difference n TCEQ to Passed 	P(est.)= es between (P = 0.02) collocate (P = 0.2)	n the two grou) ed Compariso 16)	ups is greater t	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T	mall)= 4 in the mo- nificant of Oluene i t:	n(big)= 4 edian value difference n TCEQ to	P(est.)= es between (P = 0.02) o Collocato (P = 0.2)	n the two grou) ed Compariso 16)	ups is greater t	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes	mall)= 4 in the mo- nificant of Coluene i t: t: t: t: t:	 n(big)= 4 edian value difference n TCEQ to Passed 	P(est.)= es between (P = 0.02) collocate (P = 0.2)	n the two grou) ed Compariso 16)	ups is greater t	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name TCEQ	mall)= 4 in the mo- nificant of Coluene i t: t: t: t: t:	n(big)= 4 edian value difference n TCEQ to Passed Passed	P(est.)= es between (P = 0.029) o Collocate (P = 0.2 (P = 0.5)	the two group)) ed Compariso 16) 89)	ups is greater t on.JNB	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name	mall)= 4 in the monificant of foluene i t: re Test: N	n(big)= 4 edian value difference n TCEQ to Passed Passed Missing	P(est.)= es between (P = 0.029) collocate (P = 0.2 (P = 0.5 Mean	the two group) ed Compariso 16) 89) Std Dev	ups is greater t on.JNB SEM	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name TCEQ	mall)= 4 in the monificant of foluene i t: t: <u>t:</u> <u>N</u> 4	n (big)= 4 edian value difference n TCEQ to Passed Passed Missing 0 0	P(est.)= es between (P = 0.024) Collocate (P = 0.2 (P = 0.5) Mean 0.140	the two group) ed Comparisc 16) 89) Std Dev 0.0469	ups is greater t on.JNB SEM 0.0235	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name TCEQ Collocated	mall)= 4 in the main ficant of foluene i t: re Test: N 4 4 4 0.016	n (big)= 2 edian value difference n TCEQ to Passed Passed Missing 0 0 0	P(est.)= es between (P = 0.029) o Collocate (P = 0.29) (P = 0.29	ed Compariso (16) (16) (16) (16) (16) (16) (16) (16)	ups is greater t on.JNB SEM 0.0235	
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name TCEQ Collocated Difference	mall)= 4 in the manificant of foluene i t: t: Tere Test: A 4 4 0.016 6 degree	n (big)= 2 edian value difference n TCEQ to Passed Passed Missing 0 0 0 s of freedo	P(est.)= es between (P = 0.029) o Collocate (P = 0.2 (P = 0.2 (P = 0.5) Mean 0.140 0.124 om. (P = 0.0)	ed Compariso (16) (16) (16) (16) (16) (16) (16) (16)	ups is greater t on.JNB SEM 0.0235 0.0219	Friday, June 04, 2010, 9:58:16 AM
T = 10.000 n(s The difference statistically sign III. Toluene t-test Data source: T Normality Tes Equal Variance Group Name TCEQ Collocated Difference t = 0.499 with 95 percent confi	mall)= 4 in the manificant of foluene i t: te Test: N 4 0.016 6 degree idence in	n (big)= 2 edian value difference n TCEQ to Passed Passed Missing 0 0 0 s of freedo nterval for	P(est.)= es between (P = 0.02) o Collocate (P = 0.2) (P = 0.2) (P = 0.5) Mean 0.140 0.124 om. (P = 0.02)	ed Compariso (16) (89) (16) (89) (16) (16) (16) (16) (16) (16) (16) (16	ups is greater t on.JNB <u>SEM</u> 0.0235 0.0219 0.0624 to 0.094	Friday, June 04, 2010, 9:58:16 AM
T = 10.000 n(s) The difference statistically sign III. Toluene t-test Data source: T Normality Tess Equal Variance Group Name TCEQ Collocated Difference t = 0.499 with 95 percent conf The difference	mall)= 4 in the monificant of foluene i t: re Test: N 4 4 0.016 6 degree in the monificant of the moni	 n(big)= 4 edian value edian value difference n TCEQ to Passed Passed Passed Missing 0 0 o <lio< li=""> o o o <lio<< td=""><td>P(est.)= es betweer (P = 0.024) collocate (P = 0.2 (P = 0.5) Mean 0.140 0.124 com. (P = 0.6 difference of the two</td><td>ed Compariso (16) (89) (16) (89) (16) (16) (16) (16) (16) (16) (16) (16</td><td>on.JNB SEM 0.0235 0.0219 0.0624 to 0.094 of great enough</td><td>Friday, June 04, 2010, 9:58:16 AM</td></lio<<></lio<>	P(est.)= es betweer (P = 0.024) collocate (P = 0.2 (P = 0.5) Mean 0.140 0.124 com. (P = 0.6 difference of the two	ed Compariso (16) (89) (16) (89) (16) (16) (16) (16) (16) (16) (16) (16	on.JNB SEM 0.0235 0.0219 0.0624 to 0.094 of great enough	Friday, June 04, 2010, 9:58:16 AM
T = 10.000 n(s) The difference statistically sign III. Toluene t-test Data source: T Normality Tess Equal Variance Group Name TCEQ Collocated Difference t = 0.499 with 95 percent conf The difference	mall)= 4 in the main in the main in the main in the main sampling	n (big)= 4 edian value difference n TCEQ to Passed Passed Missing 0 0 0 s of freedo nterval for ean values g variabilit	P(est.)= es betweer (P = 0.024) collocate (P = 0.2 (P = 0.2 (P = 0.2 (P = 0.5) Mean 0.140 0.124) om. (P = 0.6 difference of the two y. There is	ed Compariso (16) (16) (16) (16) (16) (16) (16) (16)	on.JNB SEM 0.0235 0.0219 0.0624 to 0.094 of great enough	Friday, June 04, 2010, 9:58:16 AM 44 h to reject the possibility that the difference is

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

IV. Ethylbenzene

t-test						Friday, June 04, 2010, 9:58:31 AM
Data source: E	Ethylbe	nzene in TCI	EQ to Coll	ocated Comp	parison.JNB	
Normality Tes	st:	Passed	(P = 0.16)	52)		
Equal Varianc	e Test	Passed	(P = 0.54)	(9)		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
TCEQ	4	0	0.0325	0.00957	0.00479	
Collocated	4	0	0.0205	0.00733	0.00366	

Difference 0.0120

t = 1.991 with 6 degrees of freedom. (P = 0.094)

95 percent confidence interval for difference of means: -0.00275 to 0.0267

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.094).

Power of performed test with alpha = 0.050: 0.298

The power of the performed test (0.298) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

V. p+m-Xylene

t-test

Friday, June 04, 2010, 9:58:48 AM

Data source: m+pX in TCEQ to Collocated Comparison.JNB

Normality Test:	Passed	(P = 0.157)
Faual Variance Test	Passed	$(\mathbf{P} = 0.334)$

Equal Varianc	e Tes	t: Passed	(P = 0.33)	54)	
Group Name	Ν	Missing	Mean	Std Dev	SEM
TCEQ	4	0	0.0700	0.0216	0.0108
Collocated	4	0	0.0355	0.0260	0.0130

Difference 0.0345

t = 2.039 with 6 degrees of freedom. (P = 0.088)

95 percent confidence interval for difference of means: -0.00690 to 0.0759

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.088).

Power of performed test with alpha = 0.050: 0.315

The power of the performed test (0.315) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

VI. o-Xylene

t-test						Friday, June 04, 2010, 10:43:41 AM
Data source: o	X in T	CEQ to Coll	ocated Cor	mparison.JNI	В	
Normality Tes	t:	Passed	(P = 0.76)	52)		
Equal Variance Test: Passed			(P = 0.60))0)		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
TCEQ	4	0	0.0238	0.0149	0.00747	
Collocated	4	0	0.0208	0.0113	0.00563	
Difference	0.0	0300				

t = 0.321 with 6 degrees of freedom. (P = 0.759)

95 percent confidence interval for difference of means: -0.0199 to 0.0259

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.759).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

Comparison	n of Ev	very 6 th -	Day TCE	Q Samples	to All C	ollocated Samples
I. Benzene						
t-test						Thursday, June 03, 2010, 5:37:19 PM
Data source: H					NB	
Normality Tes			d $(P < 0.0)$	/		
Test execution				Sum Test beg	un	
Mann-Whitne						Thursday, June 03, 2010, 5:37:19 PM
Data source: H				-		
		lissing	Median	25%	75%	
TCEQ	4	0	0.195	0.155	0.240	
	16	0	0.186	0.163	0.229	
Mann-Whitney						
T = 40.000 n(s)					•	
						eat enough to exclude the possibility that the
difference is di	ie to ran	idom sam	pling variab	ility; there is i	iot a statisti	ically significant difference $(P = 0.887)$
II. 1,3-Butadie	n 0					
t-test	ene					Thursday, June 03, 2010, 5:42:16 PM
Data source: H	Jutadiar	na in 6th T	Jav Sample	Comparisons	IND	Thursday, June 03, 2010, 3.42.16 PM
Normality Tes			ed $(P = 0.42)$		JIND	
Equal Variance			d $(P < 0.02)$			
Test execution				/	un	
Mann-Whitne				Sum rest deg	ull	Thursday, June 03, 2010, 5:42:16 PM
Data source: H				Comparisons	INB	Thursday, June 05, 2010, 5.42.10 Thu
		lissing	Median	25%	75%	
TCEQ	4	0	0.00500	0.00500	0.0050	0
-	16	0	0.00300	0.00700	0.0155	
Mann-Whitney	-	-		0.00700	0.0122	·
T = 22.000 n(s))64)		
					ns is not or	eat enough to exclude the possibility that the
						ically significant difference ($P = 0.064$)
		uom sum	ping turnuo			
III. Toluene						
t-test						Thursday, June 03, 2010, 5:43:00 PM
Data source: 7	Foluene	in 6th Da	v Sample Co	omparisons.JN	νB	,
Normality Tes			ed $(P = 0.1)$			
Equal Varian			ed $(P = 0.3)$	/		
Group Name			Mean		SEM	
TCEQ	4	0	0.140	0.0469	0.0235	
Collocated	16	ů 0	0.169	0.0861	0.0215	
Difference	-0.02		0.107	0.0001		
t = -0.632 with			eedom (P =	0.535)		
95 percent con					.124 to 0.06	564
						igh to reject the possibility that the difference is
						cant difference between the input groups ($P =$
0.535).		0				and the second sec
Demonstration C	1.4		1 0.050	0.050		

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800. Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

IV. Ethylbe t-test	nzene					Thursday, June 03, 2010, 5:43:43 PM
	e: Ethvl	lbenzene in 6	th Day Samp	le Comparisons	.JNB	1 naroauj, cano co, 2010, c. to to 111
Normality 7		Faile				
				um Test begun		
		ank Sum Te		C		Thursday, June 03, 2010, 5:43:43 PM
				le Comparisons	.JNB	
Group	Ν	Missing	Median	25%	75%	
TCEQ	4	0	0.0350	0.0250	0.0400	
Collocated	16	0	0.0265	0.0165	0.0345	
Mann-White	ney U S	Statistic= 23.	000			
T = 51.000	n(smal	l = 4 n(big)	= 16 (P = 0.42)	22)		
						eat enough to exclude the possibility that the
difference is	due to	random sam	pling variabil	ity; there is not	a statisti	cally significant difference $(P = 0.422)$
V. p+m-Xy	lene					
t-test						Thursday, June 03, 2010, 5:44:20 PM
				nparisons.JNB		
Normality			d $(P < 0.05)$			
				um Test begun		
		ank Sum Te				Thursday, June 03, 2010, 5:44:20 PM
Data source	e: m+p-			nparisons.JNB		
-						
Group	N	Missing	Median	25%	75%	
TCEQ	4	0	0.0750	0.0550	0.0850	
TCEQ Collocated	4 16	0 0	0.0750 0.0525			
TCEQ Collocated Mann-Whitt	$\frac{4}{16}$ hey U S	$0 \\ 0 \\ 0 \\ \text{Statistic} = 22.3$	0.0750 0.0525 500	0.0550 0.0330	0.0850	
TCEQ Collocated Mann-White $T = 51.500$	4 16 ney U S n(smal	$0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.39) \\ \hline$	0.0550 0.0330 95)	0.0850 0.0780	
TCEQ Collocated Mann-White T = 51.500 The different	4 16 ney U S n(smal ce in th	$0 \\ 0$ Statistic= 22.: 1)= 4 n(big)= ne median va	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.39 \\ lues between$	0.0550 0.0330 95) the two groups	0.0850 0.0780 is not gre	eat enough to exclude the possibility that the
TCEQ Collocated Mann-White T = 51.500 The different	4 16 ney U S n(smal ce in th	$0 \\ 0$ Statistic= 22.: 1)= 4 n(big)= ne median va	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.39 \\ lues between$	0.0550 0.0330 95) the two groups	0.0850 0.0780 is not gre	eat enough to exclude the possibility that the cally significant difference ($P = 0.395$)
TCEQ Collocated Mann-Whiti T = 51.500 The difference is	4 16 ney U S n(smal ce in th due to	$0 \\ 0$ Statistic= 22.: 1)= 4 n(big)= ne median va	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.39 \\ lues between$	0.0550 0.0330 95) the two groups	0.0850 0.0780 is not gre	
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen	4 16 ney U S n(smal ce in th due to	$0 \\ 0$ Statistic= 22.: 1)= 4 n(big)= ne median va	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.39 \\ lues between$	0.0550 0.0330 95) the two groups	0.0850 0.0780 is not gre	cally significant difference $(P = 0.395)$
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen t-test	4 16 ney U S n(smal ce in th due to e	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam	0.0750 0.0525 500 = 16 (P = 0.39 lues between pling variabil	0.0550 0.0330 95) the two groups ity; there is not	0.0850 0.0780 is not gre	
TCEQ Collocated Mann-Whitt T = 51.500 The difference is VI. o-Xylen t-test Data source	4 16 ney U S n(small ce in th due to e e e: o-X i	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam n 6th Day Sa	0.0750 0.0525 500 = 16 (P = 0.3) lues between pling variabil	0.0550 0.0330 95) the two groups ity; there is not risons.JNB	0.0850 0.0780 is not gre	cally significant difference $(P = 0.395)$
TCEQ Collocated Mann-Whith T = 51.500 The difference is VI. o-Xylen t-test Data source Normality	4 16 ney U S n(small ce in the due to e e e: o-X i Fest:	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam random sam n 6th Day Sa Faile	0.0750 0.0525 $\overline{500}$ = 16 (P = 0.3) lues between pling variabil umple Compate d (P < 0.05)	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0)	0.0850 0.0780 is not gre	cally significant difference $(P = 0.395)$
TCEQ Collocated Mann-Whith T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi	4 16 ney U S n(small ce in the due to e e: o-X i Fest: on endo	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam random sam n 6th Day Sa Faile ed by user re	$0.0750 \\ 0.0525 \\ \hline 500 \\ = 16 (P = 0.3) \\ lues between \\ pling variabil \\ mple Compact \\ d (P < 0.05) \\ quest, Rank S$	0.0550 0.0330 95) the two groups ity; there is not risons.JNB	0.0850 0.0780 is not gre	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi Mann-Whit	4 16 ney U S n(small ce in the due to e e: o-X i Fest: on endet tney R:	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam n 6th Day Sa Faile ed by user re ank Sum Te	0.0750 0.0525 500 = 16 (P = 0.3) lues between pling variabil ample Compate d (P < 0.05) quest, Rank S st	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) um Test begun	0.0850 0.0780 is not gre	cally significant difference $(P = 0.395)$
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen t-test Data source Normality T Test executi Mann-Whit Data source	4 16 ney U S n(small ce in the due to e e con endo they Ra con endo	0 0 Statistic= 22.: 1)= 4 n(big)= 10 median va random sam random sam random sam random sam random sam random sam random sam n 6th Day Sa	0.0750 0.0525 500 = 16 (P = 0.3) lues between pling variabil ample Comparing d (P < 0.05) quest, Rank S st ample Comparing st	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) tum Test begun risons.JNB	0.0850 0.0780 is not gre a statistic	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi Mann-White Data source Group	4 16 ney U S n(small ce in the due to e e: o-X i Fest: on ende tney R: e: o-X i N	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0750 0.0525 $\overline{500}$ = 16 (P = 0.3) lues between pling variabil ample Compate d (P < 0.05) quest, Rank S st ample Compate Median	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) sum Test begun risons.JNB 25%	0.0850 0.0780 is not gre a statistic	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM
TCEQ Collocated Mann-Whiti T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi Mann-White Data source Group TCEQ	4 16 ney U S n(small ce in the due to e e c: o-X i Fest: on ended tney R: co-X i N 4	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam random sam A faile ed by user re ank Sum Te n 6th Day Sa Missing 0	0.0750 0.0525 0.0525 0.0525 0.0525 0.0525 0.054 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.0250	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) sum Test begun risons.JNB 25% 0.0125	0.0850 0.0780 is not gre a statistic 75% 0.0350	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM
TCEQ Collocated Mann-Whith T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi Mann-White Data source Group TCEQ Collocated	4 16 ney U S n(small ce in the due to e ce o-X i Fest: on ende tney R: ci o-X i N 4 16	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam random sam Faile ed by user re ank Sum Te n 6th Day Sa Missing 0 0 0	0.0750 0.0525 0.0525 0.0525 0.0525 0.051 0.051 0.0250 0.0250 0.0270	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) sum Test begun risons.JNB 25%	0.0850 0.0780 is not gre a statistic	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM
TCEQ Collocated Mann-Whith T = 51.500 The difference is VI. o-Xylen t-test Data source Normality Test executi Mann-Whit Data source Group TCEQ Collocated Mann-Whith	4 16 ney U S n(small ce in the due to e e: o-X i Fest: on ende tney R: e: o-X i N 4 16 ney U S	0 0 Statistic= 22.: 1)= 4 n(big)= ne median va random sam n 6th Day Sa Faile ed by user re ank Sum Te n 6th Day Sa Missing 0 0 Statistic= 27.:	0.0750 0.0525 0.0525 0.0525 0.0525 0.051 0.051 0.0250 0.0250 0.0270	0.0550 0.0330 95) the two groups ity; there is not risons.JNB 0) sum Test begun risons.JNB 25% 0.0125 0.0140	0.0850 0.0780 is not gre a statistic 75% 0.0350	cally significant difference (P = 0.395) Friday, June 04, 2010, 10:38:20 AM

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.705)

Comparison of Collocated Samples to All Other Sites

I. Benzene			•	All Other 8				
a. Collocated vs.	Javcee P	ark						
t-test	Juj cec I				Monday, January 11, 2010, 10:30:28 AM			
Data source: Ben	zene Site	in VOC Si	te Compari					
Normality Test:			< 0.050)					
Fest execution end		<pre></pre>		Test begun				
Mann-Whitney F					Monday, January 11, 2010, 10:30:28 AM			
Data source: Ben			te Compari	son.JNB				
Group N	Missii		<u> </u>	25%	75%			
Collocated 20	0	0.	206	0.168	0.232			
Jaycee 20	0	0.	165	0.148	0.212			
Mann-Whitney U	Statistic=	= 143.000						
T = 467.000 n(sm)	all)= 20	n(big)=20	(P = 0.126))				
					not great enough to exclude the possibility that			
lifference is due t	o random	n sampling y	variability; 1	there is not a	statistically significant difference $(P = 0.126)$	<mark>)</mark>		
b. Collocated vs.	Water T	reatment I	Plant					
t-test					Monday, January 11, 2010, 10:31:17 AM			
Data source: Ben				son.JNB				
Normality Test:		Failed (P						
Test execution end			Rank Sum	Fest begun				
Mann-Whitney F					Monday, January 11, 2010, 10:31:17 AM			
Data source: Ben			te Comparis					
Group		Missing	Median	25%	75%			
Collocated	20	0	0.206	0.168	0.232			
Water Tmt Plant	20	0	0.184	0.146	0.224			
	Statistic=							
			(P = 0.181)					
T = 460.000 n(sm)	nall)= 20							
$\Gamma = 460.000 \text{ n(sm})$ The difference in Γ	nall)= 20 t <mark>he media</mark>	an values be	etween the t	wo groups is	not great enough to exclude the possibility that			
$\Gamma = 460.000 \text{ n(sm})$ The difference in Γ	nall)= 20 t <mark>he media</mark>	an values be	etween the t	wo groups is	not great enough to exclude the possibility the statistically significant difference $(P = 0.181)$			
T = 460.000 n(sm The difference in the difference is due the di	all)= 20 the media o random	an values be sampling	etween the t	wo groups is				
T = 460.000 n(sm The difference in t difference is due t c. Collocated vs.	all)= 20 the media o random	an values be sampling	etween the t	wo groups is	statistically significant difference $(P = 0.181)$			
T = 460.000 n(sm The difference in t difference is due t c. Collocated vs. ' t-test	hall)= 20 the media o random Triangle	an values be sampling v Park	etween the t variability; 1	wo groups is there is not a				
T = 460.000 n(srr The difference in difference is due t c. Collocated vs. t-test Data source: Ben	hall)= 20 the media o random Triangle zene Site	an values be sampling v Park in VOC Si	etween the t variability; t te Comparis	wo groups is there is not a	statistically significant difference $(P = 0.181)$			
T = 460.000 n(srr The difference in difference is due t c. Collocated vs. t-test Data source: Ben Normality Test:	nall)= 20 the media o random Triangle zene Site	an values be sampling v Park in VOC Si Failed (P	te Comparia <pre>ctween the t variability; t te Comparia < 0.050)</pre>	wo groups is there is not a son.JNB	statistically significant difference $(P = 0.181)$			
T = 460.000 n(sm The difference in difference is due t c. Collocated vs. t-test Data source: Ben Normality Test: Test execution end	nall)= 20 the media o random Triangle zene Site ded by us	an values be sampling Park in VOC Si Failed (P ser request,	te Comparia <pre>ctween the t variability; t te Comparia < 0.050)</pre>	wo groups is there is not a son.JNB	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM			
$\Gamma = 460.000 \text{ n(sm}$ The difference in the difference is due th	nall)= 20 the media o random Triangle zene Site ded by us Rank Su r	an values be sampling Park in VOC Si Failed (P ser request, n Test	te Comparis < 0.050) Rank Sum	wo groups is there is not a son.JNB Test begun	statistically significant difference $(P = 0.181)$			
$\Gamma = 460.000 \text{ n(sm}$ The difference is due t difference is due t c. Collocated vs. T t-test Data source: Ben Normality Test: Test execution end Mann-Whitney F	nall)= 20 the media o random Triangle zene Site ded by us Rank Su r	Park i sampling v Park in VOC Si Failed (P ser request, n Test in VOC Si	te Comparis < 0.050) Rank Sum T	wo groups is there is not a son.JNB Fest begun son.JNB	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM			
T = 460.000 n(sm The difference in difference is due t c. Collocated vs. ' t-test Data source: Ben Normality Test: Test execution end Mann-Whitney F Data source: Ben Group	nall)= 20 the media o random Triangle zene Site ded by us Rank Sur zene Site N M	Park i sampling v Park in VOC Si Failed (P ser request, n Test in VOC Si	te Comparis < 0.050) Rank Sum te Comparis Median	wo groups is there is not a son.JNB Test begun son.JNB 25%	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM 75%			
T = 460.000 n(sm The difference in difference is due t c. Collocated vs. t-test Data source: Ben Normality Test: Test execution end Mann-Whitney F Data source: Ben Group Collocated	nall)= 20 the media o random Triangle zene Site ded by us Rank Sur zene Site	Park i sampling Park in VOC Si Failed (P ser request, n Test in VOC Si issing 0	te Comparia < 0.050) Rank Sum te Comparia te Comparia Median 0.206	wo groups is there is not a son.JNB Test begun son.JNB 25% 0.168	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM 75% 0.232			
difference is due t c. Collocated vs. t-test Data source: Ben Normality Test: Test execution end Mann-Whitney F Data source: Ben Group Collocated Triangle Park	all)= 20 the media o random Triangle zene Site ded by us Rank Sur zene Site N M 20 5	n values be sampling Park in VOC Si Failed (P er request, n Test in VOC Si issing 0 0	te Comparis < 0.050) Rank Sum te Comparis Median	wo groups is there is not a son.JNB Test begun son.JNB 25%	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM 75%			
T = 460.000 n(sm The difference in difference is due t c. Collocated vs. t-test Data source: Ben Normality Test: Test execution end Mann-Whitney F Data source: Ben Group Collocated	all)= 20 the media o random Triangle zene Site ded by us Rank Sur zene Site N M 20 5	n values be sampling Park in VOC Si Failed (P er request, n Test in VOC Si issing 0 0	te Comparia < 0.050) Rank Sum te Comparia te Comparia Median 0.206	wo groups is there is not a son.JNB Test begun son.JNB 25% 0.168	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM 75% 0.232			
T = 460.000 n(srr The difference in the difference is due the diff	all)= 20 the media o random Triangle zene Site ded by us Rank Sur zene Site N M 20 5 Statistic=	n values be sampling Park in VOC Si Failed (P ser request, n Test in VOC Si issing 0 0 = 48.500	te Comparis < 0.050) Rank Sum te Comparis Median 0.206 0.209	wo groups is there is not a son.JNB Test begun son.JNB 25% 0.168	statistically significant difference (P = 0.181) Monday, January 11, 2010, 10:31:49 AM Monday, January 11, 2010, 10:31:49 AM 75% 0.232			

difference is due to random sampling variability; there is not a statistically significant difference (P = 0.946)

d. Collocated vs. Mountain Peak

t-test

Data source: Benzene Site in VOC Site Comparison.JNB

Monday, January 11, 2010, 10:32:31 AM

Normality To	est:	Failed	P < 0.05	0)	
Test execution					in
Mann-Whitn				100000080	Monday, January 11, 2010, 10:32:31 AM
Data source:				parison.JNB	
Group	Ν	Missing			75%
Collocated	20	0	0.206		
Mountain Pea		0	0.133		
Mann-Whitne	v U Stat	tistic = 5.00			
T = 15.000 n				08)	
					bs is greater than would be expected by chance; there is a
statistically si					
	C			-	
e. Collocated	vs. Vito	ovsky			
t-test					Monday, January 11, 2010, 10:32:59 AM
Data source:	Benzen	e Site in VO	OC Site Com	parison.JNB	
Normality To			1 (P < 0.05)		
Test execution				lum Test begu	
Mann-Whitn					Monday, January 11, 2010, 10:32:59 AM
Data source:				1	
Group		Aissing	Median	25%	75%
Collocated	20	0	0.206	0.168	0.232
Vitovsky	5	0	0.248	0.168	0.275
	··· ~		00		
Mann-Whitne $T = 76.500$ n	(small)=	= 5 n(big) =	20 $(P = 0.43)$	55)	
T = 76.500 n The difference	(small)= e in the i	5 n(big)= median valu	20 (P = 0.43)	the two group	is not great enough to exclude the possibility that the
T = 76.500 n The difference	(small)= e in the i	5 n(big)= median valu	20 (P = 0.43)	the two group	by is not great enough to exclude the possibility that the ot a statistically significant difference $(P = 0.455)$
T = 76.500 n The difference difference is c	(small)= e in the r lue to ra	5 n(big)= median valu ndom samp	20 ($P = 0.43$) ues between bling variabil	the two group	
T = 76.500 n The difference difference is c f. Collocated	(small)= e in the r lue to ra	5 n(big)= median valu ndom samp	20 ($P = 0.43$) ues between bling variabil	the two group	ot a statistically significant difference $(P = 0.455)$
T = 76.500 m The difference difference is c f. Collocated t-test	(small)= e in the i lue to ra vs. Mid	5 n(big)= median valu ndom samp llothian HS	20 (P = 0.4) ues between bling variabil	the two group lity; there is n	
T = 76.500 m The difference difference is c f. Collocated t-test Data source:	(small)= e in the r lue to ra vs. Mid Benzen	5 n(big)= median valu ndom samp lothian HS e Site in V(20 (P = 0.4) ues between bling variabil	the two group lity; there is n parison.JNB	ot a statistically significant difference $(P = 0.455)$
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To	(small)= e in the r lue to ra vs. Mid Benzen est:	5 n(big)= median valu ndom samp llothian HS e Site in V(Failed	20 (P = 0.4 ; ues between bling variabil COC Site Com d (P < 0.05)	the two group lity; there is n nparison.JNB 0)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution	(small)= e in the r lue to ra vs. Mid Benzen est: n ended	5 n(big)= median valu ndom samp llothian HS e Site in V(Failed by user req	20 ($P = 0.4$; ues between bling variabil S DC Site Com 1 ($P < 0.05$; uest, Rank S	the two group lity; there is n nparison.JNB 0)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitn	(small)= e in the r lue to ra vs. Mid Benzend est: n ended ney Ranl	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes	20 ($P = 0.4$) ues between bling variabil S DC Site Com 1 ($P < 0.05$) uest, Rank S t	the two group lity; there is n parison.JNB 0) Sum Test begu	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitn Data source:	(small)= e in the p lue to ra vs. Mid Benzence est: n ended ney Ranl Benzence	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(20 (P = 0.4 ; ues between bling variabil S OC Site Com 1 (P < 0.05 ; uest, Rank S t OC Site Com	the two group lity; there is n parison.JNB 0) Sum Test begu parison.JNB	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM In Monday, January 11, 2010, 10:33:17 AM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitn Data source: Group	(small)= e in the r lue to ra vs. Mid Benzene est: n ended ney Ranl Benzene N N	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing	20 (P = 0.4; ues between bling variabil S OC Site Com 1 (P < 0.05; uest, Rank S t OC Site Com Median	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25%	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75%
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitn Data source: Group Collocated	(small)= e in the r lue to ra vs. Mid Benzen est: n ended Benzen N N 20	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0	20 (P = 0.4; ues between bling variabil S DC Site Com t (P < 0.05; uest, Rank S t DC Site Com Median 0.206	the two group lity; there is n parison.JNB 0) Sum Test begu parison.JNB 25% 0.168	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitn Data source: Group Collocated Mid HS	(small)= e in the p lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0	20 (P = 0.4 ; ues between bling variabil S DC Site Com 1 (P < 0.05 ; uest, Rank S t DC Site Com Median 0.206 0.117	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25%	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75%
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme	(small)= e in the r lue to ra vs. Mid Benzend est: n ended tey Ranl Benzend N N 20 5 zy U Stat	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50	20 (P = 0.4 ; ues between oling variabil OC Site Com I (P < 0.05 ; uest, Rank S t OC Site Com Median 0.206 0.117 0	the two group lity; there is n parison.JNB 0) Sum Test begu parison.JNB 25% 0.168 0.0973	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232
T = 76.500 m The difference is c difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitne T = 15.500 m	(small)= e in the p lue to ra vs. Mid Benzend est: n ended ey Ranl Benzend N N 20 5 cy U Stat (small)=	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)=	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = < 0.4 ;	the two group lity; there is n parison.JNB 0) 5um Test begu parison.JNB 25% 0.168 0.0973 001)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference	(small)= e in the p lue to ra vs. Mid Benzend est: n ended ney Ranl Benzend N N 20 5 cy U Stat (small)= e in the p	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valu	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = $<$ 0. ues between	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference	(small)= e in the p lue to ra vs. Mid Benzend est: n ended ney Ranl Benzend N N 20 5 cy U Stat (small)= e in the p	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valu	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = $<$ 0. ues between	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality Te Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitne T = 15.500 m The difference statistically si	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 cy U Stat (small)= e in the r gnifican	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valu	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = $<$ 0. ues between	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference statistically si II. 1,3-Butad	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 cy U Stat (small)= e in the r gnifican iene	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valu t difference	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = $<$ 0. ues between	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 cy U Stat (small)= e in the r gnifican iene	5 n(big)= median valu ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valu t difference	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = $<$ 0. ues between	the two group lity; there is n nparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 ps is greater than would be expected by chance; there is a
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 ey U Stat (small)= e in the r gnifican iene vs. Jayo	 5 n(big)= median valuation median valuation median valuation median HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valuation t difference 	20 (P = 0.4; ues between bling variabil C Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = <0.00; ues between e (P = <0.00)	the two group lity; there is n parison.JNB 0) fum Test begu parison.JNB 25% 0.168 0.0973 001) the two group 1)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test Data source:	(small)= e in the r lue to ra vs. Mid Benzend est: n ended ley Ranl Benzend N N 20 5 ey U Stat (small)= e in the r gnifican iene vs. Jayo BD Site	 5 n(big)= median valuation median valuation median valuation median HS e Site in VO Failed by user req k Sum Tes e Site in VO Missing 0 0 tistic= 0.50 5 n(big)= median valuation t difference cee Park e in VOC S 	20 (P = 0.4; ues between bling variabil C Site Com 1 (P < 0.05; uest, Rank S t OC Site Com 0.206 0.117 0 20 (P = <0.00; ues between p (P = <0.00; 1 (P < 0.00; 0.206; 0.117 0 20 (P = <0.00; 0 (P =	the two group lity; there is n oparison.JNB 0) fum Test begu parison.JNB 0.168 0.0973 001) the two group 1)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 ps is greater than would be expected by chance; there is a
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality Te Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitme T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test Data source: Normality Te	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 cy U Stat (small)= e in the r gnifican iene vs. Jay BD Site est:	 5 n(big)= median valuation of the second state in voc second state in vo	20 (P = 0.4; ues between bling variabil C Site Com d (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = <0.00; ues between e (P = <0.00; the comparise d (P = 0.18; c Site Comparise)	the two group lity; there is n parison.JNB 0) fum Test begun parison.JNB 0.168 0.0973 001) the two group 1) son.JNB 3)	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 ps is greater than would be expected by chance; there is a
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitne T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test Data source: Normality To Equal Varian	(small)= e in the n lue to ra vs. Mid Benzend est: n ended ney Ranl Benzend N N 20 5 cy U Stat (small)= e in the n gnifican iene vs. Jay BD Site est: nce Test	 5 n(big)= median valuation of the second state in voc second state in vo	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = <0.00 ite Compariss d (P = 0.18 d (P = 0.71)	the two group lity; there is n oparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group 1) son.JNB 3) 8)	Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 os is greater than would be expected by chance; there is a Monday, January 11, 2010, 10:39:53 AM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitne T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test Data source: Normality To Equal Varian Group Name	(small)= e in the r lue to ra vs. Mid Benzend est: n ended Benzend N N 20 5 cy U Stat (small)= e in the r gnifican iene vs. Jay BD Site est: nce Test	5 n(big)= median valuation ndom samp lothian HS e Site in V(Failed by user req k Sum Tes e Site in V(Missing 0 0 tistic= 0.50 5 n(big)= median valuation t difference cee Park e in VOC S Passed : Passed Missing	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = <0.00 ite Compariss d (P = 0.18 d (P = 0.71) Mean	the two group lity; there is n oparison.JNB 0) sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group 1) son.JNB 3) 8) Std Dev	ot a statistically significant difference (P = 0.455) Monday, January 11, 2010, 10:33:17 AM m Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 os is greater than would be expected by chance; there is a Monday, January 11, 2010, 10:39:53 AM SEM
T = 76.500 m The difference difference is c f. Collocated t-test Data source: Normality To Test execution Mann-Whitm Data source: Group Collocated Mid HS Mann-Whitne T = 15.500 m The difference statistically si II. 1,3-Butad a. Collocated t-test Data source: Normality To Equal Varian	(small)= e in the n lue to ra vs. Mid Benzend est: n ended ney Ranl Benzend N N 20 5 cy U Stat (small)= e in the n gnifican iene vs. Jay BD Site est: nce Test	 5 n(big)= median valuation of the second state in voc second state in vo	20 (P = 0.4; ues between bling variabil S DC Site Com 1 (P < 0.05; uest, Rank S t DC Site Com Median 0.206 0.117 0 20 (P = <0.00 ite Compariss d (P = 0.18 d (P = 0.71)	the two group lity; there is n oparison.JNB 0) Sum Test begu nparison.JNB 25% 0.168 0.0973 001) the two group 1) son.JNB 3) 8)	Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM Monday, January 11, 2010, 10:33:17 AM 75% 0.232 0.133 Dos is greater than would be expected by chance; there is a Monday, January 11, 2010, 10:39:53 AM

Difference -0.000550

t = -0.282 with 38 degrees of freedom. (P = 0.779)

95 percent confidence interval for difference of means: -0.00450 to 0.00340

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.779).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

b. Collocated vs. Water Treatment Plant

t-test				Monday, January 11, 2010, 10:40:11 AM			
Data source: BD Site in	VOC S	ite Comparis	on.JNB				
Normality Test:	Passe	d $(P = 0.66)$	7)				
Equal Variance Test:	Passe	d ($P = 0.35$	9)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Collocated	20	0	0.0111	0.00594	0.00133		
Water Treatment Plant	20	0	0.00985	0.00509	0.00114		

0.00127 Difference

t = 0.729 with 38 degrees of freedom. (P = 0.470)

95 percent confidence interval for difference of means: -0.00227 to 0.00482

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P =0.470).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Collocated vs. Triangle Park

Equal Variance Test:

Ν

Group Name

t-test					Monday, Ja	nuary 11, 2010, 10:41:15 AM
Data source: BD	Site ir	NOC Site C	Comparison.Л	٧B	5,	
Normality Test:		Failed (P < 0.050)			
Test execution en	ded by	user request	t, Rank Sum T	est begun		
Mann-Whitney	Rank S	Sum Test		Monday, Ja	nuary 11, 2010, 10:41:15 AM	
Data source: BD	Site ir	NOC Site C	Comparison.Л	NВ		
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.0110	0.00750	0.0155	
Triangle Park	5	0	0.0150	0.0103	0.0460	
Mann-Whitney U	Statist	tic = 32.000				
T = 83.000 n(sm)						
The difference in	the me	dian values	between the ty	wo groups is n	ot great enoug	gh to exclude the possibility that the
difference is due	to rand	om sampling	g variability; t	here is not a s	atistically sig	nificant difference $(P = 0.233)$
d. Collocated vs.	Moun	tain Peak				
t-test					Monday, Ja	nuary 11, 2010, 10:41:29 AM
Data source: BD	Site ir	NOC Site C	Comparison.J	٧B	-	
Normality Test:		Passed (P = 0.730)			

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Std Dev

SEM

Passed (P = 0.710)

Mean

Missing

Collocated	20	0	0.0111	0.00594	0.00133
Mountain Peak	4	0	0.00825	0.00512	0.00256

Difference 0.00287

t = 0.899 with 22 degrees of freedom. (P = 0.378)

95 percent confidence interval for difference of means: -0.00375 to 0.00950

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.378).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

e. Collocated vs. Vitovsky

t-test Data source: BD Site in VOC Site Comparison.JNB Normality Test: Passed (P = 0.803) Equal Variance Test: Failed (P < 0.050) Test execution ended by user request, Rank Sum Test begun Mann-Whitney Rank Sum Test Data source: BD Site in VOC Site Comparison.JNB Monday, January 11, 2010, 10:41:48 AM

Monday, January 11, 2010, 10:41:48 AM

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0110	0.00750	0.0155
Vitovsky	5	0	0.0110	0.01000	0.0120

Mann-Whitney U Statistic= 49.000

T = 66.000 n(small) = 5 n(big) = 20 (P = 0.973)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.973)

f. Collocated vs. Midlothian HS

t-test					Monday, January 11, 2010, 10:42:01 AM
Data source: Bl	D Site i	in VOC Site	e Comparison	JNB	
Normality Test	:	Passed	(P = 0.861)		
Equal Variance	e Test:	Passed	(P = 0.161)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated	20	0	0.0111	0.00594	0.00133
Midlothian HS	5	0	0.00700	0.00255	0.00114
Difference	0.00/	112			

Difference 0.00412

t = 1.499 with 23 degrees of freedom. (P = 0.147)

95 percent confidence interval for difference of means: -0.00157 to 0.00982

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.147).

Power of performed test with alpha = 0.050: 0.177

The power of the performed test (0.177) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

III. Toluene a. Collocated vs. Jaycee Park t-test

Monday, January 11, 2010, 10:44:33 AM

			C Site Comp			
Normality Test Test execution e			(P < 0.050)			
Mann-Whitney				um rest begun	Monda	y, January 11, 2010, 10:44:33 AM
Data source: To				parison JNB	wonda	y, sandary 11, 2010, 10.44.35 Mivi
		Aissing	Median	25%	75%	
-	20	0	0.150	0.0940	0.185	
	20	0	0.128	0.0950	0.179	
Mann-Whitney		-		0.0920	0.179	
T = 430.500 n(s				588)		
The difference i	n the m	20 n(oig redian valu) 20 (1 0 jes between 1	be two groups i	is not great e	nough to exclude the possibility that the
						γ significant difference (P = 0.588)
	• ••• •••	uom oump		,		
b. Collocated v	s. Wat	er Treatm	ent Plant			
t-test					Monda	y, January 11, 2010, 10:44:52 AM
Data source: To	oluene	Site in VC	OC Site Com	oarison.JNB		
Normality Test	t :	Failed	(P < 0.050)))		
Fest execution e	ended b	y user req	uest, Rank S	um Test begun		
Mann-Whitney					Monda	y, January 11, 2010, 10:44:52 AM
Data source: To	oluene	Site in VC	OC Site Comp	parison.JNB		
Group		Ν	Missing	Median	25%	75%
Collocated		20	0	0.150	0.0940	0.185
Water Treatmen	nt Plant	20	0	0.110	0.0840	0.162
Mann-Whitney	U Stati	stic= 162.0	000			
$\Gamma = 448.000 \text{ n(s)}$	small)=	20 n(big	= 20 (P = 0)	.310)		
The difference i				the two groups i		nough to exclude the possibility that the
The difference i				the two groups i		nough to exclude the possibility that the $\sqrt{1000}$ significant difference (P = 0.310)
The difference i difference is due	<mark>e to ran</mark>	<mark>dom samp</mark>	ling variabili	the two groups i		
The difference i difference is due c. Collocated ve	<mark>e to ran</mark>	<mark>dom samp</mark>	ling variabili	the two groups i	a statistically	y significant difference $(P = 0.310)$
The difference i difference is due c. Collocated vs t-test	e to ran s. Triai	dom samp ngle Park	<mark>ling variabili</mark>	he two groups i ity; there is not	a statistically	
The difference i difference is due c. Collocated ve t-test Data source: Te	<mark>e to ran</mark> s. Triai oluene	dom samp ngle Park Site in VC	ling variabili DC Site Comp	the two groups in the two groups in the two groups in the second state of the second s	a statistically	y significant difference $(P = 0.310)$
The difference i difference is due c. Collocated vs t-test Data source: To Normality Test	e to ran s. Triai oluene t:	dom samp ngle Park Site in VC Failed	DC Site Comp (P < 0.050)	the two groups in ity; there is not parison.JNB	a statistically	y significant difference $(P = 0.310)$
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The difference is difference is due c. Collocated vs t-test Data source: To Normality Test Fest execution e Mann-Whitney Data source: To	e to ran s. Trian oluene t: ended b v Rank oluene	dom samp ngle Park Site in VC Failed y user req Sum Test Site in VC	DC Site Comp C Site Comp (P < 0.050 uest, Rank Site DC Site Comp	the two groups in ity; there is not parison.JNB)) um Test begun parison.JNB	a statisticall Monda Monda	y significant difference (P = 0.310) y, January 11, 2010, 10:45:09 AM y, January 11, 2010, 10:45:09 AM
The difference is difference is due c. Collocated ve t-test Data source: To Normality Test Test execution e Mann-Whitney Data source: To Group	e to ran s. Trian oluene t: ended b 7 Rank oluene N	dom samp ngle Park Site in VC Failed y user req Sum Test Site in VC Missin	OC Site Comp (P < 0.050 uest, Rank St DC Site Comp g Media	the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two groups in the two grou	a statistically Monda Monda 75%	y significant difference (P = 0.310) y, January 11, 2010, 10:45:09 AM y, January 11, 2010, 10:45:09 AM
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The difference is due difference is due to construct the second second test the second second second second test execution of the second seco	e to ran s. Trian oluene t: ended b y Rank oluene N 20 5 U Statimall)= : n the m e to ran s. Mou	dom samp ngle Park Site in VC Failed y user req Sum Test Site in VC Missing 0 0 stic= 45.00 5 n(big)= nedian valu dom samp ntain Pea	C Site Comp (P < 0.050 uest, Rank Sit C Site Comp g Media 0.150 0.100 20 (P = 0.76 ues between t ling variabilitik	the two groups in the two groups in	a statistically Monda Monda 75% 0.18: 0.320 is not great e a statistically	y significant difference (P = 0.310) y, January 11, 2010, 10:45:09 AM y, January 11, 2010, 10:45:09 AM
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The difference is due difference is due c. Collocated ve t-test Data source: Te Normality Test Test execution e Mann-Whitney Data source: Te Group Collocated Triangle Park Mann-Whitney T = 70.000 n(sr The difference is difference is due d. Collocated v t-test Data source: Te Normality Test Test execution e Mann-Whitney	e to ran s. Trian oluene t: ended by y Rank oluene N 20 5 U Statimall)= : n the m e to ran s. Mou oluene t: ended by y Rank	dom samp ngle Park Site in VC Failed y user req Sum Test Site in VC Missing 0 0 stic= 45.00 5 n(big)= nedian valu dom samp ntain Pea Site in VC Failed y user req Sum Test	OC Site Comp (P < 0.05) (P < 0.05) (uest, Rank Site C Site Comp g Media 0.15) 0.10) 00 20 (P = 0.76) les between to ling variability k DC Site Comp $(P < 0.05)(uest, Rank Site)$	the two groups i ity; there is not oarison.JNB)) um Test begun <u>parison.JNB</u> (n 25% 0 0.0940 6 0.101 (0) the two groups ity; there is not parison.JNB)) um Test begun	a statistically Monda Monda 75% 0.18: 0.320 is not great e a statistically Monda	y significant difference (P = 0.310) y, January 11, 2010, 10:45:09 AM y, January 11, 2010, 10:45:09 AM 5) nough to exclude the possibility that the y significant difference (P = 0.760)
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The difference is due difference is due c. Collocated ve t-test Data source: Te Normality Test Test execution e Mann-Whitney Data source: Te Group Collocated Triangle Park Mann-Whitney T = 70.000 n(sr The difference is difference is due d. Collocated v t-test Data source: Te Normality Test Test execution e Mann-Whitney	e to ran s. Trian oluene t: ended by y Rank oluene N 20 5 U Statimall)= : n the m e to ran s. Mou oluene t: ended by y Rank	dom samp ngle Park Site in VC Failed y user req Sum Test Site in VC Missing 0 0 stic= 45.00 5 n(big)= nedian valu dom samp ntain Pea Site in VC Failed y user req Sum Test	C Site Comp (P < 0.05) (P < 0.05) (uest, Rank St C Site Comp g Media 0.15) 0.100 00 20 (P = 0.76) (P = 0.76) (P < 0.05) k C Site Comp (P < 0.05) (uest, Rank St C Site Comp	the two groups in the two groups in the two the two groups in the two two groups in the two groups in the two the two groups in the two groups in the two two groups in the two groups in the two groups in the two two groups in the two groups in the two groups in the two two groups in the two gr	a statistically Monda Monda 75% 0.18: 0.320 is not great e a statistically Monda	y significant difference ($P = 0.310$) y, January 11, 2010, 10:45:09 AM y, January 11, 2010, 10:45:09 AM nough to exclude the possibility that the y significant difference ($P = 0.760$) y, January 11, 2010, 10:45:33 AM

Mountain Peak Mann-Whitney		0	0.0825	0.0730	0.108	
	U Stat	tistic= 15.50				
T = 25.500 n(si)				5)		
					s not great enough to exclude the possibility that	the
difference is du	e to ra	ndom samp	ling variabilit	y; there is not	statistically significant difference (P = 0.063)	
	T 7*4					
e. Collocated v	s. Vito	ovsky			Manday, January 11, 2010, 10:45:54 AM	
t-test	aluan	Site in VO	C Sita Camp	minon INID	Monday, January 11, 2010, 10:45:54 AM	
Data source: T Normality Test			(P < 0.050)			
Test execution						
Mann-Whitney				in rest begun	Monday, January 11, 2010, 10:45:54 AM	
Data source: T				arison INB	Wonduy, Sundury 11, 2010, 10.13.5 17101	
		Aissing	Median	25%	75%	
-	20	0	0.150	0.0940	0.185	
Vitovsky	5	ů 0	0.150	0.139	0.199	
Mann-Whitney	-					
T = 72.000 n(s)))		
					s not great enough to exclude the possibility that	the
					statistically significant difference ($P = 0.659$)	
			0	,		
f. Collocated v	s. Mid	lothian HS				
t-test					Monday, January 11, 2010, 10:46:09 AM	
Data source: T	oluene	e Site in VO	C Site Compa	arison.JNB		
Normality Test			(P < 0.050)			
Test execution of				m Test begun		
Mann-Whitney					Monday, January 11, 2010, 10:46:09 AM	
Data source: T	oluene	e Site in VO	1			
Group			Median	25%	75%	
	Ν	Missing				
Collocated	20	0	0.150	0.0940	0.185	
Collocated Midlothian HS	20 5	0 0	0.150 0.117	0.0940 0.0853		
Collocated Midlothian HS Mann-Whitney	20 5 U Stat	$\frac{0}{0}$ tistic= 33.50	0.150 0.117	0.0853	0.185	
Collocated Midlothian HS Mann-Whitney T = 48.500 n(st	20 5 U Stat mall)=	0 0 tistic= 33.5(5 n(big)= 1)	$0.150 \\ 0.117 \\ 0 \\ 20 (P = 0.277) \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $	0.0853	0.185 0.145	
Collocated Midlothian HS Mann-Whitney T = 48.500 n(si The difference i	20 5 U Stat mall)=	$0 \\ 0$ tistic= 33.5(5 n(big)= 1 median value	$0.150 \\ 0.117 \\ 00 \\ 20 (P = 0.277 \\ es between the$	0.0853) e two groups i	0.185 0.145 s not great enough to exclude the possibility that	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(si The difference i	20 5 U Stat mall)=	$0 \\ 0$ tistic= 33.5(5 n(big)= 1 median value	$0.150 \\ 0.117 \\ 00 \\ 20 (P = 0.277 \\ es between the$	0.0853) e two groups i	0.185 0.145	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is difference is du	20 5 U Stat mall)= in the p e to ra	$0 \\ 0$ tistic= 33.5(5 n(big)= 1 median value	$0.150 \\ 0.117 \\ 00 \\ 20 (P = 0.277 \\ es between the$	0.0853) e two groups i	0.185 0.145 s not great enough to exclude the possibility that	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(si The difference is difference is du IV. Ethylbenze	20 5 U Stat mall)= in the p e to ra	0 0 tistic= 33.50 5 n(big)= median valu ndom samp	$0.150 \\ 0.117 \\ 00 \\ 20 (P = 0.277 \\ es between the$	0.0853) e two groups i	0.185 0.145 s not great enough to exclude the possibility that	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(st The difference is difference is du IV. Ethylbenze a. Collocated v	20 5 U Stat mall)= in the p e to ra	0 0 tistic= 33.50 5 n(big)= median valu ndom samp	$0.150 \\ 0.117 \\ 00 \\ 20 (P = 0.277 \\ es between the$	0.0853) e two groups i	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277)	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test	20 5 U Stat mall)= in the p e to ra ene s. Jay	0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park	0.150 0.117 00 $20 (P = 0.277)$ es between th ling variability	0.0853) e two groups i y; there is not a	0.185 0.145 s not great enough to exclude the possibility that	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E	20 5 U Stat mall)= in the r e to ra ene (s. Jay B Site	0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit	0.150 0.117 00 20 (P = 0.277) es between th ling variability e Comparison	0.0853) e two groups i y; there is not a n.JNB	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277)	the
Collocated Midlothian HS Mann-Whitney $\Gamma = 48.500$ n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test	20 5 U Stat mall)= in the r e to ra ene s. Jay B Site t:	0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit Failed	$0.150 \\ 0.117$ $00 \\ 20 (P = 0.277 \\ es between th ling variabilit)$ $e Comparisor (P < 0.050)$	0.0853 () e two groups i y; there is not a h.JNB	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277)	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Fest execution of	20 5 U Stat mall)= in the p e to ra e to ra e to ra s. Jay B Site t: ended	0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ	$0.150 \\ 0.117$ $00 \\ 20 (P = 0.277) \\ es between th the second $	0.0853 () e two groups i y; there is not a h.JNB	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM	the
Collocated Midlothian HS Mann-Whitney $\Gamma = 48.500$ n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney	20 5 U Stat mall)= in the p e to ra ene (s. Jay) B Site t: ended y Ran	0 0 tistic= 33.50 5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test	$0.150 \\ 0.117$ $00 \\ 20 (P = 0.277 \\ es between th ling variability \\ e Comparison (P < 0.050) \\ est, Rank Sun$	0.0853) e two groups i y; there is not n.JNB m Test begun	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277)	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E	20 5 U Stat mall)= in the p e to ra ene s. Jay B Site t: ended y Ran B Site	0 0 tistic= 33.50 5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit	0.150 0.117 00 $20 (P = 0.277$ es between th ling variability e Comparison (P < 0.050) nest, Rank Sun e Comparison	0.0853 () e two groups i y; there is not n.JNB m Test begun n.JNB	0.185 0.145 not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group	$20 \\ 5 \\ \hline U \text{ Stat} \\ mall) = \\ in the result of radius \\ ence \\ s. Jay \\ B \text{ Site} \\ t: \\ ended \\ y \text{ Rand } \\ B \text{ Site} \\ \hline N$	0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing	$0.150 \\ 0.117$ 00 $20 (P = 0.277)$ es between th ling variability e Comparison (P < 0.050) uest, Rank Suu e Comparison Median	0.0853 () e two groups i y; there is not a h.JNB m Test begun h.JNB 25%	0.185 0.145 not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM	the
Collocated Midlothian HS Mann-Whitney T = 48,500 n(sr The difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group Collocated	20 5 U Stat mall)= in the p e to ra e to ra e to ra e to ra s. Jay B Site t: ended y Ran B Site N 20	0 0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing 0	$0.150 \\ 0.117$ 00 $20 (P = 0.277)$ es between th ling variability e Comparison (P < 0.050) nest, Rank Sum <u>e Comparison</u> <u>Median</u> 0.0245	0.0853 () e two groups i y; there is not n.JNB n.JNB 25% 0.0165	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM 75% 0.0315	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s: The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group Collocated Jaycee Park	20 5 U Stat mall)= in the p e to ra e	0 0 0 tistic= 33.5(5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing 0 0 0	$0.150 \\ 0.117$ $00 \\ 20 (P = 0.277 \\ es between th the set of th$	0.0853 () e two groups i y; there is not a h.JNB m Test begun h.JNB 25%	0.185 0.145 not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(sr The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Collocated Jaycee Park Mann-Whitney	$20 \\ 5 \\ U \text{ Stat} \\ mall) = \\ in the result \\ e to radius \\ e to rad$	0 0 0 tistic= 33.50 5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing 0 0 1 tistic= 191.5	$0.150 \\ 0.117$ $00 \\ 20 (P = 0.277 \\ es between the ling variability)$ $e Comparison (P < 0.050) \\ est, Rank Sume Comparison \\ Median \\ 0.0245 \\ 0.0245 \\ 0.0245 \\ 0.00$	0.0853 () e two groups i y; there is not a n.JNB m Test begun n.JNB 25% 0.0165 0.0160	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM 75% 0.0315	the
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group Collocated Jaycee Park Mann-Whitney T = 401.500 n(20 5 U Stat mall)= in the p e to ra e	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.150 0.117 00 $20 (P = 0.277$ es between th ling variability e Comparison (P < 0.050) lest, Rank Sum e Comparison Median 0.0245 0.0245 0.0245 00 = 20 (P = 0.8)	0.0853 () e two groups i y; there is not n.JNB m Test begun n.JNB 25% 0.0165 0.0160 328)	0.185 0.145 not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM 75% 0.0315 0.0360	
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group Collocated Jaycee Park Mann-Whitney T = 401.500 n(The difference is the security of t	20 5 U Stat mall)= in the p e to ra ene s. Jay B Site t: ended y Ran B Site t 20 20 U Stat small) in the p	0 0 0 tistic= 33.50 5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing 0 0 tistic= 191.5 = 20 n(big) median valu	0.150 0.117 00 $20 (P = 0.277$ es between th ling variability e Comparison (P < 0.050) uest, Rank Sun <u>e Comparison</u> <u>Median</u> 0.0245 0.0245 0.0245 0.0245 es between th	0.0853 () e two groups i y; there is not n.JNB m Test begun n.JNB 25% 0.0165 0.0160 328) e two groups i	0.185 0.145 not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM 75% 0.0315 0.0360 s not great enough to exclude the possibility that	
Collocated Midlothian HS Mann-Whitney T = 48.500 n(s) The difference is difference is du IV. Ethylbenze a. Collocated v t-test Data source: E Normality Test Test execution of Mann-Whitney Data source: E Group Collocated Jaycee Park Mann-Whitney T = 401.500 n(The difference is	20 5 U Stat mall)= in the p e to ra ene s. Jay B Site t: ended y Ran B Site t 20 20 U Stat small) in the p	0 0 0 tistic= 33.50 5 n(big)= median valu ndom samp cee Park in VOC Sit Failed by user requ k Sum Test in VOC Sit Missing 0 0 tistic= 191.5 = 20 n(big) median valu	0.150 0.117 00 $20 (P = 0.277$ es between th ling variability e Comparison (P < 0.050) uest, Rank Sun <u>e Comparison</u> <u>Median</u> 0.0245 0.0245 0.0245 0.0245 es between th	0.0853 () e two groups i y; there is not n.JNB m Test begun n.JNB 25% 0.0165 0.0160 328) e two groups i	0.185 0.145 s not great enough to exclude the possibility that statistically significant difference (P = 0.277) Monday, January 11, 2010, 10:48:18 AM Monday, January 11, 2010, 10:48:18 AM 75% 0.0315 0.0360	

b

b. Collocated vs. Water t-test Data source: EB Site in V Normality Test:	VOC Site			Monda	y, January 11, 2010, 10:48:34 AM
Test execution ended by u Mann-Whitney Rank Su Data source: EB Site in V	iser reque im Test	st, Rank Su	m Test begun		y, January 11, 2010, 10:48:34 AM
Group	N N	Aissing	Median	25%	75%
Collocated	20	0	0.0245	0.0165	0.0315
Water Treatment Plant	20	0	0.0185	0.0160	0.0265
Mann-Whitney U Statistic					
T = 445.000 n(small) = 20					
					enough to exclude the possibility that the
difference is due to rando	m samplir	ng variabilit	y; there is not	a statistically	y significant difference $(P = 0.350)$
c. Collocated vs. Triangl t-test Data source: EB Site in V		Compariso	n.JNB	Monda	y, January 11, 2010, 10:48:49 AM
Normality Test: Test execution ended by u Mann-Whitney Rank Su Data source: EB Site in V	Failed user reque um Test	(P < 0.050) st, Rank Su) m Test begun		y, January 11, 2010, 10:48:49 AM
Group N	Missing	Mediar	n 25%	75%	•
Collocated 20	0	0.0245			
Triangle Park 5	0	0.0190	0.0158	0.041	0
Mann-Whitney U Statistic					
T = 65.000 n(small) = 5 n					
					enough to exclude the possibility that the
difference is due to rando	m samplir	ig variabilit	y; there is not	a statisticall	y significant difference $(P = 0.973)$
d. Collocated vs. Mount	ain Paak				
t-test	am i cak			Monda	y, January 11, 2010, 10:49:02 AM
Data source: EB Site in V	VOC Site	Compariso	1 INB	wionad	y, summing 11, 2010, 10.49.02 min
Normality Test:		(P < 0.050)			
Test execution ended by u					
Mann-Whitney Rank Su					y, January 11, 2010, 10:49:02 AM
Data source: EB Site in V		Comparison	n.JNB		
Group N N				75%	
Collocated 20	0	0.0245	0.0165	0.0315	
Mountain Peak 4	0	0.0165	0.0130	0.120	
Mann-Whitney U Statistic	c = 32.000				
T = 42.000 n(small) = 4 n	n(big)=20	P = 0.561			
				is not great e	enough to exclude the possibility that the
difference is due to rando	<mark>m samplir</mark>	ng variabilit	y; there is not	a statisticall	y significant difference $(P = 0.561)$
e. Collocated vs. Vitovsk	cy				
t-test		а ·	D ID	Monda	y, January 11, 2010, 10:49:20 AM
Data source: EB Site in V					
Normality Test:		(P < 0.050)			
Test execution ended by u Mann-Whitney Rank Su	ım Test		-		y, January 11, 2010, 10:49:20 AM
Data source: EB Site in V	VOC Site	Comparison	n.JNB		

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0245	0.0165	0.0315
Vitovsky	5	0	0.0230	0.0208	0.0288

Mann-Whitney U Statistic= 49.000

T = 64.000 n(small)= 5 n(big)= 20 (P = 0.973)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.973)

f. Collocated vs. Midlothian HS

t-test Data source: EB Site in VOC Site Comparison.JNB Normality Test: Failed (P < 0.050) Test execution ended by user request, Rank Sum Test begun Mann-Whitney Rank Sum Test Data source: EB Site in VOC Site Comparison.JNB Monday, January 11, 2010, 10:49:38 AM

Monday, January 11, 2010, 10:49:38 AM

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0245	0.0165	0.0315
Midlothian HS	5	0	0.0140	0.0125	0.0207

Mann-Whitney U Statistic= 25.000

T = 40.000 n(small) = 5 n(big) = 20 (P = 0.096)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.096)

V. *p*+*m*-Xylene

a. Collocated vs.	, ou je						
t-test		~				ay, January 11, 2010, 1	10:51:31 AM
Data source: p+							
Normality Test:			P < 0.050	/			
Test execution er				um Test begun			
Mann-Whitney						ay, January 11, 2010, 1	10:51:31 AM
Data source: p+			n VOC Site C	Comparison.JNE			
Group N	N N	Aissing	Median	25%	75%		
Collocated 2	20	0	0.0525	0.0290	0.0715		
Jaycee Park 2	20	0	0.0545	0.0310	0.0855		
Mann-Whitney U	J Statis	stic= 179.	500				
T = 389.500 n(si)				588)			
		20 11(015	<i>j</i> 20 (1 0	.300)			
					s not great	enough to exclude the	possibility that the
The difference in	the m	edian val	ues between t	the two groups i		enough to exclude the y significant differenc	
The difference in	the m	edian val	ues between t	the two groups i			
The difference in difference is due	the m to rand	dom samp	ues between t bling variabili	the two groups i			
The difference in difference is due b. Collocated vs	the m to rand	dom samp	ues between t bling variabili	the two groups i	a statistical		e (P = 0.588)
The difference in difference is due b. Collocated vs t-test	the m to rand . Wate	edian val dom samp er Treatn	ues between t pling variabili ment Plant	he two groups i ity; there is not a	a statistical Mond	y significant differenc	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+1	the m to rand . Wate m Xyle	edian val dom samp er Treatn ene Site in	ues between t pling variabili ment Plant	the two groups i ity; there is not a Comparison.JNE	a statistical Mond	y significant differenc	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+1 Normality Test:	the m to rand . Wate m Xyle	edian vali dom samp er Treatn ene Site in Failed	ues between t bling variabili nent Plant n VOC Site C 1 (P < 0.050	the two groups i ity; there is not a Comparison.JNE	a statistical Mond	y significant differenc	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+ Normality Test: Test execution er	the m to rand . Wate m Xyle nded by	edian vali dom samp er Treatn ene Site in Failec y user req	ues between t bling variabili nent Plant n VOC Site C l (P < 0.050 uest, Rank Sp	the two groups i ity; there is not a Comparison.JNE	a statistical Mond	y significant differenc	e (P = 0.588)
The difference in	the m to rand . Wate m Xyle nded by Rank	edian vali dom samp er Treatn ene Site in Failed y user req Sum Tes	ues between t oling variabili nent Plant n VOC Site C l (P < 0.050 uest, Rank So t	the two groups i ity; there is not a Comparison.JNE)) um Test begun	a statistical Mond Mond	y significant differenc	e (P = 0.588)
The difference in difference is due b. Collocated vs t-test Data source: p+ Normality Test: Test execution er Mann-Whitney Data source: p+	the m to rand . Wate m Xyle nded by Rank	edian vali dom samp er Treatn ene Site in Failed y user req Sum Tes	ues between t oling variabili nent Plant n VOC Site C l (P < 0.050 uest, Rank So t	the two groups i ity; there is not a Comparison.JNE)) um Test begun	a statistical Mond Mond	y significant differenc	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+ Normality Test: Test execution er Mann-Whitney Data source: p+ Group	the m to rand . Wate m Xyle nded by Rank	edian vali dom samp er Treatn ene Site in Failec y user req Sum Tes ene Site in	ues between t bling variabili nent Plant n VOC Site C (P < 0.050) uest, Rank Si t n VOC Site C	the two groups i ity; there is not a Comparison.JNE)) um Test begun Comparison.JNE	a statistical Mond Mond	y significant differenc ny, January 11, 2010, 1 ny, January 11, 2010, 1	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+ Normality Test: Test execution er Mann-Whitney	the m to rand . Wate m Xyle nded by Rank m Xyle	edian vali dom samp er Treatn ene Site in Failed y user req Sum Tes ene Site in N 20	ues between t bling variabili nent Plant n VOC Site C (P < 0.050 uest, Rank So t n VOC Site C Missing	the two groups i ity; there is not a Comparison.JNE)) um Test begun Comparison.JNE Median	Mond Mond Mond	y significant difference ny, January 11, 2010, 1 ny, January 11, 2010, 1 75%	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+ Normality Test: Test execution er Mann-Whitney Data source: p+ Group Collocated Water Treatment	the m to rand . Wate m Xyle nded b Rank m Xyle Plant	edian vali dom samp er Treatn ene Site in Failec y user req Sum Tes ene Site in N 20 20	ues between to bling variability nent Plant n VOC Site C l (P < 0.050 uest, Rank Site t n VOC Site C Missing 0 0	the two groups i ity; there is not a Comparison.JNE)) um Test begun Comparison.JNE Median 0.0525	Mond Mond Mond 25% 0.0290	y significant difference ny, January 11, 2010, 1 ny, January 11, 2010, 1 75% 0.0715	e (P = 0.588)
The difference in difference is due b. Collocated vs. t-test Data source: p+ Normality Test: Test execution er Mann-Whitney Data source: p+ Group Collocated	the m to rand . Wate m Xyle nded b Rank <u>m Xyle</u> <u>Plant</u> J Statis	edian vali dom samp er Treatn ene Site in Failec y user req Sum Tes ene Site in N 20 20 stic= 162.	ues between t bling variability nent Plant n VOC Site C 1 ($P < 0.050$ uest, Rank Sit t n VOC Site C Missing 0 0 500	the two groups i ity; there is not a comparison.JNE)) um Test begun <u>Comparison.JNE</u> Median 0.0525 0.0375	Mond Mond Mond 25% 0.0290	y significant difference ny, January 11, 2010, 1 ny, January 11, 2010, 1 75% 0.0715	e (P = 0.588)

The difference in the median values between the two groups is n difference is due to random sampling variability; there is not a st	
c. Collocated vs. Triangle Park	
t-test	Monday, January 11, 2010, 10:52:04 AM
Data source: $p+m$ Xylene Site in VOC Site Comparison.JNB	
Normality Test: Failed (P < 0.050)	
Test execution ended by user request, Rank Sum Test begun	Manday January 11 2010 10:52:04 AM
Mann-Whitney Rank Sum Test	Monday, January 11, 2010, 10:52:04 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB	750/
Group N Missing Median 25%	75%
Collocated 20 0 0.0525 0.0290 Triangle Burl 5 0 0.0350 0.0232	0.0715
Triangle Park 5 0 0.0350 0.0333	0.0890
Mann-Whitney U Statistic= 48.000	
T = 67.000 n(small) = 5 n(big) = 20 (P = 0.919)	
The difference in the median values between the two groups is n	
difference is due to random sampling variability; there is not a st	atistically significant difference $(P = 0.919)$
d. Collocated vs. Mountain Peak	
t-test	Monday, January 11, 2010, 11:11:45 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB	
Normality Test: Failed (P < 0.050)	
Test execution ended by user request, Rank Sum Test begun	
Mann-Whitney Rank Sum Test	Monday, January 11, 2010, 11:11:45 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB	
Group N Missing Median 25%	75%
Collocated 20 0 0.0525 0.0290	0.0715
Mountain Peak 4 0 0.0335 0.0255	0.394
Mann-Whitney U Statistic= 35.000	
T = 45.000 n(small) = 4 n(big) = 20 (P = 0.727)	
The difference in the median values between the two groups is n	ot great enough to exclude the possibility that the
difference is due to random sampling variability; there is not a st	atistically significant difference $(P = 0.727)$
e. Collocated vs. Vitovsky	
t-test	Monday, January 11, 2010, 11:11:58 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB	
Normality Test: Failed (P < 0.050)	
Test execution ended by user request, Rank Sum Test begun	
Mann-Whitney Rank Sum Test	Monday, January 11, 2010, 11:11:58 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB	
	75%
1 8	0715
	0668
Mann-Whitney U Statistic= 45.500	
T = 69.500 n(small) = 5 n(big) = 20 (P = 0.786)	
The difference in the median values between the two groups is n	at anot an augh to an all do the measily ility that the
difference is due to random sampling variability; there is not a st	ausucarry significant difference $(P = 0.786)$
f. Collocated vs. Midlothian HS t-test Data source: p+m Xylene Site in VOC Site Comparison.JNB Normality Test: Failed (P < 0.050)	Monday, January 11, 2010, 11:12:12 AM

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Mann-Whitne	ey Rank	Sum Test		ım Test begun omparison.JNE		y, January 11, 2010, 11:12:12 AM
Group	N N	Missing	Median	*	, 75%	
Collocated	20	0	0.0525	0.0290	0.0715	
Midlothian HS		0	0.0320	0.0270	0.0405	
Mann-Whitney				0.0270	0.0405	
$\Gamma = 47.500 \text{ n(s)}$				0)		
					a not graat	enough to exclude the possibility that the
						y significant difference ($P = 0.248$)
interence is ut		uom samp	ing variabin	ty, mere is not	a statisticali	y significant difference $(1 - 0.248)$
/L o Vylono						
/I. <i>o</i> -Xylene . Collocated y	us Iovo	oo Dowly				
	vs. Jayc	ee rark			Monde	N. Jonuory 11, 2010, 11:17:00 AM
-test	Valar	Cita in VC	C Site Com	nominan IND	Monda	ny, January 11, 2010, 11:17:09 AM
Data source: o Normality Tes						
			(P < 0.050)			
				ım Test begun	Manda	L
/lann-Whitne				· DD	Monda	y, January 11, 2010, 11:17:09 AM
Data source: @						
Group		Missing	Median	25%	75%	
Collocated	20	0	0.0260	0.0140	0.0345	
aycee Park	20	0	0.0255	0.0160	0.0340	
				0.0100	0.0510	
Jann-Whitney	U Stati	stic= 189.5	00		0.0510	
Mann-Whitney $\Gamma = 399.500$ n	/ U Stati (small)=	stic= 189.5 20 n(big)	= 20 (P = 0.)	787)		
Mann-Whitney $\Gamma = 399.500$ n The difference	/ U Stati (small)= in the n	stic= 189.5 20 n(big) 1edian valu	P=20 (P = 0. es between t	787) <mark>he two groups i</mark>	s not great o	enough to exclude the possibility that the
Mann-Whitney $\Gamma = 399.500$ n The difference	/ U Stati (small)= in the n	stic= 189.5 20 n(big) 1edian valu	P=20 (P = 0. es between t	787) <mark>he two groups i</mark>	s not great o	enough to exclude the possibility that the y significant difference ($P = 0.787$)
Mann-Whitney $\Gamma = 399.500$ n The difference	/ U Stati (small)= in the n	stic= 189.5 20 n(big) 1edian valu	P=20 (P = 0. es between t	787) <mark>he two groups i</mark>	s not great o	
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$\Gamma = 62.500 \text{ n(sm)}$.)	
The difference in	the me	dian value	s between th	e two groups i	is not great enough to exclude the possibility that the
lifference is due	to rand	<mark>om sampl</mark> i	ng variability	y; there is not	a statistically significant difference $(P = 0.892)$
I. Collocated vs.	Moun	tain Peak			
t-test		~			Monday, January 11, 2010, 11:17:55 AM
Data source: o X					
Normality Test:			(P < 0.050)		
Test execution en			st, Rank Sur	n Test begun	
Mann-Whitney				· DD	Monday, January 11, 2010, 11:17:55 AM
Data source: o X	-		-		
Group		Missing	Median	25%	75%
Collocated	20	0	0.0260	0.0140	0.0345
Mountain Peak	4	0	0.0155	0.0120	0.103
Mann-Whitney U					
$\Gamma = 44.000 \text{ n(sm)}$					
					is not great enough to exclude the possibility that the
lifference is due	to rando	om sampli	ng variability	y; there is not	a statistically significant difference $(P = 0.670)$
	T 7 • ·				
e. Collocated vs.	Vitovs	ky			
-test	7 1 (· DD	Monday, January 11, 2010, 11:18:17 AM
Data source: o X					
Normality Test:			(P < 0.050)		
Fest execution en			st, Rank Sur	n Test begun	
Mann-Whitney					Monday, January 11, 2010, 11:18:17 AM
Data source: o X			1		
Group N		0	Median	25%	75%
Collocated 20			0.0260	0.0140	0.0345
Vitovsky 5			0.0230	0.0198	0.0265
Mann-Whitney U	Statist				
		m(hic) = 2	(D - 0.077)		
The difference in	the me	dian value	s between th	e two groups i	is not great enough to exclude the possibility that the
The difference in	the me	dian value	s between th	e two groups i	is not great enough to exclude the possibility that the a statistically significant difference $(P = 0.973)$
The difference in lifference is due	the me to rando	dian value om sampli	s between th	e two groups i	
The difference in lifference is due Collocated vs.	the me to rando	dian value om sampli	s between th	e two groups i	a statistically significant difference $(P = 0.973)$
The difference in difference is due f. Collocated vs. test	the me to rande Midlot	dian value om sampli thian HS	s between the ng variability	e two groups i y; there is not	
The difference in difference is due f. Collocated vs. -test Data source: o X	the me to rando Midlot Kylene S	dian value om sampli thian HS Site in VO	s between the ng variability C Site Comp	e two groups i y; there is not arison.JNB	a statistically significant difference $(P = 0.973)$
difference is due f. Collocated vs. t-test Data source: o X Normality Test:	the me to rando Midlot Xylene S	dian value om sampli thian HS Site in VO Failed	s between th ng variability C Site Comp (P < 0.050)	e two groups i y; there is not arison.JNB	a statistically significant difference $(P = 0.973)$
The difference in difference is due f. Collocated vs. t-test Data source: 0 X Normality Test: Test execution en	the me to rando Midlot Cylene S nded by	dian value om sampli thian HS Site in VO Failed user reque	s between th ng variability C Site Comp (P < 0.050)	e two groups i y; there is not arison.JNB	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM
The difference in difference is due C. Collocated vs. E-test Data source: o X Normality Test: Fest execution en Mann-Whitney	the me to rando Midlot Cylene S nded by Rank S	dian value om sampli thian HS Site in VO Failed user reque Sum Test	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur	e two groups i y; there is not arison.JNB n Test begun	a statistically significant difference $(P = 0.973)$
The difference in difference is due C. Collocated vs. -test Data source: o X Normality Test: Fest execution en Mann-Whitney Data source: o X	the me to rando Midlot Cylene S nded by Rank S Cylene S	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur C Site Comp	e two groups i y; there is not arison.JNB n Test begun arison.JNB	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM
The difference in difference is due f. Collocated vs. t-test Data source: o X Normality Test: Test execution en Mann-Whitney Data source: o X Group	the me to rando Midlot (ylene S aded by Rank S (ylene S N	dian value om sampli thian HS Site in VO Failed user reque Sum Test	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur <u>C Site Comp</u> Median	e two groups i y; there is not arison.JNB m Test begun arison.JNB 25%	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75%
The difference in lifference is due Collocated vs. -test Data source: 0 X Normality Test: Test execution en Vlann-Whitney Data source: 0 X Group Collocated	the me to rando Midlot (ylene S aded by Rank S (ylene S N 20	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing 0	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur <u>C Site Comp</u> Median 0.0260	e two groups i y; there is not arison.JNB n Test begun arison.JNB 25% 0.0140	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75% 0.0345
The difference in difference is due f. Collocated vs. t-test Data source: 0 X Normality Test: Test execution en Mann-Whitney Data source: 0 X Group Collocated	the me to rando Midlot (ylene S aded by Rank S (ylene S N	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur <u>C Site Comp</u> Median	e two groups i y; there is not arison.JNB m Test begun arison.JNB 25%	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75%
The difference in difference is due f. Collocated vs. t-test Data source: o X Normality Test: Test execution en Mann-Whitney I Collocated Midlothian HS Mann-Whitney U	the me to rando Midlot Xylene S aded by Rank S Xylene S V 20 5	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing 0 0 0	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur <u>C Site Comp</u> Median 0.0260 0.0170	e two groups i y; there is not arison.JNB n Test begun arison.JNB 25% 0.0140 0.0118	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75% 0.0345
The difference in difference is due f. Collocated vs. t-test Data source: o X Normality Test: Test execution en Mann-Whitney Data source: o X Group Collocated Midlothian HS	the me to rando Midlot Xylene S aded by Rank S Xylene S V 20 5	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing 0 0 0	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur <u>C Site Comp</u> Median 0.0260 0.0170	e two groups i y; there is not arison.JNB n Test begun arison.JNB 25% 0.0140 0.0118	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75% 0.0345
The difference in difference is due f. Collocated vs. t-test Data source: $o X$ Normality Test: Test execution en Mann-Whitney T Collocated Midlothian HS Mann-Whitney U $\Gamma = 43.500$ n(sm The difference in	the me to rando Midlot Cylene S Aded by Rank S Cylene S N 20 5 U Statist all)= 5 the me	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing 0 0 cic= 28.500 n(big)= 20	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur C Site Comp Median 0.0260 0.0170 0 (P = 0.153 s between th	e two groups i y; there is not arison.JNB n Test begun arison.JNB 25% 0.0140 0.0118	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75% 0.0345 0.0197 is not great enough to exclude the possibility that the
The difference in difference is due f. Collocated vs. t-test Data source: o X Normality Test: Test execution en Mann-Whitney Data source: o X Group Collocated Midlothian HS Mann-Whitney U $\Gamma = 43.500$ n(sm The difference in	the me to rando Midlot Cylene S Aded by Rank S Cylene S N 20 5 U Statist all)= 5 the me	dian value om sampli thian HS Site in VO Failed user reque Sum Test Site in VO Missing 0 0 cic= 28.500 n(big)= 20	s between th ng variability C Site Comp (P < 0.050) est, Rank Sur C Site Comp Median 0.0260 0.0170 0 (P = 0.153 s between th	e two groups i y; there is not arison.JNB n Test begun arison.JNB 25% 0.0140 0.0118	a statistically significant difference (P = 0.973) Monday, January 11, 2010, 11:18:38 AM Monday, January 11, 2010, 11:18:38 AM 75% 0.0345 0.0197

Appendix C – VOC Site Comparisons: All Four Quarters of Data

A. Benzene

I. Comparison of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: Benzene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksWednesday, January 06, 2010, 5:40:18 PM Data source: Benzene Site in VOC Site Comparison JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.206	0.168	0.232
Jaycee Park	20	0	0.165	0.148	0.212
Water Treatment Plant	20	0	0.184	0.146	0.224

H = 2.826 with 2 degrees of freedom. (P = 0.243)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.243)

II. Comparison of Mobile Sites

One WayOne-Way Analysis of Variance Data source: Benzene Site in VOC Site Comparison.JNB Wednesday, January 06, 2010, 5:43:54 PM

Wednesday, January 06, 2010, 5:40:18 PM

Normality Test:	Passed	(P = 0.17)	78)					
Equal Variance Test	: Passed	(P = 0.10))6)					
Group Name N	Missing	Mean	Std Dev	SEM				
Col 14-Triangle 5	0	0.228	0.0866	0.0387				
Col 15-Mt Peak 4	0	0.135	0.0234	0.0117				
Col 16-Vitov. 5	0	0.227	0.0565	0.0253				
Col 17-MHS 5	0	0.115	0.0198	0.00887				
Source of Variation	DF	SS	MS	F	Р			
Between Groups	3	0.0515	0.0172	5.599	0.009			
Residual	15	0.0460	0.00307					
Total	18	0.0975						
TT1 1:00 · .1						1 1 1	. 11	.1

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.009).

Power of performed test with alpha = 0.050: 0.792

All PairwiseAll-Pairwise Multiple Comparison Procedures (Holm-Sidak method):

Overall significance level = 0.05

Comparisons for factor:

Comparison	Diff of Means	t	Unadjusted P	Critical Level	Significant?
Col 14 vs. Col 17	0.112	3.210	0.006	0.009	Yes
Col 16 vs. Col 17	0.112	3.198	0.006	0.010	Yes
Col 14 vs. Col 15	0.0925	2.492	0.025	0.013	No
Col 16 vs. Col 15	0.0921	2.481	0.025	0.017	No
Col 15 vs. Col 17	0.0199	0.534	0.601	0.025	No
Col 14 vs. Col 16	0.000400	0.0114	0.991	0.050	No

III. Comparison of All Sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 10:35:46 AM

Data source: Ben	zene S	ite in VOC	Site Compariso	n.JNB		
Normality Test:		Failed (P < 0.050)			
Test execution end	led by	user request	t, ANOVA on F	Ranks begun		
Kruskal-Wallis ()ne W	ayOne-Way	y Analysis of V	ariance on R	RanksMonday, January 11, 2010, 10:35	5:46 AM
Data source: Ben	zene S	ite in VOC	Site Compariso	n.JNB		
Group	Ν	Missing	Median	25%	75%	

Collocated	20	0	0.206	0.168	0.232
Jaycee	20	0	0.165	0.148	0.212
Water Tmt Plant	20	0	0.184	0.146	0.224
Triangle Park	5	0	0.209	0.166	0.272
Mountain Peak	4	0	0.133	0.121	0.150
Vitovsky	5	0	0.248	0.168	0.275
Mid HS	5	0	0.117	0.0973	0.133

H = 21.010 with 6 degrees of freedom. (P = 0.002)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.002)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
Vitovsky vs Mid HS	48.600	3.348	Yes
Vitovsky vs Mountain Peak	39.400	2.559	No
Vitovsky vs Jaycee	17.600	1.534	Do Not Test
Vitovsky vs Water Tmt Plant	16.900	1.473	Do Not Test
Vitovsky vs Collocated	6.975	0.608	Do Not Test
Vitovsky vs Triangle Park	5.200	0.358	Do Not Test
Triangle Park vs Mid HS	43.400	2.990	No
Triangle Park vs Mountain Peak	34.200	2.222	Do Not Test
Triangle Park vs Jaycee	12.400	1.081	Do Not Test
Triangle Park vs Water Tmt Pla	11.700	1.020	Do Not Test
Triangle Park vs Collocated	1.775	0.155	Do Not Test
Collocated vs Mid HS	41.625	3.628	Do Not Test
Collocated vs Mountain Peak	32.425	2.580	Do Not Test
Collocated vs Jaycee	10.625	1.464	Do Not Test
Collocated vs Water Tmt Plant	9.925	1.368	Do Not Test
Water Tmt Plant vs Mid HS	31.700	2.763	Do Not Test
Water Tmt Pla vs Mountain Peak	22.500	1.790	Do Not Test
Water Tmt Plant vs Jaycee	0.700	0.0965	Do Not Test
Jaycee vs Mid HS	31.000	2.702	Do Not Test
Jaycee vs Mountain Peak	21.800	1.734	Do Not Test
Mountain Peak vs Mid HS	9.200	0.598	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

B. 1,3-Butadiene

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: BD Site in VOC Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Normality Test: Failed (P < 0.050)Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:38:35 AM Data source: BD Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0110	0.00750	0.0155
Jaycee Park	20	0	0.0115	0.00700	0.0130
Water Treatment Plant	20	0	0.00950	0.00600	0.0125
Triangle Park	5	0	0.0150	0.0103	0.0460
Mountain Peak	4	0	0.00800	0.00400	0.0125
Vitovsky	5	0	0.0110	0.01000	0.0120
Midlothian HS	5	0	0.00700	0.00475	0.00925

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Monday, January 11, 2010, 10:38:35 AM

H = 7.453 with 6 degrees of freedom. (P = 0.281)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.281)

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 10:39:13 AM

Data source: BD Site in VOC Site Comparison.JNBNormality Test:Failed (P < 0.050)</th>

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:39:13 AM Data source: BD Site in VOC Site Comparison.JNB

			1		
Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.0150	0.0103	0.0460
Mountain Peak	4	0	0.00800	0.00400	0.0125
Vitovsky	5	0	0.0110	0.01000	0.0120
Midlothian HS	5	0	0.00700	0.00475	0.00925
TT (000 11 0	1	0.0 1			

H = 6.993 with 3 degrees of freedom. (P = 0.072)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.072)

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance Data source: BD Site in VOC Site Comparison.JNB Monday, January 11, 2010, 10:39:36 AM

Normality Test:	Passee	d (P = 0.070))				
Equal Variance Test:	Passee	d ($P = 0.727$)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Collocated	20	0	0.0111	0.00594	0.00133		
Jaycee Park	20	0	0.0117	0.00639	0.00143		
Water Treatment Plant	20	0	0.00985	0.00509	0.00114		
Source of Variation	DF	SS	Μ	S F	Р		
Between Groups	2	0.0000351	0.0000	0175 0.51	6 0.600		
Residual	57	0.00194	0.0000	0340			
Total	59	0.00197					
TT1 1:00 : 1							

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.600). Power of performed test with alpha = 0.050: 0.049

The power of the performed test (0.049) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

C. Toluene

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: Toluene Site in VOC Site Comparison.JNB

Failed (P < 0.050)Normality Test:

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:43:26 AM Data source: Toluene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.150	0.0940	0.185
Jaycee Park	20	0	0.128	0.0950	0.179
Water Treatment Plant	20	0	0.110	0.0840	0.162
Triangle Park	5	0	0.106	0.101	0.320
Mountain Peak	4	0	0.0825	0.0730	0.108
Vitovsky	5	0	0.150	0.139	0.199
Midlothian HS	5	0	0.117	0.0853	0.145

H = 7.958 with 6 degrees of freedom. (P = 0.241)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.241)

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 10:43:57 AM

Monday, January 11, 2010, 10:44:11 AM

Monday, January 11, 2010, 10:43:26 AM

Data source: Toluene Site in VOC Site Comparison.JNB

Failed (P < 0.050)Normality Test:

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:43:57 AM Data source: Toluene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.150	0.0940	0.185
Jaycee Park	20	0	0.128	0.0950	0.179
Water Treatment Plant	20	0	0.110	0.0840	0.162

H = 1.216 with 2 degrees of freedom. (P = 0.545)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.545)

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance

Data source: Toluene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:44:11 AM Data source: Toluene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.106	0.101	0.320
Mountain Peak	4	0	0.0825	0.0730	0.108
Vitovsky	5	0	0.150	0.139	0.199
Midlothian HS	5	0	0.117	0.0853	0.145

H = 7.320 with 3 degrees of freedom. (P = 0.062)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.062)

D. Ethylbenzene

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: EB Site in VOC Site Comparison.JNBNormality Test:Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:47:25 AM Data source: EB Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0245	0.0165	0.0315
Jaycee Park	20	0	0.0245	0.0160	0.0360
Water Treatment Plant	20	0	0.0185	0.0160	0.0265
Triangle Park	5	0	0.0190	0.0158	0.0410
Mountain Peak	4	0	0.0165	0.0130	0.120
Vitovsky	5	0	0.0230	0.0208	0.0288
Midlothian HS	5	0	0.0140	0.0125	0.0207

H = 5.911 with 6 degrees of freedom. (P = 0.433)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.433)

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance Data source: EB Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:47:43 AM Data source: EB Site in VOC Site Comparison.JNB

	Group	N Missir	ng Median	25%	75%
Jaycee Park 20 0 0.0245 0.0160 0.036	Collocated	20 0	0.0245	0.0165	0.0315
	Jaycee Park	20 0	0.0245	0.0160	0.0360
Water Treatment Plant 20 0 0.0185 0.0160 0.026	Water Treatment Plant	20 0	0.0185	0.0160	0.0265

H = 1.466 with 2 degrees of freedom. (P = 0.480)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.480)

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 10:47:59 AM

Monday, January 11, 2010, 10:47:43 AM

Data source: EB Site in VOC Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:47:59 AM Data source: EB Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.0190	0.0158	0.0410
Mountain Peak	4	0	0.0165	0.0130	0.120
Vitovsky	5	0	0.0230	0.0208	0.0288
Midlothian HS	5	0	0.0140	0.0125	0.0207

H = 4.331 with 3 degrees of freedom. (P = 0.228)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.228)

E. *p*+*m*-Xylene

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: p+m Xylene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:50:44 AM Data source: p+m Xylene Site in VOC Site Comparison.JNB

Duta source. p in Ayter			comparison.si			
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.0525	0.0290	0.0715	
Jaycee Park	20	0	0.0545	0.0310	0.0855	
Water Treatment Plant	20	0	0.0375	0.0280	0.0560	
Triangle Park	5	0	0.0350	0.0333	0.0890	
Mountain Peak	4	0	0.0335	0.0255	0.394	
Vitovsky	5	0	0.0510	0.0428	0.0668	
Midlothian HS	5	0	0.0320	0.0270	0.0405	
H 5 3 5 0 1 1 (1	0.0	1 (D 0	10.0			

H = 5.378 with 6 degrees of freedom. (P = 0.496)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.496)

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance Data source: p+m Xylene Site in VOC Site Comparison.JNB Monday, January 11, 2010, 10:51:02 AM

Monday, January 11, 2010, 10:51:17 AM

Monday, January 11, 2010, 10:50:44 AM

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:51:02 AM Data source: p+m Xylene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0525	0.0290	0.0715
Jaycee Park	20	0	0.0545	0.0310	0.0855
Water Treatment Plant	20	0	0.0375	0.0280	0.0560

H = 2.612 with 2 degrees of freedom. (P = 0.271)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.271)

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance

Data source: p+m Xylene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 10:51:17 AM
Data source: p+m Xylene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.0350	0.0333	0.0890
Mountain Peak	4	0	0.0335	0.0255	0.394
Vitovsky	5	0	0.0510	0.0428	0.0668
Midlothian HS	5	0	0.0320	0.0270	0.0405

H = 4.196 with 3 degrees of freedom. (P = 0.241)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.241)

F. o-Xylene

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: o Xylene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 11:16:18 AM Data source: o Xylene Site in VOC Site Comparison JNB

Data source. O Myterie c			input ison.si (D			
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.0260	0.0140	0.0345	
Jaycee Park	20	0	0.0255	0.0160	0.0340	
Water Treatment Plant	20	0	0.0175	0.0135	0.0215	
Triangle Park	5	0	0.0150	0.0138	0.0385	
Mountain Peak	4	0	0.0155	0.0120	0.103	
Vitovsky	5	0	0.0230	0.0198	0.0265	
Midlothian HS	5	0	0.0170	0.0118	0.0197	
II 5 (57 14 C 1	6.6	1 (D 0	4(2)			

H = 5.657 with 6 degrees of freedom. (P = 0.463)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.463)

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 11:16:37 AM

Monday, January 11, 2010, 11:16:52 AM

Monday, January 11, 2010, 11:16:18 AM

Data source: o Xylene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 11:16:37 AM Data source: o Xylene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0260	0.0140	0.0345
Jaycee Park	20	0	0.0255	0.0160	0.0340
Water Treatment Plant	20	0	0.0175	0.0135	0.0215

H = 2.700 with 2 degrees of freedom. (P = 0.259)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.259)

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance

Data source: o Xylene Site in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 11:16:52 AM Data source: o Xylene Site in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.0150	0.0138	0.0385
Mountain Peak	4	0	0.0155	0.0120	0.103
Vitovsky	5	0	0.0230	0.0198	0.0265
Midlothian HS	5	0	0.0170	0.0118	0.0197

H = 3.154 with 3 degrees of freedom. (P = 0.368)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.368)

Appendix D – VOC Site Comparisons: Individual Quarters of Data

a. Comparison between								
One WayOne-Way Ana				М	londay, J	January 1	1, 2010, 12:0	01:23 PM
Data source: Data 7 in V		1						
Normality Test:		(P = 0.13)	/					
Equal Variance Test:		d (P = 0.30)	,	~ ~ ~				
Group Name	Ν	Missing		Std Dev	SEM			
Collocated	5	0	0.205	0.0319	0.0143			
aycee Park	5	0	0.189	0.0408	0.0183			
Water Treatment Plant	5	0	0.190	0.0404	0.0181			
Friangle Park	5	0	0.228	0.0866	0.0387			
Source of Variation	DF	SS	MS	F	Р			
Between Groups	3	0.00481	0.00160		0.660			
Residual	16	0.0473	0.00295					
Total	19	0.0521				1.7	1 1 4	
The differences in the me								
he difference is due to ra				e is not a sta	atistically	y signific	ant differenc	e (P = 0.660).
Power of performed test					60.000			
The power of the perform								
ess than desired power		s you are les	s likely to c	letect a diffe	rence wl	hen one a	ctually exist	s. Negative res
hould be interpreted cau	tiously.							
. Comparison between								
a. Comparison between One WayOne-Way Ana	lysis of			М	londay, J	January 1	1, 2010, 12:0	02:20 PM
a. Comparison between One WayOne-Way Ana Data source: Data 7 in V	l ysis of /OC Site	e Compariso		М	londay, J	January 1	1, 2010, 12:0	02:20 PM
n. Comparison between One WayOne-Way Ana Data source: Data 7 in V Normality Test:	l ysis of /OC Site Failed	e Compariso P < 0.05	0)		onday, J	January 1	1, 2010, 12:0	02:20 PM
a. Comparison between One WayOne-Way Ana Data source: Data 7 in V Normality Test: Fest execution ended by	l ysis of /OC Site Failed user req	e Compariso (P < 0.05 uest, ANOV	0) A on Ranks	s begun	•	-		
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A. Comparison between One WayOne-Way Ana Data source: Data 7 in V Normality Test: Test execution ended by Kruskal-Wallis One Wa Data source: Data 7 in V Group Collocated aycee Park	Ilysis of /OC Site Failed user req ayOne-V /OC Site N 5	e Compariso (P < 0.05 uest, ANOV Way Analys e Compariso Missing 0	0) A on Ranks is of Varia n.JNB Median 0.0120	s begun nce on Ranl 25% 0.0058 0.0058	ksMond: 38 0 38 0	ay, Januar 75%).0163		
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A. Comparison between One WayOne-Way Ana Data source: Data 7 in V Normality Test: Fest execution ended by Kruskal-Wallis One Wa Data source: Data 7 in V Group Collocated Haycee Park Water Treatment Plant Friangle Park H = 2.227 with 3 degrees The difference is due to ra	lysis of /OC Site Failed user req ayOne-V /OC Site 5 5 5 5 5 5 5 5 5 5 5 5 5	e Compariso ($P < 0.05$ uest, ANOV Way Analys e Compariso Missing 0 0 0 0 dom. ($P = 0$ lues among to ampling variant Variance e Compariso 1 ($P < 0.05$ uest, ANOV Way Analys e Compariso Missing	0) A on Rank: is of Varia n.JNB Median 0.0120 0.0110 0.00900 0.0150 .527) the treatment ability; then n.JNB 0) A on Rank: is of Varia n.JNB Median	s begun nce on Ranl 25% 0.0058 0.0025 0.0103 nt groups are 'e is not a sta M s begun nce on Ranl 25%	ksMonda 38 (0 38 (0 50 (0 50 (0 50 (0 50 (0) 50	ay, Januar 75%).0163).0158).0170).0460 at enough y signific: January 1 ay, Januar	ry 11, 2010, to exclude t ant differenc 1, 2010, 12:0	12:02:20 PM the possibility ce (P = 0.527 03:01 PM

Triangle Park	5	0	0.106	0.101	0.320
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H = 1.567 with 3 degrees of freedom. (P = 0.667)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.667)

IV. Ethylbenzene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 7 in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:03:35 PM Data source: Data 7 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0220	0.0133	0.0260
Jaycee Park	5	0	0.0160	0.0150	0.0270
Water Treatment Plant	5	0	0.0170	0.0155	0.0360
Triangle Park	5	0	0.0190	0.0158	0.0410

H = 0.856 with 3 degrees of freedom. (P = 0.836)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.836)

V. *p*+*m*-Xylene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 12:04:10 PM

Monday, January 11, 2010, 12:05:19 PM

Monday, January 11, 2010, 12:03:35 PM

Data source: Data 7 in VOC Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:04:10 PM Data source: Data 7 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0420	0.0230	0.0508
Jaycee Park	5	0	0.0280	0.0275	0.0530
Water Treatment Plant	5	0	0.0280	0.0133	0.0513
Triangle Park	5	0	0.0350	0.0333	0.0890

H = 2.157 with 3 degrees of freedom. (P = 0.541)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.541)

VI. o-Xylene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 7 in VOC Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:05:19 PM Data source: Data 7 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0180	0.01000	0.0230
Jaycee Park	5	0	0.0140	0.0120	0.0240
Water Treatment Plant	5	0	0.0130	0.0120	0.0292
Triangle Park	5	0	0.0150	0.0138	0.0385

H = 1.366 with 3 degrees of freedom. (P = 0.714)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.714)

B. 2nd Quarter VOC Data

I. Benzene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 8 in VOC Site Comparison.JNB Monday, January 11, 2010, 12:06:35 PM

Duta sourcer Duta o m	100 510	e companiso	11.01 (D				
Normality Test:	Passe	d $(P = 0.35)$	7)				
Equal Variance Test:	Passe	d $(P = 0.96)$	7)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Collocated	5	0	0.184	0.0182	0.00814		
Jaycee Park	5	0	0.158	0.0241	0.0108		
Water Treatment Plant	5	0	0.133	0.0194	0.00868		
Mountain Peak	5	1	0.135	0.0234	0.0117		
Source of Variation	DF	SS	MS	F	Р		
Between Groups	3	0.00819	0.00273	6.017	0.007		
Residual	15	0.00680	0.00045	53			
Total	18	0.0150					
m1 1:00 ! .1						 	

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.007).

Power of performed test with alpha = 0.050: 0.830

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050	
Collocated vs. Water Treatm	0.0510	4	5.355	0.009	Yes	
Collocated vs. Mountain Peak	0.0486	3	4.807	0.011	Yes	
Collocated vs. Jaycee Park	0.0254	2	2.667	0.079	No	
Jaycee Park vs. Water Treatm	0.0256	3	2.688	0.173	No	
Jaycee Park vs. Mountain Peak	0.0232	2	2.292	0.126	Do Not Test	
Mountain Pea vs. Water Treatm	0.00245	2	0.243	0.866	Do Not Test	

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

II. 1,3-Butadiene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 8 in VOC Site Comparison JNB Monday, January 11, 2010, 12:07:53 PM

Data source. Data o m	000010	Comparison	1.51 (D			
Normality Test:	Passec	P = 0.826	5)			
Equal Variance Test:	Passec	(P = 0.796)	5)			
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	5	0	0.0144	0.00594	0.00266	
Jaycee Park	5	0	0.0126	0.00643	0.00287	
Water Treatment Plant	5	0	0.00880	0.00383	0.00171	
Mountain Peak	5	1	0.00825	0.00512	0.00256	
Source of Variation	DF	SS	MS	F	Р	
Between Groups	3	0.000125	0.00004	15 1.403	0.281	

Residual	15	0.000444	0.0000296
Total	18	0.000569	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.281). Power of performed test with alpha = 0.050: 0.110

The power of the performed test (0.110) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

III. Toluene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 8 in VOC Site Comparison.JNB Monday, January 11, 2010, 12:08:25 PM

Normality Test:	Passe	d $(P = 0.18)$	2)				
•		· ·	/				
Equal Variance Test:	Passe	d (P = 0.20°	7)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Collocated	5	0	0.172	0.0941	0.0421		
Jaycee Park	5	0	0.155	0.0480	0.0215		
Water Treatment Plant	5	0	0.102	0.0444	0.0199		
Mountain Peak	5	1	0.0902	0.0257	0.0129		
Source of Variation	DF	SS	MS	F	Р		
Between Groups	3	0.0223	0.00743	2.042	0.151		
Residual	15	0.0546	0.00364				
Total	18	0.0768					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.151). Power of performed test with alpha = 0.050: 0.222

The power of the performed test (0.222) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

IV. Ethylbenzene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 8 in VOC Site Comparison.JNB

Failed (P < 0.050)Normality Test: Test execution ended by user request, ANOVA on Ranks begun Monday, January 11, 2010, 12:08:57 PM

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:08:57 PM Data source: Data 8 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0280	0.0172	0.0510
Jaycee Park	5	0	0.0370	0.0268	0.0882
Water Treatment Plant	5	0	0.0180	0.0153	0.0377
Mountain Peak	5	1	0.0165	0.0130	0.120

H = 3.397 with 3 degrees of freedom. (P = 0.334)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.334)

V. *p*+*m*-Xylene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 8 in VOC Site Comparison.JNB Monday, January 11, 2010, 12:09:22 PM

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:09:22 PM Data source: Data 8 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0600	0.0335	0.140
Jaycee Park	5	0	0.0960	0.0582	0.248
Water Treatment Park	5	0	0.0430	0.0308	0.0998
Mountain Peak	5	1	0.0335	0.0255	0.394

H = 3.314 with 3 degrees of freedom. (P = 0.346)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.346)

VI. o-Xylene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Monday, January 11, 2010, 12:09:52 PM

Data source: Data 8 in VOC Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 12:09:52 PM Data source: Data 8 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0260	0.0145	0.0500
Jaycee Park	5	0	0.0320	0.0238	0.0762
Water Treatment Plant	5	0	0.0180	0.0150	0.0338
Mountain Peak	5	1	0.0155	0.0120	0.103

H = 2.321 with 3 degrees of freedom. (P = 0.509)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.509)

C. 3rd Quarter VOC Data

I. Benzene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 9 in VOC Site Comparison.JNB Monday, January 11, 2010, 1:11:45 PM

Normality Test:	Passe	d $(P = 0.42)$	27)		
Equal Variance Test:	Passe	d $(P = 0.53)$	38)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated	5	0	0.287	0.0660	0.0295
Jaycee Park	5	0	0.302	0.107	0.0480
Water Treatment Plant	5	0	0.259	0.0677	0.0303
Vitovsky	5	0	0.227	0.0565	0.0253
Source of Variation	DF	SS	MS	F	Р
Between Groups	3	0.0163	0.00543	0.917	0.455
Residual	16	0.0947	0.00592		
Total	19	0.111			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.455). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

II. 1,3-Butadiene						
a. Comparison between	sites					
One WayOne-Way Ana	lysis of [*]	Variance		Mor	nday, January 1	1, 2010, 1:12:15 PM
Data source: Data 9 in V	/OC Site	Comparison	.JNB			
Normality Test:	Passed	(P = 0.061))			
Equal Variance Test:	Passed	I (P = 0.118))			
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	5	0	0.00990	0.00613	0.00274	
Jaycee Park	5	0	0.0142	0.00217	0.000970	
Water Treatment Plant	5	0	0.0124	0.00270	0.00121	
Vitovsky	5	0	0.0110	0.001000	0.000447	
Source of Variation	DF	SS	MS	F	Р	
Between Groups	3	0.0000517	0.0000	172 1.365	0.289	
Residual	16	0.000202	0.0000	126		
Total	19	0.000254				

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.289). Power of performed test with alpha = 0.050: 0.104

The power of the performed test (0.104) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

III. Toluene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 9 in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 1:12:40 PM Data source: Data 9 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.183	0.123	0.270
Jaycee Park	5	0	0.142	0.115	0.171
Water Treatment Plant	5	0	0.112	0.101	0.168
Vitovsky	5	0	0.150	0.139	0.199

H = 2.879 with 3 degrees of freedom. (P = 0.411)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.411)

Monday, January 11, 2010, 1:12:40 PM

IV. Ethylbenzene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 9 in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 1:13:12 PM

Data source: Data 9 in	VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0320	0.0213	0.0488
Jaycee Park	5	0	0.0280	0.0243	0.0407
Water Treatment Plant	5	0	0.0230	0.0187	0.0313
Vitovsky	5	0	0.0230	0.0208	0.0288
II = 2.716 with 2 dograd	of free	$d_{am} = (\mathbf{D} - 0)$	120)		

H = 2.716 with 3 degrees of freedom. (P = 0.438)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.438)

V. *p*+*m*-Xylene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 9 in VOC Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, January 11, 2010, 1:13:39 PM

Data source: Data 9 in VOC Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0650	0.0483	0.121
Jaycee Park	5	0	0.0650	0.0528	0.104
Water Treatment Plant	5	0	0.0460	0.0360	0.0603
Vitovsky	5	0	0.0510	0.0428	0.0668
TT 0 1 T 1 0 1	0.0	1 (5 6	0 (0)		

H = 3.156 with 3 degrees of freedom. (P = 0.368)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.368)

VI. o-Xylene

a. Comparison between	sites					
One WayOne-Way Ana	alysis of [†]	Variance		Ν	Ionday, Janu	ary 11, 2010, 1:14:00 PM
Data source: Data 9 in V	VOC Site	Comparison	.JNB			
Normality Test:	Passed	(P = 0.268)	5)			
Equal Variance Test:	Passed	(P = 0.360))			
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	5	0	0.0336	0.0141	0.00631	
Jaycee Park	5	0	0.0340	0.0116	0.00521	
Water Treatment Plant	5	0	0.0226	0.00871	0.00389	
Vitovsky	5	0	0.0240	0.00596	0.00266	
Source of Variation	DF	SS	MS	F	Р	
Between Groups	3	0.000557	0.0001	1.665	0.214	
Residual	16	0.00178	0.0001	11		
Total	19	0.00234				
The differences in the me	ean value	es among the	treatment	groups are no	ot great enou	gh to exclude the possibility that

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.214). Power of performed test with alpha = 0.050: 0.156

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Monday, January 11, 2010, 1:13:12 PM

Monday, January 11, 2010, 1:13:39 PM

The power of the performed test (0.156) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

D. 4th Quarter VOC Data

I. Benzene

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 10 in VOC Site Comparison.JNB **Normality Test:** Passed (P = 0.704) Monday, January 11, 2010, 1:14:29 PM

		- (-)					
Equal Variance Test:	Passe	d $(P = 0.50)$	2)					
Group Name	Ν	Missing	Mean	Std Dev	SEM			
Collocated	5	0	0.171	0.0340	0.0152			
Jaycee Park	5	0	0.138	0.0252	0.0113			
Water Treatment Plant	5	0	0.178	0.0435	0.0195			
Midlothian HS	5	0	0.115	0.0198	0.00887			
Source of Variation	DF	SS	MS	F	Р			
Between Groups	3	0.0127	0.00423	4.150	0.024			
Residual	16	0.0163	0.00102					
Total	19	0.0290						
TT1 1:00 : .1						1 1 1		.1

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.024).

Power of performed test with alpha = 0.050: 0.615

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Water Treatm vs. Midlothian H	0.0626	4	4.384	0.032	Yes
Water Treatm vs. Jaycee Park	0.0396	3	2.773	0.154	No
Water Treatm vs. Collocated	0.00740	2	0.518	0.719	Do Not Test
Collocated vs. Midlothian HS	0.0552	3	3.866	0.037	Yes
Collocated vs. Jaycee Park	0.0322	2	2.255	0.131	Do Not Test
Jaycee Park vs. Midlothian HS	0.0230	2	1.611	0.272	No

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

II. 1,3-Butadiene

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 10 in VOC Site Comparison.JNB Monday, January 11, 2010, 1:15:16 PM

		1				
Normality Test:	Passe	d ($P = 0.38$	(3)			
Equal Variance Test:	Passe	d $(P = 0.60)$	1)			
Group Name	Ν	Missing	Mean	Std Dev	SE	Μ
Collocated	5	0	0.00890	0.00518	0.00)232
Jaycee Park	5	0	0.00760	0.00270	0.00)121
Water Treatment Plant	5	0	0.00780	0.00303	0.00)136
Midlothian HS	5	0	0.00700	0.00255	0.00)114
Source of Variation	DF	SS	Ν	AS	F	Р
Between Groups	3	0.000009	0.000	000315	0.253	0.858

Residual	16	0.000199	0.0000124
Total	19	0.000209	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.858). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

III. Toluene

a. Comparison between sites

One WayOne-Way Ana	alysis of	Variance		Monday, January 11, 2010, 1:15:38 PM			
Data source: Data 10 in	VOC Si	te Comparis	on.JNB		•	-	
Normality Test:	Passee	1 (P = 0.16)	9)				
Equal Variance Test:	Passee	1 (P = 0.44)	1)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Collocated	5	0	0.139	0.0641	0.0286		
Jaycee Park	5	0	0.119	0.0534	0.0239		
Water Treatment Plant	5	0	0.138	0.0495	0.0221		
Midlothian HS	5	0	0.118	0.0388	0.0173		
Source of Variation	DF	SS	MS	F	Р		
Between Groups	3	0.00207	0.0006	90 0.253	0.858		
Residual	16	0.0436	0.0027.	3			
Total	19	0.0457					
The differences in the ma	ean valu	es among the	e treatment	groups are	not great end	ough to exclude the possibility the	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.858). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

IV. Ethylbenzene

a. Comparison between	sites									
One WayOne-Way Ana	lysis of	Variance		Monday, January 11, 2010, 1:15:58 PM						
Data source: Data 10 in	VOC Sit	te Comparisc	n.JNB							
Normality Test:	Passed	(P = 0.808)	3)							
Equal Variance Test:	Passed	(P = 0.590))							
Group Name	Ν	Missing	Mean	Std Dev	SEM					
Collocated	5	0	0.0234	0.0104	0.00465					
Jaycee Park	5	0	0.0184	0.00709	0.00317					
Water Treatment Plant	5	0	0.0184	0.00581	0.00260					
Midlothian HS	5	0	0.0166	0.00602	0.00269					
Source of Variation	DF	SS	MS	5 F	Р					
Between Groups	3	0.000128	0.0000	0.74	9 0.539					
Residual	16	0.000915	0.0000)572						
Total	19	0.00104								
The differences in the mo	on volue	The differences in the mean values among the treatment groups are not great enough to evalue the pessibility that								

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.539). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

V. <i>p+m</i> -Xylene a. Comparison between One WayOne-Way Ana	alysis of `			М	londay, Janu	uary 11, 2010, 1:16:19 PM
Data source: Data 10 in	VOC Sit	e Compariso	n.JNB			
Normality Test:	Passed	(P = 0.619))			
Equal Variance Test:	Passed	(P = 0.142)				
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	5	0	0.0454	0.0291	0.0130	
Jaycee Park	5	0	0.0408	0.0197	0.00879	
Water Treatment Plant	5	0	0.0368	0.0212	0.00948	
Midlothian HS	5	0	0.0352	0.0129	0.00576	
Source of Variation	DF	SS	MS	F	Р	
Between Groups	3	0.000311	0.00010	0.225	0.878	
Residual	16	0.00738	0.00040	61		
Total	19	0.00769				
The differences in the mo	ean value	s among the	treatment g	groups are no	ot great enou	gh to exclude the possibility that

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.878). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

VI. o-Xylene

a. Comparison between sites **One WayOne-Way Analysis of Variance** Monday, January 11, 2010, 1:16:44 PM Data source: Data 10 in VOC Site Comparison.JNB **Normality Test:** Passed (P = 0.961) Passed (P = 0.061) **Equal Variance Test: Group Name** Ν Missing Std Dev SEM Mean Collocated 5 0.0270 0.0144 0.00644 0 5 Javcee Park 0 0.0222 0.0112 0.00499 5 Water Treatment Plant 0 0.0168 0.00455 0.00203 5 Midlothian HS 0 0.0166 0.00559 0.00250 Source of Variation DF SS MS F Р Between Groups 0.000370 0.000123 1.283 3 0.314 Residual 16 0.00154 0.0000961 Total 19 0.00191

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.314). Power of performed test with alpha = 0.050: 0.091

The power of the performed test (0.091) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

I. Collocated

a. Benzene

One Way Analysis of Variance Data source: Collocated-VOC in Monitor Comparisons.JNB **Normality Test:** Passed (P = 0.052) Tuesday, June 01, 2010, 11:16:43 AM

Thormanly I cst.	1 455	cu (1 0.0	52)		
Equal Variance Test:	Pass	ed $(P = 0.4)$	62)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Benzene-1st Quarter	5	0	0.205	0.0319	0.0143
2nd Quarter	5	0	0.184	0.0182	0.00814
3rd Quarter	5	0	0.287	0.0660	0.0295
4th Quarter	5	0	0.171	0.0340	0.0152
Source of Variation	DF	SS	MS	F	Р
Between Groups	3	0.0409	0.0136	7.957	0.002
Residual	16	0.0274	0.0017	1	
Total	19	0.0684			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.002).

Power of performed test with alpha = 0.050: 0.944

All Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

comparisons for factor.						
Comparison	Diff of Means	р	q	Р	P<0.050	
3rd Quarter vs. 4th Quarter	0.116	4	6.285	0.002	Yes	
3rd Quarter vs. 2nd Quarter	0.103	3	5.572	0.003	Yes	
3rd Quarter vs. Benzene-1st	0.0824	2	4.449	0.006	Yes	
Benzene-1st vs. 4th Quarter	0.0340	3	1.836	0.417	No	
Benzene-1st vs. 2nd Quarter	0.0208	2	1.123	0.439	Do Not Test	
2nd Quarter vs. 4th Quarter	0.0132	2	0.713	0.621	Do Not Test	

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

b. 1,3-Butadiene

One Way Analysis of Variance Tuesday, June 01, 2010, 11:22:24 AM									
One Way Analysis of Variance Tuesday, June 01, 2010, 11:33:24 AM									
Data source: Collocated-VOC in Monitor Comparisons.JNB									
Normality Tes	t:	Passed	(P = 0.260)						
Equal Varianc	e Test	Passed	(P = 0.826)						
Group Name	Ν	Missing	Mean	Std Dev	SEM				
BD-1st Q	5	0	0.0113	0.00682	0.0030	5			
2nd Q	5	0	0.0144	0.00594	0.0026	5			
3rd Q	5	0	0.00990	0.00613	0.00274	1			
4th Q	5	0	0.00890	0.00518	0.00232	2			
Source of Vari	iation	DF	SS	MS		F	Р		
Between Group	DS	3	0.0000860	0.00002	87 0.'	785	0.520		
Residual		16	0.000584	0.00003	65				
Total		19	0.000670						

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.520). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Toluene

One Way Analysis of	Variance	
Data source: Collocate	ed-VOC in N	Monitor Comparisons.JNB
Normality Test:	Passed	(P = 0.464)

Tuesday, June 01, 2010, 11:34:04 AM

Normality 1 est		Passed	(P = 0.46)	94)			
Equal Variance	e Test:	Passed	(P = 0.53)	51)			
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Toluene-1st Q	5	0	0.129	0.0472	0.0211		
2nd Q	5	0	0.172	0.0941	0.0421		
3rd Q	5	0	0.198	0.109	0.0488		
4th Q	5	0	0.139	0.0641	0.0286		
Source of Varia	ation	DF	SS	MS	F	Р	
Between Groups	5	3	0.0148	0.00493	0.727	0.551	
Residual		16	0.108	0.00678			
Total		19	0.123				

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.551). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Ethylbenzene

d. Ethylbe	d. Ethylbenzene										
One Way	Analy	ysis of Varia	nce			Tuesday, June 01, 2010, 11:34:43 AM					
Data sour	ce: Co	ollocated-VO	C in Monitor	.JNB							
Normality	' Test	: Fa	iled $(P < 0.$	050)							
Test execu	tion e	ended by user	request, ANC	OVA on Rank	s begun						
Kruskal-V	Vallis	one Way A	nalysis of Va	riance on Ra	nks	Tuesday, June 01, 2010, 11:34:43 AM					
Data sour	ce: Co	ollocated-VO	C in Monitor	Comparisons	.JNB						
Group	Ν	Missing	Median	25%	75%						
EB-1st Q	5	0	0.0220	0.0133	0.0260						
2nd Q	5	0	0.0280	0.0172	0.0510						
3rd Q	5	0	0.0320	0.0213	0.0488						
4th Q 5 0 0.0240 0.0165 0.0302											
H = 2.389	with 3	3 degrees of f	reedom. (P =	= 0.496)							
The differe	ences	in the mediar	values amon	o the treatment	nt groups ar	e not great enough to exclude the possibility that					

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.496)

e. m+p-Xylene

One Way A		sis of Varian		Tuesday, June 01, 2010, 11:35:11 AM		
Data source	e: Co	llocated-VOC	c in Monitor C	Comparisons.J	NB	••••••
Normality 7	Test:	Fail	led $(P < 0.0)$	50)		
Test executi	on er	nded by user r	equest, ANO	VA on Ranks	begun	
		·	·	iance on Ran		Tuesday, June 01, 2010, 11:35:11 AM
Data source	e: Co	llocated-VOC	c in Monitor C	Comparisons.J	NB	
Group	Ν	Missing	Median	25%	75%	
mpX-1st Q	5	0	0.0420	0.0230	0.0508	
2nd Q	5	0	0.0600	0.0335	0.140	
3rd Q	5	0	0.0650	0.0483	0.121	
4th Q	5	0	0.0470	0.0187	0.0703	

H = 3.423 with 3 degrees of freedom. (P = 0.331)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.331)

f. o-Xylene

One Way Analysis of Variance Data source: Collocated-VOC in Monitor Comparisons.JNB Normality Test: Failed (P < 0.050)Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One Way Analysis of Variance on Ranks Data source: Collocated-VOC in Monitor Comparisons INB

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Tuesday, June 01, 2010, 11:35:58 AM

Data source. Conocated- v oc in Monitor Comparisons. 514B									
Group	Ν	Missing	Median	25%	75%				
oX-1st Q	5	0	0.0180	0.01000	0.0230				
2nd Q	5	0	0.0260	0.0145	0.0500				
3rd Q	5	0	0.0330	0.0257	0.0435				
4th Q	5	0	0.0280	0.0150	0.0382				
H = 3.989	with	3 degrees of t	freedom (P =	0 263)					

H = 3.989 with 3 degrees of freedom. (P = 0.263)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.263)

II. Jaycee Park

a. Benzene

One Way Analysis of Variance

Data source: Jaycee Park-VOC in Monitor Comparisons. JNB Normality Test: Passed (P = 0.059)

Equal Variance Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Jaycee Park-VOC in Monitor Comparisons.JNB

Group 75% Missing Median 25% Ν 5 Benzene-1st Quarter 0.194 0.149 0.224 0 2nd Quarter 5 0 0.158 0.145 0.170 5 0.359 3rd Ouarter 0 0.322 0.202 0.163 4th Ouarter 5 0 0.132 0.119

H = 11.091 with 3 degrees of freedom. (P = 0.011)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.011)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
3rd Quarter vs 4th Quarter	58.500	4.422	Yes
3rd Quarter vs 2nd Quarter	46.500	3.515	No
3rd Quarter vs Benzene-1st Q	29.000	2.192	Do Not Test
Benzene-1st Q vs 4th Quarter	29.500	2.230	No
Benzene-1st Q vs 2nd Quarter	17.500	1.323	Do Not Test
2nd Quarter vs 4th Quarter	12.000	0.907	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule,

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and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

b. 1,3-Butadiene

One Way Analysis of Variance

Data source: Jaycee Park-VOC in Monitor Comparisons.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data sour	Data source: Jaycee Park-VOC in Monitor Comparisons.JNB											
Group	Ν	Missing	Median	25%	75%							
BD-1st Q	5	0	0.0110	0.00588	0.0158							
2nd Q	5	0	0.0120	0.00825	0.0155							
3rd Q	5	0	0.0130	0.0128	0.0163							
4th Q	5	0	0.00700	0.00575	0.00900							
			0 1 (7)	0.0=0)								

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H = 6.802 with 3 degrees of freedom. (P = 0.078)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.078)

c. Toluene

One Way Analy	sis of	Variance			Tuesday, June 01, 2010, 11:40:37 AM	
Data source: Ja	ycee Pa	ark-VOC in	Monitor C	Comparisons	JNB	
Normality Test	Passed	(P = 0.10)	9)			
Equal Variance	Test:	Passed	(P = 0.84)	8)		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Toluene-1st Q	5	0	0.125	0.0662	0.0296	
2nd Q	5	0	0.155	0.0480	0.0215	
3rd Q	5	0	0.145	0.0327	0.0146	
4th Q	5	0	0.119	0.0534	0.0239	
Source of Varia	tion	DF	SS	MS	F	Р
Between Groups	5	3	0.00426	0.00142	0.535	0.665
Residual		16	0.0424	0.00265		
Total		19	0.0467			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.665). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Data source: Jaycee Park-VOC in Monitor Comparisons INB

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Ethylbenzene

One Way Analysis of Variance

Tuesday, June 01, 2010, 11:41:07 AM

Data source. J	Data source: Jayeee rark voe in Montor Comparisons.51(D										
Normality Tes	t:	Passed	(P = 0.246)								
Equal Varianc	e Test	t: Passed	(P = 0.06)	7)							
Group Name	Ν	Missing	Mean	Std Dev	SEM						
EB-1st Q	5	0	0.0212	0.00909	0.00407						
2nd Q	5	0	0.0526	0.0333	0.0149						
3rd Q	5	0	0.0332	0.0133	0.00593						
4th Q	5	0	0.0184	0.00709	0.00317						
Source of Vari	iation	DF	SS	MS	F	Р					
Between Group	DS	3	0.00363	0.00121	3.409	0.043					

Residual	16	0.00568	0.000355
Total	19	0.00930	

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.043).

Power of performed test with alpha = 0.050: 0.489

All Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
2nd Q vs. 4th Q	0.0342	4	4.060	0.049	Yes
2nd Q vs. EB-1st Q	0.0314	3	3.728	0.045	Yes
2nd Q vs. 3rd Q	0.0194	2	2.303	0.123	No
3rd Q vs. 4th Q	0.0148	3	1.757	0.447	No
3rd Q vs. EB-1st Q	0.0120	2	1.425	0.329	Do Not Test
EB-1st Q vs. 4th Q	0.00280	2	0.332	0.817	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

e. m+p-Xylene

One Way Ana	lysis of	Variance			Tuesday, June 01, 2010, 11:42:14 AM	
Data source: J	aycee I	Park-VOC in	Monitor C	Comparisons	.JNB	
Normality Test: Passed		(P = 0.162)	2)			
Equal Varianc	e Test	Passed	(P = 0.07)	0)		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
mpX-1st Q	5	0	0.0416	0.0241	0.0108	
2nd Q	5	0	0.141	0.101	0.0451	
3rd Q	5	0	0.0810	0.0421	0.0188	
4th Q	5	0	0.0408	0.0197	0.00879	
Source of Vari	iation	DF	SS	MS	F	Р
Between Group	DS	3	0.0332	0.0111	3.431	0.042
Residual		16	0.0517	0.00323		
Total		19	0.0849			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.042).

Power of performed test with alpha = 0.050: 0.493

All Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
2nd Q vs. 4th Q	0.1000	4	3.935	0.058	No
2nd Q vs. mpX-1st Q	0.0992	3	3.904	0.035	Do Not Test
2nd Q vs. 3rd Q	0.0598	2	2.353	0.116	Do Not Test
3rd Q vs. 4th Q	0.0402	3	1.582	0.517	Do Not Test
3rd Q vs. mpX-1st Q	0.0394	2	1.551	0.289	Do Not Test
mpX-1st Q vs. 4th Q	0.000800	2	0.0315	0.983	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not

Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

<mark>f. o-Xylene</mark> One Way Ana	lysis o	f Variance				Tuesday, J	une 01, 20	10, 11:42:4	44 AM
Data source: J	aycee	Park-VOC in	Monitor C	Comparisons.J	NB		,		
Normality Tes	st:	Passed	(P = 0.52)	3)					
Equal Varianc	Passed	(P = 0.10)	9)						
Group Name	Ν	Missing	Mean	Std Dev	SEM				
oX-1st Q	5	0	0.0184	0.00896	0.00401				
2nd Q	5	0	0.0460	0.0293	0.0131				
3rd Q	5	0	0.0340	0.0116	0.00521				
4th Q	5	0	0.0222	0.0112	0.00499				
Source of Var	iation	DF	SS	MS	F	Р			
Between Group	os	3	0.00234	0.000779	2.598	0.088			
Residual		16	0.00480	0.000300					
Total		19	0.00713						
TT1 1:00								1 1 .1	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.088). Power of performed test with alpha = 0.050: 0.333

The power of the performed test (0.333) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

III. Water Treatment Plant

a. Benzene										
One Way Analysis of V	ariance					Tuesday, June 01, 2010, 11:43:59 AM				
Data source: Water Tre		ant-VOC	in Monitor	Com	oarisor					
Normality Test:		(P = 0.5)		1						
Equal Variance Test:	Passed	(P = 0.1)	79)							
Group Name	N M	issing	Mean	Std D	ev	SEM				
Benzene-1st Quarter	5	0	0.190	0.04	04	0.0181				
2nd Quarter	5	0	0.133	0.01	94	0.00868				
3rd Quarter	5	0	0.259	0.06	77	0.0303				
4th Quarter	5	0	0.178	0.04	35	0.0195				
Source of Variation	DF	SS	MS		F	Р				
Between Groups	3	0.0409	0.0136	(5.426	0.005				
Residual	16	0.0339	0.0021	2						
Total	19	0.0748								
The differences in the m	ean value	s among t	he treatmer	nt grou	ups are	e greater t	han would be expected by chance; there			
is a statistically significa	ant differen	nce $(P = 0)$	0.005).							
Power of performed test	with alph	a = 0.050	: 0.868							
All Pairwise Multiple Co	omparison	Procedu	res (Studen	t-New	man-l	Keuls Me	thod) :			
Comparisons for factor:										
Comparison		Diff o	f Means	р	q	Р	P<0.050			
3rd Quarter vs. 2nd Qua	rter	0	.126	4	6.12	8 0.00	03 Yes			
3rd Quarter vs. 4th Quar	ter	0	.0810	3	3.93	3 0.02	34 Yes			
3rd Quarter vs. Benzene	-1st	0	.0686	2	3.33	1 0.03	32 Yes			
Benzene-1st vs. 2nd Qu	arter	0	.0576	3	2.79	7 0.1:	50 No			
Benzene-1st vs. 4th Qua	arter	0	.0124	2	0.60	2 0.6	76 Do Not Test			
4th Quarter vs. 2nd Qua	rter	0	.0452	2	2.19	5 0.14	40 Do Not Test			

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

b. 1,3-Butadiene

One Way Analysis of Variance

Tuesday, June 01, 2010, 11:44:27 AM

Data source: V	Vater T	Treatment Pla	int-VOC in N	Aonitor Com	paris	ons.JNB	5, ,	,	
Normality Tes	st:	Passed	(P = 0.053)		-				
Equal Variance	ce Test	: Passed	(P = 0.161)						
Group Name	Ν	Missing	Mean	Std Dev	SF	M			
BD-1st Q	5	0	0.0104	0.00876	0.0)392			
2nd Q	5	0	0.00880	0.00383	0.0	0171			
3rd Q	5	0	0.0124	0.00270	0.0)121			
4th Q	5	0	0.00780	0.00303	0.0)136			
Source of Var	iation	DF	SS	MS		F	Р		
Between Group	os	3	0.0000606	0.00002	02	0.748	0.539		
Residual		16	0.000431	0.00002	70				
Total		19	0.000492						
TT1 1:00	·	1						1 1 .1	the second second

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.539). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Toluene

One Way Analy	ysis of	Variance			Tuesday, June 01, 2010, 11:45:01 AM				
Data source: W	ater T	reatment Plar	nt-VOC in Mc	nitor Compari	risons.JNB				
Normality Test	:	Failed	(P < 0.050)						
Test execution ended by user request, ANOVA on Ranks begun									
Kruskal-Wallis	One	Way Analysi	s of Variance	Tuesday, June 01, 2010, 11:45:01 AM					
Data source: W	ater T	reatment Plar	nt-VOC in Mo	nitor Compari	risons.JNB				
Group	Ν	Missing	Median	25%	75%				
Toluene-1st Q	5	0	0.103	0.0890	0.247				
2nd Q	5	0	0.0850	0.0772	0.122				
3rd Q	5	0	0.112	0.101	0.168				
4th Q	5	0	0.131	0.105	0.165				
H = 2.200 with 3	3 degre	ees of freedor	n. $(P = 0.532)$)		_			
The differences	in the	median value	s among the t	reatment grou	ups are not great enough to exclude the possibility that	it			
the difference is	due to	random sam	pling variabil	ity; there is no	ot a statistically significant difference $(P = 0.532)$				
d. Ethylbenzen	e								
One Way Analy	ysis of	Variance			Tuesday, June 01, 2010, 11:45:32 AM				
Data source: W	ater T	reatment Plar	nt-VOC in Mo	nitor Compari	risons.JNB				
Normality Test	:	Failed	(P < 0.050)						
Test execution e	nded b	by user reques	st, ANOVA o	n Ranks begur	n				
Kruskal-Wallis	One	Way Analysi	s of Variance	e on Ranks	Tuesday, June 01, 2010, 11:45:32 AM				
Data samual W	latar T	rootmoont Dlor	+ VOC in Ma	mitor Common	Hanna NID				

Data source: Water Treatment Plant-VOC in Monitor Comparisons.JNBGroupNMissingMedian25%75%

EB-1st Q	5	0	0.0170	0.0155	0.0360
2nd Q	5	0	0.0180	0.0153	0.0377
3rd Q	5	0	0.0230	0.0187	0.0313
4th Q	5	0	0.0170	0.0142	0.0225

H = 1.795 with 3 degrees of freedom. (P = 0.616)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.616)

e. m+p-Xylene

One Way A	naly	sis of Variand	e	Tuesday, June 01, 2010, 11:46:01 AM						
Data source: Water Treatment Plant-VOC in Monitor Comparisons.JNB										
Normality 7	Normality Test: Failed $(P < 0.050)$									
Test executi	on er	nded by user re	equest, ANC	OVA on Ranks	begun					
Kruskal-W	allis	One Way An	alysis of Va	riance on Rar	ıks	Tuesday, June 01, 2010, 11:46:01 AM				
Data source	e: Wa	ter Treatment	Plant-VOC	in Monitor Co	omparisons.	JNB				
Group	Ν	Missing	Median	25%	75%					
mpX-1st Q	5	0	0.0280	0.0133	0.0513					

2nd Q	5	0	0.0430	0.0308	0.0998	
3rd Q	5	0	0.0460	0.0360	0.0603	
4th Q	5	0	0.0380	0.0225	0.0540	
H = 2.72	25 with 3 de	egrees of t	freedom $(P = 0)$	0 436)		

H = 2.725 with 3 degrees of freedom. (P = 0.436)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.436)

f. o-Xylene

One Way Analysis of Variance Tuesday, June 01, 2010, 11:46:37 AM Data source: Water Treatment Plant-VOC in Monitor Comparisons.JNB Failed (P < 0.050)**Normality Test:** Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One Way Analysis of Variance on Ranks Tuesday, June 01, 2010, 11:46:37 AM Data source: Water Treatment Plant-VOC in Monitor Comparisons. JNB Group Missing 25% 75% Ν Median oX-1st Q 5 0 0.0130 0.0120 0.0292 5 2nd Q 0 0.0180 0.0150 0.0338 3rd Q 5 0 0.0200 0.0177 0.0245 5 0 0.0170 0.0135 0.0188 4th Q

H = 1.842 with 3 degrees of freedom. (P = 0.606)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.606)

Appendix F - TCEQ CAMS 302 PM_{10} Metals Historical Comparisons

-	n betwee	en collocato	ed and histor	ical	T 1 1 10 2010 402 05 DM
t-test Data source:]	Data 1 in	Wyatt Rd	Metals Comp	JNB	Tuesday, January 19, 2010, 4:02:05 PM
Normality Te	st:	Failed	(P < 0.050)		
Fest execution			est, Rank Sun	n Test begun	
Mann-Whitne			Matala Comm	Tuesday, January 19, 2010, 4:02:05 PM	
Data source:] Group		Missing	Median	25%	75%
TCEQ	196	0	0.137	0.0845	0.226
All Quarters	20	0	0.133	0.0851	0.162
Ann-Whitney					
			= 196 (P = 0)	.268)	
					not great enough to exclude the possibility that the
ifference is d	ue to ran	dom sampli	ng variability	; there is not a	statistically significant difference $(P = 0.268)$
I. Chromiun			d and blatan	a a l	
. Compariso	n detwee	en conocato	ed and histor	ical	Tuesday, January 19, 2010, 4:02:28 PM
	Conv of	Data 1 in W	vatt Rd Meta	ls Comp.JNB	Tuesday, January 19, 2010, 4.02.28 TW
Normality Te			(P < 0.050)	is comp.sivb	
			est, Rank Sun	n Test begun	
Aann-Whitne					Tuesday, January 19, 2010, 4:02:28 PM
Data source: (yatt Rd Meta	ls Comp.JNB	
Group	Ν	Missing	Median	25%	75%
	101	0	0.00400	0.00300	0.00700
	196				
All Quarters	20	0	0.00243	0.00218	0.00344
All Quarters	20 y U Statis	$\frac{0}{\text{stic}=1170.9}$	000		
All Quarters Mann-Whitney T = 1380.000	20 y U Statis n(small)	$\frac{0}{\text{stic}=1170.0}$ $= 20 \text{ n(big)}$)00)= 196 (P = 0	.003)	0.00344
All Quarters Mann-Whitney T = 1380.000 The difference	20 y U Statis n(small) in the m	0 stic= 1170.0 = 20 n(big median value	000)= 196 (P = 0 es between the	.003)	
All Quarters Mann-Whitney $\Gamma = 1380.000$ The difference	20 y U Statis n(small) in the m	0 stic= 1170.0 = 20 n(big median value	000)= 196 (P = 0 es between the	.003)	0.00344
statistically sig	20 y U Statis n(small) e in the m gnificant	0 stic= 1170.0 = 20 n(big median value	000)= 196 (P = 0 es between the	.003)	0.00344
All Quarters Mann-Whitney T = 1380.000 The difference tatistically signal. II. Mangane	20 y U Statis n(small) in the m gnificant	0 stic= 1170.0 = 20 n(big redian value difference	000 = 196 (P = 0) 000 = 196 (P = 0) 000 = 0.003 = 0	.003) e two groups is	0.00344
All Quarters Mann-Whitney = 1380.000 The difference tatistically sig II. Manganes . Compariso	20 y U Statis n(small) in the m gnificant	0 stic= 1170.0 = 20 n(big redian value difference	000 = 196 (P = 0) 000 = 196 (P = 0) 000 = 0.003 = 0	.003) e two groups is	0.00344
All Quarters Mann-Whitney = 1380.000 The difference tatistically sig II. Manganes Compariso -test Data source:	20 y U Statis n(small) in the m gnificant se n betwee Copy (2)	0 stic= 1170.4 = 20 n(big difference en collocato of Data 1 i	$product{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{$.003) two groups is ical fetals Comp.JP	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM
All Quarters Mann-Whitney T = 1380,000 The difference tatistically sig II. Manganes A. Compariso -test Data source: Wormality Te	20 y U Statis n(small) e in the m gnificant se n betwee Copy (2) st:	0 stic= 1170.4 = 20 n(big dedian value difference en collocate of Data 1 i Failed	000 = 196 (P = 0) P = 196 (P = 0) P = 0.003 P = 0.003 P = 0.003 P = 0.003 P = 0.003	.003) two groups is ical letals Comp.JP	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM
All Quarters Mann-Whitney C = 1380,000 The difference statistically sign II. Manganes Compariso -test Data source: Cornality Te Fest execution	20 y U Statis n(small) e in the m gnificant se n betwee Copy (2) st: n ended b	0 stic= 1170.4 = 20 n(big dedian value difference en collocate of Data 1 i Failed y user requ	000 = 196 (P = 0) P = 196 (P = 0) P = 0.003 P = 0.003 P = 0.003 P = 0.003 P = 0.003	.003) two groups is ical letals Comp.JP	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB
All Quarters Mann-Whitney = 1380.000 The difference tatistically sign II. Manganey Compariso -test Data source: (Normality Te Cest execution Mann-Whitney	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: n ended b ey Rank	0 stic= 1170.4 = 20 n(big difference en collocato of Data 1 i Failed y user requ Sum Test	$pred{tabular}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}{0}$.003) e two groups is ical letals Comp.JP n Test begun	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM Tuesday, January 19, 2010, 4:02:56 PM
All Quarters Mann-Whitney = 1380.000 The difference tatistically sig II. Manganes Compariso -test Data source: Of Normality Te Cest execution Mann-Whitne Data source: Of Data source: Of Data source: Of Content Data source:	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: n ended b ey Rank Copy (2)	0 stic= 1170. = 20 n(big edian value difference en collocate of Data 1 i Failed y user requ Sum Test of Data 1 i	000 = 196 (P = 0 es between the (P = 0.003) ed and histor n Wyatt Rd M (P < 0.050) est, Rank Sun n Wyatt Rd M	.003) e two groups is ical Ietals Comp.JP n Test begun Ietals Comp.JP	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB
All Quarters Mann-Whitney = 1380.000 The difference tatistically sign II. Manganes . Compariso -test Data source: O Vormality Te Cest execution Mann-Whitne Data source: O Croup	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: i ended b ey Rank Copy (2) N	0 stic= 1170.4 = 20 n(big difference en collocato of Data 1 i Failed y user requ Sum Test of Data 1 i Missing	000 = 196 (P = 0 (P = 0.003) ed and histor n Wyatt Rd M (P < 0.050) est, Rank Sun <u>n Wyatt Rd M</u> Median	.003) e two groups is ical Ietals Comp.JP n Test begun Ietals Comp.JP 25%	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB 75%
All Quarters Aann-Whitney = 1380.000 The difference tatistically signed attistically signed tatistically signed tatistically signed attistically sig	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: a ended b ey Rank Copy (2) N 196	0 stic= 1170.4 = 20 n(big difference en collocate of Data 1 i Failed y user requ Sum Test of Data 1 i Missing 0	$pred{tabular}{lllllllllllllllllllllllllllllllllll$.003) e two groups is ical Ietals Comp.JP n Test begun <u>Ietals Comp.JP</u> 25% 0.0170	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB 75% 0.0575
All Quarters Mann-Whitney = 1380.000 The difference tatistically sign II. Manganes Compariso -test Data source: Of Normality Te Cest execution Mann-Whitney Data source: Of CEQ All Quarters	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: i ended b ey Rank Copy (2) N 196 20	0 stic= 1170.4 = 20 n(big difference en collocate of Data 1 i Failed y user requ Sum Test of Data 1 i Missing 0 0	$\frac{000}{(P = 0)} = 196 (P = 0)$ $\frac{196 (P = 0.003)}{(P = 0.003)}$ $\frac{100}{(P = 0.003)}$ $\frac{100}{(P < 0.050)}$.003) e two groups is ical Ietals Comp.JP n Test begun Ietals Comp.JP 25%	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB 75%
All Quarters Mann-Whitney = 1380.000 The difference tatistically sign II. Manganes Compariso -test Data source: (Normality Te Cest execution Mann-Whitney CEQ All Quarters Mann-Whitney	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: n ended b ey Rank Copy (2) N 196 20 y U Statis	0 stic= 1170.4 $= 20 n(big$ edian value difference en collocate of Data 1 i Failed y user requ Sum Test of Data 1 i Missing 0 0 stic= 929.50	$\frac{000}{(P = 0)} = 196 (P = 0)$ $\frac{196 (P = 0.003)}{(P = 0.003)}$ $\frac{ed \text{ and histor}}{ed \text{ and histor}}$ $\frac{10000}{(P < 0.050)}$ $\frac{10000}{(P < 0.030)}$ $\frac{10000}{(P < 0.0137)}$.003) e two groups is ical fetals Comp.JP n Test begun fetals Comp.JP 25% 0.0170 0.00766	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB 75% 0.0575
All Quarters Mann-Whitney T = 1380.000 The difference tatistically sign II. Manganes Compariso test Data source: (Normality Te Cest execution Mann-Whitney CEQ All Quarters Mann-Whitney T = 1139.500	20 y U Statis n(small) in the m gnificant se n betwee Copy (2) st: n ended b ey Rank Copy (2) N 196 20 y U Statis n(small)	0 stic= 1170.4 $= 20 n(big$ edian value difference en collocate of Data 1 i Failed y user requ Sum Test of Data 1 i Missing 0 0 stic= 929.56 $= 20 n(big$	$\frac{000}{(P = 0)} = 196 (P = 0)$ $\frac{196 (P = 0.003)}{(P = 0.003)}$ $\frac{ed \text{ and histor}}{ed \text{ and histor}}$ $n Wyatt Rd N$ $(P < 0.050)$ $est, Rank Sun$ $\frac{n Wyatt Rd N}{Median}$ 0.0300 0.0137 $\frac{100}{(P = 0.003)}$.003) e two groups is ical letals Comp.JP n Test begun letals Comp.JP 25% 0.0170 0.00766	0.00344 s greater than would be expected by chance; there is Tuesday, January 19, 2010, 4:02:56 PM NB Tuesday, January 19, 2010, 4:02:56 PM NB 75% 0.0575

a. Comparison between collocated and historical t-test

Tuesday, January 19, 2010, 4:03:19 PM

		by user requ	est, Rank S	um Test be	0		
Mann-Whitne						Tuesday	y, January 19, 2010, 4:03:19 PM
Data source: (12 \	,	3		-		
Group	Ν	Missing	Median	25%		5%	
TCEQ	196	0	0.01000			1000	
All Quarters	20	0	0.00302	0.002	.0.0	0469	
Mann-Whitney							
T = 390.000 n							
					oups is grea	ter than	would be expected by chance; there is
statistically sig	nifican	t difference	(P = < 0.00)	1)			
V. Nickel							
a. Compariso	n betw	een collocat	ed and hist	orical		T	L
t-test	7	() - CD-4- 1		Matala Ca		Tuesday	y, January 19, 2010, 4:03:39 PM
Data source: (Normality To					mp.JNB		
Normality Tes			(P < 0.05)		~~~~		
Test execution			iest, Kank S	um Test be	egun	Turnel	Lanuary 10, 2010, 4:02:20 DM
Mann-Whitne				Matala Ca		Tuesday	y, January 19, 2010, 4:03:39 PM
Data source: (=0 /	
Group	N	Missing	Median	25%		5%	
ICEQ	196	0	0.00400			0400	
All Quarters	20	0	0.00105	0.0006	o39 0.0	0140	
Monn White							
		tistic= 0.000					
T = 210.000 n	(small)	= 20 n(big)	= 196 (P =		·		
T = 210.000 n The difference	(small) in the	= 20 n(big) median valu	= 196 (P = es between	the two gro	oups is grea	ter than	would be expected by chance; there is
T = 210.000 n The difference	(small) in the	= 20 n(big) median valu	= 196 (P = es between	the two gro	oups is grea	ter than	would be expected by chance; there is
T = 210.000 n The difference statistically sig	(small) in the mifican	= 20 n(big) median valu t difference	= 196 (P = es between (P = < 0.00	the two gro 1)			
$\Gamma = 210.000$ n The difference statistically sig B. Compariso	(small) in the mifican ns of A	= 20 n(big) median valu t difference	= 196 (P = es between (P = < 0.00	the two gro 1)			
T = 210.000 n The difference statistically sig B. Compariso I. Each site av	(small) in the mifican ns of A verage	= 20 n(big) median valu t difference werage Con	= 196 (P = es between (P = <0.00)	the two gro 1) s to Histor			
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Compariso	(small) in the mifican ns of A verage n of Al	= 20 n(big) median valu t difference werage Con uminum Sit	= 196 (P = es between (P = <0.00) icentrations e Averages	the two gro 1) s to Histor		ge Conc	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Compariso One WayOne-	(small) in the p mifican ns of A verage n of Ali -Way A	= 20 n(big); median valu t difference werage Con uminum Sit Analysis of V	= 196 (P = es between (P = <0.00 acentrations e Averages Variance	the two gro 1) s to Histor		ge Conc	
$\Gamma = 210.000$ n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I	(small) in the p mifican ns of A cerage n of Al -Way A Data 2 i	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd	= 196 (P = es between (P = <0.00 acentration e Averages Variance Metals Con	the two gro 1) s to Histor s np.JNB	ical Avera	ge Conc	entrations
Γ = 210.000 nFhe differencestatistically sigB. ComparisoI. Each site ava. ComparisoOne WayOne-Data source: IGroup Name	(small) in the mifican ns of A rerage n of Al -Way A Data 2 i N	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con Mean	the two gro 1) s to Histor mp.JNB Std Dev	ical Avera	ge Conc	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1	(small) in the p mifican ns of A rerage n of Al -Way A Data 2 i N 196	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0	= 196 (P = es between (P = <0.00) ecentration e Averages Variance Metals Con Mean 0.195	the two gro 1) s to Histor mp.JNB Std Dev 0.202	ical Avera SEM 0.0145	ge Conc	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne Data source: I Group Name Row 1 Row 2	(small) in the p mifican ns of A rerage n of Al -Way A Data 2 i N 196 20	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Com Mean 0.195 0.127	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504	SEM 0.0145 0.0113	ge Conc	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1 Row 2 Row 3	(small) in the s mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172	SEM 0.0145 0.0113 0.0384	ge Conc	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1 Row 2 Row 3 Row 4	(small) in the p mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20 20	= 20 n(big); median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496	SEM 0.0145 0.0113 0.0384 0.0111	ge Conc	entrations
Γ = 210.000 n The difference statistically sig B. ComparisoL Each site ava. ComparisoOne WayOne-Data source: I Group Name Row 1Row 2Row 3Row 4Row 5	(small) in the s mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20 20 20 20	= 20 n(big); median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con 0.195 0.127 0.270 0.0877 0.117	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505	SEM 0.0145 0.0113 0.0384 0.0111 0.0113	ge Conc Tuesda	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1 Row 2 Row 2 Row 3 Row 4 Row 5 Row 6	(small) in the s mifican ns of A cerage n of Al -Way A Data 2 i N 196 20 20 20 20 20 5	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0	= 196 (P = es between (P = <0.00 ecentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877 0.117 0.0570	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203	SEM 0.0145 0.0113 0.0384 0.0111 0.0113 0.00910	ge Conc Tuesda	entrations
Γ = 210.000 n The difference statistically sig B. ComparisoL Each site ava. ComparisoOne WayOne-Data source: I Group Name Row 1Row 2Row 3Row 4Row 5Row 6Row 7	(small) in the p mifican ns of A cerage n of All -Way A Data 2 i N 196 20 20 20 20 20 5 5	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations to accentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408	SEM 0.0145 0.0113 0.0384 0.0111 0.0113 0.00910 0.0183	ge Conc Tuesda	entrations
Γ = 210.000 nFhe differencestatistically sigB. ComparisoL. Each site ava. ComparisonOne WayOneData source: IGroup NameRow 1Row 2Row 3Row 4Row 5Row 6Row 7Row 8	(small) in the p mifican ns of A rerage n of Al -Way A Data 2 i N 196 20 20 20 20 20 5 5 5	= 20 n(big); median valu t difference average Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00 ecentration e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837 0.0925	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408 0.0278	SEM 0.0145 0.0113 0.0384 0.0111 0.0113 0.00910 0.0183 0.0125	ge Conc Tuesda	entrations
Γ = 210.000 n Γhe difference statistically sig B. ComparisoI. Each site ava. ComparisonDne WayOneData source: I Group Name Row 1Row 2Row 3Row 4Row 5Row 6Row 7Row 8Row 9	(small) in the r mifican ns of A rerage n of Ali -Way A Data 2 i N 196 20 20 20 20 20 20 5 5 5 5 5	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00 ecentration e Averages Variance Metals Com 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837 0.0925 0.0798	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408 0.0278 0.0573	SEM 0.0145 0.0113 0.0384 0.0111 0.0113 0.00910 0.0183 0.0125 0.0256	ge Conc Tuesda	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1 Row 2 Row 3 Row 3 Row 4 Row 5 Row 5 Row 6 Row 7 Row 8 Row 9 Source of Var	(small) in the r mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20 20 20 20 20 20 5 5 5 5 5 5	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837 0.0925 0.0798 SS	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408 0.0278 0.0573 MS	SEM 0.0145 0.0113 0.0384 0.0111 0.013 0.00910 0.0183 0.0125 0.0256 F	ge Conc Tuesda	entrations
T = 210.000 n The difference statistically sig B. Compariso I. Each site av a. Comparison One WayOne- Data source: I Group Name Row 1 Row 2 Row 2 Row 3 Row 4 Row 5 Row 4 Row 5 Row 6 Row 7 Row 8 Row 9 Source of Var Between Group	(small) in the r mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20 20 20 20 20 20 5 5 5 5 5 5	= 20 n(big) median valu t difference werage Com uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Com 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837 0.0925 0.0798 SS 0.714	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408 0.0278 0.0278 0.0573 MS 0.0893	SEM 0.0145 0.0113 0.0384 0.0111 0.013 0.00910 0.0183 0.0125 0.0256 F	ge Conc Tuesda	entrations
T = 210.000 n	(small) in the r mifican ns of A cerage n of Al- -Way A Data 2 i N 196 20 20 20 20 20 20 20 5 5 5 5 5 5	= 20 n(big) median valu t difference werage Con uminum Sit Analysis of V in Wyatt Rd Missing 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 196 (P = es between (P = <0.00) ecentrations e Averages Variance Metals Con Mean 0.195 0.127 0.270 0.0877 0.117 0.0570 0.0837 0.0925 0.0798 SS	the two gro 1) s to Histor mp.JNB Std Dev 0.202 0.0504 0.172 0.0496 0.0505 0.0203 0.0408 0.0278 0.0573 MS	SEM 0.0145 0.0113 0.0384 0.0111 0.013 0.00910 0.0183 0.0125 0.0256 F	ge Conc Tuesda	entrations

is a statistically significant difference (P = 0.004). Power of performed test with alpha = 0.050: 0.806 All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

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Comparison	Diff of Means	р	q	Р	P<0.050
Row 3 vs. Row 6	0.213	9	3.453	0.261	No
Row 3 vs. Row 9	0.190	8	3.083	0.364	Do Not Test
Row 3 vs. Row 7	0.186	7	3.019	0.332	Do Not Test
Row 3 vs. Row 4	0.182	6	4.671	0.012	Do Not Test
Row 3 vs. Row 8	0.177	5	2.876	0.250	Do Not Test
Row 3 vs. Row 5	0.153	4	3.927	0.028	Do Not Test
Row 3 vs. Row 2	0.143	3	3.670	0.026	Do Not Test
Row 3 vs. Row 1	0.0748	2	2.587	0.067	Do Not Test
Row 1 vs. Row 6	0.138	8	2.472	0.656	Do Not Test
Row 1 vs. Row 9	0.115	7	2.063	0.769	Do Not Test
Row 1 vs. Row 7	0.111	6	1.992	0.722	Do Not Test
Row 1 vs. Row 4	0.107	5	3.705	0.067	Do Not Test
Row 1 vs. Row 8	0.102	4	1.834	0.565	Do Not Test
Row 1 vs. Row 5	0.0782	3	2.703	0.135	Do Not Test
Row 1 vs. Row 2	0.0682	2	2.357	0.096	Do Not Test
Row 2 vs. Row 6	0.0697	7	1.132	0.985	Do Not Test
Row 2 vs. Row 9	0.0469	6	0.762	0.995	Do Not Test
Row 2 vs. Row 7	0.0430	5	0.698	0.988	Do Not Test
Row 2 vs. Row 4	0.0390	4	1.001	0.894	Do Not Test
Row 2 vs. Row 8	0.0342	3	0.555	0.919	Do Not Test
Row 2 vs. Row 5	0.0100	2	0.257	0.856	Do Not Test
Row 5 vs. Row 6	0.0597	6	0.970	0.984	Do Not Test
Row 5 vs. Row 9	0.0369	5	0.599	0.993	Do Not Test
Row 5 vs. Row 7	0.0330	4	0.535	0.982	Do Not Test
Row 5 vs. Row 4	0.0290	3	0.744	0.859	Do Not Test
Row 5 vs. Row 8	0.0242	2	0.392	0.781	Do Not Test
Row 8 vs. Row 6	0.0356	5	0.456	0.998	Do Not Test
Row 8 vs. Row 9	0.0127	4	0.164	0.999	Do Not Test
Row 8 vs. Row 7	0.00880	3	0.113	0.996	Do Not Test
Row 8 vs. Row 4	0.00481	2	0.0780	0.956	Do Not Test
Row 4 vs. Row 6	0.0308	4	0.499	0.985	Do Not Test
Row 4 vs. Row 9	0.00793	3	0.129	0.995	Do Not Test
Row 4 vs. Row 7	0.00399	2	0.0649	0.963	Do Not Test
Row 7 vs. Row 6	0.0268	3	0.343	0.968	Do Not Test
Row 7 vs. Row 9	0.00394	2	0.0506	0.971	Do Not Test
Row 9 vs. Row 6	0.0228	2	0.293	0.836	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

b. Comparison of Chromium site averages

One WayOne Data source: I	-Way A	Analysis of V	Variance	Tuesday, April 20, 2010, 12:22:16 PM	
Group Name	Ν	Missing	Mean	Std Dev	SEM
Row 1	196	0	0.00539	0.00418	0.000299
Row 2	20	0	0.00281	0.000849	0.000190

Row 3	20	0	0.00520	0.00290	0.000649)	
Row 4	20	0	0.00209	0.000498	0.000111	l	
Row 5	20	0	0.00204	0.000276	0.000061	16	
Row 6	5	0	0.00157	0.000263	0.000118	3	
Row 7	5	0	0.00184	0.000232	0.000104	1	
Row 8	5	0	0.00264	0.000353	0.000158	3	
Row 9	5	0	0.00200	0.0000886	0.000039	96	
Source of V	ariation	DF	SS	MS	F	Р	
Between Gr	oups	8	0.000585	0.0000731	5.845	< 0.001	
Residual	-	287	0.00359	0.0000125			
Total		295	0.00417				

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).

Power of performed test with alpha = 0.050: 0.999

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Row 1 vs. Row 6	0.00382	9	3.375	0.291	No
Row 1 vs. Row 7	0.00355	8	3.133	0.342	Do Not Test
Row 1 vs. Row 9	0.00339	7	2.991	0.343	Do Not Test
Row 1 vs. Row 5	0.00335	6	5.703	< 0.001	Do Not Test
Row 1 vs. Row 4	0.00330	5	5.615	< 0.001	Do Not Test
Row 1 vs. Row 8	0.00275	4	2.426	0.315	Do Not Test
Row 1 vs. Row 2	0.00257	3	4.383	0.006	Do Not Test
Row 1 vs. Row 3	0.000190	2	0.324	0.819	Do Not Test
Row 3 vs. Row 6	0.00363	8	2.904	0.445	Do Not Test
Row 3 vs. Row 7	0.00336	7	2.685	0.481	Do Not Test
Row 3 vs. Row 9	0.00320	6	2.557	0.460	Do Not Test
Row 3 vs. Row 5	0.00316	5	3.993	0.038	Do Not Test
Row 3 vs. Row 4	0.00311	4	3.928	0.028	Do Not Test
Row 3 vs. Row 8	0.00256	3	2.045	0.317	Do Not Test
Row 3 vs. Row 2	0.00238	2	3.013	0.033	Do Not Test
Row 2 vs. Row 6	0.00125	7	0.999	0.992	Do Not Test
Row 2 vs. Row 7	0.000975	6	0.780	0.994	Do Not Test
Row 2 vs. Row 9	0.000815	5	0.652	0.991	Do Not Test
Row 2 vs. Row 5	0.000775	4	0.980	0.900	Do Not Test
Row 2 vs. Row 4	0.000723	3	0.915	0.794	Do Not Test
Row 2 vs. Row 8	0.000175	2	0.140	0.921	Do Not Test
Row 8 vs. Row 6	0.00107	6	0.679	0.997	Do Not Test
Row 8 vs. Row 7	0.000800	5	0.506	0.997	Do Not Test
Row 8 vs. Row 9	0.000640	4	0.405	0.992	Do Not Test
Row 8 vs. Row 5	0.000600	3	0.480	0.939	Do Not Test
Row 8 vs. Row 4	0.000548	2	0.439	0.756	Do Not Test
Row 4 vs. Row 6	0.000526	5	0.420	0.998	Do Not Test
Row 4 vs. Row 7	0.000251	4	0.201	0.999	Do Not Test
Row 4 vs. Row 9	0.0000915	3	0.0732	0.999	Do Not Test
Row 4 vs. Row 5	0.0000515	2	0.0651	0.963	Do Not Test
Row 5 vs. Row 6	0.000474	4	0.379	0.993	Do Not Test
Row 5 vs. Row 7	0.000200	3	0.160	0.993	Do Not Test
Row 5 vs. Row 9	0.0000400	2	0.0320	0.982	Do Not Test
Row 9 vs. Row 6	0.000434	3	0.274	0.979	Do Not Test
Row 9 vs. Row 7	0.000160	2	0.101	0.943	Do Not Test

Row 7 vs. Row 6 0.000274 2 0.173 0.903 Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

c. Comparison of Manganese site averages

One WayOne-Way Analysis of Variance Data source: Data 2 in Wyatt Rd Metals Comp.JNB Tuesday, April 20, 2010, 12:22:38 PM

Data source: 1	Data 2	in wyatt Rd	Metals Con	np.JNB				
Group Name	Ν	Missing	Mean	Std Dev	SEN	1		
Row 1	196	0	0.0427	0.0361	0.0025	58		
Row 2	20	0	0.0171	0.0120	0.0026	58		
Row 3	20	0	0.0628	0.0513	0.0115	5		
Row 4	20	0	0.00906	0.00679	0.001	52		
Row 5	20	0	0.0115	0.00731	0.0016	53		
Row 6	5	0	0.00694	0.00473	0.002	12		
Row 7	5	0	0.00936	0.00570	0.0025	55		
Row 8	5	0	0.00900	0.00410	0.0018	34		
Row 9	5	0	0.00486	0.00150	0.000	572		
Source of Var	iation	DF	SS	MS	F	Р		
Between Group	ps	8	0.0729	0.00912	8.468	< 0.001		
Residual		287	0.309	0.00108				
Total		295	0.382					

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).

Power of performed test with alpha = 0.050: 1.000

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Row 3 vs. Row 9	0.0579	9	4.992	0.012	Yes
Row 3 vs. Row 6	0.0558	8	4.812	0.015	Yes
Row 3 vs. Row 8	0.0538	7	4.635	0.018	Yes
Row 3 vs. Row 4	0.0537	6	7.320	< 0.001	Yes
Row 3 vs. Row 7	0.0534	5	4.604	0.010	Yes
Row 3 vs. Row 5	0.0513	4	6.995	< 0.001	Yes
Row 3 vs. Row 2	0.0457	3	6.229	< 0.001	Yes
Row 3 vs. Row 1	0.0201	2	3.694	0.009	Yes
Row 1 vs. Row 9	0.0378	8	3.596	0.178	No
Row 1 vs. Row 6	0.0357	7	3.398	0.197	Do Not Test
Row 1 vs. Row 8	0.0337	6	3.202	0.209	Do Not Test
Row 1 vs. Row 4	0.0336	5	6.167	< 0.001	Do Not Test
Row 1 vs. Row 7	0.0333	4	3.169	0.112	Do Not Test
Row 1 vs. Row 5	0.0312	3	5.729	< 0.001	Do Not Test
Row 1 vs. Row 2	0.0256	2	4.698	< 0.001	Do Not Test
Row 2 vs. Row 9	0.0122	7	1.052	0.990	Do Not Test
Row 2 vs. Row 6	0.0101	6	0.872	0.990	Do Not Test
Row 2 vs. Row 8	0.00806	5	0.695	0.988	Do Not Test
Row 2 vs. Row 4	0.00800	4	1.091	0.867	Do Not Test
Row 2 vs. Row 7	0.00771	3	0.665	0.885	Do Not Test
Row 2 vs. Row 5	0.00561	2	0.765	0.588	Do Not Test

Row 5 vs. Row 9	0.00659	6	0.568	0.999	Do Not Test
Row 5 vs. Row 6	0.00451	5	0.388	0.999	Do Not Test
Row 5 vs. Row 8	0.00245	4	0.211	0.999	Do Not Test
Row 5 vs. Row 4	0.00239	3	0.326	0.971	Do Not Test
Row 5 vs. Row 7	0.00209	2	0.181	0.898	Do Not Test
Row 7 vs. Row 9	0.00449	5	0.306	1.000	Do Not Test
Row 7 vs. Row 6	0.00241	4	0.164	0.999	Do Not Test
Row 7 vs. Row 8	0.000354	3	0.0241	1.000	Do Not Test
Row 7 vs. Row 4	0.000295	2	0.0254	0.986	Do Not Test
Row 4 vs. Row 9	0.00420	4	0.362	0.994	Do Not Test
Row 4 vs. Row 6	0.00212	3	0.182	0.991	Do Not Test
Row 4 vs. Row 8	0.0000590	2	0.00509	0.997	Do Not Test
Row 8 vs. Row 9	0.00414	3	0.282	0.978	Do Not Test
Row 8 vs. Row 6	0.00206	2	0.140	0.921	Do Not Test
Row 6 vs. Row 9	0.00208	2	0.142	0.920	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

d. Comparison of Lead site averages

One WayOne-Way Analysis of Variance Tuesday, April 20, 2010, 12:23:06 PM Data source: Data 2 in Wyatt Rd Metals Comp.JNB **Group Name** Missing Mean Std Dev SEM Ν Row 1 196 0.0159 0.0145 0.00104 0 Row 2 20 0 0.00380 0.00259 0.000580 20 Row 3 0 0.0145 0.0167 0.00373 Row 4 20 0.00257 0.00159 0 0.000356 Row 5 20 0 0.00363 0.00293 0.000654 5 Row 6 0 0.00267 0.00190 0.000851 5 Row 7 0 0.00189 0.000529 0.000236 5 Row 8 0 0.00181 0.000370 0.000166 5 Row 9 0 0.00278 0.000540 0.000241 Source of Variation DF SS MS F Р Between Groups 8 0.00952 0.00119 7.313 < 0.001 Residual 287 0.0467 0.000163 Total 295 0.0562 The differences in the mean values among the treatment groups are greater than would be expected by chance; there

is a statistically significant difference (P = <0.001).

Power of performed test with alpha = 0.050: 1.000

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Row 1 vs. Row 8	0.0141	9	3.454	0.261	No
Row 1 vs. Row 7	0.0140	8	3.436	0.227	Do Not Test
Row 1 vs. Row 4	0.0133	7	6.304	< 0.001	Do Not Test
Row 1 vs. Row 6	0.0132	6	3.243	0.197	Do Not Test
Row 1 vs. Row 9	0.0131	5	3.218	0.153	Do Not Test
Row 1 vs. Row 5	0.0123	4	5.806	< 0.001	Do Not Test
Row 1 vs. Row 2	0.0121	3	5.724	< 0.001	Do Not Test

Row 1 vs. Row 3 0.00137 2 0.649 0.646 Do Not TestRow 3 vs. Row 8 0.0127 8 2.824 0.484 Do Not TestRow 3 vs. Row 7 0.0127 7 2.807 0.424 Do Not TestRow 3 vs. Row 4 0.0120 6 4.198 0.035 Do Not TestRow 3 vs. Row 6 0.0119 5 2.633 0.338 Do Not TestRow 3 vs. Row 9 0.0118 4 2.610 0.252 Do Not TestRow 3 vs. Row 5 0.0109 3 3.828 0.019 Do Not TestRow 2 vs. Row 7 0.0107 2 3.767 0.008 Do Not TestRow 2 vs. Row 7 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 6 0.00172 2 0.6602 0.966 Do Not TestRow 2 vs. Row 7 0.00172 2 0.602 0.966 Do Not TestRow 5 vs. Row 8 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 8 0.000956 3 0.212 0.966 Do Not TestRow 5 vs. Row 9 0.000854 2 0.189 Do Not TestRow 5 vs. Row 9 0.000854 2 0.189 Do Not Test <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th></t<>						
Row 3 vs. Row 7 0.0127 7 2.807 0.424 Do Not TestRow 3 vs. Row 4 0.0120 6 4.198 0.035 Do Not TestRow 3 vs. Row 6 0.0119 5 2.633 0.338 Do Not TestRow 3 vs. Row 9 0.0118 4 2.610 0.252 Do Not TestRow 3 vs. Row 5 0.0109 3 3.828 0.019 Do Not TestRow 2 vs. Row 7 0.0017 2 3.767 0.008 Do Not TestRow 2 vs. Row 8 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 7 0.000172 2 0.0602 0.966 Do Not TestRow 2 vs. Row 9 0.00113 3 0.227 0.986 Do Not TestRow 5 vs. Row 8 0.00172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 8 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 9 0.000854 2 0.189 Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 8 0.000862 4 0.156 1.000 Do Not TestRow 9 vs. Row	Row 1 vs. Row 3	0.00137	2	0.649	0.646	Do Not Test
Row 3 vs. Row 40.012064.1980.035Do Not TestRow 3 vs. Row 60.011952.6330.338Do Not TestRow 3 vs. Row 90.011842.6100.252Do Not TestRow 3 vs. Row 50.010933.8280.019Do Not TestRow 3 vs. Row 20.010723.7670.008Do Not TestRow 2 vs. Row 80.0019970.4411.000Do Not TestRow 2 vs. Row 70.0012350.4300.998Do Not TestRow 2 vs. Row 60.0011340.2500.998Do Not TestRow 2 vs. Row 60.0017220.06020.966Do Not TestRow 2 vs. Row 70.0017220.06020.966Do Not TestRow 2 vs. Row 80.0018260.4031.000Do Not TestRow 5 vs. Row 80.0016440.3700.994Do Not TestRow 5 vs. Row 70.0085420.1890.894Do Not TestRow 9 vs. Row 80.00095630.2120.988Do Not TestRow 9 vs. Row 70.0089040.1561.000Do Not TestRow 9 vs. Row 70.0089040.1561.000Do Not TestRow 9 vs. Row 70.00086240.1561.000Do Not TestRow 9 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not Test	Row 3 vs. Row 8	0.0127	8	2.824	0.484	Do Not Test
Row 3 vs. Row 6 0.0119 5 2.633 0.338 Do Not TestRow 3 vs. Row 9 0.0118 4 2.610 0.252 Do Not TestRow 3 vs. Row 5 0.0109 3 3.828 0.019 Do Not TestRow 3 vs. Row 2 0.0107 2 3.767 0.008 Do Not TestRow 2 vs. Row 8 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 7 0.000172 2 0.0602 0.966 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00166 4 0.370 0.994 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 8 0.000712 2 0.0179 0.999 Do Not Test<	Row 3 vs. Row 7	0.0127	7	2.807	0.424	Do Not Test
Row 3 vs. Row 9 0.0118 4 2.610 0.252 Do Not TestRow 3 vs. Row 5 0.0109 3 3.828 0.019 Do Not TestRow 3 vs. Row 2 0.0107 2 3.767 0.008 Do Not TestRow 2 vs. Row 8 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 7 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 8 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00056 3 0.212 0.988 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 9 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 6 0.000102 2 0.0179 0.999 Do Not TestRow 9 vs. Row 7 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000761 3 0.169 0.992 Do Not Test<	Row 3 vs. Row 4	0.0120	6	4.198	0.035	Do Not Test
Row 3 vs. Row 50.010933.8280.019Do Not TestRow 3 vs. Row 20.010723.7670.008Do Not TestRow 2 vs. Row 80.0019970.4411.000Do Not TestRow 2 vs. Row 70.0019260.4251.000Do Not TestRow 2 vs. Row 40.0012350.4300.998Do Not TestRow 2 vs. Row 60.0011340.2500.998Do Not TestRow 2 vs. Row 60.0017220.06020.966Do Not TestRow 2 vs. Row 70.0017220.06020.966Do Not TestRow 5 vs. Row 70.0017450.3870.999Do Not TestRow 5 vs. Row 70.0016640.3700.994Do Not TestRow 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 70.00085420.1890.894Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 70.00086230.2120.998Do Not TestRow 9 vs. Row 60.00010220.01790.999Do Not TestRow 9 vs. Row 70.00088040.1561.000Do Not TestRow 9 vs. Row 60.00010220.01790.999Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not Test <td>Row 3 vs. Row 6</td> <td>0.0119</td> <td>5</td> <td>2.633</td> <td>0.338</td> <td>Do Not Test</td>	Row 3 vs. Row 6	0.0119	5	2.633	0.338	Do Not Test
Row 3 vs. Row 2 0.0107 2 3.767 0.008 Do Not TestRow 2 vs. Row 8 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 9 0.00103 3 0.227 0.986 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 8 0.00182 6 0.403 1.000 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 7 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 8 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 7 0.000761 3 0.169 0.992 Do Not Test <td>Row 3 vs. Row 9</td> <td>0.0118</td> <td>4</td> <td>2.610</td> <td>0.252</td> <td>Do Not Test</td>	Row 3 vs. Row 9	0.0118	4	2.610	0.252	Do Not Test
Row 2 vs. Row 8 0.00199 7 0.441 1.000 Do Not TestRow 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 9 0.00103 3 0.227 0.986 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 4 0.000202 3 0.0449 0.999 Do Not TestRow 6 vs. Row 7 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 7 0.000761 3 0.169 0.992 Do Not TestRow 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not Tes	Row 3 vs. Row 5	0.0109	3	3.828	0.019	Do Not Test
Row 2 vs. Row 7 0.00192 6 0.425 1.000 Do Not TestRow 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 9 0.00103 3 0.227 0.986 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 9 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 6 0.000102 2 0.0179 0.999 Do Not TestRow 6 vs. Row 8 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 7 0.000761 3 0.169 0.992 Do Not TestRow 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not Te	Row 3 vs. Row 2	0.0107	2	3.767	0.008	Do Not Test
Row 2 vs. Row 4 0.00123 5 0.430 0.998 Do Not TestRow 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 9 0.00103 3 0.227 0.986 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 8 0.00182 6 0.403 1.000 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 4 0.00106 4 0.370 0.994 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 7 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 6 0.000102 2 0.0179 0.999 Do Not TestRow 6 vs. Row 8 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not T	Row 2 vs. Row 8	0.00199	7	0.441	1.000	Do Not Test
Row 2 vs. Row 6 0.00113 4 0.250 0.998 Do Not TestRow 2 vs. Row 9 0.00103 3 0.227 0.986 Do Not TestRow 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 8 0.00182 6 0.403 1.000 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 4 0.00106 4 0.370 0.994 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 9 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 4 0.000202 3 0.0449 0.999 Do Not TestRow 6 vs. Row 8 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 8 0.000761 3 0.169 0.992 Do Not TestRow 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not Test	Row 2 vs. Row 7	0.00192	6	0.425	1.000	Do Not Test
Row 2 vs. Row 90.0010330.2270.986Do Not TestRow 2 vs. Row 50.00017220.06020.966Do Not TestRow 5 vs. Row 80.0018260.4031.000Do Not TestRow 5 vs. Row 70.0017450.3870.999Do Not TestRow 5 vs. Row 40.0010640.3700.994Do Not TestRow 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 70.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 60.00010220.01790.999Do Not TestRow 9 vs. Row 70.00086240.1511.000Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 6 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 2 vs. Row 4	0.00123	5	0.430	0.998	Do Not Test
Row 2 vs. Row 5 0.000172 2 0.0602 0.966 Do Not TestRow 5 vs. Row 8 0.00182 6 0.403 1.000 Do Not TestRow 5 vs. Row 7 0.00174 5 0.387 0.999 Do Not TestRow 5 vs. Row 4 0.00106 4 0.370 0.994 Do Not TestRow 5 vs. Row 6 0.000956 3 0.212 0.988 Do Not TestRow 5 vs. Row 9 0.000854 2 0.189 0.894 Do Not TestRow 9 vs. Row 8 0.000964 5 0.169 1.000 Do Not TestRow 9 vs. Row 7 0.000890 4 0.156 1.000 Do Not TestRow 9 vs. Row 4 0.000202 3 0.0449 0.999 Do Not TestRow 6 vs. Row 8 0.000862 4 0.151 1.000 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 6 vs. Row 4 0.000101 2 0.0223 0.987 Do Not TestRow 6 vs. Row 7 0.000788 3 0.138 0.995 Do Not TestRow 4 vs. Row 8 0.000761 3 0.169 0.992 Do Not TestRow 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not Test	Row 2 vs. Row 6	0.00113	4	0.250	0.998	Do Not Test
Row 5 vs. Row 80.0018260.4031.000Do Not TestRow 5 vs. Row 70.0017450.3870.999Do Not TestRow 5 vs. Row 40.0010640.3700.994Do Not TestRow 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 90.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 6 vs. Row 40.00016120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 2 vs. Row 9	0.00103	3	0.227	0.986	Do Not Test
Row 5 vs. Row 70.0017450.3870.999Do Not TestRow 5 vs. Row 40.0010640.3700.994Do Not TestRow 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 90.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 6 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 2 vs. Row 5	0.000172	2	0.0602	0.966	Do Not Test
Row 5 vs. Row 40.0010640.3700.994Do Not TestRow 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 90.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 6 vs. Row 70.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 5 vs. Row 8	0.00182	6	0.403	1.000	Do Not Test
Row 5 vs. Row 60.00095630.2120.988Do Not TestRow 5 vs. Row 90.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 6 vs. Row 70.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 5 vs. Row 7	0.00174	5	0.387	0.999	Do Not Test
Row 5 vs. Row 90.00085420.1890.894Do Not TestRow 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 5 vs. Row 4	0.00106	4	0.370	0.994	Do Not Test
Row 9 vs. Row 80.00096450.1691.000Do Not TestRow 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 5 vs. Row 6	0.000956	3	0.212	0.988	Do Not Test
Row 9 vs. Row 70.00089040.1561.000Do Not TestRow 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 5 vs. Row 9	0.000854	2	0.189	0.894	Do Not Test
Row 9 vs. Row 40.00020230.04490.999Do Not TestRow 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 9 vs. Row 8	0.000964	5	0.169	1.000	Do Not Test
Row 9 vs. Row 60.00010220.01790.990Do Not TestRow 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 9 vs. Row 7	0.000890	4	0.156	1.000	Do Not Test
Row 6 vs. Row 80.00086240.1511.000Do Not TestRow 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 9 vs. Row 4	0.000202	3	0.0449	0.999	Do Not Test
Row 6 vs. Row 70.00078830.1380.995Do Not TestRow 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 9 vs. Row 6	0.000102	2	0.0179	0.990	Do Not Test
Row 6 vs. Row 40.00010120.02230.987Do Not TestRow 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 6 vs. Row 8	0.000862	4	0.151	1.000	Do Not Test
Row 4 vs. Row 80.00076130.1690.992Do Not TestRow 4 vs. Row 70.00068720.1520.914Do Not Test	Row 6 vs. Row 7	0.000788	3	0.138	0.995	Do Not Test
Row 4 vs. Row 7 0.000687 2 0.152 0.914 Do Not Test	Row 6 vs. Row 4	0.000101	2	0.0223	0.987	Do Not Test
	Row 4 vs. Row 8	0.000761	3	0.169	0.992	Do Not Test
Row 7 vs. Row 8 0.0000740 2 0.0130 0.993 Do Not Test	Row 4 vs. Row 7	0.000687	2	0.152	0.914	Do Not Test
	Row 7 vs. Row 8	0.0000740	2	0.0130	0.993	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

e. Comparison of Nickel site averages

One WayOne-Way Analysis of Variance Data source: Data 2 in Wyatt Rd Metals Comp INB Tuesday, April 20, 2010, 12:23:32 PM

Data source: I	Data 2	in Wyatt Rd	Metals Comp	.JNB			
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Row 1	196	0	0.00402	0.00110	0.0000789		
Row 2	20	0	0.00103	0.000406	0.0000907		
Row 3	20	0	0.00218	0.00125	0.000279		
Row 4	20	0	0.00101	0.000499	0.000112		
Row 5	20	0	0.00155	0.00195	0.000437		
Row 6	5	0	0.000764	0.000189	0.0000845		
Row 7	5	0	0.000837	0.000240	0.000107		
Row 8	5	0	0.00115	0.000306	0.000137		
Row 9	5	0	0.000615	0.000160	0.0000715		
Source of Var	iation	DF	SS	MS	F	Р	
Between Group	ps	8	0.000507	0.0000634	52.225	< 0.001	
Residual		287	0.000349	0.00000121			

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295 0.000856
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The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).

Power of performed test with alpha = 0.050: 1.000

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Row 1 vs. Row 9	0.00341	9	9.649	< 0.001	Yes
Row 1 vs. Row 6	0.00326	8	9.227	< 0.001	Yes
Row 1 vs. Row 7	0.00318	7	9.019	< 0.001	Yes
Row 1 vs. Row 4	0.00302	6	16.483	< 0.001	Yes
Row 1 vs. Row 2	0.00299	5	16.338	< 0.001	Yes
Row 1 vs. Row 8	0.00288	4	8.146	< 0.001	Yes
Row 1 vs. Row 5	0.00247	3	13.514	< 0.001	Yes
Row 1 vs. Row 3	0.00185	2	10.086	< 0.001	Yes
Row 3 vs. Row 9	0.00156	8	4.005	0.087	No
Row 3 vs. Row 6	0.00141	7	3.622	0.138	Do Not Test
Row 3 vs. Row 7	0.00134	6	3.434	0.146	Do Not Test
Row 3 vs. Row 4	0.00117	5	4.748	0.007	Do Not Test
Row 3 vs. Row 2	0.00114	4	4.641	0.006	Do Not Test
Row 3 vs. Row 8	0.00103	3	2.643	0.148	Do Not Test
Row 3 vs. Row 5	0.000627	2	2.544	0.072	Do Not Test
Row 5 vs. Row 9	0.000933	7	2.396	0.620	Do Not Test
Row 5 vs. Row 6	0.000784	6	2.013	0.713	Do Not Test
Row 5 vs. Row 7	0.000711	5	1.825	0.697	Do Not Test
Row 5 vs. Row 4	0.000543	4	2.204	0.403	Do Not Test
Row 5 vs. Row 2	0.000517	3	2.096	0.299	Do Not Test
Row 5 vs. Row 8	0.000403	2	1.034	0.465	Do Not Test
Row 8 vs. Row 9	0.000530	6	1.076	0.974	Do Not Test
Row 8 vs. Row 6	0.000381	5	0.774	0.982	Do Not Test
Row 8 vs. Row 7	0.000308	4	0.625	0.971	Do Not Test
Row 8 vs. Row 4	0.000140	3	0.360	0.965	Do Not Test
Row 8 vs. Row 2	0.000114	2	0.292	0.837	Do Not Test
Row 2 vs. Row 9	0.000417	5	1.070	0.943	Do Not Test
Row 2 vs. Row 6	0.000268	4	0.687	0.962	Do Not Test
Row 2 vs. Row 7	0.000194	3	0.499	0.934	Do Not Test
Row 2 vs. Row 4	0.0000265	2	0.108	0.939	Do Not Test
Row 4 vs. Row 9	0.000390	4	1.002	0.894	Do Not Test
Row 4 vs. Row 6	0.000241	3	0.619	0.900	Do Not Test
Row 4 vs. Row 7	0.000168	2	0.431	0.761	Do Not Test
Row 7 vs. Row 9	0.000222	3	0.451	0.945	Do Not Test
Row 7 vs. Row 6	0.0000734	2	0.149	0.916	Do Not Test
Row 6 vs. Row 9	0.000149	2	0.302	0.831	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

Appendix $G - PM_{10}$ Metals Site Comparisons to Collocated Monitor

Page G-1

Comparison of Every 6th-Day TCEO Samples to All Collocated Samples

t-test					Friday, June 04, 2010, 9:38:19 AM
Data source: Alumin	um in 6	th Day Sam	ple Compa	risons.JNB	
Normality Test:	Pa	ssed $(P = 0)$).809)		
Equal Variance Test	: Pa	ssed $(P = 0)$).885)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated 6th-day	4	0	0.108	0.0516	0.0258
All other days	16	0	0.131	0.0522	0.0130
oifference -0.0					
= -0.819 with 18 deg					
5 percent confidence					
					enough to reject the possibility that the difference
	ng varia	ability. There	e is not a st	atistically si	gnificant difference between the input groups (P =
<mark>.424).</mark>		-1-100	50.0050		
Power of performed to				a desired not	rar of 0.800
The power of the performance of the power of the performance of the pe					lifference when one actually exists. Negative resul
hould be interpreted (iess likely	to detect a (interence when one actually exists. Negative resul
noura de micipiciea (Jaunous	51y.			
I. Chromium					
test					Friday, June 04, 2010, 9:39:08 AM
ata source: Chromi	um in 6	th Day Sam	ple Compa	risons.JNB	
ormality Test:		iled $(P < 0)$			
est execution ended		(/	st begun	
/Iann-Whitney Ranl				e	Friday, June 04, 2010, 9:39:08 AM
Data source: Chromi			ple Compa	risons.JNB	
Group	Ν	Missing	Median	25%	75%
Collocated 6th-day	4	0	0.0026	8 0.002	06 0.00359
All other days	16	0	0.00243	3 0.002	0.00344
Aann-Whitney U Stat	istic= 2	.9.000			
	4 n(hi)	g)=16 (P=	0.813)		
	1 11(01	1 1 4	.1 .		
T = 39.000 n(small)= The difference in the r	median				ot great enough to exclude the possibility that the
T = 39.000 n(small)= The difference in the r	median				ot great enough to exclude the possibility that the atistically significant difference $(P = 0.813)$
$\Gamma = 39.000 \text{ n(small)}=$ The difference in the plifference is due to range the second seco	median				
T = 39.000 n(small)= The difference in the r lifference is due to rar II. Manganese	median				atistically significant difference $(P = 0.813)$
T = 39.000 n(small)= The difference in the r ifference is due to rar II. Manganese -test	median ndom sa	ampling var	iability; the	ere is not a st	
T = 39.000 n(small)= The difference in the r lifference is due to rar II. Manganese -test Data source: Mangan	median ndom sa	ampling var 5th Day Sam	iability; the	ere is not a st	atistically significant difference $(P = 0.813)$
T = 39.000 n(small)= The difference in the p ifference is due to rat II. Manganese -test Data source: Mangan Normality Test:	median ndom sa nese in 6 Fa	ampling var 6th Day Sam iled (P < 0	ability; the ple Compa).050)	ere is not a st arisons.JNB	atistically significant difference $(P = 0.813)$
T = 39.000 n(small)= The difference in the r lifference is due to rar II. Manganese -test Data source: Mangan Normality Test: Test execution ended	median ndom sa nese in 6 Fa by user	ampling var 6th Day Sam iled (P < 0 request, Ram	ability; the ple Compa).050)	ere is not a st arisons.JNB	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM
T = 39.000 n(small)= The difference in the r difference is due to ran II. Manganese -test Data source: Mangan Normality Test: Test execution ended Mann-Whitney Ran	median ndom sa nese in 6 Fa by user k Sum 7	ampling var 6th Day Sam iled (P < 0 request, Ran Fest	ability; the ple Compa).050) nk Sum Te	ere is not a st urisons.JNB st begun	atistically significant difference $(P = 0.813)$
T = 39.000 n(small)= The difference in the r difference is due to rate the difference is due to rate the difference is due to	median ndom sa nese in 6 Fa by user k Sum 7 nese in 6	ampling var 5th Day Sam iled (P < (request, Rat Fest 5th Day Sam	ability; the ple Compa).050) nk Sum Tes ple Compa	ere is not a st arisons.JNB st begun arisons.JNB	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM
T = 39.000 n(small)= The difference in the r lifference is due to rar II. Manganese -test Data source: Mangan Normality Test: Test execution ended Mann-Whitney Ranl Data source: Mangan Group	median ndom sa nese in 6 Fa by user k Sum 7 nese in 6 N	ampling var oth Day Sam iled (P < 0 request, Ran Fest oth Day Sam Missing	ability; the pple Compa).050) nk Sum Tes pple Compa Median	ere is not a st urisons.JNB st begun urisons.JNB 25%	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM 75%
 39.000 n(small)= The difference in the rifference is due to rai II. Manganese -test Data source: Mangan Vormality Test: Test execution ended i Mann-Whitney Ranl Data source: Mangan Group Collocated 6th-day 	median ndom sa nese in 6 Fa by user k Sum 7 nese in 6 N 4	ampling var 5th Day Sam iled (P < 0 request, Ran Test 5th Day Sam Missing 0	ability; the pple Compa 0.050) nk Sum Tes <u>pple Compa</u> Median 0.0117	ere is not a st arisons.JNB st begun arisons.JNB a 25% 0.006	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM 75% 20 0.0255
T = 39.000 n(small)= The difference in the p ifference is due to rat II. Manganese -test Data source: Mangan Normality Test: Test execution ended Mann-Whitney Ranl Data source: Mangan Group Collocated 6th-day All other days	median ndom sa nese in 6 Fa by user k Sum 7 nese in 6 N 4 16	ampling var 5th Day Sam iled (P < 0 request, Ran Test 5th Day Sam Missing 0 0	ability; the pple Compa).050) nk Sum Tes pple Compa Median	ere is not a st urisons.JNB st begun urisons.JNB 25%	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM 75% 20 0.0255
T = 39.000 n(small)= The difference in the r ifference is due to rar II. Manganese test Data source: Mangan Normality Test: Test execution ended Mann-Whitney Ranl Data source: Mangan Group Collocated 6th-day Mann-Whitney U Stat	median ndom sa nese in 6 Fa by user k Sum nese in 6 N 4 16 tistic= 2	ampling var 5th Day Sam iled (P < 0 request, Ran Test 5th Day Sam Missing 0 0 28.000	ability; the pple Compa 0.050) nk Sum Tes pple Compa Median 0.0117 0.0137	ere is not a st arisons.JNB st begun arisons.JNB a 25% 0.006	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM 75% 20 0.0255
 39.000 n(small)= the difference in the nifference is due to ran the difference is due to ran the differe	median ndom sa nese in 6 Fa by user k Sum nese in 6 N 4 16 tistic= 2 4 n(bi	$\begin{array}{l} \text{ampling var}\\ \text{5th Day Sam}\\ \text{iled} (P < 0 \\ \text{request, Ram}\\ \textbf{Test}\\ \textbf{5th Day Sam}\\ \textbf{0}\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\$	ability; the pple Compa 0.050) nk Sum Tes pple Compa 0.0117 0.0137 0.741)	ere is not a st arisons.JNB st begun arisons.JNB a 25% 0.006 0.007	atistically significant difference (P = 0.813) Friday, June 04, 2010, 9:39:40 AM Friday, June 04, 2010, 9:39:40 AM 75% 20 0.0255

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

IV.	Lead

Data source: Lead in	6th Da	v Sample Co	omparisons.JN	√B	Friday, June 04, 2010, 9:40:12 AM
Normality Test:		uiled $(P < 0)$			
Fest execution ended l		(,	begun	
Mann-Whitney Rank				-Barri	Friday, June 04, 2010, 9:40:12 AM
Data source: Lead in			omparisons.JN	√B	· · · · · · · · · · · · · · · · · · ·
Group	N	Missing	Median	25%	75%
Collocated 6th-day	4	0	0.00222	0.00192	0.00360
All other days	16	0	0.00338	0.00229	0.00490
Mann-Whitney U Stat		-	0.00550	0.0022)	0.00170
$\Gamma = 32.000 \text{ n(small)}=$			0 369)		
The difference in the r	r li(01 nedian	values betw	een the two g	rouns is not ar	eat enough to exclude the possibility that the
					cally significant difference ($P = 0.369$)
		ampning van	aomty, mere	15 Hot a statisti	early significant difference (1 0.507)
V. Nickel					
t-test					Friday, June 04, 2010, 9:40:47 AM
Data source: Nickel i	n 6th D)av Sample (Comparisons	INB	111day, Julie 04, 2010, 9.40.47 1101
Normality Test:		issed $(P = 0)$			
Equal Variance Test:		(P = 0)	/		
Group Name	N N	Missing	Mean	Std Dev	SEM
Collocated 6th-day	4	0	0.00102	0.000557	0.000278
All other days	16	0	0.00102	0.000383	0.0000957
-	000101		0.00105	0.000383	0.0000337
D_{III}	000101				
			(D - 0.0(6))		
t = -0.0432 with 18 de		of freedom. (0.000500.40	0.000490
t = -0.0432 with 18 de 95 percent confidence	interva	of freedom. (al for differen	nce of means:		
t = -0.0432 with 18 de 95 percent confidence The difference in the r	interva nean va	of freedom. (al for differen alues of the t	nce of means: two groups is	not great enou	gh to reject the possibility that the difference
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random sampling	interva nean va	of freedom. (al for differen alues of the t	nce of means: two groups is	not great enou	gh to reject the possibility that the difference
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966).	interva nean va ng varia	of freedom. (al for different alues of the t ability. There	nce of means: two groups is e is not a stati	not great enou	gh to reject the possibility that the difference
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te	interva nean va ng varia	of freedom. (al for different alues of the t ability. There alpha = 0.02	nce of means: two groups is e is not a stati 50: 0.050	not great enou stically signifi	gh to reject the possibility that the difference cant difference between the input groups (P =
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the performed	interva nean va ng varia est with ormed t	of freedom. (al for different alues of the t ability. There alpha = 0.02 test (0.050) i	nce of means: two groups is e is not a stati 50: 0.050 is below the d	not great enou stically signifi esired power o	gh to reject the possibility that the difference cant difference between the input groups (P = f 0.800.
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfor Less than desired pow	interva nean va ng varia est with ormed to er indic	of freedom. (al for different alues of the tability. There ability. There alpha = 0.0 : test (0.050) is cates you are	nce of means: two groups is e is not a stati 50: 0.050 is below the d	not great enou stically signifi esired power o	gh to reject the possibility that the difference cant difference between the input groups (P = f 0.800.
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the performed	interva nean va ng varia est with ormed to er indic	of freedom. (al for different alues of the tability. There ability. There alpha = 0.0 : test (0.050) is cates you are	nce of means: two groups is e is not a stati 50: 0.050 is below the d	not great enou stically signifi esired power o	gh to reject the possibility that the difference cant difference between the input groups (P =
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of	interva nean va ng varia est with ormed to er indic	of freedom. (al for different alues of the tability. There ability. There alpha = 0.0 : test (0.050) is cates you are	nce of means: two groups is e is not a stati 50: 0.050 is below the d	not great enou stically signifi esired power o	gh to reject the possibility that the difference cant difference between the input groups (P = f 0.800.
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury	interva nean va ng varia est with ormed to er indic	of freedom. (al for different alues of the tability. There ability. There alpha = 0.0 : test (0.050) is cates you are	nce of means: two groups is e is not a stati 50: 0.050 is below the d	not great enou stically signifi esired power o	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted o VI. Mercury t-test	interva nean va ng varia est with ormed t er indic cautiou	of freedom. (al for differen- alues of the t ability. There alpha = 0.0 : test (0.050) i cates you are sly.	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to	not great enou stically signifi esired power o detect a differ	gh to reject the possibility that the difference cant difference between the input groups (P = f 0.800.
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury	interva nean va ng varia est with ormed t er indic cautiou	of freedom. (al for differen- alues of the t ability. There alpha = 0.0 : test (0.050) i cates you are sly. Day Sample	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison	not great enou stically signifi esired power o detect a differ	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test:	interva nean va ng varia est with ormed t er indic cautiou / in 6th Fa	b freedom. (al for different alues of the t ability. There alpha = 0.02 test (0.050) i cates you are sly. Day Sample uiled (P < 0	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050)	not great enou stically signifi esired power o detect a differ s.JNB	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended b	interva nean va ng varia est with ormed t er indic cautiou / in 6th Fa by user	of freedom. (al for different alues of the t ability. There alpha = 0.02 test (0.050) i cates you are sly. Day Sample iiled (P < 0 request, Ram	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050)	not great enou stically signifi esired power o detect a differ s.JNB	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu Friday, June 04, 2010, 9:41:19 AM
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended b Mann-Whitney Rank	interva nean va ng varia est with prmed t er indic cautiou / in 6th Fa by user < Sum '	of freedom. (al for differer alues of the t ability. There alpha = 0.02 test (0.050) i cates you are sly. Day Sample iiled (P < 0 request, Ran Test	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050) nk Sum Test b	not great enou stically signifi esired power o detect a differ s.JNB pegun	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended b Mann-Whitney Rank Data source: Mercury	interva nean va ng varia est with ormed t er indic cautiou / in 6th Fa by user c Sum '/ / in 6th	of freedom. (al for different alues of the t ability. There alpha = 0.0: test (0.050) i cates you are sly. Day Sample Liled (P < 0 request, Ran Test Day Sample	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050) nk Sum Test b e Comparison	not great enou stically signifi esired power o detect a differ s.JNB pegun s.JNB	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu Friday, June 04, 2010, 9:41:19 AM Friday, June 04, 2010, 9:41:19 AM
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t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended I Mann-Whitney Rank Data source: Mercury Group Collocated 6th-day	interva nean va ng varia est with ormed t er indic cautiou / in 6th Fa by user Sum ' / in 6th N 4	of freedom. (al for different alues of the t ability. There alpha = 0.02 test (0.050) i cates you are sly. Day Sample tiled (P < 0 request, Ran Test Day Sample Missing 0	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050) nk Sum Test b e Comparison Median 0.0000300	not great enou stically signifi esired power of detect a differ s.JNB begun s.JNB 25% 0.0000210	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu Friday, June 04, 2010, 9:41:19 AM Friday, June 04, 2010, 9:41:19 AM
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t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfo Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended I Mann-Whitney Rank Data source: Mercury Group Collocated 6th-day All other days Mann-Whitney U Stat T = 42.500 n(small)=	intervation intervatio intervation intervation intervation intervation interv	of freedom. (al for different alues of the t ability. There alpha = 0.02 test (0.050) i cates you are sly. Day Sample tiled (P < 0 request, Ran Test Day Sample 0 0 31.500 g)= 16 (P =	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050) nk Sum Test b e Comparison Median 0.0000300 0.0000255	not great enou stically signifi esired power of detect a differ s.JNB <u>25%</u> 0.0000210 0.0000135	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu Friday, June 04, 2010, 9:41:19 AM Friday, June 04, 2010, 9:41:19 AM 75% 0.0000455 0.000155
t = -0.0432 with 18 de 95 percent confidence The difference in the r due to random samplin 0.966). Power of performed te The power of the perfor Less than desired pow should be interpreted of VI. Mercury t-test Data source: Mercury Normality Test: Test execution ended to Mann-Whitney Rank Data source: Mercury Group Collocated 6th-day All other days Mann-Whitney U Stat T = 42.500 n(small)= The difference in the r	interva nean va nean va ig varia est with bormed t er indic cautiou v in 6th Fa by user c Sum ' v in 6th N 4 16 istic= 3 4 n(bi nedian	b) freedom. (al for differential of the freedom.) alues of the freedom. (alues of the freedom	nce of means: two groups is e is not a stati 50: 0.050 is below the d e less likely to e Comparison 0.050) nk Sum Test b e Comparison Median 0.0000300 0.0000255 1.000) een the two g	not great enou stically signifi esired power of detect a differ s.JNB begun s.JNB 0.0000210 0.0000135 roups is not gr	gh to reject the possibility that the difference cant difference between the input groups (P = of 0.800. rence when one actually exists. Negative resu Friday, June 04, 2010, 9:41:19 AM Friday, June 04, 2010, 9:41:19 AM

VII. Hexavalent Chromium

t-test

Friday, June 04, 2010, 9:41:58 AM

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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Data source: Hexavalent Chromium in 6th Day Sample Comparisons.JNB **Normality Test:** Failed (P < 0.050) Test execution ended by user request, Rank Sum Test begun Mann-Whitney Rank Sum Test Friday, June 04, 2010, 9:41:58 AM Data source: Hexavalent Chromium in 6th Day Sample Comparisons.JNB Group Ν Missing Median 25% 75% Collocated 6th-day 4 0.00000215 0.00000215 0.0000771 0 All other days 16 0 0.0000480 0.00000920 0.0000809 Mann-Whitney U Statistic= 21.000

T = 31.000 n(small) = 4 n(big) = 16 (P = 0.317)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.317)

Comparison of Collocated Samples to All Other Sites

Comparis		conocai	cu Si	impies to		
I. Aluminun						
a. Collocate	d vs. W	yatt Rd				
t-test						Monday, March 29, 2010, 3:52:40 PM
Data source	: Al Site	e in Metal	s Site	Comparisoi	n.JNB	
Normality T				P < 0.050)		
Test execution	on ende	d by user i	equest	t, Rank Sun	n Test begun	
Mann-Whit					-	Monday, March 29, 2010, 3:52:40 PM
Data source				Compariso	n.JNB	
Group	Ν	Missing	Μ	edian	25%	75%
Collocated	20	0	(0.133	0.0851	0.162
Wyatt Rd	20	0	(0.239	0.157	0.332
Mann-Whitn	ney U St	atistic= 76	5.000			
T = 286.000				P = <0.	001)	
						is greater than would be expected by chance; there i
statistically s						
b. Collocate	d vs. Ja	ycee Parl	K			
t-test						Friday, January 22, 2010, 11:05:25 AM
Data source	: Al Site	e in Metal	s Site	Comparisoi	n.JNB	
Normality T	Test:	Fai	led (P < 0.050)		
Test execution	on ende	d by user i	equest	t, Rank Sun	n Test begun	
Mann-Whit	ney Ra	nk Sum T	est		-	Friday, January 22, 2010, 11:05:25 AM
Data source				Compariso	n.JNB	
Group		Missing		edian	25%	75%
Collocated	20	0		133	0.0851	0.162
Jaycee	20	0	0.	0745	0.0625	0.102
Mann-Whitn						
T = 499.000	2				17)	
						is greater than would be expected by chance; there i
statistically s					0 1	- 8 ····· · · · · · · · · · · · · · · ·
	0			· · · · · ·		
c. Collocate	d vs. W	ater Trea	tment	Plant		
t-test						Friday, January 22, 2010, 11:05:42 AM
Data source	: Al Site	e in Metal	s Site	Compariso	1.JNB	
Normality T				P = 0.233)		
Equal Varia				P = 0.993)		
Group Nam			ssing	Mean	Std Dev	SEM
Collocated		20	0	0.127	0.0516	0.0115
Water Tmt P	Plant	20	0	0.117	0.0505	0.0113
Difference		0100	~		0.0000	
t = 0.620 wi			reedor	P = 0.53	(9)	
					means: -0.02	27 to 0 0427
						eat enough to reject the possibility that the difference
						y significant difference between the input groups (P
$\left(\begin{array}{c} 0 \\ 539 \end{array} \right)$	in sump		mry.	11010 15 110	i a statisticali	, significant afference between the input groups (1

<mark>0.539).</mark>

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Collocated vs. Triangle Park

t-test				Frida	y, January 22, 2010, 11:05:56 AM	
Data source: A	l Site ir	n Metals Sit	e Comparis	on.JNB		
Normality Test	t :	Passed	(P = 0.941)	.)		
Equal Variance	e Test:	Passed	(P = 0.127)	')		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	20	0	0.127	0.0516	0.0115	
Triangle Park	5	0	0.0570	0.0203	0.00910	
Difference	0.069	07				

t = 2.926 with 23 degrees of freedom. (P = 0.008)

95 percent confidence interval for difference of means: 0.0204 to 0.119

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.008).

Power of performed test with alpha = 0.050: 0.759

e. Collocated vs. Mountain Peak Elementary School

t-test

t-test

Data source: Al Site in Metals Site Comparison.JNB

Normality Test	:	Passed	(P = 0.844)	
Equal Variance	e Test:	Passed	(P = 0.476)	
Group Name	Ν	Missing	Mean	Std Dev
Collocated	20	0	0.127	0.0516

Friday, January 22, 2010, 11:06:12 AM

Mountain Peak	5	0	0.0837	0.0408	0.0183
Difference	0.0430				
t = 1.722 with 2	3 degrees	s of freed	lom. $(P = 0.0)$	98)	
95 percent confi	dence inte	erval for	difference of	means: -0.0	.00864 to 0.0946
The difference in	n the mea	n values	of the two gr	oups is not	t great enough to reject the possibility that the difference is
due to random sa	ampling v	ariabilit	y. There is no	ot a statistica	cally significant difference between the input groups (P =
<mark>0.098).</mark>					

SEM

0.0115

Power of performed test with alpha = 0.050: 0.255

The power of the performed test (0.255) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

Data source: Al Site in Metals Site Comparison.JNB

Friday, January 22, 2010, 11:06:26 AM

			F		
Normality Tes	st:	Passed	(P = 0.92)	26)	
Equal Varian	ce Test	Passed	(P = 0.32)	21)	
Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated	20	0	0.127	0.0516	0.0115
Vitovsky	5	0	0.0925	0.0278	0.0125
Difference	0.03	242			

Difference 0.0342

t = 1.414 with 23 degrees of freedom. (P = 0.171)

95 percent confidence interval for difference of means: -0.0158 to 0.0842

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P =0.171).

Power of performed test with alpha = 0.050: 0.150

The power of the performed test (0.150) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

t-test	VS. IVII	llothian H	igh School			Friday, March 19, 2010, 11:08:46 AM
Data source: .	Al Site	in Metals S	Site Compari	son.JNB		111day, 11aon 19, 2010, 11.00. 10 1111
Normality Te	st:	Passe	ed (P = 0.34	0)		
Equal Varian	ce Test	t: Passe	ed $(P = 0.53)$	2)		
Group Name		Missing	Mean	Std Dev	SEM	
Collocated	20	0	0.127	0.0516	0.0115	
Mid HS	5	0	0.0798	0.0573	0.0256	
Difference	0.04					
= 1.782 with						
95 percent con						
						ugh to reject the possibility that the difference is
	sampli	ng variabil	ity. There is	not a statistic	ally signif	icant difference between the input groups (P =
<mark>).088).</mark>	1.	1	1 0.050	2.2.2		
Power of perfo						- 60 900
The power of t						
should be inter				s likely to del	lect a diffe	erence when one actually exists. Negative results
nould be inter	ipicicu	cautiously	•			
II. Chromiun						
a. Collocated		att Rd				
-test	vs. vv y	att Ku				Monday, March 29, 2010, 4:15:42 PM
Data source: (Cr Site	in Motole	Site Compari	son INB		11011day, 111111 29, 2010, 1.13.121111
			1			
Normality Te	st:	Faile	d ($P < 0.05$	0)	ın	
Normality Te Fest execution	st: ended	Faile by user rec	d (P < 0.05 quest, Rank S	0)	un	Monday, March 29, 2010, 4:15:42 PM
Normality Te Fest execution Mann-Whitne	st: 1 ended ey Ran	Faile by user rec k Sum Tes	d (P < 0.05 quest, Rank S st	0) Jum Test begu	un	Monday, March 29, 2010, 4:15:42 PM
Normality Te Test execution Mann-Whitne Data source:	st: a ended ey Ran Cr Site	Faile by user rec k Sum Tes in Metals S	d (P < 0.05 quest, Rank S st Site Comparia	0) Jum Test begu son.JNB		
Normality Te Fest execution Mann-Whitne Data source: (Group	st: ended ey Ran Cr Site N I	Failed by user rec k Sum Tes in Metals S Missing	d (P < 0.05 quest, Rank S st Site Comparia Median	0) Jum Test begu son.JNB 25%	75%)
Normality Te Fest execution Mann-Whitne Data source: Group Collocated	st: a ended ey Ran Cr Site N N 20	Failed by user red k Sum Tes in Metals S Missing 0	d (P < 0.05 quest, Rank S st Site Comparie Median 0.00243	0) Jum Test begu son.JNB 25% 0.00218	75% 0.003	, 44
Normality Te Fest execution Mann-Whitne Data source: (Group Collocated Wyatt Rd	st: a ended ey Ran Cr Site N 20 20	Failed by user red k Sum Tes in Metals S Missing 0 0	d $(P < 0.05)$ quest, Rank S st Site Comparie Median 0.00243 0.00433	0) Jum Test begu son.JNB 25%	75%	4 4
Normality Te Fest execution Mann-Whitne Data source: Group Collocated Wyatt Rd Mann-Whitne	st: a ended ey Ran Cr Site N M 20 20 y U Sta	Failed by user red k Sum Tes in Metals S Missing 0 0 tisstic= 84.5	d $(P < 0.05)$ quest, Rank S st Site Comparie Median 0.00243 0.00433 500	0) bum Test begu son.JNB 25% 0.00218 0.00279	75% 0.003	5 44
Normality Te Fest execution Mann-Whitne Data source: (Group Collocated Wyatt Rd Mann-Whitne $\Gamma = 294.500$ n	st: a ended ey Ran Cr Site N M 20 20 y U Sta a(small)	Failed by user red k Sum Test in Metals S Missing 0 0 tistic= 84.5 = 20 n(big	d $(P < 0.05)$ quest, Rank S st Site Comparie Median 0.00243 0.00433 500 g = 20 (P = 0)	0) 500 JNB 25% 0.00218 0.00279 0.002)	75% 0.003 0.006	44 85
Normality Te Fest execution Mann-Whitne Data source: O Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference	st: a ended ey Ran Cr Site N N 20 20 y U Sta a(small) e in the	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val	d $(P < 0.05)$ quest, Rank S st Site Comparing Median 0.00243 0.00433 500 g)= 20 $(P = 0)$ lues between	0) bum Test begr son.JNB 25% 0.00218 0.00279 0.002) the two group	75% 0.003 0.006	5 44
Normality Te Fest execution Mann-Whitne Data source: (Group Collocated Wyatt Rd Mann-Whitne $\Gamma = 294.500$ n	st: a ended ey Ran Cr Site N N 20 20 y U Sta a(small) e in the	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val	d $(P < 0.05)$ quest, Rank S st Site Comparing Median 0.00243 0.00433 500 g)= 20 $(P = 0)$ lues between	0) bum Test begr son.JNB 25% 0.00218 0.00279 0.002) the two group	75% 0.003 0.006	44 85
Normality Te Fest execution Mann-Whitne Data source: 0 Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically signals	st: a ended ey Ran Cr Site N 1 20 20 y U Sta a(small) e in the gnificar	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at difference	d $(P < 0.05)$ quest, Rank S st Site Comparing Median 0.00243 0.00433 500 g)= 20 $(P = 0)$ lues between	0) bum Test begr son.JNB 25% 0.00218 0.00279 0.002) the two group	75% 0.003 0.006	44 85
Normality Te Fest execution Mann-Whitne Data source: 0 Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically signed b. Collocated	st: a ended ey Ran Cr Site N 1 20 20 y U Sta a(small) e in the gnificar	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at difference	d $(P < 0.05)$ quest, Rank S st Site Comparing Median 0.00243 0.00433 500 g)= 20 $(P = 0)$ lues between	0) bum Test begr son.JNB 25% 0.00218 0.00279 0.002) the two group	75% 0.003 0.006 ps is great	44 85 er than would be expected by chance; there is a
Normality Te Fest execution Mann-Whitne Data source: 0 Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically signed b. Collocated t-test	st: a ended ey Ran Cr Site N N 20 20 y U Sta a(small) e in the gnificar vs. Jay	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at difference ccee Park	d ($P < 0.05$ quest, Rank S st Site Compari- Median 0.00243 0.00433 500 g)= 20 ($P = 0$ lues between e ($P = 0.002$	0) Jum Test begu son.JNB 25% 0.00218 0.00279 0.002) the two group	75% 0.003 0.006 ps is great	44 85
Normality Te Fest execution Mann-Whitne Data source: (Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically signed Collocated (-test Data source: (st: ended ey Ran Cr Site N M 20 20 y U Sta (small) e in the gnificar vs. Jay Cr Site	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at difference ccee Park in Metals S	d ($P < 0.05$ quest, Rank S st Site Comparie Median 0.00243 0.00433 500 g)= 20 ($P = 0$ lues between e ($P = 0.002$ Site Comparie	0) 100 Test begins 1000218 1000279 100020 100000 100000 100000 10000000 1000000 10000000 10000000 1000000 1000000 100000 100000	75% 0.003 0.006 ps is great	44 85 er than would be expected by chance; there is a
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Normality Te Test execution Mann-Whitne Data source: O Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically signed b. Collocated t-test Data source: O Normality Te Test execution	st: ended ey Ran Cr Site N N 20 20 y U Sta (small) e in the gnificar vs. Jay Cr Site st: e ended	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at differenc cee Park in Metals S Failed by user red	d ($P < 0.05$ quest, Rank S st Site Comparie Median 0.00243 0.00433 $\overline{500}$ g)= 20 ($P = 0$ lues between e ($P = 0.002$ Site Comparie d ($P < 0.05$ quest, Rank S	0) 500 JNB 25% 0.00218 0.00279 0.002) the two group 500 JNB 0)	75% 0.003 0.006 ps is great	er than would be expected by chance; there is a Friday, January 22, 2010, 11:10:49 AM
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Normality Te Fest execution Mann-Whitne Data source: (Group Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically sign b. Collocated Collocated Collocated Mann-Whitne Cost execution Mann-Whitne Data source: (Group Collocated	st: ended ey Ran Cr Site N N 20 20 y U Sta (small) e in the gnificar vs. Jay Cr Site st: e ended ey Ran Cr Site N N 20	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val at difference cee Park in Metals S Failed by user red k Sum Tes in Metals S Missing 0	d ($P < 0.05$ quest, Rank S st Site Compari- Median 0.00243 0.00433 500 g)= 20 ($P = C$ lues between e ($P = 0.002$ Site Compari- d ($P < 0.05$ quest, Rank S st Site Compari- Median 0.00243	0) 5 um Test begu 5 son.JNB 25% 0.00218 0.00279 0.002) the two group 5 son.JNB 0) 5 um Test begu 5 son.JNB 25% 0.00218	75% 0.003 0.006 ps is great n	er than would be expected by chance; there is a Friday, January 22, 2010, 11:10:49 AM Friday, January 22, 2010, 11:10:49 AM
Normality Te Test execution Mann-Whitne Collocated Wyatt Rd Mann-Whitney $\Gamma = 294.500$ m The difference statistically sign b. Collocated t-test Data source: (Collocated Collocated Mann-Whitney Collocated Data source: (Collocated Data source: (Collocated Data source) Collocated Data source: (Collocated Data source)	st: a ended ey Ran Cr Site N P 20 20 y U Sta a(small) e in the gnificar vs. Jay Cr Site st: a ended ey Ran Cr Site N P 20 20 20 y U Sta sin the gnificar	Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 84.5 = 20 n(big median val it differenc cee Park in Metals S Failed by user red k Sum Tes in Metals S Missing 0 0	d ($P < 0.05$ quest, Rank S st Site Compari- Median 0.00243 0.00433 500 g)= 20 ($P = 0$ lues between e ($P = 0.002$ Site Compari- d ($P < 0.05$ quest, Rank S st Site Compari- Site Compari- Median 0.00243 0.00207	0) 5 um Test begu 5 son.JNB 25% 0.00218 0.00279 0.002) the two group 0.002) the two group 0.002) the two group 0.002) the two group 0.002) the two group 0.002) 5 son.JNB 00 5 son.JNB 25%	75% 0.003 0.006 ps is great un	er than would be expected by chance; there is a Friday, January 22, 2010, 11:10:49 AM Friday, January 22, 2010, 11:10:49 AM
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Normality Te Fest execution Mann-Whitne Collocated Wyatt Rd Mann-Whitney T = 294.500 m The difference tatistically sign Collocated -test Data source: Collocated Test execution Mann-Whitney Collocated aycee Mann-Whitney T = 527.500 m	st: a ended ey Ran Cr Site N N 20 20 y U Sta a(small) c in the gnificar vs. Jay Cr Site st: a ended ey Ran Cr Site N N 20 20 y U Sta a(small) c site y Cr Site st: a ended ey Ran Cr Site y Cr Site y Cr Site st: a ended ey Ran Cr Site y Cr Site st: a ended ey Ran Cr Site y Cr Site st: a ended ey Ran Cr Site y Cr Site y Cr Site st: a ended ey Ran Cr Site y Cr Site y Cr Site st: a ended y Cr Site y Cr Site	Failed by user red k Sum Tes in Metals S Vissing 0 0 tistic= 84.5 = 20 n(big median val at differenc ccee Park in Metals S Failed by user red k Sum Tes in Metals S Missing 0 0 tistic= 82.5 = 20 n(big	d $(P < 0.05)$ quest, Rank S st Site Compari- Median 0.00243 0.00433 $\overline{500}$ g)= 20 $(P = 0)$ lues between e $(P = 0.002)$ Site Compari- d $(P < 0.05)$ quest, Rank S st Site Compari- Median 0.00243 0.00207 $\overline{500}$ g)= 20 $(P = 0)$	0) Jum Test begu <u>25%</u> 0.00218 0.00279 0.002) the two group 0.002) the two group 0.002) the two group 0.0021 <u>500.JNB</u> <u>25%</u> 0.00218 0.00218 0.00218 0.00218	75% 0.003 0.006 ps is great un 75% 0.003 0.002	er than would be expected by chance; there is a Friday, January 22, 2010, 11:10:49 AM Friday, January 22, 2010, 11:10:49 AM

c.	Collocated	vs.	Water	Treatment Plant	
•••	Conocateu	v	i atti	II catinent I fant	

t-test

Data source: Cr Site in Metals Site Comparison.JNBNormality Test:Failed (P < 0.050)</th>

Friday, January 22, 2010, 11:11:02 AM

Mann-Whitney R Data source: Cr S			Comparison	.JNB	Friday, January 22, 2010, 11:11:02 AM	
Group	Ν	Missing	Median		75%	
Collocated	20	0	0.00243			
Water Tmt Plant	20	0	0.00207	0.00179	0.00222	
Mann-Whitney U	Statisti	ic = 76.000				
T = 534.000 n(sm)						
				two groups is	greater than would be expected by chance; the	ere i
statistically signific	cant di	fference (P = < 0.001)			
d. Collocated vs.	Triang	gle Park				
t-test					Friday, January 22, 2010, 11:11:13 AM	
Data source: Cr S	Site in I			.JNB		
Normality Test:			(P = 0.064)			
Equal Variance T			(P = 0.213)			
1		Missing	Mean	Std Dev	SEM	
	20	0	0.00282	0.000849	0.000190	
Triangle Park	5	0	0.00157	0.000263	0.000118	
	0.0012					
t = 3.204 with 23	degree					
	-					
95 percent confide						
95 percent confide The difference in t	the mea	an values o	of the two gro	ups is greater	than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific	he mea cant di	an values o fference be	of the two gro etween the in	ups is greater put groups (P	than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific	he mea cant di	an values o fference be	of the two gro etween the in	ups is greater put groups (P	than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific Power of performe	he mea cant di ed test	an values of fference be with alpha	of the two gro etween the in	ups is greater put groups (P	than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M	he mea cant di ed test	an values of fference be with alpha	of the two gro etween the in	ups is greater put groups (P	than would be expected by chance; there is a = 0.004).	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test	the mean cant di cant di test Mount	an values o fference be with alpha ain Peak	of the two gro etween the in = 0.050: 0.84	ups is greater put groups (P 45	than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S	the mean cant di cant di test Mount	an values o fference be with alpha ain Peak Metals Site	f the two gro etween the in = 0.050: 0.84 Comparison	ups is greater put groups (P 45	than would be expected by chance; there is a = 0.004).	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test:	he mea cant di ed test Mount	an values o fference be with alpha ain Peak Metals Site Passed	f the two gro etween the in = 0.050 : 0.84 • Comparison (P = 0.067)	ups is greater put groups (P 45	than would be expected by chance; there is a = 0.004).	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T	the mean cant di ed test Mount Site in N	an values o fference be with alpha ain Peak Metals Site Passed Passed	f the two gro etween the in = 0.050 : 0.84 • Comparison (P = 0.067) (P = 0.199)	ups is greater put groups (P 45 .JNB	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM	
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95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated	the mean cant di ed test Mount Site in N Cest: N 20	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0	f the two gro etween the in = 0.050 : 0.84 • Comparison (P = 0.067) (P = 0.199) Mean 0.00282	ups is greater put groups (P 45 .JNB Std Dev 0.000849	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak	the mean cant di ed test Mount Site in N Site in N Sest: N 20 5	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0	f the two gro etween the in = 0.050 : 0.84 • Comparison (P = 0.067) (P = 0.199) Mean	ups is greater put groups (P 45 .JNB Std Dev	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75	f the two gro etween the in = $0.050: 0.84$ • Comparison (P = 0.067) (P = 0.199) • Mean 0.00282 0.00184	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference t = 2.507 with 23 of the second seco	the mea cant di ed test Mount Site in N Fest: N 20 5 0.0009 degree	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo	f the two gro etween the in = $0.050: 0.84$ Comparison (P = 0.067) (P = 0.199) Mean 0.00282 0.00184 m. (P = 0.020	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM 0.000190 0.000104	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference t = 2.507 with 23 95 percent confide	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009 degree ence int	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d	f the two gro etween the in = 0.050 : 0.84 Comparison (P = 0.067) (P = 0.199) Mean 0.00282 0.00184 m. (P = 0.020 ifference of 1	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM 0.000190 0.000104 70 to 0.00178	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference t = 2.507 with 23 95 percent confide The difference in t	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009 degree ence int the mea	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o	f the two gro etween the in = 0.050 : 0.84 Comparison (P = 0.067) (P = 0.199) Mean 0.00282 0.00184 em. (P = 0.020 lifference of r	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) neans: 0.0001 ups is greater	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference (t = 2.507 with 23 of 95 percent confide The difference in t statistically signific	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009 degree ence int the mea cant di	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o fference be	f the two gro etween the in = 0.050 : 0.84 : Comparison (P = 0.067) (P = 0.199) Mean 0.00282 0.00184 m. (P = 0.020 ifference of r of the two gro etween the in	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001 ups is greater put groups (P	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a	
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95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference (C t = 2.507 with 23 95 percent confide The difference in t statistically signific Power of performe f. Collocated vs. J	the mea cant di ed test Mount Site in N Cest: N I 20 5 0.0009 degree ence int the mea cant di ed test	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o fference be with alpha	f the two gro etween the in = 0.050 : 0.84 : Comparison (P = 0.067) (P = 0.199) Mean 0.00282 0.00184 m. (P = 0.020 ifference of r of the two gro etween the in	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001 ups is greater put groups (P	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a = 0.020).	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference (C t = 2.507 with 23 of 95 percent confide The difference in t statistically signific Power of performe f. Collocated vs. J t-test	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009 degree ence int the mea cant di ed test VA Vite	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o fference be with alpha	of the two gro etween the in = $0.050: 0.84$ • Comparison (P = 0.067) (P = 0.199) • Mean 0.00282 0.00184 • m. (P = 0.020 ifference of r of the two gro etween the in = $0.050: 0.59$	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001 ups is greater put groups (P 93	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference (C t = 2.507 with 23 of 95 percent confide The difference in t statistically signific Power of performe f. Collocated vs. J t-test Data source: Cr S	the mea cant di ed test Mount Site in N Cest: N 20 5 0.0009 degree ence int the mea cant di ed test VA Vite	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o fference be with alpha ovsky Metals Site	of the two gro etween the in = 0.050 : 0.84 • Comparison (P = 0.067) (P = 0.199) • Mean 0.00282 0.00184 • m. (P = 0.020 ifference of to of the two gro etween the in = 0.050 : 0.59 • Comparison	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001 ups is greater put groups (P 93	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a = 0.020).	
95 percent confide The difference in t statistically signific Power of performe e. Collocated vs. M t-test Data source: Cr S Normality Test: Equal Variance T Group Name Collocated Mountain Peak Difference (C t = 2.507 with 23 of 95 percent confide The difference in t statistically signific Power of performe f. Collocated vs. J t-test	the mean cant di cat test for test for Site in N Cest: N 20 5 0.0009 degree cant di cant di cat test for the mean cant di cat test for the mean cat test for the	an values o fference be with alpha ain Peak Metals Site Passed Passed Missing 0 0 75 s of freedo terval for d an values o fference be with alpha ovsky Metals Site Passed	of the two gro etween the in = $0.050: 0.84$ • Comparison (P = 0.067) (P = 0.199) • Mean 0.00282 0.00184 • m. (P = 0.020 ifference of r of the two gro etween the in = $0.050: 0.59$	ups is greater put groups (P 45 .JNB Std Dev 0.000849 0.000232 0) means: 0.0001 ups is greater put groups (P 93	than would be expected by chance; there is a = 0.004). Friday, January 22, 2010, 11:11:26 AM SEM 0.000190 0.000190 0.000104 70 to 0.00178 than would be expected by chance; there is a = 0.020).	

Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated	20	0	0.00282	0.000849	0.000190
Vitovsky	5	0	0.00264	0.000353	0.000158
- 1.00					

Difference 0.000175

t = 0.445 with 23 degrees of freedom. (P = 0.660)

95 percent confidence interval for difference of means: -0.000638 to 0.000988

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.660).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

t-testFriday, January 22, 2010, 11:11:50 AMData source: Cr Site in Metals Site Comparison.JNBNormality Test:Passed (P = 0.075)Equal Variance Test:Passed (P = 0.092)Group NameNMissingMeanStd DevCollocated2000.002820.0008490.000190
Normality Test:Passed(P = 0.075)Equal Variance Test:Passed(P = 0.092)Group NameNMissingMeanStd DevSEM
Equal Variance Test: Passed (P = 0.092) Group Name N Missing Mean Std Dev SEM
Group Name N Missing Mean Std Dev SEM
Collocated 20 0 0.00282 0.000849 0.000190
Mid HS 5 0 0.00200 0.0000886 0.0000396
Difference 0.000815
t = 2.109 with 23 degrees of freedom. (P = 0.046)
95 percent confidence interval for difference of means: 0.0000157 to 0.00161
The difference in the mean values of the two groups is greater than would be expected by chance; there is a
statistically significant difference between the input groups ($P = 0.046$).
Power of performed test with $alpha = 0.050$: 0.416
C. Manganese
a. Collocated vs. Wyatt Rd
t-test Monday, March 29, 2010, 4:52:33 PM
Data source: Mn Site in Metals Site Comparison.JNB
Normality Test: Failed ($P < 0.050$)
Test execution ended by user request, Rank Sum Test begun
Mann-Whitney Rank Sum Test Monday, March 29, 2010, 4:52:33 PM
Data source: Mn Site in Metals Site Comparison.JNB
Group N Missing Median 25% 75%
Collocated 20 0 0.0137 0.00766 0.0306
Wyatt Rd 20 0 0.0137 0.00700 0.0300 Wyatt Rd 20 0 0.0493 0.0222 0.0903
Mann-Whitney U Statistic= 73.500
T = 283.500 n(small)= 20 n(big)= 20 (P = < 0.001)
The difference in the median values between the two groups is greater than would be expected by chance; there is a
statistically significant difference ($P = <0.001$)
b. Collocated vs. Jaycee Park
t-test Friday, January 22, 2010, 11:13:48 AM
Data source: Mn Site in Metals Site Comparison.JNB
Normality Test: Failed $(P < 0.050)$
Test execution ended by user request, Rank Sum Test begun
Mann-Whitney Rank Sum TestFriday, January 22, 2010, 11:13:48 AM
Data source: Mn Site in Metals Site Comparison.JNB

Group Collocated	N 20	Miss 0		edian)137 (25% 0.00766	75% 0.0306				
Jaycee	$\frac{1}{20}$	Ő			0.00381	0.0111				
		Statistic								
Mann-Whitney U Statistic= 110.500 T = 499.500 n(small)= 20 n(big)= 20 (P = 0.016)										
The difference in the median values between the two groups is greater than would be expected by chance; there is a										
statistically s					0					
	0		(
c. Collocate t-test	d vs. V	Vater 1	[reatment]	Plant	Friday, January 22, 2010, 11:14:02 AM					
Data source	: Mn S	Site in I	Metals Site	Comparison	I.JNB					
Normality T			Failed (I							
Test execution				Rank Sum	Test begun					
Mann-Whit						Friday, January 22, 2010, 11:14:02 AM				
Data source	: Mn S	Site in I	Metals Site	Comparison						
Group		Ν	Missing	Median	25%	75%				
Collocated		20	0	0.0137	0.0076					
Water Tmt P		20	0	0.0104	0.0049	4 0.0157				
Mann-Whitn	ney U S	Statistic	= 146.000							
T = 464.000	n(sma	all)= 20	n(big)=20	P = 0.148	8)					
						s not great enough to exclude the possibility that the				
difference is	due to	rando	<mark>m sampling</mark>	variability;	there is not a	a statistically significant difference $(P = 0.148)$				
d. Collocate	d vs. T	[riangl	e Park							
t-test		Ŭ				Friday, January 22, 2010, 11:14:17 AM				
Data source	: Mn S	Site in I	Metals Site	Comparison	.JNB					
Normality T			Failed (I							
Test execution		ed by u			Test begun					
Mann-Whit					U	Friday, January 22, 2010, 11:14:17 AM				
Data source				Comparison	.JNB					
Group			lissing	Median	25%	75%				
Collocated		20	0	0.0137	0.00766	0.0306				
Triangle Parl		5	ů 0	0.00486	0.00412	0.00897				
Mann-Whitn				0.00400	0.00412	0.0007				
T = 37.000 m				(D - 0.062)						
						s not great enough to exclude the possibility that the				
afference is	due to	randoi	in sampling	variability;	there is not a	a statistically significant difference $(P = 0.062)$				
· C-II-	a	A								
e. Collocate	a vs. N	<i>lounta</i>	un Peak			Dillar Lange 20 2010 11 14 21 434				
t-test				a .	D ID	Friday, January 22, 2010, 11:14:31 AM				
Data source		Site in I			I.JNB					
Normality 7			Failed (I							
Test execution				Rank Sum	Test begun					
Mann-Whit				~		Friday, January 22, 2010, 11:14:31 AM				
Data source	: Mn S			1						
Group	l	N N	lissing	Median	25%	75%				
Collocated		20	0	0.0137	0.00766	0.0306				
Mountain Pe	ak	5	0	0.00707	0.00597	0.0111				
Mann-Whitn	ney U S	Statistic	= 32.000							
T = 47.000 m				P = 0.234						
					two groups i	s not great enough to exclude the possibility that the				
						a statistically significant difference ($P = 0.234$)				
			B	,						

t-test Data source Normality T	: Mn S	itovsky ite in Metals Faile	Site Compari d (P < 0.050	Friday, January 22, 2010, 11:14:42 AM	
Test execution Mann-White	on ende ney Ra	ed by user re I nk Sum Te	quest, Rank Sı	Friday, January 22, 2010, 11:14:42 AM	
Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0137	0.00766	0.0306
Vitovsky	5	0	0.00873	0.00534	0.0117
Mann-Whitr	ev U S				
			= 20 (P = 0.26)	2)	
					is not great enough to exclude the possibility that the
					a statistically significant difference $(P = 0.262)$
			F 8 m	· j , · · · · · ·	
g. Collocate	d vs. N	lidlothian H	IS		
t-test					Friday, January 22, 2010, 11:14:58 AM
Data source	: Mn S	ite in Metals	Site Compari	son.JNB	
Normality 7	[est:	Faile	d $(P < 0.050)$))	
Test execution	on ende	d by user re	quest, Rank Sı	ım Test begun	
Mann-Whit	ney Ra	ink Sum Te	st		Friday, January 22, 2010, 11:14:58 AM
Data source	: Mn S	ite in Metals	Site Compari	son.JNB	
Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0137	0.00766	0.0306
Mid HS	5	0	0.00487	0.00355	0.00630
Mann-Whitr	ev U S	tatistic= 11.	000		
			= 20 (P = 0.00)	9)	
					is greater than would be expected by chance; there is a
			e (P = 0.009)	0 1	
	C				
D. Lead					
a. Collocate	d vs. V	/yatt Rd			
		•			
t-test					Monday, March 29, 2010, 5:06:59 PM
Data source		te in Metals	Site Comparis		Monday, March 29, 2010, 5:06:59 PM
Data source Normality 7	[est:	te in Metals Faile	d ($P < 0.050$))	Monday, March 29, 2010, 5:06:59 PM
Data source Normality T Test execution	f est: on ende	te in Metals Faile ed by user re	d (P < 0.050 quest, Rank Su		
Data source Normality 7 Test execution Mann-Whit	fest: on ende ney Ra	te in Metals Faile ed by user re- ank Sum Te	d (P < 0.050 quest, Rank Su st)) um Test begun	Monday, March 29, 2010, 5:06:59 PM Monday, March 29, 2010, 5:06:59 PM
Data source Normality 7 Test execution Mann-White Data source	f est: on ende ney R a : Pb Si	te in Metals Faile ed by user re unk Sum Te te in Metals	d (P < 0.050 quest, Rank Su st Site Comparis)) 1m Test begun on.JNB	Monday, March 29, 2010, 5:06:59 PM
Data source Normality T Test execution Mann-White Data source Group	Fest: on ende ney Ra : Pb Si N	te in Metals Faile ed by user re ink Sum Te te in Metals Missing	d (P < 0.050 quest, Rank Su st Site Comparis Median)) 1m Test begun 0n.JNB 25%	Monday, March 29, 2010, 5:06:59 PM 75%
Data source Normality T Test execution Mann-White Data source Group Collocated	Test: on ende ney Ra : Pb Si N 20	te in Metals Faile ed by user re ink Sum Te te in Metals Missing 0	d (P < 0.050 quest, Rank Su st Site Comparis Median 0.00302	0) 1m Test begun 0n.JNB 25% 0.00221	Monday, March 29, 2010, 5:06:59 PM 75% 0.00469
Data source Normality T Test executiv Mann-Whit Data source Group Collocated Wyatt Rd	Test: on ende ney Ra : Pb Si N 20 20	te in Metals Faile ed by user re- ink Sum Te te in Metals Missing 0 0	d (P < 0.050 quest, Rank Su st Site Comparis Median 0.00302 0.01000)) 1m Test begun 0n.JNB 25%	Monday, March 29, 2010, 5:06:59 PM
Data source Normality T Test execution Mann-White Data source Group Collocated Wyatt Rd Mann-White	Test: on ende ney Ra : Pb Si N 20 20 ey U S	te in Metals Faile d by user re ink Sum Te te in Metals Missing 0 0 tatistic= 84.0	d ($P < 0.050$ quest, Rank Su st Site Comparis Median 0.00302 0.01000 000	0) 1m Test begun on.JNB 25% 0.00221 0.00373	Monday, March 29, 2010, 5:06:59 PM 75% 0.00469
Data source Normality T Test execution Mann-White Data source Group Collocated Wyatt Rd Mann-White T = 294.000	Test: on ende ney Ra : Pb Si N 20 20 20 ney U S n(sma	te in Metals Faile d by user re ink Sum Te te in Metals Missing 0 tatistic= 84.0 ll)= 20 n(bi	d (P < 0.050 quest, Rank Su st Site Comparis Median 0.00302 0.01000 000 g)= 20 (P = 0.050	0) 1m Test begun 0n.JNB 25% 0.00221 0.00373 002)	Monday, March 29, 2010, 5:06:59 PM 75% 0.00469 0.0193
Data source Normality T Test execution Mann-White Data source Group Collocated Wyatt Rd Mann-White T = 294.000 The different	Fest: on ende ney Ra : Pb Si N 20 20 20 ney U S n(sma ce in th	te in Metals Faile ed by user re ink Sum Te te in Metals Missing 0 tatistic= 84.1 Il)= 20 n(bi e median va	d ($P < 0.050$ quest, Rank Su st Site Comparis Median 0.00302 0.01000 g)= 20 ($P = 0$ lues between t)) im Test begun on.JNB 25% 0.00221 0.00373 002) he two groups	Monday, March 29, 2010, 5:06:59 PM 75% 0.00469
Data source Normality T Test execution Mann-White Data source Group Collocated Wyatt Rd Mann-White T = 294.000 The different	Fest: on ende ney Ra : Pb Si N 20 20 20 ney U S n(sma ce in th	te in Metals Faile ed by user re ink Sum Te te in Metals Missing 0 tatistic= 84.1 Il)= 20 n(bi e median va	d (P < 0.050 quest, Rank Su st Site Comparis Median 0.00302 0.01000 000 g)= 20 (P = 0.050)) im Test begun on.JNB 25% 0.00221 0.00373 002) he two groups	Monday, March 29, 2010, 5:06:59 PM 75% 0.00469 0.0193

Mann-Whitney Rank Sum Test

Mann-Whit					Frida	ay, January 22, 2010, 11:16:51 AM	
Data source				1			
Group	Ν	Missing		lian	25%	75%	
Collocated	20	0		0302	0.00221	0.00469	
Jaycee	20	0		0215	0.00150	0.00288	
Mann-Whitn							
T = 479.500							
							enough to exclude the possibility that the
difference is	due to	random s	ampling	variability	; there is not a	a statisticall	y significant difference $(P = 0.062)$
	_		_				
c. Collocate	d vs. V	Vater Tre	atment P	lant			
t-test	DI G		1 0. 0		N ID	Frida	ay, January 22, 2010, 11:17:05 AM
Data source					1.JNB		
Normality 7			<pre></pre>	< 0.050)	T (1		
Test execution				Rank Sum	n Test begun	р·1	
Mann-Whit					NID	Frida	ay, January 22, 2010, 11:17:05 AM
Data source	PD SI			1			o /
Group			lissing	Median		75	
Collocated	M	20	0	0.0030			
Water Tmt P		20	0	0.0027	3 0.0019	0.00	406
Mann-Whitn				(T) 0 ()			
T = 426.500							
							enough to exclude the possibility that the
difference is	due to	random s	ampling	variability	; there is not a	a statisticall	y significant difference $(P = 0.665)$
d. Collocate	d vs. 1	riangle P	ark			F · 1	
t-test	DI C		1 0. 0		n in	Frida	ay, January 22, 2010, 11:17:20 AM
Data source					1.JNB		
Normality 7			ailed (P		T. (1		
Test execution				Rank Sum	n Test begun	P .: 1	L
Mann-Whit					NID	Frida	ay, January 22, 2010, 11:17:20 AM
Data source				1			
Group		N Miss		Median	25%	75%	
Collocated				0.00302	0.00221	0.0046	
Triangle Par		-		0.00205	0.00153	0.0033	4
Mann-Whitn							
T = 46.000							
							enough to exclude the possibility that the
difference is	due to	random s	ampling	variability	; there is not a	a statisticall	y significant difference (P = 0.209)
e. Collocate	d vs. N	lountain	Peak				
t-test						Frida	ay, January 22, 2010, 11:17:40 AM
Data source					1.JNB		
Normality 7			ailed (P				
Test execution				Rank Sum	n Test begun		
Mann-Whit						Frida	ay, January 22, 2010, 11:17:40 AM
Data source				1			
Group		N Miss		Median	25%	75%	
Collocated				0.00302	0.00221	0.0046	
Mountain Pe				0.00197	0.00143	0.0023	2
Mann-Whitn	ney U S	Statistic= 1	19.000				

			e (P = 0.038)		
f. Collocated t-test Data source: Normality T	Pb S	ite in Metals	Site Comparis d (P < 0.05)	Friday, January 22, 2010, 11:17:56 AM	
Mann-White Data source:	ney R Pb S	ank Sum Testite in Metals	Site Comparis	Friday, January 22, 2010, 11:17:56 AM	
Group Collocated Vitovsky	N 20 5	Missing 0 0	Median 0.00302 0.00171	25% 0.00221 0.00159	75% 0.00469 0.00210
Mann-Whitne $T = 34.000$ n	(smal	l = 5 n(big)	P = 20 (P = 0.02)	38)	
			lues between e $(P = 0.038)$		is greater than would be expected by chance; there is a
g. Collocated t-test Data source: Normality T Test executio Mann-Whiti	Pb Si est:	ite in Metals Faile ed by user rea	Site Comparis d (P < 0.05) quest, Rank S	Friday, January 22, 2010, 11:18:08 AM Friday, January 22, 2010, 11:18:08 AM	
Data source: Group	Pb Si	ite in Metals Missing	Site Comparie Median	son.JNB 25%	75%
Collocated Mid HS	20 5	0 0	$0.00302 \\ 0.00299$	0.00221 0.00228	0.00469 0.00313
Mann-Whitner $T = 58,000$ n			P = 20 (P = 0.65)	59)	
The differenc	e in th	ne median va	lues between	the two groups	is not great enough to exclude the possibility that the
difference is	due to	random sam	pling variabil	ity; there is no	t a statistically significant difference $(P = 0.659)$
E. Nickel a. Collocated t-test Data source: Normality T Equal Varia	: Ni Si est:	te in Metals Passe	ed $(P = 0.67)$	Tuesday, April 13, 2010, 3:32:30 PM	
Mann-Whiti	ney R	ank Sum Te	quest, Rank S st Site Comparis	Tuesday, April 13, 2010, 3:32:30 PM	
Group Collocated Wyatt Rd	N 20 20	Missing 0 0	Median 0.00105 0.00213	25% 0.000639 0.000965	75% 0.00140 0.00328
	n(sma	all)= 20 n(bi	g = 20 (P = 0)		is greater than would be expected by chance; there is a

b. Collocated vs. Jaycee Park

t-test	. NI: CI		M-4-1- 0:4-	Gammaia			Friday, January 22, 2010, 11:19:46 AM	
Data source Normality T		ite in I		(P < 0.050)				
Test executio		ed by		· · · · ·		ı		
Mann-Whit				,		-	Friday, January 22, 2010, 11:19:46 AM	
Data source				Compariso				
Group	Ν	Mis		Iedian	25%	75%		
Collocated	20				0.000639	0.001		
Jaycee	20				0.000651	0.001	134	
Mann-Whitn					• •			
T = 428.500						. ,		1
							great enough to exclude the possibility that stically significant difference $(P = 0.626)$	tne.
c. Collocate	d vs. V	Vater	Treatmen	t Plant				
t-test							Friday, January 22, 2010, 11:19:58 AM	
Data source	: Ni Si	ite in I	Metals Site	Compariso	n.JNB			
Normality T	est:		Failed	(P < 0.050)				
Test execution	on end	ed by	ucar raqua	st Rank Sur	n Test heaur	,		
Mann-Whit				si, italik Sul	n rest begul	1	Friday, January 22, 2010, 11:19:58 AM	
Data source				Compariso	n.JNB		110day, January 22, 2010, 11.19.50 Milli	
Group		N	Missing	1		6	75%	
Collocated		20	0	0.00105			0.00140	
Water Tmt P	lant	20	0	0.00096			0.00127	
Mann-Whitn	ev U S	Statist	c = 197.50	0				
T = 412.500					57)			
The differen	ce in th	ne me	dian values	between th	e two groups	s is not g	great enough to exclude the possibility that	<mark>t the</mark>
difference is	due to	rando	om samplir	ig variability	y; there is no	t a statis	stically significant difference (P = 0.957)	
d Collegato	d and T	Futon	do Doulr					
d. Collocate t-test	u vs. i	riang	gie Park				Friday, January 22, 2010, 11:20:08 AM	
Data source	• Ni Si	ite in I	Metals Site	Compariso	n INB		Thuay, January 22, 2010, 11.20.08 AM	
Normality T				(P = 0.312)				
Equal Varia		est:		(P = 0.134)				
Group Nam			Missing	Mean	Std Dev	5	SEM	
Collocated		20	0	0.00103	0.000400		0000907	
Triangle Parl		5		0.000764	0.000189		0000845	
Difference		.0002						
t = 1.420 wi	th 23 c	legree	s of freedo	m. $(P = 0.16)$	<u>69)</u>			
95 percent co								
							ough to reject the possibility that the different	
	<mark>m sam</mark>	pling	variability.	There is no	t a statistical	ly signi	ficant difference between the input groups	(P =
<mark>0.169).</mark>	0	1		0.050.01	50			
Power of per						1	0.00 0.00	
The power o								
should be int				ou are less i	ikely to dete	ci a uni	ference when one actually exists. Negative	result
	1		5					
e. Collocate	d vs. N	1ount	ain Peak				Friday January 22 2010 11.20.10 ANA	
t-test Data source	• Ni Ci	ite in 1	Metale Site	Compariso	n INR		Friday, January 22, 2010, 11:20:18 AM	
Data source	• 1VI OI		victais Sile	Compariso	11.J1ND			
Englugion -	fthal	lidlar	high Town	Ambiant 1	in Collection	l land	lutical Chamical Analysis Data	\overline{C}
Evaluation o	y ine N	uaioti	nan, 1exas	s amoient Al	r Collection	α Anal	lytical Chemical Analysis Data Pag	ge G-1-

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Normality Test:	:	Passed	(P = 0.246)			
Equal Variance Test:		Passed	(P = 0.248)			
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Collocated	20	0	0.00103	0.000406	0.0000907	
Mountain Peak	5	0	0.000837	0.000240	0.000107	

Difference 0.000194

t = 1.017 with 23 degrees of freedom. (P = 0.320)

95 percent confidence interval for difference of means: -0.000201 to 0.000590

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.320).

Power of performed test with alpha = 0.050: 0.051

The power of the performed test (0.051) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

Friday, January 22, 2010, 11:20:28 AM

f. Collocated vs. Vitovsky

t-test

Data source: Ni Site in Metals Site Comparison.JNB

Normality Tes	t:	Passed	(P = 0.152)	
Equal Varianc	e Test	Passed	(P = 0.665)	
Group Name	Ν	Missing	Mean	Std Dev
Collocated	20	0	0.00103	0.000406
Vitovsky	5	0	0.00115	0.000306

Vitovsky 5 0 Difference -0.000114

t = -0.582 with 23 degrees of freedom. (P = 0.566)

95 percent confidence interval for difference of means: -0.000517 to 0.000290

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the input groups (P = 0.566).

SEM

0.0000907

0.000137

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

g. Collocated vs. Midlothian HS

t-test					Friday, January 22, 2010, 11:20:39 AM
Data source: N	Ji Site	in Metals Sit	e Comparison	JNB	
Normality Tes	t:	Passed	(P = 0.335)		
Equal Variance	e Test	Passed	(P = 0.087)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Collocated	20	0	0.00103	0.000406	0.0000907
Mid HS	5	0	0.000615	0.000160	0.0000715
D:66	0.00	0417			

Difference 0.000417

t = 2.224 with 23 degrees of freedom. (P = 0.036)

95 percent confidence interval for difference of means: 0.0000291 to 0.000804

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = 0.036). Power of performed test with alpha = 0.050: 0.467

F. Mercury a. Collocated vs. Wyatt Rd

t tost							Tuesday, April 13, 2010, 3:51:51 PM
t-test Data source:	Hasi	ite in N	Notals Site (omnarisor	n INB		Tuesday, April 15, 2010, 5.51.51 PM
Normality T			Failed (I		II.JIND		
Test executio		dhu			n Tost ha	ann	
Mann-Whitr				Kalik Suili	I Test De	gun	Tuesday, April 12, 2010, 2:51:51 DM
				.			Tuesday, April 13, 2010, 3:51:51 PM
Data source:	-			*		,	
Group	N	Miss		edian	25%		75%
Collocated	20	(0.0000		00103
Wyatt Rd	20	(000375	0.00002	205 0.0	000970
Mann-Whitne							
T = 378.000							
							great enough to exclude the possibility that the
difference is o	due to	rando	<mark>m sampling</mark>	variability	; there is	<mark>s not a stati</mark>	stically significant difference $(P = 0.394)$
b. Collocated	l vs. Ja	aycee	Park				
t-test							Friday, January 22, 2010, 11:22:36 AM
Data source:	Hg Si	ite in I	Metals Site (Comparisor	n.JNB		
Normality T	est:		Failed (I	P < 0.050)			
Test executio	n ende	ed by i	iser request,	Rank Sum	n Test be	egun	
Mann-Whitr						C	Friday, January 22, 2010, 11:22:36 AM
Data source:	•			Comparisor	n.JNB		
Group	N	Miss		edian	25%	6	75%
Collocated	20	(0		0.0000		000103
Jaycee	20	(0.0000		0000400
2				00200	0.00000	0.000	0000400
Mann-Whitne							
T = 446.500							
							great enough to exclude the possibility that the
difference is o	due to	rando	m sampling	variability	; there is	s not a stati	stically significant difference $(P = 0.330)$
c. Collocated	l vs. W	ater '	Freatment	Plant			
t-test							Friday, January 22, 2010, 11:22:51 AM
Data source:		ite in I			n.JNB		
Normality T			Failed (I				
Test executio	n ende	ed by ı	iser request,	Rank Sum	n Test be	egun	
Mann-Whitr	iey Ra	ınk Sı	ım Test				Friday, January 22, 2010, 11:22:51 AM
Data source:	Hg Si	ite in I	Metals Site (Comparisor	n.JNB		
Group		Ν	Missing	Media		25%	75%
Collocated		20	0	0.00002		.0000145	0.000103
Water Tmt Pl	ant	20	0 0	0.00001		.00000115	0.0000230
Mann-Whitne				0.00001.	55 0	.00000750	0.0000230
	2			D = 0.04	19)		
T = 483.500							
					e two gro	oups is grea	ter than would be expected by chance; there is a
statistically si	gnific	ant di	ference (P	= 0.048)			
d. Collocated	l vs. T	riang	le Park				
t-test							Friday, January 22, 2010, 11:23:07 AM
Data source:		ite in I			n.JNB		
Normality T	est:		Failed (I	P < 0.050)			
Test executio		ed by u			n Test be	egun	
Mann-Whitr						-	Friday, January 22, 2010, 11:23:07 AM
Data source:				Comparisor	n.JNB		
Group	N		Aissing	Median		25%	75%
Stoup	1	, 1	1.551115	1110ulaii	4	-070	

Collocated	20 5	0 0	0.0000280 0.0000280	0.0000145 0.0000227	0.000103 0.0000833	
Triangle Park Mann-Whitne				0.0000227	0.0000855	
			= 20 (P = 0.683)			
					ot great enough to exclude the possibility that the	
difference is d	lue to rar	ndom sam	pling variability;	there is not a st	catistically significant difference $(P = 0.683)$	
~ ~						
e. Collocated	vs. Mou	intain Pea	ak		Eriden January 22, 2010, 11,22,10 AM	
t-test Data source:	Ha Site	in Metals	Site Comparison	INB	Friday, January 22, 2010, 11:23:19 AM	
Normality Te	0		d ($P < 0.050$)	1.5111		
			quest, Rank Sum	Test begun		
Mann-Whitn				U	Friday, January 22, 2010, 11:23:19 AM	
Data source:	Hg Site	in Metals	Site Comparison	n.JNB		
Group	Ν	Missing		25%	75%	
Collocated	20	0	0.0000280	0.0000145	0.000103	
Mountain Pea		0	0.000266	0.000230	0.000293	
Mann-Whitne						
			= 20 (P = 0.016)			
				two groups is g	reater than would be expected by chance; there is a	
statistically sig	gnificant	differenc	e (P = 0.016)			
f. Collocated	vs Vito	velv				
t-test	vs. vito	VSRY			Friday, January 22, 2010, 11:23:31 AM	
	Hg Site	in Metals	Site Comparisor	JNB	1 may, January 22, 2010, 11.23.31 mivi	
Normality Te		Faile				
				-		
	n ended t	by user rec	quest, Rank Sum	Test begun		
Mann-Whitn			quest, Rank Sum s t	Test begun	Friday, January 22, 2010, 11:23:31 AM	
Mann-Whitn	ey Rank	Sum Tes		-	Friday, January 22, 2010, 11:23:31 AM	
Mann-Whitn Data source: Group	ey Rank Hg Site N N	Sum Tes	st Site Comparisor Median	n.JNB 25%	75%	
Mann-Whitn Data source: Group Collocated	ey Rank Hg Site N N 20	Sum Tes in Metals lissing 0	st Site Comparisor Median 0.0000280	n.JNB 25% 0.0000145	75% 0.000103	
Mann-Whitn Data source: Group Collocated Vitovsky	ey Rank Hg Site N N 20 5	Sum Tes in Metals lissing 0 0	st Site Comparisor Median 0.0000280 0.00001000	n.JNB 25%	75%	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne	ey Rank Hg Site N N 20 5 y U Stat	Sum Tes in Metals lissing 0 0 istic= 17.5	st Site Comparisor Median 0.0000280 0.00001000 500	a.JNB 25% 0.0000145 0.00000775	75% 0.000103	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nd	ey Rank Hg Site N M 20 5 ey U Stat (small)=	Sum Tes in Metals Iissing 0 0 istic= 17.5 5 n(big)=	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030)	n.JNB 25% 0.0000145 0.00000775	75% 0.000103 0.0000150	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nt The difference	ey Rank Hg Site N N 20 5 ey U Stat: (small)= e in the r	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the	n.JNB 25% 0.0000145 0.00000775	75% 0.000103	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nd	ey Rank Hg Site N N 20 5 ey U Stat: (small)= e in the r	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the	n.JNB 25% 0.0000145 0.00000775	75% 0.000103 0.0000150	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nf The difference statistically sig	ey Rank Hg Site N N 20 5 y U Stat: (small)= e in the r gnificant	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val c difference	St Site Comparison Median 0.0000280 0.000010000 0.00001000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.0000100000 0.0000100000 0.00001000000 0.000000000000 0.00000000000000000 $0.0000000000000000000000000000000000$	n.JNB 25% 0.0000145 0.00000775	75% 0.000103 0.0000150	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically signal g. Collocated	ey Rank Hg Site N N 20 5 y U Stat: (small)= e in the r gnificant	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val c difference	St Site Comparison Median 0.0000280 0.000010000 0.00001000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.0000100000 0.0000100000 0.00001000000 0.000000000000 0.00000000000000000 $0.0000000000000000000000000000000000$	n.JNB 25% 0.0000145 0.00000775	75% 0.000103 0.0000150 reater than would be expected by chance; there is a	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32,500 nd The difference statistically sig g. Collocated t-test	ey Rank Hg Site N N 20 5 ey U Stat (small)= e in the r gnificant vs. Mid	s Sum Tes in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val c differenc lothian H	St Site Comparison Median 0.0000280 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.000010000 0.0000100000 0.00000100000 0.000000000000 0.0000000000000000 <th r<="" red<th="" td=""><td>n.JNB 25% 0.0000145 0.00000775 two groups is g</td><td>75% 0.000103 0.0000150</td></th>	<td>n.JNB 25% 0.0000145 0.00000775 two groups is g</td> <td>75% 0.000103 0.0000150</td>	n.JNB 25% 0.0000145 0.00000775 two groups is g	75% 0.000103 0.0000150
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically signal g. Collocated t-test Data source:	ey Rank Hg Site N $N205ey U Stat(small)=e in the rgnificantvs. MidHg Site$	Sum Tes in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val differenc lothian H in Metals	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) IS Site Comparison	n.JNB 25% 0.0000145 0.00000775 two groups is g	75% 0.000103 0.0000150 reater than would be expected by chance; there is a	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically signal g. Collocated t-test Data source: Normality Te	ey Rank Hg Site N $N205ey U Stat:(small)=e in the rgnificantvs. MidHg Siteest:$	Sum Tes in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val differenc lothian H in Metals Faile	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) IS Site Comparison d (P < 0.050)	n.JNB 25% 0.0000145 0.00000775 two groups is g	75% 0.000103 0.0000150 reater than would be expected by chance; there is a	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically signal g. Collocated t-test Data source: Normality Te	ey Rank Hg Site N $N205ey U Stat:(small)=e in the rgnificantvs. MidHg Siteest:n ended b$	Sum Test in Metals lissing 0 istic= 17.5 5 n(big)= nedian val difference lothian H in Metals Faile by user rec	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) (S Site Comparison d (P < 0.050) quest, Rank Sum	n.JNB 25% 0.0000145 0.00000775 two groups is g	75% 0.000103 0.0000150 reater than would be expected by chance; there is a	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically sign g. Collocated t-test Data source: Normality Te Test execution Mann-Whitn	ey Rank Hg Site N N 20 5 ey U Stat: (small)= e in the r gnificant vs. Mid Hg Site est: n ended b ey Rank	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val difference lothian H in Metals Faile by user reas Sum Test	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) (S) Site Comparison d (P < 0.050) quest, Rank Sum	n.JNB 25% 0.0000145 0.00000775 two groups is g n.JNB Test begun	75% 0.000103 0.0000150 reater than would be expected by chance; there is a Friday, January 22, 2010, 11:23:42 AM	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically sign g. Collocated t-test Data source: Normality Te Test execution Mann-Whitn	ey Rank Hg Site N N 20 5 ey U Stat (small)= e in the r gnificant vs. Mid Hg Site est: n ended b ey Rank Hg Site	Sum Test in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val difference lothian H in Metals Faile by user reas Sum Test	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) IS Site Comparison d (P < 0.050) quest, Rank Sum st	n.JNB 25% 0.0000145 0.00000775 two groups is g n.JNB Test begun	75% 0.000103 0.0000150 reater than would be expected by chance; there is a Friday, January 22, 2010, 11:23:42 AM	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nf The difference statistically sig g. Collocated t-test Data source: Normality Te Test execution Mann-Whitn Data source:	ey Rank Hg Site N N 20 5 ey U Stat (small)= e in the r gnificant vs. Mid Hg Site est: n ended b ey Rank Hg Site	Sum Tes in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val difference lothian H in Metals Faile by user rea Sum Tes in Metals	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) IS Site Comparison d (P < 0.050) quest, Rank Sum st Site Comparison	n.JNB 25% 0.0000145 0.00000775 two groups is g n.JNB Test begun n.JNB	75% 0.000103 0.0000150 reater than would be expected by chance; there is a Friday, January 22, 2010, 11:23:42 AM Friday, January 22, 2010, 11:23:42 AM	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 n(The difference statistically signed g. Collocated t-test Data source: Normality Te Test execution Mann-Whitn Data source: Group Collocated Mid HS	ey Rank Hg Site N N 20 5 ey U Stat: (small)= e in the r gnificant vs. Mid Hg Site est: n ended b ey Rank Hg Site N N 20 5	Sum Tes in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian val difference lothian H in Metals Faile by user rea Sum Tes in Metals lissing 0 0	st Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) IS Site Comparison d (P < 0.050) quest, Rank Sum st Site Comparison Median 0.0000280 0.00000600	n.JNB 25% 0.0000145 0.00000775 two groups is g n.JNB Test begun n.JNB 25%	75% 0.000103 0.0000150 reater than would be expected by chance; there is a Friday, January 22, 2010, 11:23:42 AM Friday, January 22, 2010, 11:23:42 AM 75%	
Mann-Whitn Data source: Group Collocated Vitovsky Mann-Whitne T = 32.500 nc The difference statistically sig g. Collocated t-test Data source: Normality Te Test execution Mann-Whitn Data source: Group Collocated Mid HS Mann-Whitne	ey Rank Hg Site N N 20 5 (small)= e in the r gnificant vs. Mid Hg Site est: n ended b ey Rank Hg Site N N 20 5 (small)=	Sum Testin Metals in Metals lissing 0 0 istic= 17.5 5 n(big)= nedian value ofference lothian H in Metals Faile oy user react Sum Testin in Metals Faile oy user react Sum Testin lissing 0 0 0 1 istic= 11.5	St Site Comparison Median 0.0000280 0.00001000 500 = 20 (P = 0.030) lues between the e (P = 0.030) Is Site Comparison d (P < 0.050)	n.JNB 25% 0.0000145 0.00000775 two groups is g n.JNB Test begun n.JNB 25% 0.0000145 0.0000145 0.00000600	75% 0.000103 0.0000150 reater than would be expected by chance; there is a Friday, January 22, 2010, 11:23:42 AM Friday, January 22, 2010, 11:23:42 AM 75% 0.000103	
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Appendix $H - PM_{10}$ Metals Site Comparisons: All Four Quarters of Data

A. Aluminum

I. Comparison of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: Al Site in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 3:49:38 PM Data source: Al Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.133	0.0851	0.162	
Wyatt Rd	20	0	0.239	0.157	0.332	
Jaycee	20	0	0.0745	0.0625	0.102	
Water Tmt Plant	20	0	0.116	0.0751	0.152	
II = 25, 240 with 2	dograd	a of froodom	(D - < 0.001)			

Monday, March 29, 2010, 3:49:38 PM

H = 25.249 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee	722.500	6.952	Yes
Wyatt Rd vs Water Tmt Plant	492.000	4.734	Yes
Wyatt Rd vs Collocated	423.500	4.075	Yes
Collocated vs Jaycee	299.000	2.877	No
Collocated vs Water Tmt Plant	68.500	0.659	Do Not Test
Water Tmt Plant vs Jaycee	230.500	2.218	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

II. Comparison of Mobile Sites

One WayOne-Way Analysis of Variance Friday, March 19, 2010, 11:06:02 AM Data source: Al Site in Metals Site Comparison.JNB Failed (P < 0.050)Normality Test: Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksFriday, March 19, 2010, 11:06:02 AM Data source: Al Site in Metals Site Comparison.JNB Group Ν Missing Median 25% 75% **Triangle Park** 5 0 0.0503 0.0421 0.0678 5 Mountain Peak 0 0.0708 0.0601 0.0967 Vitovsky 5 0 0.0878 0.0705 0.113 Mid HS 5 0 0.0425 0.0358 0.141 H = 3.754 with 3 degrees of freedom. (P = 0.289) The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.289)**III. Comparison of All Sites One WayOne-Way Analysis of Variance** Monday, March 29, 2010, 3:50:24 PM Data source: Al Site in Metals Site Comparison.JNB Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Data source: Al S	Site in N	Metals Site C	omparison.JN	B		
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.133	0.0851	0.162	
Wyatt Rd	20	0	0.239	0.157	0.332	
Jaycee	20	0	0.0745	0.0625	0.102	
Water Tmt Plant	20	0	0.116	0.0751	0.152	
Triangle Park	5	0	0.0503	0.0421	0.0678	
Mountain Peak	5	0	0.0708	0.0601	0.0967	
Vitovsky	5	0	0.0878	0.0705	0.113	
Mid HS	5	0	0.0425	0.0358	0.141	

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 3:50:24 PM Data source: Al Site in Metals Site Comparison.JNB

H = 35.482 with 7 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
Wyatt Rd vs Triangle Park	60.825	4.193	Yes
Wyatt Rd vs Mid HS	48.925	3.373	Yes
Wyatt Rd vs Mountain Peak	44.025	3.035	No
Wyatt Rd vs Jaycee	43.000	4.687	Do Not Test
Wyatt Rd vs Vitovsky	37.825	2.608	Do Not Test
Wyatt Rd vs Water Tmt Plant	28.000	3.052	Do Not Test
Wyatt Rd vs Collocated	23.725	2.586	Do Not Test
Collocated vs Triangle Park	37.100	2.558	No
Collocated vs Mid HS	25.200	1.737	Do Not Test
Collocated vs Mountain Peak	20.300	1.399	Do Not Test
Collocated vs Jaycee	19.275	2.101	Do Not Test
Collocated vs Vitovsky	14.100	0.972	Do Not Test
Collocated vs Water Tmt Plant	4.275	0.466	Do Not Test
Water Tmt Pla vs Triangle Park	32.825	2.263	Do Not Test
Water Tmt Plant vs Mid HS	20.925	1.443	Do Not Test
Water Tmt Pla vs Mountain Peak	16.025	1.105	Do Not Test
Water Tmt Plant vs Jaycee	15.000	1.635	Do Not Test
Water Tmt Plant vs Vitovsky	9.825	0.677	Do Not Test
Vitovsky vs Triangle Park	23.000	1.254	Do Not Test
Vitovsky vs Mid HS	11.100	0.605	Do Not Test
Vitovsky vs Mountain Peak	6.200	0.338	Do Not Test
Vitovsky vs Jaycee	5.175	0.357	Do Not Test
Jaycee vs Triangle Park	17.825	1.229	Do Not Test
Jaycee vs Mid HS	5.925	0.408	Do Not Test
Jaycee vs Mountain Peak	1.025	0.0707	Do Not Test
Mountain Peak vs Triangle Park	16.800	0.916	Do Not Test
Mountain Peak vs Mid HS	4.900	0.267	Do Not Test
Mid HS vs Triangle Park	11.900	0.649	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

B. Chromium

I. Comparison of Stationary Sites

One WayOne-Way Analysis of Variance Data source: Cr Site in Metals Site Comparison.JNB Monday, March 29, 2010, 4:14:28 PM

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 4:14:28 PM Data source: Cr Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.00243	0.00218	0.00344
Wyatt Rd	20	0	0.00433	0.00279	0.00685
Jaycee	20	0	0.00207	0.00187	0.00222
Water Tmt Plant	20	0	0.00207	0.00179	0.00222

H = 36.691 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All Pairwise All-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Water Tmt Plant	750.000	7.217	Yes
Wyatt Rd vs Jaycee	750.000	7.217	Yes
Wyatt Rd vs Collocated	332.000	3.195	No
Collocated vs Water Tmt Plant	418.000	4.022	Yes
Collocated vs Jaycee	418.000	4.022	Yes
Jaycee vs Water Tmt Plant	0.000	0.000	No

Note: The multiple comparisons on ranks do not include an adjustment for ties.

II. Comparison of Mobile Sites

One WayOne-Way Analysis of Variance Friday, January 22, 2010, 11:09:36 AM Data source: Cr Site in Metals Site Comparison.JNB Passed (P = 0.446)**Normality Test: Equal Variance Test:** Passed (P = 0.079)**Group Name** Ν Missing Mean Std Dev SEM **Triangle Park** 5 0.000118 0 0.00157 0.000263 5 Mountain Peak 0 0.00184 0.000232 0.000104 Vitovsky 5 0 0.00264 0.000353 0.000158 Mid HS 5 0 0.00200 0.0000886 0.0000396 Р Source of Variation DF SS MS F Between Groups 0.00000312 0.00000104 < 0.001 3 16.251 0.00000102 0.000000639 Residual 16 19 Total 0.00000414 The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001). Power of performed test with alpha = 0.050: 1.000 All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) : Comparisons for factor: Comparison **Diff of Means** Р P<0.050 р q Vitovsky vs. Triangle Park 0.00107 4 < 0.001 9 501 Yes

vite vsky vs. Thangle Fall	0.00107		2.201	0.001	100
Vitovsky vs. Mountain Peak	0.000800	3	7.077	< 0.001	Yes
Vitovsky vs. Mid HS	0.000640	2	5.662	0.001	Yes
Mid HS vs. Triangle Park	0.000434	3	3.839	0.039	Yes
Mid HS vs. Mountain Peak	0.000160	2	1.415	0.332	No
Mountain Pea vs. Triangle Par	0.000274	2	2.424	0.106	No

III. Comparison of All Sites

One WayOne-Way Analysis of Variance

Data source: Cr Site in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 4:15:17 PM Data source: Cr Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.00243	0.00218	0.00344	
Wyatt Rd	20	0	0.00433	0.00279	0.00685	
Jaycee	20	0	0.00207	0.00187	0.00222	
Water Tmt Plant	20	0	0.00207	0.00179	0.00222	
Triangle Park	5	0	0.00161	0.00133	0.00172	
Mountain Peak	5	0	0.00189	0.00162	0.00204	
Vitovsky	5	0	0.00264	0.00232	0.00287	
Mid HS	5	0	0.00204	0.00191	0.00207	

H = 54.860 with 7 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All PairwiseAll-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
Wyatt Rd vs Triangle Park	72.075	4.969	Yes
Wyatt Rd vs Mountain Peak	59.975	4.135	Yes
Wyatt Rd vs Mid HS	50.275	3.466	Yes
Wyatt Rd vs Jaycee	45.100	4.916	Yes
Wyatt Rd vs Water Tmt Plant	44.800	4.883	Yes
Wyatt Rd vs Collocated	18.725	2.041	No
Wyatt Rd vs Vitovsky	12.675	0.874	Do Not Test
Vitovsky vs Triangle Park	59.400	3.237	Yes
Vitovsky vs Mountain Peak	47.300	2.578	No
Vitovsky vs Mid HS	37.600	2.049	Do Not Test
Vitovsky vs Jaycee	32.425	2.235	Do Not Test
Vitovsky vs Water Tmt Plant	32.125	2.215	Do Not Test
Vitovsky vs Collocated	6.050	0.417	Do Not Test
Collocated vs Triangle Park	53.350	3.678	Yes
Collocated vs Mountain Peak	41.250	2.844	Do Not Test
Collocated vs Mid HS	31.550	2.175	Do Not Test
Collocated vs Jaycee	26.375	2.875	Do Not Test
Collocated vs Water Tmt Plant	26.075	2.842	Do Not Test
Water Tmt Pla vs Triangle Park	27.275	1.880	No
Water Tmt Pla vs Mountain Peak	15.175	1.046	Do Not Test
Water Tmt Plant vs Mid HS	5.475	0.377	Do Not Test
Water Tmt Plant vs Jaycee	0.300	0.0327	Do Not Test
Jaycee vs Triangle Park	26.975	1.860	Do Not Test
Jaycee vs Mountain Peak	14.875	1.025	Do Not Test
Jaycee vs Mid HS	5.175	0.357	Do Not Test
Mid HS vs Triangle Park	21.800	1.188	Do Not Test
Mid HS vs Mountain Peak	9.700	0.529	Do Not Test
Mountain Peak vs Triangle Park	12.100	0.659	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

C. Manganese

I. Comparison of Stationary Sites

One WayOne-Way Analysis of Variance

Data source: Mn Site in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 4:51:39 PM Data source: Mn Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0137	0.00766	0.0306
Wyatt Rd	20	0	0.0493	0.0222	0.0903
Jaycee	20	0	0.00715	0.00381	0.0111
Water Tmt Plant	20	0	0.0104	0.00494	0.0157

H = 28.709 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee	737.000	7.092	Yes
Wyatt Rd vs Water Tmt Plant	607.500	5.846	Yes
Wyatt Rd vs Collocated	425.500	4.094	<mark>Yes</mark>
Collocated vs Jaycee	311.500	2.997	No
Collocated vs Water Tmt Plant	182.000	1.751	Do Not Test
Water Tmt Plant vs Jaycee	129.500	1.246	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

II. Comparison of Mobile Sites

One WayOne-Way Analysis of Variance Data source: Mn Site in Metals Site Comparison INB Friday, January 22, 2010, 11:12:53 AM

Monday, March 29, 2010, 4:51:39 PM

Data source. Will Site	III IVICture DI	te comparison.
Normality Test:	Failed	(P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksFriday, January 22, 2010), 11:12:53 AM
Data source: Mn Site in Metals Site Comparison.JNB	

Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.00486	0.00412	0.00897
Mountain Peak	5	0	0.00707	0.00597	0.0111
Vitovsky	5	0	0.00873	0.00534	0.0117
Mid HS	5	0	0.00487	0.00355	0.00630
TT 5041 141 6	N 1	C C 1	(D 0 1 5 5)		

H = 5.241 with 3 degrees of freedom. (P = 0.155)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.155)

III. Comparison of All Sites

One WayOne-Way Analysis of Variance Data source: Mn Site in Metals Site Comparison.JNB Monday, March 29, 2010, 4:52:09 PM

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 4:52:09 PM Data source: Mn Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0137	0.00766	0.0306
Wyatt Rd	20	0	0.0493	0.0222	0.0903
Jaycee	20	0	0.00715	0.00381	0.0111
Water Tmt Plant	20	0	0.0104	0.00494	0.0157
Triangle Park	5	0	0.00486	0.00412	0.00897
Mountain Peak	5	0	0.00707	0.00597	0.0111
Vitovsky	5	0	0.00873	0.00534	0.0117
Mid HS	5	0	0.00487	0.00355	0.00630

H = 37.617 with 7 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All Pairwise All-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05	
Wyatt Rd vs Mid HS	61.175	4.217	Yes	
Wyatt Rd vs Triangle Park	52.075	3.590	Yes	
Wyatt Rd vs Jaycee	44.550	4.856	Yes	
Wyatt Rd vs Mountain Peak	39.375	2.714	No	
Wyatt Rd vs Vitovsky	39.275	2.708	Do Not Test	
Wyatt Rd vs Water Tmt Plant	36.125	3.938	Do Not Test	
Wyatt Rd vs Collocated	24.725	2.695	Do Not Test	
Collocated vs Mid HS	36.450	2.513	No	
Collocated vs Triangle Park	27.350	1.885	Do Not Test	
Collocated vs Jaycee	19.825	2.161	Do Not Test	
Collocated vs Mountain Peak	14.650	1.010	Do Not Test	
Collocated vs Vitovsky	14.550	1.003	Do Not Test	
Collocated vs Water Tmt Plant	11.400	1.243	Do Not Test	
Water Tmt Plant vs Mid HS	25.050	1.727	Do Not Test	
Water Tmt Pla vs Triangle Park	15.950	1.100	Do Not Test	
Water Tmt Plant vs Jaycee	8.425	0.918	Do Not Test	
Water Tmt Pla vs Mountain Peak	3.250	0.224	Do Not Test	
Water Tmt Plant vs Vitovsky	3.150	0.217	Do Not Test	
Vitovsky vs Mid HS	21.900	1.194	Do Not Test	
Vitovsky vs Triangle Park	12.800	0.698	Do Not Test	
Vitovsky vs Jaycee	5.275	0.364	Do Not Test	
Vitovsky vs Mountain Peak	0.100	0.00545	Do Not Test	
Mountain Peak vs Mid HS	21.800	1.188	Do Not Test	
Mountain Peak vs Triangle Park	12.700	0.692	Do Not Test	
Mountain Peak vs Jaycee	5.175	0.357	Do Not Test	
Jaycee vs Mid HS	16.625	1.146	Do Not Test	
Jaycee vs Triangle Park	7.525	0.519	Do Not Test	
Triangle Park vs Mid HS	9.100	0.496	Do Not Test	

Note: The multiple comparisons on ranks do not include an adjustment for ties.

D. Lead

I. Comparisons of Stationary Sites One WayOne-Way Analysis of Variance

Monday, March 29, 2010, 5:06:16 PM

Data source: Pb Site in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 5:06:16 PM

Data source: Pb Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.00302	0.00221	0.00469
Wyatt Rd	20	0	0.01000	0.00373	0.0193
Jaycee	20	0	0.00215	0.00150	0.00288
Water Tmt Plant	20	0	0.00273	0.00190	0.00406

H = 22.093 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee	666.000	6.409	Yes
Wyatt Rd vs Water Tmt Plant	486.000	4.677	Yes
Wyatt Rd vs Collocated	424.000	4.080	Yes
Collocated vs Jaycee	242.000	2.329	No
Collocated vs Water Tmt Plant	62.000	0.597	Do Not Test
Water Tmt Plant vs Jaycee	180.000	1.732	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance Friday, January 22, 2010, 11:15:52 AM Data source: Pb Site in Metals Site Comparison.JNB Failed (P < 0.050) Normality Test: Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksFriday, January 22, 2010, 11:15:52 AM Data source: Pb Site in Metals Site Comparison.JNB 75% Group Ν Missing Median 25% Triangle Park 5 0.00205 0.00153 0.00334 0 Mountain Peak 5 0 0.00197 0.00143 0.00232 5 Vitovsky 0 0.00171 0.00159 0.00210 0.00299 Mid HS 5 0 0.00228 0.00313

H = 5.971 with 3 degrees of freedom. (P = 0.113)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.113)

 III. Comparisons of All Sites

 One WayOne-Way Analysis of Variance
 Monday, March 29, 2010, 5:06:42 PM

 Data source: Pb Site in Metals Site Comparison.JNB
 Monday, March 29, 2010, 5:06:42 PM

 Normality Test:
 Failed (P < 0.050)</td>

 Test execution ended by user request, ANOVA on Ranks begun
 Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, March 29, 2010, 5:06:42 PM

Data source: Pb Site in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.00302	0.00221	0.00469	
Wyatt Rd	20	0	0.01000	0.00373	0.0193	
Jaycee	20	0	0.00215	0.00150	0.00288	
Water Tmt Plant	20	0	0.00273	0.00190	0.00406	
Triangle Park	5	0	0.00205	0.00153	0.00334	
Mountain Peak	5	0	0.00197	0.00143	0.00232	
Vitovsky	5	0	0.00171	0.00159	0.00210	
Mid HS	5	0	0.00299	0.00228	0.00313	

H = 31.485 with 7 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05	
Wyatt Rd vs Vitovsky	53.875	3.714	Yes	
Wyatt Rd vs Mountain Peak	52.075	3.590	Yes	
Wyatt Rd vs Triangle Park	42.675	2.942	No	
Wyatt Rd vs Jaycee	40.800	4.447	Do Not Test	
Wyatt Rd vs Water Tmt Plant	29.175	3.180	Do Not Test	
Wyatt Rd vs Mid HS	27.475	1.894	Do Not Test	
Wyatt Rd vs Collocated	24.875	2.711	Do Not Test	
Collocated vs Vitovsky	29.000	1.999	No	
Collocated vs Mountain Peak	27.200	1.875	Do Not Test	
Collocated vs Triangle Park	17.800	1.227	Do Not Test	
Collocated vs Jaycee	15.925	1.736	Do Not Test	
Collocated vs Water Tmt Plant	4.300	0.469	Do Not Test	
Collocated vs Mid HS	2.600	0.179	Do Not Test	
Mid HS vs Vitovsky	26.400	1.439	Do Not Test	
Mid HS vs Mountain Peak	24.600	1.341	Do Not Test	
Mid HS vs Triangle Park	15.200	0.828	Do Not Test	
Mid HS vs Jaycee	13.325	0.919	Do Not Test	
Mid HS vs Water Tmt Plant	1.700	0.117	Do Not Test	
Water Tmt Plant vs Vitovsky	24.700	1.703	Do Not Test	
Water Tmt Pla vs Mountain Peak	22.900	1.579	Do Not Test	
Water Tmt Pla vs Triangle Park	13.500	0.931	Do Not Test	
Water Tmt Plant vs Jaycee	11.625	1.267	Do Not Test	
Jaycee vs Vitovsky	13.075	0.901	Do Not Test	
Jaycee vs Mountain Peak	11.275	0.777	Do Not Test	
Jaycee vs Triangle Park	1.875	0.129	Do Not Test	
Triangle Park vs Vitovsky	11.200	0.610	Do Not Test	
Triangle Park vs Mountain Peak	9.400	0.512	Do Not Test	
Mountain Peak vs Vitovsky	1.800	0.0981	Do Not Test	

Note: The multiple comparisons on ranks do not include an adjustment for ties.

E. Nickel

 I. Comparisons of Stationary Sites

 One WayOne-Way Analysis of Variance

 Data source: Ni Site in Metals Site Comparison.JNB

 Normality Test:
 Failed (P < 0.050)</td>

 Test execution ended by user request, ANOVA on Ranks begun

Tuesday, April 13, 2010, 3:31:23 PM

Data source: NI S	me m r	vietais site Co	omparison.jiv.	D		
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.00105	0.000639	0.00140	
Wyatt Rd	20	0	0.00213	0.000965	0.00328	
Jaycee	20	0	0.000879	0.000651	0.00134	
Water Tmt Plant	20	0	0.000963	0.000679	0.00127	
H = 11590 with 3	degree	es of freedom	(P = 0.009)			

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 13, 2010, 3:31:23 PM Data source. Ni Site in Metals Site Comparison INB

H = 11.590 with 3 degrees of freedom. (P = 0.009)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.009)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All Pairwise All-Pairwise Multiple Comparison Procedures (Tukey Test):

An ran wise An-ran wise with the Comparison rocedures (rukey rest).						
Comparison	Diff of Ranks	q	P<0.05			
Wyatt Rd vs Jaycee	455.500	4.383	Yes			
Wyatt Rd vs Collocated	384.500	3.700	Yes			
Wyatt Rd vs Water Tmt Plant	362.000	3.483	No			
Water Tmt Plant vs Jaycee	93.500	0.900	No			
Water Tmt Plant vs Collocated	22.500	0.217	Do Not Test			
Collocated vs Jaycee	71.000	0.683	Do Not Test			

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

II. Comparisons of Mobile Sites

One WavOne-Wav Analysis of Variance Data source: Ni Site in Metals Site Comparison.JNB Friday, January 22, 2010, 11:18:59 AM

Normality Test:		Passed	(P = 0.680)						
Equal Variance	Test:	Passed	(P = 0.505)						
Group Name	Ν	Missing	Mean	Std Dev	SE	Μ			
Triangle Park	5	0	0.000764	0.000189	0.000	0845			
Mountain Peak	5	0	0.000837	0.000240	0.000	0107			
Vitovsky	5	0	0.00115	0.000306	0.000	0137			
Mid HS	5	0	0.000615	0.000160	0.000	00715			
Source of Varia	tion	DF	SS	MS		F	Р		
Between Groups		3	0.000000748	0.000000	249	4.694	0.016		
Residual		16	0.000000850	0.000000	0531				
Total		19	0.00000160						
TT1 1:00							1 1 1		

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.016).

Power of performed test with alpha = 0.050: 0.694

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Vitovsky vs. Mid HS	0.000530	4	5.145	0.011	Yes
Vitovsky vs. Triangle Park	0.000381	3	3.700	0.047	Yes
Vitovsky vs. Mountain Peak	0.000308	2	2.988	0.051	No
Mountain Peak vs. Mid HS	0.000222	3	2.157	0.306	No
Mountain Pea vs. Triangle Par	0.0000734	2	0.712	0.622	Do Not Test

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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0.000149

2 1.445 0.322

Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

III. Comparisons One WayOne-Wa			iance		Tuesday, Apr	il 13, 2010, 3:32:02 PM
Data source: Ni Si				В	5 / 1	
Normality Test:		Failed (F	P < 0.050)			
Test execution end	ed by u			anks begun		
					anksTuesday, Apr	il 13, 2010, 3:32:02 PM
Data source: Ni Si					57 1	, , ,
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.00105	0.000639	0.00140	
Wyatt Rd	20	0	0.00213	0.000965	0.00328	
Jaycee	20	0	0.000879	0.000651	0.00134	
Water Tmt Plant	20	0	0.000963	0.000679	0.00127	
Triangle Park	5	0	0.000772	0.000625	0.000931	
Mountain Peak	5	0	0.000773	0.000656	0.000996	
Vitovsky	5	0	0.00128	0.000840	0.00138	
Mid HS	5	0	0.000603	0.000490	0.000769	
H = 20.504 with 7						
				tment groups	are greater than w	ould be expected by chance;
there is a statistical					are greater than th	oura de emperera dy chance,
To isolate the grou					ltiple comparison	procedure
All PairwiseAll-Pa						procedure.
Comparison	11 11 150		Diff of Ran		P<0.05	
Wyatt Rd vs Mid H	15		52.050	3.588	Yes	
Wyatt Rd vs Trians		k	38.950	2.685	No	
Wyatt Rd vs Moun			33.050	2.005	Do Not Test	
Wyatt Rd vs Jayce		an	27.600	3.008	Do Not Test	
Wyatt Rd vs Collo			23.000	2.507	Do Not Test	
Wyatt Rd vs Water		lant	21.900	2.387	Do Not Test	
Wyatt Rd vs Water		lant	12.950	0.893	Do Not Test	
Vitovsky vs Mid H			39.100	2.131	No	
Vitovsky vs Triang		-	26.000	1.417	Do Not Test	
Vitovsky vs Mount			20.000	1.095	Do Not Test	
Vitovsky vs Jaycee		ıĸ	14.650	1.010	Do Not Test	
Vitovsky vs Colloc			14.050	0.693	Do Not Test	
Vitovsky vs Conoc Vitovsky vs Water		ant	8.950	0.617	Do Not Test	
Water Tmt Plant vs			30.150	2.078	Do Not Test	
Water Tmt Pla vs T			17.050	1.175	Do Not Test	
Water Tmt Pla vs N	U		11.150	0.769	Do Not Test	
Water Tmt Plant vs			5.700	0.621	Do Not Test	
Water Tmt Plant vs	•		1.100	0.021	Do Not Test	
Collocated vs Mid		caleu				
		rle	29.050	2.003	Do Not Test	
Collocated vs Trian	0		15.950	1.100	Do Not Test	
Collocated vs Mou		CdK	10.050	0.693 0.501	Do Not Test	
Collocated vs Jayce	ee		4.600	0.501	Do Not Test	

Jaycee vs Mid HS	24.450	1.686	Do Not Test
Jaycee vs Triangle Park	11.350	0.782	Do Not Test
Jaycee vs Mountain Peak	5.450	0.376	Do Not Test
Mountain Peak vs Mid HS	19.000	1.036	Do Not Test
Mountain Peak vs Triangle Park	5.900	0.322	Do Not Test
Triangle Park vs Mid HS	13.100	0.714	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

F. Mercury

I. Comparisons of Stationary Sites

One WayOne-Way Analysis of Variance Data source: Hg Site in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 13, 2010, 3:50:57 PM Data source: Hg Site in Metals Site Comparison JNB

Data source. If the in Means the Comparison stab						
Group	Ν	Missing	Median	25%	75%	
Collocated	20	0	0.0000280	0.0000145	0.000103	
Wyatt Rd	20	0	0.0000375	0.0000205	0.0000970	
Jaycee	20	0	0.0000200	0.00000800	0.0000400	
Water Tmt Plant	20	0	0.0000135	0.00000950	0.0000230	

Tuesday, April 13, 2010, 3:50:57 PM

H = 9.932 with 3 degrees of freedom. (P = 0.019)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.019)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

1	1)
Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Water Tmt Plant	432.000	4.157	Yes
Wyatt Rd vs Jaycee	309.000	2.973	No
Wyatt Rd vs Collocated	143.000	1.376	Do Not Test
Collocated vs Water Tmt Plant	289.000	2.781	No
Collocated vs Jaycee	166.000	1.597	Do Not Test
Jaycee vs Water Tmt Plant	123.000	1.184	Do Not Test
NL (TE1 1/1 1	1 1 / 1 1	1	

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

II. Comparisons of Mobile Sites

One WayOne-Way Analysis of Variance Friday, January 22, 2010, 11:21:42 AM Data source: Hg Site in Metals Site Comparison.JNB Failed (P < 0.050)Normality Test: Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksFriday, January 22, 2010, 11:21:42 AM Data source: Hg Site in Metals Site Comparison.JNB Group Ν Missing Median 25% 75% 5 **Triangle Park** 0 0.0000280 0.0000227 0.0000833 5 0 Mountain Peak 0.000266 0.000230 0.000293 5 0.00001000 0.0000150 Vitovsky 0 0.00000775

Mid HS	5	0	0.00000600	0.00000600	0.00000825

H = 16.800 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Mountain Peak vs Mid HS70.0005.292YesMountain Peak vs Vitovsky53.0004.006YesMountain Peak vs Triangle Park23.0001.739NoTriangle Park vs Mid HS47.0003.553NoTriangle Park vs Vitovsky30.0002.268Do Not Test	Comparison	Diff of Ranks	q	P<0.05
Mountain Peak vs Triangle Park23.0001.739NoTriangle Park vs Mid HS47.0003.553NoTriangle Park vs Vitovsky30.0002.268Do Not Test	Mountain Peak vs Mid HS	70.000	5.292	Yes
Triangle Park vs Mid HS47.0003.553NoTriangle Park vs Vitovsky30.0002.268Do Not Test	Mountain Peak vs Vitovsky	53.000	4.006	Yes
Triangle Park vs Vitovsky30.0002.268Do Not Test	Mountain Peak vs Triangle Park	23.000	1.739	No
6	Triangle Park vs Mid HS	47.000	3.553	No
	Triangle Park vs Vitovsky	30.000	2.268	Do Not Test
Vitovsky vs Mid HS 17.000 1.285 Do Not Test	Vitovsky vs Mid HS	17.000	1.285	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

III. Comparisons of All Sites

One WayOne-Way Analysis of Variance

Tuesday, April 13, 2010, 3:51:25 PM

Data source: Hg Site in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 13, 2010, 3:51:25 PM Data source: Hg Site in Metals Site Comparison JNB

Group	Ν	Missing	Median	25%	75%
Collocated	20	0	0.0000280	0.0000145	0.000103
Wyatt Rd	20	0	0.0000375	0.0000205	0.0000970
Jaycee	20	0	0.0000200	0.00000800	0.0000400
Water Tmt Plant	20	0	0.0000135	0.00000950	0.0000230
Triangle Park	5	0	0.0000280	0.0000227	0.0000833
Mountain Peak	5	0	0.000266	0.000230	0.000293
Vitovsky	5	0	0.00001000	0.00000775	0.0000150
Mid HS	5	0	0.00000600	0.00000600	0.00000825

H = 32.411 with 7 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All PairwiseAll-Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
Mountain Peak vs Mid HS	77.900	4.246	Yes
Mountain Peak vs Vitovsky	67.800	3.695	Yes
Mountain Peak vs Water Tmt Pla	53.800	3.709	Yes
Mountain Peak vs Jaycee	47.050	3.244	Yes
Mountain Peak vs Collocated	36.475	2.515	No
Mountain Peak vs Wyatt Rd	28.250	1.948	Do Not Test
Mountain Peak vs Triangle Park	28.000	1.526	Do Not Test
Triangle Park vs Mid HS	49.900	2.720	No
Triangle Park vs Vitovsky	39.800	2.169	Do Not Test

Triangle Park vs Water Tmt Pla	25.800	1.779	Do Not Test
Triangle Park vs Jaycee	19.050	1.313	Do Not Test
Triangle Park vs Collocated	8.475	0.584	Do Not Test
Triangle Park vs Wyatt Rd	0.250	0.0172	Do Not Test
Wyatt Rd vs Mid HS	49.650	3.423	Do Not Test
Wyatt Rd vs Vitovsky	39.550	2.727	Do Not Test
Wyatt Rd vs Water Tmt Plant	25.550	2.785	Do Not Test
Wyatt Rd vs Jaycee	18.800	2.049	Do Not Test
Wyatt Rd vs Collocated	8.225	0.897	Do Not Test
Collocated vs Mid HS	41.425	2.856	Do Not Test
Collocated vs Vitovsky	31.325	2.159	Do Not Test
Collocated vs Water Tmt Plant	17.325	1.888	Do Not Test
Collocated vs Jaycee	10.575	1.153	Do Not Test
Jaycee vs Mid HS	30.850	2.127	Do Not Test
Jaycee vs Vitovsky	20.750	1.430	Do Not Test
Jaycee vs Water Tmt Plant	6.750	0.736	Do Not Test
Water Tmt Plant vs Mid HS	24.100	1.661	Do Not Test
Water Tmt Plant vs Vitovsky	14.000	0.965	Do Not Test
Vitovsky vs Mid HS	10.100	0.550	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

Appendix $I - PM_{10}$ Metals Site Comparisons: Individual Quarters of Data

A. 1st Quarter Metals PM₁₀ Data

I. Aluminum

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 7 in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 3:05:40 PM Data source: Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Al Collocated	5	0	0.166	0.110	0.183
Wyatt Rd	5	0	0.303	0.133	0.456
Jaycee Park	5	0	0.0665	0.0529	0.0746
Water Treatment Plant	5	0	0.0846	0.0693	0.101
Triangle Park	5	0	0.0503	0.0421	0.0678

H = 8.043 with 4 degrees of freedom. (P = 0.090)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.090)

II. Chromium

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 7 in Metals Site Comparison.JNB Thursday, January 21, 2010, 3:06:21 PM

Thursday, January 21, 2010, 3:05:40 PM

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 3:06:21 PM Data source: Data 7 in Metals Site Comparison.JNB

		1			
Group	Ν	Missing	Median	25%	75%
Cr Collocated	5	0	0.00339	0.00212	0.00361
Wyatt Rd	5	0	0.00665	0.00316	0.00840
Jaycee Park	5	0	0.00187	0.00146	0.00234
Water Treatment Plant	5	0	0.00182	0.00163	0.00193
Triangle Park	5	0	0.00161	0.00133	0.00172
TT 44 TC4 14 4 1	0.0	1 (5	0.001		

H = 11.564 with 4 degrees of freedom. (P = 0.021)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.021)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Triangle Park	69.500	4.223	Yes
Wyatt Rd vs Water Treatme	48.500	2.947	No
Wyatt Rd vs Jaycee Park	48.500	2.947	Do Not Test
Wyatt Rd vs Cr Collocated	16.000	0.972	Do Not Test
Cr Collocated vs Triangle Park	53.500	3.251	No
Cr Collocated vs Water Treatme	32.500	1.975	Do Not Test
Cr Collocated vs Jaycee Park	32.500	1.975	Do Not Test
Jaycee Park vs Triangle Park	21.000	1.276	Do Not Test
Jaycee Park vs Water Treatme	0.000	0.000	Do Not Test
Water Treatme vs Triangle Park	21.000	1.276	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant

difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

Thursday, January 21, 2010, 3:07:02 PM

Thursday, January 21, 2010, 3:07:31 PM

III. Manganese

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 3:07:02 PM Data source: Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Mn Collocated	5	0	0.0329	0.0122	0.0348	
Wyatt Rd	5	0	0.0924	0.0206	0.130	
Jaycee Park	5	0	0.00668	0.00559	0.0133	
Water Treatment Plant	5	0	0.0110	0.00835	0.0152	
Triangle Park	5	0	0.00486	0.00412	0.00897	

H = 7.894 with 4 degrees of freedom. (P = 0.096)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.096)

IV. Lead

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 3:07:31 PM Data source: Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Pb Collocated	5	0	0.00490	0.00369	0.00690
Wyatt Rd	5	0	0.0103	0.00760	0.0172
Jaycee Park	5	0	0.00312	0.00188	0.00602
Water Treatment Plant	5	0	0.00355	0.00211	0.00503
Triangle Park	5	0	0.00205	0.00153	0.00334

H = 5.808 with 4 degrees of freedom. (P = 0.214)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.214)

V. Nickel

a. Comparison between s	sites					
One WayOne-Way Anal	ysis of '	Variance		Thurs	day, January 21	, 2010, 3:26:59 PM
Data source: Data 7 in M	etals Si	te Comparis	son.JNB			
Normality Test:	Failed	(P < 0.05	0)			
Test execution ended by u	ser requ	lest, ANOV	'A on Ranks b	begun		
Kruskal-Wallis One Wa	yOne-V	Vay Analys	is of Varianc	e on RanksT	hursday, Januar	y 21, 2010, 3:26:59 PM
Data source: Data 7 in M	etals Si	te Comparis	son.JNB			
Group	Ν	Missing	Median	25%	75%	
Ni Collocated	5	0	0.00111	0.000973	0.00168	
Wyatt Rd	5	0	0.00329	0.00233	0.00349	

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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Jaycee Park	5	0	0.000680	0.000655	0.00209
Water Treatment Plant	5	0	0.000912	0.000636	0.000973
Triangle Park	5	0	0.000772	0.000625	0.000931

H = 6.683 with 4 degrees of freedom. (P = 0.154)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.154)

VI. Mercury

a. Comparison be	tween sites
------------------	-------------

Thursday, January 21, 2010, 3:27:31 PM

Data source: Data 7 in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

One WayOne-Way Analysis of Variance

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 3:27:31 PM Data source: Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Hg Collocated	5	0	0.0000320	0.0000103	0.0000612
Wyatt Rd	5	0	0.0000210	0.0000150	0.0000960
Jaycee Park	5	0	0.0000190	0.0000115	0.0000532
Water Treatment Plant	5	0	0.00000800	0.00000600	0.0000147
Triangle Park	5	0	0.0000280	0.0000227	0.0000833

H = 7.418 with 4 degrees of freedom. (P = 0.115)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.115)

B. 2nd Quarter Metals Data

I. Aluminum

a. Comparison between sites

One WayOne-Way Analysis of Variance Data source: Copy of Data 7 in Metals Site Comparison.JNB Thursday, January 21, 2010, 4:13:09 PM

Data sourcer copy of D			companioon		
Normality Test:	Passe	d $(P = 0.50)$)9)		
Equal Variance Test:	Passe	d $(P = 0.07)$	75)		
Group Name	Ν	Missing	Mean	Std Dev	SEM
Al Collocated	5	0	0.107	0.0338	0.0151
Wyatt Rd	5	0	0.265	0.108	0.0484
Jaycee Park	5	0	0.107	0.0535	0.0239
Water Treatment Plant	5	0	0.118	0.0436	0.0195
Mountain Peak	5	0	0.0837	0.0408	0.0183
Source of Variation	DF	SS	MS	F	Р
Between Groups	4	0.107	0.0267	6.922	0.001
Residual	20	0.0772	0.00386		
Total	24	0.184			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.001).

Power of performed test with alpha = 0.050: 0.956

All PairwiseAll-Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
Wyatt Rd vs. Mountain Peak	0.181	5	6.525	0.002	Yes
Wyatt Rd vs. Jaycee Park	0.158	4	5.686	0.004	Yes
Wyatt Rd vs. Al Collocated	0.158	3	5.679	0.002	Yes
Wyatt Rd vs. Water Treatm	0.147	2	5.298	0.001	Yes

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

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Water Treatm vs. Mountain Peak	0.0341	4	1.228	0.821	No
Water Treatm vs. Jaycee Park	0.0108	3	0.389	0.959	Do Not Test
Water Treatm vs. Al Collocate	0.0106	2	0.381	0.791	Do Not Test
Al Collocate vs. Triangle Par	0.0235	3	0.847	0.822	Do Not Test
Al Collocated vs. Jaycee Park	0.000220	2	0.00792	0.996	Do Not Test
Jaycee Park vs. Mountain Peak	0.0233	2	0.839	0.560	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

Thursday, January 21, 2010, 4:13:43 PM

II. Chromium

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:13:43 PM Data source: Copy of Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%		
Cr Collocated	5	0	0.00220	0.0019	3 0.00275		
Wyatt Rd	5	0	0.00426	0.0034	3 0.00583		
Jaycee Park	5	0	0.00195	0.0016	0.00216		
Water Treatment Plant	5	0	0.00177	0.0017	3 0.00197		
Mountain Peak	5	0	0.00189	0.0016	2 0.00204		
H = 15.006 with 4 degrees	s of fre	edom. $(P = $	0.005)				
The differences in the me	dian va	lues among	the treatment	groups are	greater than would be	e expected by chance;	
there is a statistically sign	ificant	difference (P = 0.005)				
To isolate the group or groups that differ from the others use a multiple comparison procedure.							
All PairwiseAll-Pairwise	Multip	le Compariso	on Procedures	s (Tukey Te	st):		
Comparison		Diff	of Ranks	q	P<0.05		
W UDI M UDI					1 0100		
Wyatt Rd vs Mountain Pe	eak		74.500	4.527	Yes		
Wyatt Rd vs Mountain Pe Wyatt Rd vs Water Treatr			74.500 73.000				
5				4.527	Yes		
Wyatt Rd vs Water Treatr	me		73.000	4.527 4.436	Yes Yes		
Wyatt Rd vs Water Treatr Wyatt Rd vs Jaycee Park Wyatt Rd vs Cr Collocate	me ed		73.000 63.500	4.527 4.436 3.859	Yes Yes Yes		
Wyatt Rd vs Water Treatr Wyatt Rd vs Jaycee Park	me ed in Peak		73.000 63.500 34.000	4.527 4.436 3.859 2.066	Yes Yes Yes No		
Wyatt Rd vs Water Treatr Wyatt Rd vs Jaycee Park Wyatt Rd vs Cr Collocate Cr Collocated vs Mountai	me ed in Peak reatme		73.000 63.500 34.000 40.500	4.527 4.436 3.859 2.066 2.461	Yes Yes Yes No No		
Wyatt Rd vs Water Treatr Wyatt Rd vs Jaycee Park Wyatt Rd vs Cr Collocate Cr Collocated vs Mountai Cr Collocated vs Water T	me ed in Peak reatme Park		73.000 63.500 34.000 40.500 39.000	4.527 4.436 3.859 2.066 2.461 2.370	Yes Yes Yes No No Do Not Test		
Wyatt Rd vs Water Treatr Wyatt Rd vs Jaycee Park Wyatt Rd vs Cr Collocate Cr Collocated vs Mountai Cr Collocated vs Water T Cr Collocated vs Jaycee P	me ed in Peak reatme Park Peak		73.000 63.500 34.000 40.500 39.000 29.500	4.527 4.436 3.859 2.066 2.461 2.370 1.793	Yes Yes No No Do Not Test Do Not Test		

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

III. Manganese

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:14:13 PM Data source: Copy of Data 7 in Metals Site Comparison INB

Thursday, January 21, 2010, 4:14:13 PM

Thursday, January 21, 2010, 4:14:47 PM

Data source. Copy of Da	<i>ita / III</i>	Wietais Bite v	20111parison.51	ND		
Group	Ν	Missing	Median	25%	75%	
Mn Collocated	5	0	0.0127	0.0104	0.0214	
Wyatt Rd	5	0	0.0608	0.0450	0.0910	
Jaycee Park	5	0	0.0102	0.00824	0.0184	
Water Treatment Plant	5	0	0.0156	0.0104	0.0212	
Mountain Peak	5	0	0.00707	0.00597	0.0111	

H = 12.827 with 4 degrees of freedom. (P = 0.012)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.012)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Mountain Peak	81.000	4.922	Yes
Wyatt Rd vs Jaycee Park	57.000	3.464	No
Wyatt Rd vs Water Treatme	50.000	3.038	Do Not Test
Wyatt Rd vs Mn Collocated	47.000	2.856	Do Not Test
Mn Collocated vs Mountain Peak	34.000	2.066	No
Mn Collocated vs Jaycee Park	10.000	0.608	Do Not Test
Mn Collocated vs Water Treatme	3.000	0.182	Do Not Test
Water Treatme vs Mountain Peak	31.000	1.884	Do Not Test
Water Treatme vs Jaycee Park	7.000	0.425	Do Not Test
Jaycee Park vs Mountain Peak	24.000	1.458	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

IV. Lead

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:14:47 PM Data source: Copy of Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Pb Collocated	5	0	0.00255	0.00215	0.00416	
Wyatt Rd	5	0	0.00443	0.00389	0.0331	
Jaycee Park	5	0	0.00221	0.00174	0.00244	
Water Treatment Plant	5	0	0.00192	0.00165	0.00278	
Mountain Peak	5	0	0.00197	0.00143	0.00232	

H = 12.383 with 4 degrees of freedom. (P = 0.015)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.015)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Wyatt Rd vs Mountain Peak72.0004.375Yes
Wyatt Rd vs Jaycee Park63.5003.859Yes
Wyatt Rd vs Water Treatme60.5003.676No
Wyatt Rd vs Pb Collocated39.0002.370Do Not Test
Pb Collocated vs Mountain Peak 33.000 2.005 No
Pb Collocated vs Jaycee Park 24.500 1.489 Do Not Test
Pb Collocated vs Water Treatme 21.500 1.306 Do Not Test
Water Treatme vs Mountain Peak11.5000.699Do Not Test
Water Treatme vs Jaycee Park3.0000.182Do Not Test
Jaycee Park vs Mountain Peak8.5000.516Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

Thursday, January 21, 2010, 4:15:21 PM

V. Nickel

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:15:21 PM Data source: Copy of Data 7 in Metals Site Comparison.JNB

······································						
Group	Ν	Missing	Median	25%	75%	
Ni Collocated	5	0	0.00101	0.000629	0.00137	
Wyatt Rd	5	0	0.00205	0.00131	0.00261	
Jaycee Park	5	0	0.00134	0.000885	0.00136	
Water Treatment Plant	5	0	0.00124	0.000679	0.00144	
Mountain Peak	5	0	0.000773	0.000656	0.000996	

H = 7.380 with 4 degrees of freedom. (P = 0.117)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.117)

VI. Mercury

a. Comparison between	sites							
One WayOne-Way Analysis of Variance					Thursday, January 21, 2010, 4:15:46 PM			
Data source: Copy of Da	ata 7 in I	Metals Site C	Comparison.JN	ΙВ				
Normality Test:	Failed	(P < 0.05)	0)					
Test execution ended by	user requ	uest, ANOV	A on Ranks be	egun				
Kruskal-Wallis One Wa	yOne-V	Vay Analys	is of Variance	e <mark>on Ranks</mark> Thu	irsday, January	21, 2010, 4:15:46 PM		
Data source: Copy of Da	ata 7 in I	Metals Site C	Comparison.JN	1B				
Group	Ν	Missing	Median	25%	75%			
Hg Collocated	5	0	0.000320	0.000137	0.000373			

Wyatt Rd	5	0	0.0000700	0.0000582	0.000293
Jaycee Park	5	0	0.0000580	0.0000375	0.000203
Water Treatment Plant	5	0	0.0000620	0.0000497	0.0000827
Mountain Peak	5	0	0.000266	0.000230	0.000293

H = 7.945 with 4 degrees of freedom. (P = 0.094)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.094)

C. 3rd Quarter Metals Data

I. Aluminum

a. Comparison between sites

One WayOne-Way Analysis of Variance

Thursday, January 21, 2010, 4:16:35 PM

Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:16:35 PM **Data source:** Copy of Copy of Data 7 in Metals Site Comparison.JNB

Group	N	Missing	Median	25%	75%
Al Collocated	5	0	0.118	0.0964	0.162
Wyatt Rd	5	0	0.212	0.184	0.383
Jaycee Park	5	0	0.0938	0.0658	0.144
Water Treatment Plant	5	0	0.112	0.0712	0.126
Vitovsky	5	0	0.0878	0.0705	0.113

H = 10.626 with 4 degrees of freedom. (P = 0.031)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.031)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Vitovsky	67.000	4.071	Yes
Wyatt Rd vs Jaycee Park	60.000	3.646	No
Wyatt Rd vs Water Treatme	55.000	3.342	Do Not Test
Wyatt Rd vs Al Collocated	38.000	2.309	Do Not Test
Al Collocated vs Vitovsky	29.000	1.762	No
Al Collocated vs Jaycee Park	22.000	1.337	Do Not Test
Al Collocated vs Water Treatme	17.000	1.033	Do Not Test
Water Treatme vs Vitovsky	12.000	0.729	Do Not Test
Water Treatme vs Jaycee Park	5.000	0.304	Do Not Test
Jaycee Park vs Vitovsky	7.000	0.425	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

 II. Chromium

 a. Comparison between sites

 One WayOne-Way Analysis of Variance

 Thursday, January 21, 2010, 4:17:06 PM

 Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

 Normality Test:
 Failed (P < 0.050)</td>

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:17:06 PM
Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Data source: copy or c	opj or i		and store eemp	ansentera	
Group	Ν	Missing	Median	25%	75%
Cr Collocated	5	0	0.00259	0.00227	0.00364
Wyatt Rd	5	0	0.00474	0.00359	0.00826
Jaycee Park	5	0	0.00214	0.00214	0.00234
Water Treatment Plant	5	0	0.00222	0.00213	0.00246
Vitovsky	5	0	0.00264	0.00232	0.00287

H = 14.265 with 4 degrees of freedom. (P = 0.006)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.006)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All Pairwise All-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee Park	77.000	4.679	Yes
Wyatt Rd vs Water Treatme	70.000	4.254	Yes
Wyatt Rd vs Cr Collocated	35.500	2.157	No
Wyatt Rd vs Triangle Park	35.000	2.127	Do Not Test
Vitovsky vs Jaycee Park	42.000	2.552	No
Vitovsky vs Water Treatme	35.000	2.127	Do Not Test
Vitovsky vs Cr Collocated	0.500	0.0304	Do Not Test
Cr Collocated vs Jaycee Park	41.500	2.522	Do Not Test
Cr Collocated vs Water Treatme	34.500	2.096	Do Not Test
Water Treatme vs Jaycee Park	7.000	0.425	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

III. Manganese

a. Comparison between sites

One WayOne-Way Ana	lysis of	Variance		Thurs	day, January 21, 2010, 4:17:32 PM
Data source: Copy of Co			als Site Comp		
Normality Test:	Failed	d (P < 0.05)	0)		
Test execution ended by	user rec	juest, ANOV	A on Ranks be	egun	
Kruskal-Wallis One Wa	yOne-	Way Analys	is of Variance	e on RanksTh	ursday, January 21, 2010, 4:17:32 PM
Data source: Copy of Co	opy of I	Data 7 in Met	als Site Comp	arison.JNB	
Group	Ν	Missing	Median	25%	75%
Mn Collocated	5	0	0.00866	0.00537	0.0208
Wyatt Rd	5	0	0.0372	0.0320	0.107
Jaycee Park	5	0	0.00360	0.00322	0.00783
Water Treatment Plant	5	0	0.00530	0.00409	0.00610
Vitovsky	5	0	0.00873	0.00534	0.0117
H = 14.149 with 4 degree	es of fre	edom. $(P = 0)$	0.007)		
The differences in the me	edian va	lues among t	he treatment g	roups are greater	ater than would be expected by chance;
there is a statistically sign	nificant	difference (I	P = 0.007)		
To isolate the group or gr	oups th	at differ fron	n the others us	e a multiple c	omparison procedure.
All PairwiseAll-Pairwise	Multip	le Compariso	on Procedures	(Tukey Test):	

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee Park	76.000	4.618	Yes
Wyatt Rd vs Water Treatme	74.000	4.497	Yes
Wyatt Rd vs Vitovsky	45.000	2.734	No
Wyatt Rd vs Mn Collocated	40.000	2.431	Do Not Test
Mn Collocated vs Jaycee Park	36.000	2.188	No
Mn Collocated vs Water Treatme	34.000	2.066	Do Not Test
Mn Collocated vs Vitovsky	5.000	0.304	Do Not Test
Vitovsky vs Jaycee Park	31.000	1.884	Do Not Test
Vitovsky vs Water Treatme	29.000	1.762	Do Not Test
Water Treatme vs Jaycee Park	2.000	0.122	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

IV. Lead

a. Comparison between sites

One WayOne-Way Analysis of Variance

Thursday, January 21, 2010, 4:18:01 PM

Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:18:01 PM Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%
Pb Collocated	5	0	0.00214	0.00163	0.00380
Wyatt Rd	5	0	0.0151	0.00561	0.0277
Jaycee Park	5	0	0.00137	0.00134	0.00192
Water Treatment Plant	5	0	0.00223	0.00161	0.00846
Vitovsky	5	0	0.00171	0.00159	0.00210

H = 10.987 with 4 degrees of freedom. (P = 0.027)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.027)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Jaycee Park	72.500	4.405	Yes
Wyatt Rd vs Vitovsky	58.500	3.555	No
Wyatt Rd vs Pb Collocated	42.500	2.582	Do Not Test
Wyatt Rd vs Water Treatme	39.000	2.370	Do Not Test
Water Treatme vs Jaycee Park	33.500	2.036	No
Water Treatme vs Vitovsky	19.500	1.185	Do Not Test
Water Treatme vs Pb Collocated	3.500	0.213	Do Not Test
Pb Collocated vs Jaycee Park	30.000	1.823	Do Not Test
Pb Collocated vs Vitovsky	16.000	0.972	Do Not Test
Vitovsky vs Jaycee Park	14.000	0.851	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant

difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

V. Nickel

a. Comparison between sites

One WayOne-Way Analysis of Variance

Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:18:28 PM Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Group	Ν	Missing	Median	25%	75%	
Ni Collocated	5	0	0.00109	0.000773	0.00130	
Wyatt Rd	5	0	0.00153	0.00124	0.00299	
Jaycee Park	5	0	0.000959	0.000889	0.00118	
Water Treatment Plant	5	0	0.00120	0.000968	0.00490	
Vitovsky	5	0	0.00128	0.000840	0.00138	

H = 4.918 with 4 degrees of freedom. (P = 0.296)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.296)

VI. Mercury

a. Comparison between sites

One WayOne-Way Analysis of Variance

Thursday, January 21, 2010, 4:18:52 PM

Thursday, January 21, 2010, 4:18:28 PM

Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksThursday, January 21, 2010, 4:18:52 PM Data source: Copy of Copy of Data 7 in Metals Site Comparison.JNB

15	1.2		1			
Group	Ν	Missing	Median	25%	75%	
Hg Collocated	5	0	0.0000230	0.0000135	0.0000280	
Wyatt Rd	5	0	0.0000680	0.0000355	0.000136	
Jaycee Park	5	0	0.00000600	0.00000400	0.0000243	
Water Treatment Plant	5	0	0.0000120	0.0000113	0.0000188	
Vitovsky	5	0	0.00001000	0.00000775	0.0000150	
	0.0	1 (5	0.01.7			

H = 12.395 with 4 degrees of freedom. (P = 0.015)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.015)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

ComparisonDiff of RanksqP<0.05
Wyatt Rd vs Jaycee Park69.5004.223Yes
Wyatt Rd vs Water Treatme55.0003.342No
Wyatt Rd vs Hg Collocated40.5002.461Do Not Test
Hg Collocated vs Vitovsky 29.500 1.793 No
Hg Collocated vs Jaycee Park 29.000 1.762 Do Not Test
Hg Collocated vs Water Treatme 14.500 0.881 Do Not Test
Water Treatme vs Vitovsky15.0000.911Do Not Test
Water Treatme vs Jaycee Park14.5000.881Do Not Test

Jaycee Park vs Vitovsky0.5000.0304Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

D. 4th Quarter Metals Data

I. Aluminum

a. Comparison between sites

One WayOne-Way Analysis of Variance

Tuesday, April 20, 2010, 11:36:36 AM

Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB

Normality Test:	Passe	d $(P = 0.78)$	(5)				
Equal Variance Test:	Passe	d ($P = 0.35$	9)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Al Collocated	5	0	0.122	0.0594	0.0266		
Wyatt Rd	5	0	0.194	0.111	0.0495		
Jaycee Park	5	0	0.0682	0.0368	0.0165		
Water Treatment Plant	5	0	0.159	0.0663	0.0297		
Midlothian HS	5	0	0.0798	0.0573	0.0256		
Source of Variation	DF	SS	MS	F	Р		
Between Groups	4	0.0558	0.0140	2.808	0.053		
Residual	20	0.0994	0.00497				
Total	24	0.155					
		-					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.053). Power of performed test with alpha = 0.050: 0.446

The power of the performed test (0.446) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

II. Chromium

a. Comparison between sites

One WayOne-Way Analysis of Variance

Tuesday, April 20, 2010, 11:33:48 AM

Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 20, 2010, 11:33:48 AM Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB

Dura sources copy (2) of copy of Dura / in fileaus site comparison.prob					
Group	Ν	Missing	Median	25%	75%
Cr Collocated	5	0	0.00241	0.00230	0.00332
Wyatt Rd	5	0	0.00294	0.00237	0.00525
Jaycee Park	5	0	0.00200	0.00195	0.00226
Water Treatment Plant	5	0	0.00221	0.00219	0.00230
Midlothian HS	5	0	0.00204	0.00191	0.00207

H = 13.994 with 4 degrees of freedom. (P = 0.007)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.007)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Midlothian HS	73.000	4.436	Yes
Wyatt Rd vs Jaycee Park	57.500	3.494	No
Wyatt Rd vs Water Treatme	28.500	1.732	Do Not Test
Wyatt Rd vs Cr Collocated	11.000	0.668	Do Not Test
Cr Collocated vs Midlothian HS	62.000	3.767	No
Cr Collocated vs Jaycee Park	46.500	2.826	Do Not Test
Cr Collocated vs Water Treatme	17.500	1.063	Do Not Test
Water Treatme vs Midlothian HS	44.500	2.704	Do Not Test
Water Treatme vs Jaycee Park	29.000	1.762	Do Not Test
Jaycee Park vs Midlothian HS	15.500	0.942	Do Not Test

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

III. Manganese

a. Comparison between sites

One WayOne-Way Analysis of Variance

Tuesday, April 20, 2010, 11:34:23 AM

Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB **Normality Test:** Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 20, 2010, 11:34:23 AM

Data source: Copy (2) o	of Copy c	of Data 7 in	Metals Site Co	omparison.JNI	3	
Group	Ν	Missing	Median	25%	75%	
Mn Collocated	5	0	0.00875	0.00617	0.0193	
Wyatt Rd	5	0	0.0233	0.0105	0.0506	
Jaycee Park	5	0	0.00601	0.00316	0.00987	
Water Treatment Plant	5	0	0.0134	0.00654	0.0190	
Midlothian HS	5	0	0.00487	0.00355	0.00630	
						-

H = 9.866 with 4 degrees of freedom. (P = 0.043)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.043)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Wyatt Rd vs Midlothian HS64.0003.889YesWyatt Rd vs Jaycee Park54.0003.281NoWyatt Rd vs Water Treatme24.0001.458Do Not TestWyatt Rd vs Mn Collocated23.0001.398Do Not TestMn Collocated vs Midlothian HS41.0002.491No
Wyatt Rd vs Water Treatme24.0001.458Do Not TestWyatt Rd vs Mn Collocated23.0001.398Do Not Test
Wyatt Rd vs Mn Collocated23.0001.398Do Not Test
Mn Collocated vs Midlothian HS 41.000 2.491 No
Mn Collocated vs Jaycee Park 31.000 1.884 Do Not Test
Mn Collocated vs Water Treatme 1.000 0.0608 Do Not Test
Water Treatme vs Midlothian HS40.0002.431Do Not Test
Water Treatme vs Jaycee Park30.0001.823Do Not Test
Jaycee Park vs Midlothian HS10.0000.608Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

IV. Lead

a. Comparison between sites

One WayOne-Way Analysis of Variance Tuesday, April 20, 2010, 11:34:49 AM Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB Normality Test: Failed (P < 0.050)Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 20, 2010, 11:34:49 AM Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB Group Ν Missing Median 25% 75% Pb Collocated 5 0 0.00333 0.00230 0.00415 Wyatt Rd 5 0 0.00478 0.00295 0.0140 Jaycee Park 5 0 0.00270 0.00185 0.00323

0.00338

0.00299

H = 4.746 with 4 degrees of freedom. (P = 0.314)

5

5

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.314)

0.00273

0.00228

0.00415

0.00313

V. Nickel

a. Comparison between sites

Water Treatment Plant

Midlothian HS

One WayOne-Way Analysis of Variance

Tuesday, April 20, 2010, 11:35:22 AM

Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB

0

0

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 20, 2010, 11:35:22 AM Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB

15()	1 2			1	
Group	Ν	Missing	Median	25%	75%
Ni Collocated	5	0	0.000619	0.000509	0.00104
Wyatt Rd	5	0	0.00104	0.000630	0.00304
Jaycee Park	5	0	0.000543	0.000469	0.000680
Water Treatment Plant	5	0	0.000677	0.000522	0.00141
Midlothian HS	5	0	0.000603	0.000490	0.000769
TT 4 (50 1/1 4 1	6.6	1 /D	0.005)		

H = 4.652 with 4 degrees of freedom. (P = 0.325)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.325)

VI. Mercury

a. Comparison between	sites								
One WayOne-Way Ana	lysis of Va	ariance		Tuesday	, April 20, 2010, 11	:35:46 AM			
Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB									
Normality Test:	Failed	(P < 0.050))						
Test execution ended by	user reque	st, ANOVA	on Ranks begu	n					
Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksTuesday, April 20, 2010, 11:35:46 AM									
Data source: Copy (2) of Copy of Data 7 in Metals Site Comparison.JNB									
Group	N N	Aissing	Median	25%	75%				

Hg Collocated	5	0	0.0000150	0.0000130	0.0000250
Wyatt Rd	5	0	0.0000200	0.0000133	0.0000343
Jaycee Park	5	0	0.0000150	0.00000575	0.0000232
Water Treatment Plant	5	0	0.00001000	0.00000950	0.0000145
Midlothian HS	5	0	0.00000600	0.00000600	0.00000825

H = 8.057 with 4 degrees of freedom. (P = 0.090) The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.090)

I. Collocated

a. Aluminum

One Way Analysis of Variance

Data source: Collocated-Metals in Monitor Comparisons.JNB **Normality Test:** Passed (P = 0.992)

Normanty Test:		r asseu	$(\Gamma = 0.992)$				
Equal Variance	Test:	Passed	(P = 0.836)				
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Al-1st Quarter	5	0	0.142	0.0582	0.0260		
2nd Quarter	5	0	0.107	0.0338	0.0151		
3rd Quarter	5	0	0.135	0.0608	0.0272		
4th Quarter	5	0	0.122	0.0594	0.0266		
Source of Variat	tion	DF	SS	MS	F	Р	
Between Groups		3	0.00358	0.00119	0.407	0.750	
Residual		16	0.0470	0.00294			
Total		19	0.0506				

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.750). Power of performed test with alpha = 0.050; 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

b. Chromium

One Way Analysis of Variance

Data source: Collocated-Metals in Monitor Comparisons JNB Normality Test: Passed (P = 0.144) Tuesday, June 01, 2010, 11:48:33 AM

Tuesday, June 01, 2010, 11:48:06 AM

Normality Les	ST:	Passed	(P = 0.144)					
Equal Varianc	e Test	Passed	(P = 0.881)					
Group Name	Ν	Missing	Mean	Std Dev	SE	М		
Cr-1st Q	5	0	0.00297	0.000915	0.00	0409		
2nd Q	5	0	0.00245	0.000695	0.00	0311		
3rd Q	5	0	0.00303	0.00111	0.00	0498		
4th Q	5	0	0.00281	0.000780	0.00	0349		
Source of Var	iation	DF	SS	MS	5	F	Р	
Between Group	os	3	0.00000103	0.00000	00342	0.432	0.733	
Residual		16	0.0000127	0.00000	0792			
Total		19	0.0000137					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.733).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Manganese

One Way Anal	lysis of	f Variance			Tuesday, June 01, 2010, 11:48:56 AM				
Data source: Collocated-Metals in Monitor Comparisons.JNB									
Normality Tes	t:	Passed	(P = 0.31)	2)					
Equal Varianc	e Test	: Passed	(P = 0.90)	2)					
Group Name	Ν	Missing	Mean	Std Dev	SEM				
Mn-1st Q	5	0	0.0246	0.0140	0.00627				
2nd Q	5	0	0.0165	0.00949	0.00424				
3rd Q	5	0	0.0143	0.0140	0.00627				
	5 5	÷							

4th Q	5	0	0.0129	0.00995	0.00445		
Source of V	ariation	DF	SS	MS	F	Р	
Between Gr	oups	3	0.000406	0.000135	0.930	0.449	
Residual		16	0.00233	0.000145	i		
Total		19	0.00273				

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.449). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Lead

One Way Analysis of Variance

Tuesday, June 0

Tuesday, June 01, 2010, 11:49:36 AM

Data source: Collocated-Metals in Monitor Comparisons.JNBNormality Test:Failed(P < 0.050)Test execution ended by user request, ANOVA on Ranks begun

Tuesday, June 01, 2010, 11:49:36 AM

Kruskal-Wallis One Way Analysis of Variance on Ranks Data source: Collocated-Metals in Monitor Comparisons.JNB

Data Soul	Butu source: Conocated means in monitor Comparisons.										
Group	Ν	Missing	Median	25%	75%						
Pb-1st Q	5	0	0.00490	0.00369	0.00690						
2nd Q	5	0	0.00255	0.00215	0.00416						
3rd Q	5	0	0.00214	0.00163	0.00380						
4th Q	5	0	0.00333	0.00230	0.00415						
11 - 2.020		2 1	C 1	0.401)							

H = 2.939 with 3 degrees of freedom. (P = 0.401)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.401)

e. Nickel

One Way Ana	One Way Analysis of Variance Tuesday, June 01, 2010, 11:50:01 AM										
Data source: (Colloca	ted-Metals in	Monitor Com	parisons.JN	В						
Normality Tes	t:	Passed	(P = 0.296)								
Equal Varianc	e Test	Passed	(P = 0.923)								
Group Name	Ν	Missing	Mean	Std Dev	SEM						
Ni-1st Q	5	0	0.00124	0.000457	0.00020)5					
2nd Q	5	0	0.00100	0.000399	0.00017	78					
3rd Q	5	0	0.00108	0.000346	0.0001	55					
4th Q	5	0	0.000803	0.000411	0.00018	34					
Source of Vari	ation	DF	SS	MS	5	F	Р				
Between Group)S	3	0.000000501	0.00000	0167	1.017	0.411				
Residual		16	0.00000263	0.00000	0164						
Total		19	0.00000313								
									14 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.411). Power of performed test with alpha = 0.050: 0.052

The power of the performed test (0.052) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

f. Mercury

One Way Analysis of Variance Data source: Collocated-Metals in Monitor Comparisons.JNB Tuesday, June 01, 2010, 11:50:50 AM

Normality Test:	Failed	(P < 0.050)					
Test execution ended by	user requ	est, ANOVA on Ranks begun					
Kruskal-Wallis One Way Analysis of Variance on Ranks							
Data source: Collocated	l-Metals in	n Monitor Comparisons.JNB					

Tuesday, June 01, 2010, 11:50:50 AM

Data soul	Data source. Conocated-Metals in Monitor Comparisons. JND								
Group	Ν	Missing	Median	25%	75%				
Hg-1st Q	5	0	0.0000320	0.0000103	0.0000612				
2nd Q	5	0	0.000320	0.000137	0.000373				
3rd Q	5	0	0.0000230	0.0000135	0.0000280				
4th Q	5	0	0.0000150	0.0000130	0.0000250				
TT 10 454	0 .1	2.1	CC 1 (D	0.015)					

H = 10.459 with 3 degrees of freedom. (P = 0.015)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.015)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All Pairwise Multiple Comparison Procedures (Tukey Test):

The function of the companion from a set of the set.								
Comparison	Diff of Ranks	q	P<0.05					
2nd Q vs 4th Q	53.000	4.006	Yes					
2nd Q vs 3rd Q	50.000	3.780	Yes					
2nd Q vs Hg-1st Q	43.000	3.250	No					
Hg-1st Q vs 4th Q	10.000	0.756	No					
Hg-1st Q vs 3rd Q	7.000	0.529	Do Not Test					
3rd Q vs 4th Q	3.000	0.227	Do Not Test					

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

g. Hexavalent Chromium One Way Analysis of Variance

Tuesday, June 01, 2010, 11:51:12 AM

One may rina	J 515 0.	, ai ianee			1 acoualy, build of, 2010, 11.01.12 11.01				
Data source: (Colloca	ted-Metals in	Monitor Comp	arisons.JNB					
Normality Tes	st:	Passed	(P = 0.193)						
Equal Variance	ce Test	: Passed	(P = 0.090)						
Group Name	Ν	Missing	Mean	Std Dev	SEN	A			
Cr6+-1st Q	5	0	0.0000965	0.000109	0.0000)486			
2nd Q	5	0	0.0000413	0.0000429	0.0000)192			
3rd Q	5	0	0.0000380	0.0000400	0.0000)179			
4th Q	5	0	0.0000447	0.0000473	0.0000	212			
Source of Var	iation	DF	SS	M	5	F	Р		
Between Group	os	3	0.0000000115	0.000000	000384	0.879	0.473		
Residual		16	0.0000000699	0.000000	000437				
Total		19	0.000000814	ŀ					
TT1 1:00	·	1					1 / 1 1 /1	· · · · · · · · · · · ·	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.473). Power of performed test with alpha = 0.050; 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

II. Wyatt Rd

a. Aluminum

One Way Analysis of Variance Data source: Wyatt Rd-Metals in Monitor Comparisons.JNB

Normality Test:		Passed	(P = 0.090)))			
Equal Variance	Test:	Passed	(P = 0.642)	2)			
Group Name	Ν	Missing	Mean	Std Dev	SEM		
Al-1st Quarter	5	0	0.309	0.235	0.105		
2nd Quarter	5	0	0.265	0.108	0.048	4	
3rd Quarter	5	0	0.310	0.224	0.100	0	
4th Quarter	5	0	0.194	0.111	0.049	5	
Source of Varia	tion	DF	SS	MS	F	Р	
Between Groups		3	0.0450	0.0150	0.465	0.711	
Residual		16	0.516	0.0323			
Total		19	0.561				
TTI 1.00 ·	1	1					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.711).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

b. Chromium

One Way Analysis of Variance Data source: Wyatt Rd-Metals in Monitor Comparisons.JNB Tuesday, June 01, 2010, 1:17:43 PM

Normality Tes	st:	Passed	(P = 0.232)						
Equal Varianc	e Test	Passed	(P = 0.734)						
Group Name	Ν	Missing	Mean	Std Dev	SI	EM			
Cr-1st Q	5	0	0.00595	0.00322	0.00)144			
2nd Q	5	0	0.00501	0.00294	0.00)131			
3rd Q	5	0	0.00605	0.00364	0.00)163			
4th Q	5	0	0.00379	0.00188	0.00	00841			
Source of Vari	iation	DF	SS	MS	MS		Р		
Between Group	os	3	0.0000166	0.00000)552	0.616	0.614		
Residual		16	0.000143	0.00000)896				
Total		19	0.000160						

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.614). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

c. Manganese

One Way Ana	lysis of	f Variance		Tuesday, June 01, 2010, 1:18:18 PM		
Data source: W	Vyatt F	d-Metals in	Monitor C	JNB		
Normality Tes	st:	Passed	(P = 0.37)	(8)		
Equal Varianc	e Test	: Passed	(P = 0.49)	2)		
Group Name	Ν	Missing	Mean	Std Dev	SEM	
Mn-1st Q	5	0	0.0807	0.0652	0.0292	
2nd Q	5	0	0.0715	0.0487	0.0218	
3rd Q	5	0	0.0683	0.0586	0.0262	
4th Q	5	0	0.0306	0.0247	0.0110	
Source of Vari	iation	DF	SS	MS	F	Р

Between Groups	3	0.00732	0.00244	0.916	0.455
Residual	16	0.0426	0.00267		
Total	19	0.0500			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.455). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Lead

u. Leau											
One Way	Anal	ysis of Varia	nce		Tuesday, June 01, 2010, 1:19:49 PM						
Data sour	ce: W	yatt Rd-Meta	als in Monitor								
Normality	Normality Test: Failed $(P < 0.050)$										
Test exect	Test execution ended by user request, ANOVA on Ranks begun										
Kruskal-V	Wallis	s One Way A	nalysis of Va	nks	Tuesday, June 01, 2010, 1:19:49 PM						
Data sour	ce: W	yatt Rd-Meta	als in Monitor	Comparisons.	JNB						
Group	Ν	Missing	Median	25%	75%						
Pb-1st Q	5	0	0.0103	0.00760	0.0172						
2nd Q	5	0	0.00443	0.00389	0.0331						
3rd Q	5	0	0.0151	0.00561	0.0277						
4th Q	5	0	0.00478	0.00295	0.0140						

H = 1.160 with 3 degrees of freedom. (P = 0.763)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.763)

e. Nickel

One Way Analysis of Variance Data source: Wyatt Rd-Metals in Monitor Comparisons.JNB Tuesday, June 01, 2010, 1:20:09 PM

Normality Tes	t:	Passed	(P = 0.747)	1				
Equal Variance	e Test	Passed	(P = 0.965)					
Group Name	Ν	Missing	Mean	Std Dev	SE	М		
Ni-1st Q	5	0	0.00283	0.00132	0.000)589		
2nd Q	5	0	0.00206	0.00114	0.000)509		
3rd Q	5	0	0.00212	0.00133	0.000)594		
4th Q	5	0	0.00169	0.00132	0.000)591		
Source of Vari	iation	DF	SS	Μ	S	F	Р	
Between Group	DS	3	0.0000033	7 0.0000	0112	0.688	0.573	
Residual		16	0.0000262	0.0000	0163			
Total		19	0.0000295					

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.573). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

f. Mercury

One Way Analysis of Variance Data source: Wyatt Rd-Metals in Monitor Comparisons.JNB **Normality Test:** Failed (P < 0.050) Test execution ended by user request, ANOVA on Ranks begun Tuesday, June 01, 2010, 1:20:34 PM

Kruskal-Wallis One Way Analysis of Variance on Ranks

Group	Ν	Missing	Median	25%	75%
Hg-1st Q	5	0	0.0000210	0.0000150	0.0000960
2nd Q	5	0	0.0000700	0.0000582	0.000293
3rd Q	5	0	0.0000680	0.0000355	0.000136
4th Q	5	0	0.0000200	0.0000133	0.0000343

H = 7.188 with 3 degrees of freedom. (P = 0.066)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.066)

g. Hexavalent Chromium

One Way A	nalysi	s of Varianc	e		Tuesday, June 01, 2010, 1:20:55 PM					
Data source	: Wya	tt Rd-Metals	in Monitor Co							
Normality T	Formality Test: Failed ($P < 0.050$)									
Test execution	Test execution ended by user request, ANOVA on Ranks begun									
Kruskal-Wa	Kruskal-Wallis One Way Analysis of Variance on Ranks Tuesday, June 01, 2010, 1:20:55 PM									
Data source	: Wya	tt Rd-Metals	in Monitor Co							
Group	Ν	Missing	Median	25%	75%					
Cr6+-1st Q	5	0	0.0000192	0.00000251	0.000215					
2nd Q	5	0	0.0000609	0.00000215	0.0000897					
3rd Q	5	0	0.0000340	0.0000269	0.0000427					
4th Q	5	0	0.0000361	0.00000215	0.0000612					

H = 0.190 with 3 degrees of freedom. (P = 0.979)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.979)

III. Jaycee Park

a. Aluminum					
One Way Analy	sis of '	Variance			Tuesday, June 01, 2010, 12:48:24 PM
Data source: Jay	ycee Pa	rk-Metals in	Monitor Com	parisons.JNB	
Normality Test:		Failed (P < 0.050)		
Test execution en	nded by	y user reques	t, ANOVA on	Ranks begun	
Kruskal-Wallis	One W	Vay Analysis	of Variance	on Ranks	Tuesday, June 01, 2010, 12:48:24 PM
Data source: Jay	ycee Pa	rk-Metals in	Monitor Com	parisons.JNB	-
Group	Ν	Missing	Median	25%	75%
Al-1st Quarter	5	0	0.0665	0.0529	0.0746
2nd Quarter	5	0	0.0786	0.0764	0.132
3rd Quarter	5	0	0.0938	0.0658	0.144
4th Quarter	5	0	0.0686	0.0338	0.0992
H = 4.623 with 3	degree	es of freedom	n. $(P = 0.202)$		
The differences i	n the n	nedian values	among the tr	eatment group	s are not great enough to exclude the possibility that
the difference is	due to	random samp	oling variabilit	ty; there is not	a statistically significant difference $(P = 0.202)$
b. Chromium					
One Way Analy	sis of '	Variance			Tuesday, June 01, 2010, 1:09:12 PM
Data source: Jay	ycee Pa	rk-Metals in	Monitor Com	parisons.JNB	-
Normality Test:		Failed (P < 0.050)	-	
Test execution er	nded by	v user reques	t. ANOVA on	Ranks begun	
Kruskal-Wallis	-	-		-	Tuesday, June 01, 2010, 1:09:12 PM

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Data source: Jaycee Park-Metals in Monitor Comparisons.JNB

Group	Ν	Missing	Median	25%	75%
Cr-1st Q	5	0	0.00187	0.00146	0.00234
2nd Q	5	0	0.00195	0.00169	0.00216
3rd Q	5	0	0.00214	0.00214	0.00234
4th Q	5	0	0.00200	0.00195	0.00226

H = 5.559 with 3 degrees of freedom. (P = 0.135)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.135)

c. Manganese

One Way	Anal	ysis of Varia	nce			Tuesday, June 01, 2010, 1:09:40 PM
•			etals in Monit	or Comparison	ns.JNB	
Normality	v Test	Fa	niled $(P < 0.0)$	050)		
Test execu	tion e	ended by user	request, ANC	VA on Ranks	s begun	
Kruskal-V	Vallis	s One Way A	nalysis of Va	riance on Ra	nks	Tuesday, June 01, 2010, 1:09:40 PM
Data sour	ce: Ja	ycee Park-M	etals in Monit	or Comparison	ns.JNB	
Group	Ν	Missing	Median	25%	75%	
Mn-1st Q	5	0	0.00668	0.00559	0.0133	
2nd Q	5	0	0.0102	0.00824	0.0184	
3rd Q	5	0	0.00360	0.00322	0.00783	
4th Q	5	0	0.00601	0.00316	0.00987	
II = 5.720	with	2 dograda of 1	Frandam (D -	0 126)		

H = 5.720 with 3 degrees of freedom. (P = 0.126)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.126)

d. Lead

a. Leaa						
One Way	Anal	lysis of Vari	iance			
Data sour	ce: Ja	aycee Park-N	Metals in	Monito	or Comparis	ons.JNB
Normality	Tes	t: I	Passed (P = 0.1	85)	
Equal Va	rianc	e Test: 1	Failed (P < 0.0)50)	
Test execu	tion	ended by use	er request	, ANO	VA on Ran	ks begun
Kruskal-V	Valli	s One Way	Analysis	of Var	riance on R	anks
Data sour	ce: Ja	aycee Park-N	Metals in	Monito	or Comparis	ons.JNB
Group	Ν	Missing	Med	ian	25%	75%
Pb-1st Q	5	0	0.00	312	0.00188	0.00602
2nd Q	5	0	0.00	221	0.00174	0.00244

0.00137

0.00270

Tuesday, June 01, 2010, 1:10:12 PM

Tuesday, June 01, 2010, 1:10:12 PM

H = 4.989 with 3 degrees of freedom. (P = 0.173)

0

0

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.173)

0.00192

0.00323

0.00134

0.00185

e. Nickel

3rd Q

4th Q

5 5

5

One Way Ana	One Way Analysis of VarianceTuesday, June 01, 2010, 1:10:36 PM								
Data source: Jaycee Park-Metals in Monitor Comparisons.JNB									
Normality Tes	Normality Test: Passed $(P = 0.279)$								
Equal Variance	e Test	t: Passed	(P = 0.321)						
Group Name	Ν	Missing	Mean	Std Dev	SEM				
Ni-1st Q	5	0	0.00125	0.000809	0.000362				
2nd Q	5	0	0.00114	0.000322	0.000144				
3rd Q	5	0	0.00106	0.000251	0.000112				
4th Q	5	0	0.000575	0.000171	0.0000767				

Source of Variation	DF	SS	MS	F	Р
Between Groups	3	0.00000133	0.000000443	2.084	0.143
Residual	16	0.00000340	0.000000213		
Total	19	0.00000473			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.143). Power of performed test with alpha = 0.050: 0.233

The power of the performed test (0.233) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

f. Mercury

One Way Analysis of Variance

Data source: Jaycee Park-Metals in Monitor Comparisons.JNBNormality Test:Failed(P < 0.050)</th>Test execution ended by user request, ANOVA on Ranks begunKruskal-Wallis One Way Analysis of Variance on RanksData source:Jaycee Park-Metals in Monitor Comparisons.JNB

Tuesday, June 01, 2010, 1:11:07 PM

Tuesday, June 01, 2010, 1:11:07 PM

Group	Ν	Missing	Median	25%	75%
Hg-1st Q	5	0	0.0000190	0.0000115	0.0000532
2nd Q	5	0	0.0000580	0.0000375	0.000203
3rd Q	5	0	0.00000600	0.00000400	0.0000243
4th Q	5	0	0.0000150	0.00000575	0.0000232

H = 8.885 with 3 degrees of freedom. (P = 0.031)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.031)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Comparison	Diff of Ranks	q	P<0.05
2nd Q vs 3rd Q	51.500	3.893	Yes
2nd Q vs 4th Q	43.500	3.288	No
2nd Q vs Hg-1st Q	27.000	2.041	Do Not Test
Hg-1st Q vs 3rd Q	24.500	1.852	No
Hg-1st Q vs 4th Q	16.500	1.247	Do Not Test
4th Q vs 3rd Q	8.000	0.605	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

g. Hexavalent Chromium

•	Tuesday, June 01, 2010, 1:11:30 PM						
s in Monitor Co	mparisons.JNB						
Normality Test: Passed $(P = 0.078)$							
d $(P = 0.498)$							
Mean	Std Dev	SEM					
0.0000218	0.0000252	0.0000113					
0.0000107	0.0000118	0.00000526					
0.0000119	0.00000896	0.00000401					
	s in Monitor Cod d $(P = 0.078)$ d $(P = 0.498)$ Mean 0.0000218 0.0000107	s in Monitor Comparisons.JNB d (P = 0.078) d (P = 0.498) Mean Std Dev 0.0000218 0.0000252 0.0000107 0.0000118	s in Monitor Comparisons.JNB d (P = 0.078) d (P = 0.498) Mean Std Dev SEM 0.0000218 0.0000252 0.0000113 0.0000107 0.0000118 0.00000526				

4th Q	5	0	0.0000191 0.0	0000197 0.00000	881		
Source of Va	ariation	DF	SS	MS	F	Р	
Between Gro	ups	3	0.000000000441	0.00000000147	0.474	0.705	
Residual		16	0.00000000496	0.00000000310			
Total		19	0.00000000540				

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.705). Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

IV. Water Treatment Plant

a. Aluminum

One Way Analysis of Variance

Tuesday, June 01, 2010, 1:12:11 PM

Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB Normality Tast: Passad (P = 0.007)

Normality Test:		Passed	(P = 0.907))				
Equal Variance	Test:	Passed	(P = 0.262))				
Group Name	Ν	Missing	Mean	Std Dev	SEM			
Al-1st Quarter	5	0	0.0885	0.0366	0.016	4		
2nd Quarter	5	0	0.118	0.0436	0.019	5		
3rd Quarter	5	0	0.102	0.0319	0.014	3		
4th Quarter	5	0	0.159	0.0663	0.029	7		
Source of Varia	tion	DF	SS	MS	F	Р		
Between Groups		3	0.0138	0.00460	2.127	0.137		
Residual		16	0.0346	0.00216				
Total		19	0.0484					
							_	

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.137). Power of performed test with alpha = 0.050: 0.241

The power of the performed test (0.241) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

b. Chromium

D. Chi Unitum										
One Way Ana	lysis of	f Variance]	Fuesday,	June 01, 20	10, 1:12:4	14 PM		
Data source: W	Vater T	reatment Pla	int-Metals in	Monitor Com	parisons.Л	NB				
Normality Tes	st:	Passed	(P = 0.451)							
Equal Varianc	e Test	Passed	(P = 0.334)							
Group Name	Ν	Missing	Mean	Std Dev	SEM					
Cr-1st Q	5	0	0.00179	0.000175	0.00007	81				
2nd Q	5	0	0.00184	0.000172	0.00007	68				
3rd Q	5	0	0.00228	0.000204	0.00009	10				
4th Q	5	0	0.00225	0.0000819	0.00003	66				
Source of Vari	iation	DF	SS	Μ	S	F	Р			
Between Group	os	3	0.00000101	0.00000	00337	12.474	< 0.001			
Residual		16	0.00000043	0.00000	000270					
Total		19	0.00000144	ŀ						
TT1 1:00	·	1				4 41	111	4 11	1	

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).

Power of performed test with alpha = 0.050: 0.997

All Pairwise Multiple Comparison Procedures (Student-Newman-Keuls Method) :

Comparisons for factor:

Comparison	Diff of Means	р	q	Р	P<0.050
3rd Q vs. Cr-1st Q	0.000486	4	6.611	0.001	Yes
3rd Q vs. 2nd Q	0.000438	3	5.958	0.002	Yes
3rd Q vs. 4th Q	0.0000280	2	0.381	0.791	No
4th Q vs. Cr-1st Q	0.000458	3	6.230	0.001	Yes
4th Q vs. 2nd Q	0.000410	2	5.577	0.001	Yes
2nd Q vs. Cr-1st Q	0.0000480	2	0.653	0.651	No

c. Manganese

One Way Analysis of Variance Tuesday, June 01, 2010, 1:13:26 PM Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB Normality Test: Passed (P = 0.561) **Equal Variance Test:** Passed (P = 0.107) **Group Name** Mean N Missing Std Dev SEM 5 Mn-1st Q 0.0115 0.00555 0.00248 0 5 2nd Q 0 0.0153 0.00737 0.00330 5 0.00533 0 0.00194 3rd Q 0.000869 5 0.00965 4th Q 0 0.0136 0.00432 Р DF SS F Source of Variation MS Between Groups 3 0.000286 0.0000955 2.097 0.141 Residual 16 0.000729 0.0000455 Total 19 0.00102

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.141). Power of performed test with alpha = 0.050: 0.236

The power of the performed test (0.236) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

d. Lead

One Way	One Way Analysis of Variance Tuesday, June 01, 2010, 1:14:00 PM									
Data sour	Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB									
Normality	Normality Test: Failed $(P < 0.050)$									
Test exect	Test execution ended by user request, ANOVA on Ranks begun									
Kruskal-V	Kruskal-Wallis One Way Analysis of Variance on Ranks Tuesday, June 01, 2010, 1:14:00 PM									
Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB										
Group	Ν	Missing	Median	25%	75%					
Pb-1st Q	5	0	0.00355	0.00211	0.00503					
2nd Q	5	0	0.00192	0.00165	0.00278					
3rd Q	5	0	0.00223	0.00161	0.00846					
4th Q	5	0	0.00338	0.00273	0.00415					
H = 2.971	with .	3 degrees of f	freedom. (P =	0.396)						

with 3 degrees of freedom. (P

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.396)

e. Nickel

One Way Analysis of Variance	Tuesday, June 01, 2010, 1:14:31 PM				
Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB					
Normality Test: Failed $(P < 0.050)$					
Test execution ended by user request, ANOVA on Ranks begun					
Kruskal-Wallis One Way Analysis of Variance on Ranks	Tuesday, June 01, 2010, 1:14:31 PM				

Data sour	ce: W	ater Treatme	nt Plant-Meta	ls in Mon	itor Com	parisons.J	NB
Group	Ν	Missing	Median	25%)	75%	
Ni-1st Q	5	0	0.000912	0.0006	36 0.0	00973	
2nd Q	5	0	0.00124	0.0006	79 0.0	0144	
3rd Q	5	0	0.00120	0.0009	68 0.0	0490	
4th Q	5	0	0.000677	0.00052	22 0.0	0141	
H = 5.583	with 1	3 degrees of f	freedom. (P =	0.134)			
					tment gro	ups are n	ot great enough to exclude the possibility that
							stically significant difference $(P = 0.134)$
£ M							
f. Mercury							Tuesday, Lung 01, 2010, 1,15,01 DM
		ysis of Varia		la in Man	itor Com		Tuesday, June 01, 2010, 1:15:01 PM
Normality			int Plant-Meta $(P < 0)$			parisons.j	IND
•			request, ANC	,	anks hea	un	
			nalysis of Va				Tuesday, June 01, 2010, 1:15:01 PM
			nt Plant-Meta				
Group	<u>N</u>	Missing	Median		25%	75%	
Hg-1st Q	5	0	0.00000800		000600	0.00001	
2nd Q	5	0	0.0000620		00497	0.00000	
3rd Q	5	0	0.0000020		00113	0.00001	
4th Q	5	0	0.0000120		000950	0.00001	
	-	÷	freedom. (P		000720	0.00001	
					tment ord	uns are o	reater than would be expected by chance;
			ant difference			ups are g	reater than would be expected by chance,
						a multiple	comparison procedure.
			rison Procedu			, manipio	comparison procedure.
Comparis		1 1	of Ranks	q	P<0.0	5	
2nd Q vs H			58.500	4.422	1 .0.0	Yes	
2nd Q vs 4	0	-	49.500	3.742		Yes	
2nd Q vs 3			38.000	2.873		No	
3rd Q vs H			20.500	1.550		No	
3rd Q vs 4		-	11.500	0.869	Do Not	Test	
4th Q vs H	~		9.000	0.680	Do Not		
	-		ons on ranks c	lo not inc			for ties.
							difference is found between the two rank
							sums sorted in order, and found no significant
							and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4
							the enclosed rank sums is a procedural rule,
							t difference between the rank sums, even
		appear to ex			2 0	0	· · · · · · · · · · · · · · · · · · ·
	J	11					

g. Hexavalent Chromium

One Way A	nalysi	s of Varianc	e		Tuesday,	June 01, 2010, 1:15:28 PM			
Data source	Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB								
Normality T	est:	Faile	ed $(P < 0.050)$						
Test execution	Test execution ended by user request, ANOVA on Ranks begun								
Kruskal-Wa	Kruskal-Wallis One Way Analysis of Variance on Ranks Tuesday, June 01, 2010, 1:15:28 PM								
Data source: Water Treatment Plant-Metals in Monitor Comparisons.JNB									
Group	Ν	Missing	Median	25%	75%				
Cr6+-1st Q	5	0	0.0000210	0.00000366	0.0000329				
2nd Q	5	0	0.00000215	0.00000215	0.00000215				

3rd Q	5	0	0.00000215	0.00000215	0.0000198
4th Q	5	0	0.0000204	0.0000126	0.0000522

H = 11.824 with 3 degrees of freedom. (P = 0.008)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.008)

To isolate the group or groups that differ from the others use a multiple comparison procedure. All Pairwise Multiple Comparison Procedures (Tukey Test):

All Pallwise Multiple Comparison Procedures (Tukey Test).								
Comparison	Diff of Ranks	q	P<0.05					
4th Q vs 2nd Q	53.500	4.044	Yes					
4th Q vs 3rd Q	35.500	2.684	No					
4th Q vs Cr6+-1st Q	5.000	0.378	Do Not Test					
Cr6+-1st Q vs 2nd Q	48.500	3.666	Yes					
Cr6+-1st Q vs 3rd Q	30.500	2.306	Do Not Test					
3rd Q vs 2nd Q	18.000	1.361	No					

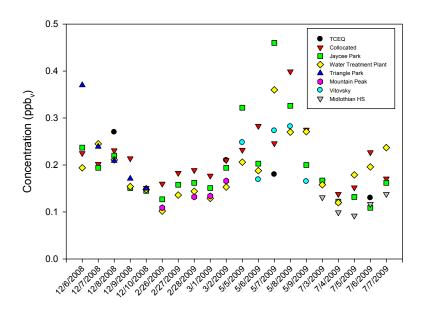
Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

Appendix K – Raw Data Graphs

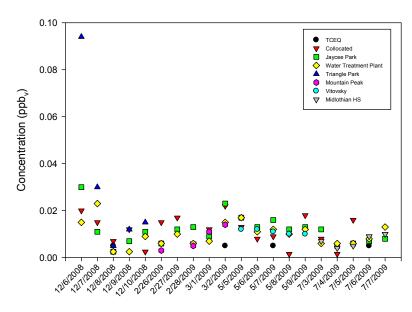
VOCs

I. Comparisons with All 4 Quarters of Data



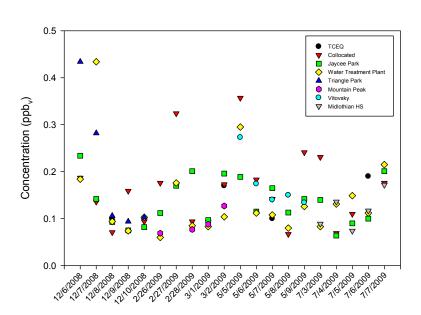
Comparison of Benzene for All 4 Quarters at All of the Monitoring Locations

Figure K-1. Monitoring Site Comparisons for Benzene for All Four Quarters of Data.



Comparison of 1,3-Butadiene for All 4 Quarters at All Sampling Locations





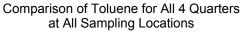
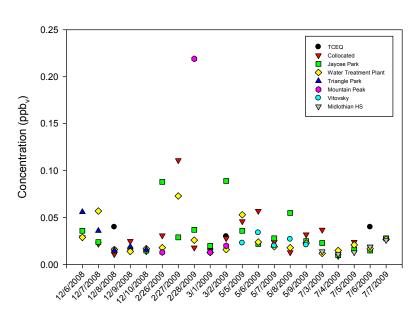
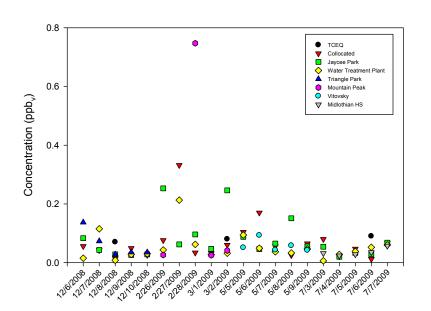


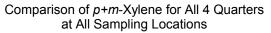
Figure K- 3. Monitoring Site Comparisons for Toluene for All Four Quarters of Data.

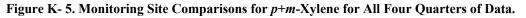


Comparison of Ethylbenzene for All 4 Quarters at All Sampling Locations









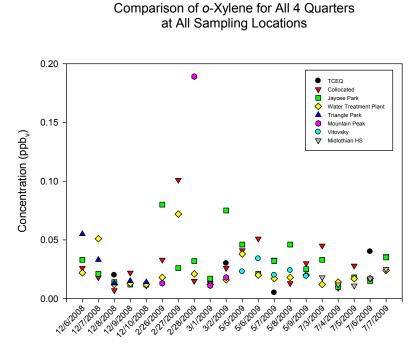


Figure K- 6. Monitoring Site Comparisons for *o*-Xylene for All Four Quarters of Data.

II. Comparisons of Individual Quarterly Data

1st Quarter Comparison of Sampling Sites: Benzene

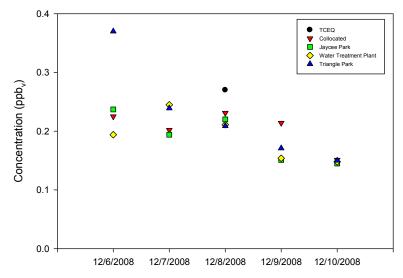


Figure K- 7. First Quarter Comparison of Sampling Sites: Benzene.

1st Quarter Comparison of Sampling Sites: 1,3-Butadiene

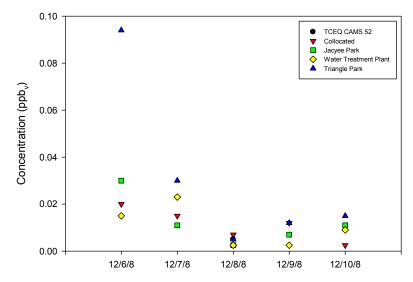


Figure K- 8. First Quarter Comparison of Sampling Sites: 1,3-Butadiene.

1st Quarter Comparison of Sampling Sites: Toluene

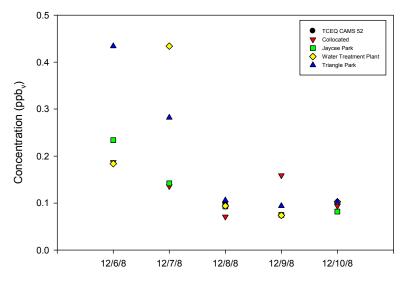


Figure K- 9. First Quarter Comparison of Sampling Sites: Toluene.

1st Quarter Comparison of Sampling Sites: Ethylbenzene

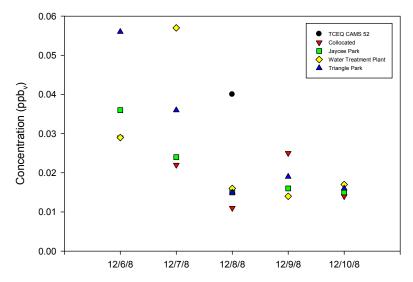
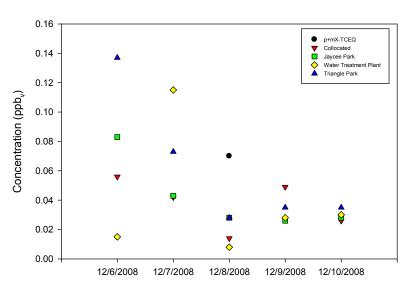


Figure K- 10. First Quarter Comparison of Sampling Sites: Ethylbenzene.



1st Quarter Comparison of Sampling Sites: *p*+*m*-Xylene

Figure K- 11. First Quarter Comparison of Sampling Sites: *p*+*m*-Xylene.

1st Quarter Comparison of Sampling Sites: o-Xylene

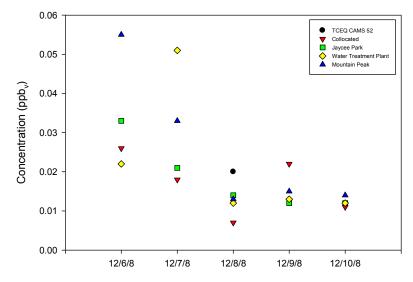


Figure K-12. First Quarter Comparison of Sampling Sites: o-Xylene.

2nd Quarter Comparison of Sampling Sites: Benzene

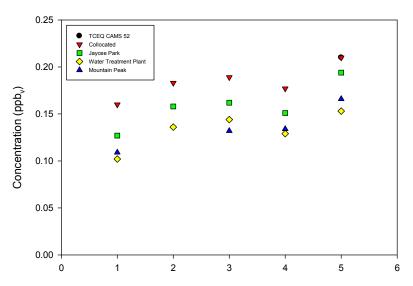


Figure K- 13. Second Quarter Comparison of Sampling Sites: Benzene.

2nd Quarter Comparison of Sampling Sites: 1,3-Butadiene

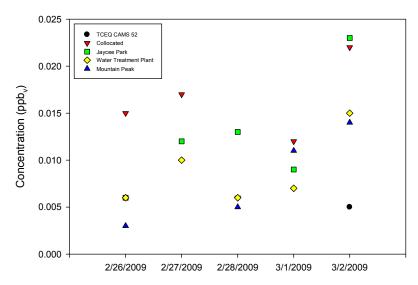
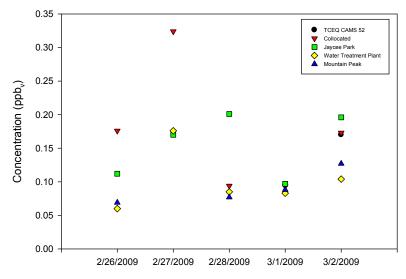


Figure K- 14. Second Quarter Comparison of Sampling Sites: 1,3-Butadiene.



2nd Quarter Comparison of Sampling Sites: Toluene

Figure K- 15. Second Quarter Comparison of Sampling Sites: Toluene.

2nd Quarter Comparison of Sampling Sites: Ethylbenzene

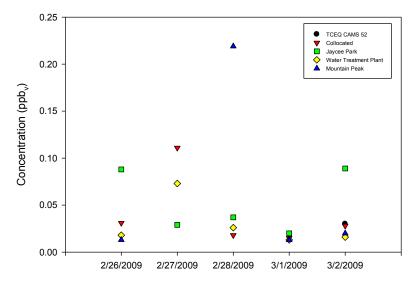


Figure K- 16. Second Quarter Comparison of Sampling Sites: Ethylbenzene.



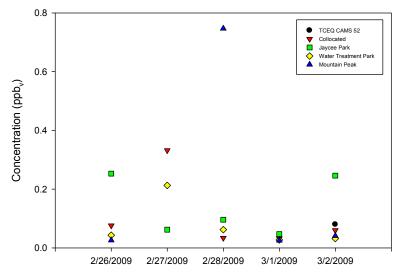


Figure K- 17. Second Quarter Comparison of Sampling Sites: *p*+*m*-Xylene.

2nd Quarter Comparison of Sampling Sites: o-Xylene

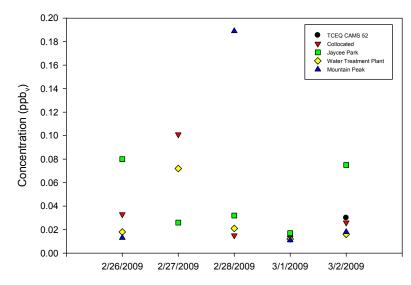
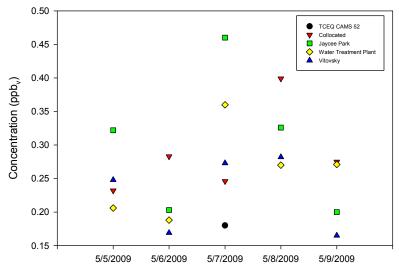
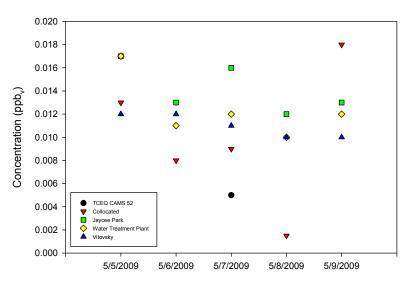


Figure K- 18. Second Quarter Comparison of Sampling Sites: o-Xylene.



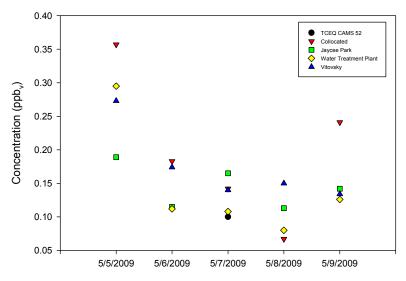
3rd Quarter Comparison of Sampling Sites: Benzene

Figure K- 19. Third Quarter Comparison of Sampling Sites: Benzene.



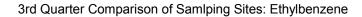
3rd Quarter Comparison of Sampling Sites: 1,3-Butadiene

Figure K- 20. Third Quarter Comparison of Sampling Sites: 1,3-Butadiene.



3rd Quarter Comparison of Sampling Sites: Toluene

Figure K- 21. Third Quarter Comparison of Sampling Sites: Toluene.



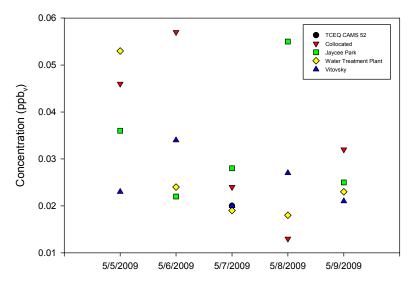
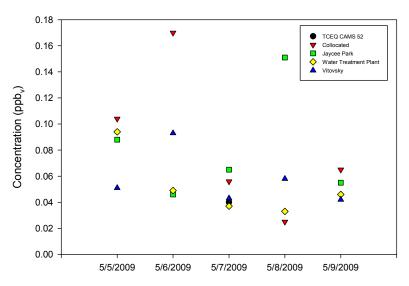


Figure K- 22. Third Quarter Comparison of Sampling Sites: Ethylbenzene.



3rd Quarter Comparison of Sampling Sites: p+m-Xylene

Figure K- 23. Third Quarter Comparison of Sampling Sites: *p*+*m*-Xylene.

3rd Quarter Comparison of Sampling Sites: o-Xylene

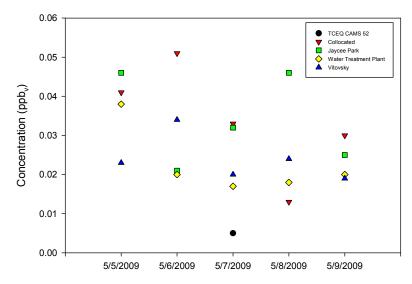
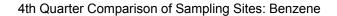


Figure K- 24. Third Quarter Comparison of Sampling Sites: o-Xylene.



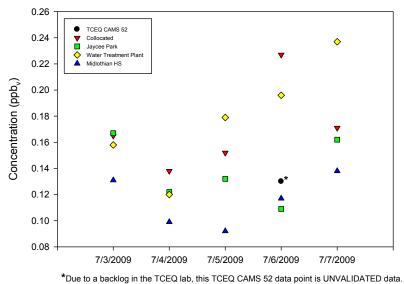
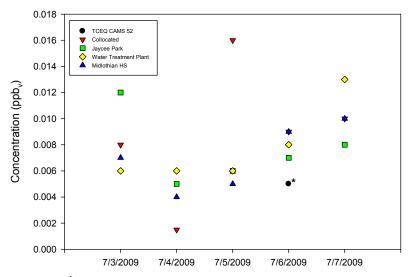
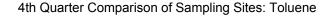


Figure K- 25. Fourth Quarter Comparison of Sampling Sites: Benzene.

4th Quarter Comparison of Sampling Sites: 1,3-Butadiene



*Due to a backlog in the TCEQ lab, this TCEQ CAMS 52 data point is UNVALIDATED data. Figure K- 26. Fourth Quarter Comparison of Sampling Sites: 1,3-Butadiene.



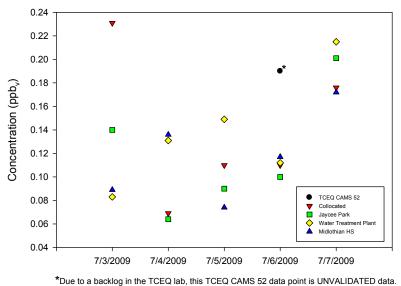
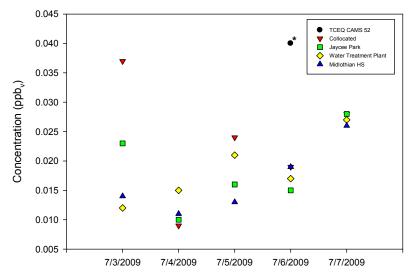


Figure K- 27. Fourth Quarter Comparison of Sampling Sites: Toluene.

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4th Quarter Comparison of Sampling Sites: Ethylbenzene



*Due to a backlog in the TCEQ lab, this TCEQ CAMS 52 data point is UNVALIDATED data. Figure K- 28. Fourth Quarter Comparison of Sampling Sites: Ethylbenzene.

4th Quarter Comparison of Sampling Sites: *p*+*m*-Xylene

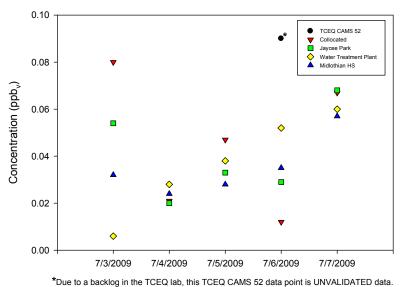
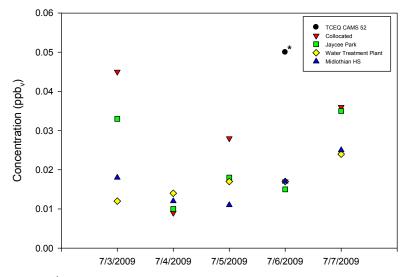


Figure K- 29. Fourth Quarter Comparison of Sampling Sites: *p*+*m*-Xylene.

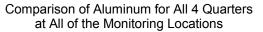
4th Quarter Comparison of Sampling Sites: o-Xylene



*Due to a backlog in the TCEQ lab, this TCEQ CAMS 52 data point is UNVALIDATED data. Figure K- 30. Fourth Quarter Comparison of Sampling Sites: *o*-Xylene.

Metals

I. Comparisons with All 4 Quarters of Data



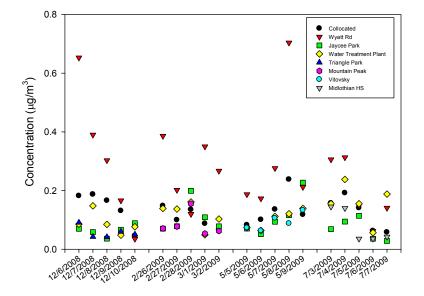
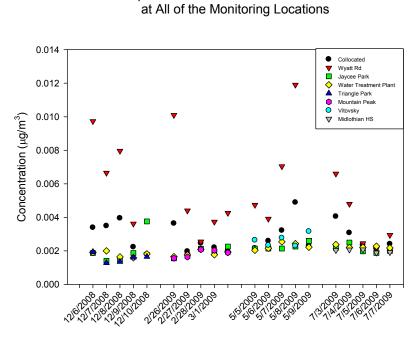


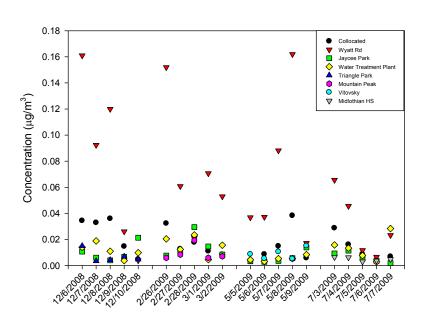
Figure K- 31. Monitoring Site Comparisons for PM₁₀ Aluminum for All Four Quarters of Data.

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Comparison of Chromium for All 4 Quarters

Figure K- 32. Monitoring Site Comparisons for PM₁₀ Chromium for All Four Quarters of Data.



Comparison of Manganese for All 4 Quarters at All of the Monitoring Locations

Figure K- 33. Monitoring Site Comparisons for PM₁₀ Manganese for All Four Quarters of Data.

Comparison of Lead for All 4 Quarters at All of the Monitoring Locations

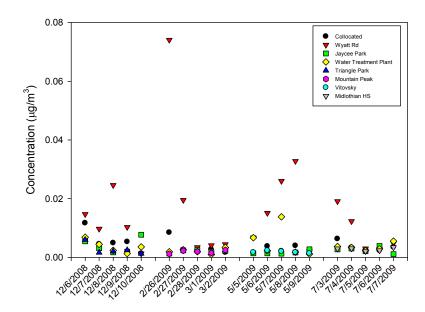
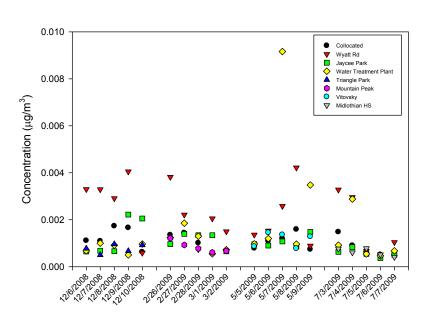


Figure K- 34. Monitoring Site Comparisons for PM₁₀ Lead for All Four Quarters of Data.



Comparison of Nickel for All 4 Quarters at All of the Monitoring Locations

Figure K- 35. Monitoring Site Comparisons for PM₁₀ Nickel for All Four Quarters of Data.

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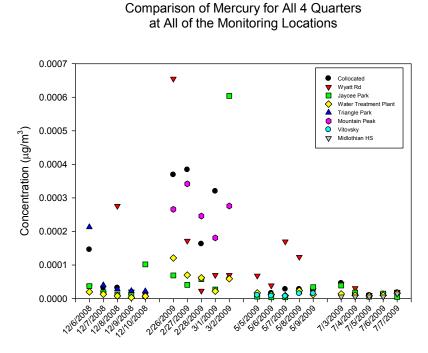


Figure K- 36. Monitoring Site Comparisons for PM₁₀ Mercury for All Four Quarters of Data.

II. Comparisons of Individual Quarterly Data

1st Quarter Comparison of Sampling Sites: PM₁₀ Aluminum

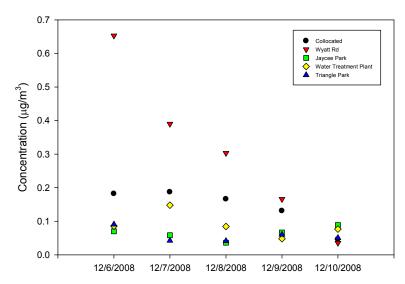
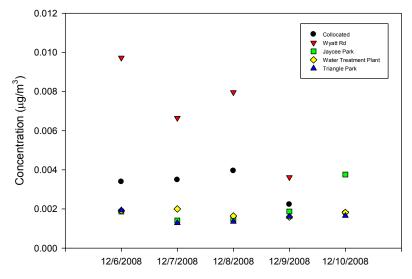


Figure K- 37. First Quarter Comparison of Sampling Sites: PM₁₀ Aluminum.



1st Quarter Comparison of Sampling Sites: PM_{10} Total Chromium

Figure K- 38. First Quarter Comparison of Sampling Sites: PM₁₀ Chromium.

1st Quarter Comparison of Sampling Sites: $\mathsf{PM}_{\mathrm{10}}$ Manganese

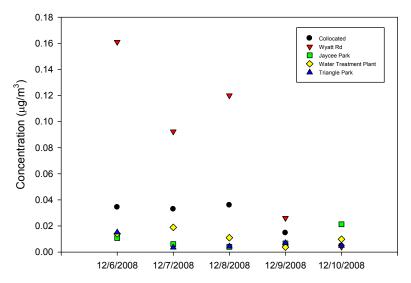


Figure K- 39. First Quarter Comparison of Sampling Sites: PM₁₀ Manganese.

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1st Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Lead

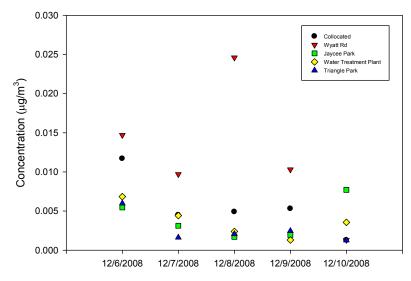


Figure K- 40. First Quarter Comparison of Sampling Sites: PM₁₀ Lead.

1st Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Nickel

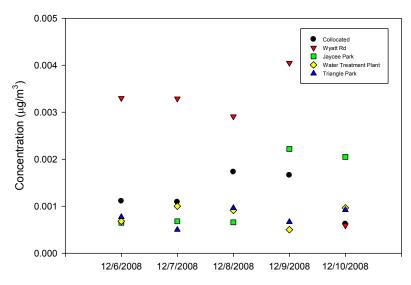


Figure K- 41. First Quarter Comparison of Sampling Sites: PM₁₀ Nickel.

1st Quarter Comparison of Sampling Sites: PM_{10} Mercury

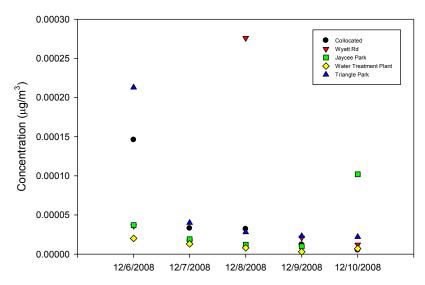


Figure K- 42. First Quarter Comparison of Sampling Sites: PM₁₀ Mercury.

2nd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Aluminum

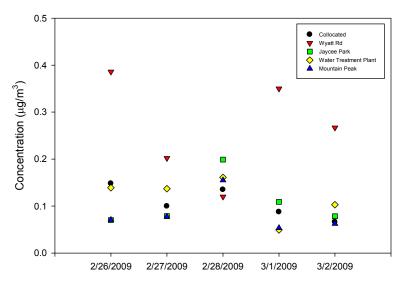


Figure K- 43. Second Quarter Comparison of Sampling Sites: PM₁₀ Aluminum.

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2nd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Chromium

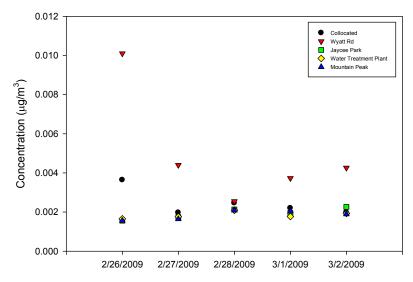


Figure K- 44. Second Quarter Comparison of Sampling Sites: PM₁₀ Chromium.

2nd Quarter Comparison of Sampling Sites: $\ensuremath{\mathsf{PM}_{\mathrm{10}}}$ Manganese

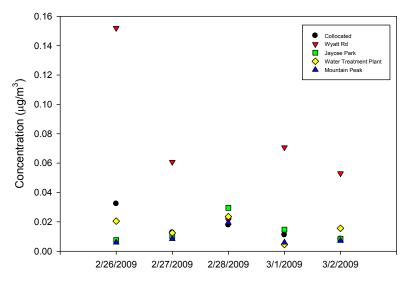


Figure K- 45. Second Quarter Comparison of Sampling Sites: PM₁₀ Manganese.

2nd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Lead

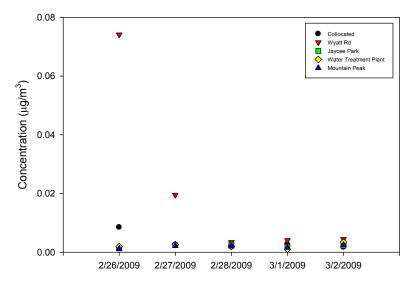


Figure K- 46. Second Quarter Comparison of Sampling Sites: PM₁₀ Lead.

2nd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Nickel

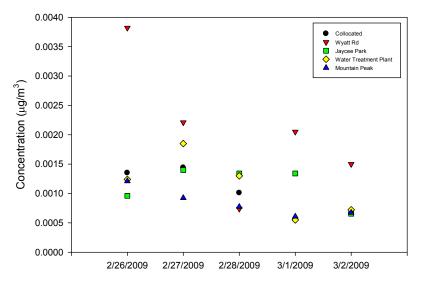


Figure K- 47. Second Quarter Comparison of Sampling Sites: PM₁₀ Nickel.

2nd Quarter Comparison of Sampling Sites: PM_{10} Mercury

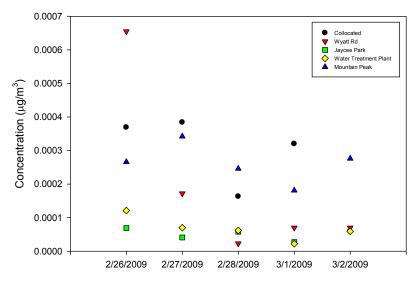


Figure K- 48. Second Quarter Comparison of Sampling Sites: PM₁₀ Mercury.

3rd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Aluminum

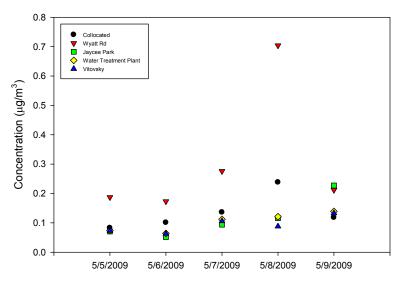


Figure K- 49. Third Quarter Comparison of Sampling Sites: PM₁₀ Aluminum.

3rd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Chromium

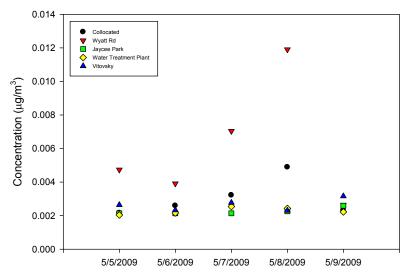


Figure K- 50. Third Quarter Comparison of Sampling Sites: PM₁₀ Chromium.



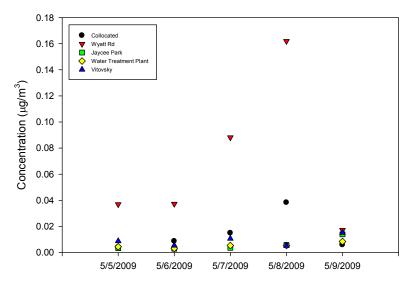


Figure K- 51. Third Quarter Comparison of Sampling Sites: PM₁₀ Manganese.

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3rd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Lead

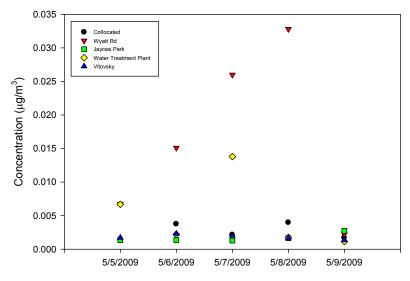


Figure K- 52. Third Quarter Comparison of Sampling Sites: PM₁₀ Lead.

3rd Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Nickel

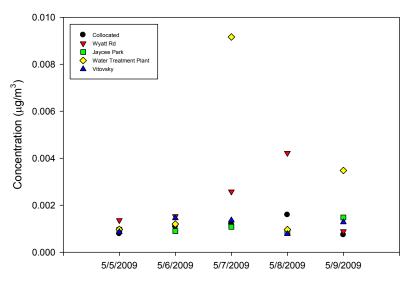


Figure K- 53. Third Quarter Comparison of Sampling Sites: PM₁₀ Nickel.

3rd Quarter Comparison of Sampling Sites: PM₁₀ Mercury

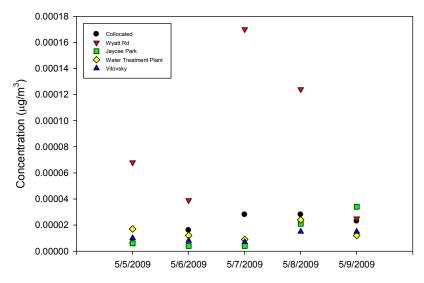


Figure K- 54. Third Quarter Comparison of Sampling Sites: PM₁₀ Mercury.

4th Quarter Comparison of Sampling Sites: PM_{10} Aluminum

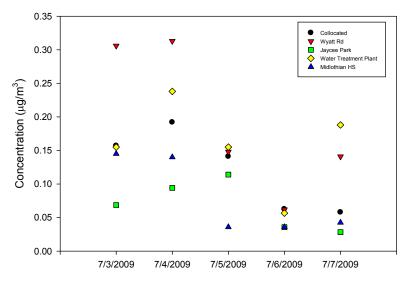


Figure K- 55. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Aluminum.

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4th Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Chromium

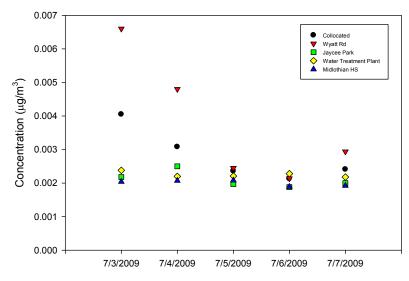


Figure K- 56. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Chromium.

4th Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Manganese

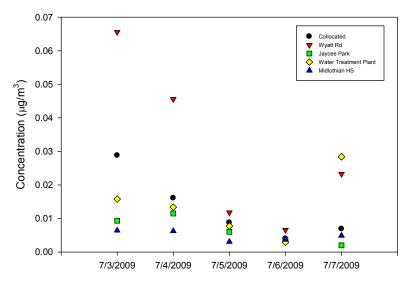


Figure K- 57. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Manganese.

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4th Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Lead

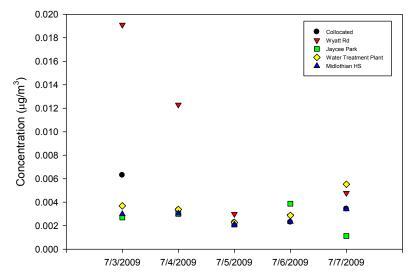
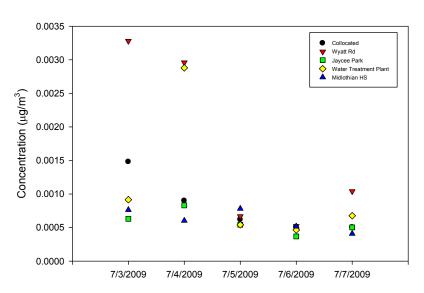


Figure K- 58. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Lead.



4th Quarter Comparison of Sampling Sites: $\mathrm{PM}_{\mathrm{10}}$ Nickel

Figure K- 59. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Nickel.

4th Quarter Comparison of Sampling Sites: PM₁₀ Mercury

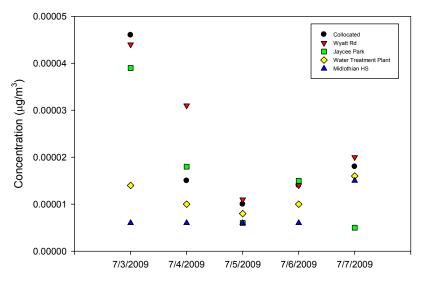
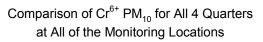


Figure K- 60. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Mercury.

III. Hexavalent Chromium Comparisons of Quarterly Data

A. Comparisons with All 4 Quarters of Data



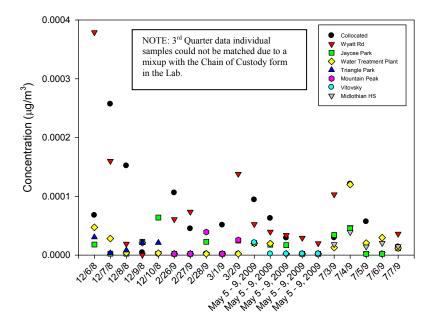
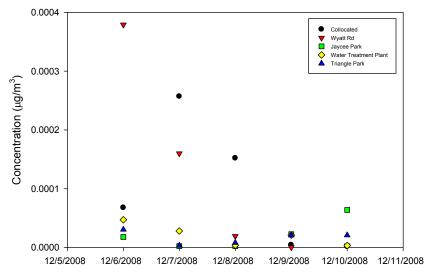


Figure K- 61. Monitoring Site Comparisons for PM₁₀ Cr⁶⁺ for All Four Quarters of Data.

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B. Comparisons with Individual Quarterly Data



1st Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺

Figure K- 62. First Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺.

2nd Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺

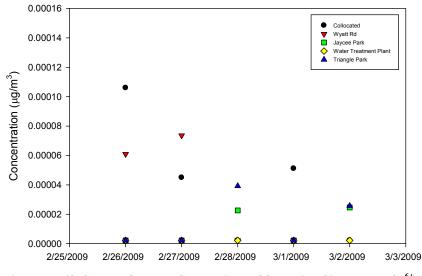
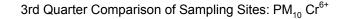


Figure K- 63. Second Quarter Comparison of Sampling Sites: $PM_{10} Cr^{6+}$.



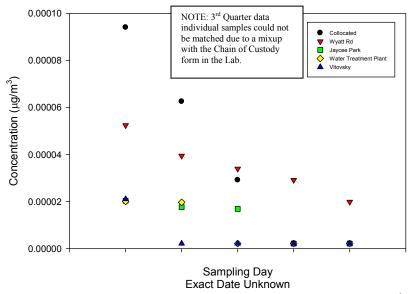
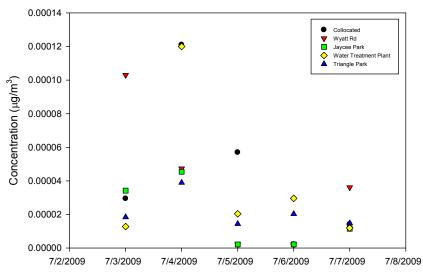


Figure K- 64. Third Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺.



4th Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺

Figure K- 65. Fourth Quarter Comparison of Sampling Sites: PM₁₀ Cr⁶⁺.

A. PM₁₀ Cr⁶⁺ Comparison to Total Cr

A. PM ₁₀ Cr Comparison to Total Cr	
t-test	Tuesday, February 02, 2010, 11:55:57 AM
Data source: total Chromium in Chromium.JNB	
Group Name N Missing Mean Std Dev	SEM
Row 1-CrT 100 0 0.00275 0.00178	0.000178
Row 2-Cr6+ 100 0 0.0000327 0.0000543	0.00000543
Difference 0.00272	
t = 15.245 with 198 degrees of freedom. (P = <0.001)	
95 percent confidence interval for difference of means: 0.002	37 to 0.00307
The difference in the mean values of the two groups is greate	
statistically significant difference between the input groups (I	
Power of performed test with alpha = 0.050 : 1.000	
1 ower of performed test with uping 0.050. 1.000	
D DM Cu ⁶⁺ Site Commonisons to Collegated Manite	
B. PM ₁₀ Cr ⁶⁺ Site Comparisons to Collocated Monito	r
I. Collocated vs. Wyatt Rd	
t-test	Monday, February 01, 2010, 3:58:21 PM
Data source: Data 4 in Chromium.JNB	
Normality Test: Failed $(P < 0.050)$	
Test execution ended by user request, Rank Sum Test begun	
Mann-Whitney Rank Sum Test	Monday, February 01, 2010, 3:58:21 PM
Data source: Data 4 in Chromium.JNB	
Group N Missing Median 25%	75%
Collocated 20 0 0.0000372 0.00000215	0.0000809
Wyatt Rd 20 0 0.0000350 0.00000270	0.0000673
Mann-Whitney U Statistic= 198.500	0.0000075
T = 411.500 n(small) = 20 n(big) = 20 (P = 0.978)	
	s not great enough to exclude the possibility that the
The difference in the median values between the two groups in difference is due to random sampling variability; there is not	
difference is due to random sampling variability; there is not	
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park t-test	
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park	a statistically significant difference $(P = 0.978)$
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park t-test Data source: Data 4 in Chromium.JNB	a statistically significant difference $(P = 0.978)$
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park t-test	a statistically significant difference $(P = 0.978)$
difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test:Failed (P < 0.050)	a statistically significant difference $(P = 0.978)$
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difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Park t-testData source: Data 4 in Chromium.JNB Normality Test:Normality Test:Failed(P < 0.050)	a statistically significant difference $(P = 0.978)$
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park t-test Data source: Data 4 in Chromium.JNB Normality Test: Failed (P < 0.050) Test execution ended by user request, Rank Sum Test begun Mann-Whitney Rank Sum Test Data source: Data 4 in Chromium.JNB	a statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM
difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test:Failed (P < 0.050)	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75%
difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test:Failed (P < 0.050)	a statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 5. 0.0000809
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difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test: Failed ($P < 0.050$)Test execution ended by user request, Rank Sum Test begunMann-Whitney Rank Sum TestData source: Data 4 in Chromium.JNBGroup N Missing Median 25%Collocated 20 0 0.0000372 0.00000215Jaycee Park 20 0 0.0000142 0.00000215Jaycee Park 20 0 0.0000142Mann-Whitney U Statistic= 134.500	a statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 5. 0.0000809
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difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test: Failed (P < 0.050)Test execution ended by user request, Rank Sum Test begunMann-Whitney Rank Sum TestData source: Data 4 in Chromium.JNBGroup N Missing Median 25%Collocated 20 0 0.0000372 0.00000215Jaycee Park 20 0 0.0000142 0.00000215	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 5 0.0000809 5 0.0000226 s not great enough to exclude the possibility that the
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difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test: Failed ($P < 0.050$)Test execution ended by user request, Rank Sum Test begunMann-Whitney Rank Sum TestData source: Data 4 in Chromium.JNBGroup N Missing Median 25%Collocated 20 0 0.0000372 0.00000215Jaycee Park 20 0 0.0000142 0.00000215Jaycee Park 20 0 0.0000142 0.00000215Mann-Whitney U Statistic= 134.500T = 475.500 n(small)= 20 n(big)= 20 (P = 0.075)The difference in the median values between the two groups in difference is due to random sampling variability; there is notIII. Collocated vs. Water Treatment Plantt-test	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 5 0.0000809 5 0.0000226 s not great enough to exclude the possibility that the
difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test: Failed (P < 0.050)	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 0.0000809 0.0000226 s not great enough to exclude the possibility that the a statistically significant difference (P = 0.075)
difference is due to random sampling variability; there is not II. Collocated vs. Jaycee Park t-test Data source: Data 4 in Chromium.JNB Normality Test: Failed ($P < 0.050$) Test execution ended by user request, Rank Sum Test begun Mann-Whitney Rank Sum Test Data source: Data 4 in Chromium.JNB Group N Missing Median 25% Collocated 20 0 0.0000372 0.00000215 Jaycee Park 20 0 0.0000142 0.00000215 Mann-Whitney U Statistic= 134.500 T = 475.500 n(small)= 20 n(big)= 20 (P = 0.075) The difference in the median values between the two groups in difference is due to random sampling variability; there is not III. Collocated vs. Water Treatment Plant t-test Data source: Data 4 in Chromium.JNB Normality Test: Failed ($P < 0.050$)	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 0.0000809 0.0000226 s not great enough to exclude the possibility that the a statistically significant difference (P = 0.075)
difference is due to random sampling variability; there is notII. Collocated vs. Jaycee Parkt-testData source: Data 4 in Chromium.JNBNormality Test: Failed (P < 0.050)	A statistically significant difference (P = 0.978) Monday, February 01, 2010, 3:58:35 PM Monday, February 01, 2010, 3:58:35 PM 75% 0.0000809 0.0000226 s not great enough to exclude the possibility that the a statistically significant difference (P = 0.075)

Group	Ν	Missing	Median	25%	75%	
Collocated	20			0.00000215	0.0000809	
Water Treatment Plan			0.00000785	0.00000215	0.0000207	
Mann-Whitney U Sta						
$\Gamma = 478.000 \text{ n(small)}$	= 20 n(big	(P = 0.06)	53)			
The difference in the	median val	ues between the	two groups is n	ot great enou	igh to exclude the possi	bility that the
lifference is due to ra	ndom samj	oling variability	; there is not a si	atistically si	gnificant difference (P =	= 0.063)
	.					
V. Collocated vs.	I riangle	Park		Mandari	Zahmam, 01, 2010, 2,50	.00 DM
- test Data source: Data 4 i	in Chromiu	m IND		Monday,	February 01, 2010, 3:59	.08 PM
Normality Test:		1 (P < 0.050)				
Test execution ended		()	n Test hegun			
Mann-Whitney Ran			i i est began	Monday	February 01, 2010, 3:59	·08 PM
Data source: Data 4				monday,	cordary 01, 2010, 5.57	
Group N			25%	75%	/ 0	
Collocated 20		0.000037				
Triangle Park	5 0	0.000020	6 0.0000068	9 0.0000	233	
Mann-Whitney U Sta	tistic= 39.0	00				
$\Gamma = 54.000$ n(small)=	= 5 n(big)=	20 (P = 0.474)				
1 34.000 m(sman)						
The difference in the	median val	ues between the	two groups is n		igh to exclude the possi	
The difference in the difference is due to ra 7. Collocated vs. Notest test Data source: Data 4 is	median val ndom samj Aountain in Chromiu	ues between the pling variability Peak Elemen ım.JNB	two groups is n there is not a st	atistically si	igh to exclude the possi gnificant difference (P = February 01, 2010, 3:59	<u>= 0.474)</u>
The difference in the lifference is due to ra V. Collocated vs. No- test Data source: Data 4 is Normality Test: Test execution ended Mann-Whitney Ran	median val ndom samp Aountain in Chromiu Failed by user rec k Sum Tes	ues between the oling variability Peak Elemen Im.JNB d (P < 0.050) Juest, Rank Sun t	two groups is n ; there is not a st tary School	atistically si Monday, I	gnificant difference (P	<mark>= 0.474)</mark> :21 PM
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The difference in the difference is due to radifference is due to radifference is due to raV. Collocated vs. Mt-testData source: Data 4 ifNormality Test:Test execution endedMann-Whitney RanData source: Data 4 ifGroupNCollocated20Mountain Peak5Mann-Whitney U StaT = 43.500 n(small)=The difference in the difference is due to raVI. Collocated vs. statestData source: Data 4 ifNormality Test:Test execution ended	median val ndom samp Aountain in Chromiu Failed by user rec k Sum Tes in Chromiu Missing 0 0 tistic= 28.5 5 n(big)= median val ndom samp J.A. Vitov in Chromiu Failed by user rec	ues between the oling variability Peak Elemen um.JNB d (P < 0.050) juest, Rank Sun t um.JNB Median 0.0000372 0.0000021 00 20 (P = 0.147) ues between the oling variability vsky Element: um.JNB d (P < 0.050) juest, Rank Sun	two groups is n tary School Test begun 0.0000021 0.0000021	atistically si Monday, I Monday, I 75% 5 0.0000 5 0.0000 ot great enou atistically si Monday, I	gnificant difference (P February 01, 2010, 3:59 February 01, 2010, 3:59 6 809 291 Igh to exclude the possi gnificant difference (P	= 0.474) :21 PM :21 PM bility that the = 0.147) :34 PM
The difference in the difference is due to radifference is due to raV. Collocated vs. Mt-testData source: Data 4 in Normality Test:Test execution endedMann-Whitney RamData source: Data 4 in GroupNCollocated20Mountain Peak5Mann-Whitney U Sta $\Gamma = 43.500$ n(small)=The difference in the	median val ndom samp Aountain in Chromiu Failed by user rec k Sum Tes in Chromiu Missing 0 0 tistic= 28.5 5 n(big)= median val ndom samp J.A. Vitov in Chromiu Failed by user rec k Sum Tes	ues between the oling variability Peak Elemen um.JNB 1 (P < 0.050) juest, Rank Sun t um.JNB g Median 0.0000372 0.0000021 00 20 (P = 0.147) ues between the oling variability vsky Element um.JNB 1 (P < 0.050) juest, Rank Sun t	two groups is n tary School Test begun 0.0000021 0.0000021	atistically si Monday, I Monday, I 75% 5 0.0000 5 0.0000 ot great enou atistically si Monday, I	gnificant difference (P February 01, 2010, 3:59 February 01, 2010, 3:59 6 809 291 Igh to exclude the possi gnificant difference (P February 01, 2010, 3:59	= 0.474) :21 PM :21 PM bility that the = 0.147) :34 PM
The difference in the difference is due to radifference is due to radifference is due to radifference is due to radiat source: Data 4 is Normality Test: Test execution ended Mann-Whitney Ran Data source: Data 4 is Group N Collocated 20 Mountain Peak 5 Mann-Whitney U Sta $T = 43.500$ n(small)= The difference in the difference is due to radifference is due to radifference is due to radifference in the difference is due to radifference is due to radifferenc	median val ndom samp Aountain in Chromiu Failed by user rec k Sum Tes in Chromiu Missing 0 0 tistic= 28.5 5 n(big)= median val ndom samp J.A. Vitov in Chromiu Failed by user rec k Sum Tes	ues between the oling variability Peak Elemen um.JNB 1 (P < 0.050) juest, Rank Sun t um.JNB g Median 0.0000372 0.0000021 00 20 (P = 0.147) ues between the oling variability vsky Element um.JNB 1 (P < 0.050) juest, Rank Sun t	two groups is n tary School Test begun 0.0000021 0.0000021	atistically si Monday, I Monday, I 75% 5 0.0000 5 0.0000 ot great enou atistically si Monday, I	gnificant difference (P February 01, 2010, 3:59 February 01, 2010, 3:59 6 809 291 Igh to exclude the possi gnificant difference (P February 01, 2010, 3:59	= 0.474) :21 PM :21 PM bility that the = 0.147) :34 PM
The difference in the difference is due to radiifference is due to radiifference is due to radiifference is due to radiifference: Data 4 if Normality Test: Test execution ended Mann-Whitney Ran Data source: Data 4 if Group N Collocated 20 Mountain Peak 5 Mann-Whitney U Stator (State) The difference in the difference is due to radiifference is due to radiifference is due to radiifference: Data 4 if Normality Test: Test execution ended VI. Collocated vs. Advances to the difference of the	median val ndom sam Jountain in Chromiu Failed by user rec k Sum Tes in Chromiu Missing 0 0 tistic= 28.5 = 5 n(big)= median val ndom sam J.A. Vitov in Chromiu Failed by user rec k Sum Tes in Chromiu	ues between the pling variability Peak Elemen um.JNB 1 (P < 0.050) uest, Rank Sum t um.JNB Median 0.0000372 0.0000021 00 20 (P = 0.147) ues between the pling variability vsky Element um.JNB 1 (P < 0.050) uest, Rank Sum t um.JNB	two groups is n tary School Test begun 25% 0.0000021 0.0000021 two groups is n there is not a si ary School Test begun	atistically si Monday, I Monday, I 75% 5 0.0000 5 0.0000 ot great enou atistically si Monday, I Monday, I	gnificant difference (P February 01, 2010, 3:59 February 01, 2010, 3:59 6 809 291 Igh to exclude the possi gnificant difference (P February 01, 2010, 3:59 February 01, 2010, 3:59	= 0.474) :21 PM :21 PM bility that the = 0.147) :34 PM

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.056)

VII. Collocated vs. N	Aidlothi a	n High Scho	ol						
t-test		C	Monday, February 01, 2010, 3:59:50 PM						
Data source: Data 4 in	Chromiun	n.JNB		•					
Normality Test:	Failed	(P < 0.050)							
Test execution ended by user request, Rank Sum Test begun									
Mann-Whitney Rank	Sum Test		-	Monday, Fe	ebruary 01, 2010, 3:59:50 PM				
Data source: Data 4 in	Chromiun	n.JNB		-	-				
Group N	Missing	Median	25%	75%					
Collocated 20	0	0.0000372	0.00000215	0.0000809	9				
Midlothian HS 5	0	0.0000184	0.0000147	0.0000249	9				
Mann-Whitney U Statis	tic = 42.00	00							
T = 57.000 n(small) = 5	n(big)=2	20 $(P = 0.609)$)						
				ot great enoug	th to exclude the possibility that the				
					nificant difference $(P = 0.609)$				
	-								
C. PM ₁₀ Cr ⁶⁺ Site Co	ompariso	ns: All Four	Quarters of D	ata					
I. Comparison of Sta	ationary	Sites							
One WayOne-Way Ar	alysis of `	Variance		Monday, Fe	ebruary 01, 2010, 3:57:28 PM				
Data source: Data 4 in					•				
Normality Test:	Failed	(P < 0.050)							
Test execution ended by	y user requ	iest, ANOVÁ	on Ranks begun						
Kruskal-Wallis One V	VayOne-V	Vay Analysis	of Variance on I	RanksMonday	7, February 01, 2010, 3:57:28 PM				
Data source: Data 4 in	Chromiun	n.JNB		-					
Group	Ν	Missing	Median	25%	75%				
Collocated	20	0 (0.0000372 0	.00000215	0.0000809				
Collocated Wyatt Rd	20 20			.00000215	0.0000809 0.0000673				
		0 (0.0000350 0						
Wyatt Rd	20	0 (0 (0.0000350 0 0.0000142 0	.00000270	0.0000673				
Wyatt Rd Jaycee Park	20 20 20	0 0 0 0 0 0	0.000035000.000014200.000007850	.00000270 .00000215	0.0000673 0.0000226				

the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.051)

II. Comparison of Mobile Sites

One WayOne-Way Analysis of Variance

Data source: Data 4 in Chromium.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 3:57:41 PM Data source: Data 4 in Chromium.JNB

		• •			
Group	Ν	Missing	Median	25%	75%
Triangle Park	5	0	0.0000206	0.00000689	0.0000233
Mountain Peak	5	0	0.00000215	0.00000215	0.0000291
Vitovsky	5	0	0.00000215	0.00000215	0.00000689
Midlothian HS	5	0	0.0000184	0.0000147	0.0000249

Monday, February 01, 2010, 3:57:41 PM

H = 4.301 with 3 degrees of freedom. (P = 0.231)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.231)

III. Comparison of All Sites

One WayOne-Way Analysis of Variance

Data source: Data 4 in Chromium.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 3:57:58 PM Data source: Data 4 in Chromium.JNB

Ν	Missing	Median	25%	75%
20	0	0.0000372	0.00000215	0.0000809
20	0	0.0000350	0.00000270	0.0000673
20	0	0.0000142	0.00000215	0.0000226
20	0	0.00000785	0.00000215	0.0000207
5	0	0.0000206	0.00000689	0.0000233
5	0	0.00000215	0.00000215	0.0000291
5	0	0.00000215	0.00000215	0.00000689
5	0	0.0000184	0.0000147	0.0000249
	20 20 20 20 5 5 5 5	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

H = 12.873 with 7 degrees of freedom. (P = 0.075)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.075)

D. PM₁₀ Cr⁶⁺ Site Comparisons: Individual Quarters of Data

I. 1st Quarter PM₁₀ Cr⁶⁺ Data

One	WayOne	-Way A	Analysis	of V	ariance
-----	--------	--------	----------	------	---------

Data source: Data 3 in Chromium.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 4:53:23 PM Data source: Data 3 in Chromium.JNB

Dura sour eer Dura b m c	0111011114				
Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0000677	0.00000360	0.000178
Wyatt Rd	5	0	0.0000192	0.00000251	0.000215
Jaycee Park	5	0	0.0000179	0.00000240	0.0000329
Water Treatment Plant	5	0	0.0000210	0.00000366	0.0000329
Triangle Park	5	0	0.0000206	0.00000689	0.0000233
TT 4 4 4 m 1 1 4 1	0.0	1 (D (

H = 1.147 with 4 degrees of freedom. (P = 0.887)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.887)

II. 2nd Quarter PM₁₀ Cr⁶⁺ Data

One WayOne-Way Analysis of Variance

Data source: Data 5 in Chromium.JNB

Monday, February 01, 2010, 5:07:13 PM

Monday, February 01, 2010, 4:53:23 PM

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 5:07:13 PM Data source: Data 5 in Chromium.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0000449	0.00000215	0.0000648
Wyatt Rd	5	0	0.0000609	0.00000215	0.0000897
Jaycee Park	5	0	0.00000215	0.00000215	0.0000231
Water Treatment Plant	5	0	0.00000215	0.00000215	0.00000215
Mountain Peak	5	0	0.00000215	0.00000215	0.0000291

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Monday, February 01, 2010, 3:57:58 PM

H = 6.598 with 4 degrees of freedom. (P = 0.159)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.159)

III. 3rd Quarter PM₁₀ Cr⁶⁺ Data

Normality Test:

One WayOne-Way Analysis of Variance

Data source: Data 6 in Chromium.JNB

Monday, February 01, 2010, 5:08:00 PM

Test execution ended by user request, ANOVA on Ranks begun Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 5:08:00 PM Data source: Data 6 in Chromium INB

Data source. Data o in enformani.stvD								
Group	Ν	Missing	Median	25%	75%			
Collocated	5	0	0.0000292	0.00000215	0.0000705			
Wyatt Rd	5	0	0.0000340	0.0000269	0.0000427			
Jaycee Park	5	0	0.0000169	0.00000215	0.0000184			
Water Treatment Plant	5	0	0.00000215	0.00000215	0.0000198			
Vitovsky	5	0	0.00000215	0.00000215	0.00000689			

H = 9.844 with 4 degrees of freedom. (P = 0.043)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.043)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All PairwiseAll-Pairwise Multiple Comparison Procedures (Tukey Test):

Failed (P < 0.050)

Comparison	Diff of Ranks	q	P<0.05
Wyatt Rd vs Vitovsky	58.500	3.555	No
Wyatt Rd vs Water Treatme	52.500	3.190	Do Not Test
Wyatt Rd vs Jaycee Park	46.500	2.826	Do Not Test
Wyatt Rd vs Collocated	20.000	1.215	Do Not Test
Collocated vs Vitovsky	38.500	2.339	Do Not Test
Collocated vs Water Treatme	32.500	1.975	Do Not Test
Collocated vs Jaycee Park	26.500	1.610	Do Not Test
Jaycee Park vs Vitovsky	12.000	0.729	Do Not Test
Jaycee Park vs Water Treatme	6.000	0.365	Do Not Test
Water Treatme vs Vitovsky	6.000	0.365	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

IV. 4th Quarter PM₁₀ Cr⁶⁺ Data

One WayOne-Way Analysis of Variance

Monday, February 01, 2010, 5:08:25 PM

Data source: Data 7 in Chromium.JNB

Normality Test: Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One WayOne-Way Analysis of Variance on RanksMonday, February 01, 2010, 5:08:25 PM Data source: Data 7 in Chromium.JNB

Group	Ν	Missing	Median	25%	75%
Collocated	5	0	0.0000294	0.0000111	0.0000729
Wyatt Rd	5	0	0.0000361	0.00000215	0.0000612

Jaycee Park	5	0	0.0000115	0.00000215	0.0000370
Water Treatment Plant	5	0	0.0000204	0.0000126	0.0000522
Midlothian HS	5	0	0.0000184	0.0000147	0.0000249

H = 1.347 with 4 degrees of freedom. (P = 0.853)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.853)

E. Hexavalent Chromium Seasonal Variation Comparisons

I. Collocated				-								
One Way Ana	lysis o	f Variance		Tuesday, June 01, 2010, 11:51:12 AM								
			n Monitor Com	parisons.JNB								
Normality Tes	t:	Passed	· · · · · ·									
Equal Variance	e Test	: Passed	(P = 0.090)									
Group Name	Ν	Missing	Mean	Std Dev	SEM							
Cr6+-1st Q	5	0	0.0000965	0.000109	0.0000486							
2nd Q	5	0	0.0000413	0.0000429	0.0000192							
3rd Q	5	0	0.0000380	0.0000400	0.0000179							
4th Q	5	0	0.0000447	0.0000473	0.0000212							
Source of Variation DF SS MS F P												
Between Group)S	3	0.0000000113	5 0.00000	000384 0.879	9 0.473						
Residual		16	0.0000000699	9 0.00000	000437							
Total		19	0.000000814									
						ough to exclude the possibility that						
					t a statistically s	ignificant difference (P = 0.473).						
			a = 0.050: 0.050									
The power of the	he perf	ormed test (0.050) is below	the desired po	ower of 0.800.							
			you are less like	ely to detect a	difference when	one actually exists. Negative results						
should be inter	preted	cautiously.										
II. Wyatt Rd												
One Way Ana					Tuesday	, June 01, 2010, 1:20:55 PM						
			Monitor Comp	arisons.JNB								
Normality Tes		Failed										
			est, ANOVA or									
			sis of Variance		Tuesday	, June 01, 2010, 1:20:55 PM						
	5		Monitor Compa									
		Aissing	Median	25%	75%							
	5			.00000251	0.000215							
	5			.00000215	0.0000897							
· ·	5			.0000269	0.0000427							
4th Q	5	0	0.0000361 0	.00000215	0.0000612							
			om. $(P = 0.979)$									
The differences	s in the	median val	ues among the ti	reatment group	ps are not great e	enough to exclude the possibility that						
the difference i	s due t	o random sa	<mark>mpling variabili</mark>	ty; there is no	t a statistically s	ignificant difference (P = 0.979)						
III. Jaycee Par	rk											
One Way Ana	lysis o	f Variance			Tuesday	, June 01, 2010, 1:11:30 PM						
Data source: Jaycee Park-Metals in Monitor Comparisons.JNB												
Normality Tes			(P = 0.078)									
Equal Variance	<u>e Test</u>	: Passed	(P = 0.498)									
Group Name	Ν	Missing	Mean	Std Dev	SEM							
Cr6+-1st Q	5	0	0.0000218	0.0000252	0.0000113							

2 10	-	0	0.0000107	0.0000110	0 000005	2		
2nd Q	5	0	0.0000107	0.0000118	0.000005			
3rd Q	5	0	0.0000119	0.00000896	0.000004			
4th Q	5	0	0.0000191	0.0000197	0.00008			
Source of V		DF	SS		MS	F	Р	
Between Gr	oups	3	0.00000000		00000147	0.474	0.705	
Residual		16	0.00000000		000000310			
Total		19	0.00000000					
								<mark>e possibility that</mark>
				ility; there is no	t a statistically	y signific	ant differenc	e (P = 0.705).
			bha = 0.050: 0.0					
				w the desired po				
				kely to detect a	difference wh	nen one a	ctually exists	. Negative results
should be in	terpreted	cautiously.						
IV. Water	[<mark>reatme</mark> r	it Plant						
One Way A	nalysis o	f Variance	:		Tuesd	ay, June	01, 2010, 1:1	5:28 PM
Data source	: Water	Freatment F	lant-Metals in	Monitor Compa	risons.JNB			
Normality 7	Test:	Failed	1 (P < 0.050)					
Test executi	on ended	by user req	uest, ANOVA	on Ranks begui	1			
Kruskal-W	allis One	Way Anal	ysis of Varian	ce on Ranks	Tuesd	ay, June	01, 2010, 1:1	5:28 PM
Data source	: Water	Freatment F	lant-Metals in	Monitor Compa	risons.JNB			
Group	N I	Missing	Median	25%	75%			
Cr6+-1st Q	5	0	0.0000210	0.00000366	0.0000329			
2nd Q	5	0	0.00000215	0.00000215	0.0000021	5		
3rd Q	5	0	0.00000215	0.00000215	0.0000198			
4th Q	5	0	0.0000204	0.0000126	0.0000522			
H = 11.824	with 3 de	grees of fre	edom. $(P = 0.0)$	08)				
				treatment grou	ps are greater	than wou	ld be expected	ed by chance:
			difference (P =					
				ne others use a	nultiple comr	arison pr	ocedure	
			on Procedures (nanopie eomp	anoon pi		
Comparison			-	q P<0.	05			
4th Q vs 2nd				q 1 <0. 044				
	1 ()	`			YAS			
4th O ve 3rd					Yes No			
4th Q vs 3rd 4th Q vs Cré	Q	3	5.500 2.	684 378 Do No	No			

 3rd Q vs 2nd Q
 18.000
 1.361
 No

48.500

30.500

Cr6+-1st Q vs 2nd Q

Cr6+-1st Q vs 3rd Q

Note: The multiple comparisons on ranks do not include an adjustment for ties.

3.666

2.306

A result of "Do Not Test" occurs for a comparison when no significant difference is found between the two rank sums that enclose that comparison. For example, if you had four rank sums sorted in order, and found no significant difference between rank sums 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed rank sums is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the rank sums, even though one may appear to exist.

Yes

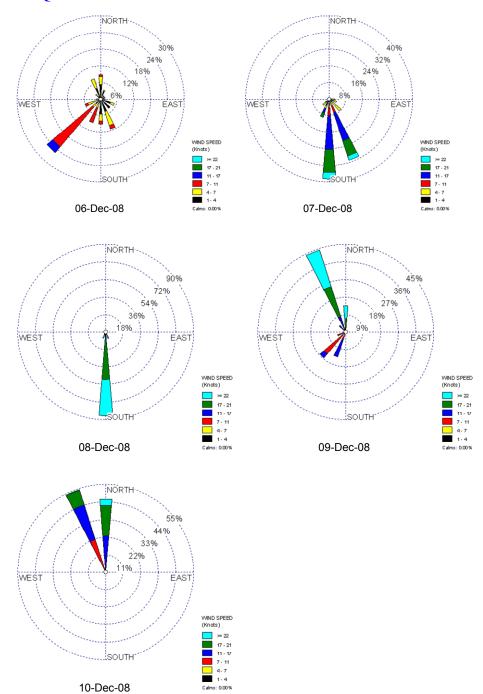
Do Not Test

Appendix M – Wind Roses

Page M-1

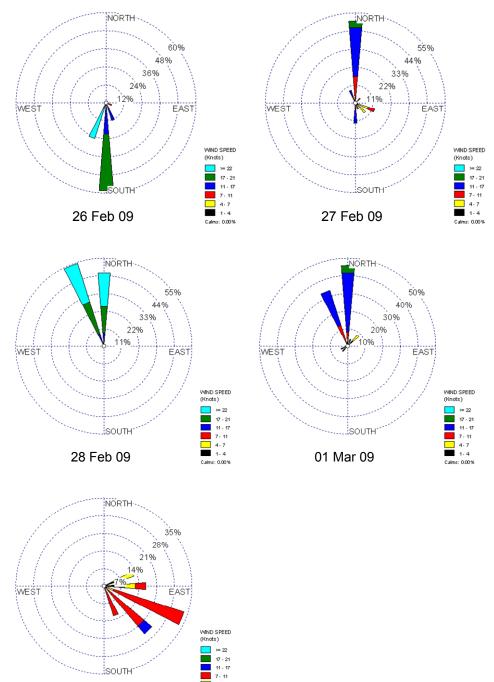
Daily Wind Direction Averages





Calms: 0.00%

II. 2nd Quarter



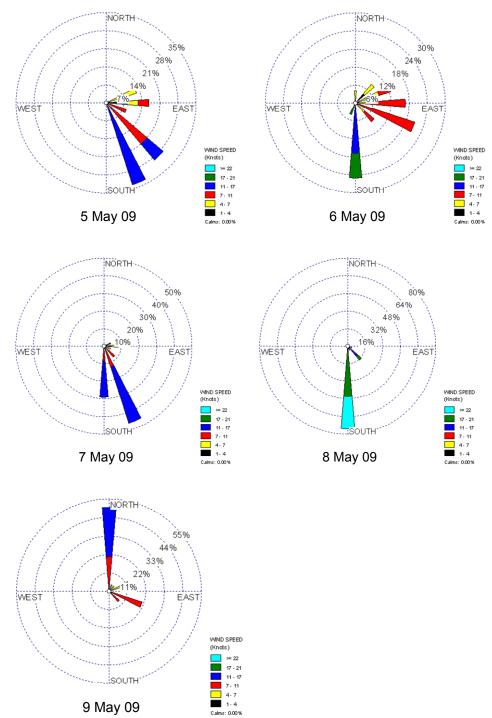
Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

4·7

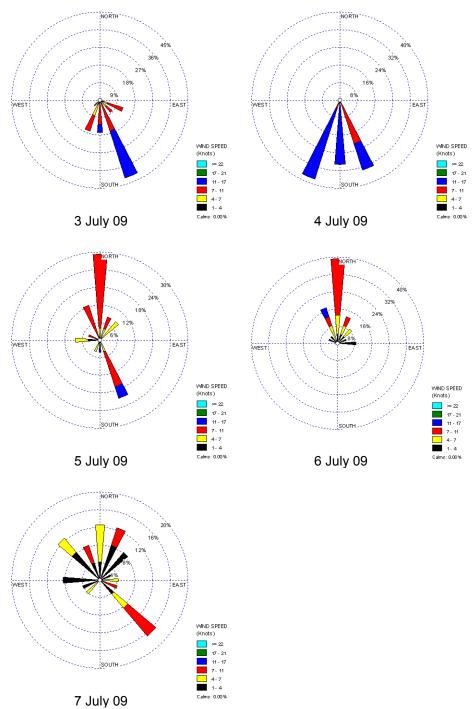
Calms: 0.00%

02 Mar 09

III. 3rd Quarter



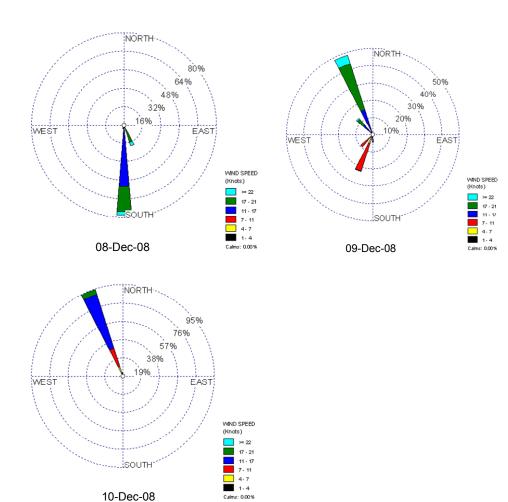
IV. 4th Quarter



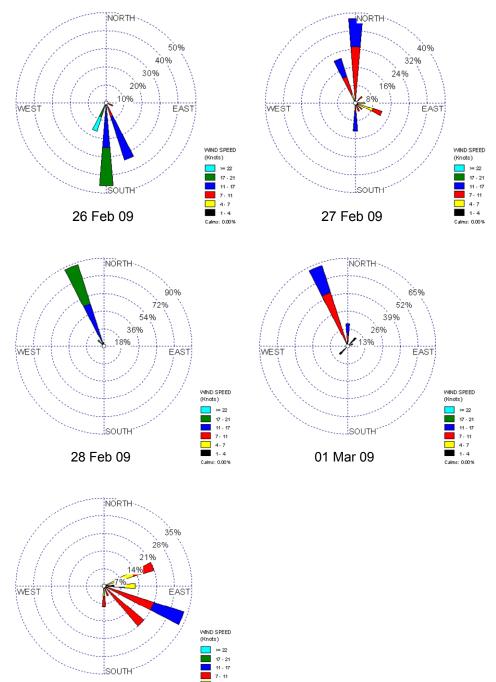
B. Wyatt Rd I. 1st Quarter

No meteorological data available for 06-Dec-08

Insufficient data capture for 07-Dec-08



II. 2nd Quarter

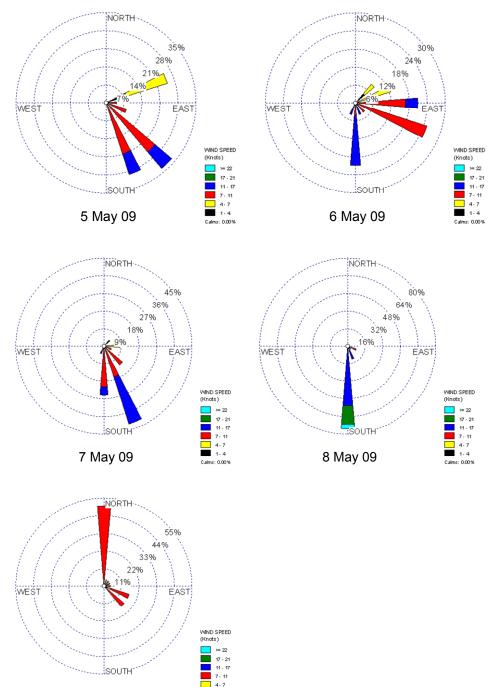


02 Mar 09

4.7

III. 3rd Quarter

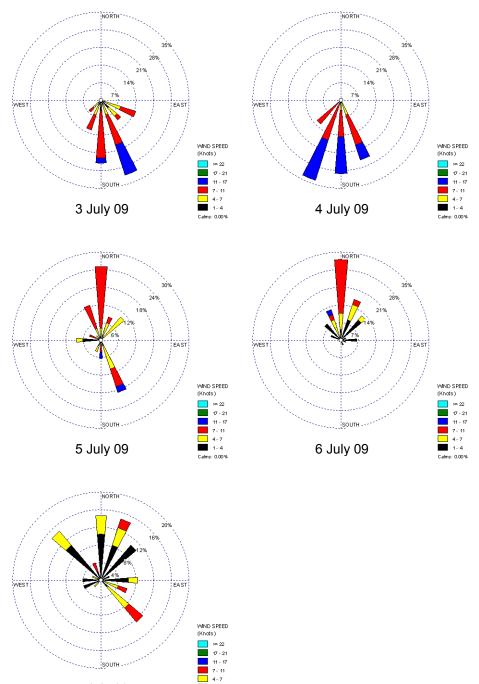
9 May 09



1 - 4 Calms: 0.00%

IV. 4th Quarter

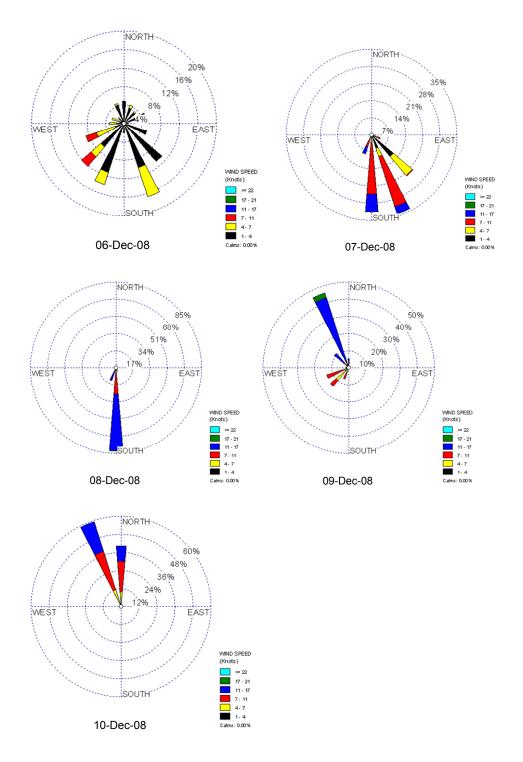
7 July 09



1.4

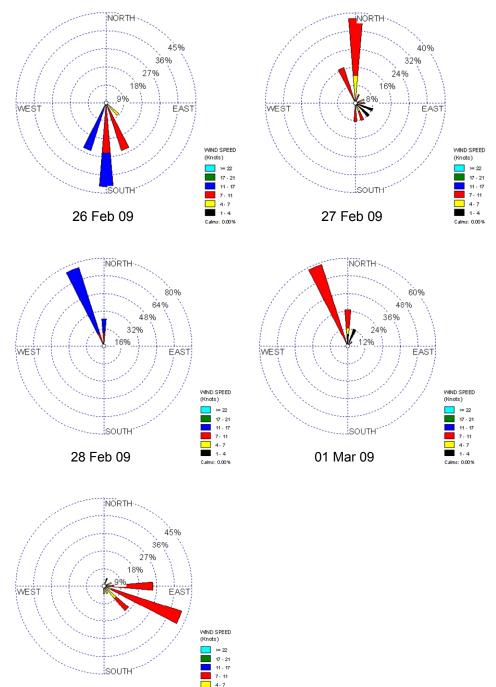
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C. Jaycee Park I. 1st Quarter



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II. 2nd Quarter



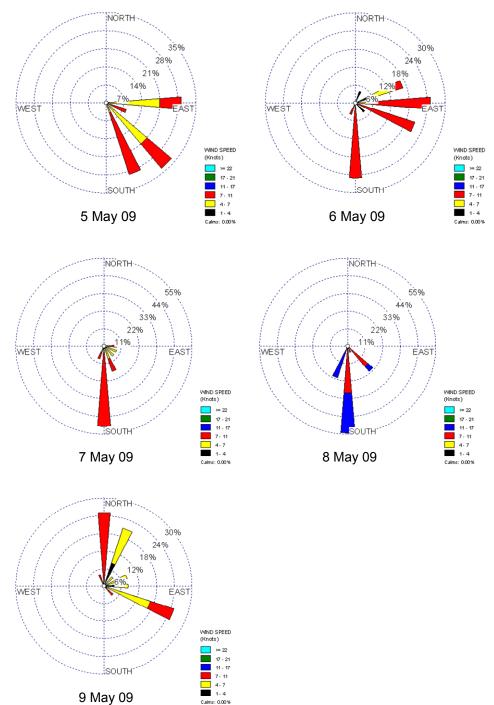
1-4

Calms: 0.00%

02 Mar 09

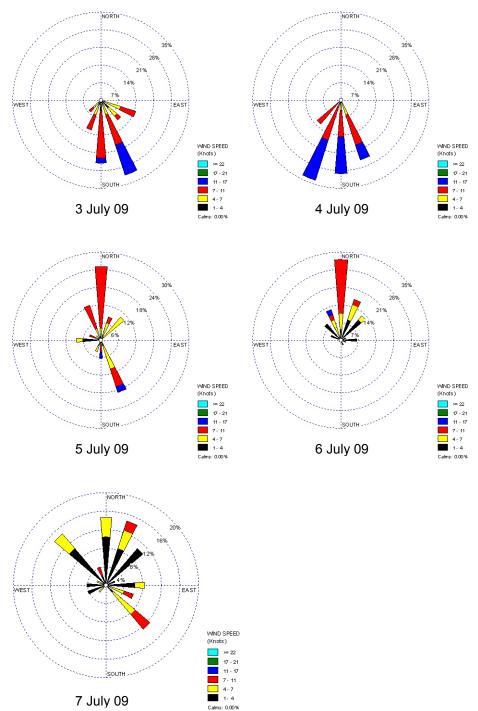
Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data
 Page M-11

III. 3rd Quarter



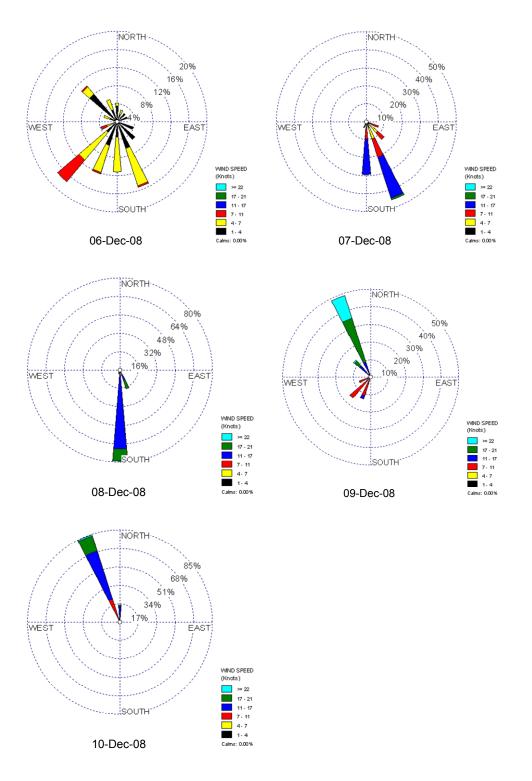
Calms: 0.00%

IV. 4th Quarter



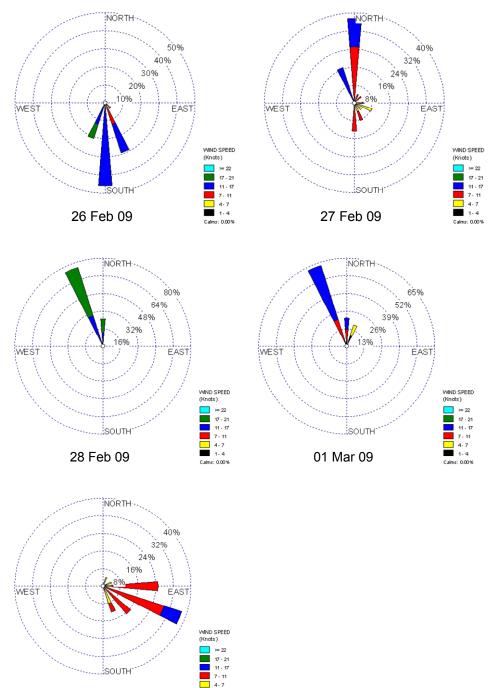
Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis DataPage M-13

D. Water Treatment Plant I. 1st Quarter



Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data Page M-14

II. 2nd Quarter

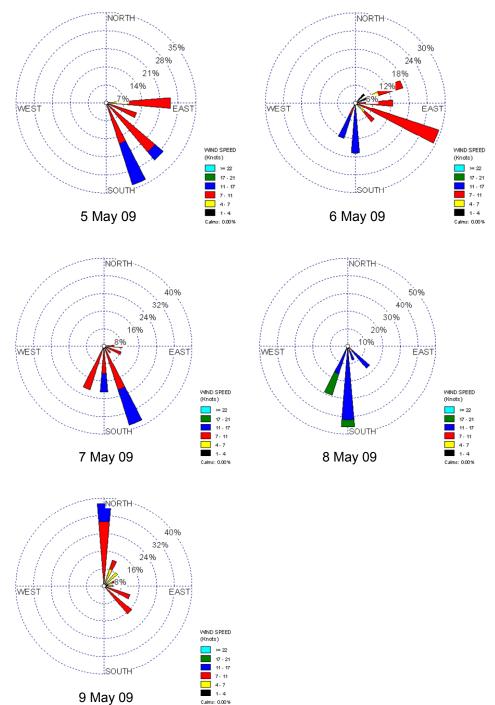


1.4

Calms: 0.00%

02 Mar 09

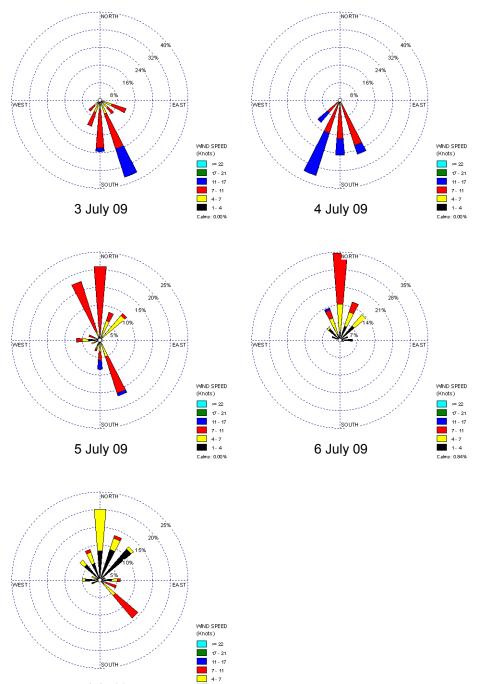
III. 3rd Quarter



Calms: 0.00%

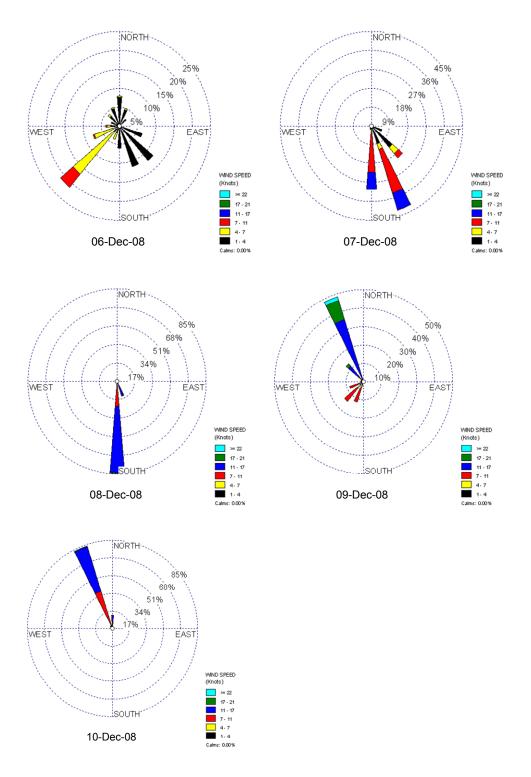
IV. 4th Quarter

7 July 09



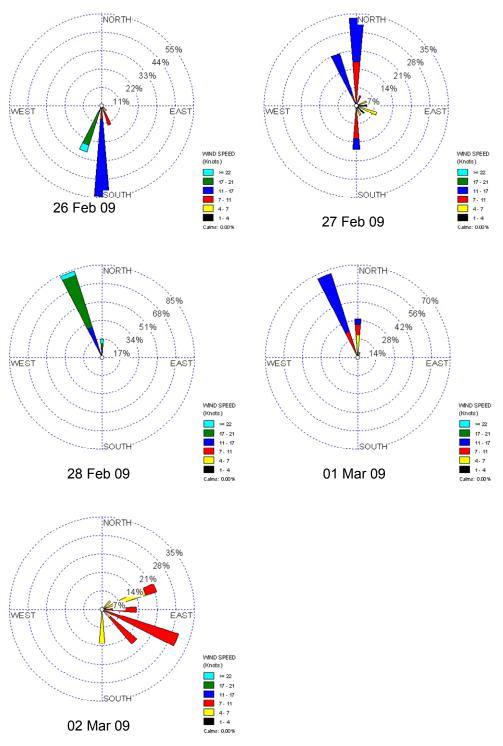
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E. Triangle Park I. 1st Quarter

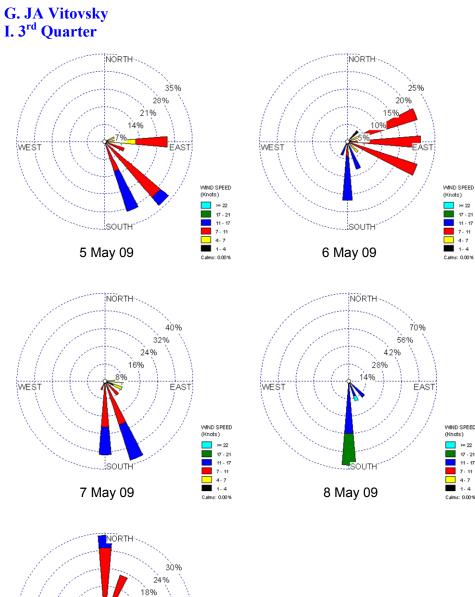


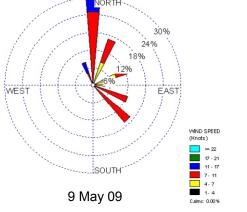
Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data Page M-18

F. Mountain Peak I. 2nd Quarter



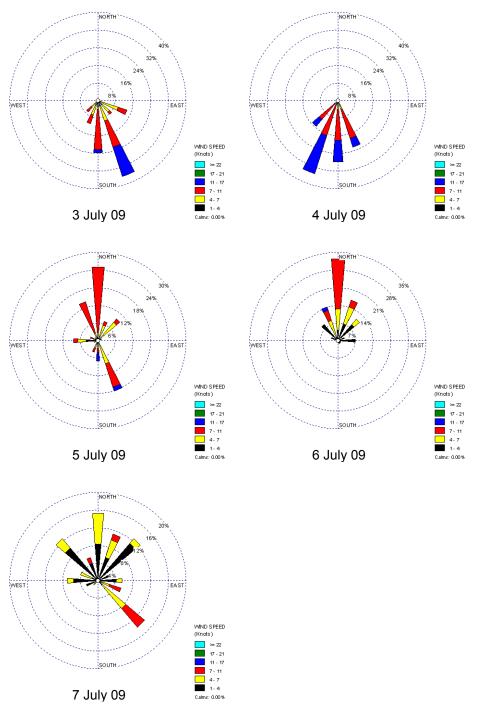
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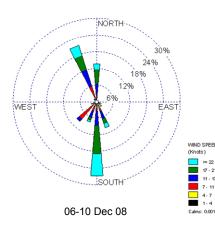
Page M-20 Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

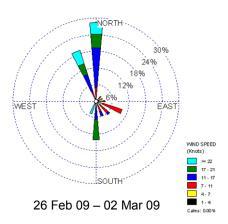
H. Midlothian HS I. 4th Quarter



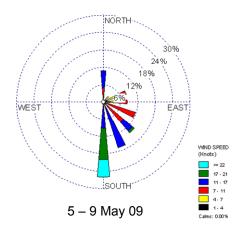
Site Quarterly Wind Direction Averages A. Collocated Monitor

I. 1st Quarter



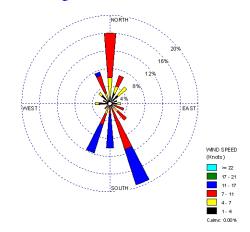


III. 3rd Quarter



IV. 4th Quarter

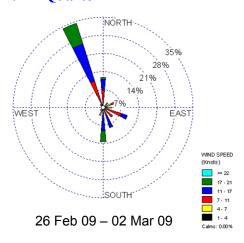
II. 2nd Quarter



B. Wyatt Rd

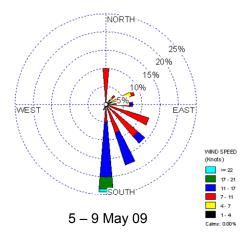
I. 1st Quarter

II. 2nd Quarter

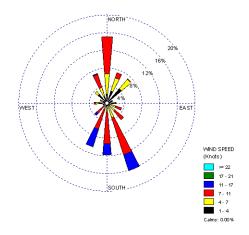


Insufficient data capture 06-10 Dec 08

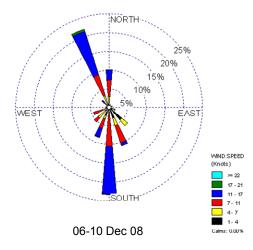
III. 3rd Quarter



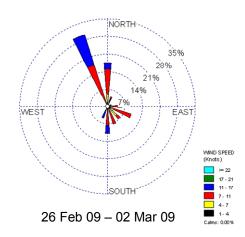
IV. 4th Quarter



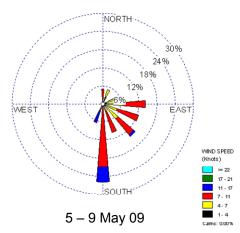
C. Jaycee Park I. 1st Quarter



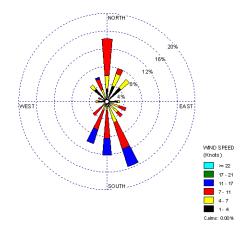
II. 2nd Quarter



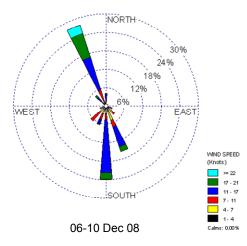
III. 3rd Quarter



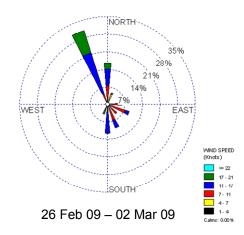
IV. 4th Quarter



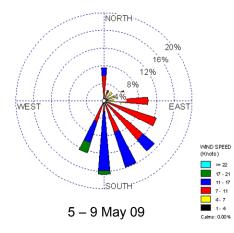
D. Water Treatment Plant I. 1st Quarter



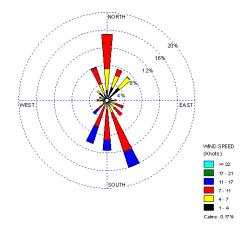
II. 2nd Quarter



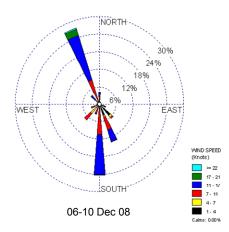
III. 3rd Quarter



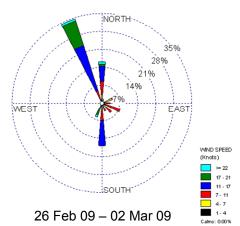




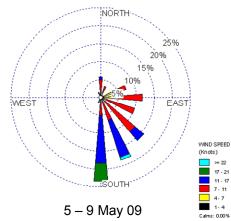




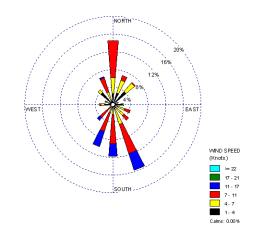
F. Mountain Peak I. 2nd Quarter



G. JA Vitovsky I. 3rd Quarter



H. Midlothian HS I. 4th Quarter



Appendix N - URS Memorandum on 3^{rd} Quarter Hexavalent Chromium Data

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MEMORANDUM

- TO: Tracie Phillips, TCEQ
- FROM: A1 Hendler, URS
- DATE: June 9, 2009
- SUBJECT: Midlothian Third Quarter Hexavalent Chromium (Cr⁵⁺) and Total Unspeciated Chromium (CrT) Measurement Results

Third quarter sampling for the Midlothian, Texas Ambient Air Collection and Chemical Analysis Project took place on five consecutive days during May 5 - 9, 2009. As previously discussed, the laboratory results for Cr^{6+} samples cannot be positively aligned with the specific dates on which the samples were collected. This is because of a procedural mistake in which the Chain-of-Custody Form (COC) that documented the sampling date and site was removed from each solitary sample container by laboratory receiving personnel without the sampling date ever being copied from the COC.

Despite the oversight, the location at which each sample was collected is known because each shipping container was labeled with a site identification code. Therefore, the following conclusions can be drawn from the data:

- Cr⁶⁺ levels did not exceed 0.1 nanograms per cubic meter (ng/m³) at any of the sampling sites on any of the five sampling days;
- Averaged over the entire five days, Cr⁶⁺ levels did not exceed 0.038 ng/m³ at any of the sampling sites;
- At Vitovsky Elementary School, Cr⁶⁺ levels were below the lower limit of detection on four of the five sampling days;
- At the four stationary sampling sites, 24-hour average Cr⁶⁺ levels were within the ranges measured during the first and second quarters; and
- At worst case, Cr⁶⁺ composed no greater than 4% of CrT at any of the sampling sites on any of the five sampling days.

Data from each site are summarized below

CAMS 52

Twenty-four hour average Cr^{6+} levels ranged from below the lower limit of detection to 0.094 ng/m³ with a mean of 0.038 ng/m³ (assuming one-half the detection limit for the non-detects). All the 3rd quarter 24-hour levels were inside the range of 24-hour levels measured during the 1st and 2nd quarters while the 3rd quarter average was lower than the averages for Q1 and Q2. At worst case, Cr^{6+} composed no greater than 4% of Cr_T during any 24-hour period. This was estimated by dividing the 3rd quarter highest Cr^{6+} level by the lowest Cr_T level.

Quarterly Min., Max., and Means for Cr⁵⁺ in

16/m			
	Q1	Q2	Q3
Min	0.002	ND	ND
Max	0.257	0.106	0.094
Mean	0.097	0.041	0.038

Hexavalent Chromium		Total Chromium	
Rank	Conc.	Date	Conc.
lst	0.0941	5/5/2009	2.16
2nd	0.0626	5/6/2009	2.59
3rd	0.0292	5/7/2009	3.22
4th	ND	5/8/2009	4.89
5th	ND	5/9/2009	2.31
Min	ND	Min	2.16
Max	0.094	Max	4.89

Wyatt Road

Twenty-four hour average Cr^{6+} levels ranged from 0.020 ng/m³ to 0.053 ng/m³ with a mean of 0.035 ng/m³. All the 3rd quarter 24-hour levels were inside the range of 24-hour levels measured during the 1st and 2nd quarters while the 3rd quarter average was lower than the averages for Q1 and Q2. At worst case, Cr^{6+} composed no greater than 2% of Cr_T during any 24-hour period. This was estimated by dividing the 3rd quarter highest Cr^{6+} level by the lowest Cr_T level.

Quarterly Min., Max., and Means for ${\rm Cr}^{\text{5+}}$ in ng/m^3

	Q1	Q2	Q3
Min	ND	ND	0.020
Max	0.379	0.138	0.053
Mean	0.112	0.055	0.035

3rd Quarter Cr	⁶⁺ and Cr⊤	Results in	ng/m ³
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Hexavalent Chromium		Total Chromium	
Rank	Conc.	Date	Conc.
lst	0.0525	5/5/2009	4.74
2nd	0.0395	5/6/2009	3.91
3rd	0.034	5/7/2009	7.04
4th	0.0292	5/8/2009	11.9
5th	0.0199	5/9/2009	2.64
Min	0.020	Min	2.64
Max	0.053	Max	11.9

Evaluation of the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Data

Jaycee Park

Twenty-four hour average Cr^{6+} levels ranged from below the lower limit of detection to 0.020 ng/m³ with a mean of 0.012 ng/m³. All the 3rd quarter 24-hour levels were inside the range of 24-hour levels measured during the 1st and 2nd quarters while the 3rd quarter average was between the averages for Q1 and Q2. At worst case, Cr^{6+} composed no greater than 1% of Cr_T during any 24-hour period. This was estimated by dividing the 3rd quarter highest Cr^{6+} level by the lowest Cr_T level.

Quarterly Min., Max., and Means for Cr⁵⁺ in

ng/m			
	Q1	Q2	Q3
Min	0.002	ND	ND
Max	0.064	0.025	0.020
Mean	0.022	0.011	0.012

3rd Quarter Cr⁶⁺ and Cr_T Results in ng/m³

Hexavalent Chromium		Total Chromium	
Rank	Conc.	Date	Conc.
1 st	0.0204	5/5/2009	2.14
2 nd	0.0177	5/6/2009	2.14
3rd	0.0169	5/7/2009	2.14
4 th	ND	5/8/2009	2.26
5 th	ND	5/9/2009	2.59
Min	ND	Min	2.14
Max	0.020	Max	2.59

Water Treatment Plant

Twenty-four hour average Cr^{6+} levels ranged from below the lower limit of detection to 0.020 ng/m³ with a mean of 0.009 ng/m³. All the 3rd quarter 24-hour levels were inside the range of 24-hour levels measured during the 1st and 2nd quarters while the 3rd quarter average was between the averages for Q1 and Q2. At worst case, Cr^{6+} composed no greater than 1% of CrT during any 24-hour period. This was estimated by dividing the 3rd quarter highest Cr^{6+} level by the lowest Cr_T level.

Quarterly Min., Max., and Means for ${\rm Cr}^{6+}$ in ng/m^3

	Q1	Q2	Q3
Min	ND	ND	ND
Max	0.047	ND	0.020
Mean	0.021	0.002	0.009

3rd Quarter Cr⁶⁺ and Cr_T Results in ng/m³

Hexavalent Chromium		Total Chromium	
Rank	Conc.	Date Conc.	
lst	0.0201	5/5/2009	2.04
2nd	0.0197	5/6/2009	2.16
3rd	ND	5/7/2009	2.54
4th	ND	5/8/2009	2.43
5th	ND	5/9/2009	2.22
Min	ND	Min	2.04
Max	0.020	Max	2.54

Vitovsky Elementary School

Twenty-four hour average Cr^{6^+} levels ranged from below the lower limit of detection to 0.021 ng/m³ with a mean of 0.006 ng/m³. No sampling was conducted at Vitovsky Elementary School during the 1st and 2nd quarters. At worst case, Cr^{6^+} composed no greater than 1% of Cr_T during any 24-hour period. This was estimated by dividing the 3rd quarter highest Cr^{6^+} level by the lowest Cr_T level.

Hexavalent Chromium		Total Chromium	
Rank	Conc.	Date	Conc.
lst	0.0211	5/5/2009	2.64
2nd	ND	5/6/2009	2.33
3rd	ND	5/7/2009	2.77
4th	ND	5/8/2009	2.3
5th	ND	5/9/2009	3.16
Min	ND	Min	2.3
Max	0.021	Max	3.16

 $3^{\rm rd}$ Quarter ${\rm Cr}^{6+}$ and ${\rm Cr}_T$ Results in ng/m^3

Appendix O – ERG Letter to URS about 3rd Quarter Hexavalent Chromium Data



June 9, 2009

Al Hendler URS Corporation 9400 Amberglen Blvd Austin, TX 78720 Project Name: JPTX

Dear Al Hendler,

As discussed with you via phone, there was an issue at the laboratory concerning the receipt of the samples collected in Midlothian, TX from 5/05/09 to 5/09/09. We were unable to identify the exact sample date for the samples that were collected in Midlothian, TX from May 5-9, 2009.

Our usual process for hexavalent chromium samples is to label the container with the sample identification code and date sampled to identify the samples. The Chain of Custody (COC) has the same information as the label on the container. The COCs are wrapped around the container for shipment to the field. After the sample is taken and sent back to the laboratory, the COCs are taken off the container and the samples are logged into our Laboratory Information Management System (LIMS). LIMS provides a unique identification code that is put on the COC and the COC is then matched back up with the container.

Because we were unsure what days the Midlothian samples would be taken, we did not place a date on the container label; however, they were labeled with the site codes. When the hexavalent chromium samples were received at the laboratory, the receiving personnel did not notice that the containers were not labeled with sample dates. When the COCs were removed, we were unable to determine which COC went with each of the samples after sample login. The codes were identified but the sample dates were not verifiable.

Because of this laboratory error, a new procedure was adopted to uniquely identify each of the sample containers. A container number will be recorded on the COCs before the samples are logged into LIMS. After the samples are given their unique identification code, the COC will be matched back to the container based on the identification code on the container.

Because we were unable to identify the exact sample date for these samples that were collected in Midlothian, TX from May 5-9, 2009, each of them are labeled with the range of sampling dates. The analytical data pass all of ERG laboratory's quality control requirements. The sample reports are attached to this letter.

If you have any questions, please contact me at 919-468-7924.

Sincerely,

que L. Surt

Julie Swift Program Manager

Keystenk Park Drive, Suita 200, Mernsville, NC 27560+ Phone (019) 468-7800 • Fax (919) 468-7803
 • Arlington, VA + Atlanta, GA • Auttin, TX • Boston, MA • Chantily, VA • Cinconsti, OH • Hershey, PA
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