Helis Oil & Gas

2015 Baseline Meteorological and Air Quality Monitoring Report

June 2015 through September 2015

FINAL

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November 2015

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	Micrograms per Cubic Meter
BAM	Beta Attenuation Monitors
BP	Barometric Pressure
°C	Degree Celsius
CO	Carbon Monoxide
Helis	Helis Oil and Gas
Hg	Mercury
lpm	Liters per Minute
mg/m^3	Milligrams per Square Meter
MJ/m^2	Megajoules per Square Meter
m	Meter
mm	Millimeter
m/s	Meter per Second
N/A	Not Applicable
NAAQS	National Ambient Air Quality Standards
ND	Not Detected
NO	Nitrogen Monoxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
ppb	Parts per Billion
ppm	Parts per Million
$PM_{2.5}$	Particulate Matter less than 2.5 Microns in Diameter
PM_{10}	Particulate Matter less than 10 Microns in Diameter
PQ200	BGI, Inc Filter-based 24-hr Sampling System
PUF	Poly Urethane Foam
QAPP	Quality Assurance Project Plan for Conducting Ambient Air Quality and Meteorological Monitoring for the St. Tammany Parish Exploratory Well Project
RH	Relative Humidity
RL	Reporting Limit
RSLs	EPA Region 6 Regional Screening Levels
SO_2	Sulfur Dioxide
SVOC	Semi-Volatile Organic Compounds
THQ	Target Hazard Quotient
TR	Target Cancer Risk
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compounds
W/m^2	Watts per Square Meter

EXECUTIVE SUMMARY

Helis Oil & Gas (Helis) initiated an ambient air quality and meteorological monitoring program in June of 2015 at the St. Tammany Parish Exploratory Well Project (St. Tammany Parish Project) site located in St. Tammany Parish, Louisiana to establish baseline (existing) air quality levels in the project area prior to commencement of project activities. Establishment of baseline air quality levels will allow a comparison with the air quality levels observed once operations begin. The meteorological data are being collected so that correlations may be made between observed air quality levels and sources in the area, including the St. Tammany Parish Project. Additionally, the meteorological data may be used as input to air quality dispersion modeling to estimate impacts from the St. Tammany Parish Project as well as other sources of air emissions in the vicinity should the need arise.

Air quality and meteorological data has been collected at three monitoring stations in accordance with the *Helis Oil & Gas Quality Assurance Project Plan for Conducting Ambient Air Quality and Meteorological Monitoring for the St. Tammany Parish Exploratory Well Project* (QAPP). These data have been collected and are being reported in a manner suitable for comparison to the United States National Ambient Air Quality Standards (NAAQS) The air quality data collected include nitrogen dioxide (NO_2), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), particulate matter less than 10 microns in diameter (PM_{10}), metals (barium, cadmium, chromium, nickel, and zinc), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). The meteorological parameters monitored include, horizontal wind speed and direction, ambient temperature, solar radiation, precipitation, barometric pressure, and relative humidity.

The data recovery for the reporting period met or exceeded the minimum data recovery rate of 75% set forth in the QAPP with the exception of $PM_{2.5}$ at Site 1 and precipitation at Site 2. The data recovery rates for $PM_{2.5}$ at Site 1 and precipitation at Site 2 were both 71%. The loss of $PM_{2.5}$ data at Site 1 was a result of a pump failure at the end of July impacting data collection through August 21 when the pump was replaced. The loss of the precipitation data at Site 2 was a result of a lightning strike which destroyed the meteorological data logger on July 21. The data logger was replaced on August 17.

The meteorological data was consistent across all three sites and within expected values for the season. The $PM_{2.5}$ and PM_{10} data demonstrated that particulate levels were well below the applicable NAAQS for the monitoring period, as were the NO_2, CO, and SO_2 concentrations. While there are no NAAQS for the metals that were monitored, all monitored values for each of the metals was less than 1 microgram per cubic meter (μ/m^3). A number of VOCs and SVOCs were observed to exceed the United States Environmental Protection Agency (US EPA) screening levels. There are no ambient standards for VOCs and SVOCs.

1.0 INTRODUCTION

Helis Oil & Gas (Helis) contracted Tetra Tech, Inc. (Tetra Tech) to install and operate a network of three air quality monitoring stations at the St. Tammany Parish Exploratory Well Project (St. Tammany Parish Project) located in St. Tammany Parish, Louisiana. These stations include particulate matter, volatile organic compounds and semi-volatile organic compounds, metals, and gaseous monitoring and a 10 meter (m) meteorological tower. The first site is in a vacant business park located at the intersection of I-12 and LA 1088 (Site 1). The second site is located on the school grounds of Lakeshore High School (Site 2), and the third site is at the well pad (Site 3). These stations were installed and operated to characterize and evaluate existing air quality levels in the project area prior to project startup. This baseline report includes data collected at all three sites from installation in June 2015 through the end of the baseline period (September 30, 2015). The stations were operated and all data were collected, screened, and processed in accordance with the *Helis Oil & Gas Quality Assurance Project Plan for Conducting Ambient Air Quality and Meteorological Monitoring for the St. Tammany Parish Exploratory Well Project* (QAPP) prepared by Tetra Tech in May 2015.

The initial date of data collection was staggered as various sensors and equipment came online (see **Table 1-0** below).

Table 1-0. Sample Collection Start Dates

Data Type	Site 1 Start Dates[1]	Site 2 Start Dates[1]	Site 3 Start Dates[1]
Wind, Temperature, and Precipitation	6/26/15	6/19/15	7/23/15
Relative Humidity and Solar Radiation	8/26/15	8/27/15	7/23/15
Barometric Pressure	8/26/15	8/27/15	7/23/15
Nitrogen Dioxide	7/8/15	6/19/15	7/24/15
Carbon Monoxide	7/8/15	6/19/15	7/24/15
Sulfur Dioxide	N/A	7/22/15	8/1/15
Particulate Matter less than 2.5 microns	7/7/15	7/9/15	8/5/15
Particulate Matter less than 10 microns	7/7/15	6/24/15	7/24/15
Metals: Barium, Cadmium, Chromium, Nickel, and Zinc	6/20/15	6/20/15	7/26/15
Volatile Organic Compounds	6/23/15	6/23/15	7/26/15
Semi-Volatile Organic Compounds	6/20/15	6/20/15	7/26/15

[1] Staggered start dates for various parameters were due to station installation, testing, and discrete sample collection schedules; as of the date of this report all parameters are operational.

All rental meteorological instrumentation was replaced with purchased equipment the week of August 24, 2015.

The sites were designed to collect a baseline (background) air quality and meteorological data for comparison with United States National Ambient Air Quality Standards (NAAQS). Air quality and meteorological data for each site is summarized in this report.

1.1 Description of Monitoring Station Location

A meteorological tower, ambient air quality monitoring station, and particulate monitoring instrumentation are located at each of the project sites. Location coordinates for each site are provided in **Table 1-1**.

Table 1-1. Location Coordinates for the Air Quality Monitoring Stations

Site	UTM Easting (m)	UTM Northing (m)
Site 1	788192m E	3366870m N
Site 2	215145m E	3367385m N
Site 3	213848m E	3365636m N

1.2 Description of Monitoring Station and Air Quality Station

Tetra Tech installed ambient air monitoring equipment including meteorological instrumentation and towers, gaseous analyzers, particulate matter (PM) monitors, poly urethane foam (PUF) samplers, and Summa® canisters. The monitored parameters include the following:

- Horizontal wind speed and direction,
- Ambient temperature
- Solar radiation
- Precipitation
- Barometric pressure (BP)
- Relative humidity (RH)
- Nitrogen Dioxide (NO_2)
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO_2) *(at Sites 2 & 3 only)*
- Particulate Matter less than 10 microns (PM_{10}) (Continuous Monitor)
- Particulate Matter less than 2.5 microns ($PM_{2.5}$) (Continuous Monitor)
- Metals: Barium, Cadmium, Chromium, Nickel, and Zinc
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)

Table 1-2 and **Table 1-3** summarize the key air quality and meteorological monitoring equipment and measurement specifications for this reporting period. The monitoring system, sampling frequency, quality assurance program, and data management aspects of the monitoring program are described in the QAPP.

Table 1-2. Helis Air Quality Monitoring Station Equipment Specifications

Location	Instrumentation	Manufacturer	Model	Range	Accuracy
Inside Shelter at all Sites	$NO\text{-}NO_2\text{-}NO_x$	Thermo Scientific	42i	0 – 500 ppb	±0.4ppb
Inside Shelter at Sites 2 and 3	SO_2	Thermo Scientific	43i	0 – 500 ppb	±0.4ppb
Inside Shelter at all Sites	CO	Thermo Scientific	48i	0 – 50 ppm	±0.1ppm
Inside Shelter at all Sites	Gas Calibrator/Photometer	Teledyne API	T700	0 – 10 lpm	±1% full scale
Inside Shelter at all Sites	PM_{10} Continuous Monitor	Met One, Inc.	E-BAM (with PM_{10} inlet)	0 to 65 mg/m^3	2.5 µg or 10% in 24 hours
Inside Shelter at all Sites	$PM_{2.5}$ Continuous Monitor	Met One, Inc.	E-BAM (with $PM_{2.5}$ very sharp cut cyclone)	0 to 65 mg/m^3	2.5 µg or 10% in 24 hours
Inside Shelter at all Sites	Metals – Filter Based (manual)	BGI, Inc.	PQ200	24-hr integrated sample @ 16.7 lpm	N/A
Inside Shelter at all Sites	SVOC	Tisch	TE-1000	See laboratory data	N/A
Inside Shelter at all Sites	VOC	Xonteck	910	See laboratory data	N/A

Table 1-3. Helis Primary Station Meteorological Monitoring Equipment Specifications

Location	Instrumentation	Manufacturer	Model	Range	Accuracy
Inside Shelter at all Sites	Barometric pressure sensor	Setra	278	17.70-32.50 in. Hg	±0.09 in. of Hg (at 0° to +40°C)
	Data logger	Campbell Scientific (CSI)	CR1000	N/A	0.06% for analog voltage
Ground Level at all Sites	Tipping bucket precipitation sensor	Texas Electronics	TE525WS	0.01 in per tip	±1.0% (up to 1 in. per hour)
2m Level on Tower at all Sites	Temperature sensor	CSI	CS215	-22 to 122°F	±0.5°F
	Relative humidity/temperature sensor	CSI	CS215	0 to 100%	±2.0% RH (for range of 10 - 90% RH).
	Solar radiation sensor	Li-Cor	LI200x	0 - 3,000 W/m^2	/+-5% in Natural Daylight
10m Level on Tower at all Sites	Horizontal Wind speed sensor	RM Young	O5305AQ	0 to 100 mph	±0.5 mph
	Horizontal wind direction sensor	RM Young	O5305AQ	0 to 360 degrees	±5 degrees

2.0 PROJECT PERFORMANCE SUMMARY

The baseline data recovery statistics for meteorological and air quality parameters are presented in this section, along with a summary of missing data. The data recovery for the reporting period met or exceeded the minimum data recovery rate of 75% set forth in Section 3.0 of the QAPP with the exception of $PM_{2.5}$ at Site 1 and precipitation at Site 2. The data recovery rates for $PM_{2.5}$ at Site 1 and precipitation at Site 2 were both 71%. The following sections note significant events, data loss, and data capture summaries for the monitoring period.

2.1 Significant Events and Data Losses

A significant event occurs when the data collection is temporarily interrupted. Significant events include the following:

- Equipment calibrations
- Equipment troubleshooting and repair
- Replacement of rental equipment
- Maintenance
- Equipment malfunctions

Significant events that occurred during the baseline monitoring period are presented in **Table 2-1**.

Table 2-1. Chronology of Significant Events

Date	Location	Description
6/19/2015	Site 2	Site 2 station startup
6/26/2015	Site 1	Site 1 station startup
7/21/2015	Site 2	Lightning strike destroyed meteorological data logger
7/21/2015	Site 1	Gas analyzer calibration
7/22-23/2015	Site 2	Gas analyzer calibration
7/23/2015	Site 3	Site 3 station startup
7/31/2015	Site 1	PM2.5 EBAM pump failure
7/31/2015	Site 3	Gas analyzer calibration
8/7/2015	Site 1,2,3	Gas analyzer calibration
8/17/2015	Site 2	Meteorological data logger replaced
8/18/2015	Site 1,2	Gas analyzer calibration
8/21/2015	Site 3	Gas analyzer calibration
8/21/2015	Site 1	PM2.5 EBAM pump replaced
8/25/2015	Site 1	Met One meteorological equipment replaced with Campbell Scientific equipment
8/26/2015	Site 2,3	Met One meteorological equipment replaced with Campbell Scientific equipment
9/15/2015	Site 1	Gas analyzer calibration
9/16/2015	Site 2	Gas analyzer calibration
9/30/2015	Site 2	Gas analyzer calibration
10/30/2015	Site 2	End of monitoring period

Table 2-2 summarizes the meteorological and air quality data losses at each site during the baseline monitoring period.

Table 2-2. Data Losses during the Baseline Monitoring Period

Date	Location	Parameter	Hours Lost	Reason for Data Loss
7/22/2015-7/23/2015	Site 2	PM2.5	33	Sample Flow Rate out of Limits
7/24/2015	Site 3	All Gas	8	Calibration Check
7/25/2015-7/27/2015	Site 3	PM10	33	Data logger Error
7/27/2015	Site 3	All Gas	5	Machine Malfunction
7/30/2015-8/21/2015	Site 1	PM2.5	590	Pump Failure
7/30/2015-7/31/2015	Site 3	Temp and RH	22	Construction in area
8/7/2015	Site 3	All Gas	6	Calibration Check
8/8/2015-8/12/2015	Site 3	PM2.5	96	Sample Flow Rate out of Limits
8/17/2015	Site 1	PM10	12	Sample Flow Rate out of Limits
8/19/2015- 8/20/2015	Site 2	PM2.5	25	Sample Flow Rate out of Limits
8/20/2015	Site 2	All Gas	2	Calibration Check
8/20/2015-8/21/2015	Site 3	All Met	32	Site Computer and data logger down
8/21/2015	Site 3	All Gas	11	Calibration Check
8/24/2015-8/26/2015	Site 3	All Gas	51	Installing Campbell Scientific Equipment
8/25/2015	Site 1	All Met	7	Installing Campbell Scientific Equipment
8/26/2015	Site 2	All Met	3	Installing Campbell Scientific Equipment
8/26/2015-8/27/2015	Site 3	All Met	22	Installing Campbell Scientific Equipment
8/28/2015	Site 3	All Gas	6	Power Failure
8/28/2015	Site 3	PM10	5	Data Logger Error
9/5/2015	Site 2	All Gas	3	Machine Malfunction
9/11/2015	Site 2	All Gas	4	Machine Malfunction
9/15/2015	Site 1	All Gas	4	Calibration Check
9/16/2015	Site 2	All Gas	3	Calibration Check
9/30/2015	Site 1	All Gas	4	Calibration Check
9/11/2015-9/14/2015	Site 3	PM10	64	Data Logger Error
9/15/2015	Site 3	All Gas	5	Calibration Check
9/16/2015-9/19/2015	Site 2	PM10	62	Sample Flow Rate out of Limits
9/28/2015	Site 1	PM2.5	59	Data logger Error
9/28/2015	Site 2	PM10	48	Data logger Error
9/28/2015-9/30/2015	Site 1	PM10	40	Data collector error
9/28/2015-9/30/2015	Site 1	PM2.5	59	Data collector error
9/30/2015	Site 2	All Gas	7	Calibration Check
9/30/2015	Site 3	All Gas	3	Calibration Check

2.2 Project Data Capture

Meteorological and air quality data capture percentages were calculated by summing the valid data hours collected, dividing by the number of hours in the month, and multiplying by 100. Hours lost due to the occurrences discussed in Section 3.2 have been flagged in the data

validation process. The data capture percentages for each parameter at each site are summarized in **Table 2-3**, **Table 2-4**, and **Table 2-5**. Cells marked N/A indicate that summary data are not available because the period is prior to installation of equipment.

Table 2-3. Site 1 Summary of Data Recovery for Baseline Monitoring Period

Data Parameter	June	July	August	September	Baseline Total
10m Wind Speed	100%	100%	99%	100%	**99%**
10m Wind Direction	100%	100%	99%	100%	**100%**
2m Avg Temp	100%	100%	99%	100%	**100%**
Relative Humidity	N/A	N/A	99%	100%	**100%**
Solar Radiation	N/A	N/A	99%	100%	**100%**
Precipitation	100%	99%	99%	100%	**99%**
Barometric Pressure	N/A	N/A	99%	100%	**100%**
PM_{10} – Continuous	N/A	100%	97%	90%	**95%**
$PM_{2.5}$ – Continuous	N/A	96%	32%	90%	**71%**
NO_2	N/A	98%	100%	100%	**100%**
CO	N/A	99%	100%	100%	**100%**
Metals – Filter-Based	100%	100%	91%	100%	**98%**
SVOC	100%	100%	100%	100%	**100%**
VOC	100%	88%	100%	90%	**95%**

Table 2-4. Site 2 Summary of Data Recovery for Baseline Monitoring Period

Data Parameter	June	July	August	September	Baseline Total
10m Wind Speed	100%	66%	46%	100%	**78%**
10m Wind Direction	100%	66%	46%	100%	**78%**
2m Avg Temp	100%	66%	46%	100%	**78%**
Relative Humidity	N/A	N/A	100%	100%	**100%**
Solar Radiation	N/A	N/A	100%	100%	**100%**
Precipitation	N/A	66%	46%	100%	**71%**
Barometric Pressure	N/A	N/A	99%	100%	**100%**
PM_{10} – Continuous	58%	100%	100$	87%	**86%**
$PM_{2.5}$ – Continuous	N/A	91%	94%	100%	**95%**
NO_2	95%	96%	100%	99%	**98%**
CO	95%	96%	100%	99%	**98%**
SO_2	N/A	99%	100%	99%	**99%**
Metals – Filter-Based	100%	100%	82%	89%	**93%**
SVOC	100%	100%	100%	100%	**100%**
VOC	100%	100%	100%	100%	**100%**

Table 2-5. Site 3 Summary of Data Recovery for Baseline Monitoring Period

Data Parameter	June	July	August	September	Baseline Total
10m Wind Speed	N/A	99%	93%	100%	**97%**
10m Wind Direction	N/A	100%	93%	100%	**97%**
2m Avg Temp	N/A	89%	93%	100%	**95%**
Relative Humidity	N/A	87%	93%	100%	**95%**
Solar Radiation	N/A	91%	93%	100%	**96%**
Precipitation	N/A	97%	97%	100%	**98%**
Barometric Pressure	N/A	100%	93%	100%	**97%**
PM_{10} – Continuous	N/A	75%	100%	87%	**91%**
$PM_{2.5}$ – Continuous	N/A	N/A	59%	100%	**81%**
NO_2	N/A	93%	92%	90%	**92%**
CO	N/A	96%	92%	91%	**92%**
SO_2	N/A	N/A	92%	100%	**96%**
Metals – Filter-Based	N/A	100%	100%	100%	**100%**
SVOC	N/A	100%	100%	90%	**97%**
VOC	N/A	100%	100%	100%	**100%**

3.0 METEOROLOGICAL DATA SUMMARY

The meteorological data was comparable among the three monitoring sites. The sections below include results for each site and a graph comparing the three sites. Meteorological data collected at the meteorological towers included the following:

- Horizontal wind speed and direction at 10m
- Ambient temperature at 2m
- Solar radiation at 2m
- Relative humidity at 2m
- Station barometric pressure
- Station precipitation

3.1 Site Wind Speed Summary

The baseline monthly one-hour average horizontal wind speed readings for each site at the 10m level are summarized in **Table 3-1**, **Table 3-2**, and **Table 3-3**. A visual comparison of each site can be found in **Figure 3-1**.

Table 3-1. Site 1 Baseline Monthly Average Wind Speed Summary

Month	10m horizontal wind speed Avg. (mph)	10m horizontal wind speed Max. (mph)
June[1]	5.73	12.30
July	4.52	13.80
August	4.06	12.70
September	2.84	12.54

[1] June does not represent a full month

Table 3-2. Site 2 Baseline Monthly Average Wind Speed Summary

Month	10m horizontal wind speed Avg. (mph)	10m horizontal wind speed Max. (mph)
June[1]	3.65	10.20
July	3.27	9.30
August	2.74	8.60
September	2.23	8.98

[1] June does not represent a full month

Table 3-3. Site 3 Baseline Monthly Average Wind Speed Summary

Month	10m horizontal wind speed Avg. (mph)	10m horizontal wind speed Max. (mph)
July[1]	3.45	9.00
August	3.03	9.60
September	2.09	9.18

[1] July does not represent a full month

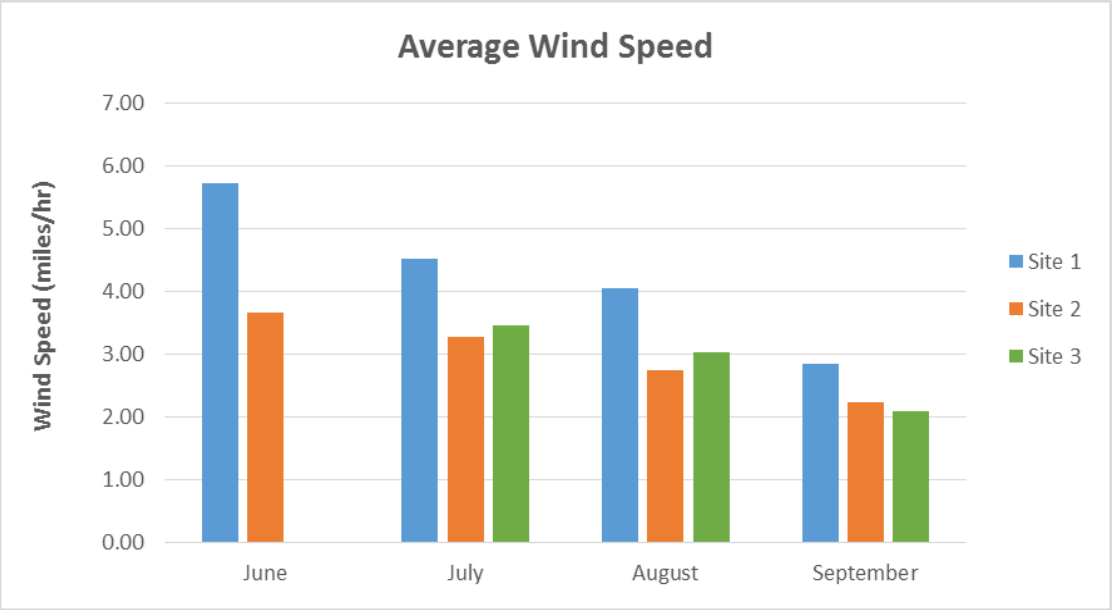

Figure 3-1. Monthly Average Wind Speed Comparison

3.2 Site Wind Direction Summary

Figure 3-2, **Figure 3-3**, and **Figure 3-4** present wind rose plots for the 10m wind speed and direction at each site. The wind rose presents a visible representation of how the wind speed and direction were distributed during the baseline monitoring period. The barbs on the wind rose represent the direction the wind blows from.

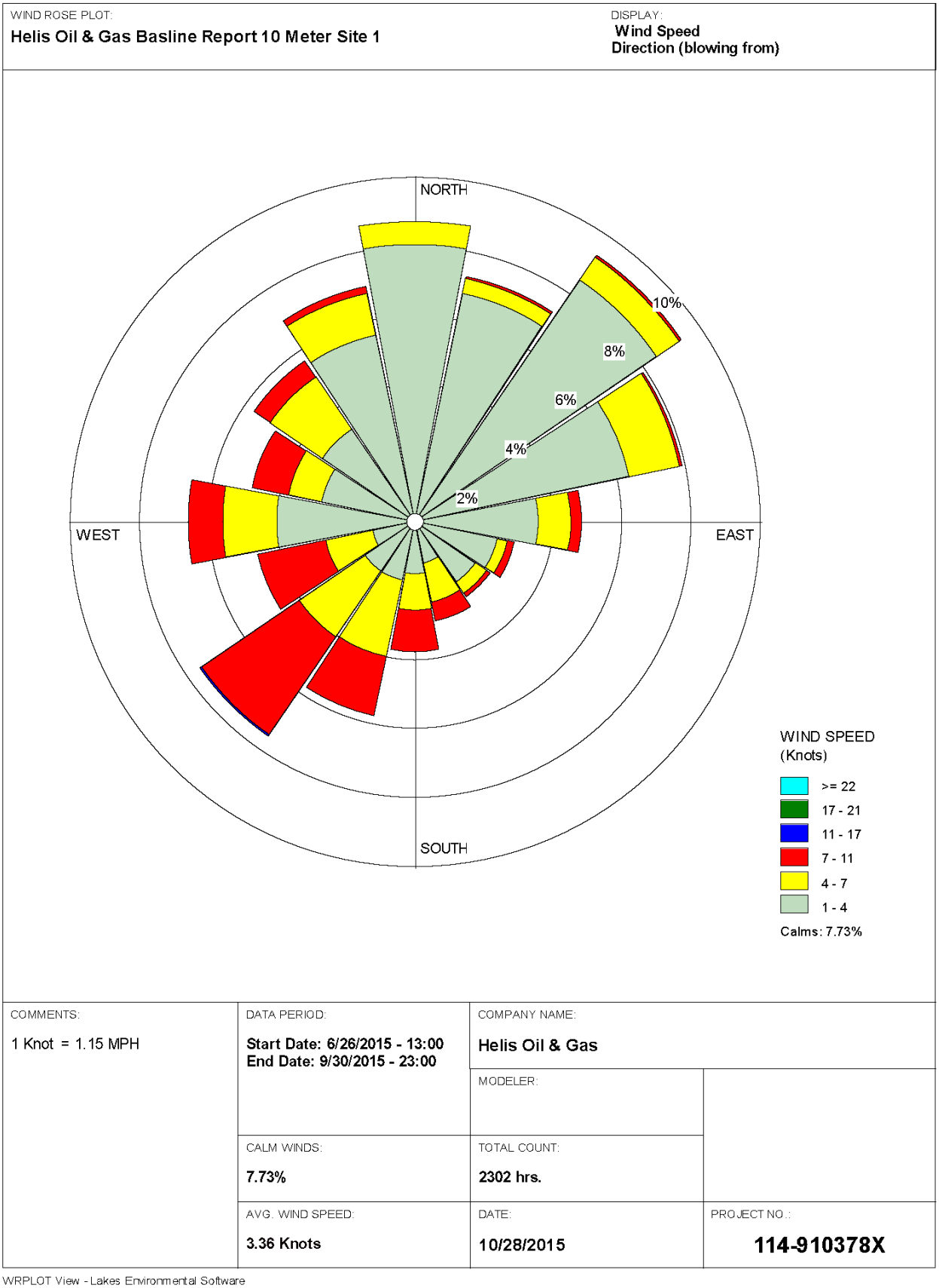

Figure 3-2. Site 1 Helis Site 10m Wind Rose June through September 2015

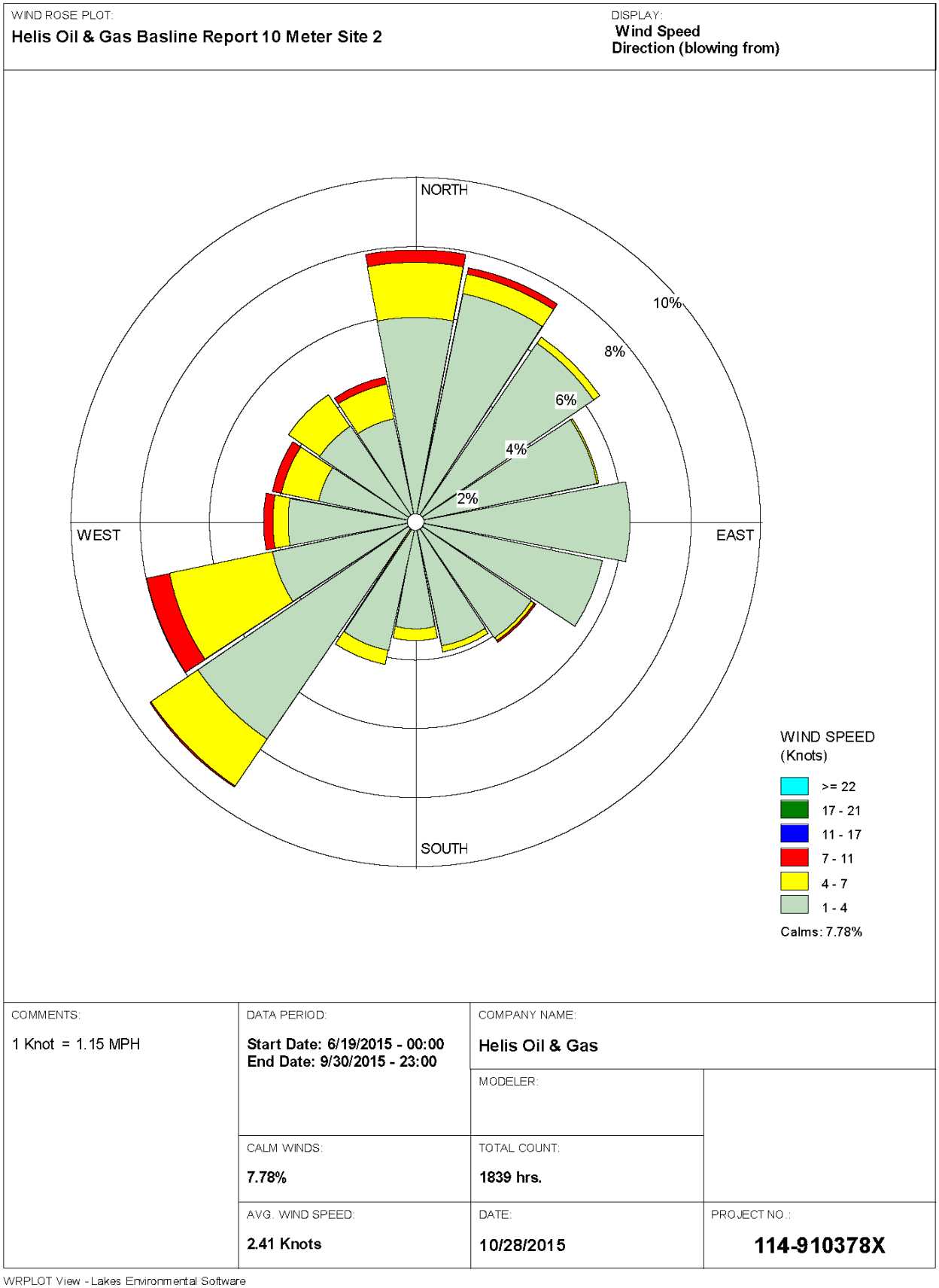

Figure 3-3. Site 2 Helis Site 10m Wind Rose June through September 2015

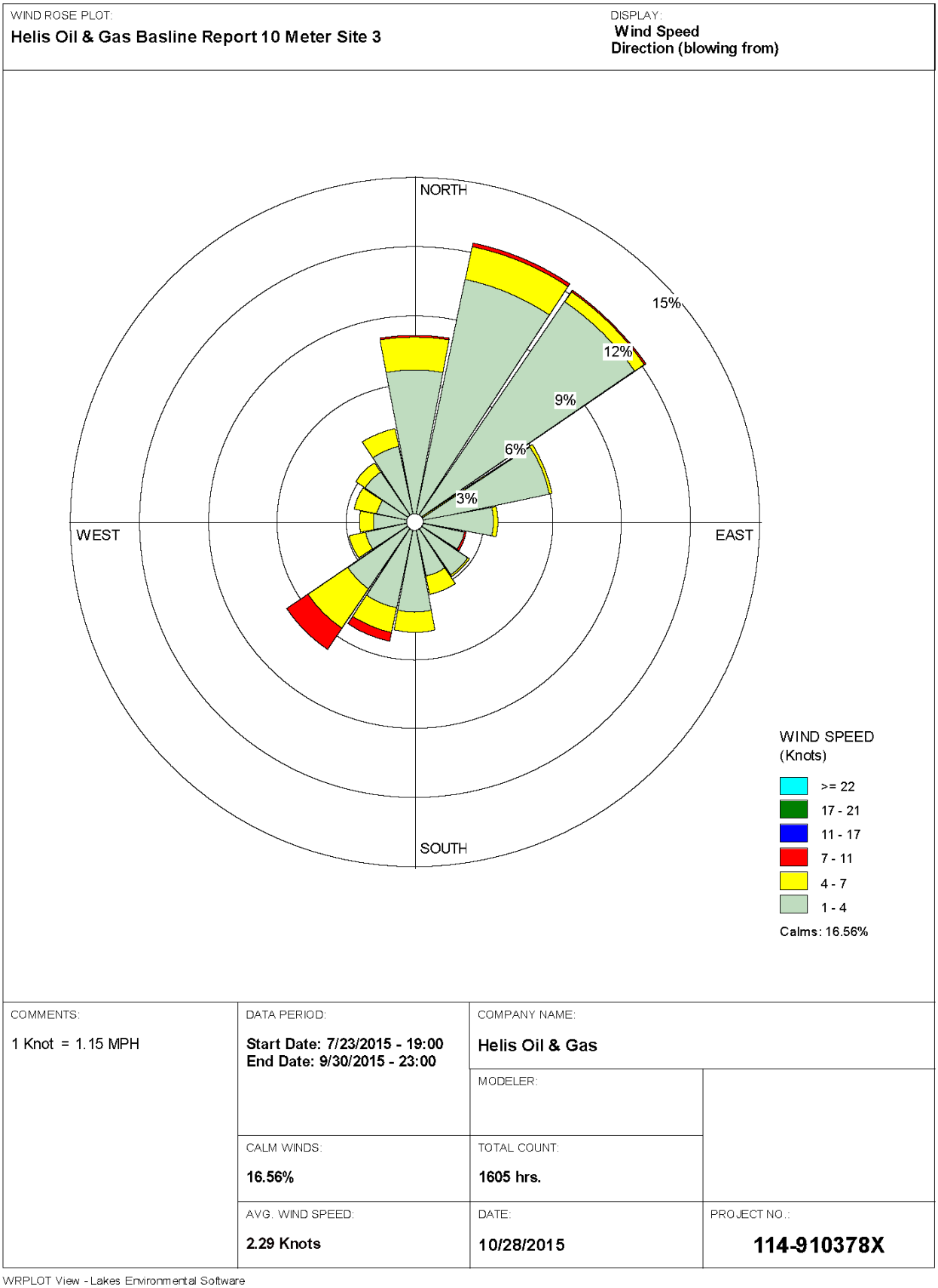

Figure 3-4. Site 3 Helis Site 10m Wind Rose June through September 2015

3.3 Temperature Summary

Baseline monthly one-hour average temperature readings for all sites at the 2m levels are summarized in **Table 3-4**, **Table 3-5**, and **Table 3-6**. A graphic summary of monthly one-hour averages for the sites at the 10m level is presented in **Figure 3-5**.

Table 3-4. Site 1 Baseline Monthly Temperature Summary

Month	2m Min (°F)	Date and Time of Min.	2m Max (°F)	Date and Time of Max.	2m Avg (°F)
June[1]	68.4	6/29/15 5:00	91.20	6/26/15 13:00	80.06
July	67.8	7/1/15 6:00	100.30	7/29/15 14:00	83.53
August	56.4	8/27/15 6:00	101.80	8/9/15 16:00	81.31
September	51.6	9/14/15 6:00	94.20	9/19/15 16:00	76.00

[1] June does not represent a full month

Table 3-5. Site 2 Baseline Monthly Temperature Summary

Month	2m Min (°F	Date and Time of Min.	2m Max (°F)	Date and Time of Max.	2m Avg (°F)
June[1]	69.70	6/29/15 5:00	95.80	6/22/15 12:00	81.21
July	68.00	7/1/15 6:00	100.60	7/19/15 16:00	83.13
August	57.33	8/27/15 6:00	98.20	8/24/15 15:00	79.43
September	52.56	9/14/15 4:00	94.80	9/19/15 16:00	76.59

[1] June does not represent a full month

Table 3-6. Site 3 Baseline Monthly Temperature Summary

Month	2m Min (°F)	Date and Time of Min.	2m Max (°F)	Date and Time of Max.	2m Avg (°F)
July[1]	64.70	8/1/15 0:00[2]	101.30	7/24/15 12:00	78.09
August	50.40	8/26/15 7:00	94.60	8/9/15 17:00	76.29
September	49.55	9/14/15 5:00	95.50	9/19/15 15:00	75.55

[1] July does not represent a full month
[2] Represents the last hour of July

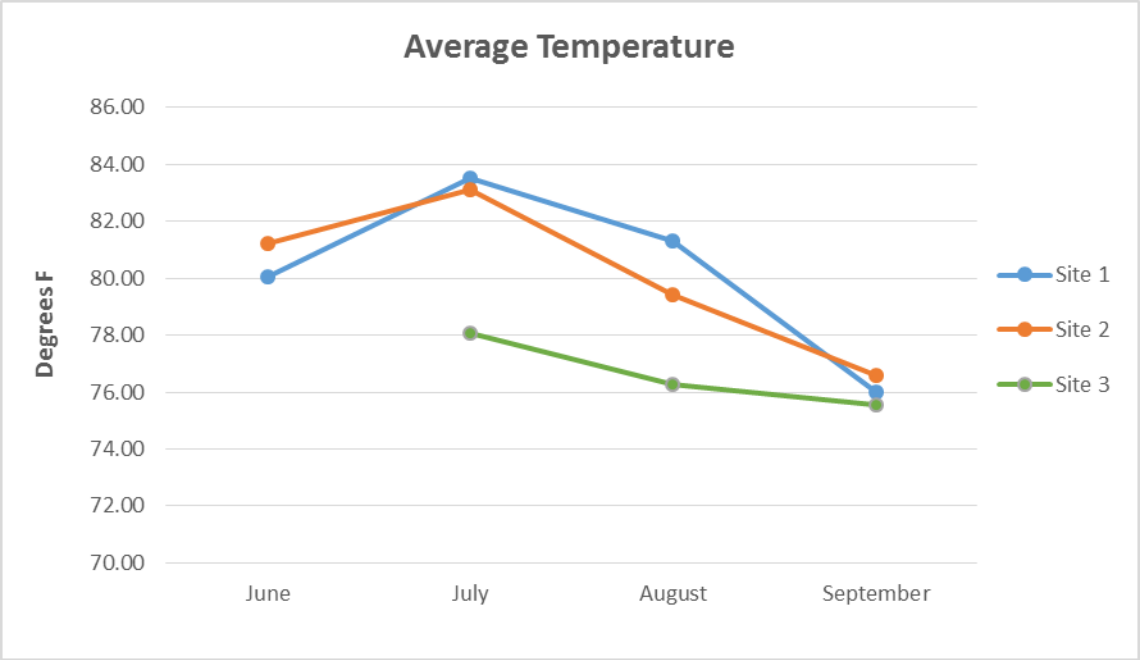

Figure 3-5. Baseline Temperature Comparison

3.4 Site Solar Radiation Summary

At each site, the average solar radiation peaked in August. A graph showing the monthly total solar radiation during the Baseline monitoring period is presented in **Figure 3-6**.

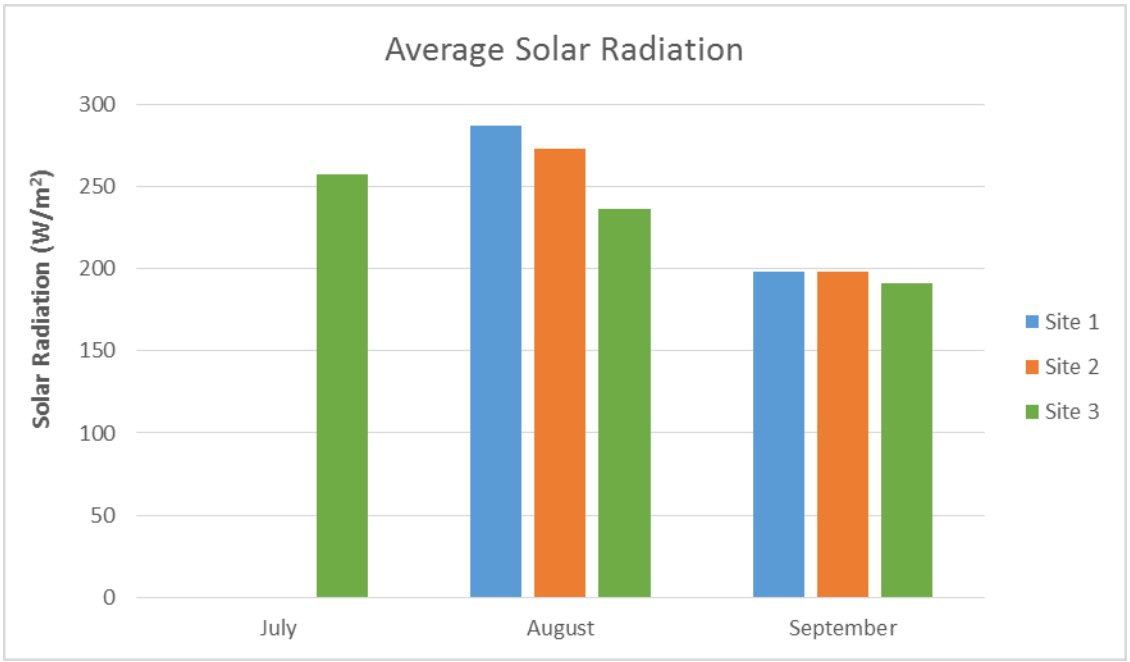

Figure 3-6. Baseline Solar Radiation Comparison

3.5 Site Relative Humidity Summary

A summary of the relative humidity data from the sites for the baseline monitoring period is presented in **Table 3-7**, **Table 3-8**, and **Table 3-9**. A visual comparison of each site can be found in **Figure 3-7**.

Table 3-7. Site 1 Baseline Relative Humidity Summary

Month	Minimum Relative Humidity (percent)	Date & Time Occurred	Maximum Relative Humidity (Percent)	Date & Time Occurred	Average Relative Humidity (percent)
August[1]	28.07	8/26/15 16:00	99.60	8/30/15 3:00	72.17
September	32.36	9/13/15 15:00	100.00	9/1/15 5:00	83.55

[1] August does not represent a full month

Table 3-8. Site 2 Baseline Relative Humidity Summary

Month	Minimum Relative Humidity (percent)	Date & Time Occurred	Maximum Relative Humidity (Percent)	Date & Time Occurred	Average Relative Humidity (percent)
August[1]	31.91	8/30/15 5:00	98.00	8/30/15 5:00	72.00
September	31.45	9/6/15 1:00	100.00	9/6/15 1:00	81.92

[1] August does not represent a full month

Table 3-9. Site 3 Baseline Relative Humidity Summary

Month	Minimum Relative Humidity (percent)	Date & Time Occurred	Maximum Relative Humidity (Percent)	Date & Time Occurred	Average Relative Humidity (percent)
July[1]	31.00	7/24/15 12:00	97.00	7/26/15 2:00	76.46
August	29.00	8/2/15 14:00	99.10	8/28/15 5:00	77.17
September	32.13	9/13/15 16:00	100.00	9/1/15 6:00	83.69

[1] July does not represent a full month

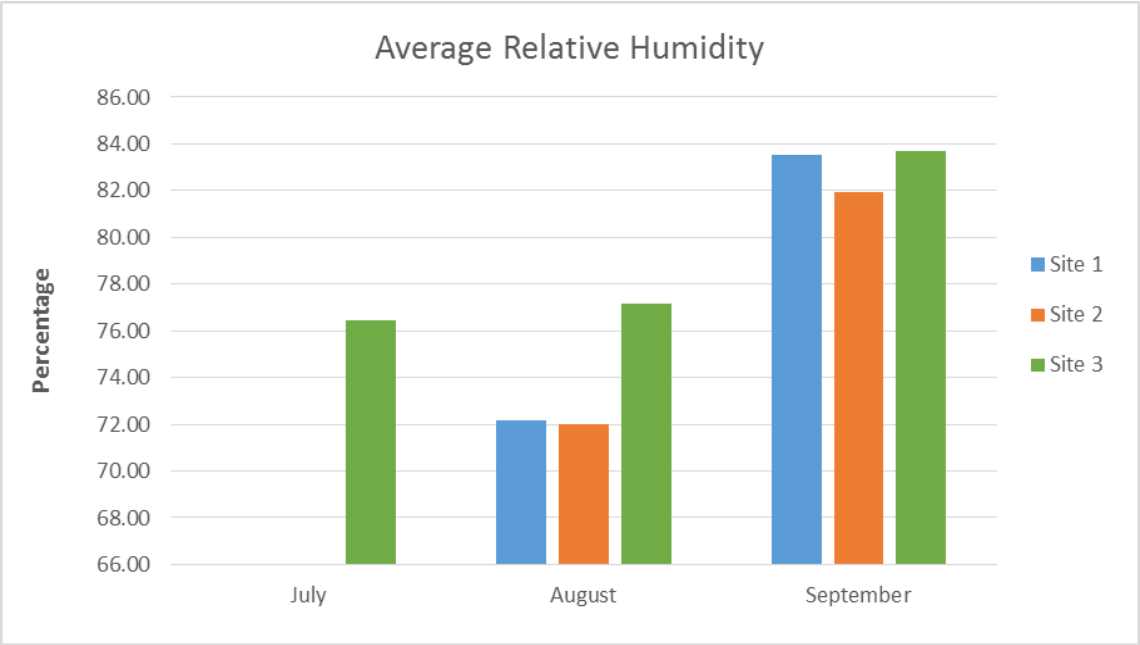

Figure 3-7. Relative Humidity for Comparison

3.6 Site Barometric Pressure Summary

A summary of the barometric pressure data from the sites for the baseline monitoring period is presented in **Table 3-10**, **Table 3-11**, and **Table 3-12**. A visual comparison of each site can be found in **Figure 3-8**.

Table 3-10. Site 1 Baseline Barometric Pressure Summary

Month	Avg Barometric Pressure (in/Hg))	Max Avg Barometric Pressure (in/Hg)	Min Avg Barometric Pressure (in/Hg
August[1]	30.00	30.07	29.92
September	29.96	30.17	29.74

[1] August does not represent a full month

Table 3-11. Site 2 Baseline Barometric Pressure Summary

Month	Min Avg Barometric Pressure (in/Hg	Min Avg Barometric Pressure (in/Hg	Min Avg Barometric Pressure (in/Hg
August[1]	29.98	30.05	29.90
September	29.94	30.15	29.72

[1] August does not represent a full month

Table 3-12. Site 3 Baseline Barometric Pressure Summary

Month	Min Avg Barometric Pressure (in/Hg	Min Avg Barometric Pressure (in/Hg	Min Avg Barometric Pressure (in/Hg
July[1]	29.91	30.00	29.79
August	29.91	30.04	27.38
September	29.93	30.15	29.72

[1] July does not represent a full month

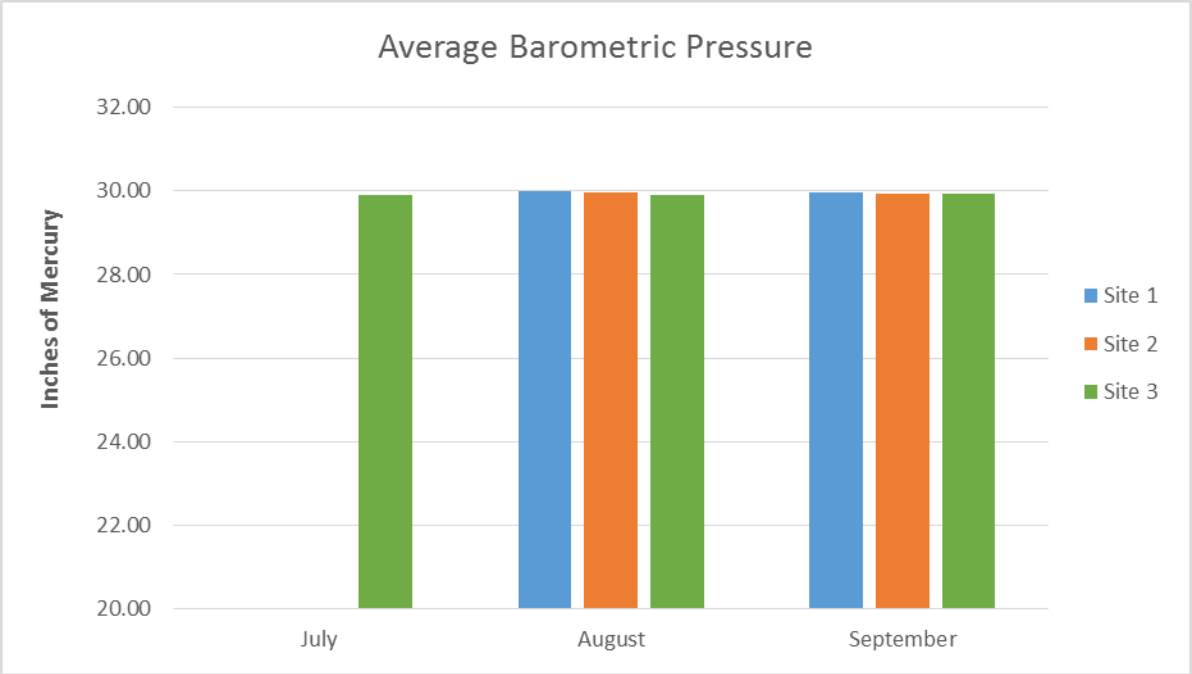

Figure 3-8. Barometric Pressure Comparison

3.7 Site Precipitation Summary

A summary of the precipitation data from the Helis sites for the baseline monitoring period is presented in **Table 3-13**, **Table 3-14**, and **Table 3-15** below. A visual comparison of each site can be found in **Figure 3-9**.

Table 3-13. Site 1 Baseline Precipitation Summary

Month	Maximum Precipitation (inches)	Date & Time Occurred	Total Monthly Precipitation (inches)
June[1]	0.26	6/29/15 8:00	0.55
July	0.94	7/29/15 18:00	4.57
August	0.62	8/21/15 16:00	2.20
September	1.34	9/11/15 13:00	5.40

[1] June does not represent a full month

Table 3-14. Site 2 Baseline Precipitation Summary

Month	1-Hour Maximum Precipitation (inches)	Date & Time Occurred	Total Monthly Precipitation (inches)
June[1]	0.82	6/19/15 8:00	1.53
July	0.73	7/9/15 19:00	3.26
August	0.70	8/21/15 17:00	1.02
September	1.39	9/11/15 13:00	4.85

[1] June does not represent a full month

Table 3-15. Site 3 Baseline Precipitation Summary

Month	1-Hour Maximum Precipitation (inches)	Date & Time Occurred	Total Monthly Precipitation (inches)
July[1]	1.44	7/29/15 19:00	3.24
August	0.55	8/21/15 17:00	1.78
September	0.98	9/11/15 13:00	4.51

[1] July does not represent a full month

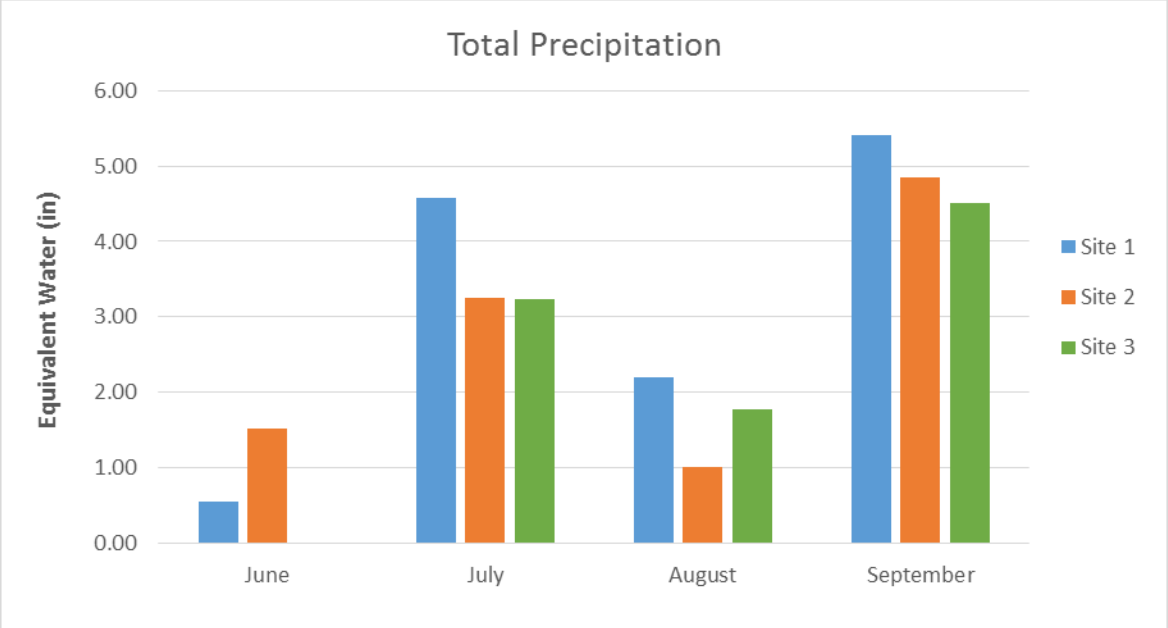

Figure 3-9. Precipitation Comparison

4.0 PARTICULATE DATA SUMMARY

4.1 BAM PM_{10} 24-Hour Mass Concentration at Standard Conditions Summary

The current NAAQS for PM_{10} (at standard conditions) is 150 µg/m^3 for a 24-hr average period. No standard currently exists for a 1-hr or annual average. A summary of the five highest Helis maximum 24-hr average PM_{10} concentrations for each site for the baseline monitoring period is presented in **Table 4-1**, **Table 4-2**, and **Table 4-3**. **Table 4-4** lists the 24-hr concentrations for each site during the baseline monitoring period. A graphic presentation of the site 24-hr PM_{10} concentrations comparisons is presented in **Figure 4-1**. The PM_{10} concentrations are relatively consistent between the sites with Site 2 often the highest. The higher PM_{10} concentrations at Site 2 are likely the result of activities associated with the high school. These activities often include traffic effects from idling buses and vehicles picking up or dropping off students along with the air conditioning and ventilation system of the school. During the baseline monitoring period, the PM_{10} concentrations were below the NAAQS.

Table 4-1. Site 1 Baseline PM_{10} Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr PM_{10} Conc. (mg/m^3)	Max 24-Hr PM_{10} Conc. (µg/m^3)	Date of Max.
1	0.031	31	9/8/2015
2	0.031	31	8/9/2015
3	0.030	30	7/23/2015
4	0.029	29	9/25/2015
5	0.029	29	9/19/2015

Table 4-2. Site 2 Baseline PM_{10} Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr PM_{10} Conc. (mg/m^3)	Max 24-Hr PM_{10} Conc. (µg/m^3)	Date of Max.
1	0.059	59	7/3/2015
2	0.044	44	7/2/2015
3	0.039	39	8/9/2015
4	0.038	38	7/11/2015
5	0.038	38	6/29/2015

Table 4-3. Site 3 Baseline PM_{10} Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr PM_{10} Conc. (mg/m^3)	Max 24-Hr PM_{10} Conc. (µg/m^3)	Date of Max.
1	0.036	36	8/3/2015
2	0.030	30	8/9/2015
3	0.029	29	8/31/2015
4	0.027	27	8/5/2015
5	0.026	26	7/28/2015

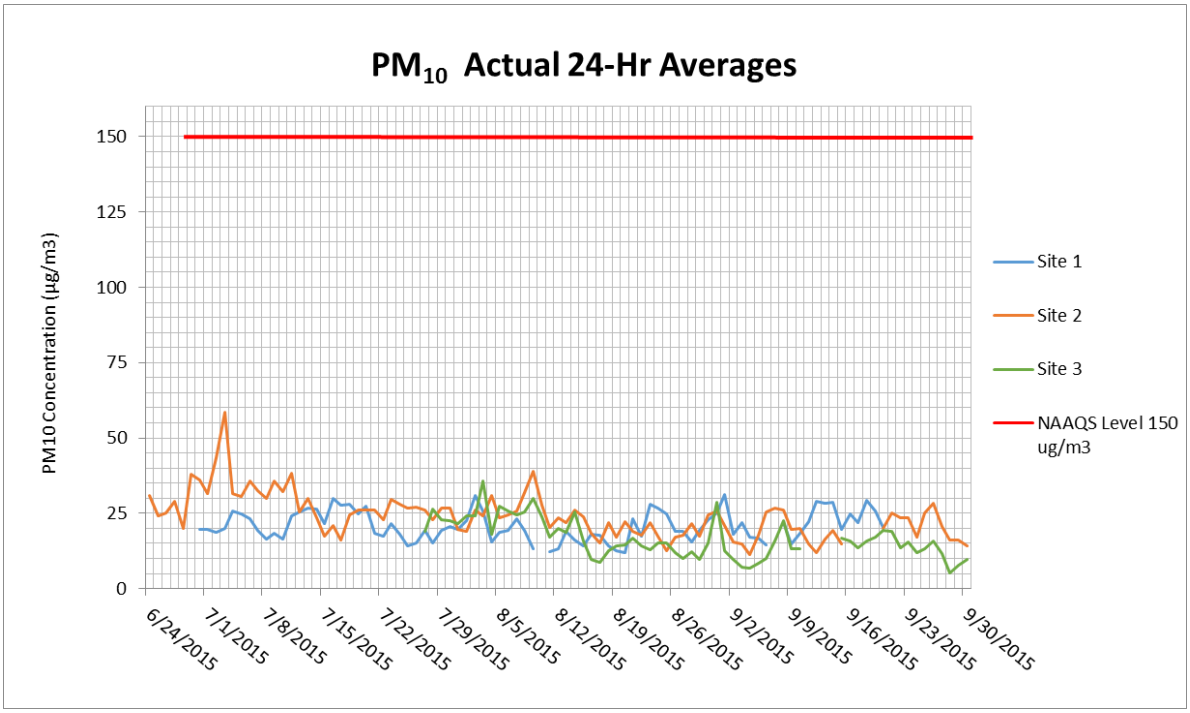

Figure 4-1. 24-hr PM_{10} Concentrations Comparison

Table 4-4. Baseline PM_{10} 24-Hour Mass Concentration Summary

Date	PM_{10} Concentrations (µg/m3)		
	Site 1	Site 2	Site 3
6/24/2015	Prior to Installation	31	Prior to Installation
6/25/2015	Prior to Installation	24	Prior to Installation
6/26/2015	Prior to Installation	25	Prior to Installation
6/27/2015	Prior to Installation	29	Prior to Installation
6/28/2015	Prior to Installation	20	Prior to Installation
6/29/2015	Prior to Installation	38	Prior to Installation
6/30/2015	Prior to Installation	36	Prior to Installation
7/1/2015	Prior to Installation	31	Prior to Installation
7/2/2015	Prior to Installation	44	Prior to Installation
7/3/2015	Prior to Installation	59	Prior to Installation
7/4/2015	Prior to Installation	32	Prior to Installation
7/5/2015	Prior to Installation	31	Prior to Installation
7/6/2015	Prior to Installation	36	Prior to Installation
7/7/2015	20	32	Prior to Installation
7/8/2015	20	30	Prior to Installation
7/9/2015	19	36	Prior to Installation
7/10/2015	20	32	Prior to Installation
7/11/2015	26	38	Prior to Installation
7/12/2015	25	25	Prior to Installation
7/13/2015	23	30	Prior to Installation

Date	PM_{10} Concentrations (µg/m3)		
	Site 1	Site 2	Site 3
7/14/2015	19	24	Prior to Installation
7/15/2015	17	17	Prior to Installation
7/16/2015	18	21	Prior to Installation
7/17/2015	17	16	Prior to Installation
7/18/2015	24	25	Prior to Installation
7/19/2015	26	26	Prior to Installation
7/20/2015	27	26	Prior to Installation
7/21/2015	26	26	Prior to Installation
7/22/2015	22	23	Prior to Installation
7/23/2015	30	30	Prior to Installation
7/24/2015	28	28	Prior to Installation
7/25/2015	28	27	19
7/26/2015	25	27	Data Logger Error
7/27/2015	27	26	19
7/28/2015	18	23	26
7/29/2015	18	27	23
7/30/2015	22	27	23
7/31/2015	18	20	21
8/1/2015	14	19	24
8/2/2015	15	26	24
8/3/2015	19	24	36
8/4/2015	15	31	18
8/5/2015	19	24	27
8/6/2015	21	24	26
8/7/2015	20	26	24
8/8/2015	23	32	26
8/9/2015	31	39	30
8/10/2015	26	28	24
8/11/2015	15	20	17
8/12/2015	19	23	20
8/13/2015	19	22	19
8/14/2015	23	26	25
8/15/2015	19	24	16
8/16/2015	13	18	10
8/17/2015	Sample Flow Rate out of Limits	15	9
8/18/2015	12	22	13
8/19/2015	13	17	14
8/20/2015	19	22	15
8/21/2015	16	19	17
8/22/2015	14	18	14
8/23/2015	18	22	13
8/24/2015	18	17	15
8/25/2015	14	13	15

Date	PM_{10} Concentrations (µg/m3)		
	Site 1	**Site 2**	**Site 3**
8/26/2015	13	17	12
8/27/2015	12	18	10
8/28/2015	23	22	12
8/29/2015	18	17	10
8/30/2015	28	25	15
8/31/2015	27	26	29
9/1/2015	25	21	13
9/2/2015	19	16	10
9/3/2015	19	15	7
9/4/2015	15	11	7
9/5/2015	19	18	8
9/6/2015	23	26	10
9/7/2015	25	27	16
9/8/2015	31	26	23
9/9/2015	18	20	13
9/10/2015	22	20	13
9/11/2015	17	15	Data Logger Error
9/12/2015	17	12	Data Logger Error
9/13/2015	15	17	Data Logger Error
9/14/2015	17	19	Data Logger Error
9/15/2015	22	15	17
9/16/2015	15	Sample Flow Rate out of Limits	16
9/17/2015	18	Sample Flow Rate out of Limits	13
9/18/2015	22	Sample Flow Rate out of Limits	16
9/19/2015	29	Sample Flow Rate out of Limits	17
9/20/2015	28	20	19
9/21/2015	29	25	19
9/22/2015	20	23	13
9/23/2015	25	23	15
9/24/2015	22	17	12
9/25/2015	29	25	13
9/26/2015	26	28	16
9/27/2015	20	21	12
9/28/2015	Data Collector Error	16	5
9/29/2015	Data Collector Error	16	8
9/30/2015	Data Collector Error	14	10
Baseline Average	**21**	**24**	**17**

4.2 BAM $PM_{2.5}$ 24-Hour Mass Concentration Summary

The current NAAQS for PM2.5 is 35 µg/m3 for a 24-hr average period and 12 µg/m3 for an annual average period. A summary of the monthly five highest maximum 24-hr average PM2.5 concentrations for the baseline monitoring period is presented in **Table 4-5**, **Table 4-6**, and **Table 4-7**. A list of all 24-hr averages for the baseline monitoring period are listed in **Table 4-8**, and a graphic presentation of the site 24-hr average PM2.5 concentration comparisons is presented in **Figure 4-2**. The PM10 concentrations are relatively consistent between the sites with Site 2 often the highest. The higher PM2.5 concentrations at Site 2 are likely the result of activities associated with the high school. These activities often include traffic effects from idling buses and vehicles picking up or dropping off students along with the air conditioning and ventilation system of the school. During the baseline monitoring period, the $PM_{2.5}$ concentrations were well below the NAAQS.

Table 4-5. Site 1 Baseline $PM_{2.5}$ Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr $PM_{2.5}$ Conc. (mg/m^3)	Max 24-Hr $PM_{2.5}$ Conc. ($\mu g/m^3$)	Date of Max.
1	0.021	21	7/30/2015
2	0.020	20	8/30/2015
3	0.020	20	7/27/2015
4	0.019	19	7/28/2015
5	0.019	19	8/31/2015

Table 4-6. Site 2 Baseline $PM_{2.5}$ Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr $PM_{2.5}$ Conc. (mg/m^3)	Max 24-Hr $PM_{2.5}$ Conc. ($\mu g/m^3$)	Date of Max.
1	0.028	28	9/8/2015
2	0.026	26	8/14/2015
3	0.026	26	8/31/2015
4	0.025	25	8/9/2015
5	0.024	24	8/30/2015

Table 4-7. Site 3 Baseline $PM_{2.5}$ Maximum 24-Hour Mass Concentration Summary

Rank	Max 24-Hr $PM_{2.5}$ Conc. (mg/m^3)	Max 24-Hr $PM_{2.5}$ Conc. ($\mu g/m^3$)	Date of Max.
1	0.027	27	9/21/2015
2	0.027	27	9/8/2015
3	0.026	26	9/20/2015
4	0.023	23	9/22/2015
5	0.023	23	9/26/2015

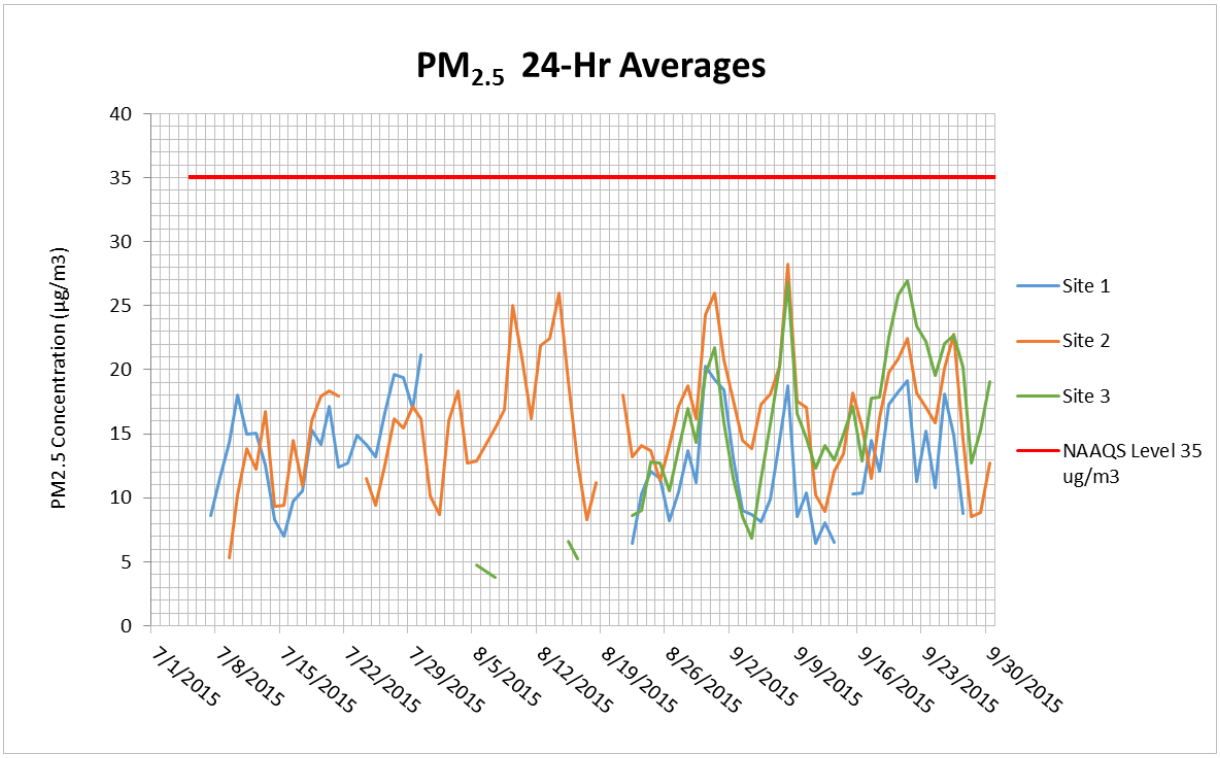

Figure 4-2. 24-hr PM_{10} Concentrations Comparison

Table 4-8. Baseline $PM_{2.5}$ 24-Hour Mass Concentration Summary

Date	$PM_{2.5}$ Concentrations ($\mu g/m^3$)		
	Site 1	Site 2	Site 3
7/1/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/2/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/3/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/4/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/5/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/6/2015	Prior to Installation	Prior to Installation	Prior to Installation
7/7/2015	9	Prior to Installation	Prior to Installation
7/8/2015	12	Prior to Installation	Prior to Installation
7/9/2015	14	5	Prior to Installation
7/10/2015	18	10	Prior to Installation
7/11/2015	15	14	Prior to Installation
7/12/2015	15	12	Prior to Installation
7/13/2015	13	17	Prior to Installation
7/14/2015	8	9	Prior to Installation
7/15/2015	7	9	Prior to Installation
7/16/2015	10	15	Prior to Installation
7/17/2015	11	11	Prior to Installation
7/18/2015	15	16	Prior to Installation

Date	$PM_{2.5}$ Concentrations ($\mu g/m^3$)		
	Site 1	Site 2	Site 3
7/19/2015	14	18	Prior to Installation
7/20/2015	17	18	Prior to Installation
7/21/2015	12	18	Prior to Installation
7/22/2015	13	Sample Flow Rate out of Limits	Prior to Installation
7/23/2015	15	Sample Flow Rate out of Limits	Prior to Installation
7/24/2015	14	12	Prior to Installation
7/25/2015	13	9	Prior to Installation
7/26/2015	17	13	Prior to Installation
7/27/2015	20	16	Prior to Installation
7/28/2015	19	15	Prior to Installation
7/29/2015	17	17	Prior to Installation
7/30/2015	21	16	Prior to Installation
7/31/2015	Pump Failure	10	Prior to Installation
8/1/2015	Pump Failure	9	Prior to Installation
8/2/2015	Pump Failure	16	Prior to Installation
8/3/2015	Pump Failure	18	Prior to Installation
8/4/2015	Pump Failure	13	Prior to Installation
8/5/2015	Pump Failure	13	Prior to Installation
8/6/2015	Pump Failure	14	Prior to Installation
8/7/2015	Pump Failure	15	Prior to Installation
8/8/2015	Pump Failure	17	Prior to Installation
8/9/2015	Pump Failure	25	Prior to Installation
8/10/2015	Pump Failure	21	Prior to Installation
8/11/2015	Pump Failure	16	Prior to Installation
8/12/2015	Pump Failure	22	Prior to Installation
8/13/2015	Pump Failure	22	Prior to Installation
8/14/2015	Pump Failure	26	Prior to Installation
8/15/2015	Pump Failure	19	Prior to Installation
8/16/2015	Pump Failure	13	Prior to Installation
8/17/2015	Pump Failure	8	Prior to Installation
8/18/2015	Pump Failure	11	Prior to Installation
8/19/2015	Pump Failure	Sample Flow Rate out of Limits	Prior to Installation
8/20/2015	Pump Failure	Sample Flow Rate out of Limits	Prior to Installation
8/21/2015	Pump Failure	18	Prior to Installation
8/22/2015	6	13	9
8/23/2015	10	14	9
8/24/2015	12	14	13
8/25/2015	12	11	13
8/26/2015	8	14	11
8/27/2015	10	17	14
8/28/2015	14	19	17

Date	$PM_{2.5}$ Concentrations ($\mu g/m^3$)		
	Site 1	**Site 2**	**Site 3**
8/29/2015	11	16	14
8/30/2015	20	24	20
8/31/2015	19	26	22
9/1/2015	18	21	16
9/2/2015	13	18	12
9/3/2015	9	15	9
9/4/2015	9	14	7
9/5/2015	8	17	12
9/6/2015	10	18	16
9/7/2015	15	20	20
9/8/2015	19	28	27
9/9/2015	9	18	17
9/10/2015	10	17	15
9/11/2015	6	10	12
9/12/2015	8	9	14
9/13/2015	7	12	13
9/14/2015	7	13	15
9/15/2015	10	18	17
9/16/2015	10	16	13
9/17/2015	15	12	18
9/18/2015	12	16	18
9/19/2015	17	20	23
9/20/2015	18	21	26
9/21/2015	19	22	27
9/22/2015	11	18	23
9/23/2015	15	17	22
9/24/2015	11	16	20
9/25/2015	18	20	22
9/26/2015	15	23	23
9/27/2015	9	15	20
9/28/2015	Data Collector Error	9	13
9/29/2015	Data Collector Error	9	15
9/30/2015	Data Collector Error	13	19
Baseline Average	**13**	**16**	**15**

5.0 GASEOUS NO_2, SO_2, CO, AND O_3 AIR QUALITY DATA SUMMARY

The current NAAQS for each of the gaseous pollutants is listed below.

- NO_2
  - 1 hour – 100 ppb
  - Annual – 53 ppb
- SO_2
  - 1 hour – 75 ppb
  - 3 hour – 500 ppb
- CO
  - 1 hour – 35 ppm
  - 8 hour – 9 ppm

5.1 Gaseous NO_2 Data Summary

The 1-hr average NO_2 concentrations during the baseline monitoring period were well below the NAAQS. The top five maximum averages of NO_2 data are presented in **Table 5-1**, **Table 5-2**, and **Table 5-3**. A graphical comparison of all three sites is found in **Figure 5-1**.

Table 5-1. Site 1 Baseline NO_2 Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg NO_2 Gas (ppb)	Date and Time Occurred
1	14.00	9/8/15 19:00
2	13.14	9/2/15 15:00
3	12.92	9/9/15 19:00
4	12.87	7/14/15 22:00
5	11.86	9/2/15 19:00

Table 5-2. Site 2 Baseline NO_2 Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg NO_2 Gas (ppb)	Date and Time Occurred
1	11.37	8/5/15 21:00
2	11.21	7/7/15 19:00
3	8.99	7/3/15 19:00
4	8.62	9/2/15 21:00
5	8.57	9/2/15 19:00

Table 5-3. Site 3 Baseline NO_2 Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg NO_2 Gas (ppb)	Date and Time Occurred
1	24.34	8/2/15 17:00
2	24.13	8/2/15 8:00
3	16.68	8/2/15 16:00
4	14.86	8/2/15 15:00
5	12.66	8/2/15 21:00

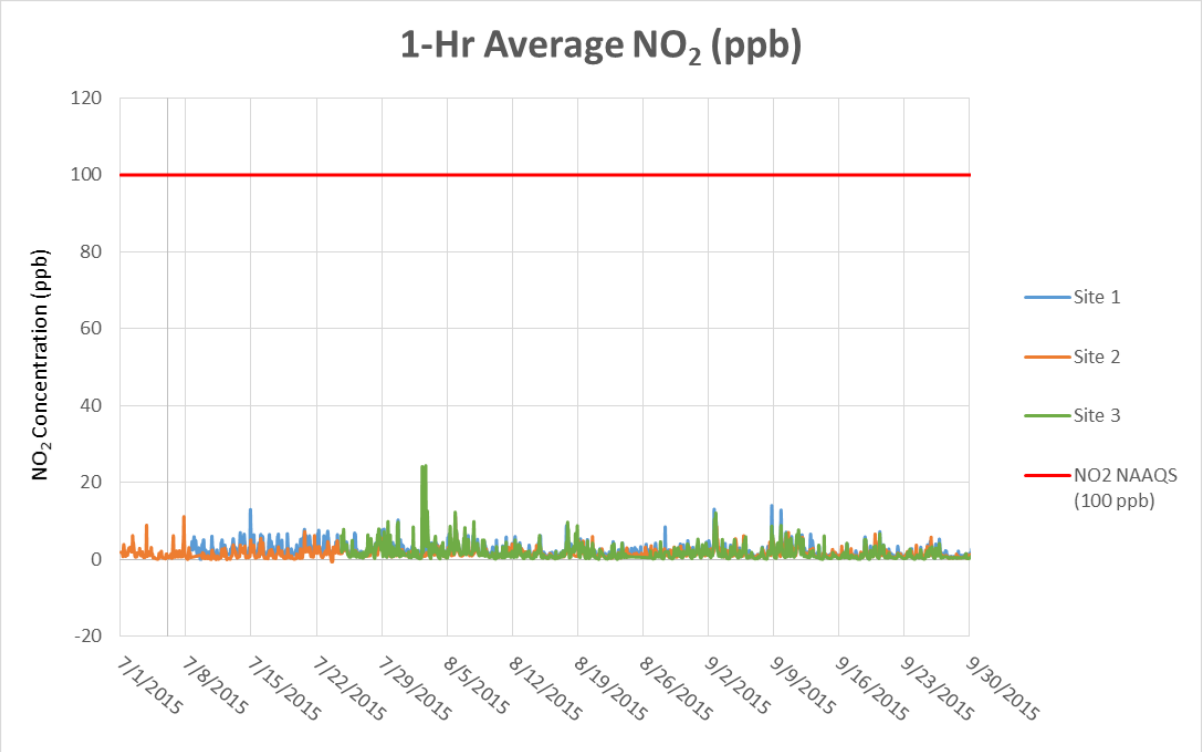

Figure 5-1. Baseline NO_2 1-Hour Average Comparison

5.2 Gaseous SO_2 Data Summary

Both the 1-hr and the 3-hr SO_2 concentrations during the baseline monitoring period were well below the NAAQS. The top five maximum 1-hr averages of baseline SO_2 data are presented in **Table 5-4** and **Table 5-5** and the top five maximum 3-hr averages of baseline SO_2 data are presented **Table 5-6** and **Table 5-7**. **Figure 5-2** shows a graphical comparison of the 1-hr concentrations for all three sites and **Figure 5-3** shows a graphical comparison of the 3-hr concentrations for all three sites.

Table 5-4. Site 2 Baseline SO_2 Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg SO_2 Gas (ppb)	Date and Time Occurred
1	2.36	8/30/15 9:00
2	2.36	9/5/15 19:00
3	2.02	8/31/15 9:00
4	1.96	8/31/15 10:00
5	1.91	8/30/15 10:00

Table 5-5. Site 3 Baseline SO_2 Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg SO_2 Gas (ppb)	Date and Time Occurred
1	3.33	9/14/15 10:00
2	2.79	8/30/15 9:00
3	2.47	8/31/15 10:00
4	2.45	8/10/15 7:00
5	2.03	8/30/15 10:00

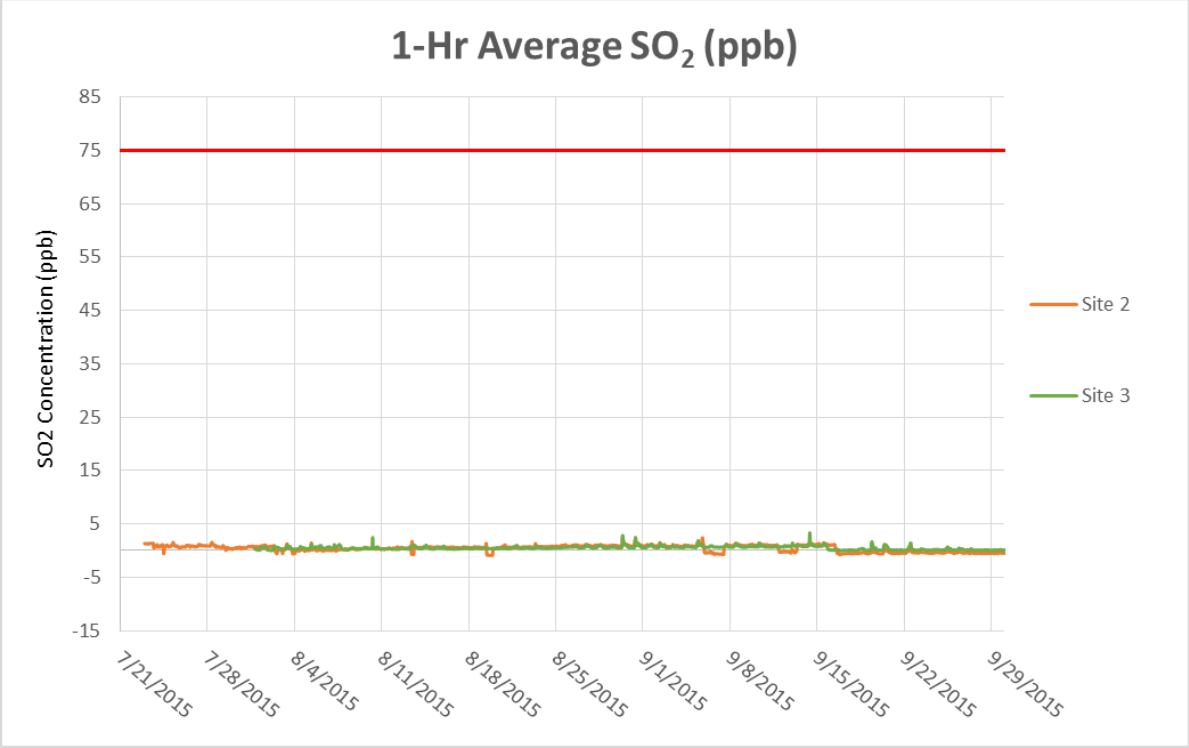

Figure 5-2. Baseline SO_2 1-Hour Averages Comparison

Table 5-6. Site 2 Baseline SO_2 Top 5 Maximum 3-Hour Averages

Rank	Top 5 Max 3 Hr Avg SO_2 Gas (ppb)	Date and Time Occurred
1	1.92	8/30/15 11:00
2	1.79	8/31/15 11:00
3	1.55	9/5/15 11:00
4	1.42	7/28/15 10:00
5	1.38	7/23/15 15:00

Table 5-7. Site 3 Baseline SO_2 Top 5 Maximum 3-Hour Averages

Rank	Top 5 Max 3 Hr Avg SO_2 Gas (ppb)	Date and Time Occurred
1	2.12	8/30/15 11:00
2	1.95	9/14/15 12:00
3	1.85	8/31/15 11:00
4	1.58	9/5/15 12:00
5	1.45	9/19/15 11:00

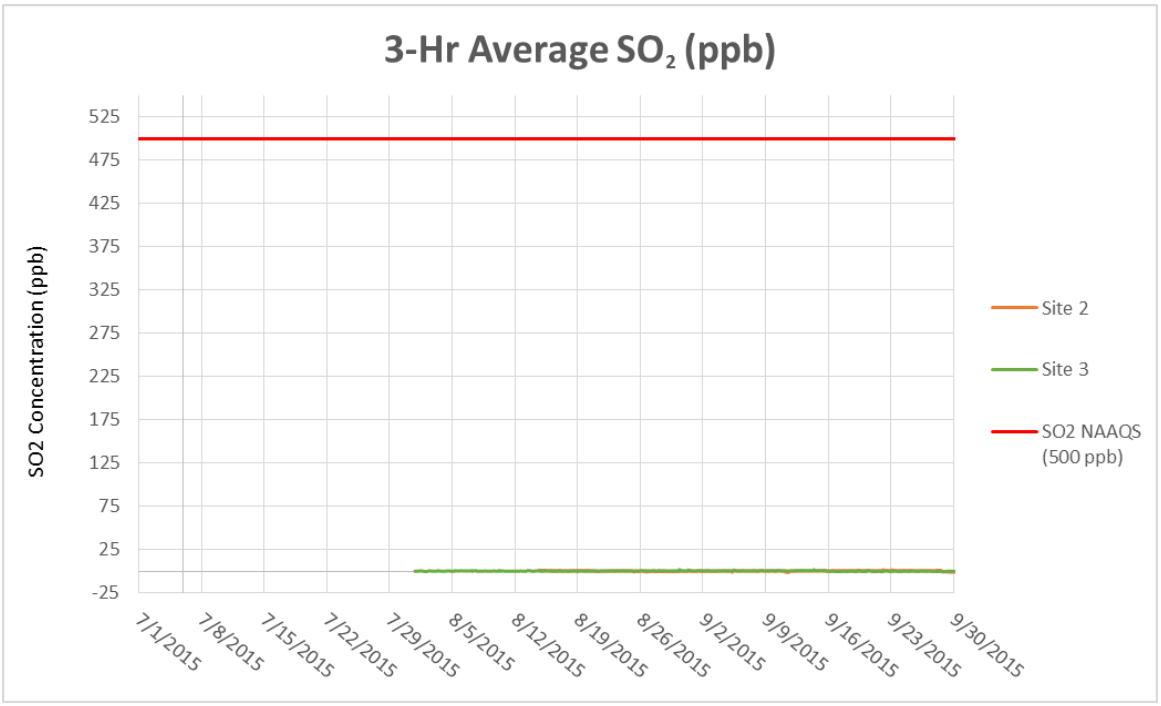

Figure 5-3. Baseline SO_2 3-Hour Averages Comparison

5.3 Gaseous CO Data Summary

Both the 1-hr and 8-hr CO concentrations during the baseline monitoring period were well below the NAAQS. The top five maximum 1-hr averages of CO data are presented in **Table 5-8**, **Table**

5-9, and **Table 5-10** and the top five maximum 8-hr averages of CO data are presented in **Table 5-11**, **Table 5-12**, and **Table 5-13**. **Figure 5-4** and **Figure 5-5** shows a graphical comparison for the 1-hr and 8-hr concentrations respectively, for all three sites.

Table 5-8. Site 1 Baseline CO Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	0.77	8/10/15 7:00
2	0.75	8/14/15 4:00
3	0.75	8/14/15 3:00
4	0.70	8/14/15 5:00
5	0.69	8/14/15 2:00

Table 5-9. Site 2 Baseline CO Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	1.05	9/26/15 6:00
2	1.02	9/26/15 5:00
3	0.98	9/26/15 7:00
4	0.82	8/30/15 8:00
5	0.81	8/14/15 1:00

Table 5-10. Site 3 Baseline CO Top 5 Maximum 1-Hour Averages

Rank	Top 5 Max 1 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	0.42	9/26/15 7:00
2	0.35	8/3/15 8:00
3	0.34	8/10/15 7:00
4	0.33	8/2/15 8:00
5	0.33	7/27/15 1:00

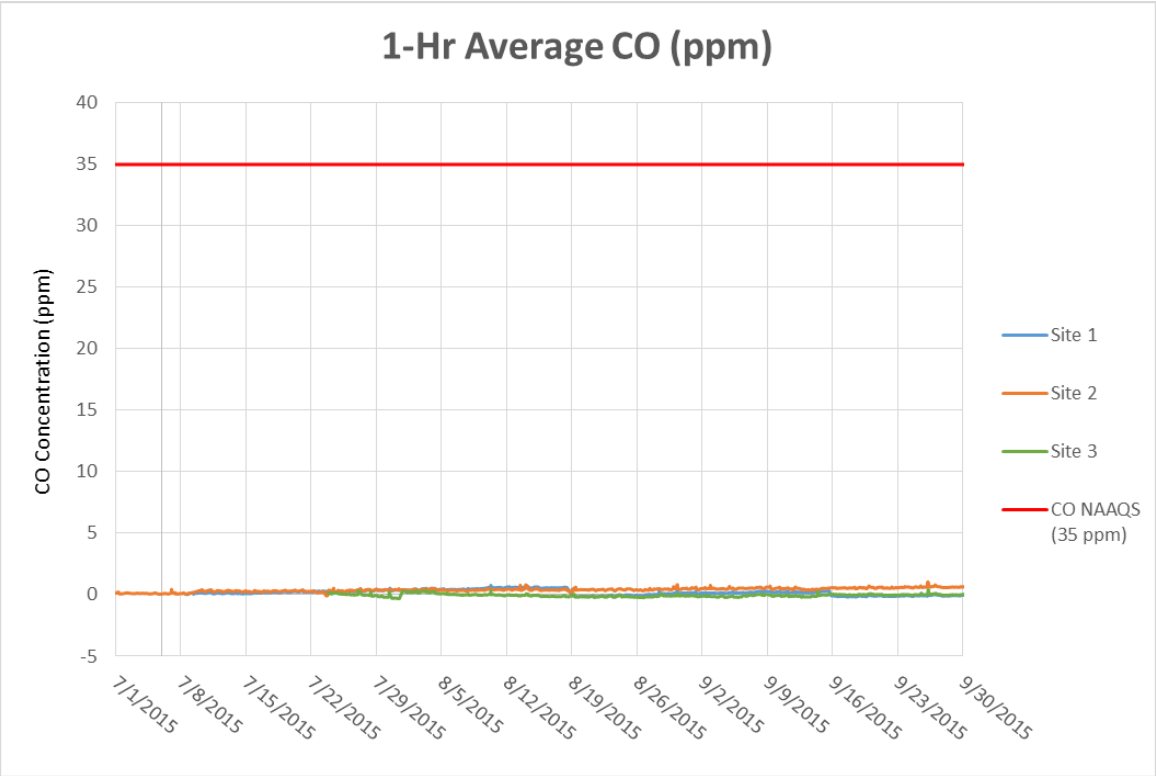

Figure 5-4. Baseline CO 1-Hour Averages Comparison

Table 5-11. Site 1 Baseline CO Top 5 Maximum 8-Hour Averages

Rank	Top 5 Max 8 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	0.68	8/14/15 1:00
2	0.64	8/15/15 0:00
3	0.63	8/12/15 0:00
4	0.62	8/10/15 4:00
5	0.61	8/12/15 19:00

Table 5-12. Site 2 Baseline CO Top 5 Maximum 8-Hour Averages

Rank	Top 5 Max 8 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	0.82	9/26/15 4:00
2	0.74	9/25/15 23:00
3	0.73	9/26/15 22:00
4	0.72	9/27/15 0:00
5	0.67	9/26/15 14:00

Table 5-13. Site 3 Baseline CO Top 5 Maximum 8-Hour Averages

Rank	Top 5 Max 8 Hr Avg CO Gas (ppm)	Date and Time Occurred
1	0.28	7/31/15 18:00
2	0.27	8/2/15 20:00
3	0.25	8/2/15 2:00
4	0.25	8/3/15 23:00
5	0.24	8/3/15 5:00

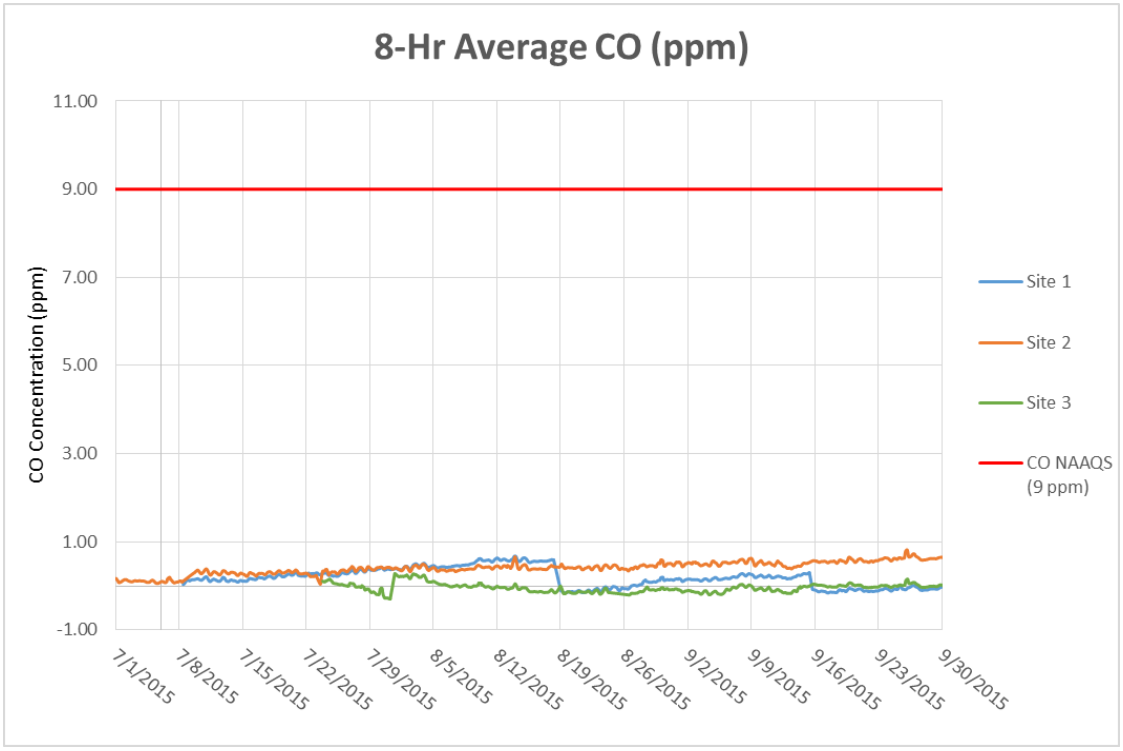

Figure 5-5. Baseline CO 8-Hour Averages Comparison

6.0 ANALYTICAL DATA

Air samples were collected and analyzed for metals, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs). Data for the sampling period covered by this report are presented in the tables below. Data collected in this reporting period constitutes baseline data prior to the commencement of project operations on-site.

6.1 Metals

Elemental metals analysis was conducted using x-ray fluorescence (XRF) for barium, cadmium, chromium, nickel and zinc (project metals). During the baseline monitoring period, a total of four field blanks were submitted for analysis. All field blanks were run at Site 2. Results from the field blanks indicated that none of the project metals were detected in the field blank samples.

A discussion of results is presented in the following sections by site. Observed detections of project metals at each of the sites followed similar trends, with concentrations typically higher in the first few weeks of sampling, and only period detections of barium, chromium and nickel, no detections of cadmium, and ongoing low level detections of zinc.

6.1.1 Site 1

One metals sample at Site 1 was void (08012015). Baseline data are summarized in **Appendix C. Figure 6-1** depicts detected concentrations over the baseline monitoring period to facilitate observations of trends. A summary by analyte of the number of detections, maximum concentration detected, and the date the maximum concentration was detected is included in **Table 6-1**.

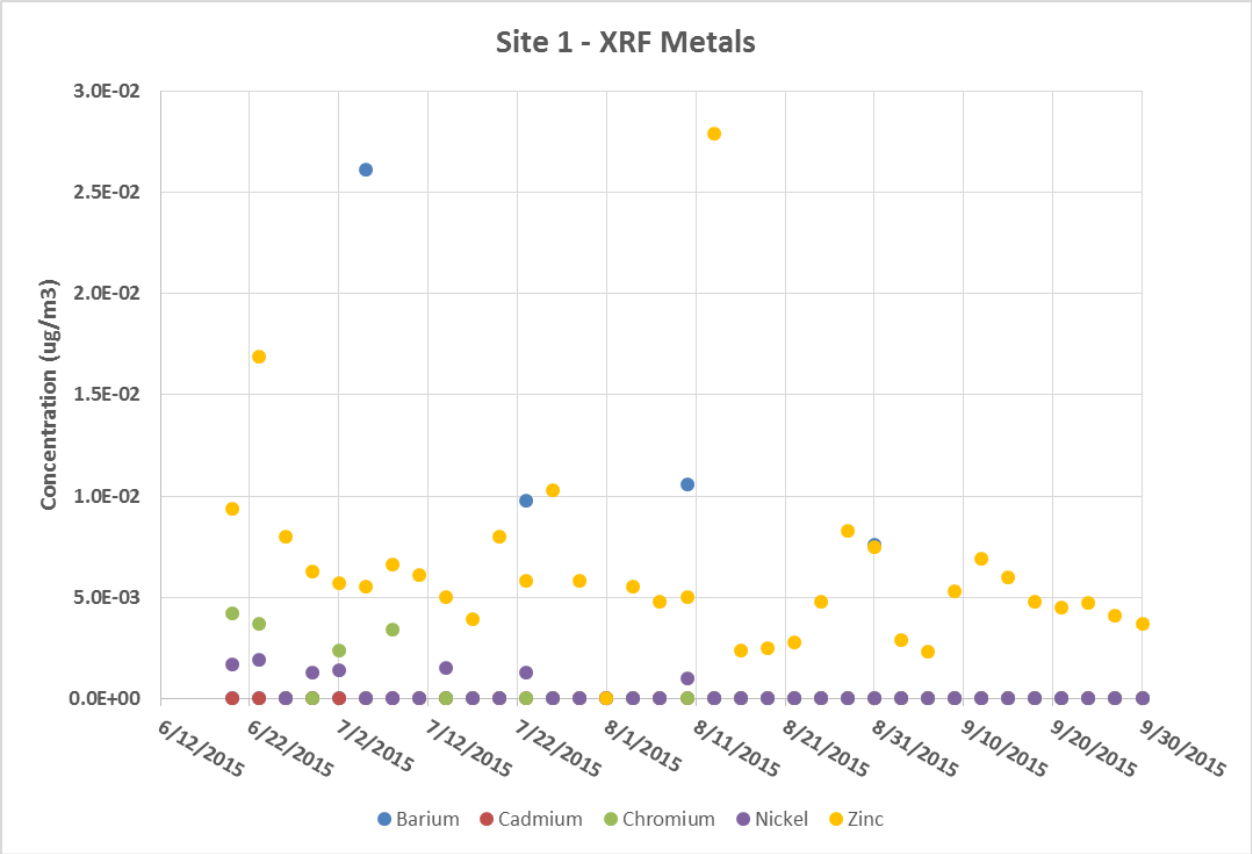

Figure 6-1. Site 1 XRF Metals

Table 6-1. Site 1 Project Metal Detections & Maximum Concentrations

Analyte	Barium	Cadmium	Chromium	Nickel	Zinc
Detections	4/34	0/34	4/34	7/34	34/34
Maximum (ug/m3)	0.0261	NA	0.0042	0.0019	0.0063
Date Max. Detected	July 5, 2015	NA	June 20, 2015	June 23, 2015	August 13,2015

6.1.2 Site 2

Four metals samples at Site 2 were void including:

- Metals2-08222015, no reason provided
- Metals2-08252015, no reason provided
- Metals2-09182015, an insect was on the filter
- Metals2-09212015, sampler ran only 16.25 out of 24 hrs

Baseline data are summarized in **Appendix C. Figure 6-2** shows detected concentrations over the baseline monitoring period to facilitate observations of trends. A summary by analyte of the

number of detections, maximum concentration detected, and the date the maximum concentration was detected is included in **Table 6-2**.

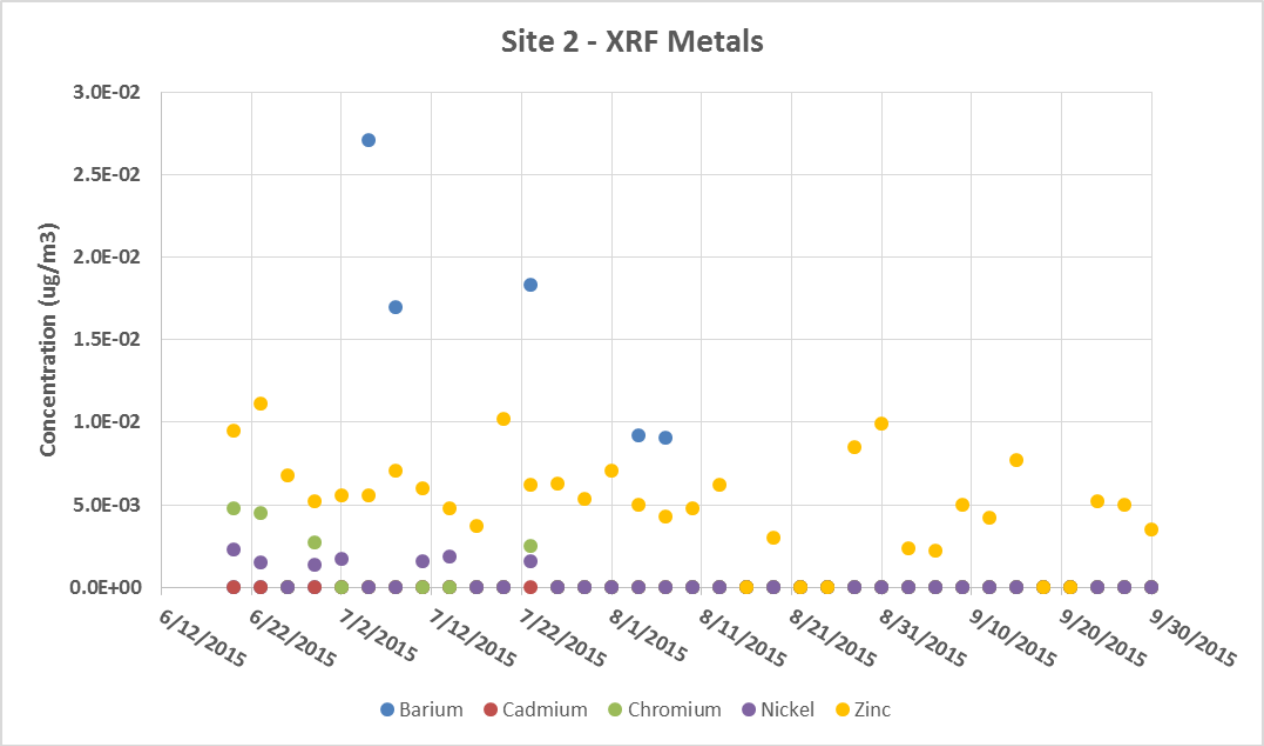

Figure 6-2. Site 2 XRF Metals

Table 6-2. Site 2 Project Metal Detections & Maximum Concentrations

Analyte	Barium	Cadmium	Chromium	Nickel	Zinc
Detections	5/31	0/31	4/31	7/31	30/31
Maximum (ug/m3)	0.0271	NA	0.0048	0.0023	0.011
Date Max. Detected	July 5, 2015	NA	June 20, 2015	June 20, 2015	June 23,2015

6.1.3 Site 3

All samples collected at Site 3 were valid. Baseline data are summarized in **Appendix C. Figure 6-3** shows detected concentrations over the baseline monitoring period to facilitate observations of trends. A summary by analyte of the number of detections, maximum concentration detected, and the date the maximum concentration was detected is included in **Table 6-3**.

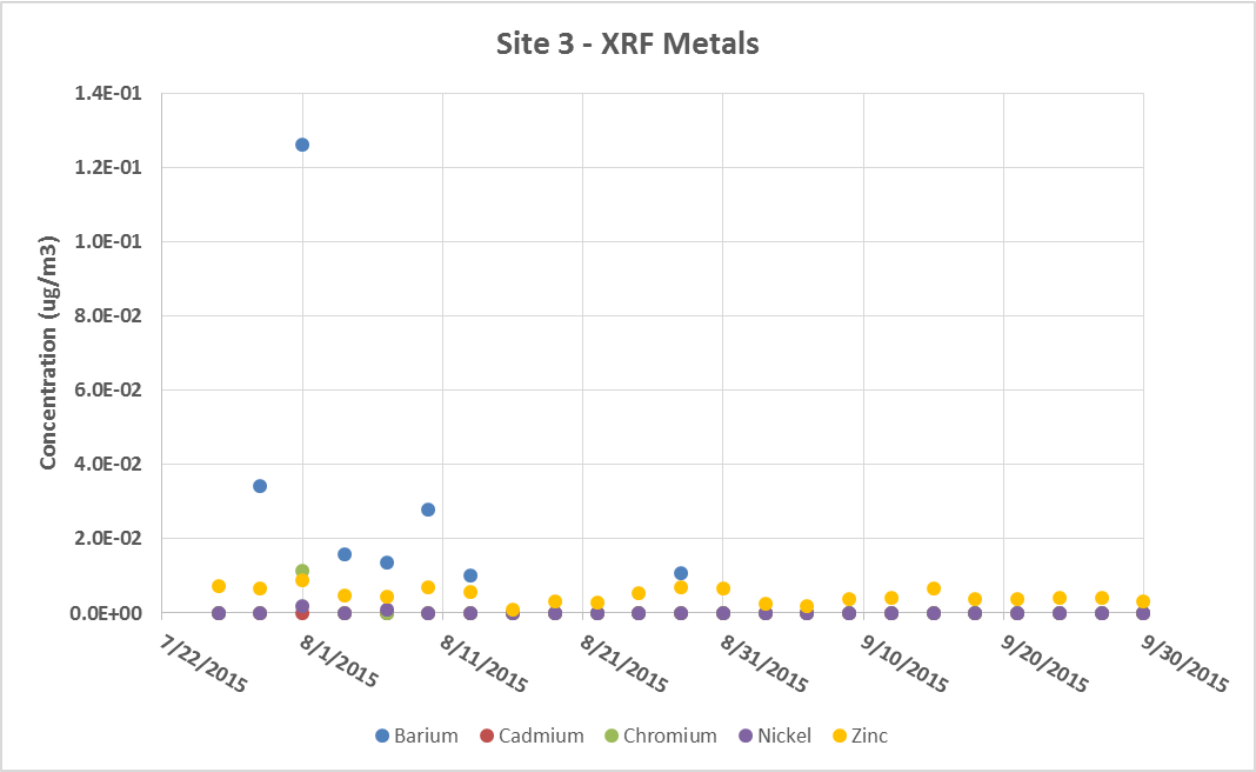

Figure 6-3. Site 3 XRF Metals

Table 6-3. Site 3 Project Metal Detections & Maximum Concentrations

Analyte	Barium	Cadmium	Chromium	Nickel	Zinc
Detections	7/23	0/23	1/23	2/23	23/23
Maximum (ug/m3)	0.126	NA	0.0115	0.0019	0.009
Date Max. Detected	August 1, 2015	NA	August 1, 2015	August 1, 2015	August 1,2015

6.2 Semi-Volatile Organic Compounds

SVOCs were analyzed using EPA Method TO-13A. This method analyzes for 65 constituents. Data for the baseline sampling period covered by this report are presented in tables by site. Observed concentrations were compared to the EPA Region 6 Regional Screening Levels (RSLs) for ambient air in a residential setting associated with a target cancer risk (TR) of 1E-06 or a target hazard quotient (THQ) of 0.1. Not every SVOC analyzed has an associated screening level, so comparisons of all constituents to screening levels was not possible. In addition, for some SVOCs, the EPA RSL is lower than the reporting limit (RL) achieved by the laboratory, as shown by the note (1) in the summary tables.

During the baseline monitoring period, a total of four field blanks were submitted for analysis. All field blanks were run at Site 2. Results from the field blanks indicated that concentrations of surrogate constituents were observed in the field blanks, but no other constituents were observed. In addition, laboratory control samples were run with each batch of samples submitted to the

laboratory. Data validation was performed on the data based upon review of the results of the laboratory control samples. Data qualifiers were adjusted as appropriate based upon the results of the data validation. Data quality flags provided by the laboratory and resulting from data validation are provided in the summary tables and defined in the notes below each table. A discussion of results is presented in the following sections by site.

6.2.1 Site 1

All SVOC samples at Site 1 were valid. Baseline data are summarized in **Appendix C**. Only one constituent was observed above detection levels, however, no observed concentrations were greater than the screening levels.

6.2.2 Site 2

All SVOC samples at Site 2 were valid. Baseline data are summarized in **Appendix C**. Only one constituent was observed above detection levels, however, no observed concentrations were greater than the screening levels.

6.2.3 Site 3

One SVOC sample at Site 3 was void (sample PUF3-09242015) due to the sample container breaking when taken out of the sampler. Baseline data are summarized in **Appendix C**. Four constituents were observed above detection levels, however, no observed concentrations were greater than the screening levels.

6.3 Volatile Organic Compounds

VOCs were analyzed using EPA Method TO-15. This method analyzes for 79 constituents. Data for the baseline sampling period covered by this report are presented in tables by site. Observed concentrations were compared to the EPA RSLs for ambient air in a residential setting associated with a TR of 1E-06 or a THQ of 0.1. Not every VOC analyzed has an associated screening level, so comparisons of all constituents to screening levels was not possible. In addition, for some VOCs, the EPA RSL is lower than the RL achieved by the laboratory, as shown by the note (1) in the summary tables.

Field blanks were not collected as the method of sampling was not conducive to their collection. Laboratory control samples were run with each batch of samples submitted to the laboratory. Data validation was performed on the data based upon review of the results of the laboratory control samples. Data qualifiers were adjusted as appropriate based upon the results of the data validation. Data quality flags provided by the laboratory and resulting from data validation are provided in the summary tables and defined in the notes below each table. A discussion of results is presented in the following sections by site.

6.3.1 Site 1

Two VOC samples at Site 1 were void (Summa1-07202015 and Summa1-09032015). Baseline data are summarized in **Appendix C**. A number of constituents were observed above detection levels, including some constituents which exceeded the EPA screening level in at least one of the

samples. **Table 6-4** presents a selection of data for those constituents whose screening level were exceeded at least once during the baseline sampling period.

Observed constituents exceeding EPA screening levels at Site 1 were comparable with those at Site 2 and more constituents were observed exceeding screening levels than at Site 3. Further investigation regarding the source of these VOCs is beyond the scope of this initial baseline inspection. It is possible that these constituents may in part be due to vehicle exhaust emissions in the area, but this has not been verified.

6.3.2 Site 2

All VOC samples at Site 2 were valid. Baseline data are summarized in **Appendix C**. A number of constituents were observed above detection levels, including some constituents which exceeded the EPA screening level in at least one of the samples. **Table 6-5** presents a selection of data for those constituents whose screening level were exceeded at least once during the baseline sampling period.

Observed constituents exceeding EPA screening levels at Site 2 were comparable with those at Site 1 and more constituents were observed exceeding screening levels than at Site 3. Further investigation regarding the source of these VOCs is beyond the scope of this initial baseline inspection. It is possible that these constituents may in part be due to vehicle exhaust emissions in the area, but this has not been verified.

6.3.3 Site 3

All VOC samples at Site 3 were valid. Baseline data are summarized in **Appendix C**. A number of constituents were observed above detection levels, including some constituents which exceeded the EPA screening level in at least one of the samples. **Table 6-6** presents a selection of data for those constituents whose screening level were exceeded at least once during the baseline sampling period.

The number of constituents observed exceeding EPA screening levels were fewer at Site 3 than at Sites 1 or 2. Further investigation regarding the source of these VOCs is beyond the scope of this initial baseline inspection. It is possible that these constituents may in part be due to vehicle exhaust emissions in the area, but this has not been verified.

Four constituents were detected at all three baseline sites. Graphs displaying the observed concentrations over the baseline sampling period at each site are included as **Figure 6-4** for benzene, **Figure 6-5** for bromomethane, **Figure 6-6** for carbon tetrachloride, and **Figure 6-7** for chloroform.

Table 6-4. Site 1 VOC EPA RSL Exceedances

Analyte	1,1,2,2-Tetrachloro-ethane		1,1,2-Trichloro-ethane		1,2,3-Trichloro-propane		1,2,3-Trimethyl-benzene		1,2,4-Trimethyl-benzene		1,2-Dichloro-ethane		1,2-Dichloro-propane		1,4-Dichloro-benzene		Benzene		Bromodichloro-methane		Bromo-methane		Carbon tetrachloride		Chloroform		Dibromochloro-methane		Dibromo-methane		Hexachloro-butadiene		Tetrachloro-ethene		Trichloro-ethene		Vinyl bromide	
CAS	79-34-5		79-00-5		96-18-4		526-73-8		95-63-6		107-06-2		78-87-5		106-46-7		71-43-2		75-27-4		74-83-9		56-23-5		67-66-3		124-48-1		74-95-3		87-68-3		127-18-4		79-01-6		593-60-2	
EPA RSL	0.048		0.021		0.031		0.52		0.73		0.11		0.28		0.26		0.36		0.076		0.52		0.47		0.12		0.1		0.42		0.13		4.2		0.21		0.088	
Date	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag
6/23/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.45**	J	ND(1)	-	ND(1)	-	0.37	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
6/26/2015	**0.88**	J	**0.92**	J	**1.3**	J	**1.1**	-	**1.1**	-	**0.82**	-	**0.73**	J	**1.2**	-	**0.73**	-	**1**	J	**0.88**	-	**1.2**	J	**0.91**	J	**1.1**	J	**1.2**	J	ND(1)	-	1.2	J	**1.1**	-	**0.74**	J
6/30/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	0.17	J	0.47	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/3/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.3	J	ND(1)	-	0.49	J	0.44	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/11/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.47**	J	ND(1)	-	ND(1)	-	**0.51**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/14/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.38**	J	ND(1)	-	ND(1)	-	0.46	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/17/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.36	J	ND(1)	-	ND(1)	-	**0.5**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/20/2015	DO SAMPLE																																					
7/23/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.27**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**1.8**	-	**0.6**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/26/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.47**	J	ND(1)	-	ND(1)	-	**0.52**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
7/29/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.31	J	ND(1)	-	**0.61**	J	0.4	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/1/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.3	J	ND(1)	-	**0.74**	J	0.41	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/4/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.23	J	ND(1)	-	**0.57**	J	**1**	J	**1.1**	-	ND(1)	-	ND(1)	-	**2.5**	-	**6.3**	-	ND(1)	-	ND(1)	-
8/7/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**1.1**	-	ND(1)	-	**0.59**	J	0.38	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/10/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.27	J	ND(1)	-	0.34	J	0.42	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/13/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	0.29	J	0.38	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/16/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.19	J	0.47	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/19/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	ND(1)	-	ND(1)	-	**0.48**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/22/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	0.46	J	**0.2**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/25/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.33	J	ND(1)	-	0.21	J	0.44	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/28/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.4**	J	ND(1)	-	0.19	J	**0.5**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
8/31/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.29	J	ND(1)	-	0.23	J	0.47	J	**0.21**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/3/2015	DO SAMPLE																																					
9/6/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.2	J	ND(1)	-	0.27	J	0.44	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	1.1	J	ND(1)	-	ND(1)	-
9/9/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.23	J	ND(1)	-	0.2	J	0.46	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/12/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.21	J	ND(1)	-	0.13	J	0.42	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/15/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.29	J	ND(1)	-	ND(1)	-	**0.48**	"J"	**1.2**	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/18/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.23	J	ND(1)	-	ND(1)	-	**0.58**	"J"	**0.21**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/21/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.27	J	ND(1)	-	ND(1)	-	**0.52**	"J"	**0.24**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/24/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	ND(1)	-	0.13	J	0.43	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-
9/27/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	ND(1)	-	ND(1)	-	**0.7**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	2	-	ND(1)	-	ND(1)	-
9/30/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.33	J	ND(1)	-	ND(1)	-	0.39	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-

(1) Reporting Limit exceeds screening level
(2) Values with gray shading and bold text exceed the screening level
CAS: Chemical Abstracts Service
EPA RSL updated June 2015, Residential Air Standard used
J: Laboratory qualifier indicating result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
"J": Data validation qualifier indicating estimated value

Table 6-5. Site 2 VOC EPA RSL Exceedances

Analyte	1,1,2,2-Tetrachloro-ethane		1,1,2-Trichloro-ethane		1,2,3-Trichloro-propane		1,2-Dibromoethane (EDB)		1,2-Dichloroethane		1,4-Dichloro-benzene		Benzene		Bromodichloro-methane		Bromo-methane		Carbon tetrachloride		Chloroform		Dibromochloro-methane		Dibromo-methane		Ethylbenzene		Naphthalene		Trichloro-ethene		Vinyl bromide		Vinyl chloride	
CAS	79-34-5		79-00-5		96-18-4		106-93-4		107-06-2		106-46-7		71-43-2		75-27-4		74-83-9		56-23-5		67-66-3		124-48-1		74-95-3		100-41-4		91-20-3		79-01-6		593-60-2		75-01-4	
EPA RSL	0.048		0.021		0.031		0.0047		0.11		0.26		0.36		0.076		0.52		0.47		0.12		0.1		0.42		1.1		0.083		0.21		0.088		0.17	
Date	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag
6/23/2015	**0.43**	J	**0.38**	J	**0.46**	J	**0.86**	J	**0.35**	J	ND(1)	-	**0.5**	J	**0.4**	J	0.35	J	**0.71**	J	**0.39**	J	**0.45**	J	**0.45**	J	0.47	J	ND(1)	-	**0.56**	J	**0.27**	J	ND(1)	-
6/26/2015	**2.4**	-	**1.6**	-	**2.3**	J	**2.2**	-	**1.3**	-	**2.1**	-	**1**	-	**1.8**	-	**1.3**	-	**2.1**	-	**1.5**	-	**2.1**	-	**2**	J	**1.4**	-	**1.6**	J	**1.4**	-	**1.2**	-	**0.78**	-
6/30/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	ND(1)	-	ND(1)	-	0.43	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/3/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.98**	-	ND(1)	-	ND(1)	-	0.45	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	**4.5**	-	ND(1)	-	ND(1)	-
7/11/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.59**	J	ND(1)	-	ND(1)	-	0.45	J	**0.21**	J	ND(1)	-	ND(1)	-	0.82	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/14/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.24**	J	ND(1)	-	**0.76**	-	ND(1)	-	ND(1)	-	0.42	J	ND(1)	-	ND(1)	-	ND(1)	-	0.63	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/17/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.48**	J	ND(1)	-	ND(1)	-	**0.5**	J	**0.22**	J	ND(1)	-	ND(1)	-	0.54	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/20/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.45**	J	ND(1)	-	ND(1)	-	**0.51**	J	**0.22**	J	ND(1)	-	ND(1)	-	0.65	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/23/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.39**	J	ND(1)	-	ND(1)	-	0.32	J	ND(1)	-	ND(1)	-	ND(1)	-	0.32	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/26/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.35	J	ND(1)	-	ND(1)	-	0.41	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
7/29/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.35	J	ND(1)	-	**0.73**	J	0.46	J	ND(1)	-	ND(1)	-	ND(1)	-	0.51	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/1/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.34	J	ND(1)	-	0.41	J	0.41	J	ND(1)	-	ND(1)	-	ND(1)	-	0.62	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/4/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	0.31	J	**0.49**	J	**0.21**	J	ND(1)	-	ND(1)	-	0.4	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/7/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	0.46	J	0.33	J	ND(1)	-	ND(1)	-	ND(1)	-	0.52	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/10/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.31	J	ND(1)	-	**0.54**	J	**0.48**	J	**0.27**	J	ND(1)	-	ND(1)	-	0.38	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/13/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.31	J	ND(1)	-	0.38	J	0.45	J	**0.19**	J	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/16/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.27	J	ND(1)	-	0.42	J	**0.49**	J	ND(1)	-	ND(1)	-	ND(1)	-	0.48	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/19/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.24	J	ND(1)	-	0.37	J	0.47	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/22/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.36	J	0.38	J	ND(1)	-	ND(1)	-	ND(1)	-	0.36	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/25/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.39**	J	ND(1)	-	0.42	J	**0.5**	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/28/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.34	J	ND(1)	-	0.35	J	0.41	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
8/31/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	**0.51**	J	ND(1)	-	ND(1)	-	0.42	J	**0.2**	J	ND(1)	-	ND(1)	-	0.59	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/3/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.19	J	ND(1)	-	0.28	J	0.4	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/6/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.19	J	ND(1)	-	0.32	J	0.45	J	ND(1)	-	ND(1)	-	ND(1)	-	0.37	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/9/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.22	J	ND(1)	-	0.32	J	0.45	J	**0.23**	J	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/12/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.19	J	ND(1)	-	0.19	J	0.43	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/15/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.21	J	ND(1)	-	0.18	J	0.44	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/18/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.24	J	ND(1)	-	ND(1)	-	0.45	J	ND(1)	-	ND(1)	-	ND(1)	-	0.33	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/21/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	ND(1)	-	0.47	"J"	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/24/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.25	J	ND(1)	-	0.26	J	**0.48**	J	**0.21**	J	ND(1)	-	ND(1)	-	0.32	J	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/27/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.33	J	ND(1)	-	0.32	J	0.39	J	**0.22**	J	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-
9/30/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	0.28	J	ND(1)	-	ND(1)	-	0.26	J	ND(1)	-	ND(1)	-	ND(1)	-	ND	-	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-

(1) Reporting Limit exceeds screening level
(2) Values with gray shading and bold text exceed the screening level
CAS: Chemical Abstracts Service
EPA RSL updated June 2015, Residential Air Standard used
J: Laboratory qualifier indicating result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
"J": Data validation qualifier indicating estimated value

Table 6-6. Site 3 VOC EPA RSL Exceedances

Analyte	Benzene		Bromomethane		Carbon tetrachloride		Chloroform		Ethylbenzene	
CAS	71-43-2		74-83-9		56-23-5		67-66-3		100-41-4	
EPA RSL in ug/m3	0.36		0.52		0.47		0.12		1.1	
Date	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag	Result (ug/m3)	Flag
7/26/2015	**1.2**(2)	-	ND(1)	-	0.44	J	ND(1)	-	**1.9**	-
7/29/2015	**0.48**	J	**0.75**	J	0.44	J	0.32	J	0.47	J
8/1/2015	**0.4**	J	**0.68**	J	0.39	J	ND(1)	-	0.4	J
8/4/2015	**0.35**	J	**0.68**	J	**0.45**	J	ND(1)	-	**0.37**	J
8/7/2015	**0.48**	J	**1.4**	-	0.45	J	ND(1)	-	0.37	J
8/10/2015	0.34	J	**0.81**	-	**0.44**	J	ND(1)	-	0.31	J
8/13/2015	0.33	J	**0.57**	J	**0.42**	J	ND(1)	-	0.31	J
8/16/2015	0.28	J	**0.84**	-	**0.56**	J	ND(1)	-	**0.32**	J
8/19/2015	0.31	J	**0.44**	J	**0.45**	J	0.25	J	**0.36**	J
8/22/2015	0.33	J	**0.44**	J	**0.54**	J	0.25	J	**0.36**	J
8/25/2015	**0.36**	J	**0.42**	J	**0.43**	J	ND(1)	-	ND	-
8/28/2015	**0.95**	-	0.69	J	0.43	J	ND(1)	-	**1.1**	-
8/31/2015	0.34	J	**0.39**	J	**0.39**	J	ND(1)	-	ND	-
9/3/2015	0.22	J	**0.32**	J	**0.33**	J	ND(1)	-	ND	-
9/6/2015	0.23	J	**0.37**	J	**0.4**	J	ND(1)	-	ND	-
9/9/2015	ND(1)	-	ND(1)	-	ND(1)	-	ND(1)	-	ND	-
9/12/2015	**0.4**	J	ND(1)	-	**0.43**	J	ND(1)	-	**2.2**	-
9/15/2015	0.28	J	ND(1)	-	**0.37**	"J"	ND(1)	-	ND	-
9/18/2015	0.24	J	ND(1)	-	**0.49**	"J"	0.2	J	ND	-
9/21/2015	0.26	J	ND(1)	-	**0.49**	"J"	ND(1)	-	ND	-
9/24/2015	0.33	J	0.31	J	**0.45**	J	0.19	J	ND	-
9/27/2015	0.35	J	0.31	J	**0.41**	J	ND(1)	-	ND	-
9/30/2015	**0.37**	J	0.25	J	**0.39**	J	ND(1)	-	ND	-

Notes:
(1) Reporting Limit exceeds screening level
(2) Values with gray shading and bold text exceed the screening level
CAS: Chemical Abstracts Service
EPA RSL updated June 2015, Residential Air Standard used
J: Laboratory qualifier indicating result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
"J": Data validation qualifier indicating estimated value

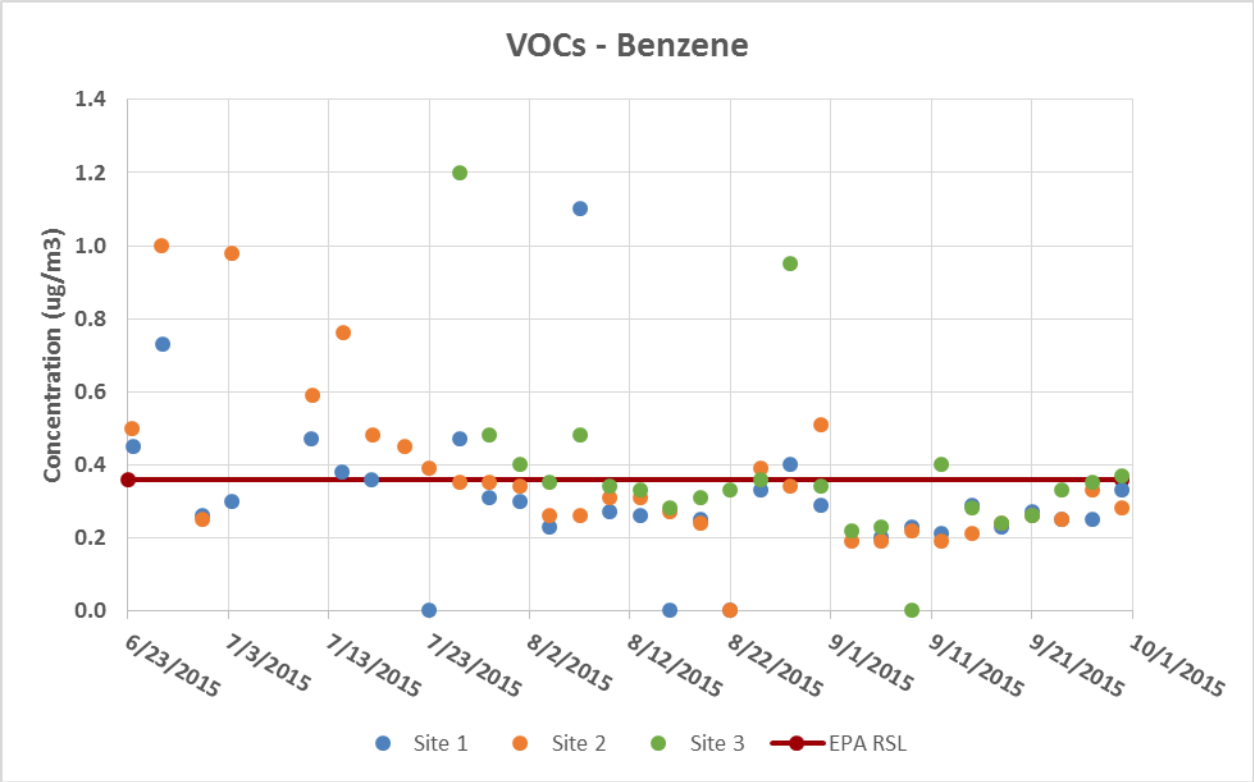

Figure 6-4. Baseline VOCs - Benzene

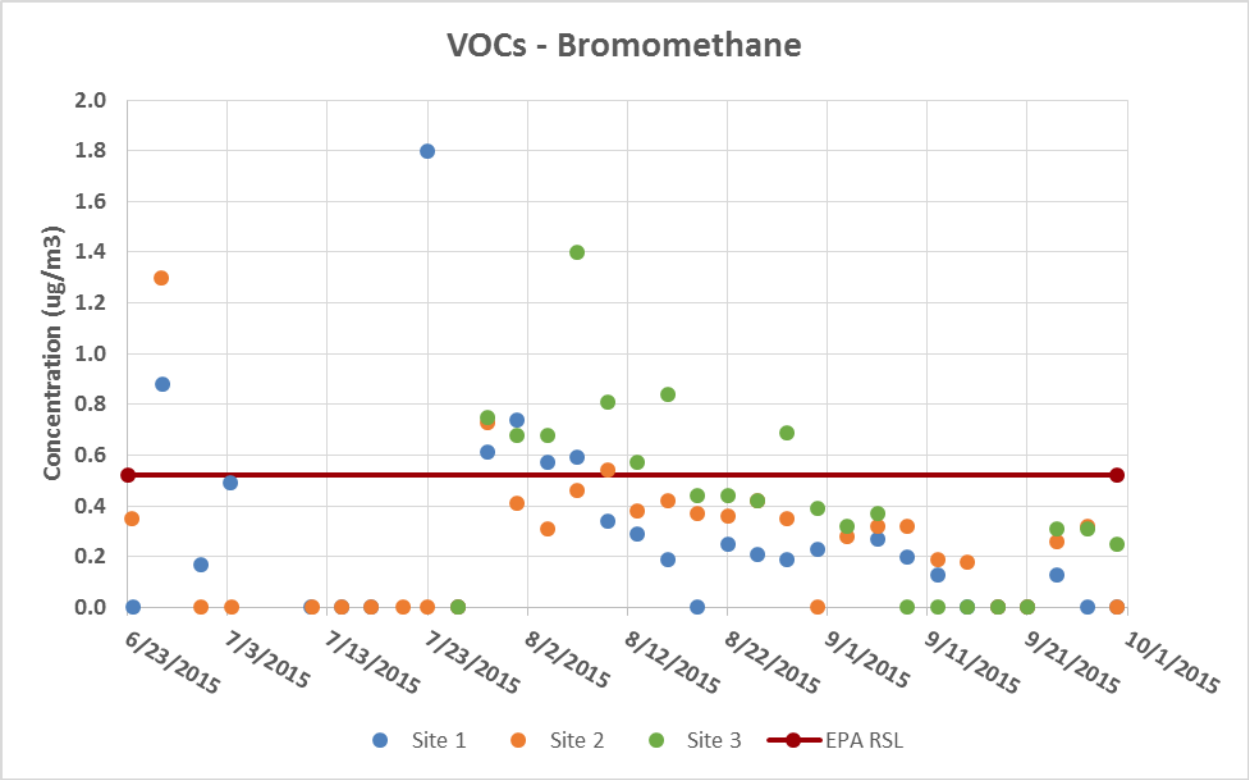

Figure 6-5. Baseline VOCs - Bromomethane

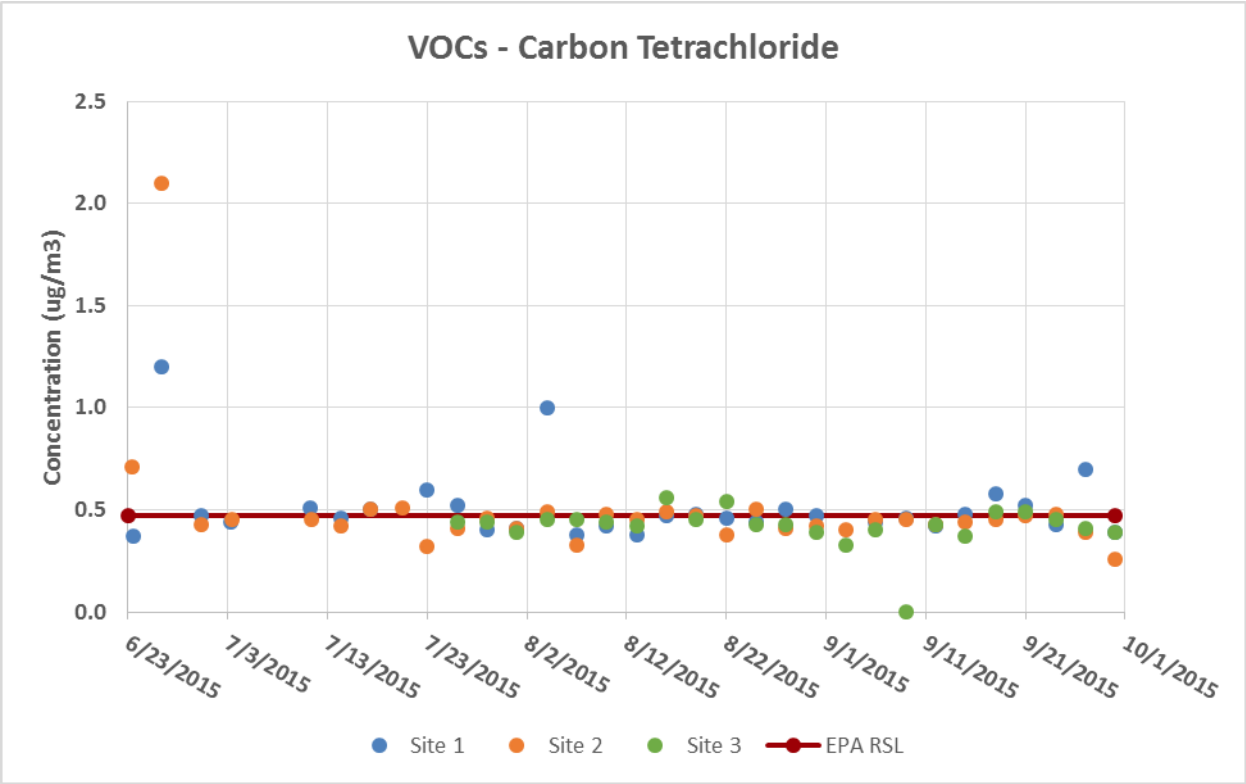

Figure 6-6. Baseline VOCs – Carbon Tetrachloride

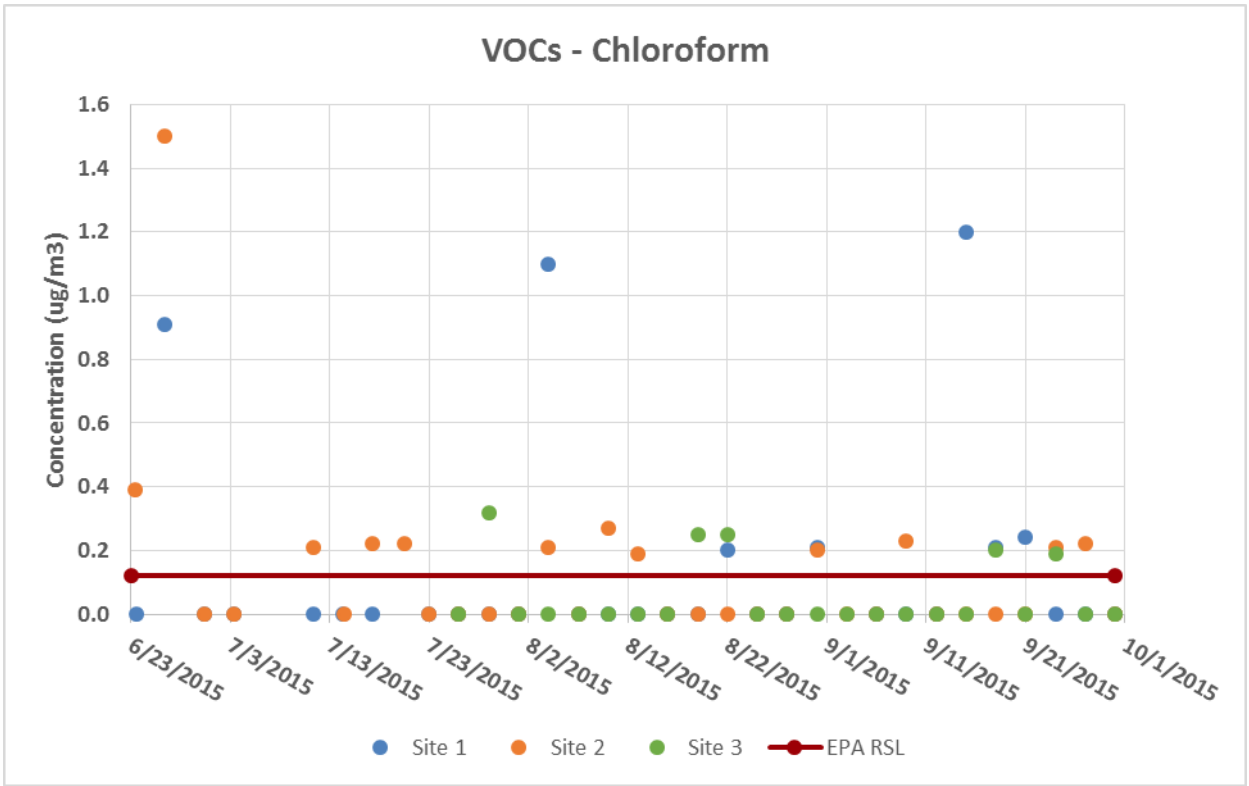

Figure 6-7. Baseline VOCs – Chloroform

7.0 REFERENCES

Tetra Tech, Inc. 2015. Quality Assurance Project Plan for Conducting Ambient Air Quality and Meteorological Monitoring for the St. Tammany Parish Exploratory Well Project

APPENDIX A

DATA PROCESSING SPECIFICATIONS AND STATISTICAL FORMULAE

DATA PROCESSING SPECIFICATIONS AND STATISTICAL FORMULAE

A.1 Data Capture Percentage

The total data capture percentage (P_t) for each parameter is determined as follows:

$$P_t = \frac{h_v}{h_t} \times 100$$

where: h_v = number of hours of valid data
h_t = total hours in the period

A.2 Calculation of Hourly Sigma-Theta Values

The hourly values of sigma-theta were calculated from the 15-minute averages using the following equation:

$$\sigma_\theta(hourly) = \sqrt{\frac{\sum_{i=1}^{n} \sigma^2{}_{\theta i}}{n}}$$

The data logger calculates sigma-theta using the Yamartino method.

APPENDIX B

UNIT VECTOR AVERAGING METHOD FOR WIND DIRECTION

UNIT VECTOR AVERAGING METHOD FOR WIND DIRECTIONS

The unit vector method for averaging wind direction reduces the wind direction for a given period to a "unit vector" and subsequently does not weight the north-south and east-west components of the wind direction by the wind speed. The formula for the components of the wind direction, both in the X-direction and the Y-direction, is as follows:

$$\mathbf{V_x = -(1/N) \sum sin\ (A_i)}$$
$$\mathbf{V_y = -(1/N) \sum cos\ (A_i)}$$

Where A_i is the wind direction for a specific period and N is the number of such observations for the hour.

The formula for calculating wind direction is as follows:

$$\mathbf{Vector\ Wind = arctan\ (V_x/V_y)}$$

If the Y-direction component (V_y) is zero and the X-direction component (V_x) is nonzero, the vector wind is set to 90°; however, if V_x, is zero, the vector wind is set to zero.
The unit vector wind is calculated based on the sign of the component winds in the following formula:

$$\mathbf{Unit\ Vector\ Wind = Vector\ Wind + FLOW}$$

FLOW is determined by examining the signs of both V_x and V_y. If these are both less than or equal to zero, FLOW is set to zero. If V_x is negative, FLOW is set to 360°. If both are positive, FLOW is set to 180°. The following algorithm describes how FLOW is determined:

```
IF (Vy ≤ 0) THEN
        IF (Vx ≤ 0) THEN
                FLOW = 0°
        ELSE
                FLOW = 360°
        ELSE
                FLOW = 180°
```

APPENDIX C

METALS, VOC, AND SVOC LABORATORY DATA SHEETS

APPENDIX D
CALIBRATION NOTES

APPENDIX E

METEOROLOGICAL AND AIR QUALTIY DATA

(Separate Excel File Titled, "Coded Raw Baseline Met and AQ Data")