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Monthly Report: Richmond Community Air Monitoring Program

Report Number: RCAMP_MO_2
Date: May 2013

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Executive Summary

The following report summarizes the monthly data generated as part of the Richmond Community Air Monitoring Program. The Richmond Community Air Monitoring Program is an independent initiative designed to provide air quality readings to the general public and educate the community about what's in the air. The equipment used to collect and analyze the air quality readings and their installations were funded by Chevron in consultation with the City of Richmond. Ongoing operation, maintenance and data reporting is managed by Argos Scientific, Inc. with direction from the City Manager's Office and input from Chevron and community representatives.

This report details the information collected by the operation of the fence line (Open Path) monitoring systems installed near the perimeter of Chevron's Richmond Refinery. The report explains the data and measurements of target compounds for the period 05/01/2013 to 05/31/2013 at the fence line monitoring locations located near the Richmond Refinery perimeter, adjacent to Point Richmond, Atchison Village and North Richmond.

Operating performance events
During the month, there was one activity that resulted in the fence line air monitoring equipment being off line. This was a scheduled power outage for building maintenance between 8:00 AM and 9:00 AM on 05/04/2013. In addition, minor damage to the meteorological station adjacent to the Atchison Village and Point Richmond fence line resulted in it being offline. Analysis of this meteorological data against the data from the meteorological station adjacent to North Richmond indicated that the data was affected from 1:09 PM on 05/22/2013.

Maintenance activities
Maintenance activities occurred on the same days that quality assurance/quality control (QA/QC) occurred. These dates were 05/02/2013 and 05/13/2013.

Summary Findings
The following was noted from the monthly results:

- The results indicated that there were detections of target compounds to the south of the refinery perimeter that is adjacent to Point Richmond particularly on southeast winds;

- To the northeast and northwest of the refinery perimeter that is adjacent to Atchison Village, there appear to be sources of sulfur dioxide and toluene;

- As with the refinery perimeter that is adjacent to Point Richmond, the perimeter that is adjacent to Atchison Village showed detections of benzene on winds from the southeast;

- The fence line monitoring equipment located near the refinery perimeter adjacent to North Richmond showed a detection of benzene on high winds from the west-to-southwest. This differed from the April 2013 monitoring period where no benzene was detected;

- As more data is collected, the possible link between gas detections and wind direction should be researched.

1 Report Document Control

PROJECT REFERENCE:	RCAMP_MO_2
REPORT TITLE:	Monthly Report: Richmond Community Air Monitoring Program
DATE SUBMITTED:	06/11/2013
PREPARED BY:	Don Gamiles Argos Scientific Inc.
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2 Introduction

Table 2.1 below lists the target compounds monitored during the period of 05/01/2013 to 05/31/2013 at the fence line monitoring locations located near the refinery perimeter and adjacent to Point Richmond, Atchison Village and North Richmond.

Table 2.1: Target Compounds Measured by Fence Line System

Compound	**Instrument**
Benzene	Open Path UV
Toluene	Open Path UV
Sulfur Dioxide (SO_2)	Open Path UV
p-Xylene	Open Path UV
Ozone	Open Path UV
Carbon Dislfide	Open Path UV
Hydrogen Sulfide	Tunable Diode Laser (TDL)

As indicated in Table 2.1 above there are two instruments per site (see Appendix C for equipment location map) for each fence line system (UV and TDL). In addition each site is equipped with a meteorological station measuring the following parameters:

- Wind speed
- Wind direction
- Temperature
- Relative humidity

The results of the measurements performed by the system for the month of May 2013 are presented in the sections that follow.

3 Results

This section of the report presents the results for the monitoring performed for the month of May 2013. Tables 3.1, 3.2 and 3.3 below list the maximum monthly concentrations measured at each of the sites for the monitoring period.

Table 3.1: Maximum Detected Concentrations Measured by the Fence Line Monitoring Equipment Located Adjacent to Point Richmond

Compound	Date	Time	Concentration (ppb)	Toxicity Summary (ppb)	System
Benzene	05/02/2013	3:55 PM	11	Short-term/acute (for a 6-hour exposure) [1]: 433 Long-term/chronic [2]: 20	UV
Sulfur Dioxide	05/01/2013	2:15 PM	16	Short-term/acute (for a 1-hour exposure)[1]: 230	UV
Toluene	05/01/2013	2:00 PM	13	Short-term/acute (for a 1-hour exposure) [1]: 8600 Long-term/chronic[2]: 70	UV
p-Xylene	05/27/2013	2:42 PM	16	Short-term/acute (for a 1-hour exposure)[1]: 6285 Long-term/chronic[2]: 200	UV
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	UV
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[2]: 8	TDL
Ozone	05/24/2013	4:47 PM	72	Short-term/acute (for a 1-hour exposure)[1]: 90	UV

[1] California Office of Environmental Health Hazard Assessment, Acute Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf)
[2] California Office of Environmental Health Hazard Assessment, Chronic Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD3_final.pdf)

Table 3.2: Maximum Detected Concentrations Measured by the Fence Line Monitoring Equipment Located Adjacent to Atchison Village

Compound	Date	Time	Concentration (ppb)	Toxicity Summary (ppb)	System
Benzene	05/14/2013	8:58 AM	8	Short-term/acute (for a 6-hour exposure)[3]: 433 Long-term/chronic[4]: 20	UV
Sulfur Dioxide	05/01/2013	9:25 PM	24	Short-term/acute (for a 1-hour exposure)[3]: 230	UV
Toluene	05/03/2013	8:35 AM	15	Short-term/acute (for a 1-hour exposure)[3]: 8600 Long-term/chronic[4]: 70	UV
p-Xylene	05/02/2013	8:31 AM	9	Short-term/acute (for a 1-hour exposure)[3]: 6285 Long-term/chronic[4]: 200	UV
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	UV
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[4]: 8	TDL
Ozone	05/02/2013	2:38 PM	45	Short-term/acute (for a 1-hour exposure)[3]: 90	UV

[3] California Office of Environmental Health Hazard Assessment, Acute Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf)
[4] California Office of Environmental Health Hazard Assessment, Chronic Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD3_final.pdf)

Table 3.3: Maximum Detected Concentrations Measured by the Fence Line Monitoring Equipment Located Adjacent to North Richmond

Compound	Date	Time	Concentration (ppb)	Toxicity Summary (ppb)	System
Benzene	05/21/2013	9:19 PM	6	Short-term/acute (for a 6-hour exposure) [5]: 433 Long-term/chronic[6]: 20	UV
Sulfur Dioxide	05/03/2013	7:29 AM	15	Short-term/acute (for a 1-hour exposure)[5]: 230	UV
Toluene	05/02/2013	6:47 AM	23	Short-term/acute (for a 1-hour exposure)[5]: 8600 Long-term/chronic[6]: 70	UV
p-Xylene	Nothing Detected	Nothing Detected	Nothing Detected	Short-term/acute (for a 1-hour exposure) [5]: 6285 Long-term/chronic[6]: 200	UV
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	UV
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[6]: 8	TDL
Ozone	05/20/2013	2:22 PM	60	Short-term/acute (for a 1-hour exposure) [5]: 90	UV

Tables 3.1, 3.2 and 3.3 above indicate the following:

- Though the fence line equipment detected compounds at each location, the concentrations of these compounds were significantly lower than the toxicity standards established by the State of California.
- The monthly maximum concentration of benzene detected by the fence line monitoring equipment located near the refinery perimeter and adjacent to Point Richmond was 11 ppb on a southeast wind direction.
- The monthly maximum concentration of sulfur dioxide detected by the fence line monitoring equipment located near the refinery perimeter and adjacent to Atchison Village was 24 ppb on a northeast wind direction.
- At the fence line monitoring equipment located near the refinery perimeter and adjacent to North Richmond benzene was detected (maxmum 6 ppb) on a west-to-northwest. No benzene was detected at this monitoring site in April 2013.

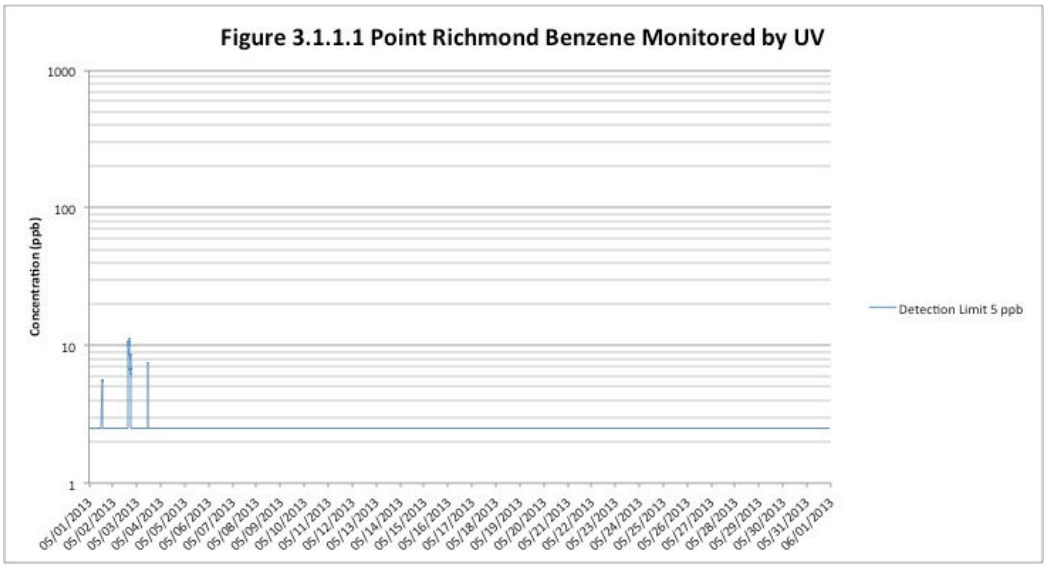
[5] California Office of Environmental Health Hazard Assessment, Acute Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf)
[6] California Office of Environmental Health Hazard Assessment, Chronic Toxicity Summary (http://oehha.ca.gov/air/hot_spots/2008/AppendixD3_final.pdf)

3.1 Monthly Fence Line Detections

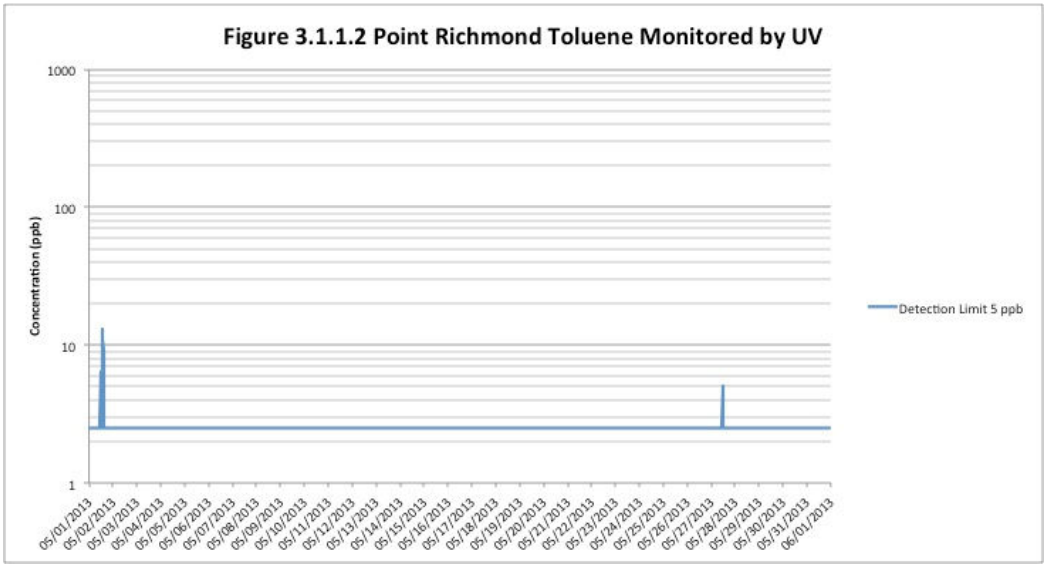
The sections below detail the compounds detected at each of the monitoring locations. Where there were no detections for the month these graphs are not included. The data is grouped by sampling site with the associated meteorological data included.

3.1.1 Point Richmond

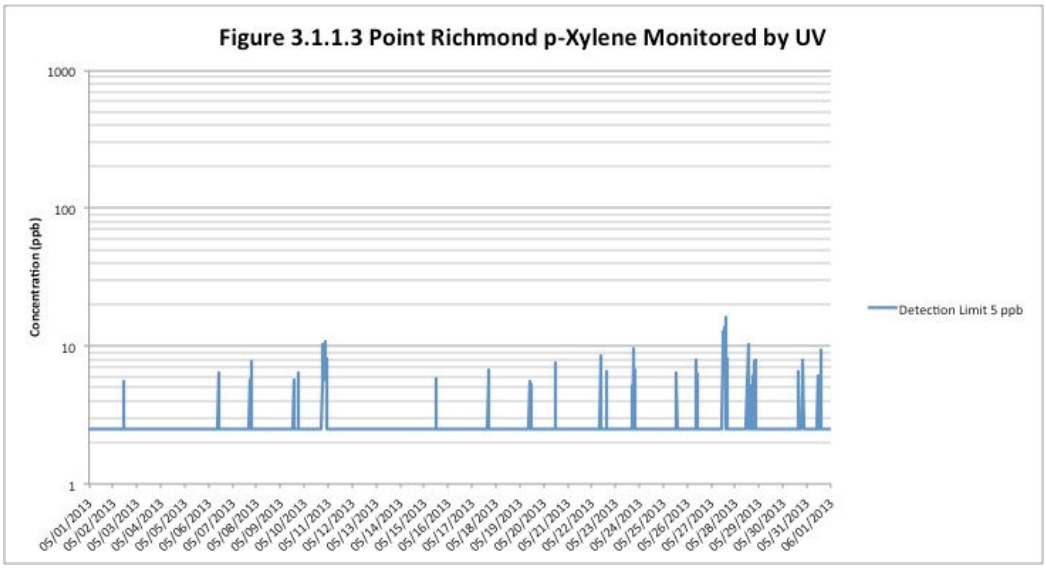
Figures 3.1.1.1 to 3.1.1.7 show the gas detections for the month of May 2013 at the at the fence line monitoring location located near the refinery perimeter and adjacent to Point Richmond as well as the wind speed and wind direction data measured by the system. For the month of May 2013, Carbon Disulfide and Hydrogen Sulfide were not detected. The gas data is plotted on a logarithmic scale.



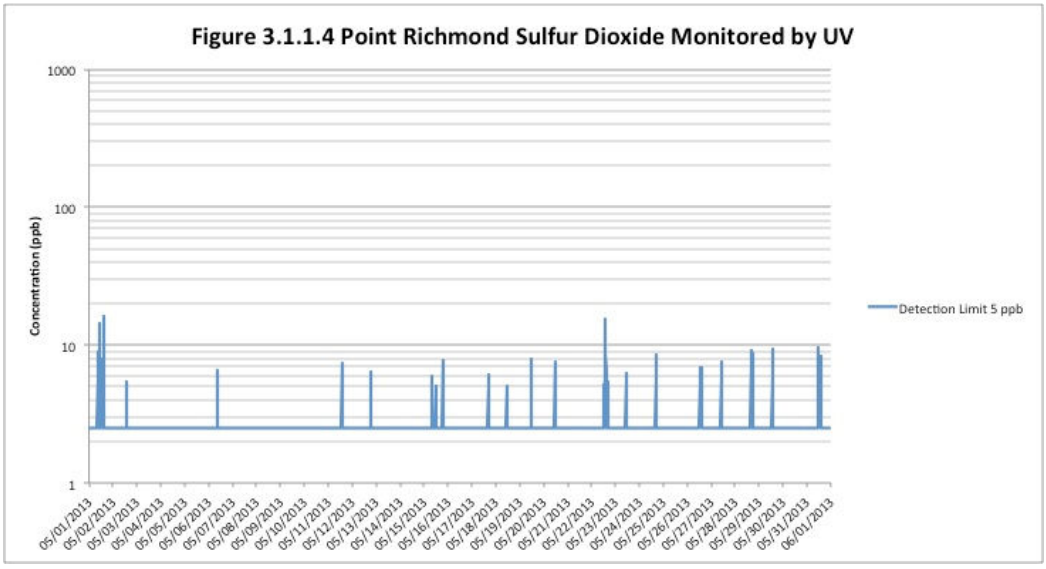
Benzene was measured at levels between 8 and 11 ppb on 05/02/2013 from 3:30 PM to 5:40 PM when the wind direction was southeast. Toxicity levels established by the State of California are listed in tables 3.1 above.



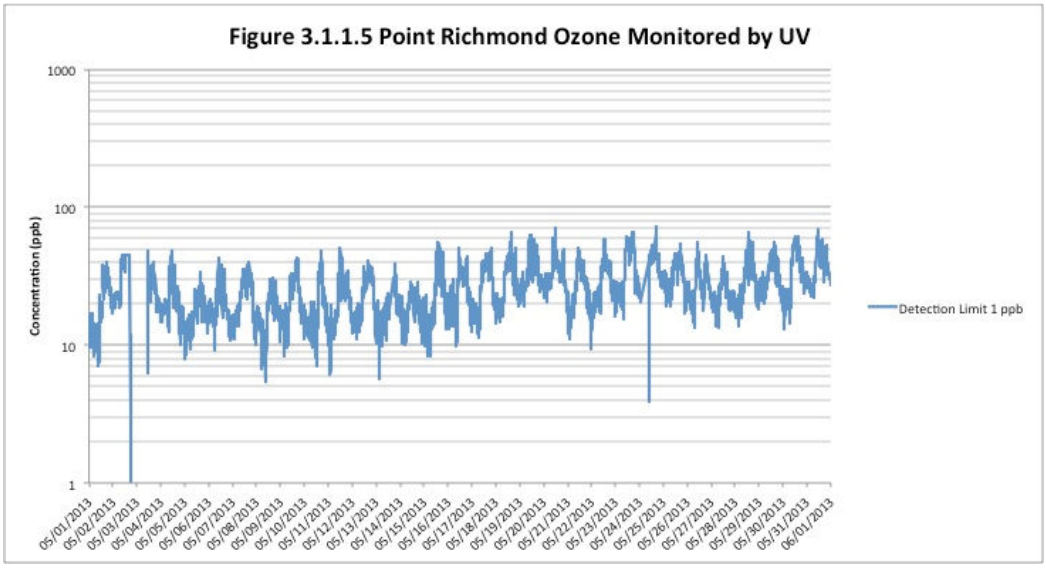
Toluene was measured at levels between 6 and 13 ppb on 05/01/2013 from 1:40 PM to 2:45 PM as the wind direction changed from northwest to southeast. Toxicity levels established by the State of California are listed in tables 3.1 above.



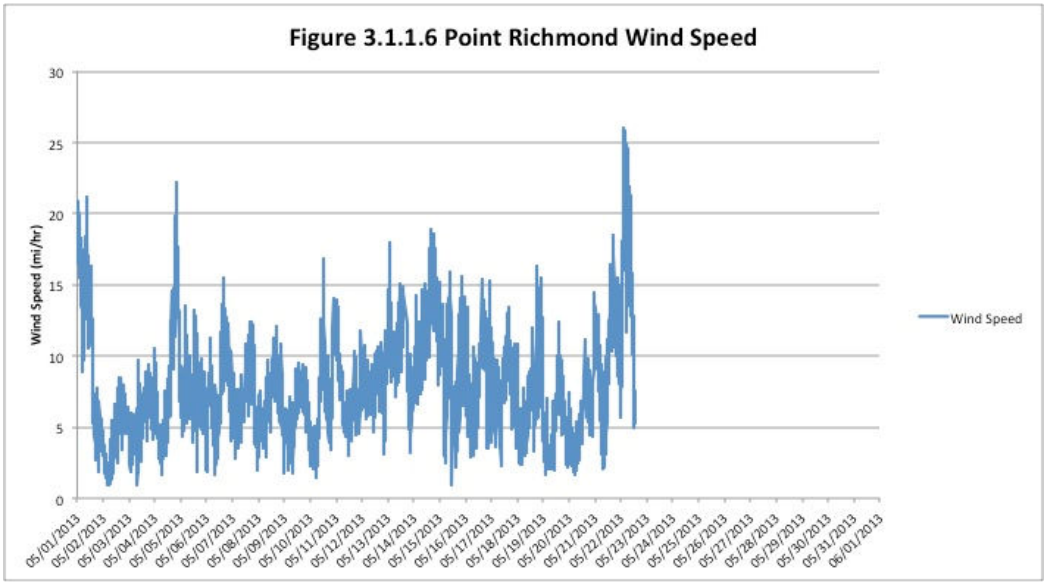
Maximum p-Xylene was measured as 16 ppb on 05/27/2013 at 2:45 PM. The meteorological station at the site was not operational due to a bird strike (see sections below) but the meteorological station situated adjacent to the refinery fence line at North Richmond indicated a wind direction of south-to-southwest. Toxicity levels established by the State of California are listed in tables 3.1 above.

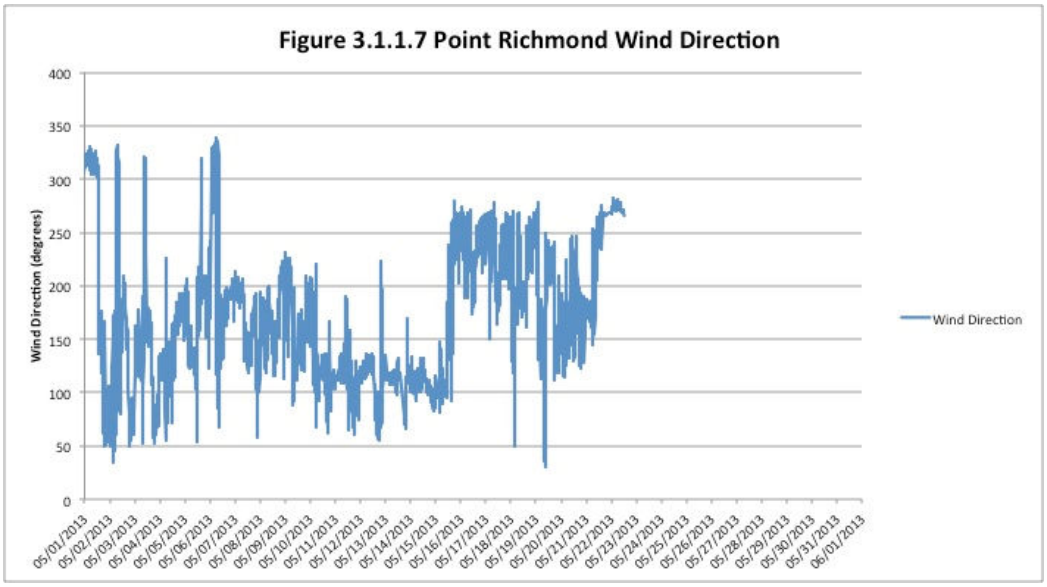


Maximum Sulfur Dioxide was measured as 16 ppb on 05/01/2013 at 2:20 PM on a southeast wind direction. Toxicity levels established by the State of California are listed in tables 3.1 above.



3.1.1.1 Point Richmond Wind Speed and Wind Direction

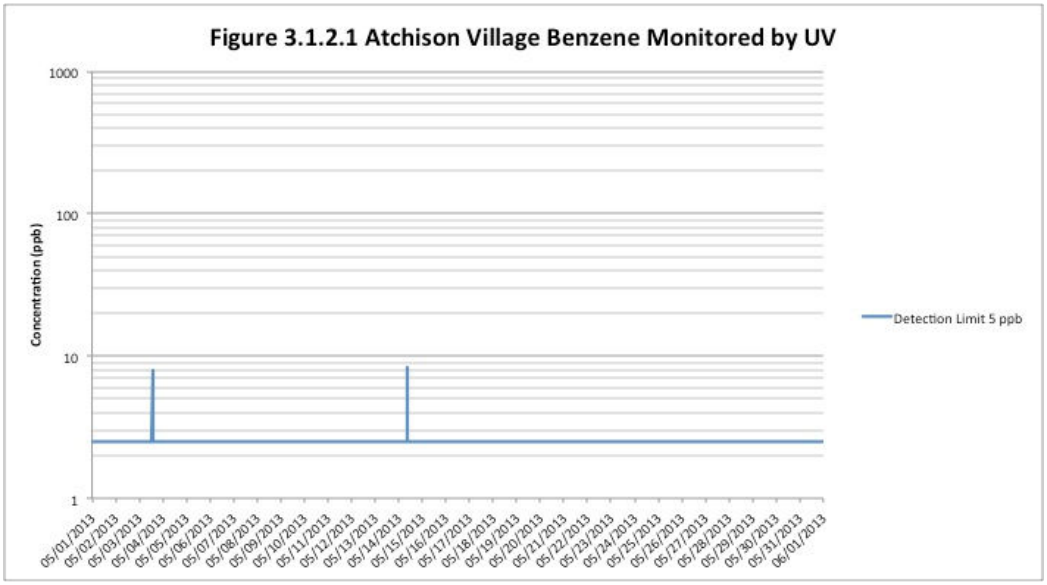




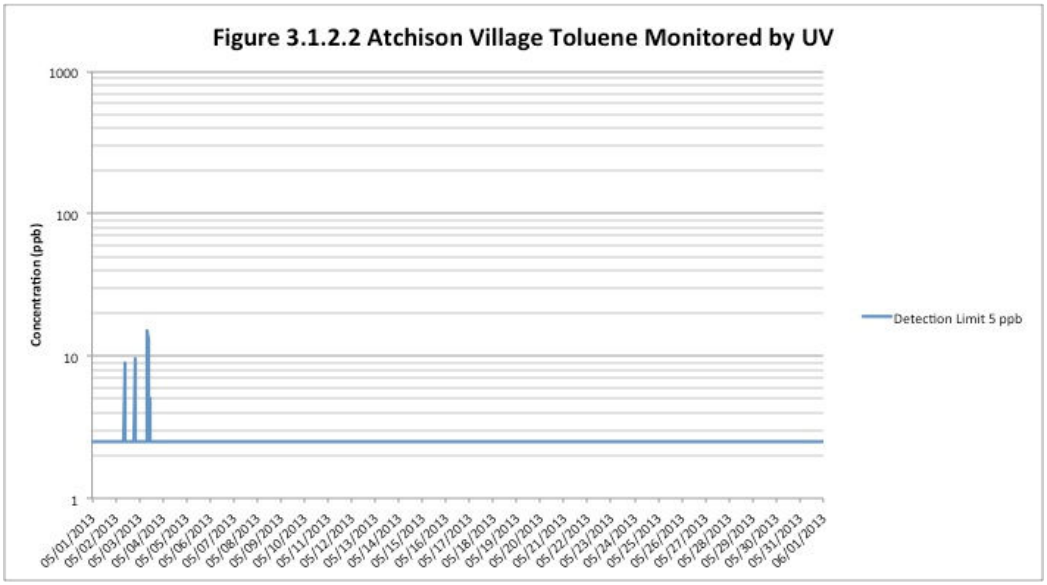
Wind speed and direction data was not available for the site from 1:09 PM on 05/22/2013, the reasons for this are discussed later in the report.

3.1.2 Atchison Village

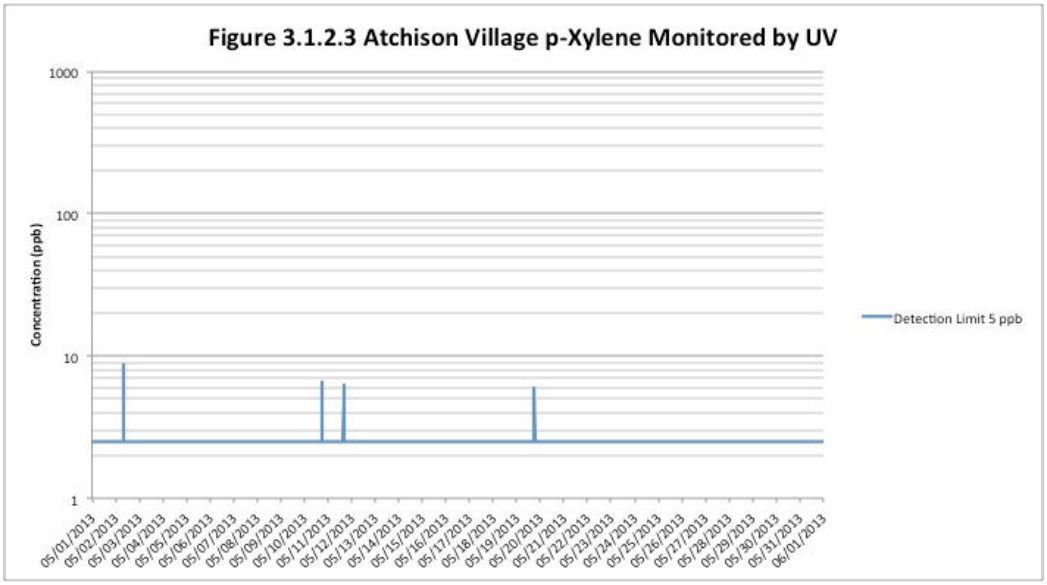
Figures 3.1.2.1 to 3.1.2.7 show the gas detections for the month of May 2013 at the fence line monitoring location located near the refinery perimeter and adjacent to Atchison Village as well as the wind speed and wind direction data measured by the system. For the month of May 2013, Carbon Disulfide and Hydrogen Sulfide were not detected. The gas data is plotted on a logarithmic scale.



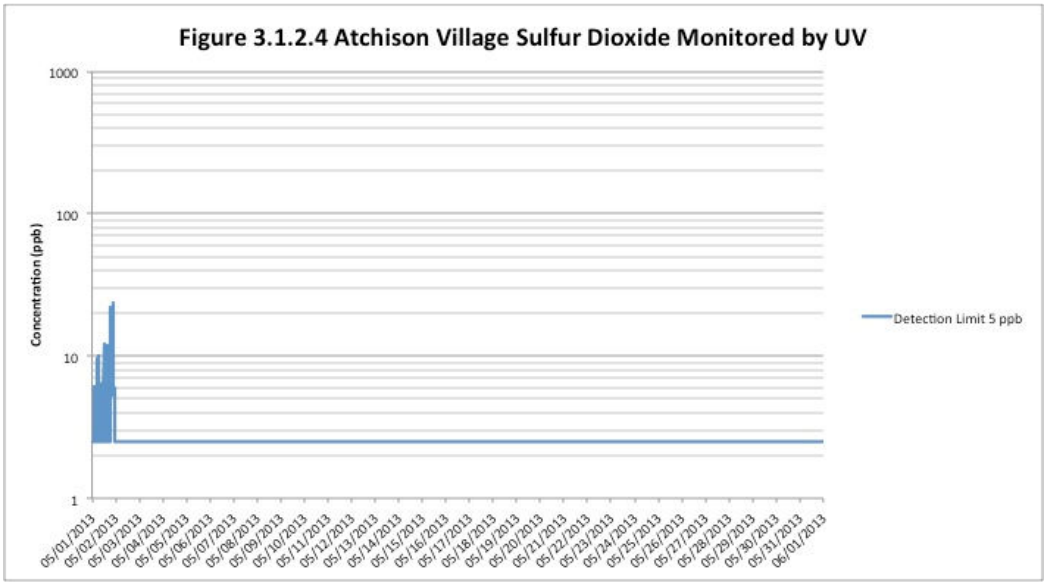
Benzene was measured as 8 ppb on 05/03/2013 at 1:20 PM and on 05/14/2013 at 9:00 AM both were on a east-to-southeast wind direction. Toxicity levels established by the State of California are listed in tables 3.2 above.



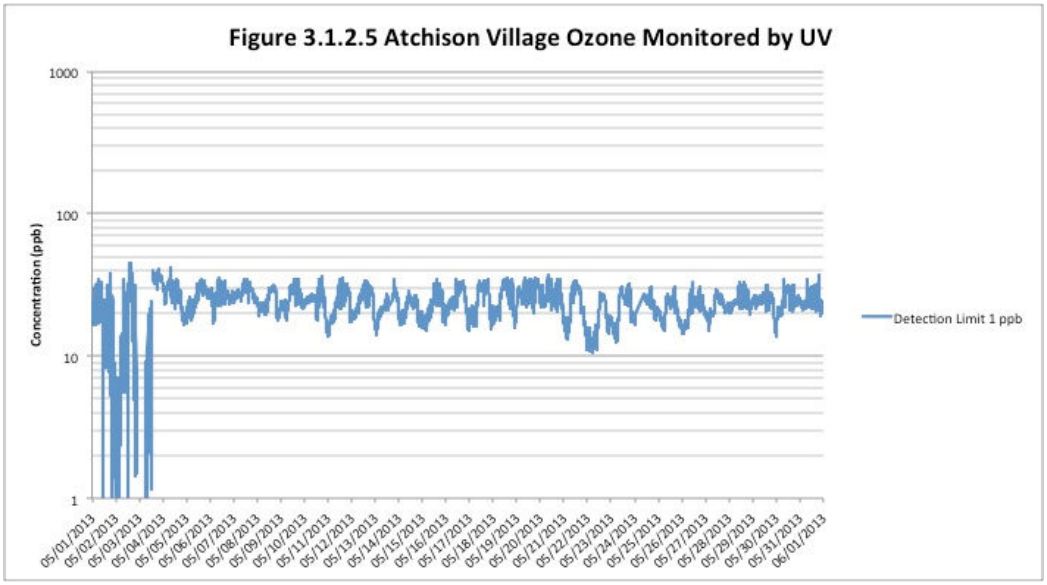
Toluene was measured in the concentration range 10 to 15 ppb on 05/03/2013 between 8:20 AM and 9:25 AM as the wind direction changed from southeast to northwest. Toxicity levels established by the State of California are listed in tables 3.2 above.



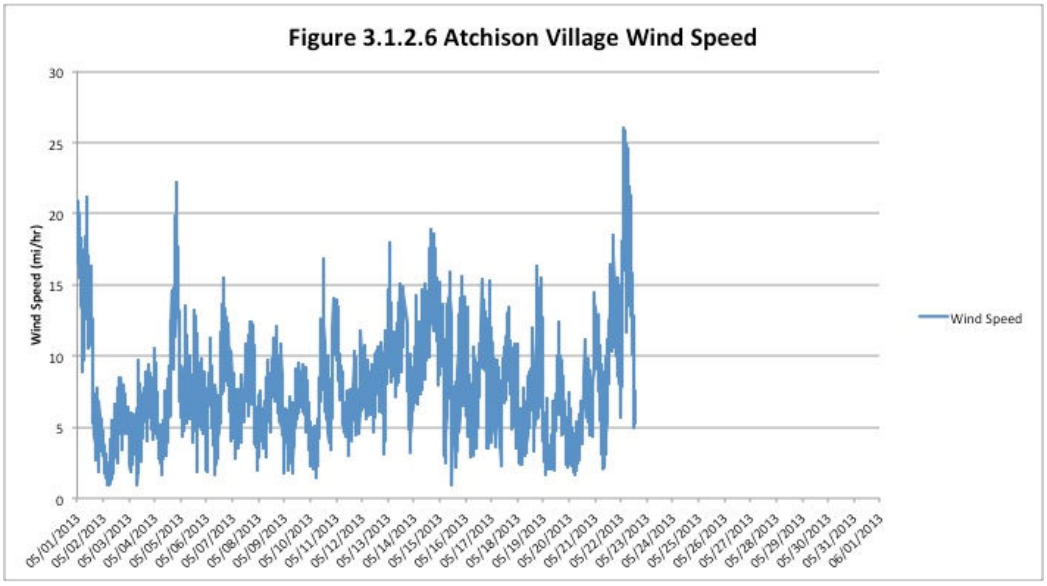
Maximum p-Xylene was measured as 9 ppb on 05/02/2013 at 8:35 PM on a west-to-northwest wind direction. Toxicity levels established by the State of California are listed in tables 3.2 above.

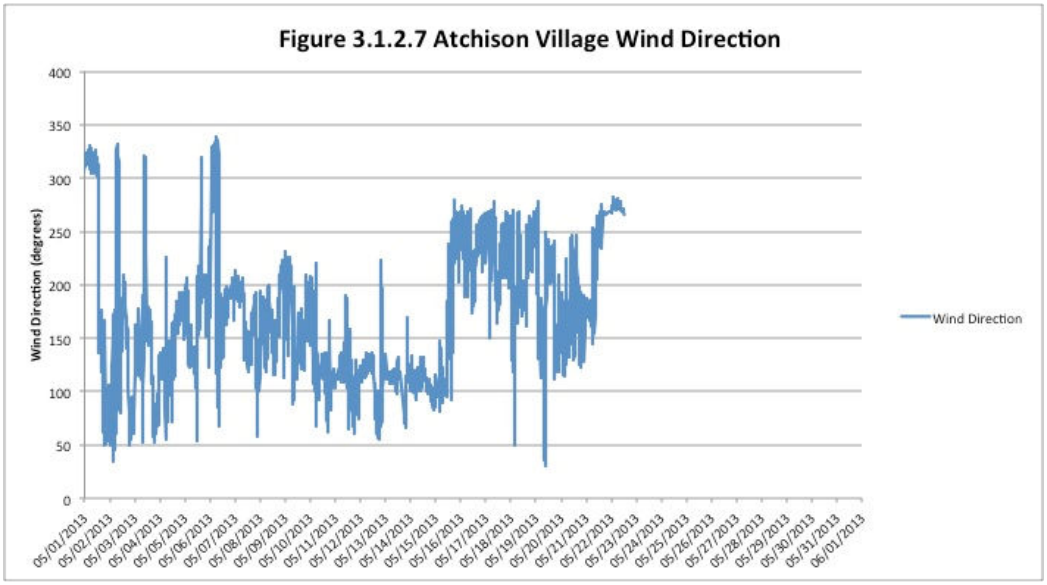


Sulfur Dioxide was measured in the concentration range 5 to 23 ppb on 05/01/2013 between 1:20 AM and 10:40 PM on winds from the northwest to the northeast. Toxicity levels established by the State of California are listed in tables 3.2 above.



3.1.2.1 Atchison Village Wind Speed and Wind Direction

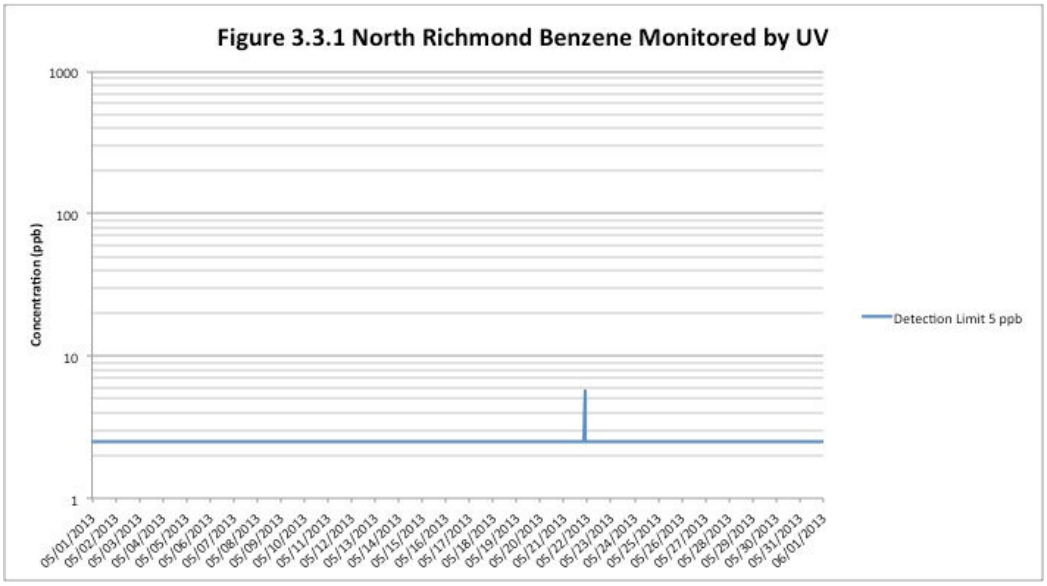




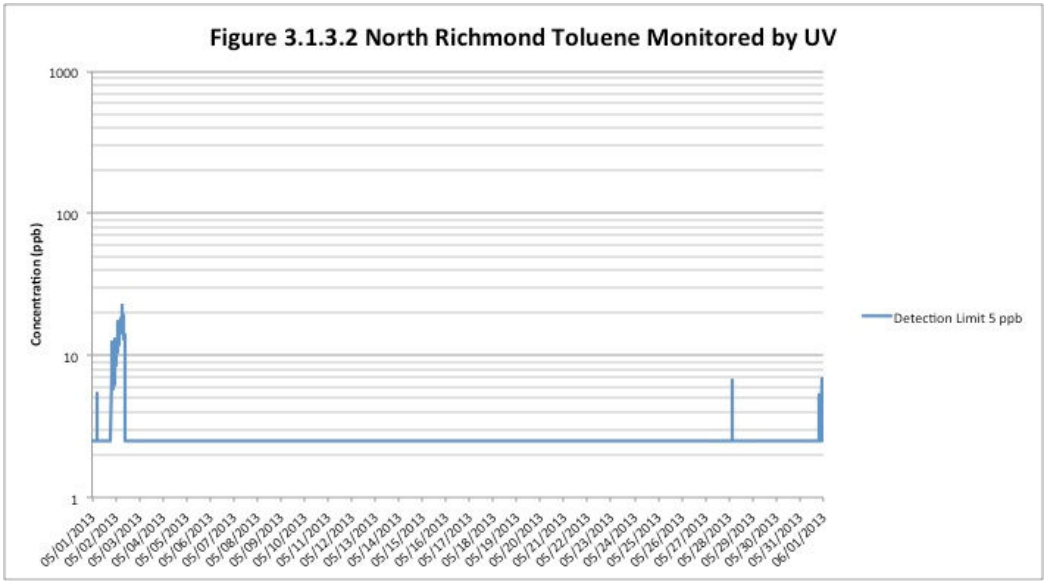
Wind speed and direction data was not available for the site from 1:09 PM on 05/22/2013, the reasons for this are discussed later in the report.

3.1.3 North Richmond

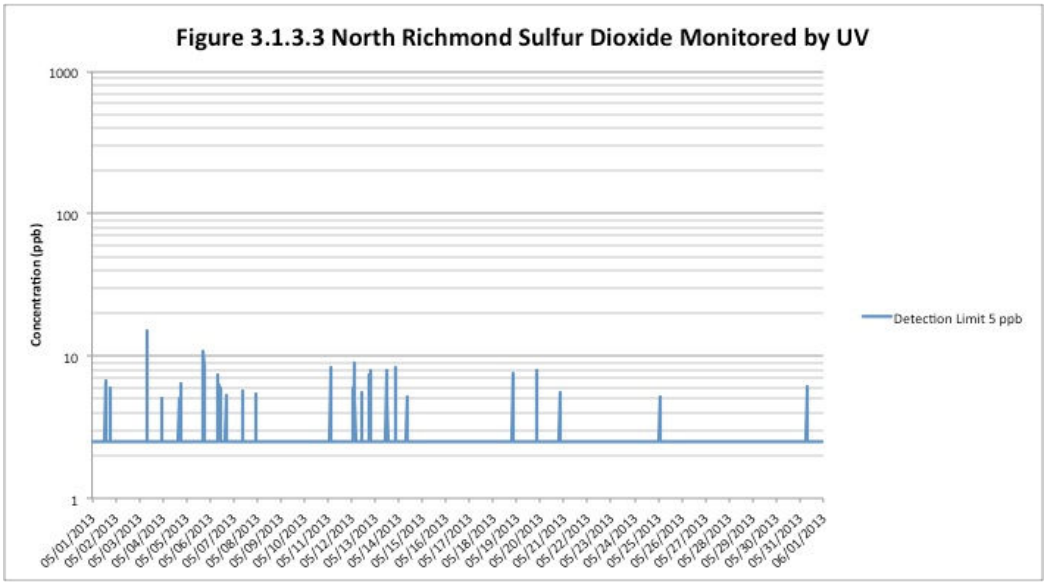
Figures 3.1.3.1 to 3.1.3.6 show the gas detections for the month of May 2013 at the fence line monitoring location located near the refinery perimeter and adjacent to North Richmond as well as the wind speed and wind direction data measured by the system. For the month of May 2013, p-Xylene, Carbon Disulfide and Hydrogen Sulfide were not detected. The gas data is plotted on a logarithmic scale.



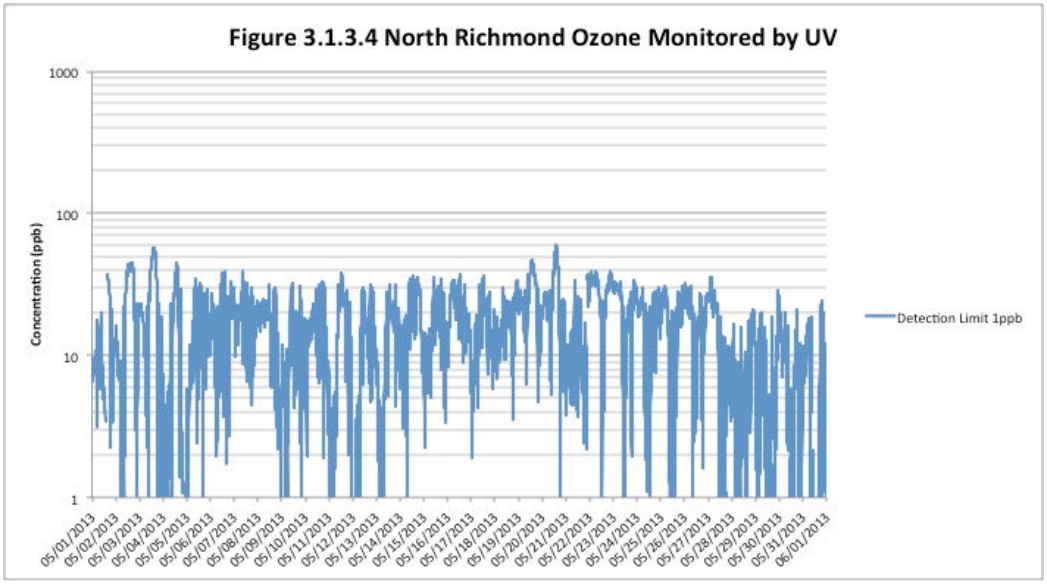
This figure shows that the maximum benzene concentration measured during the reporting period was 6 ppb. This value was measured on a wind direction of 265 degrees (west-to-south west) on 05/21/2013 at 9:20 PM. Toxicity levels established by the State of California are listed in tables 3.3 above



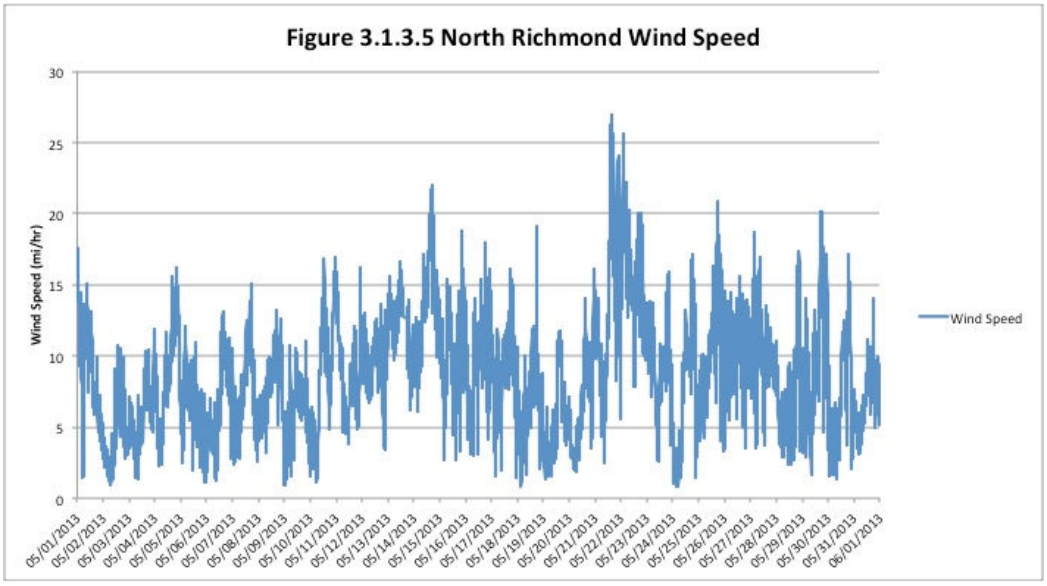
This figure shows that the maximum toluene concentration measured during the reporting period was 23 ppb. This value was measured during low wind speeds and a wind direction of 26 degrees (northeast wind) on 05/02/2013 at 06:50 AM. There was a sustained period of toluene detections from 05/01/2013 at 8:05 PM to 05/02/2013 at 9:05 AM of which the maximum was a part. During this period the winds were initially from the southeast at above 2.7 miles per hour later the wind dropped to below 2.7 miles per hour and came from a northerly wind direction. Toxicity levels established by the State of California are listed in tables 3.3 above.



Maximum Sulfur Dioxide concentration was measured as 15 ppb on 05/03/2013 at 7:30 AM on winds from the northwest to the southeast. Toxicity levels established by the State of California are listed in tables 3.3 above.



3.1.3.1 North Richmond Wind Speed and Wind Direction



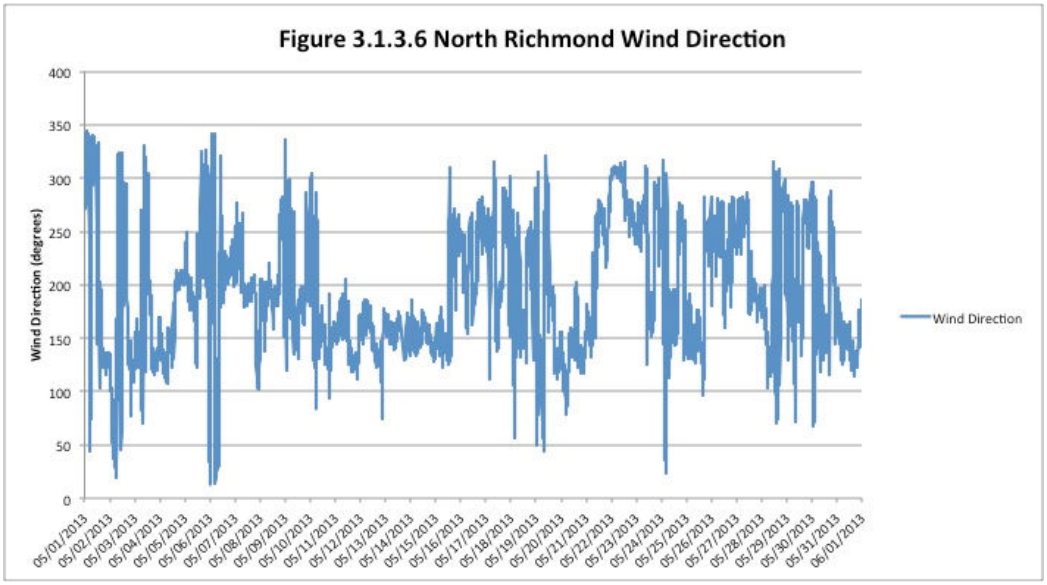


Figure 3.1.3.6 North Richmond Wind Direction
Wind Direction (degrees)
400
350
300
250
200
150
100
50
0
05/01/2013
05/02/2013
05/03/2013
05/04/2013
05/05/2013
05/06/2013
05/07/2013
05/08/2013
05/09/2013
05/10/2013
05/11/2013
05/12/2013
05/13/2013
05/14/2013
05/15/2013
05/16/2013
05/17/2013
05/18/2013
05/19/2013
05/20/2013
05/21/2013
05/22/2013
05/23/2013
05/24/2013
05/25/2013
05/26/2013
05/27/2013
05/28/2013
05/29/2013
05/30/2013
05/31/2013
06/01/2013
Wind Direction

4 Operating Performance Events

During the month, there was one activity that resulted in the fence line air monitoring equipment being off line. This was a scheduled power outage for building maintenance between 8:00 AM and 9:00 AM on 05/04/2013. In addition, a bird colliding with the wind direction sensor damaged the meteorological station adjacent to the Atchison Village and Point Richmond fence line. Analysis of this meteorological data against the data from the meteorological station adjacent to North Richmond indicated that the data was affected from 1:09 PM on 05/22/2013.

5 Maintenance Activities

Maintenance activities occurred on the same days that quality assurance/quality control (QA/QC) occurred. These dates were 05/02/2013 and 05/13/2013.

6 Summary of Findings

The following was noted from the results:

- The results indicated that there were detections of target compounds to the south of the refinery perimeter that is adjacent to Point Richmond particularly on southeast winds;

- To the northeast and northwest of the refinery perimeter that is adjacent to Atchison Village, there appear to be sources of sources of sulfur dioxide and toluene;

- As with the refinery perimeter that is adjacent to Point Richmond the perimeter that is adjacent to Atchison Village showed detections of benzene on winds from the southeast;

- The fence line monitoring equipment located near the refinery perimeter adjacent to North Richmond showed a detection of benzene on high winds from the west-to-southwest. This differed from the April 2013 monitoring period where no benzene was detected;

- As more data is collected, the possible link between gas detections and wind direction should be researched.

Appendix A: Maintenance and Calibration Activities

The following calibration activities were recorded at the site.

Point Richmond QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, SO_2, p-Xylene	05/02/2013	9:47 AM	Yes
TDL	H_2S	05/02/2013	10:27 AM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	05/13/2013	1:13 PM	Yes
TDL	H_2S	05/13/2013	1:13 PM	Yes

Atchison Village QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, SO_2, p-Xylene	05/02/2013	9:15 AM	Yes
TDL	H_2S	05/02/2013	10:37 AM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	05/13/2013	12:49 PM	Yes
TDL	H_2S	05/13/2013	12:49 PM	Yes

North Richmond QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, SO_2, p-Xylene	05/02/2013	12:33 PM	Yes
TDL	H_2S	05/02/2013	12:33 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	05/13/2013	11:44 AM	Yes
TDL	H_2S	05/13/2013	11:44 AM	Yes

Appendix B: Website Message Board Logs

The following operational issues were noted on the Richmond Refinery Community Website:

- 05/26/2013 09:00 - Because of a malfunction of the wind vane of the Atchison Village/Point Richmond MET station, the wind direction for these locations will be coming from the North Richmond MET station for the time being.

- 05/04/2013 09:26 - The Point Richmond Open-path UV system is back on line and collecting data.

- 05/04/2013 06:12 - There is a scheduled power outage for building maintenance on Saturday May 4 between the hours of 8 am and 9 am. The power outage will impact the Point Richmond fence line UV air monitoring system, which will be taken off-line during this period. The other fence line air monitoring systems and the meteorological systems will remain operational. The message board will be updated after the scheduled power outage ends and the fence line UV air monitor is brought back on line.

- 05/03/2013 10:42 - Weekly calibration of all of the fence line air monitors was completed yesterday.

Appendix C: Equipment Location

The location of the sampling systems is shown in Figure C.1 below: