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Monthly Report: Richmond Community Air Monitoring Program

Report Number: RCAMP_MO_1
Date: April 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 04/05/2013 to 04/30/2013 at the fence line monitoring locations located near the Richmond Refinery perimeter, adjacent to Point Richmond, Atchison Village and North Richmond.

Operating performance

During the month, there were two occasions where the fence line air monitoring equipment was off line. The two dates in question where 04/06/2013 and 04/08/2013. The reasons for the system being offline were a power failure and high winds respectively.

Maintenance activities

Maintenance activities occurred on the same days that quality assurance/quality control (QA/QC) occurred. These dates were 04/04/2013, 04/16/2013 to 04/18/2013, and 04/25/2013.

Summary Findings

During the month of April there was a flaring incident, which was reported to the Bay Area Air Quality Management District, that was investigated from 04:30 AM to 05:30 AM on 04/25/2013 at the fence line monitoring location near to North Richmond. During this time a maximum concentration of 9 ppb of sulfur dioxide was measured with winds from the southwest.

Throughout the month of April, Chevron began making preparations to restart equipment and place it back into service following the shutdown from the 08/06/2012 fire. Before the end of April, the crude unit was online, processing feed and returning to normal operations.

The following was noted from the monthly results:

- The results indicated that there are no detections of target compounds to the south of the refinery perimeter that is adjacent to Point Richmond;

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

- The fence line monitoring equipment located near the refinery perimeter adjacent to North Richmond only detected sulfur dioxide and toluene during the sampling period;

- 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_1
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DATE SUBMITTED:	05/10/2013
PREPARED BY:	Don Gamiles Argos Scientific Inc.
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NOTICE	

2 Introduction

Table 2.1 below lists the target compounds monitored during the period of 04/05/2013 to 04/30/2013 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 Disulfide	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 (Open Path 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 April 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 April 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	4/10/2013	11:09 pm	7	Short-term/acute (for a 6-hour exposure) [1]: 433 Long-term/chronic[2]: 20	UV
Sulfur Dioxide	4/29/2013	1:22 pm	27	Short-term/acute (for a 1-hour exposure)[1]: 230	UV
Toluene	4/9/2013	8:11 pm	23	Short-term/acute (for a 1-hour exposure) [1]: 8600 Long-term/chronic[2]: 70	UV
p-Xylene	4/10/2013	11:09 pm	10	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	4/20/2013	10:48	45	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	4/28/2013	7:58 pm	8	Short-term/acute (for a 6-hour exposure)[3]: 433 Long-term/chronic[4]: 20	UV
Sulfur Dioxide	4/22/2013	2:35 am	51	Short-term/acute (for a 1-hour exposure)[3]: 230	UV
Toluene	4/21/2013	6:21 am	23	Short-term/acute (for a 1-hour exposure)[3]: 8600 Long-term/chronic[4]: 70	UV
p-Xylene	4/30/2013	7:16 am	8	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	4/16/2013	15:07	50	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	Nothing Detected	Nothing Detected	Nothing Detected	Short-term/acute (for a 6-hour exposure) [5]: 433 Long-term/chronic[6]: 20	UV
Sulfur Dioxide	4/10/2013	3:21 pm	20	Short-term/acute (for a 1-hour exposure)[5]: 230	UV
Toluene	4/29/2013	7:56 am	9	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	4/19/2013	23:21	45	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 Atchison Village was 8 ppb on a northeast wind. The maximum sulfur dioxide concentration of 51 ppb was recorded on a southeast wind direction.
- The monthly maximum concentration of benzene detected by the fence line monitoring equipment located near the refinery perimeter and adjacent to Point Richmond was 7 ppb on a southwest wind direction. This maximum concentration did not occur on the same day as the maximum concentration of benzene detected by the fence line monitoring

[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)

equipment located near the refinery perimeter and adjacent to Atchison Village.

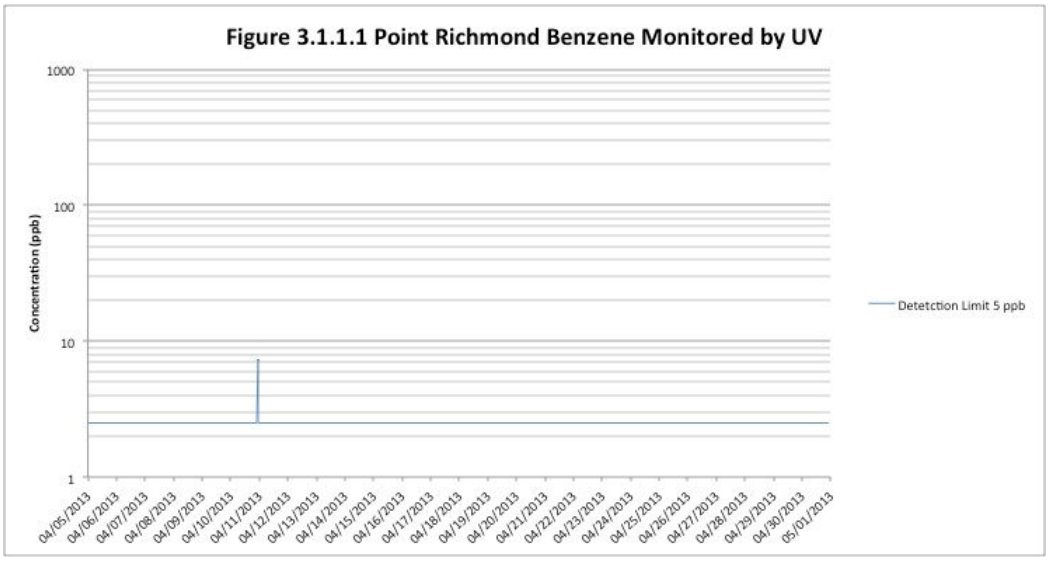
- At the fence line monitoring equipment located near the refinery perimeter and adjacent to North Richmond, only toluene and sulfur dioxide were detected during the sampling period.

3.1 Monthly Fence Line Detections

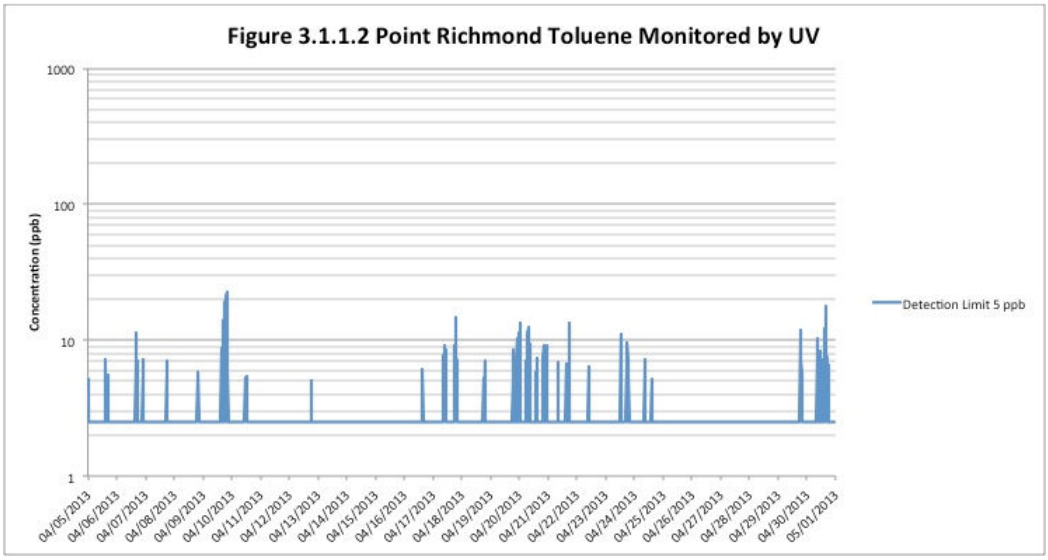
The sections below detail the compounds detected at each of the monitoring locations. Where there were no detections for the month these graphs are not included. The data is grouped by sampling site with the associated meteorological data included.

3.1.1 Point Richmond

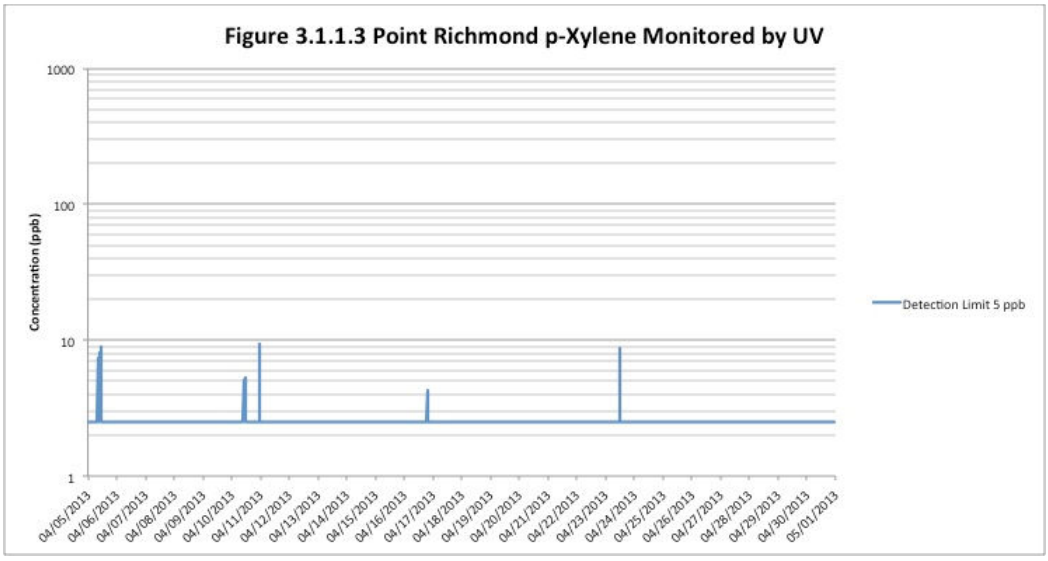
Figures 3.1.1.1 to 3.1.1.7 show the gas detections for the month of April 2013 at the fence line monitoring location located near the refinery perimeter and adjacent to Point Richmond as well as the wind speed and wind direction data measured by the system. For the month of April 2013, carbon disulfide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



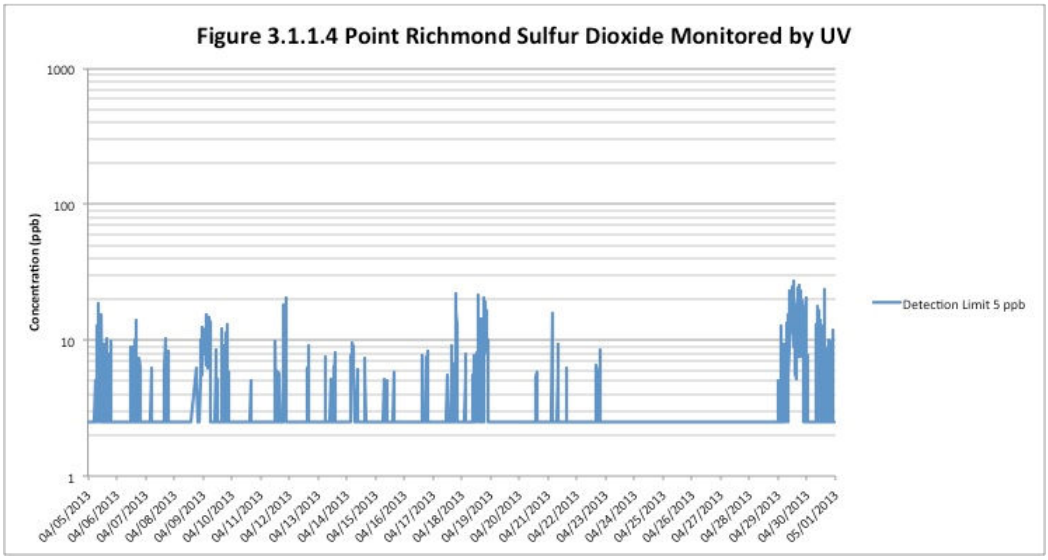
The figure above indicates that there was one occasion where benzene was detected at the fence line monitoring location located near the refinery perimeter and adjacent to Point Richmond (04/10/2013 from 11:05 PM to 11:10 PM). This was measured on a wind direction of between 210 and 216 degrees (winds from the south west). Toxicity levels established by the State of California are listed in tables 3.1 above.



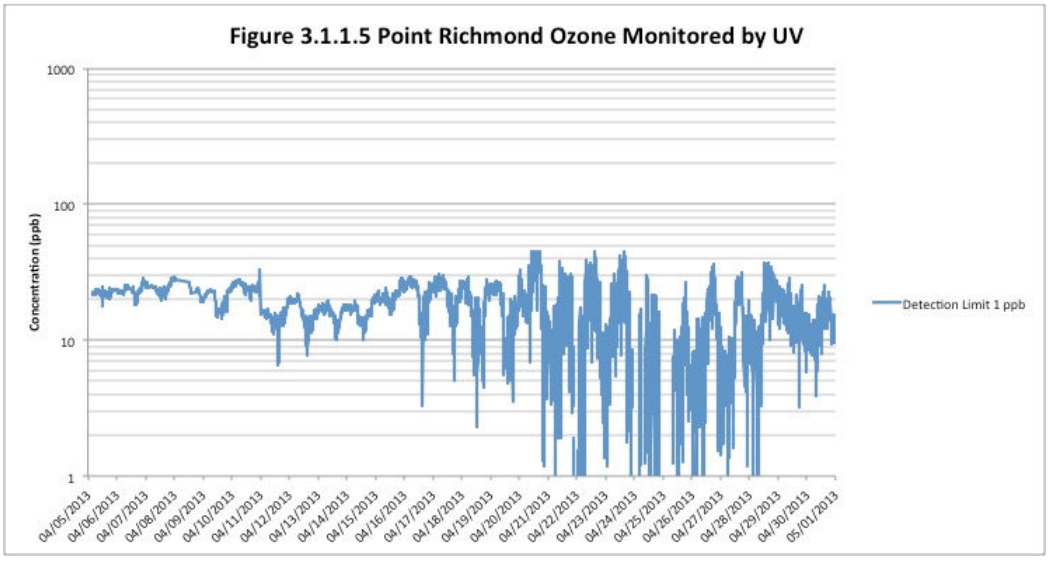
The figure above indicates that toluene was detected on various occasions during the reporting period. The highest concentrations (above 20 ppb) were measured on 04/09/2013 from 7:50 PM to 7:10 PM with the wind direction between 232 and 266 degrees (winds from the east south east). Toxicity levels established by the State of California are listed in tables 3.1 above.



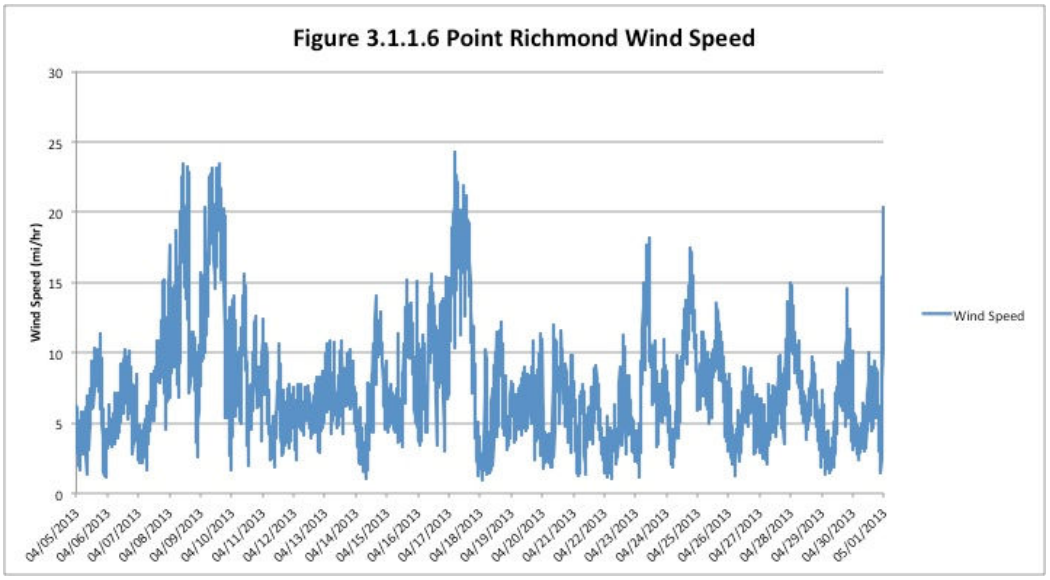
The figure above indicates 5 periods where p-xylene was detected during the reporting period. The highest value of 9 ppb occurred at the same time as the benzene detection discussed in Figure 3.1.1.1 above. Toxicity levels established by the State of California are listed in tables 3.1 above.

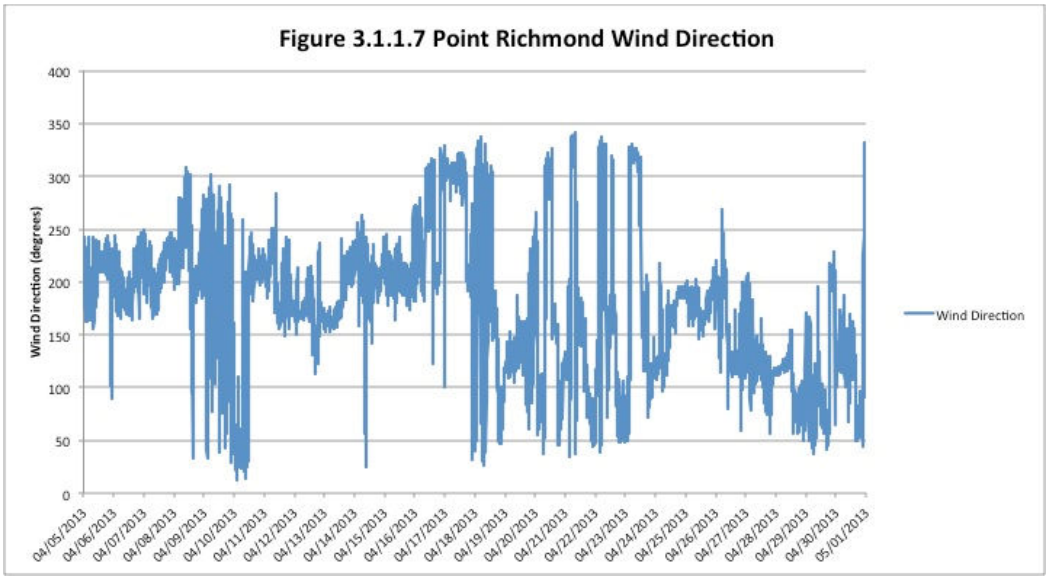


The figure above shows that there were a number of occasions during this sampling period where sulfur dioxide was measured at levels above 10 ppb. The maximum measured value was 27 ppb on 04/29/2013 at 1:22 PM when the wind was blowing from the northeast. Toxicity levels established by the State of California are listed in tables 3.1 above.



3.1.1.1 Point Richmond Wind Speed and Wind Direction

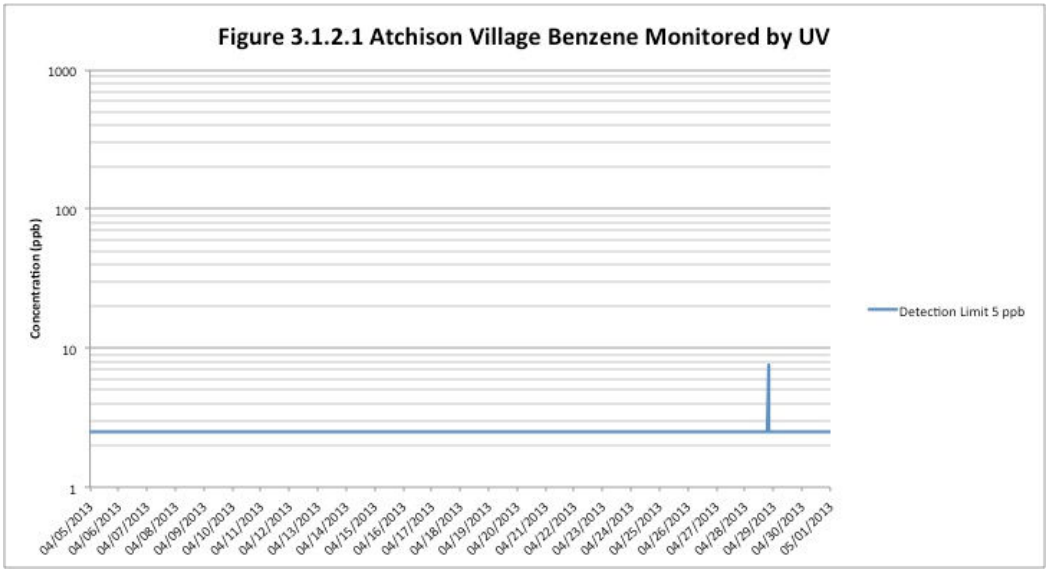




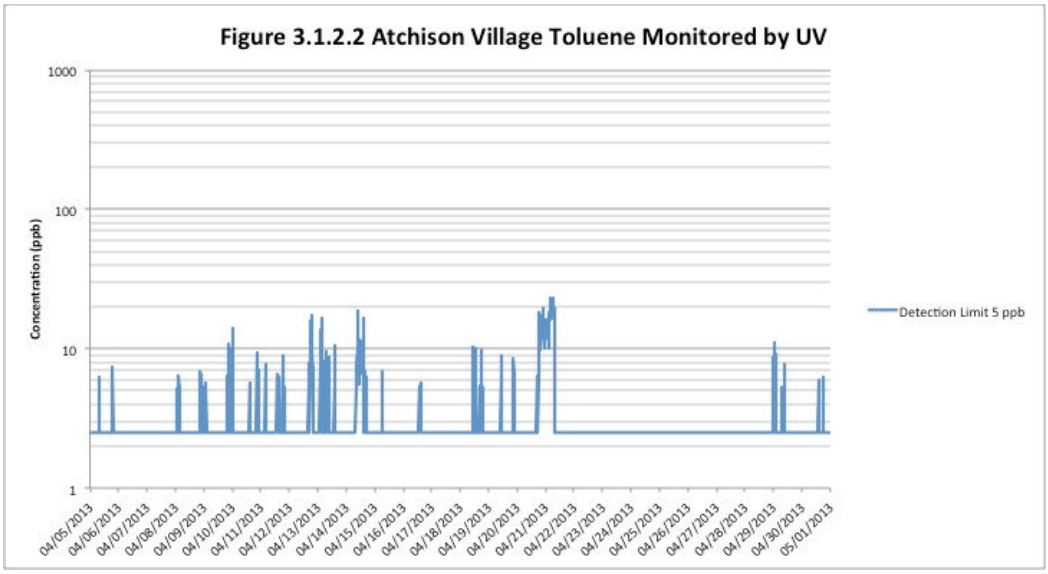
Figures 3.1.1.6 and 3.1.1.7 above show the wind speed and wind direction for the reporting period. It is noted that there was a period of sustained south-to-southeast between the 04/23/2013 and 04/28/2013 where no target compounds were detected by the sampling system.

3.1.2 Atchison Village

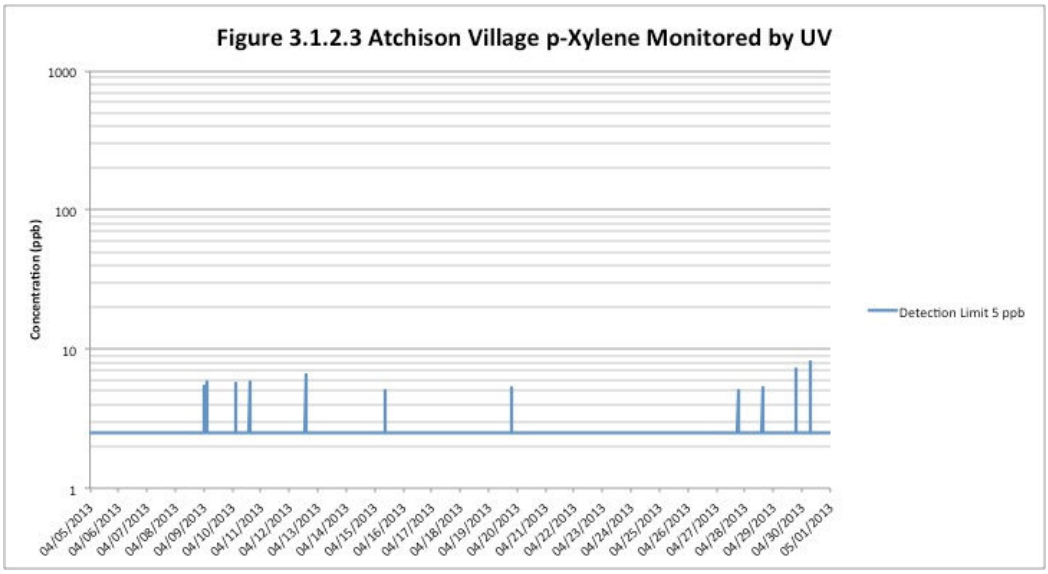
Figures 3.1.2.1 to 3.1.2.7 show the gas detections for the month of April 2013 at the fence line monitoring location located near the refinery perimeter and adjacent to Atchison Village as well as the wind speed and wind direction data measured by the system. For the month of April 2013, carbon disulfide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



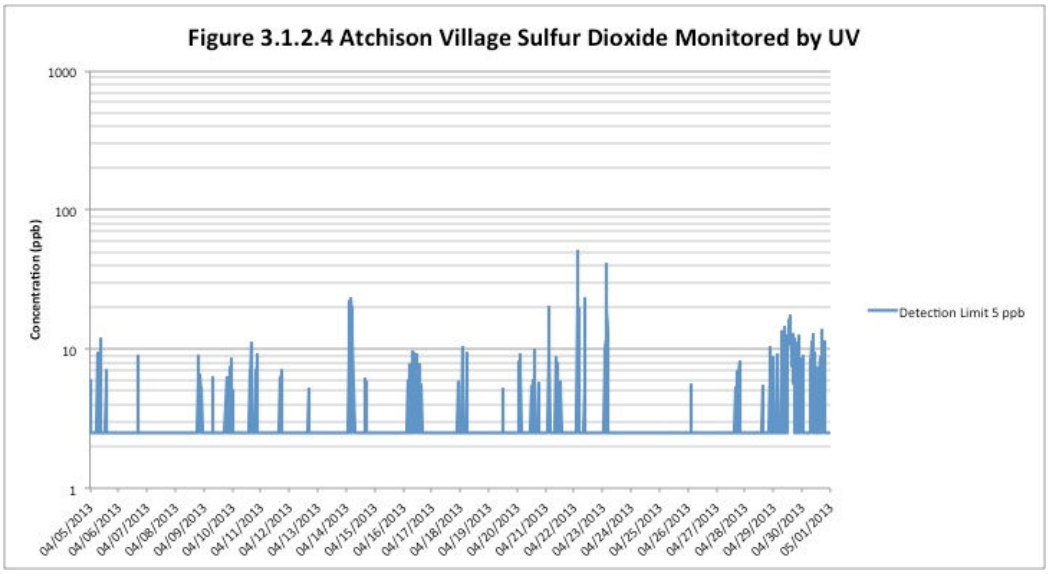
The maximum benzene detection of 8 ppb occurred on 04/28/2013 at 7:58 PM when the wind direction was north northeast. Toxicity levels established by the State of California are listed in tables 3.2 above.



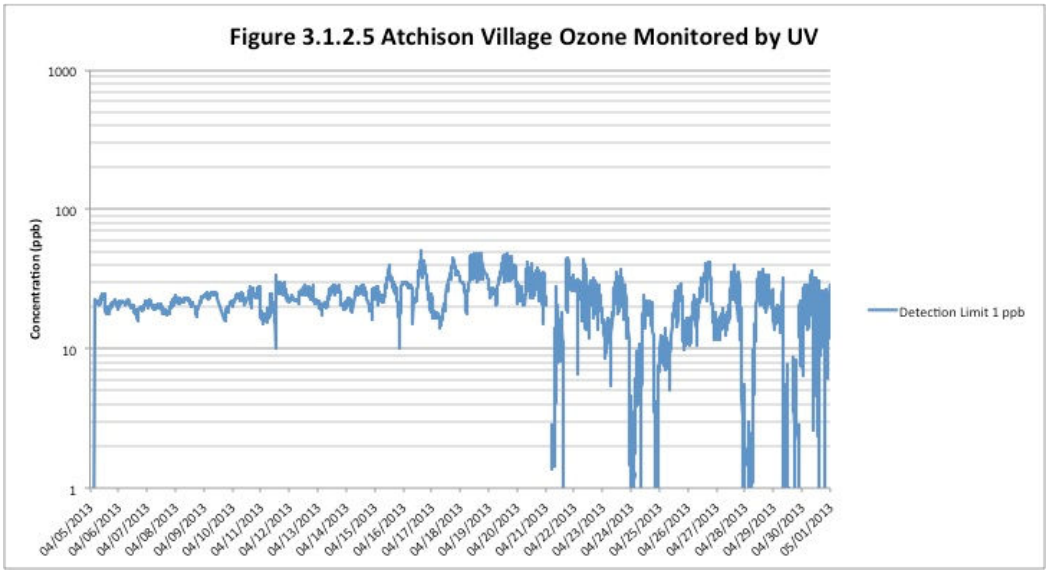
The maximum toluene detection of 23 ppb occurred on 04/21/2013 at 6:21 AM when the wind direction was from the northwest. Toxicity levels established by the State of California are listed in tables 3.2 above.



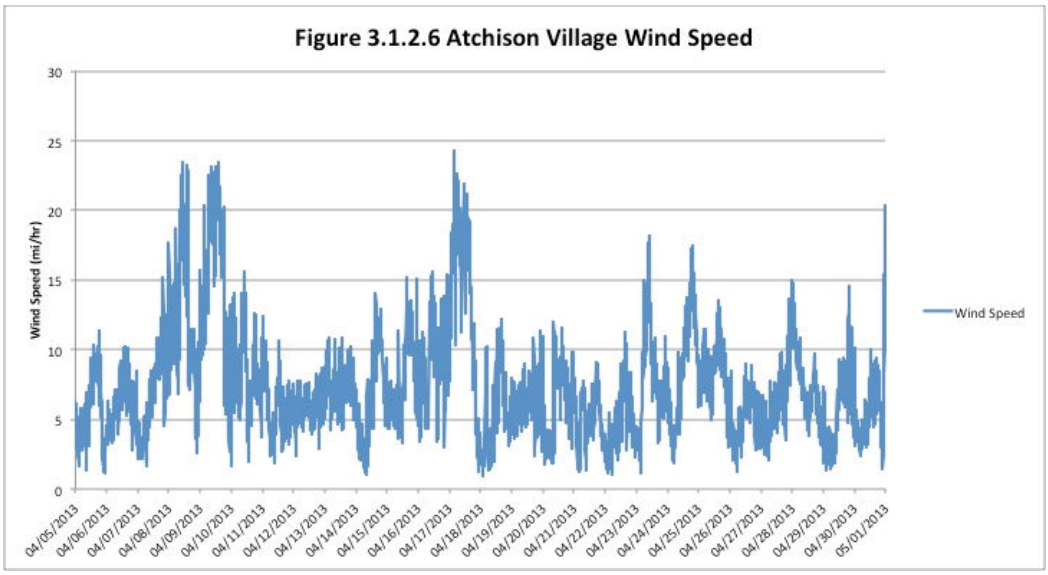
The maximum p-Xylene detection of 8 ppb occurred on 04/30/2013 at 7:16 AM when the wind direction was from the east. Toxicity levels established by the State of California are listed in tables 3.2 above.



The maximum sulfur dioxide detection of 51 ppb occurred on 04/22/2013 at 1:22 PM when the wind direction was from the southeast. 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



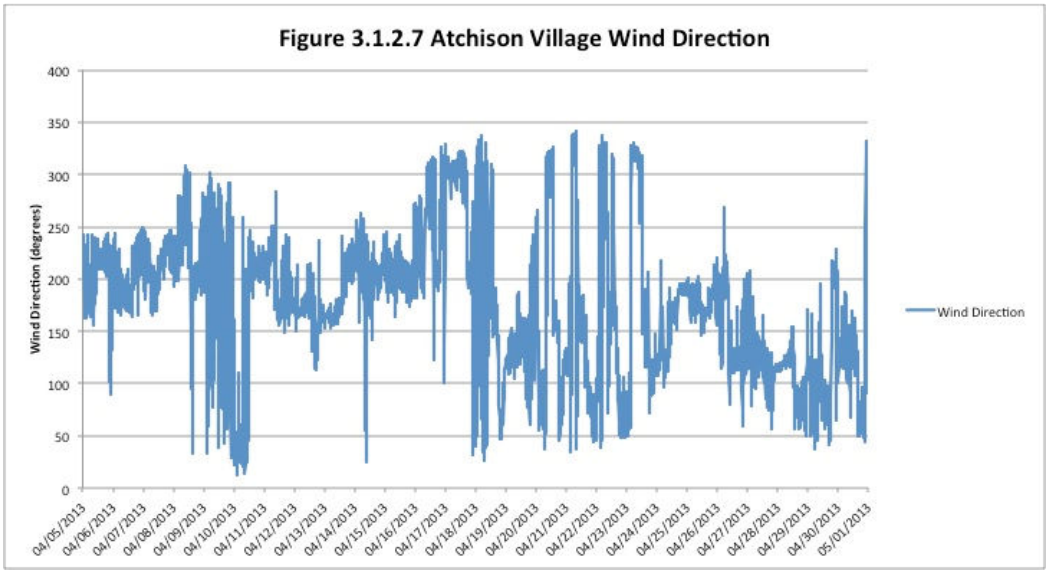
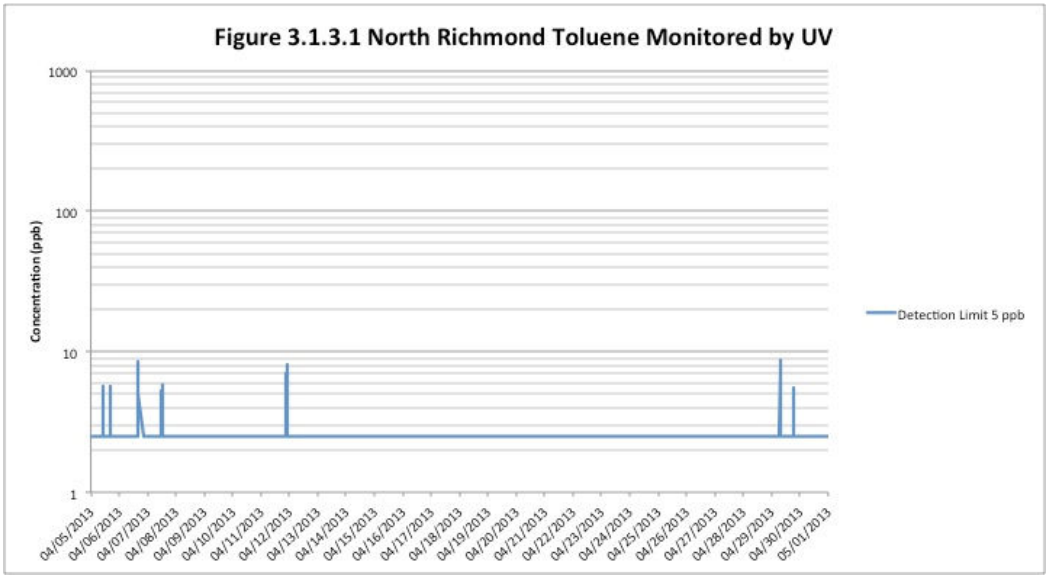


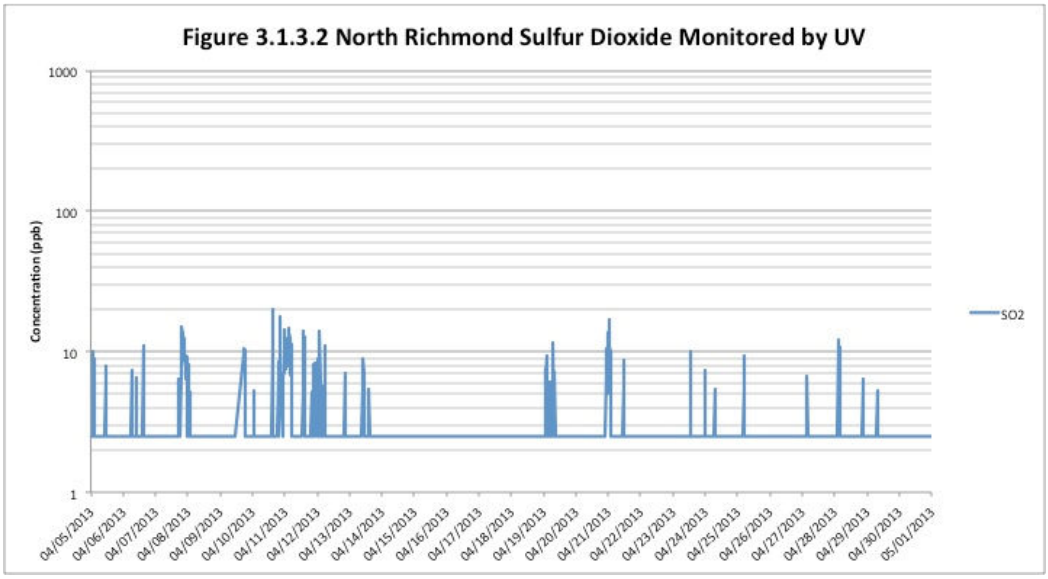
Figure 3.1.2.7 Atchison Village Wind Direction
Wind Direction (degrees)
400
350
300
250
200
150
100
50
0
04/05/2013
04/06/2013
04/07/2013
04/08/2013
04/09/2013
04/10/2013
04/11/2013
04/12/2013
04/13/2013
04/14/2013
04/15/2013
04/16/2013
04/17/2013
04/18/2013
04/19/2013
04/20/2013
04/21/2013
04/22/2013
04/23/2013
04/24/2013
04/25/2013
04/26/2013
04/27/2013
04/28/2013
04/29/2013
04/30/2013
05/01/2013
Wind Direction

3.1.3 North Richmond

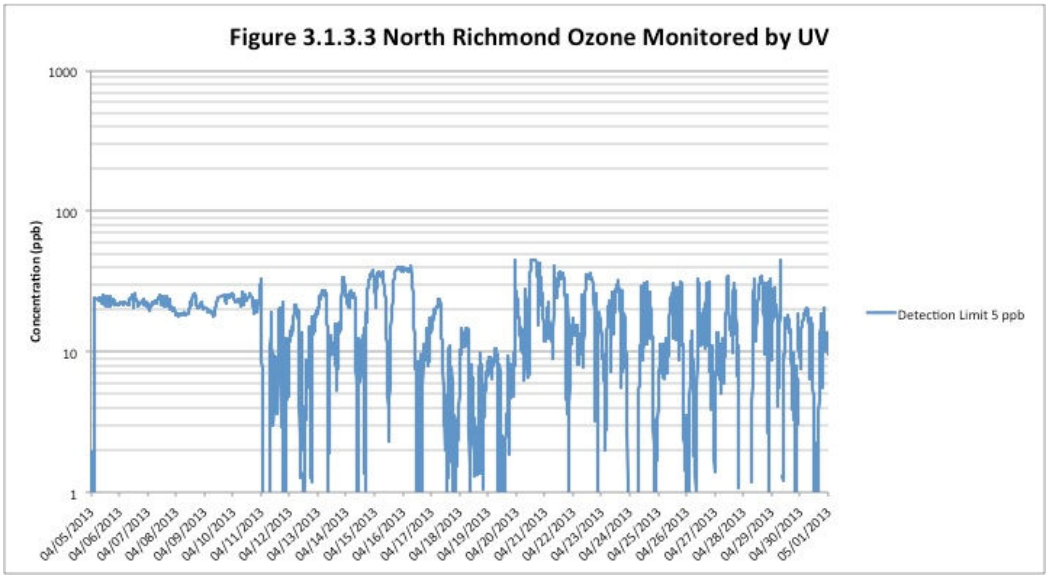
Figures 3.1.3.1 to 3.1.3.5 show the gas detections for the month of April 2013 at the fence line monitoring location located near the refinery perimeter and adjacent to North Richmond as well as the wind speed and wind direction data measured by the system. For the month of April 2013, benzene, carbon disulfide and hydrogen sulfide were not detected. The gas data is plotted on a logarithmic scale.



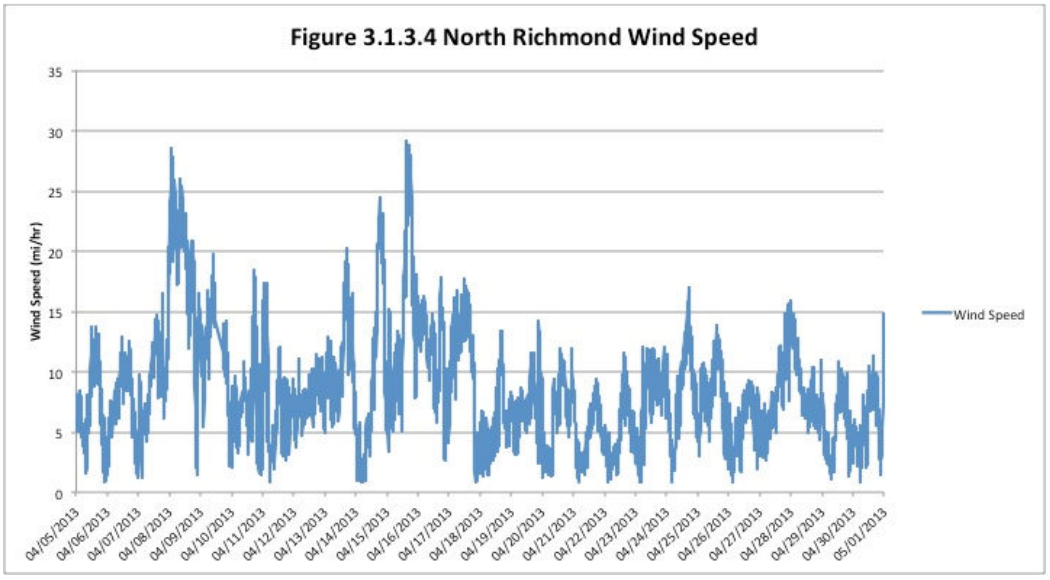
This figure shows that the maximum toluene concentration measured during the reporting period was 8 ppb. This value was measured during low wind speeds and a wind direction of 116 degrees (southeast wind) on 04/29/2013 at 07:56 AM. The low wind speeds could indicate that the source is close to the sampling site. It must also be noted that this could also mean that the source may not have necessarily been to the southeast as indicated because under such conditions the wind often gusts at low wind speeds. Toxicity levels established by the State of California are listed in tables 3.3 above.

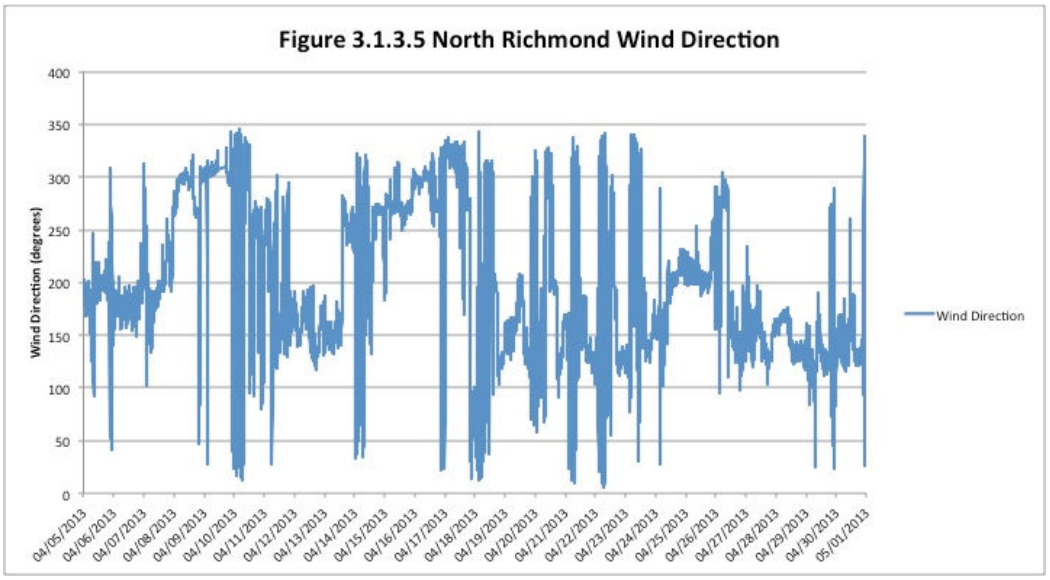


The maximum sulfur dioxide concentration (20 ppb) measured during the reporting period was at 3:21 PM on 04/10/2013 on a southeast wind direction. Toxicity levels established by the State of California are listed in tables 3.3 above.



3.1.3.1 North Richmond Wind Speed and Wind Direction





4 Operating performance events

During the month, there were two occasions where the fence line air monitoring equipment was off line. On 04/06/2013 from 4:09 PM to 8:28 PM there was a power failure a power failure at the system adjacent to North Richmond. On 04/08/2013 from 01:48 AM to 12:15 PM the UV system was blow out of alignment due to high winds. The detail of these events was logged on the message board. These logs are presented in Appendix B.

5 Maintenance activities

Maintenance activities occurred on the same days that quality assurance/quality control (QA/QC) occurred. These dates were 04/04/2013, 04/16/2013 to 04/18/2013, and 04/25/2013.

6 Summary of Findings

The following was noted from the results:

- The results indicated that there are no detections of target compounds to the south of the refinery perimeter that is adjacent to Point Richmond;

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

- The fence line monitoring equipment located near the refinery perimeter adjacent to North Richmond only detected sulfur dioxide and toluene during the sampling period;

- 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. Note: in the future it will be done monthly.

Fence line Monitoring Adjacent to Point Richmond QA/QC .

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, SO_2, p-Xylene	4/4/2013	7:58 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/5/2013	5:18 PM	Yes
TDL	H_2S	4/4/2013	7:58 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/16/2013	3:19 PM	Yes
TDL	H_2S	4/16/2013	3:19 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/25/2013	2:50 PM	Yes
TDL	H_2S	4/25/2013	2:50 PM	Yes

Fence line Monitoring Adjacent to Atchison Village QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, SO_2	4/4/2013	6:59 PM	Yes
TDL	H_2S	4/4/2013	6:59 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/16/2013	4:02 PM	Yes
TDL	H_2S	4/16/2013	4:02 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/25/2013	2:20 PM	Yes
TDL	H_2S	4/25/2013	2:20 PM	Yes

Fence line Monitoring Adjacent to North Richmond QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, SO_2, p-Xylene	4/4/2013	5:24 PM	Yes
TDL	H_2S	4/8/2013	1:09 PM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/17/2013	11:42 AM	Yes
TDL	H_2S	4/17/2013	11:42 AM	Yes
UV	Benzene, Toluene, SO_2, p-Xylene	4/25/2013	1:30 PM	Yes
TDL	H_2S	4/25/2013	1:30 PM	Yes

Appendix B: Website Message Board Logs

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

- 04/25/2013 18:32 - Weekly calibration of all of the fence line air monitors was completed today.

- 04/18/2013 21:54 - Calibration of all of the fence line air monitors has been completed. Next Quality Assurance (QA) check is scheduled for early next week.

- 04/08/2013 9:35 - During the high winds event on Monday April 8th, the UV system located near the refinery perimeter and adjacent to Atchison Village was temporarily knocked out of alignment when a door latch broke loose and the door bumped the system out of alignment. Argos was notified of a low signal alarm and dispatched a technician to fix the problem. The door latch was repaired by 9:00 and will be replaced with a stronger latch.

- 04/06/2013 21:44 - The UV system located near the refinery perimeter and adjacent to North Richmond lost power to its source. Argos was informed on the situation and dispatched a technician to fix the problem. The system restarted around 21:00.

- 04/04/2013 17:30 - Calibration and QA/QC has been performed on all of the fence line instruments

Appendix C: Equipment Location

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