ARGOS

Scientific

Monthly Report: Chevron Richmond Community Air Monitoring Program

Report Number: RCAMP_MO_6
Date: September 2013

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Executive Summary

The following report summarizes the monthly data generated as part of the Richmond Community Air Monitoring Program (RCAMP). RCAMP is an independent initiative designed to provide air quality readings to the general public and educate the community about what is in the air. The air quality monitoring equipment and its installation was 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 open path fence line monitoring systems installed near the perimeter of Chevron's Richmond Refinery. The report explains the data and measurements of target compounds (benzene, toluene, sulfur dioxide, p-xylene, carbon disulfide and hydrogen sulfide) for the month of September 2013, at the fence line monitoring locations located near the Richmond Refinery perimeter, adjacent to Point Richmond, Atchison Village and North Richmond.

Detections Associated with Refinery Operations

During the month of September 2013, there were no detections by the fence line monitoring systems that could be traced to specific refinery operations.

Operational Performance Events

During September 2013 there was one event that affected the monitoring system on the refinery perimeter that is adjacent to North Richmond. On September 21, 2013 the data acquisition system froze. An Argos technician was dispatched on September 23, 2013 when access to the site became possible. The system was restored to operational status.

Maintenance Activities

Routine maintenance and quality assurance/quality control (QA/QC) for the open path fence line monitoring systems occurred on September 09, 2013 and September 19, 2013.

Summary Findings

The following was noted from the monthly results of the monitoring activities:

- At the refinery perimeter that is adjacent to Point Richmond, the maximum benzene concentration was recorded when the winds were from the South. The maximum sulfur dioxide concentration was recorded when the winds were from the Northeast. The maximum toluene value was recorded when winds were from the South-to-southeast. The

maximum p-xylene value was recorded when winds were from the South-to-southeast;

- At the refinery perimeter that is adjacent to Atchison Village, the maximum benzene concentration was recorded when the winds were from the South-to-southeast. The maximum sulfur dioxide concentration was recorded when the winds were from the South-to-southeast, this concentration was for a 5 min duration and did not last long enough for the one hour average concentration to be above the short-term/acute limit of 230 ppb used for RCAMP. The maximum toluene value was recorded when winds were from the East-to-southeast. The maximum p-xylene value was recorded when winds were from the South-to-southwest;
- At the refinery perimeter that is adjacent to North Richmond, the maximum sulfur dioxide concentration was recorded when the winds were from the South-to-southwest. The maximum toluene value was recorded when winds were from the North-to-northwest. The maximum p-xylene value was recorded when winds were from the East-to-northeast.

1 Report Document Control

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STATUS	Draft

2 Introduction

Table 2.1 lists the target compounds monitored during the month of September 2013, at the fence line monitoring systems near the refinery perimeter and adjacent to Point Richmond, Atchison Village and North Richmond. Each site has an open path Ultra Violet (Open Path UV) air monitoring system and an open path tunable diode laser (TDL) air monitoring system, see Appendix C for an equipment location map.

Table 2.1: Target Compounds Measured by Fence Line System

Compound	**Instrument**
Benzene	Open Path UV
Toluene	Open Path UV
Sulfur Dioxide	Open Path UV
p-Xylene	Open Path UV
Carbon Disulfide	Open Path UV
Hydrogen Sulfide	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 September 2013, are presented in the sections that follow.

3 Results

3.1 Monthly Maximum Fence Line Detections

This section of the report presents the results for the monitoring performed for the month of September 2013. Tables 3.1, 3.2 and 3.3 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)	Wind Direction
Benzene	09/28/2013	02:35 PM	24	Short-term/acute (for a 6-hour exposure) [1]: 433 Long-term/chronic[2]: 20	South
Sulfur Dioxide	09/07/2013	05:05 AM	124	Short-term/acute (for a 1-hour exposure)[1]: 230	Northeast
Toluene	09/22/2013	03:15 PM	35	Short-term/acute (for a 1-hour exposure) [1]: 8600 Long-term/chronic[2]: 70	South-to-southeast
p-Xylene	09/30/2013	11:15 AM	10	Short-term/acute (for a 1-hour exposure)[1]: 6285 Long-term/chronic[2]: 200	South-to-southeast
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	Nothing Detected
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[2]: 8	Nothing Detected

[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)	Wind Direction
Benzene	09/26/2013	03:35 PM	10	Short-term/acute (for a 6-hour exposure)[3]: 433 Long-term/chronic[4]: 20	South-to-southeast
Sulfur Dioxide	09/07/2013	04:50 AM	257	Short-term/acute (for a 1-hour exposure)[3]: 230	South-to-southeast
Toluene	09/07/2013	06:00 PM	72	Short-term/acute (for a 1-hour exposure)[3]: 8600 Long-term/chronic[4]: 70	East-to-southeast
p-Xylene	09/02/2013	06:10 PM	7	Short-term/acute (for a 1-hour exposure)[3]: 6285 Long-term/chronic[4]: 200	South-to-southwest
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	Nothing Detected
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[4]: 8	Nothing Detected

[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)	Wind Direction
Benzene	Nothing Detected	Nothing Detected	Nothing Detected	Short-term/acute (for a 6-hour exposure) [5]: 433 Long-term/chronic[6]: 20	Nothing Detected
Sulfur Dioxide	09/06/2013	12:10 AM	41	Short-term/acute (for a 1-hour exposure)[5]: 230	South-to-southwest
Toluene	09/28/2013	08:40 PM	16	Short-term/acute (for a 1-hour exposure)[5]: 8600 Long-term/chronic[6]: 70	North-to-northwest
p-Xylene	09/26/2013	08:30 PM	5	Short-term/acute (for a 1-hour exposure) [5]: 6285 Long-term/chronic[6]: 200	East-to-northeast
Carbon Disulfide	Nothing Detected	Nothing Detected	Nothing Detected	Currently there are no standards set for evaluating risks of exposure to Carbon Disulfide	Nothing Detected
Hydrogen Sulfide	Nothing Detected	Nothing Detected	Nothing Detected	Long-term/chronic[6]: 8	Nothing Detected

Tables 3.1, 3.2 and 3.3 above indicate that the fence line equipment detected compounds at each location. The concentrations the majority of these compounds were significantly lower than the toxicity standards established by the State of California. The exception was Sulfur Dioxide at Atchison Village on September 09, 2013 which was above the short-term/acute exposure limit of 230 ppb. This concentration was for a 5 min duration and did not last long enough for the one hour average concentration to be above the short-term/acute limit of 230 ppb used for RCAMP

3.2 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

[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)

included. The data is grouped by sampling site with the associated meteorological data included.

3.2.1 Point Richmond

Figures 3.1 to 3.6 show the gas detections for the month of September 2013 at the fence line monitoring system near the refinery perimeter and adjacent to Point Richmond. In addition wind speed and wind direction data measured by the system is reported. For the month of September 2013, carbon disulfide and hydrogen sulfide were not detected by the system. The data is plotted on a logarithmic scale.

Figure 3.1: Point Richmond Benzene Monitored by UV

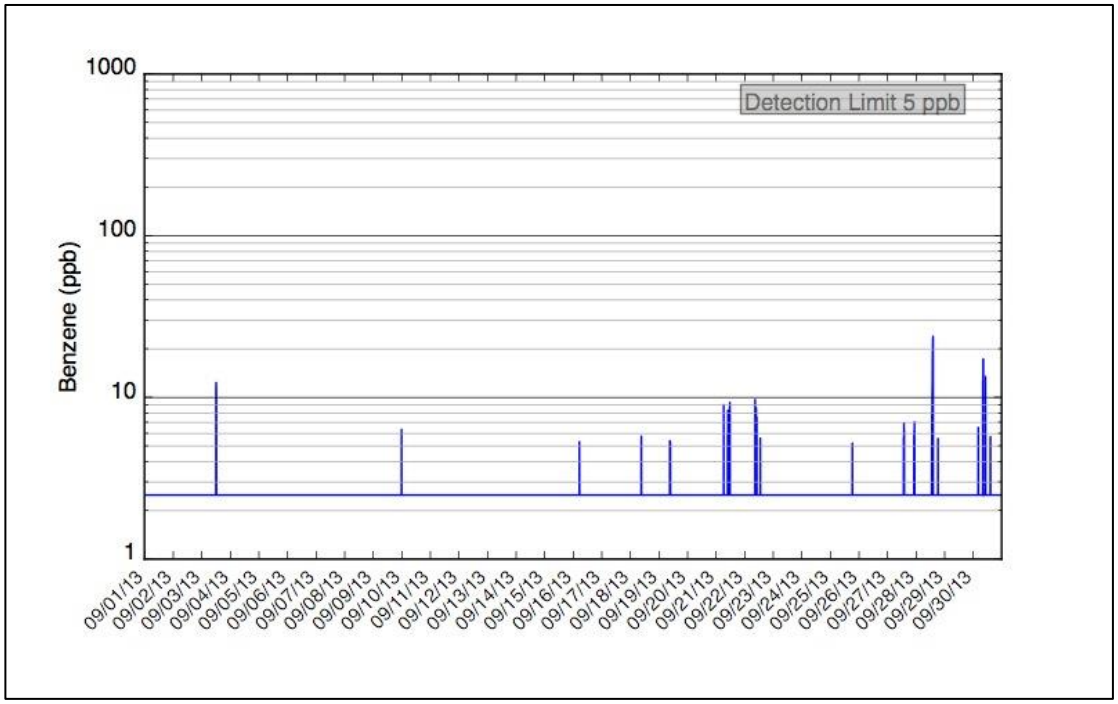


Figure 3.1 shows that the maximum concentration of 24 ppb was detected on September 28, 2013 at 02:35 PM. Toxicity levels established by the State of California are listed in tables 3.1 above.

Figure 3.2: Point Richmond Sulfur Dioxide Monitored by UV

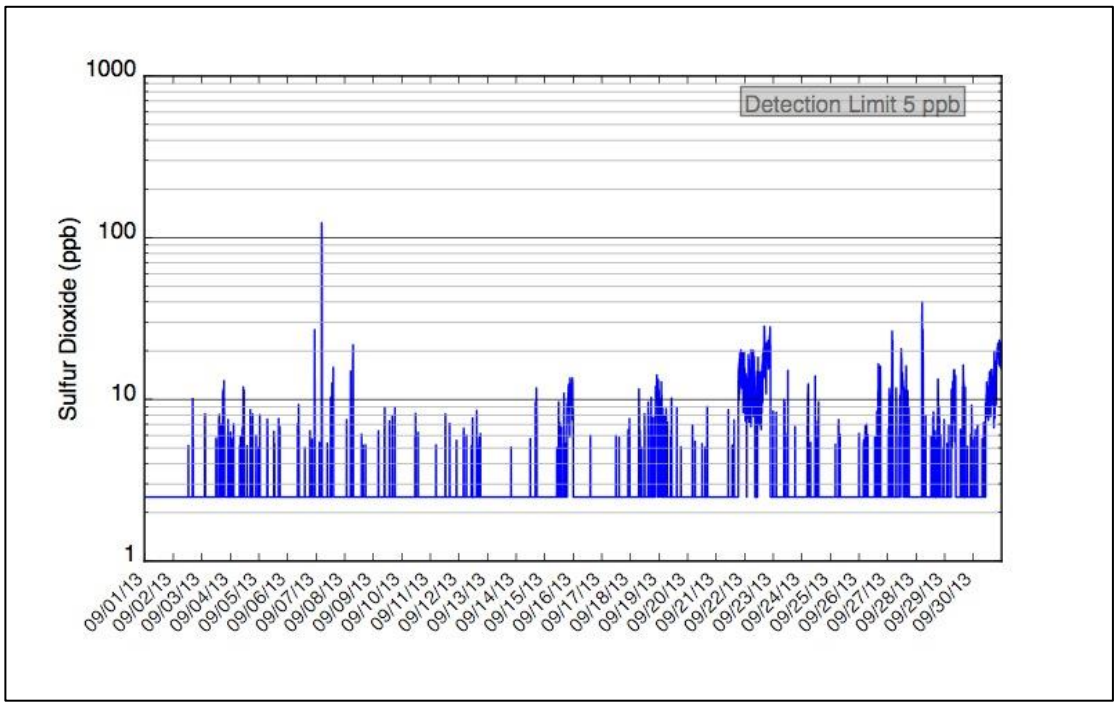


Figure 3.2 shows that the maximum concentration of 124 ppb was detected on September 07, 2013 at 05:05 AM. Toxicity levels established by the State of California are listed in tables 3.1 above.

Figure 3.3: Point Richmond Toluene Monitored by UV

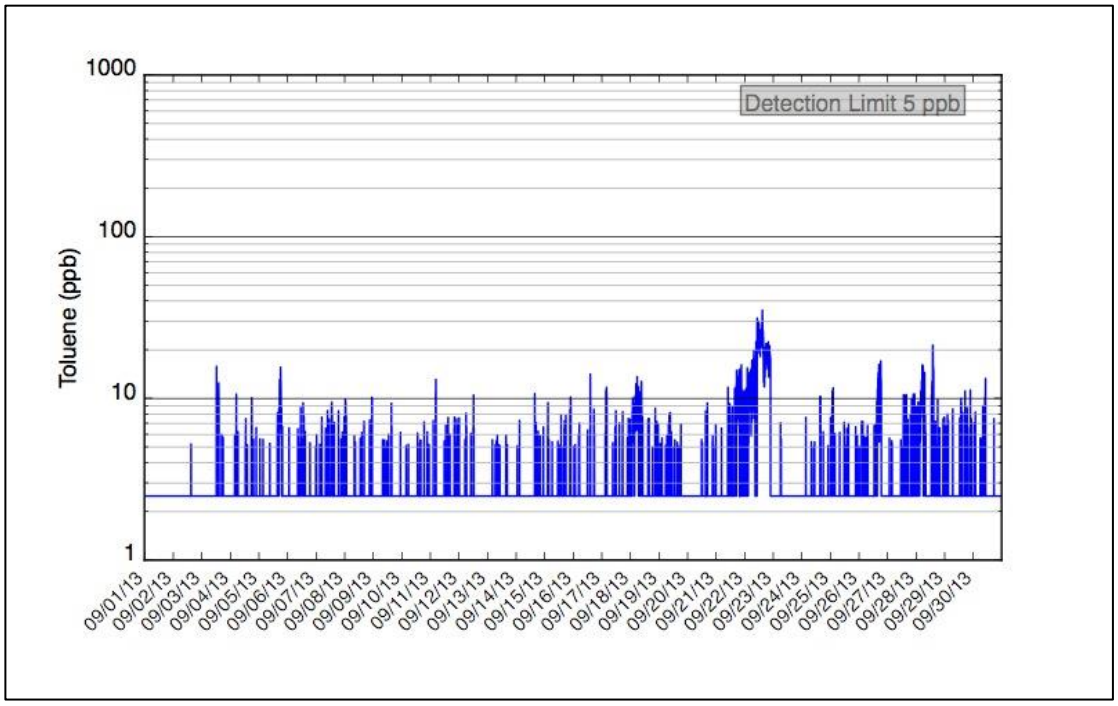


Figure 3.3 shows that the maximum concentration of 35 ppb was detected on September 22, 2013 at 03:15 PM. Toxicity levels established by the State of California are listed in tables 3.1 above.

Figure 3.4: Point Richmond p-Xylene Monitored by UV

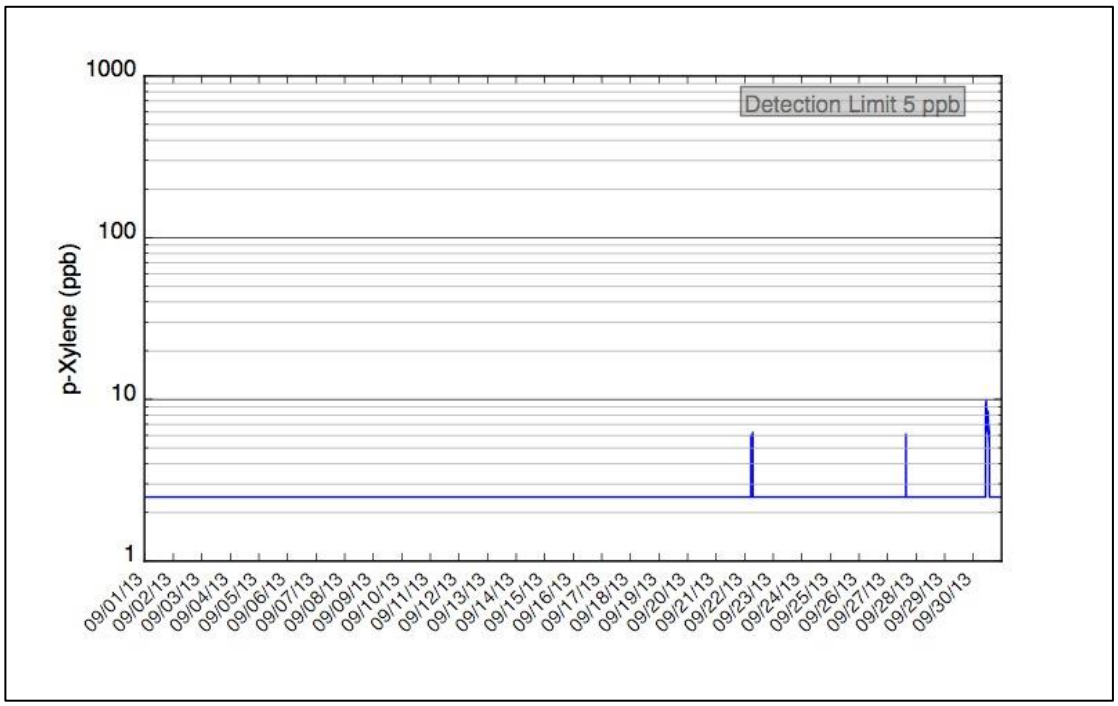


Figure 3.4 shows that the maximum concentration of 10 ppb was detected on September 30, 2013 at 11:15 AM. Toxicity levels established by the State of California are listed in tables 3.1 above.

3.2.1.1 Point Richmond Wind Speed and Wind Direction

Figure 3.5: Point Richmond Wind Speed

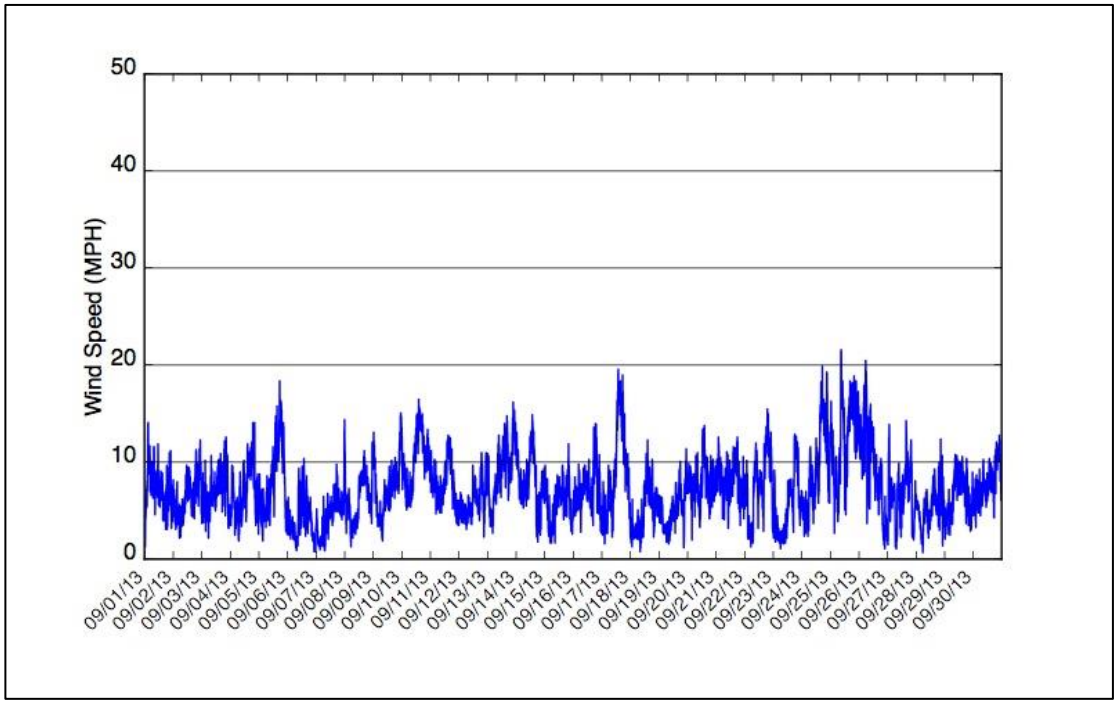
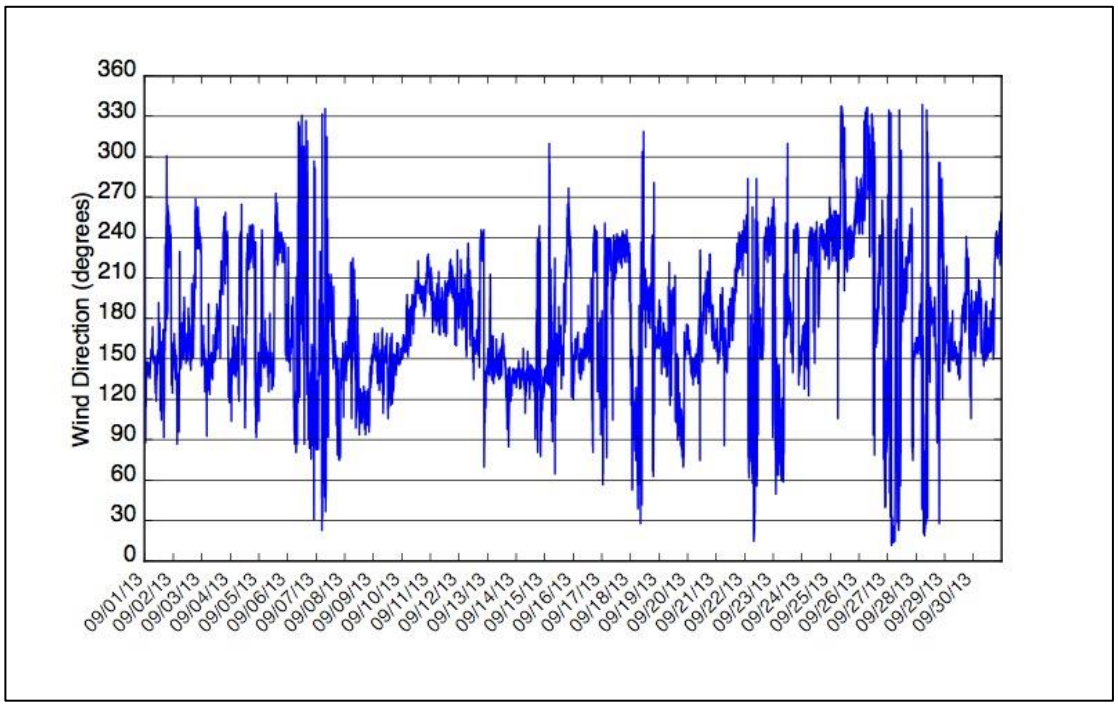


Figure 3.6: Point Richmond Wind Direction



3.2.2 Atchison Village

Figures 3.7 to 3.12 show the gas detections for the month of September 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 September 2013, carbon disulfide and hydrogen sulfide were not detected. The gas data is plotted on a logarithmic scale.

Figure 3.7: Atchison Village Benzene Monitored by UV

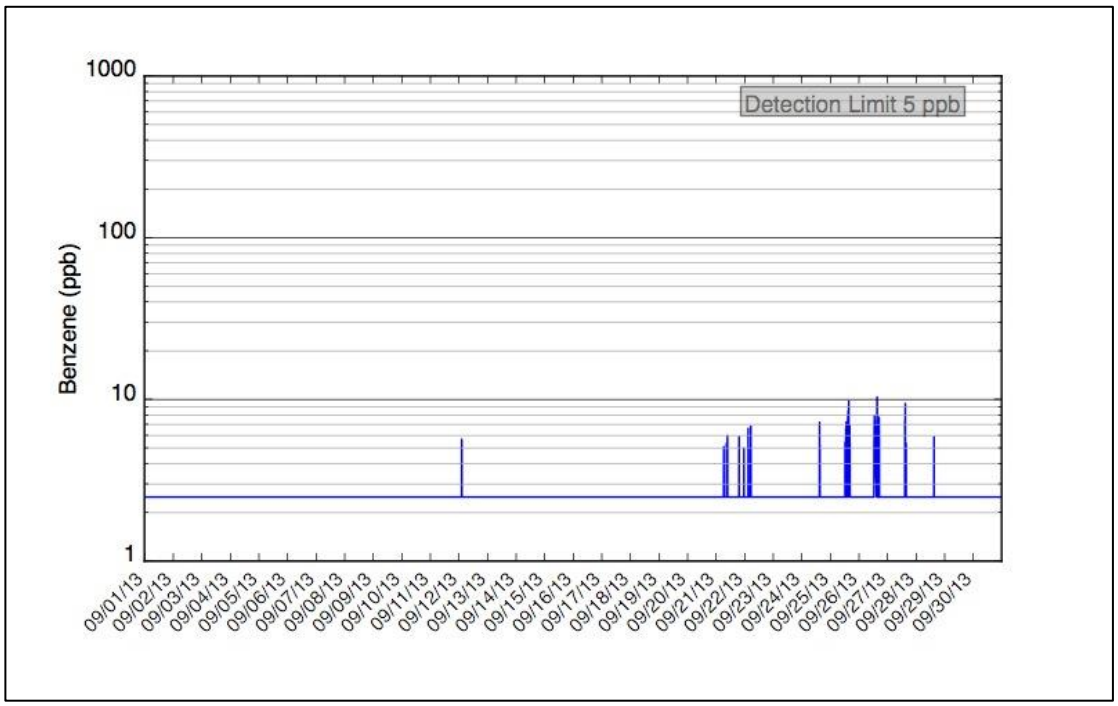


Figure 3.7 shows that the maximum concentration of 10 ppb was detected on September 26, 2013 at 03:35 PM. Toxicity levels established by the State of California are listed in tables 3.2 above.

Figure 3.8: Atchison Village Sulfur Dioxide Monitored by UV

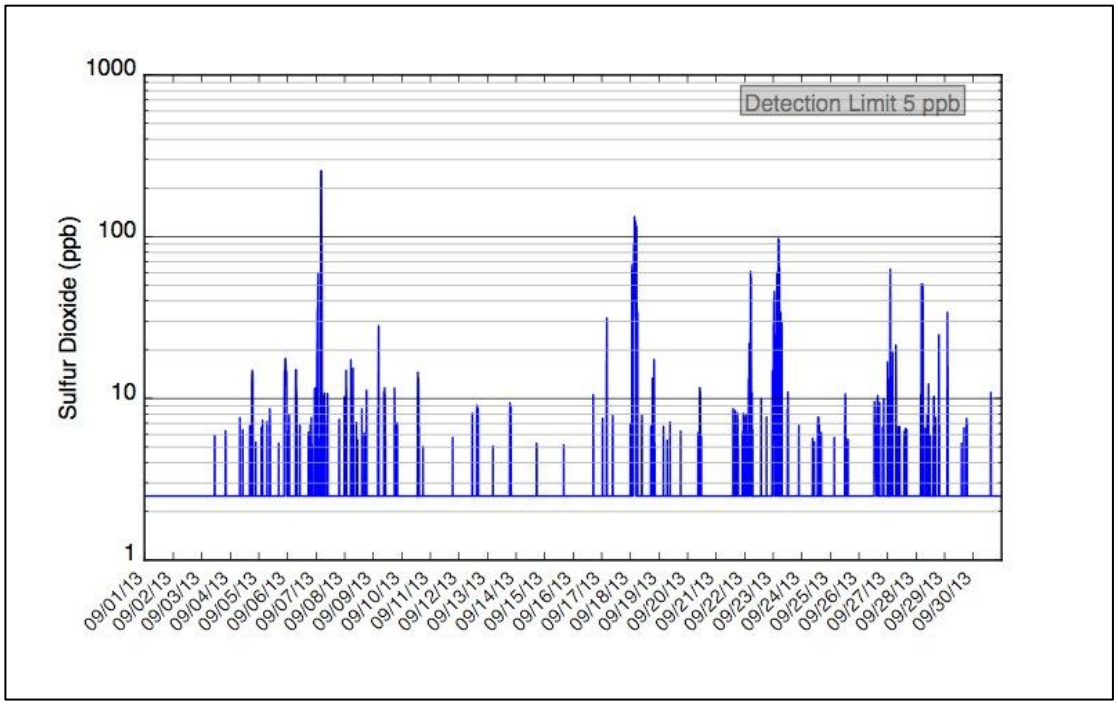


Figure 3.8 shows that the maximum concentration of 257 ppb was detected on September 07, 2013 at 04:50 AM. Toxicity levels established by the State of California are listed in tables 3.2 above.

Figure 3.9: Atchison Village Toluene Monitored by UV

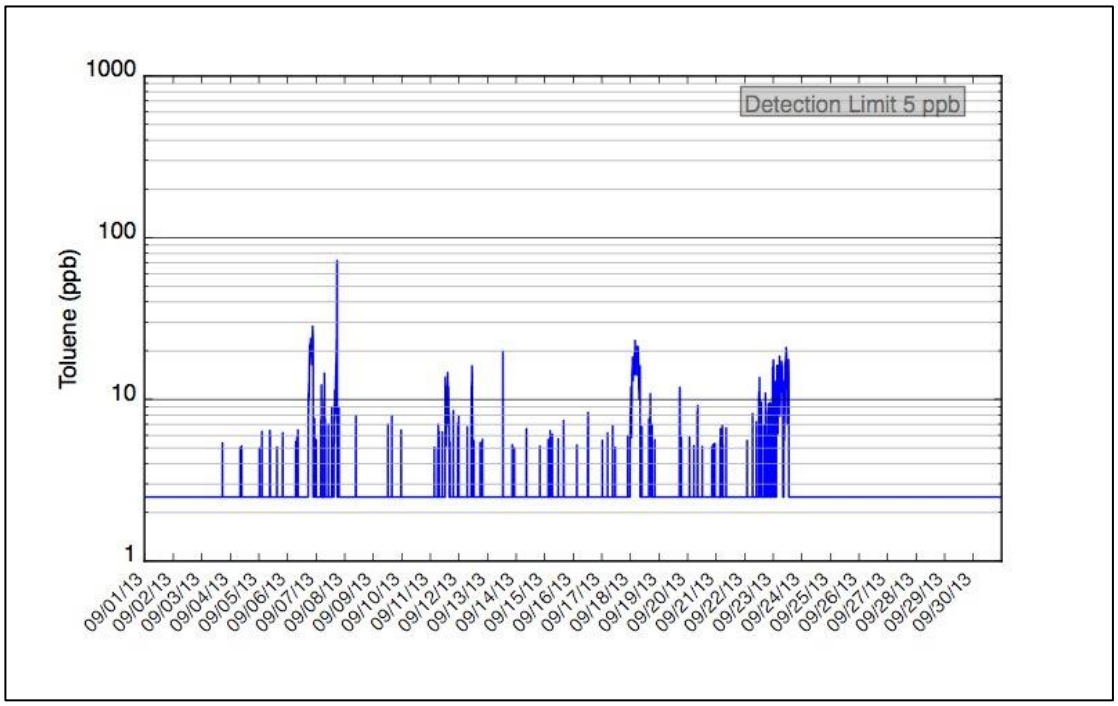


Figure 3.9 shows that the maximum concentration of 72 ppb was detected on September 07, 2013 at 06:00 PM. Toxicity levels established by the State of California are listed in tables 3.2 above.

Figure 3.10 Atchison Village p-Xylene Monitored by UV

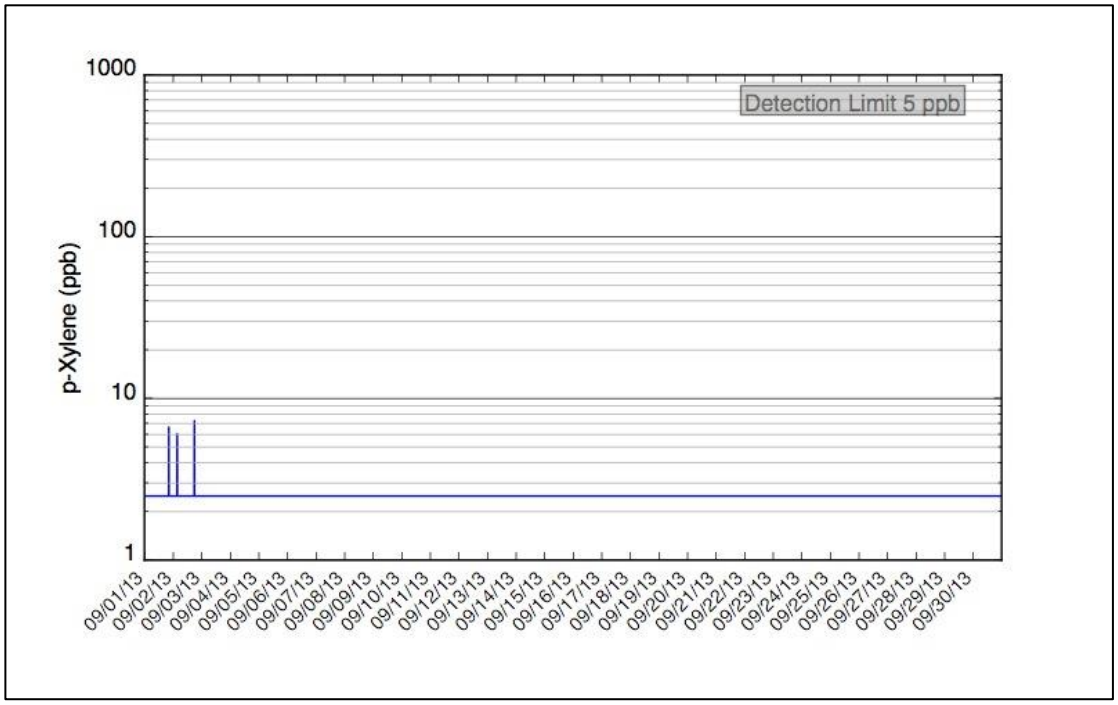


Figure 3.10 shows that the maximum concentration of 7 ppb was detected on September 02, 2013 at 06:10 PM Toxicity levels established by the State of California are listed in tables 3.2 above.

3.2.2.1 Atchison Village Wind Speed and Wind Direction

Figure 3.11: Atchison Village Wind Speed

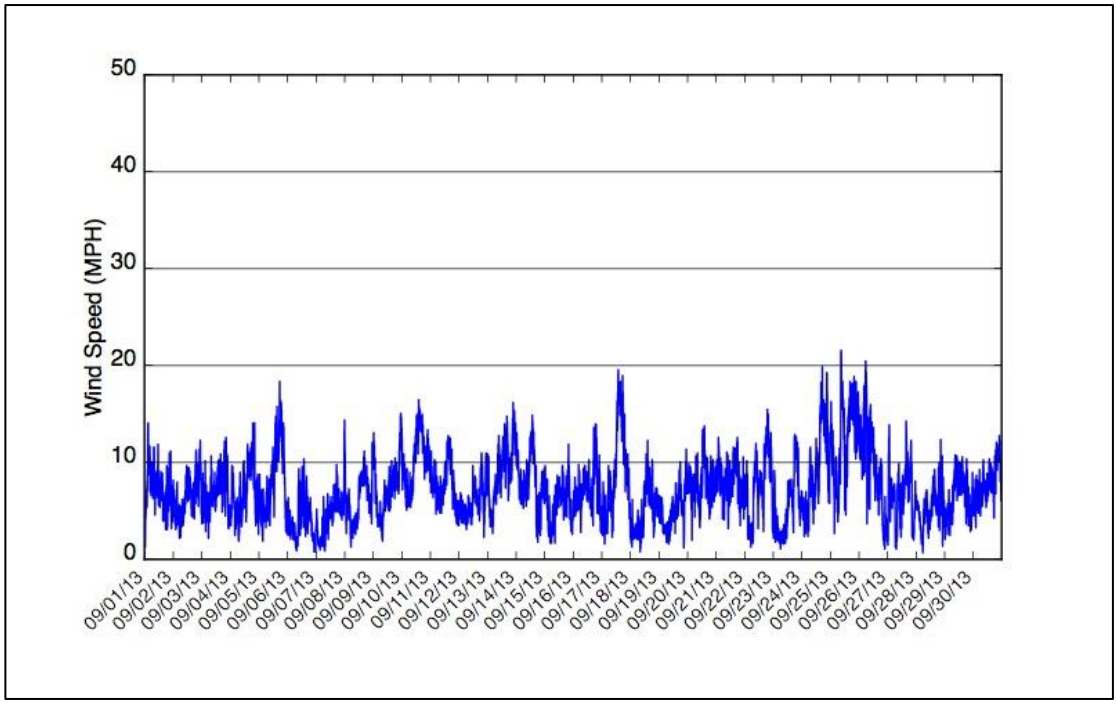
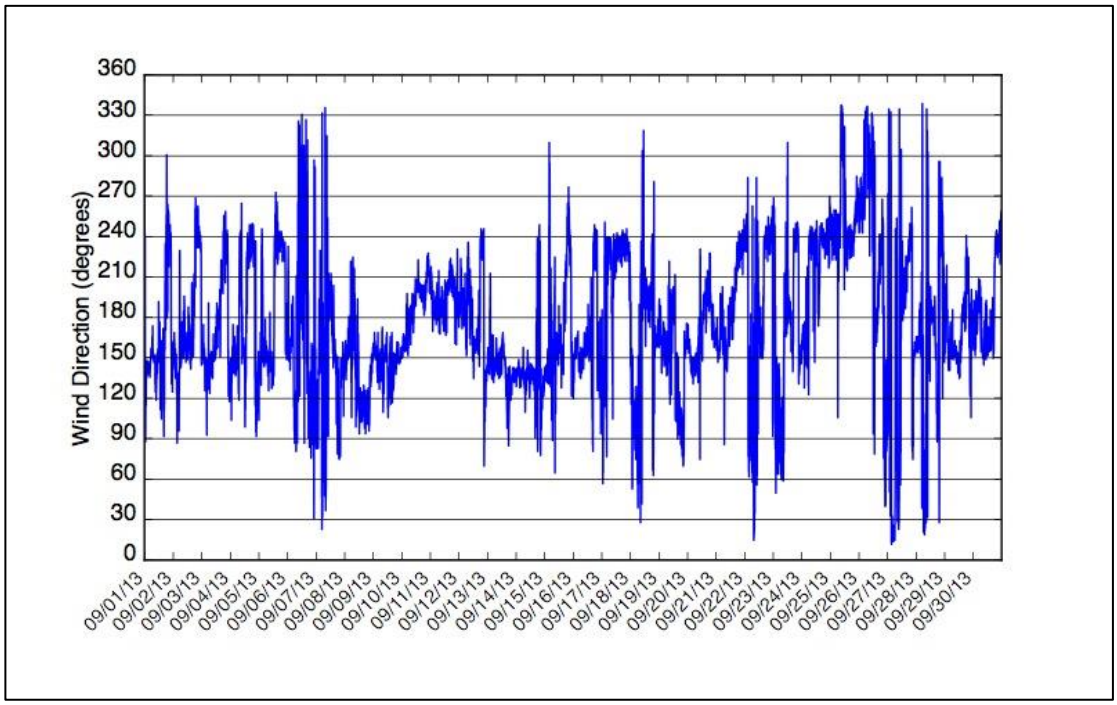


Figure 3.12: Atchison Village Wind Direction



3.2.3 North Richmond

Figures 3.13 to 3.16 show the gas detections for the month of September 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 September 2013, benzene, carbon disulfide and hydrogen sulfide were not detected. The gas data is plotted on a logarithmic scale.

Figure 3.13: North Richmond Sulfur Dioxide Monitored by UV

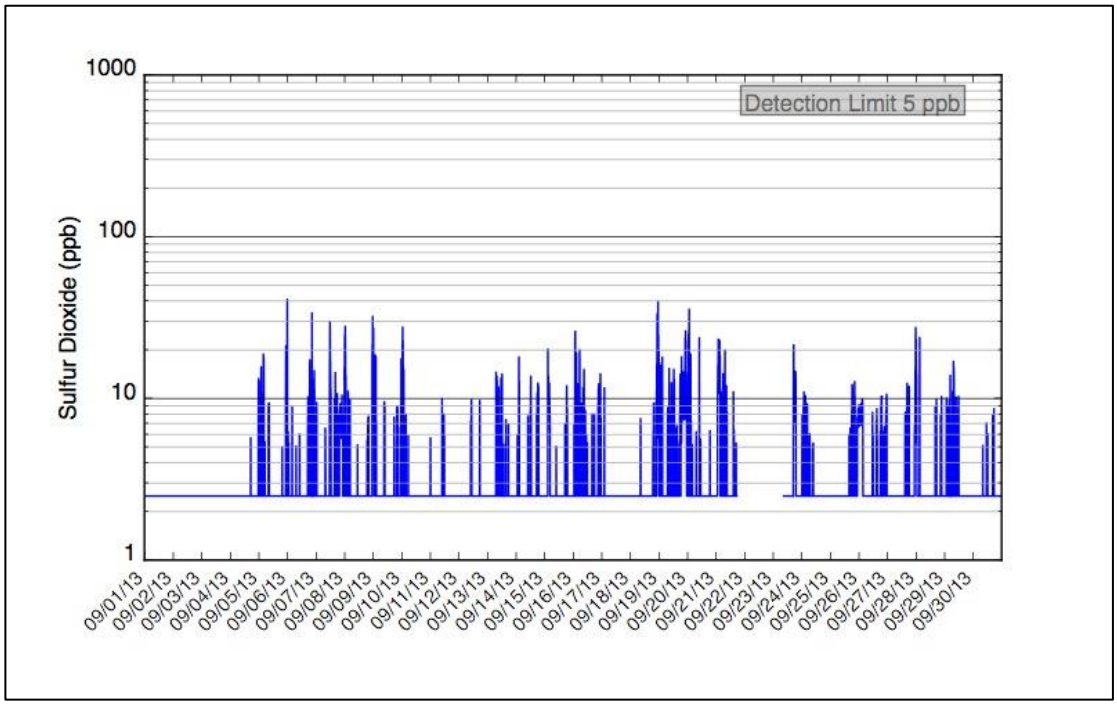


Figure 3.13 shows that the maximum concentration of 41 ppb was detected on September 06, 2013 at 12:10 AM. Toxicity levels established by the State of California are listed in tables 3.3 above

Figure 3.14: North Richmond Toluene Monitored by UV

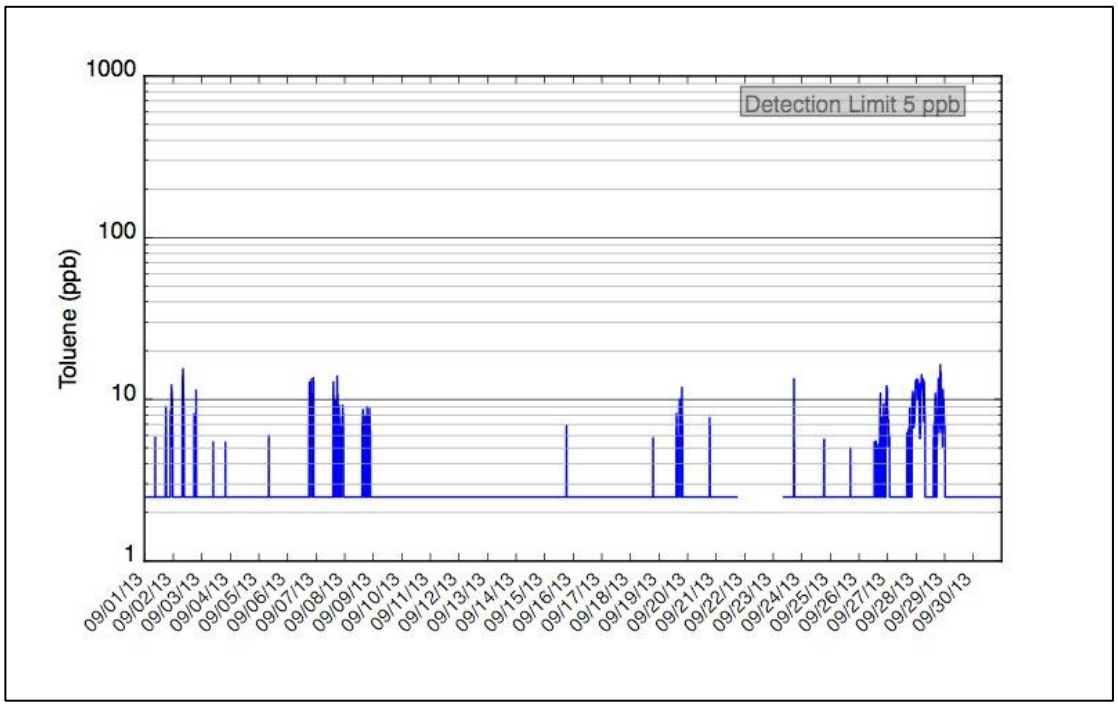


Figure 3.14 shows that the maximum concentration of 16 ppb was detected on September 28, 2013 at 08:40 PM. Toxicity levels established by the State of California are listed in tables 3.3 above.

Figure 3.15: North Richmond p-Xylene Monitored by UV

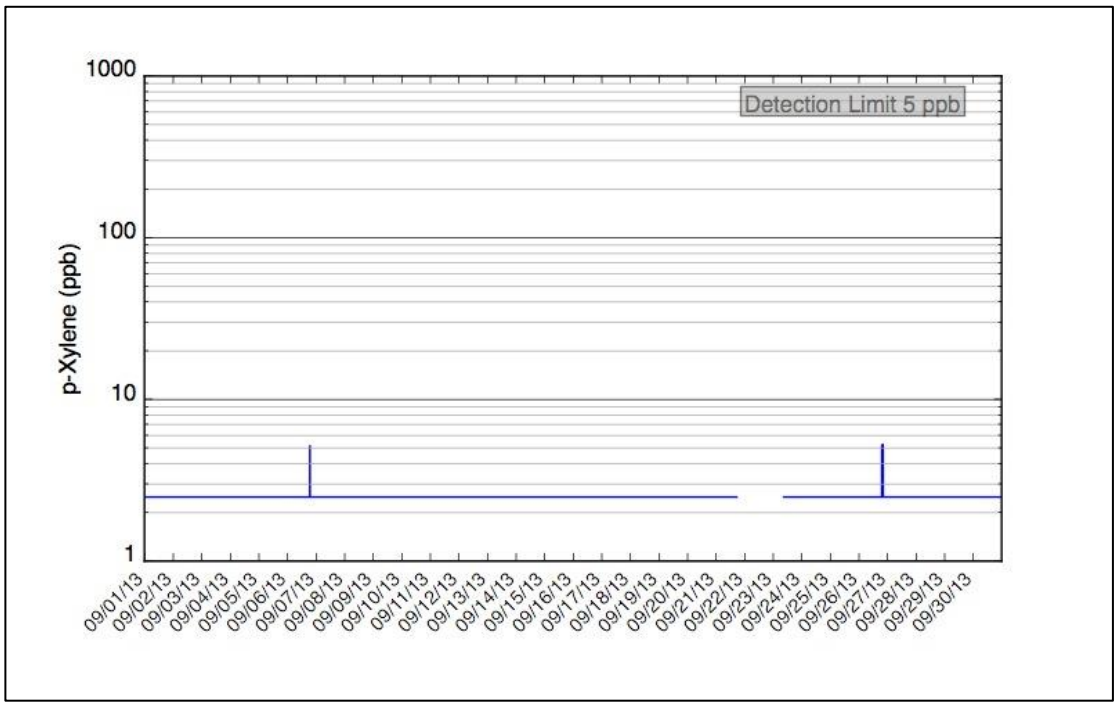


Figure 3.15 shows that the maximum concentration of 5 ppb was detected on September 26, 2013 at 08:30 PM. Toxicity levels established by the State of California are listed in tables 3.3 above.

3.2.3.1 North Richmond Wind Speed and Wind Direction

Figure 3.16: North Richmond Wind Speed

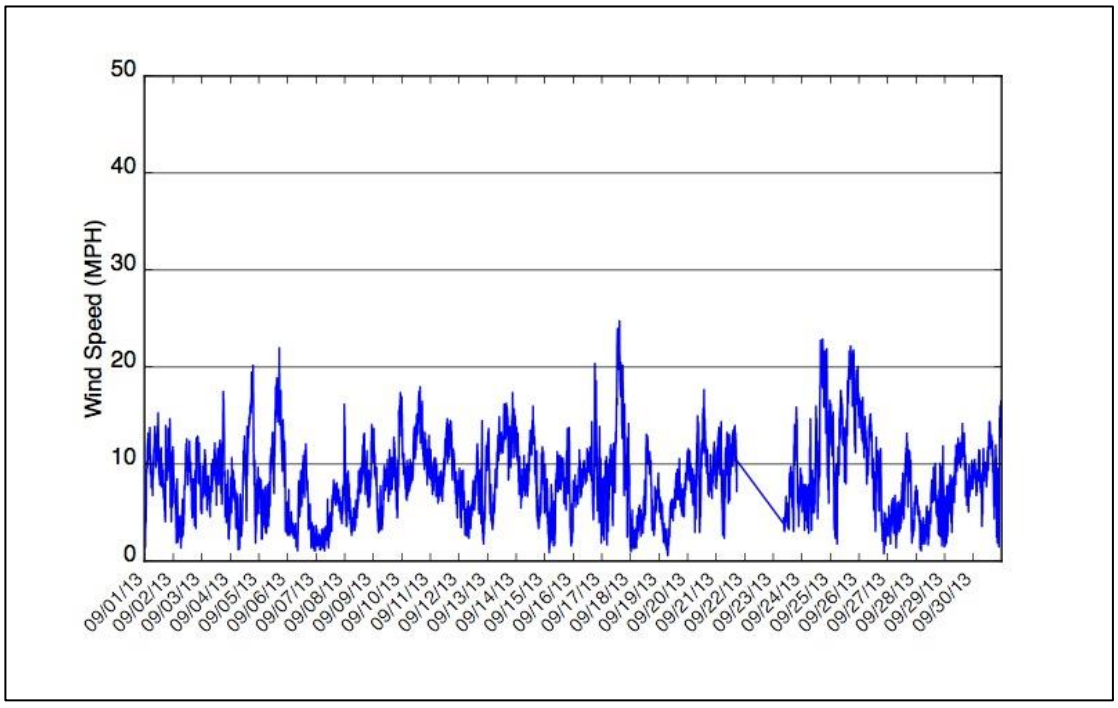
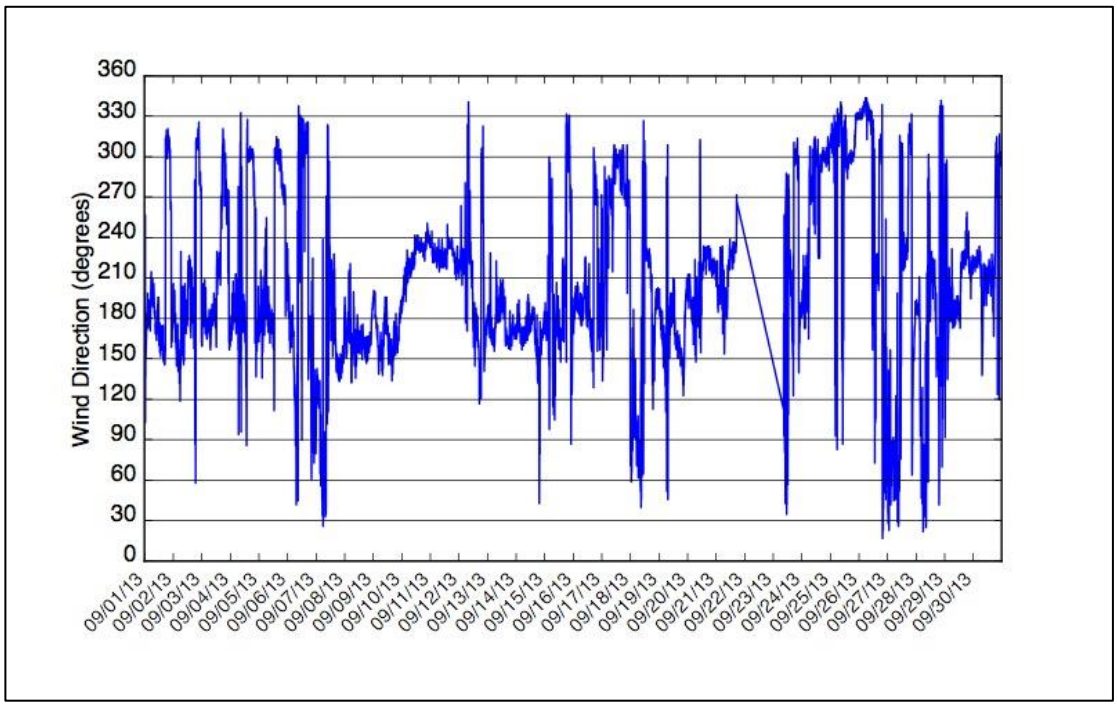


Figure 3.17: North Richmond Wind Direction



3.3 QA/QC Checks

Figure 3.18: Point Richmond Ozone by UV

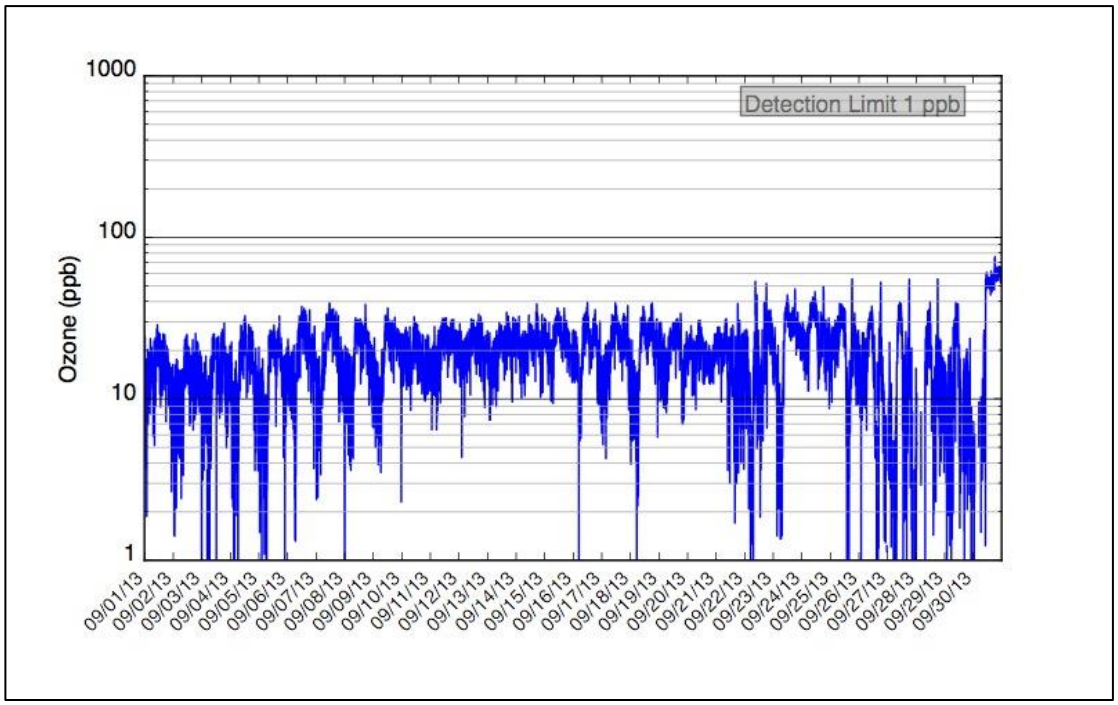


Figure 3.19: Atchison Village Ozone by UV

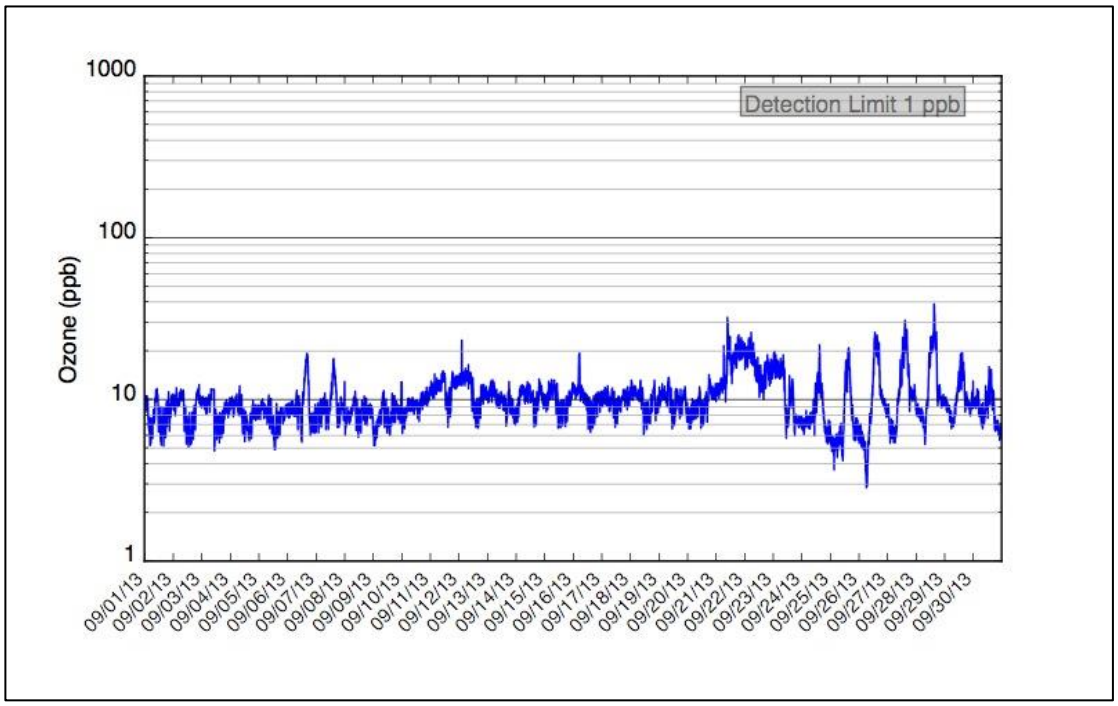
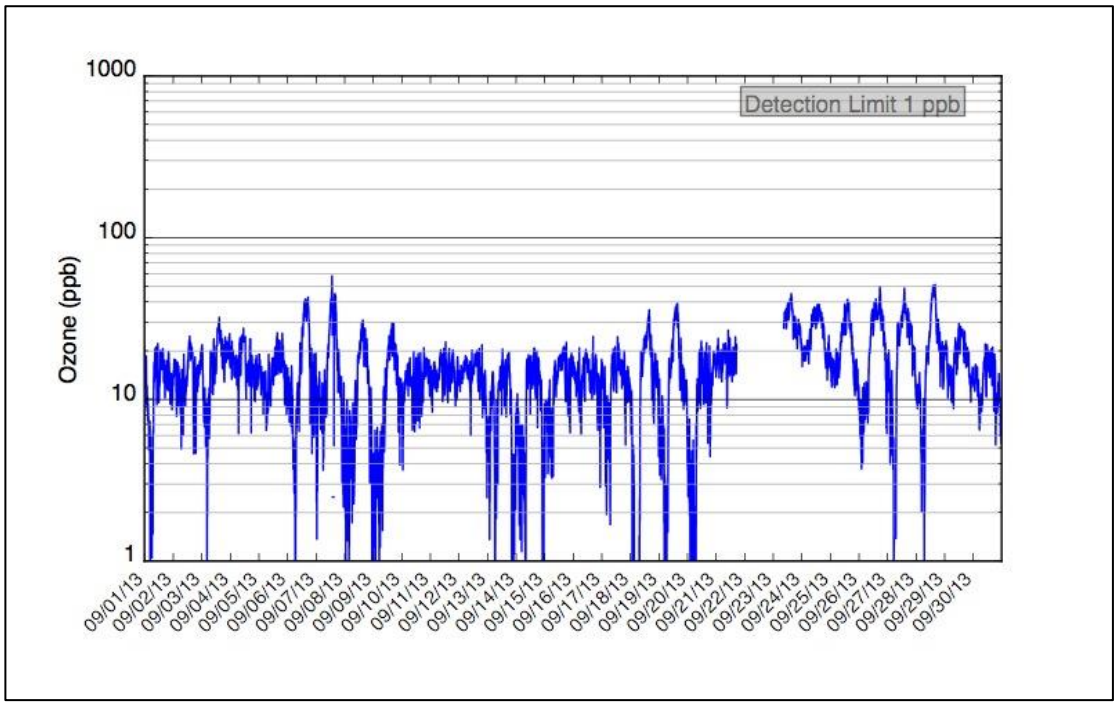


Figure 3.20: North Richmond Ozone by UV



4 Operational Performance Events

During September 2013 there was one event that affected the monitoring system on the refinery perimeter that is adjacent to North Richmond. On September 21, 2013 the data acquisition system froze. An Argos technician was dispatched on September 23, 2013 when access to the site became possible. The system was restored to operational status.

5 Maintenance Activities

Routine maintenance and quality assurance/quality control (QA/QC) for the open path fence line monitoring systems occurred on September 09, 2013 and September 19, 2013.

6 Summary of Findings

The following was noted from the monthly results of the monitoring activities:

- At the refinery perimeter that is adjacent to Point Richmond, the maximum benzene concentration was recorded when the winds were from the South. The maximum sulfur dioxide concentration was recorded when the winds were from the Northeast. The maximum toluene value was recorded when winds were from the South-to-southeast. The maximum p-xylene value was recorded when winds were from the South-to-southeast;
- At the refinery perimeter that is adjacent to Atchison Village, the maximum benzene concentration was recorded when the winds were from the South-to-southeast. The maximum sulfur dioxide concentration was recorded when the winds were from the South-to-southeast. The maximum toluene value was recorded when winds were from the East-to-southeast. The maximum p-xylene value was recorded when winds were from the South-to-southwest;
- At the refinery perimeter that is adjacent to North Richmond, the maximum sulfur dioxide concentration was recorded when the winds were from the South-to-southwest. The maximum toluene value was recorded when winds were from the North-to-northwest. The maximum p-xylene value was recorded when winds were from the East-to-northeast.

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, Sulfur Dioxide, p-Xylene	09/03/2013	11:08 AM	Yes
TDL	Hydrogen Sulfide	09/03/2013	11:28 AM	Yes
UV	Benzene, Toluene, Sulfur Dioxide, p-Xylene	09/19/2013	11:34 AM	Yes
TDL	Hydrogen Sulfide	09/19/2013	11:14 AM	Yes

Atchison Village QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, Sulfur Dioxide, p-Xylene	09/03/2013	09:41 AM	Yes
TDL	Hydrogen Sulfide	09/03/2013	10:43 AM	Yes
UV	Benzene, Toluene, Sulfur Dioxide, p-Xylene	09/19/2013	10:42 AM	Yes
TDL	Hydrogen Sulfide	09/19/2013	10:52 AM	Yes

North Richmond QA/QC

Instrument	Compound	Date	Time	Passed Yes/No
UV	Benzene, Toluene, Sulfur Dioxide, p-Xylene	09/04/2013	11:51 AM	Yes
TDL	Hydrogen Sulfide	09/04/2013	11:32 AM	Yes
UV	Benzene, Toluene, Sulfur Dioxide, p-Xylene	09/19/2013	12:04 AM	Yes
TDL	Hydrogen Sulfide	09/19/2013	12:00 PM	Yes

Appendix B: Website Message Board Logs

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

- 09/03/2013 08:31 - Argos is on site to perform monthly maintenance. UV, TDL, and MET systems may be temporarily offline for the next few hours. The message board will be updated when QA/QC work is complete.
- 09/03/2013 16:42 - QA/QC and monthly maintenance of the fence line monitoring systems have been completed.
- 09/19/2013 10:54 - Argos is on site to perform monthly maintenance. UV, TDL, and MET systems may be temporarily offline for the next few hours. The message board will be updated when QA/QC work is complete
- 09/20/2013 00:06 - QA/QC work has been completed

Appendix C: Equipment Location

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