

**WEEKLY REPORT FOR WEEK 44  
(JUNE 2, 2019 – JUNE 8, 2019)**

**Report No. 53005-81-RPT-062**

**September 2019**

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## Approval Form

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Tyler Williams

Date: 09/20/2019

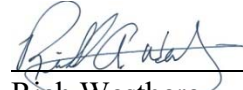
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Date: 09/20/2019

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### Record of Revision

Revision	Date	Pages/Sections Changed	Brief Description
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## Acronyms and Abbreviations

A/C	Air Conditioning
ML	Mobile Laboratory
PTR-MS	Proton Transfer Reaction – Mass Spectrometer
PTR-TOF	Proton Transfer Reaction – Time-of-Flight
R&D	Research and Development
SME	Subject Matter Expert
VOC	Volatile Organic Compound

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## **1.0 INTRODUCTION**

During the week of June 3, 2019, through June 8, 2019, TerraGraphics personnel performed general maintenance tasks. The Mobile Laboratory (ML) Vapor Monitoring Team worked toward the installment of the new Proton Transfer Reaction – Mass Spectrometer (PTR-MS) from IONICON<sup>®1</sup>. The data processing team worked on processing data from Week 43 and the reporting team worked towards the completion of the reports for Weeks 40 through 43 as well as the reports for Months 7 through 9. The following sections describe the activities performed during Week 44 in detail.

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<sup>1</sup> IONICON is a registered trademark of Ionicon Analytik Gesellschaft m.b.H., Innsbruck, Austria.

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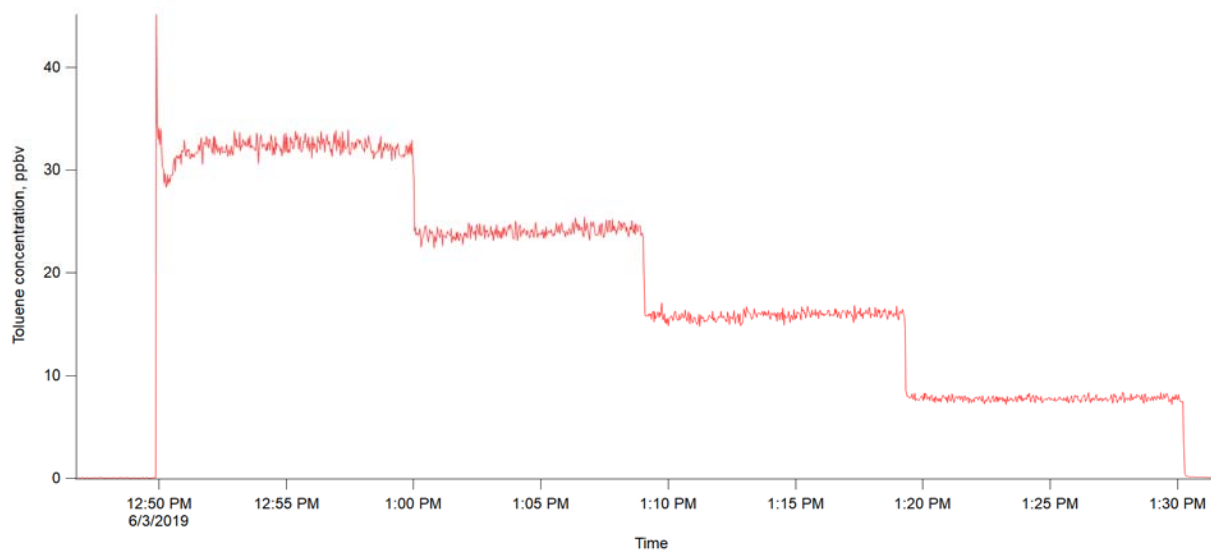
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## 2.0 JUNE 3, 2019 – MOBILE LABORATORY TESTING

All times reported in this document are recorded in Pacific Standard Time.

### 2.1 Summary

On June 3, 2019, ML personnel arrived at the TerraGraphics warehouse at 11:50 to perform two multipoint calibrations while sampling from the research and development (R&D) cylinder. The second multipoint was ran while overflowing the sampling inlet. Overflowing the inlet was conducted by connecting an inlet overflow tube from CZ-MHE-001 to the sampling inlet. A new PTR-MS file was initiated at 11:57 to record the testing to follow. Prior to running tests from the R&D cylinder, a PTR-MS zero was initiated at 12:11 and a span from the volatile organic compound (VOC) cylinder ran from 12:30 to 12:40. Following the span, the PTR-MS was set on zero-air while the calibration gas line was switched from the VOC cylinder to the R&D cylinder. Figure 2-1 shows the first R&D multi-point calibration that was initiated at 12:49 and concluded at 13:29.

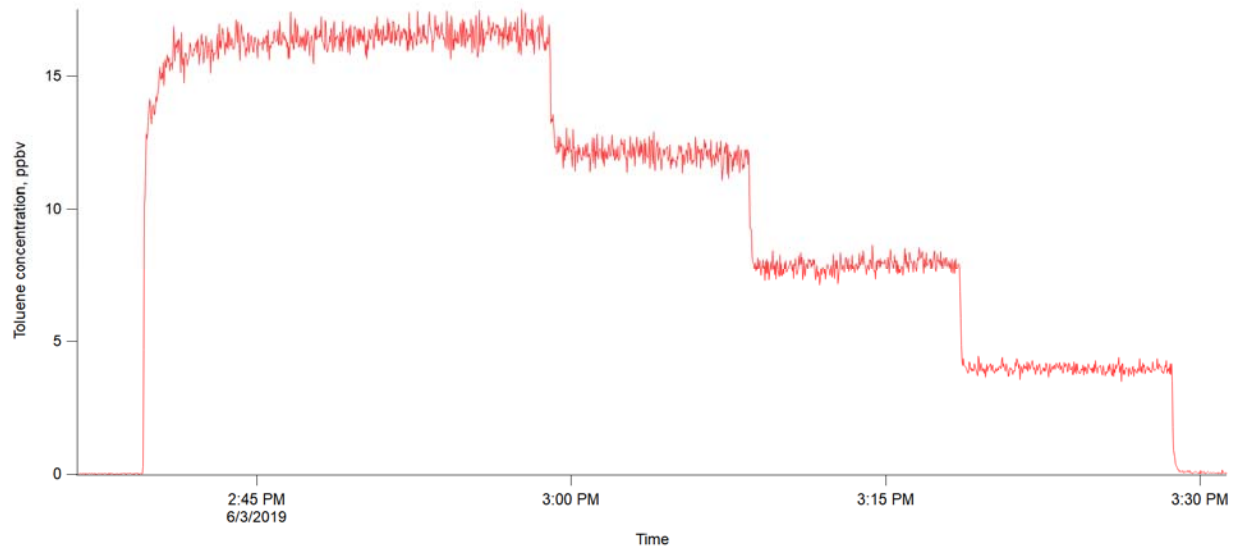


**Figure 2-1. Research and Development Multipoint Calibration.**

Following the conclusion of the first R&D multipoint calibration, the PTR-MS sampled zero air from 13:29 to 13:39. The ML operator made the overflow connection to the sampling inlet at 13:39. Zero air was overflowing from 13:39 to 14:39. At 14:39, the second R&D multipoint calibration while overflowing the sampling inlet began and this test concluded at 15:28. Results from the second test are shown in Figure 2-2. At 15:43, the ML was configured to its original state and ready for deployment.

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**Figure 2-2. Research and Development Multipoint Calibration While Overflowing the Sampling Inlet.**



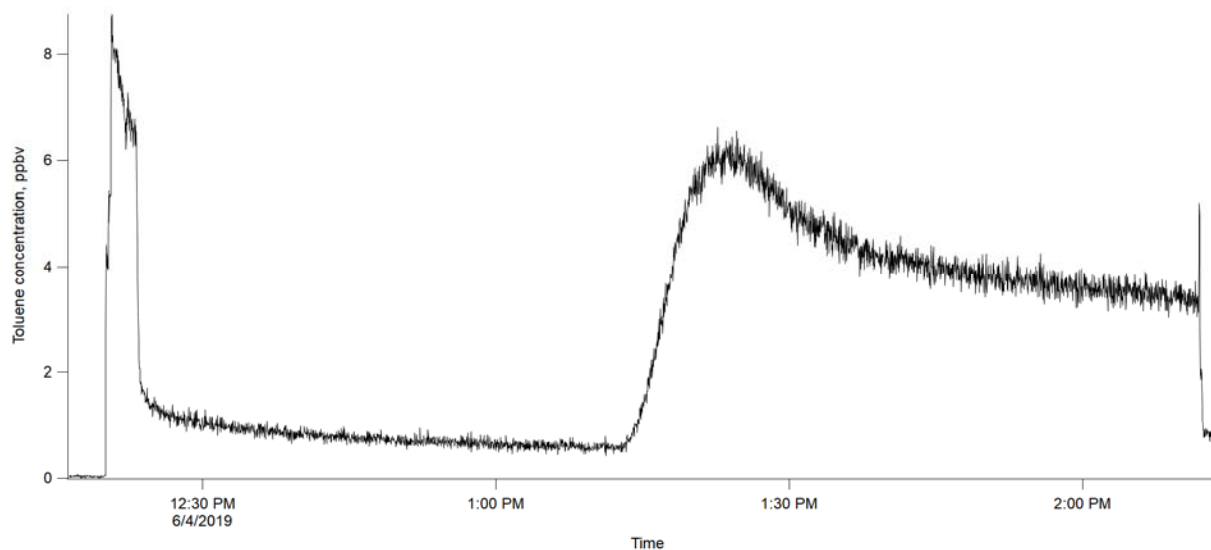
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### 3.0 JUNE 4, 2019 – MOBILE LABORATORY MAINTENANCE AND TESTING

#### 3.1 Summary

On June 4, 2019, the ML personnel arrived at the TerraGraphics warehouse at 09:45 and prepared the ML to be transported to the TerraGraphics Shoshone office to clean the air conditioning (A/C) component. The ML arrived at the TerraGraphics office on Shoshone in Pasco, WA, at 10:05 and began cleaning the A/C unit. After cleaning and reassembling the unit, the ML Operators returned to the TerraGraphics warehouse at 10:56. At 11:25, a new PTR-MS file was initiated to capture testing of the 208-foot heated line to follow. After installing a new zero-air gas standard (Lot #: 2191061), a zero-air and span check were performed on the PTR-MS. At 12:08, Operators began to switch sampling from the mast to the 208-foot heated line. By 12:21, the PTR-MS began sampling from the 208-foot heated line and zero-air was set to overflow the inlet. The heated line was turned on and began heating to reach 60°C at 13:12. At 14:11, the subject matter expert (SME) restarted DAQFactory<sup>®2</sup> and toggled the PTR-MS valve. At 14:55, the ammonia gas standard used for research and development was connected to begin conditioning the line for ammonia testing to occur the following day. The zero test of the 208-foot heated line was completed at 15:14, and all flows were stopped. At 15:16, the inlet was switched back to the mast and the ML was reconfigured for deployment. Figure 3-1 below shows a time series plot which summarizes the heated line testing performed on this day.



**Figure 3-1. 208-foot Heated Line Testing with Zero Air.**

<sup>2</sup> DAQFactory is a registered trademark of AzeoTech, Inc., Ashland, Oregon.

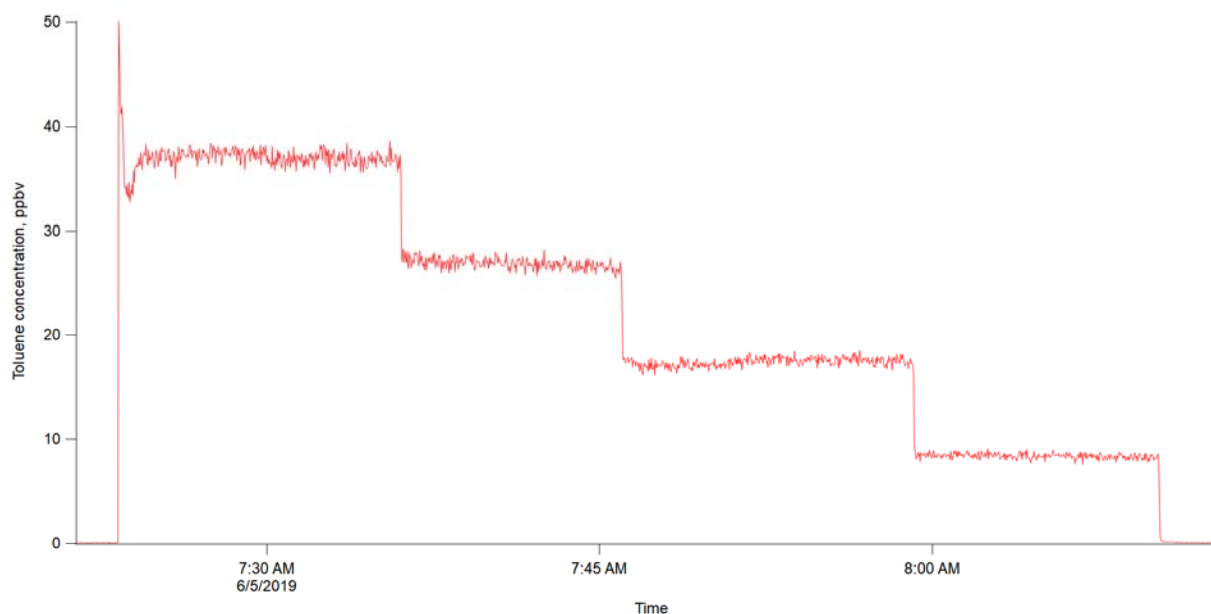
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## 4.0 JUNE 5, 2019 – MOBILE LABORATORY TESTING

### 4.1 Summary

On June 5, 2019, ML personnel arrived at the TerraGraphics warehouse at 06:25 to complete generator maintenance and to begin PTR-MS and ammonia testing. A PTR-MS zero-air and span were initiated at 07:00 with the VOC gas standard and the zero-air gas cylinder. After completing the span and zero, the calibration gas line was switched from the VOC cylinder to the R&D cylinder for testing purposes. A multipoint was initiated on the Proton Transfer Reaction – Time-of-Flight (PTR-TOF) at 07:23 by sampling 1000 sccm (standard cubic centimeters per minute) from the zero-air cylinder and 80 sccm from the R&D cylinder. Operators lowered the flow from the R&D cylinder five times setting flow to 80 sccm, 60 sccm, 40 sccm, 20 sccm, and 0 sccm. Figure 4-1 shows the multipoint calibration that occurred from 07:23 to 08:10. At 08:55, the ML was moved to the TerraGraphics office on Ainsworth in Pasco, WA, to swap out PTR-MS instruments and perform ammonia testing. At 09:09, the PTR-MS file was stopped and the instrument was completely shut down. The Operators then proceeded to remove the PTR-MS from the ML and transfer it into the Ainsworth Office, where the mounts could be switched over to the new PTR-MS.



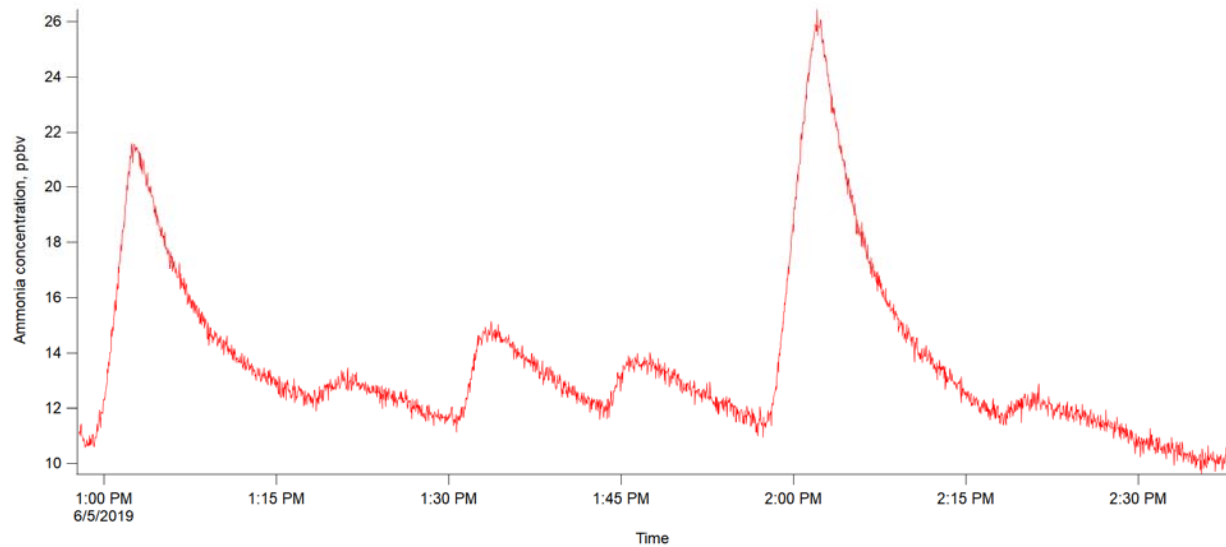
**Figure 4-1. Multipoint Calibration performed on June 5, 2019.**

At 10:23, the ML Operators started to setup for  $\text{NH}_3$ /Picarro response testing. This test was designed to see how the Picarro responded to small plumes of ammonia. At 13:01, the Picarro was set to sample zero-air until it switched to sampling 100 sccm of ammonia for a minute burst at 13:16. After seeing a response on the analyzer, Operators allowed time for the instrument to stabilize. At 13:29, the analyzer was sampling a burst of ammonia at 100 sccm for 2 minutes followed by a stabilization period. At 13:41, the analyzer was set to sample a burst of ammonia at 100 sccm for approximately 90 seconds and given time to stabilize after. At 13:55, a 6-minute burst of ammonia at 100 sccm was set. At 14:16, a second 1-minute burst of ammonia at 100

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sccm was initiated. At 14:30, ammonia was set to 0 sccm. Figure 4-2 shows the various bursts of ammonia throughout the duration of this testing. At 16:20, the ML was returned to the TerraGraphics warehouse.



**Figure 4-2. Ammonia Plume Simulation Testing on June 5, 2019.**

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## 5.0 JUNE 6, 2019 – MOBILE LABORATORY MAINTENANCE

### 5.1 Summary

On June 6, 2019, ML personnel arrived at the TerraGraphics warehouse at 07:25 and prepared the ML to relocate to the TerraGraphics office on Ainsworth in Pasco, WA, to install a new PTR-MS. The ML arrived at the TerraGraphics Ainsworth Office at 07:45. After loading the new PTR-MS into the ML, the ML returned to the TerraGraphics warehouse at 09:00. Operators began the ammonia testing by trying to simulate an ammonia plume, similar to the previous day. The PTR-MS was powered on at 09:47 and the zero-air gas flow was disconnected briefly. The Quality Assurance Representative arrived to perform oversight of the acceptance testing for two mass flow controllers recently received back from calibration. The mass flow controllers (ID: MDR-4D3D1000020N-01/18060002 and ID: MDR-4D3D1000020N-01/18060005) both passed acceptance testing.

The DAQFactory computer was restarted at 12:40 and the ammonia testing was continued. Starting at 12:50, Operators began initiating large bursts of ammonia and carbon dioxide into the system at 2-minute intervals. Over the next hour and a half, Operators varied between three-, two-, one-, and thirty second- intervals. All flows other than ammonia were stopped by 14:52 and testing for the day was completed. Figure 5-1 below summarizes the testing performed on this day.

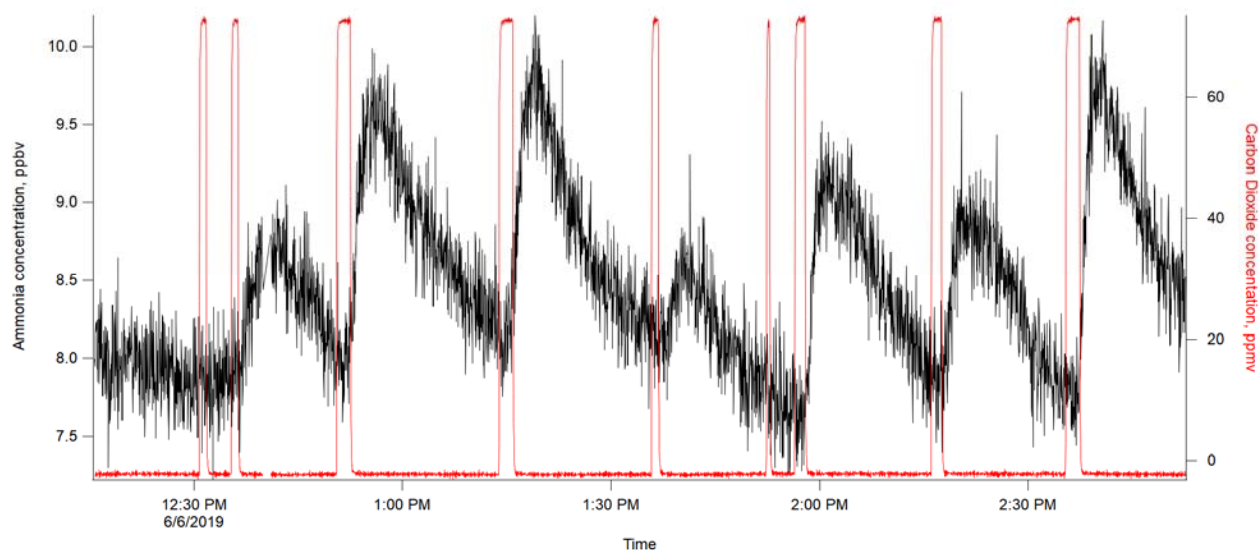


Figure 5-1. Simulated Plume Testing on June 6, 2019.

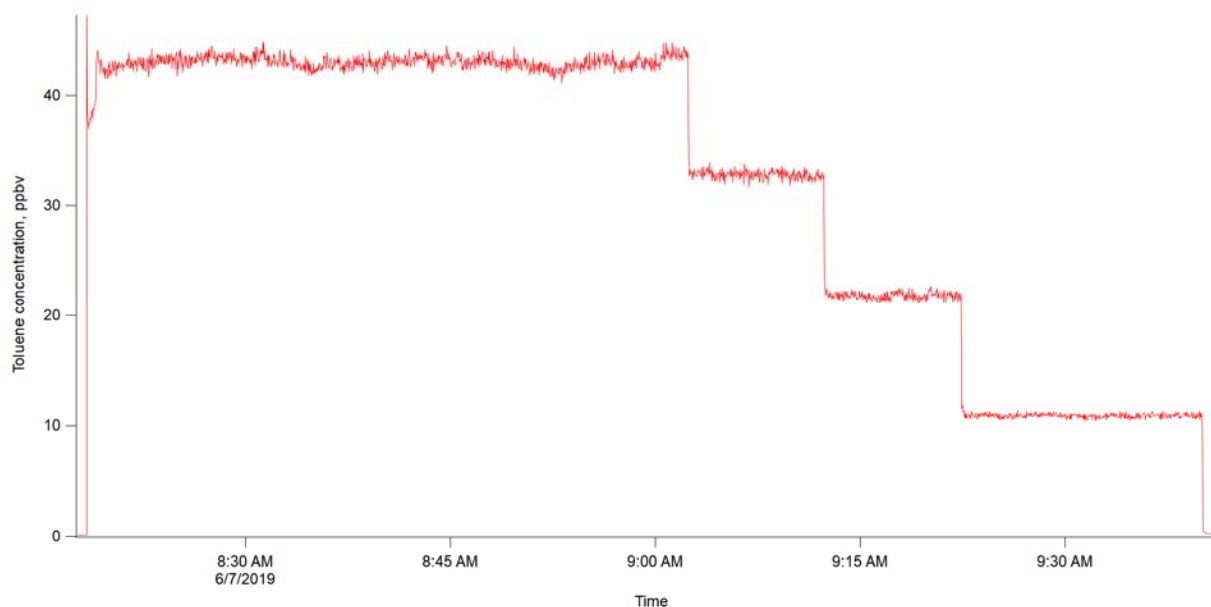
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## 6.0 JUNE 7, 2019 – MOBILE LABORATORY TESTING

### 6.1 Summary

On June 7, 2019, the ML personnel arrived at the TerraGraphics warehouse at 07:00 to perform a PTR-MS multipoint calibration and ammonia plume testing. A new PTR-MS file was initiated at 07:12. At 07:22, the Picarro was set on 2500 sccm of the zero-air standard to bring the ammonia concentration down to a background level. The ammonia level in the garage is much higher than ambient background at the Hanford Site. Operators began a PTR-MS zero check by setting the PTR-MS on 1000 sccm zero-air. This concluded at 07:45 when the PTR-MS span was initiated and was set on 20 sccm of the VOC gas standard. The PTR-MS span finished at 08:00 and the VOC gas flow was stopped, leaving the PTR-MS on 1000 sccm zero-air. At 08:01, the calibration gas line was switched to the R&D gas standard to start a PTR-MS multipoint calibration. The PTR-MS multipoint calibration was initiated at 08:18 and the flow of R&D gas was set at 80 sccm until 09:40 when the calibration was complete. Figure 6-1 below shows the results of the PTR-MS multipoint performed on this day.

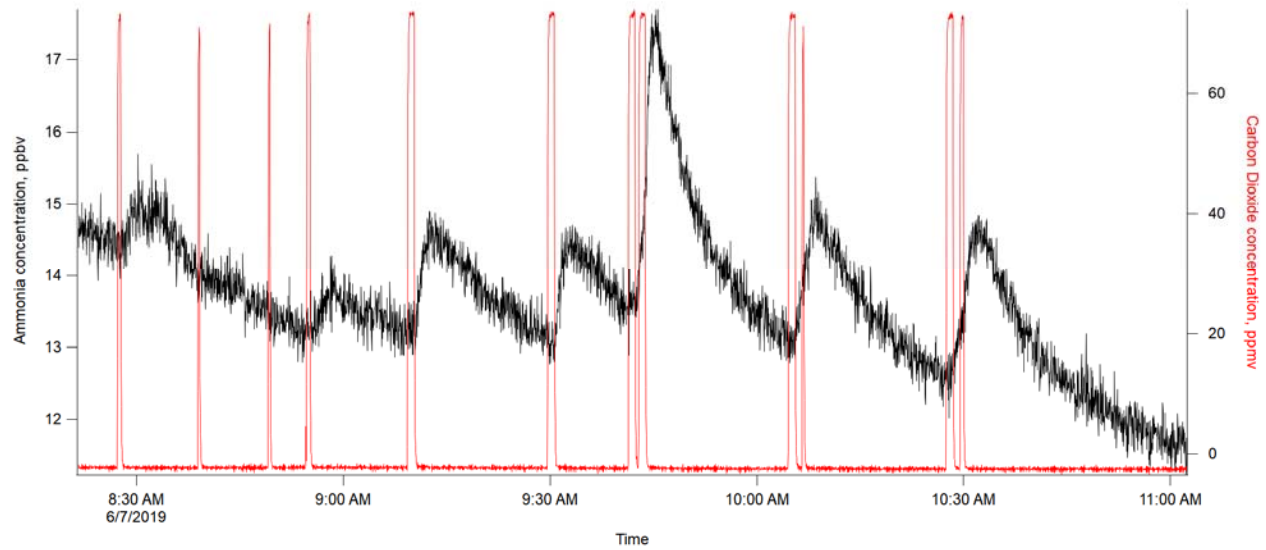


**Figure 6-1. Research and Development Multipoint Calibration.**

Operators began their testing to simulate small plumes of ammonia (15-60 seconds) at 08:26 and continued this testing until 09:29. At 09:41, more ammonia plume testing started; the Picarro was blasted with  $\text{NH}_3$  and  $\text{CO}_2$  for 60 seconds, followed by a 60-second pause, and then blasted again for another 60 seconds with  $\text{NH}_3$  and  $\text{CO}_2$ . This testing was run using different length burst times until 11:02 when the testing was complete and all the flows were stopped. Figure 6-2 below summarizes the simulated plume testing activities performed on this day.

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**Figure 6-2. Simulated Plume Testing on June 7, 2019.**

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## **7.0 DATA PROCESSING AND REPORTING SUMMARY**

During the week of June 2, 2019, through June 8, 2019, the data team worked on processing Week 43 data. The reporting team worked towards the completion of reports for Weeks 40 through 42, as well as reports for Months 6 through 9. The data for Week 43 were officially accepted during Week 44 via the Data Acceptance Checklist.