

TOC INCOMING LETTER OF TRANSMITTAL

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Date: 4/4/17 Subcontract Release Number/Purchase Order: 61485 Transmittal Number: 005 Project Number: GAL610132 Project/Contract Title: PTR-MS Mobile Laboratory

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005	Weekly Report 4.1							00

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WEEK 4.1 REPORT – PTR-MS Tour

March 15th, 2017

Summary

On March 15th the Mobile Lab was used from 12:30 PM to 5:30 PM. Preparation for a tour and shut-down of the lab occurred at Columbia Basin Analytical Laboratories (CBAL). The mobile lab was in transit or at the Hanford Site, 200 E area, from 1:15 PM until 5:25 PM. At 4:10 PM a brief tour of the Mobile Lab was given to approximately 10 individuals from the Department of Energy and Washington River Protection Solutions. Data collected from this day's activities will be used to gain experience in data handling for the Picarro analyzer. This trip also provided an opportunity to test the LogMeIn software in the field.

WEEK 4.1 REPORT – Mobile Lab Maintenance

March 16th, 2017

Summary

On March 16th the Mobile Lab was used at from 8:00 AM to 1:15 PM. Data from March 15th was loaded onto an external hard drive for the data handling team to gain experience working with data from the Picarro. During this time period all mass flow controllers were removed from the Mobile Lab and sent to Energy Northwest for recertification. Additionally, the gas cylinder for helium was removed to be filled to support GC-MS work. The ultra-high purity nitrogen cylinder was also removed and replaced to support the thermal desorption unit and to provide dilution gas for the preparation of standards, the operation of the liquid calibration unit and the purging of the ammonia monitor detection cell.

WEEK 4.1 REPORT – PTR-MS and Picarro Time Synchronization Experiments

March 17th, 2017

Summary

On March 17th the Mobile Lab was used at CBAL from 8:00 AM to 11:00 AM to perform several experiments to determine standard operational protocols and operational characteristics. One experiment compared the ammonia tailing behavior of polyether ether ketone (PEEK) and perfluoroalkoxy alkane (PFA) tubing. The other experiment compared PTR-MS and Picarro signal peak times.

For the first experiment described, a mixed standard of ammonia and volatile organic compounds was connected to the Mobile Lab cab tee in the sampling line and analyzed by the Picarro and PTR-MS through the standard sampling system made of PFA tubing. The canister valve was opened for approximately 1 second every two minutes to provide a signal. Then PEEK tubing was connected directly to the Picarro and the canister and the experiment was repeated. The resulting signals are compared in Figure Time 3.4.3a. It was found that at lower concentrations of ammonia PEEK tubing had less tailing than PFA. At higher concentrations, the type of tubing made little difference.

In the other experiment, the data from the PFA tubing portion of the first experiment was compared between the PTR-MS and the Picarro. The purpose was to understand what the time difference is between the detection of a single sample using the two methods. A graph displaying the signals along the same time axis is displayed in Figure Time 3.4.3b and a table for comparing the times of the corresponding apexes is shown in Figure Time 3.4.3c.

March 17th, 2017

Figure Time 3.4.3a

Figure Time 3.4.3a displays Picarro signal through PEEK, orange, and PFA, blue, tubing aligned by peaks. Please note that although these experiments were not simultaneous the time scale for both plots is equivalent so that tailing behavior can be compared. Also, note that the increase in background and noise for the PEEK tubing was due to the nature of the experiment. The inlet tubing was exposed to ambient air and the noise is probably due to ammonia from the analyst's hands. The tailing behavior for the PEEK and PFA tubing appears similar except in the case of the fourth peak where the PFA tubing has increased tailing compared to apex height.

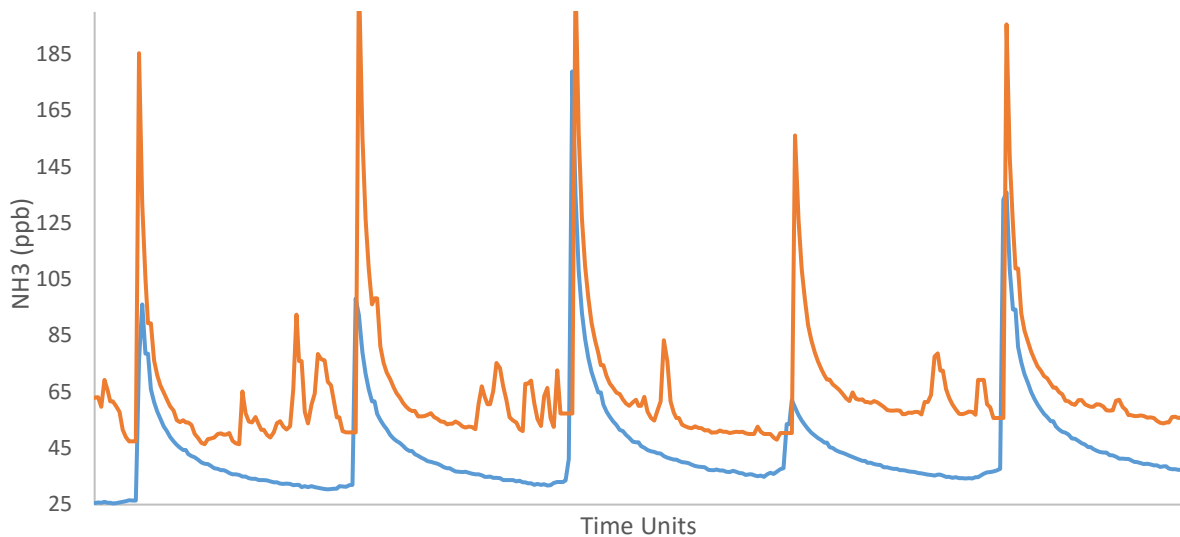


Figure Time 3.4.3b

Figure Time 3.4.3b displays Picarro signal in blue and PTR-MS signal of benzene in orange when individual samples were analyzed simultaneously. This experiment indicates very little delay between the PTR-MS and Picarro signals. A table comparing these times is in Figure Time 3.4.3c.

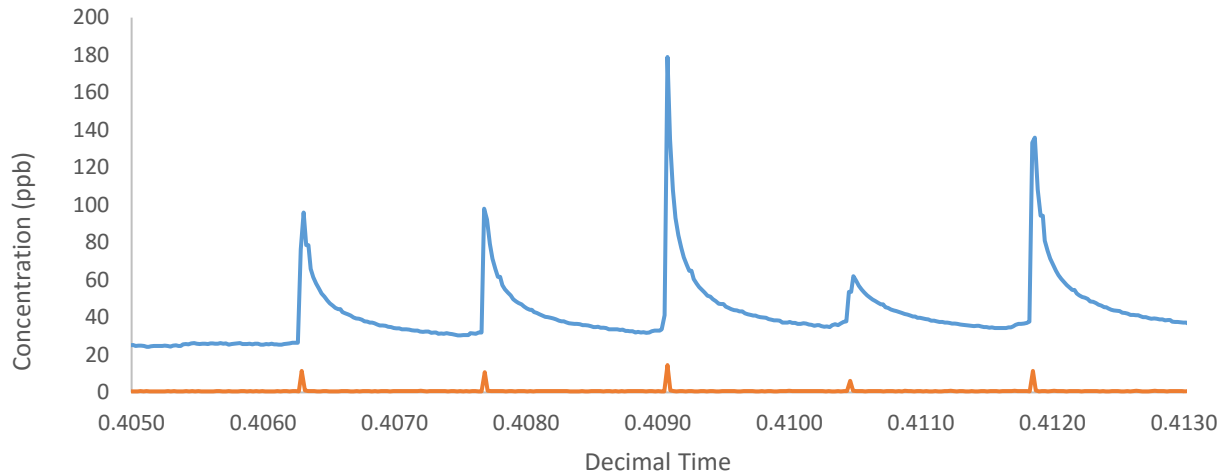
**Figure Time 3.4.3c**

Figure Time 3.4.3c is a table that compares the time of the apexes in Figure Time 3.4.3b. It was found that on average the Picarro will detect a signal 0.8 seconds after the PTR-MS. In practice an ammonia peak within 0 to 2 seconds after a PTR-MS signal may be considered from the same air sample.

Apex Time		
Picarro	PTR-MS	Difference
9:45:05	9:45:04	0:00:01
9:47:04	9:47:04	0:00:00
9:49:04	9:49:04	0:00:00
9:51:06	9:51:04	0:00:02
9:53:05	9:53:04	0:00:01

WEEK 4.1 REPORT – Picarro Flow Check

March 20th, 2017

Summary

On March 20th the Mobile Lab was used at CBAL from 8:00 AM to 9:30 AM to perform a verification check of the Picarro. The Mesa Labs Defender 520 flow controller (SN 134085) was used to check the flow rate of the Picarro inlet sampling line.

WEEK 4.1 REPORT – Compass Calibration

March 21st, 2017

Summary

On March 21st the Mobile Lab was used at CBAL from 2:00 PM to 4:00 PM to perform a compass calibration of the Airmar Weather Station. The autocalibration procedure included in the Airmar 150WX Instruction Manual was followed. Additionally, a refilled helium tank was installed in the Mobile Lab and the GC-MS system was powered up again.