

AQRP Monthly Technical Report

PROJECT TITLE	Hydrogen Cyanide for Improved Identification of Fire Plumes in the (BC)² Network	PROJECT #	22-006
PROJECT PARTICIPANTS	Dr. Tara I. Yacovitch, PI Dr. Rebecca Sheesley and Dr. Sascha Usenko, Co-PIs	DATE SUBMITTED	3/10/2023
REPORTING PERIOD	From: 2/1/2023 To: 2/28/2023	REPORT #	7

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task for reporting period

The project team continues to hold update meetings on a weekly basis via telecon.

Dr. Usenko and the Baylor team worked with TCEQ and local officials to evaluate work performed by electrical contractors at the Mecham Airport site. After much effort and coordination, the site has been successfully updated.

During troubleshooting of the HCN instrument at Aerodyne, a contact issue on a data acquisition card connector was found to be the cause of the faulty valve behavior. Valves are now responsive to being toggled in the instrument software. Upon removing the side cover of the instrument, loose hardware near the main power supply was also discovered. During turn-on at Baylor, an intermittent power cycling issue appeared to have been caused by other loose hardware found in the same area. Otherwise, all of the electrical connections have been tested and physically evaluated with no notable findings. Currently, the instrument is running in the laboratory and sampling room air with a 1 Hz precision of ~60 ppt. However, we will continue assessing and testing the system to fully understand the unusual behavior (i.e., high noise, voltage offset on detector) witnessed in the field. We are operating with the same detector as before, though we are prepared to install a new one, if necessary.

Aerodyne has an opportunity in March (3/13 – 3/17) to test this instrument in the presence of biomass burning signal as part of a laboratory-scale controlled study using the Aerodyne Mobile Laboratory (AML) at their facility in Billerica, MA. A suite of instruments will be sampling smoke from wood samples prepared and burned by a team from Stanford University. Participating in this work offers a chance to evaluate instrument performance in the context of these real-world emissions and use the time to find any remaining hardware issues.

Looking ahead to the spring measurement period, our current plan is to bring the HCN analyzer back to Texas in the AML during the transit to the DFW area for a concurrent field campaign (AQRP 22-010). Several logistical and scientific benefits arise from this arrangement. With

Aerodyne managing the instrument transportation, we can ensure a careful shipping and handling process (e.g., air-ride truck, Aerodyne loading and unloading). Since the instrument will be integrated into the AML during the collaboration with Stanford, transitioning into mobile measurement use in the DFW area (first week of April) prior to off-loading and beginning the stationary sampling period would be possible without adding additional effort. Mobile surveying throughout the region would seek to provide useful context for several (BC)² sites in the area, especially in the event that airmasses impacted by biomass burning emerge during this time period.

If mobile sampling occurs during the first week of the AQRP 22-010 project, installation into the (BC)² trailer could then happen by April 8th. Stationary sampling would continue until at least June 13th to fulfill the 66 day measurement period. Discussion on acquiring consumables for the stationary work has begun (for spectral backgrounding of the analyzer).

Preliminary Analysis

No preliminary analysis has been done in this reporting period.

Data Collected

Ambient data at Baylor University was collected. This data is not part of the project deliverables but was used to identify an instrument issue.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

Previous delays with site electrical upgrades, combined with the instrument issues identified in November have caused the measurement days from the anticipated fall campaign to be moved to the spring campaign.

The original project design included a 45-day deployment in the fall, (Sept – Oct); and a 21 day deployment in the spring (to coincide with Aerodyne mobile lab project AQRP 22-010, which is tentatively being scheduled for April). The full 66 HCN measurement days will now be allocated to this spring measurement period. We expect to deploy the instrument to the trailer in early April.

Accomplishing the science goals of this project depends on measuring biomass burning emissions in the DFW area. We still believe an extended spring campaign gives us the greatest likelihood of capturing such emissions from a variety of sources.

Goals and Anticipated Issues for the Succeeding Reporting Period

Aerodyne expects to thoroughly test and evaluate the instrument as part of a week-long collaborative study in March that will involve sampling biomass burning using the AML on-site at our facility. Integration of the instrument on-board the AML will also provide security and vibration isolation for transit to Texas at the end of the month.

Detailed Analysis of the Progress of the Task Order to Date

Measurement days originally assigned to the fall campaign have been added to the spring campaign.

Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.

Yes No

Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?

Yes No

Do you have any bibliographic publications (i.e.: publications that cite the project) related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.

Yes No

Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).

Yes No

Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.

Yes No

Have any personnel changes occurred that were not listed in the original proposal? If so, please include a detailed description of the personnel change(s) below.

Yes No

As described in the Workplan documents, and discussed directly with AQRP project management, Dr. Yacovitch will be on family leave beginning mid-December for approximately 4 months, with Conner Daube handling project management and reporting during her absence.

Are any delays expected in the progress of the research? If so, please include a detailed description of the potential delay below.

Yes No

Given the previous delays with the electrical work at the sampling sites in the DFW, measurement days were added to the spring campaign from the fall campaign.

Describe any possible concerns/issues (technical or non-technical) that AQRP should be made aware of.

See above sections describing the ongoing issues and project changes.

**Are you anticipating using all the available funds allocated to this project by the end date?
If not, why and approximately what is the amount to be returned?**

Yes No

Submitted to AQRP by,

Conner Daube