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**	12/12/2022
REPORTING PERIOD	**From:** 11/1/2022 **To:** 11/30/2022	**REPORT #**	4

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 regular project meetings.

During this reporting period, the HCN instrument was operating in the $(BC)^2$ trailer at Baylor University, but with reduced performance due to the previously described electronics issue/detector issue. During instrument operation in the month of November, we have further identified issues with valve actuation. Valves controlling zero air additions to the instrument have gotten stuck open, or failed to actuate. We suspect that the electrical issue that caused a problem with the detector upon installation into the rack may have been more impactful than initially thought.

Site planning is continuing through the $(BC)^2$ network program, led by Dr. Usenko, and in coordination with Doug Boyer (TCEQ, for the $(BC)^2$ network project) and Vince Torres (TX AQRP, for this HCN project and the related AQRP project 22-010, PI: Dr. Fortner). The two candidate sites are the Arlington Municipal Airport site (in between Dallas and Fort-Worth, near I-20) and the Meacham Airport (Fort Worth Northwest site). Both sites require electrical upgrades to host an additional $(BC)^2$ trailer.

Meetings with the electrician and other site stakeholders continued through November, but no work was able to be scheduled that month. The Thanksgiving holiday and the electrician's personal availability were both contributors to these delays.

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 the valve issue described above.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

The continued delays with site electrical upgrades, combined with the newly identified instrument valve issue are causing a major delay in the fall campaign, with the "fall window" now closed.

The initial project planned for 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 science goals depend on measuring biomass burning emissions in the DFW area. We believe an extended spring campaign gives us the greatest likelihood of capturing such emissions from a variety of sources.

In light of these issues, we propose the following modification to the project plan, subject to discussion and approval by AQRP project management and our TCEQ project liaisons.

- Site electrical upgrades will continue to be prioritized by Dr. Usenko as part of the $(BC)^2$ network project. Electrical work will be scheduled as soon as possible but not available for fall measurements.
- The HCN instrument only (no accessories) will be shipped back to Aerodyne as soon as possible for a repair of the detector and the valves.
    - Shipping the instrument to Aerodyne will allow for a comprehensive evaluation of the instrument's electrical systems. We will have access to the full suite of replacement parts and testing equipment.
    - Leaving the accessories (inlet tubing, pump, chiller) will allow for a quick re-integration of the instrument by trained Baylor students, and will save time and shipping expenses.
- The HCN instrument repair and evaluation will occur immediately, so that the instrument is ready to ship back out.
    - Upon instrument evaluation at Aerodyne, we will notify AQRP and TCEQ of the expected repair timeline.
- **We propose to cancel the fall measurement campaign, and extend the spring measurement campaign by 45 days, for a total of 66 measurement days**, beginning in March when $(BC)^2$ network sites first get turned on, in advance of the April 1st $(BC)^2$ network start.
    - The full 66 HCN measurement days will be allocated to this Spring measurement period, giving us a better chance of catching a biomass burning event.
    - In the event of significant wintertime fires, we will reconsider this plan. We expect the instrument can be shipped and integrated into the trailer within 10 days.

Goals and Anticipated Issues for the Succeeding Reporting Period

The $(BC)^2$ project continues to push for site power upgrades to occur in the next reporting period. We also plan to evaluate and repair the HCN instrument at Aerodyne.

The HCN instrument will be evaluated upon receipt at Aerodyne, and AQRP and TCEQ will be notified of the expected repair timeline.

Challenges in getting the site electrical work scheduled continues to be of concern. The proposal above mitigates these issues by moving HCN measurements to the "spring window".

Detailed Analysis of the Progress of the Task Order to Date

The project fall campaign has been delayed due to delays in site electrical upgrades and instrument issues.

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 (ie: 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 to take over project management and reporting during her absence. He is already heavily involved in the project.

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

☒ **Yes** ☐ **No**

As described in detail above, the continued challenges with site electrical upgrades, in combination with instrument electrical issues have delayed the planned "fall" campaign. Above, we propose an alternative plan that will meet the science goals of the project, subject to AQRP and TCEQ approval.

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

See above sections: site electrical upgrades, instrument repair.

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

Dr. Tara Yacovitch, PI
Conner Daube, Interim PI