AQRP Monthly Technical Report

PROJECT TITLE	**Dallas Field Study (DFS); Ozone Precursors, Local Sources and Remote Transport Including Biomass Burning**	**PROJECT #**	22-010
PROJECT PARTICIPANTS	**Dr. Ed Fortner PI**	**DATE SUBMITTED**	05/10/2023
REPORTING PERIOD	**From:** 4/01/2023 **To:** 4/30/2023	**REPORT #**	9

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

Task 5: Campaign Execution:

The campaign intensive occurred from April 2 – 24. The Aerodyne Mobile Laboratory (AML) was based out of RV Ranch in Mansfield TX from Apr 2 – 9 and then moved its base to Meacham Field in Fort Worth from Apr 10-24. The Mansfield site was close to many large industrial point sources in the Midlothian TX area and the stationary data at Mansfield could serve as an upwind or downwind site when winds were out of the South or North respectively. The Meacham Field Site provided the advantage of the AML being co-located with both a TCEQ monitoring station and the Baylor university atmospheric chemistry trailer associated with Project 22-006.

The campaign featured the measurement of many large point source emitters in the DFW region. Point source measurements were carried out on 14 days at a variety of locations within the DFW metropolitan area. Over 50 industrial facility point sources of interest were measured with over 30 facilities preliminarily identified as emitting measurable plumes of gas phase and particle phase compounds above the neighborhood background levels. On four days the AML conducted a more general upwind/downwind measurement experiment where inflow to DFW and outflow from the metropolitan area was measured on a given day by placing the AML in two different locations and conducting stationary measurements for 2 – 6 hours at both the upwind and downwind sites. This was done both on weekend days and weekdays and under both North and South winds. The AML also directly measured a wildfire on one measurement day. This fire could have potentially impacted the DFW metro air quality at some point during the campaign, so it was useful to obtain a direct measurement of it.

Task 6: Preliminary Data Analysis:

At this time data analysis conducted has been for the purpose of guiding future measurements on a daily basis. Areas of signal enhancement are recognized wind conditions are considered and

determinations are made regarding the source of the signal enhancement. A couple of examples are discussed below primarily to give an indication of the thought process used in near real time preliminary analysis guiding future mission planning. These examples are a very small subset of the total number of facilities looked at and plumes encountered.

Johns Manville Cleburne TX

On April 7th while conducting measurements in Cleburne TX a plume of organic aerosol was encountered emanating from the Johns Manville plant (figure 1). This was one of the more straightforward plume transects to analyze due to the ability to conduct a close upwind and a close downwind on this day which featured a consistent East-Northeast wind. Attempts are always made to go to facilities which have the correct road structure surrounding them to enable close upwind and downwind transects given the correct wind orientation with a limited number of potential interferences. While figure 1 only depicts one transect there were multiple transects of this plume on this day.

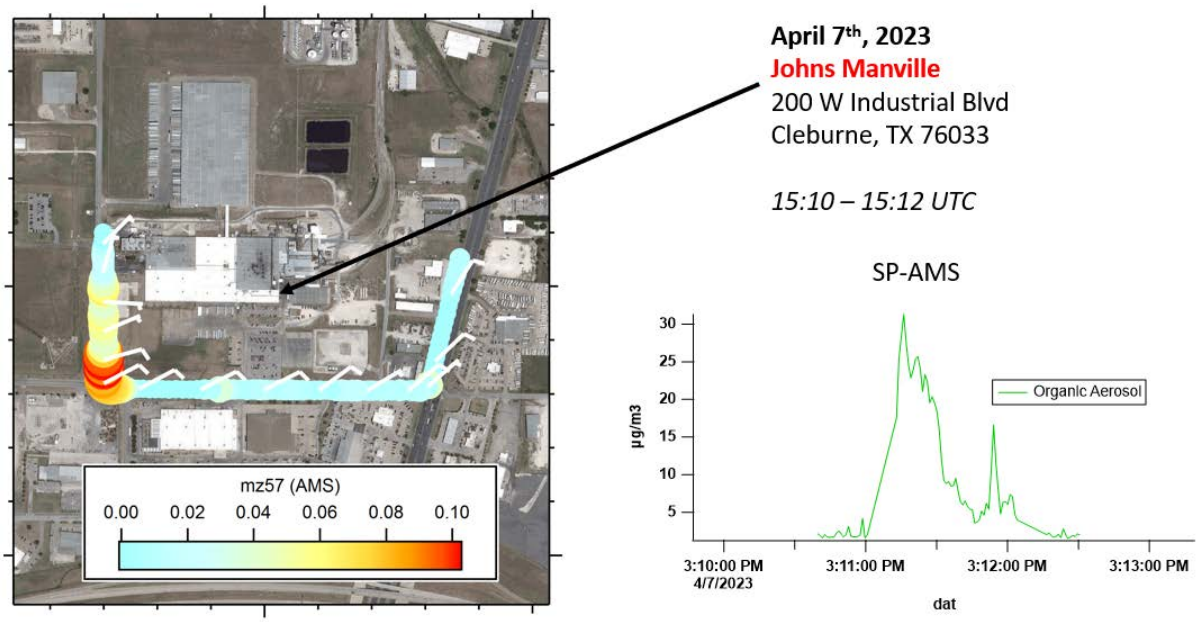

Figure 1; The map at left shows the route of the AML colored by concentration of mz 57 as measured by the SP-AMS is an organic dominated mz. The matching time series for total Organic is depicted at right (preliminary data)

Dartco/Owens Corning Waxahatchie TX;

A more difficult to interpret sequence of measurements conducted in the Waxahatchie area is interesting to consider. There are multiple facilities in this area and there are roads present to sample on however the road structure is not gridlike and under many different wind vectors it is difficult to isolate just one potential source. On April 4th while driving in the Waxahatchie area a clear plume is encountered immediately downwind of the Owens Corning facility. Winds were strong out of the South on this day, VOC's detected by the VOCUS instrument showed immediate enhancement (figure 2). It should also be noted that Dartco Container Corporation is further downwind of this plume so it is hard to rule out any impact from the Dartco facility.

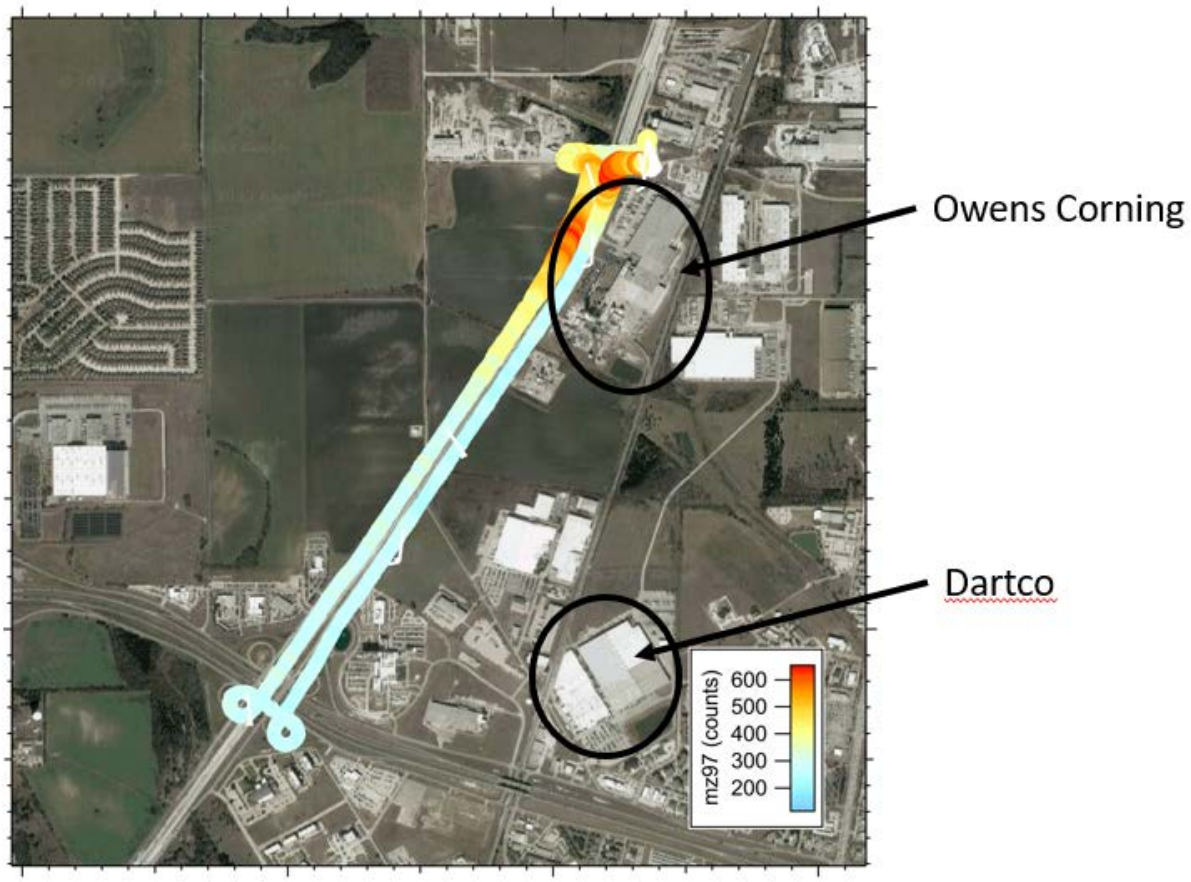

Figure 2; The route of the AML is depicted by the colored trace. The trace is colored by mz 97 counts from the VOCUS typically attributed to vinyl chloride.

The next day April 5th winds shifted to being out of the Northwest and while this wind does not work well for sampling Owens Corning it is useful for sampling Dartco. Figure 3 depicts measurements of a plume immediately downwind of the Dartco facility. The AML was able to park in this plume enabling GC-EIToF measurements of this plume in addition to the typical one second measurements of gas phase and particle phase species.

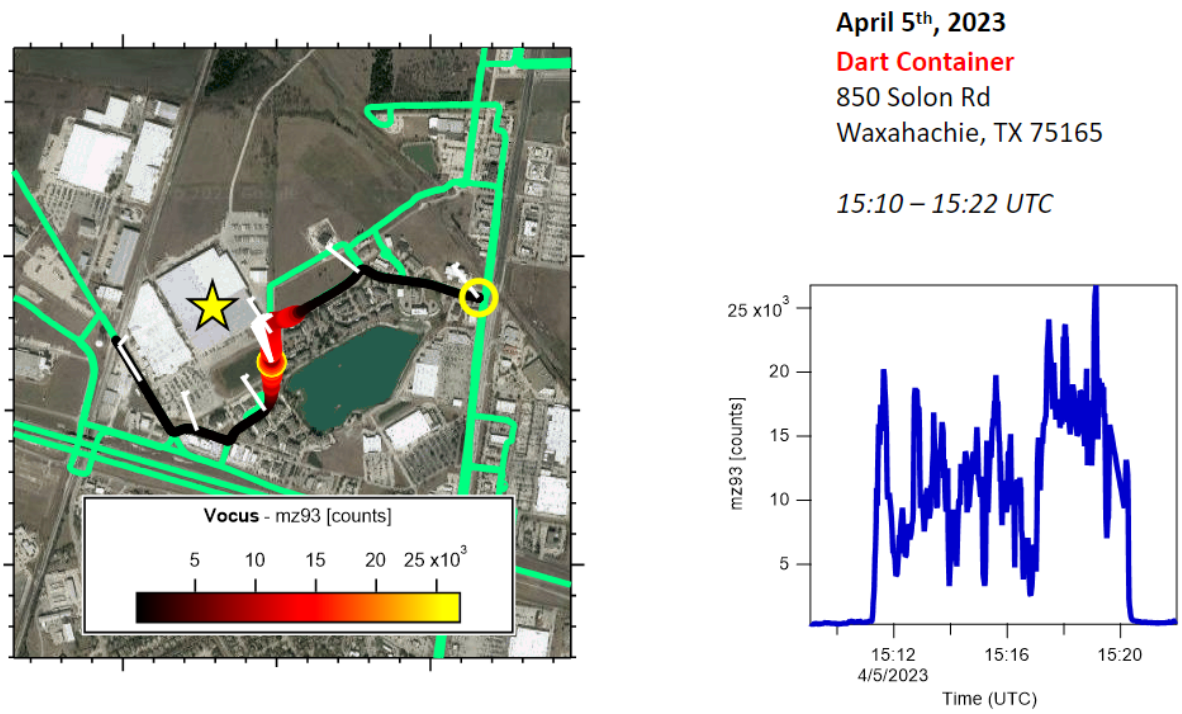

Figure 3; The route of the AML is depicted at left colored by the mz93 (toluene) intensity as measured by VOCUS and the time series of mz 93 (toluene) is depicted at right.

Finally on April 10th measurements were conducted in the Waxahatchie area with an East wind. This wind worked well for measuring both Owens Corning and Dartco without their respective plumes overlapping each other (figure 4)

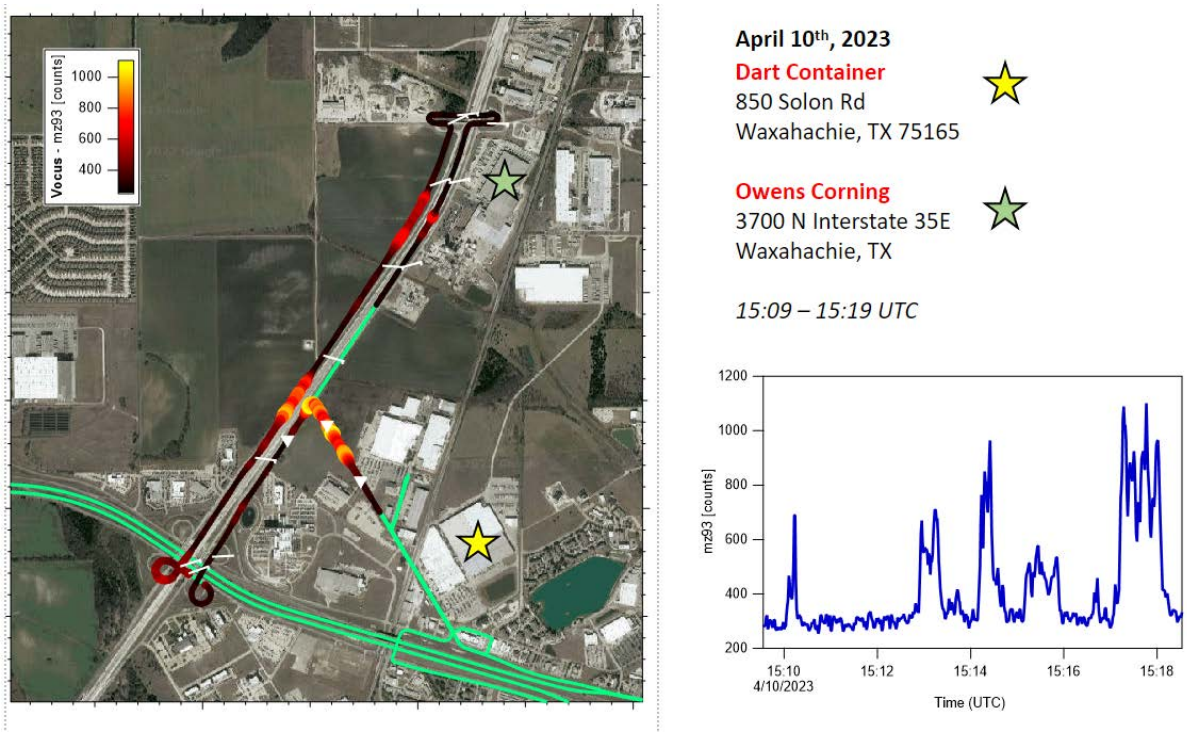

Figure 4; The route of the AML is depicted at left colored by the mz93 (toluene) intensity as measured by VOCUS and the time series of mz 93 (toluene) is depicted at right.

Preliminary Analysis
Described in Task 6 above.

Data Collected

All raw data from all instrumentation has been saved on respective instruments and at a central server location at Aerodyne. Analysis of this data has begun.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

No new problems or issues encountered. The intensive campaign was successfully executed and now data analysis is occurring.

Goals and Anticipated Issues for the Succeeding Reporting Period

During this next reporting period significant efforts towards quality assuring the various gas phase particle phase and other time series measured parameters will occur.

Detailed Analysis of the Progress of the Task Order to Date

Task 5 was successfully executed and the assistance of the Fort Worth Meachum Field airport personnel as well as AQRP and TCEQ personnel towards making facilities available to our measurement team is greatly appreciated. Task 6 (Data Analysis) is underway and on schedule.

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**

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

☐ **Yes** ☒ **No**

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

No new concerns or issues.

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. Ed Fortner, PI