

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	07/10/2023
REPORTING PERIOD	From: 6/01/2023 To: 6/30/2023	REPORT #	11

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 6: Data Analysis:

During the month of June the focus of data analysis has been entirely on completing quality assured (QA) time series waves for the many different parameters measured during the Dallas FS field study. This task is complete for most instruments. The GC-EI-ToF instrument is currently still being analyzed and time series being developed. The personnel qualified to process this data are limited and they have been delayed somewhat by other commitments, but they do expect to have completion of QA time series by mid-July. Additionally HCN, C₂H₂ and H₂O measurements are still being QA at this time.

Unfortunately, during the analysis of the TILDAS CH₄, C₂H₆ and CO data it became apparent that a problem with the inlets to those systems existed from 04/03 – 04/14. This inlet issue was discovered in the field on 04/14 and corrected at that time but the overall extent of the impact to data quality was unclear until the data was analyzed during the QA process. Details of this inlet leak follow.

On 4/14, the field team discovered a major leak on the low-pressure side of the pressure controller upstream of the mini-TILDAS. This leak occurred at the location marked “truck air” in the schematic below (only 3 TILDAS drawn, there were 4). The upstream gas phase instruments for CO₂, Ozone and NO_x/NO₂ were not affected, and neither was the dual TILDAS for ethylene oxide. The other spectrometers which measure gas and particle phase (VOCUS, GC-EI-ToF, SP-AMS) are also either upstream of this leak or on a different inlet.

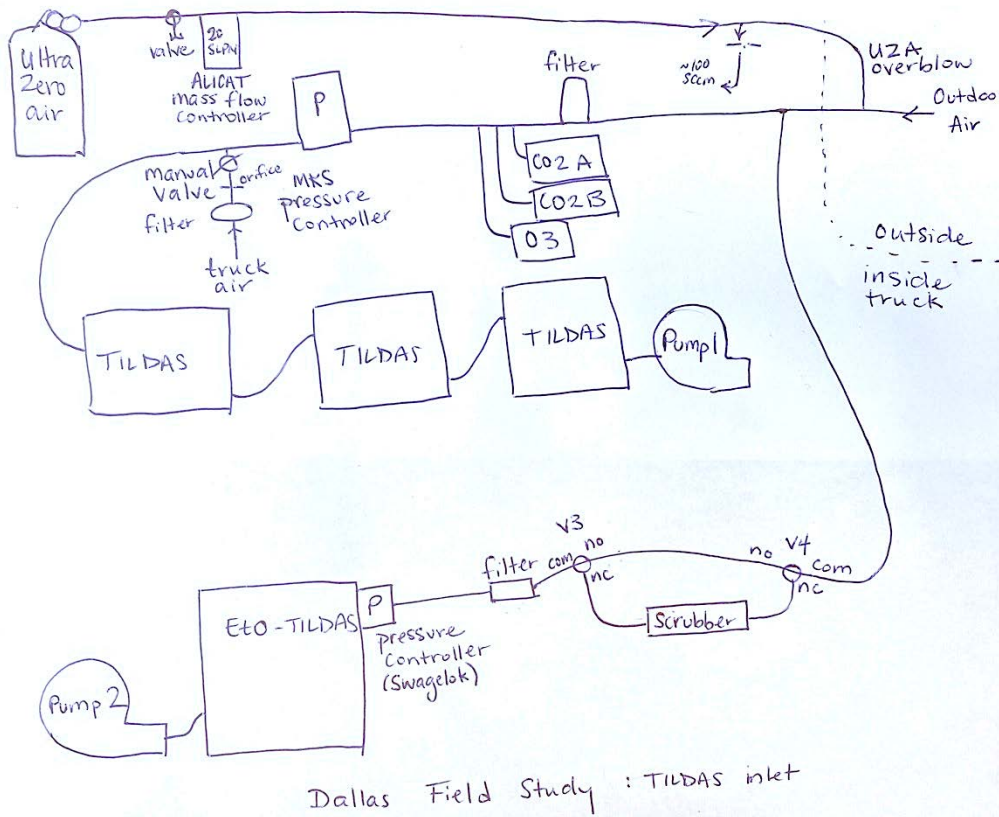


Figure 1. Gas Phase Inlet Diagram

The impact of this inlet leak is severe – about 75% of the measured air was originating from inside the mobile lab, as quantified by the offsets visible in the zero air overblows. This problem with the zero levels was noted early in the campaign but incorrectly diagnosed as being due to impurities in the UZA cylinders.

For the affected TILDAS data prior to the 14th, the truck acts as a large integrating volume with a time constant of 15-30 minutes. The truck air shows slow plumes, with fast spikes from the outdoor air on top if it. This is particularly evident for mobile methane measurements of a landfill on 4/14. We can compare the fast rise and slow decay with the inlet leak present (left, red) with the fast response measurements (right, blue) after the inlet leak was fixed.

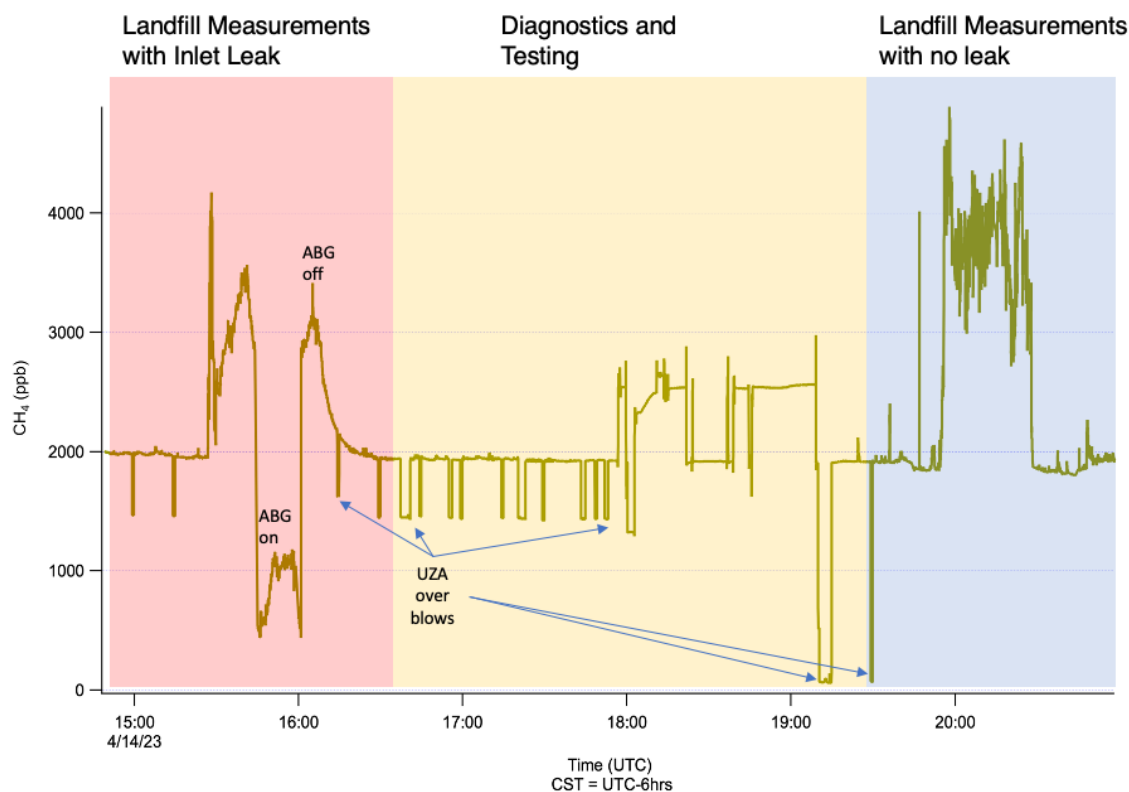


Figure 2. Methane time trace before and after inlet leak correction. Before the leak (shaded red area), the time response is slow, with a fast rise. Zero air overblows only descend from 2000 ppb to 1500 ppb. After the inlet leak is corrected (shaded blue area), the instrument zeroes completely and the time response is fast.

Several mitigation strategies were taken when this leak was discovered. 1) High-importance sites like the landfill above were re-visited after the inlet leak was corrected; 2) auxiliary measurements of CH_4 , C_2H_6 and HCHO from the unaffected EtO-TILDAS were analyzed and produced as a separate data product; 3) stationary data prior to the 14th was kept in the data stream, with the assumption that ambient concentration measurements should be correct, long as the time constant is considered.

Task 7: Finalized Dataset:

Datasets have been completed as detailed in Task 6 above.

Preliminary Analysis

The submission of data has enabled the comparison across instrument platforms at different time periods of interest. QA time series are being examined to better understand where periods of interest are located and stories around specific events are being developed.

Data Collected

All raw data from all instrumentation has been saved on respective instruments and at a central server location at Aerodyne. QA datasets as described in Task 6 have also been saved at a central server location at Aerodyne.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

The inlet issue described above in Task 6 is noted along with the mitigations to deal with the issue.

Goals and Anticipated Issues for the Succeeding Reporting Period

Stories of interest will be developed and the Final Report will be written (Draft submitted) during this next reporting period.

Detailed Analysis of the Progress of the Task Order to Date

Task 6 data analysis is slightly delayed with respect to the EI-GC-ToF instrument but otherwise has been completed on schedule. Task 10 (Draft Final Report) is being undertaken currently.

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

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