

## AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Sources of Organic Particulate Matter in Houston: Evidence from DISCOVER-AQ data Modeling and Experiments	<b>PROJECT #</b>	14-024
<b>PROJECT PARTICIPANTS</b>	Lea Hildebrandt Ruiz and Ying Xu (The University of Texas at Austin) Greg Yarwood Bonyoung Koo (ENVIRON) Gookyong Heo (University of California, Riverside)	<b>DATE SUBMITTED</b>	2/8/2015
<b>REPORTING PERIOD</b>	<b>From:</b> January 1, 2015 <b>To:</b> January 31, 2015	<b>REPORT #</b>	8

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 15<sup>th</sup> of the month following the reporting period shown above.

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### Detailed Accomplishments by Task

#### Task 2. Environmental Chamber Experiments and Box Modeling

Analysis of the first trial experiment revealed that all IVOCs appear to exhibit some wall loss, but at different rates. The two Tenax samples collected during each experiment are insufficient to calculate wall loss rates for these these experiments. Thus, additional trial experiments were conducted during which four IVOCs were injected into the chamber and five Tenax tubes were collected (approximately 15 minutes apart) to obtain information on IVOC concentrations and wall losses at higher time resolution. Analysis of these additional experiments is currently underway.

Valve switching and temperature control of the thermodenuder was automated, and a cage was built for the thermodenuder for protection from warm / heated surfaces. The thermodenuder is now ready for use in the SOA formation experiments.

#### Task 4. Photochemical Modeling

Volatility distribution of primary organic compounds varies by different source sectors. Based on recent chamber data, the CAMx VBS model applies different volatility distribution factors for gasoline vehicles, diesel vehicles, meat cooking, and biomass burning emissions. However, pre-merged emission inputs for those categories are not readily available in the 2013 Texas ozone forecast modeling database that this study plans to use for the DISCOVER-AQ modeling.

ENVIRON obtained the emission inventory processing data from TCEQ and examined the source profiles to estimate average fractions of the emissions for those categories.

#### Task 5. Discover-AQ Data Analysis – UT Austin

We continued analysis of gas-phase data from the High Resolution Time – of – Flight Chemical Ionization Mass Spectrometer (HR-ToF-CIMS) operated in negative ionization mode. Time series and diurnal cycles of molecular ions identified may be useful and insightful for the physical interpretation of positive matrix factorization (PMF) results.

#### Task 6. Positive Matrix factorization – ENVIRON and UT Austin

Upon recommendation by experts at Aerodyne Research we explored inclusion of inorganic compounds (sulfate, ammonium, nitrate) in the PMF analysis. However, the inclusion of the inorganics is unconventional and did not seem to yield additional insights, so we decided to focus on the PMF results from organic mass spectra only.

### **Identify Problems or Issues Encountered and Proposed Solutions or Adjustments**

#### Task 2. Environmental Chamber Experiments and Box Modeling

Trial experiments revealed issues with injection of one of the IVOCs, which is in a solid form at room temperature. In the first trial experiment we tried to let the compound sublime; however the measured concentrations were much lower than the targeted concentration, suggesting that the compound was either injected inefficiently and/or decomposed during injection. In subsequent trial experiments we first dissolved a compound in hexane and then injected the solution; we are still waiting for the results from that experiment.

### **Goals and Anticipated Issues for the Succeeding Reporting Period**

#### Task 2. Environmental Chamber Experiments and Box Modeling

The focus over the next month will be to conduct 2-3 experiments every week in order to evaluate the SOA yields of the IVOCs of interest. (This work was delayed due to issues with the GC-MS system.)

#### Task 5. Discover-AQ Data Analysis – UT Austin

Results from the analysis of inorganic ions from collected filters should be available by the end of February. The analysis is performed by researchers at the Desert Research Institute. Time series and diurnal cycles of molecular ions measured by the HR-ToF-CIMS will be analyzed and may be used in the physical interpretation of PMF factors.

Task 6. Positive Matrix factorization – ENVIRON and UT Austin

We anticipate that we will complete the PMF analysis by the end of March.

**Detailed Analysis of the Progress of the Task Order to Date**

Progress to date has been appropriate. There have been delays, but overall we do not anticipate problems completing all project tasks by the end of the project period (June 30, 2015).

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Submitted to AQRP by: Lea Hildebrandt Ruiz

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