Statement of Work
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Title: West Valley High Time Resolution Air Toxics Monitoring Campaign

Two air sampling campaigns that will be carried out in West Valley City, UT during the winter and summer months using a suite of state-of-the-art instruments. Data from this study will allow for an estimate of population exposure to HAPs. West Valley City is a municipality with a rapidly expanding population (2nd largest in Utah) to the west of Salt Lake City, with relatively lower income, significant minority population, and potential exposure to HAPs. The instruments will be based at West Valley City's Neil Armstrong Academy, an elementary school dedicated to science, technology, and mathematics, thereby providing unique outreach opportunities to arise out of this project. The winter study (December-February) will emphasize the measurements of HAPs in the gas and particulate phase, including diesel particulate matter during the inversion season. Measurement of the organic component of particle matter during the two air sampling campaigns will be accomplished using a new instrument developed at Brigham Young University called the Organic Aerosol Monitor (OAM).

One main advantage of the OAM is its ability to monitor fine changes in chemical speciation of ambient particles. The data analysis software is linked to the National Institute of Standards and Technology (NIST) standard Mass Spectral database, which allows for rapid identification of detected compounds based on the retention time and mass spectrum. The NIST database allows for identification of about 80% of the compounds in the EPA's HAPs list. The library in the OAM software is expandable and compounds can easily be added to the system as needed.

Researchers from Brigham Young University will be primarily responsible for the following two elements of the air sampling campaign:

1) *determine the chemical speciation of PAHs and diesel particulate matter in the particle phase as well as estimate the particle toxicity during high $PM_{2.5}$ pollution episodes in the winter and summer; and*
2) *conduct a source apportionment analysis using the high temporal resolution dataset of HAPs and related species.*

Analysis of the particulate data will occur in 3 steps:

Step 1: Interpretation of the GC/MS monitor data. The OAM software will identify target compounds, based on retention time, observed spectra, and comparison with the primary compound database for: i) all identifiable PAH compounds in the sample; ii) all particulate compounds in the EPA HAPs list which are included in the NIST database or for which data from standard compounds can be added

Step 2: PMF interpretation. The data obtained from each sampling campaign will be used in PMF analysis as both joined and separate datasets. Other hourly gaseous and meteorological parameters collected at the site will aid in the source apportionment analysis. Drawing upon our past experience with such rich datasets, we will be able to identify gasoline and diesel sources, wood smoke emissions, major secondary formation processes in the atmosphere, and specific sources based on the GC/MS marker data.

Step 3: Factor Analysis of the Sources or Atmospheric Processes Associated with Gas Phase Toxic Compounds. Measurements with the PTR-MS will provide a rich dataset of highly resolved gaseous HAPs. The analysis methods and PMF analysis will identify many of the factors that are associated with primary and secondary sources of HAPs in this location. A factor analysis will be

conducted using these hourly averaged PMF results and the PTR-MS measurements of gas phase HAPs to identify links between the particulate and gas phase HAPs.

Schedule of activities

Activity	Date
Winter air sampling campaign (instrument set-up and collection of data)	Oct. 2015-March 2016
Preliminary data analysis	March 2016-June 2016
Summertime air sampling campaign (instrument set-up and collection of data)	June 2016-July 2016
PMF analysis and manuscript writing	Aug. 2016-Sept. 2017

Deliverables

(1) The OAM will be installed and operated at the Neil Armstrong Academy from Oct. 2015-March 2016

(2) Data from the wintertime air sampling campaign will be available for analysis by August 2016

(3) The OAM will be installed and operated at the Neil Armstrong Academy from June 2016-July 2016

(4) PMF analysis of both the winter and summer time air sampling campaigns will be available in a final report by Sept. 2017