DAQ Aethalometer Study for Estimating Woodburning Compliance
PI: Kerry Kelly, University of Utah

Statement of Work
The University of Utah Department of Chemical Engineering will collaborate with the DAQ to estimate the contributions of wood burning to winter-time $PM_{2.5}$ levels using aethalometer data from four locations and from mobile aethalometer measurements. The goal of this study is to identify and understand levels of wood burning and compliance with wood-burning restrictions during the winter of 2018/2019. The work is divided into three tasks:

Task 1.   Stationary monitoring. The PI and her students will collect and analyze aethalometer data from 7-channel aethalometers sited at four locations. The plan is to locate the aethalometers at four DAQ monitoring stations between December 1, 2018 and February 28, 2019. The University of Utah (UofU) will:

- Deploy their aethalometer, at either Rose Park or Hawthorne, and the final location will be selected in consultation with DAQ. The UofU will be responsible for the installation of their aethalometer, data collection, and maintenance. They will work with DAQ on the exact location of the aethalometer, including exact location in the trailer and the ports in one of DAQ's trailers. They will collect their aethalometer data weekly and ensure that the equipment is operating properly.
- Analyze the 7-channel aethalometer data to estimate the contributions from brown carbon, which is indicative of brown carbon. In completing this task, we will seek to develop an automated method (i.e., Python script) to analyze the aethalometer data.
- The UofU will estimate hourly and daily brown-carbon contributions for each of the four locations. They will also normalize the brown carbon concentrations by temperature and heat deficit, and group the measurements into burn and no-burn days to assess compliance with burning restrictions.
- The UofU will remove their aethalometer from the DAQ trailer during 1 month to complete Task 2. They will reinstall it when Task 2 data collection is complete.

To support this task, the DAQ will locate their 3 aethalometers at 3 of their monitoring stations. They will be responsible for installing, collecting data at regular intervals, and maintaining their aethalometers. The DAQ will also provide a list of burn and no burn days.

Task 2.   Mobile monitoring. The UofU will collect estimates of wood-burning contributions to $PM_{2.5}$ levels, and they will focus on contributions from wood burning from commercial operations. They will drive a route, selected in cooperation with DAQ, and measure $PM_{2.5}$ and brown carbon concentrations with an aethalometer. The mobile monitoring will take place 2 to 3 evenings per week (approximately 3 hours each trip) for one month. The exact schedule will depend on weather and road conditions. The UofU will provide maps of brown carbon contributions, and they will also note locations where they smell or see wood smoke.

To support this task, the DAQ will lend the UofU their vehicle for mobile sampling. The UofU

will ensure that any students or staff driving the state vehicle have a driver's license and have taken the state's required training for driving a state vehicle. The DAQ will also provide a list of commercial wood-burning operations and work with the UofU to develop a sampling route.

Schedule of Deliverables
The PI and her staff will complete the following deliverables:
- December 2018.
  - Install the UofU aethalometer at a DAQ monitoring station.
  - Draft a route for the mobile sampling in cooperation with DAQ.
  - Begin development of an automated data analysis strategy for the aethalometer data.
- March 2019.
  - Complete mobile and stationary sampling.
  - Preliminary reporting including drafts of mobile maps and summary of stationary results.
- Ongoing: quarterly reports
- July 2019: final/annual report
- Sharing of data as DAQ requires, either through the UofU or DAQ portals.

See attached budget.