**Understanding how Wood-burning’s Contributions to Particulate Matter Concentrations Have Changed over Time**

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Wood burning is a significant contributor to PM2.5 (particulate matter with an aerodynamic diameter of 2.5 µm and less) levels along the Wasatch Front. For example, on a typical winter day (Nov – Feb) during the years 2007 to 2009, wood burning contributed approximately 17 – 19% to PM2.5 levels. Several counties along Utah’s Wasatch Front are subject to elevated PM2.5 levels associated with winter-time persistent cold air pools (PCAPs). To decrease particulate emissions during PCAPs, the Utah Division of Air Quality (DAQ) issues mandatory and voluntary no-burn days, during which time residential solid-fuel burning is restricted. In addition, the state, UCAIR, and the federal government have funded programs to convert wood-burning fireplaces, inserts or stoves to natural gas or EPA-certified devices. Finally, numerous organizations and media outlets have improved awareness of burn conditions and the health effects associated with wood smoke.

The main objective of this study is to understand how wood-burning’s contribution to winter-time PM2.5 levels have changed over time, from 2007 through the 2017/18 winter season, and how effective efforts have been to curtail wood burning during PCAP events. Specifically, we applied Positive Matrix Factorization (PMF) source apportionment modeling to identify the contributions from primary and atmospherically processed, aged wood smoke. The modeling included PM2.5 chemical composition from Chemical Speciation Network (CSN) sites for Bountiful, Salt Lake City and Lindon from 2007 to summer 2018. Winter-time PM2.5 levels are linked to meteorological conditions, and we considered differences in these conditions, specifically by normalizing the PMF results by the winter-time atmospheric stability (defined by heat deficit).

Our results suggest that the increased public awareness and the compliance with wood-burning restrictions have led to a decrease in wood-burning emissions by a factor of 2 to 10 over the past 10 years for the three monitoring stations studied. In addition, as expected higher wood-burning levels were observed for cooler days, which may be associated with an increased need for heat as well as a decrease in atmospheric mixing.

In addition, we will highlight two additional components of our work: (1) the development a strategy for estimating compliance with wood-burning restriction that relies on aethalometer measurements and heat deficit estimation, and (2) a publicly available tool that can be used to view and download aethalometer data and heat deficit.