Submission to the AWMA Symposium On Air Quality Measurement Methods And Technology, March 15-17, 2016, in Chapel Hill, North Carolina
Draft copy for review purposes only, not cleared for publication, version 9/30/2015

Assessment of Component-level Emission Measurements Using a High Volume Sampler at Oil and Natural Gas Production Pads in Utah

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Oil and natural gas (ONG) production facilities have the potential to emit a substantial amount of greenhouse gasses, hydrocarbons and hazardous air pollutants into the atmosphere. These emissions come from a wide variety of sources including engine exhaust, combustor gases, atmospheric venting from uncontrolled tanks and leaks. Engine exhaust, combustor gases and atmospheric tank venting are included in the initial estimation of a production facilities cumulative emissions. However, there is a large amount of uncertainty associated with magnitude and composition of leaks at these facilities. In order to understand the environmental impacts of these emissions we must first be able characterize the emission flow rate and chemical composition of these leaks/venting. A number of recent publications regarding emission flow rate measurements of components at ONG production facilities have brought into question the validity of such measurements and the sampling methodology. An accurate methodology for quantifying hydrocarbon leaks/venting is needed to support both emission inventories and environmental compliance.

This interim report will summarize recent results from a small leak survey completed at ONG production facilities in Utah to characterize their flow rate and chemical composition using a suite of instruments using a high volume sampler (Bacharach Hi Flow Sampler; Bacharach, Inc.), as well as infrared (IR) cameras, a photoionization detector (PID), a flame ionization detector (FID), and sub-atmospheric canisters. The leaks were first identified by conducting an IR camera survey. Identified leaks were measured using a HVS to determine flow rate, PID and FID to determine hydrocarbon concentrations and canisters for laboratory evaluation of chemical composition. Multiple HVS measurements were made at each leak to verify consistent flow rate and concentration. By comparing PID, FID and canister samples, the distribution of hydrocarbons as well as hazardous air pollutant composition can be characterized for each leak. This research provides a unique approach to simultaneously determine flow rate and chemical composition of leaks at ONG production facilities while simultaneously using both innovative and industry standard technology.