

Efficiency and Emissions of Flares Burning Non-Hydrocarbon Aerosols in the Flare Stream

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Hydraulic fracturing of gas bearing rock or shale is rapidly emerging as a dominant method for natural gas and tight oil production in Canada, the US and elsewhere globally. Fracturing fluids typically include small amounts of chlorine containing acids and salts that can be carried over into the produced gas stream during well completion, liquid unloading, purging, or testing. When these non-hydrocarbon liquids are carried over as aerosols into flare systems, there is a potential to affect flare efficiency and emissions. The AUPRF steering committee has identified this specific issue as priority knowledge gap to be addressed. Building directly on our 2012 AUPRF funded project at the University of Alberta to conduct exploratory investigation of particulate concentrations in highly idealized lab-flames, this project will conduct quantitative emissions and conversion efficiency measurements in controlled, large-scale lab-based turbulent flares.

Experiments will be conducted in the new large-scale flare facility being completed at Carleton University in which different representative fracturing fluid mixtures will be aerosolized and injected into the flare stream in controlled amounts.

This research will directly address two policy issues: 1) “Improving air emissions inventories through improved emissions factors and reporting methodologies” focusing on the specifically identified associated knowledge gap “potential emissions associated with flaring non hydrocarbon liquids”; and 2) Identification and estimation of sources of emission for substances of concern. The proposed project builds directly on previous AUPRF and NRCan co-funded research and brings together collaborators with a range of research expertise to address these critical research issues.

Policy Issue

Improving air emissions inventories through improved emissions factors and reporting methodologies.

Knowledge Gap

A project that assesses currently available emission factors for particulate matter speciation and supplements this data with test data, if appropriate, is required.