EXECUTIVE SUMMARY

This report presents interim results from "Evaluation of Emission Quantification Technologies", a research program undertaken by the University of Waterloo (UW), Arolytics, Inc., and Carbon Management Canada (CMC) on behalf of the Petroleum Technology Alliance Canada (PTAC) and the Clean Resources Innovation Network (CRIN). The overall objective of this research is to survey candidate methane emissions quantification technologies and assess their performance under a range of industrially relevant scenarios. A key focus is placed on the estimation of uncertainty, which is endemic to emissions quantification.

Research tasks are divided into four phases: Phase 1 is a survey of candidate emission quantification technologies available to industry and their overall capability and suitability for various emissions scenarios; Phase 2 assesses the performance of candidate technologies through simulations and laboratory-scale measurements; Phase 3 is the planning and execution of field campaigns; and Phase 4 focuses on data analysis and detailed uncertainty quantification.

This report focuses on Phases 3 and 4, specifically the design, execution, and preliminary analysis of results from the first field campaign, held at CMC's Field Research Station in Newall County, Alberta, April 20-24, 2022. Five emission services providers or technology developers participated in the first field campaign, using four different quantification modalities: handheld quantitative optical gas imaging (QOGI), truck mounted tunable-diode laser-absorption spectroscopy (TDLAS), drone-mounted TDLAS, and airborne short-wavelength infrared (SWIR) hyperspectral imaging. Release rates were blind to the Providers, who were responsible for deriving their own emissions estimates from their measurements. In the case of the truck mounted TDLAS, a second analysis was carried out on the data by UW personnel using an alternative measurement model. Preliminary data analysis reveals that the quantification accuracy and precision of each technology is distinct and depends on emission rate and environmental factors in a unique way from the others.

The report concludes with a discussion of next steps, including planning for the second field campaign, planned for Fall 2022, and detailed uncertainty quantification (phase 4), which will be complete in 2023.