Quarterly Report

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Prepared for: Pipeline and Hazardous Materials Safety Administration (PHMSA)
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General Information required on all Public Quarterly Reports

Results and Conclusions:
Preliminary results were obtained from experiments and numerical modeling to evaluate capacity and performance. These initial findings will ultimately aid us to understand the conditions that affect gas migration and migration mechanisms. Field experiments are currently under design. Experiments will be conducted in existing testbeds at the Methane Emissions Technology Evaluation Center (METEC) in Fort Collins, Colorado. A proof of concept, three-dimensional model that includes six components: water, brine, $CH_4/CO_2/N_2$, gas tracer, air, and heat was tested against preliminary field-scale experiments. Simulations were run to assess the effect of environmental conditions on gas migration including soil moisture, soil temperature, leakage rate, obstructions and overlapping pipelines around the leaking point.

Plans for Future Activity:
Future experiments will focus on developing a quantitative method to predict leakage rates based on above-ground gas concentrations and wind conditions. These experiments will evaluate (1) the extent of subsurface gas migration over a range of realistic natural gas leakage rates, and (2) the effect of wind conditions on above-ground gas concentrations that arise from underground leaks. Results from these studies will be used to calibrate numerical models to predict gas above-ground and below-ground migration behavior for a wider range of potential field conditions. Future modeling work will be extended to different obstruction conditions, vegetation, soil layering, and other environmental parameters. We will also continue to develop a field based survey tool with our industry participants.