Large Scale Experiments on Hydrogen Jet Fires For Pipeline Safety

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ABSTRACT

Hydrogen is widely used in the refining and chemical industries. It also has great potential as an alternative energy carrier since it is clean burning and produces near-zero greenhouse gas emissions.

Pipelines are the most economic way to deliver large quantities of hydrogen to industrial customers. As hydrogen becomes widely used as a transportation fuel, a pipeline infrastructure will be required for distribution.

The study of hydrogen jet fires is motivated by the need to adequately assess the consequences of a potential underground hydrogen pipeline failure. A series of experiments was commissioned by Air Products to measure the thermal radiation from hydrogen jet fires. First, experiments were conducted with hydrogen released from 3/4” and 2” pipes and deliberately ignited to produce jet fires. Second, two experiments were performed with a buried 6” pipe which was intentionally failed to generate a full bore release of hydrogen gas. The hydrogen was ignited immediately following the pipeline failure. The pipeline was buried 1m in a typical topsoil in the first test and in a mixture of sand and topsoil in the second test. The release characteristics, the thermal radiation and the maximum flame length were measured in all experiments.

The data from these experiments are being used to improve our modeling of the thermal radiation from hydrogen jet fires.

Keywords: Hydrogen gas pipeline, jet fire, thermal radiation