Project Profile

Project Name:	Acid Gas Accidental Release Control Methods
Project Number:	ES-Well-2019-02
Proponent:	Ray Mireault
Funding Envelope:	Engineering and Safety Research—Wells, Facilities and Other
Timeframe:	October 15, 2018 to July 31, 2019

Project objectives

The objective of the project is to:

- Increase the understanding of the unique thermodynamic aspects of acid gas releases and associated challenges of safe mitigation, through the documentation of relevant science and technical knowledge.
- Identify potentially effective acid gas release control methods and equipment for the two release scenarios (low rate and medium-high rate) for further discussion and evaluation.

Project description

The project will:

- inform and identify options for safe mitigation (i.e. control) of two acid gas release rate scenario types: a low and finite release scenario and medium to high release rate scenario. Potential control methods might include the feasibility of pumping oxygen and heat into the plume in order to ignite and dissipate it and thereafter undertake conventional well control operations. The study will also consider the practicalities of well control operations from a distance (remotely) for medium and high release rate scenarios, and identify areas for further study and discussion.
- involve an engineering analysis of wellbore dynamics including consideration of well depth, the thermodynamics of various fluid phase changes, reservoir pressure and resulting release conditions.

A literature review to study comparable releases and devised control methods will be undertaken. .

Project background

Acid gas disposal involves injection of liquefied waste products, H2S and CO2, into deep underground storage reservoirs. An uncontrolled release of these wastes due, for example to a loss of well control, is extremely unlikely. However, due to the high toxicity and the low flammability and non-buoyancy of these waste products, potential health, safety and environmental (HS&E) consequences are unique, and conventional methods to safely regain well control for natural gas releases may not be effective or safe should a sustained uncontrolled release occur.

In BC, there are currently 7 active acid gas disposal wells, 5 suspended and 4 abandoned. As the Province continues to develop its unconventional gas resources, retires and/or retrofits aging sour gas processing plants, and potentially implements carbon capture and sequestration (CCS) technology, the number of acid gas disposal wells may increase. Effective regulation and management of these wells requires the development of science-based procedures for safe mitigation of loss of well control incidents should they occur.

Collaboration with international acid gas processing experts, emails with an international well control expert (Wild Well), and searches of well safety and regulatory websites indicate research to inform safe and effective well control methods involving acid gas release is needed. Specific research focus is required to. (a) Comprehensively document the thermodynamics of the system and potential gas release behaviours and risks and (b) Identify and evaluate potential well control measures that address the unique conditions and risks associated with an acid gas release.

Project deliverables

The deliverables from this project include the following:

1. A report summarizing:
    - the thermodynamics of an acid gas release, the potential Health, Safety and Environmental (HS&E) consequences resulting from a stable, non-buoyant cloud of toxic gas, and the reasons why conventional well control methods are ineffective.
    - the potential methods of blowout control in acid gas or carbon capture and storage (CCS) release scenarios, developments in new and/or specialized well control equipment, and learnings from other blowout incidents. This may include comparable scenarios from blowouts such as the natural gas storage blowout in California or the Todd Energy blowout in BC.
2. A technical presentation of the wellbore dynamics and expected plume characteristics.