Project Profile

Project Name:	Role of Structural Connectivity and Completion Types on Hydraulic Fracturing Induced Seismicity
Project Number:	Local-Seismic-2025-01
Proponent:	WSP Canada Ltd.
Funding Envelope:	Operations-Local Matters—Induced Seismicity
Timeframe:	June 1, 2024 to February 28, 2025

Project description

This project aims to explore practical engineering solutions to the mitigation of induced seismicity during hydraulic fracturing operations that can be readily applied by operators that would result in minimum loss of resource.

The research extends work done during 2022/23 (ER-Seismic-2025-01) to further understand the reactivation of faults from hydraulic fracturing by considering:

- the injection of high-pressure fluid into the subsurface;
- the diffusion of pressure and fluid away from the well completion; the stresses and pore pressures in the ground;
- the faults that may be reactivated; and
- whether there are ways to mitigate the occurrence of induced seismicity.

Access to an additional set of data, from a pad next to one of the existing data providers, allows the researcher to improve the structural characterization of the reservoir layer and further understand how pressure is diffusing through the reservoir away from the well. As these adjacent pads use contrasting completion styles, one being open holed and the other a cased hole completion, there is an opportunity to investigate how completion style may impact the resultant induced seismicity.

Project objectives

The objectives of this project are to:

- develop an improved structural characterization of Montney reservoir structures and their distribution through improvements in the modeling approach that can build conditioned simulations of subsurface structures.
- investigate if the completion style (open hole, cased hole) makes any material impact upon the induced seismicity and whether any of the availability stimulation properties might result in less seismicity.

- improve understanding of potential mitigation approaches--including injection rate, ramp up rate, injection pressure and viscosity.

Project approach

The project will consist of the following three tasks:

1. **Data Collection**
   The research project will use an additional dataset from a well pad adjacent to the previously studied pad in the initial project in 2022/23 (ER-Seismic-2025-01).

2. **Modeling and Analysis**
   This research will build on the FracMan DFN simulation workflow developed in the initial project to model and analyze the contrasting completion styles—open holed and cased hole completion. With similar structural patterns and geomechanical setting, this provides a useful examination of this aspect of the hydraulic fracturing process and how it impacts induced seismicity using 3DEC numerical simulations.

3. **Report and discuss findings.**

Project deliverables

The deliverables from this project include the following:

1. Final report.