# Project Profile

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| **Project Name:** | NEBC Velocity Model Extension (Nanometrics, Inc.) |
| **Project Number:** | Local-Seismic-2025-02 |
| **Proponent:** | Nanometrics, Inc. |
| **Funding Envelope:** | Operations-Local Matters—Induced Seismicity |
| **Timeframe:** | September 1, 2024 to January 31, 2025 |

**Project description**

The velocity model for earthquake location is a critical input for determining an accurate location and magnitude estimate. Historically, simple 1D velocity profiles with low resolution have been used as the standard across regional and national scales. These are often sufficient to characterize larger induced events and natural seismicity. In the case where seismicity is related to smaller faults and are potentially induced from anthropogenic activity, higher resolution and more accurate velocity models are required. In particular, it is important to capture the structure of the upper crust (down to approximately 10km) where oil and gas operations influence the stress fields. The goal of this project is to create a higher resolution 3D velocity model that accurately reflects the subsurface properties within the Northeast British Columbia region.

This project will use publicly available well logs and geological horizons to develop a subsurface compression (P-) and shear (S-) wave velocity model. The study area will comprise an area of approximately 180km x 120km and will involve the evaluation of over 2,000 well log files and information from multiple geologic horizons.

From the well logs, a 3D velocity model will be constructed that honors the measurements and geologic layers throughout the region. The new model will be an improvement over the current publicly available models for the region thus allowing for more accurate earthquake locations. More accurate earthquake locations, and derived properties, will allow for an improved understanding of the subsurface. For oil and gas operators, it has the potential to improve the efficiency of their stimulation operations and better assess the risks due to natural and induced seismicity. For regulators, more accurate locations enhance the ability to delineate possible induced events to better inform and protect the public through appropriate protocols.

In addition to improvement in earthquake locations, the derivative parameters and associated interpretations, the velocity model may benefit additional investigations. It may serve as a starting model for seismic migration workflows for subsurface mapping, geotechnical and fluid flow modeling, or numerous forward modeling studies.

**Project objectives**

The objectives of this project are to:

- provide a subsurface velocity model to improve the understanding of seismicity in northeast B.C. and allow for better estimates of potential hazards.

**Project deliverables**

The deliverables from this project include the following:

1. Final report.
2. Velocity Model:
    - 3D P-wave velocity model in ASCII format
    - 3D S-wave velocity model in ASCII format
    - Average 1D P-wave velocity model in ASCII format
    - Average 1D S-wave velocity model in ASCIII format