

EQC Committee report

Date: November 8, 2024

Subject: Hydrocarbon Investigation Program, Montana Bureau of Mines and Geology

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Mr. Chair and members of the EQC Committee:

This report summarizes the activities of the Montana Bureau of Mines and Geology (MBMG) Hydrocarbon Investigation Program for the 2022-2024 biennium as required by 2021 HB648 Section 1(4)

Background

The Hydrocarbon Investigation Program was established by HB648 of the 2021 Regular Session for the purposes:

- 1) *to determine if new methods of oil and gas production will improve production in existing oil and gas fields, and*
- 2) *to locate new fields containing oil and gas resources.*

To accomplish these goals, the MBMG is conducting research projects to:

- Estimate the remaining volume of oil in Montana's known oil fields and determine the most effective Enhanced Oil Recovery (EOR) methods to increase oil recovery.
- Conduct subsurface mapping to depict the spatial extent and characteristics of geologic formations, from which potential oil and gas targets can be identified.
- With our data preservation group, acquire unpublished maps and geologic studies that identify potential petroleum prospects. These are made public through the MBMG website.

Specific Activities and Investigations completed and underway:

1) Provide easy-to-use, public access to oil and gas data via MBMG Data Hub

An oil and gas web page has been developed and is publicly available. The MBMG online interface provides a platform for public and private users to easily query and digest well, production, and other geologic data. The data in our web application is sourced from the Montana Board of Oil and Gas. Our Oil and Gas Data Hub is accessible via the MBMG website:

<https://gis-data-hub-mbmng.hub.arcgis.com/apps/abd203d2c78d4f8195806f769e8fd287/explore>

2) Subsurface Mapping

Subsurface geologic maps, generated from a high-quality set of formation tops, are critical for identifying new drilling targets for petroleum exploration. They are also important for understanding geologic hazards such as faults, identifying targets for wastewater and/or CO₂ injection, and managing and protecting groundwater aquifers. The Montana Bureau of Mines and Geology (MBMG) is systematically interpreting formation tops and generating subsurface geologic maps on a 250K quadrangle-by-quadrangle basis.

Our initial focus is on the Williston Basin in northeastern Montana since this is the most active petroleum province in Montana and the area most likely to attract new petroleum exploration (Figure 1).

Completed: **Wolf Point** 250k quadrangle: (includes all or portions of Daniels, McCone, Sheridan, Roosevelt, Richland, and Valley Counties)

Glendive 250k quadrangle: (includes all or portions of Dawson, McCone, Prairie, Richland, and Wibaux Counties)

In Progress: **Glasgow** 250k quadrangle: (includes all or portions of McCone, Phillips, and Valley Counties)

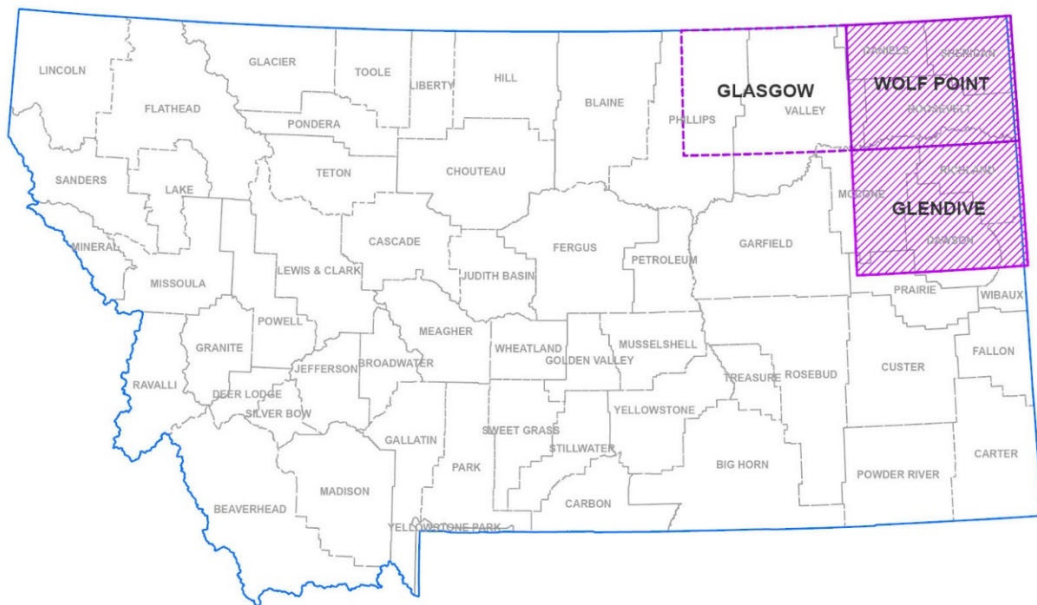


Figure 1: Map of Montana showing 250k quadrangles where MBMG is mapping subsurface geology. Hachured = completed.

Figure 2 is one example of the types of geologic structure and thickness maps being generated. Such maps are a fundamental component for oil and gas exploration.

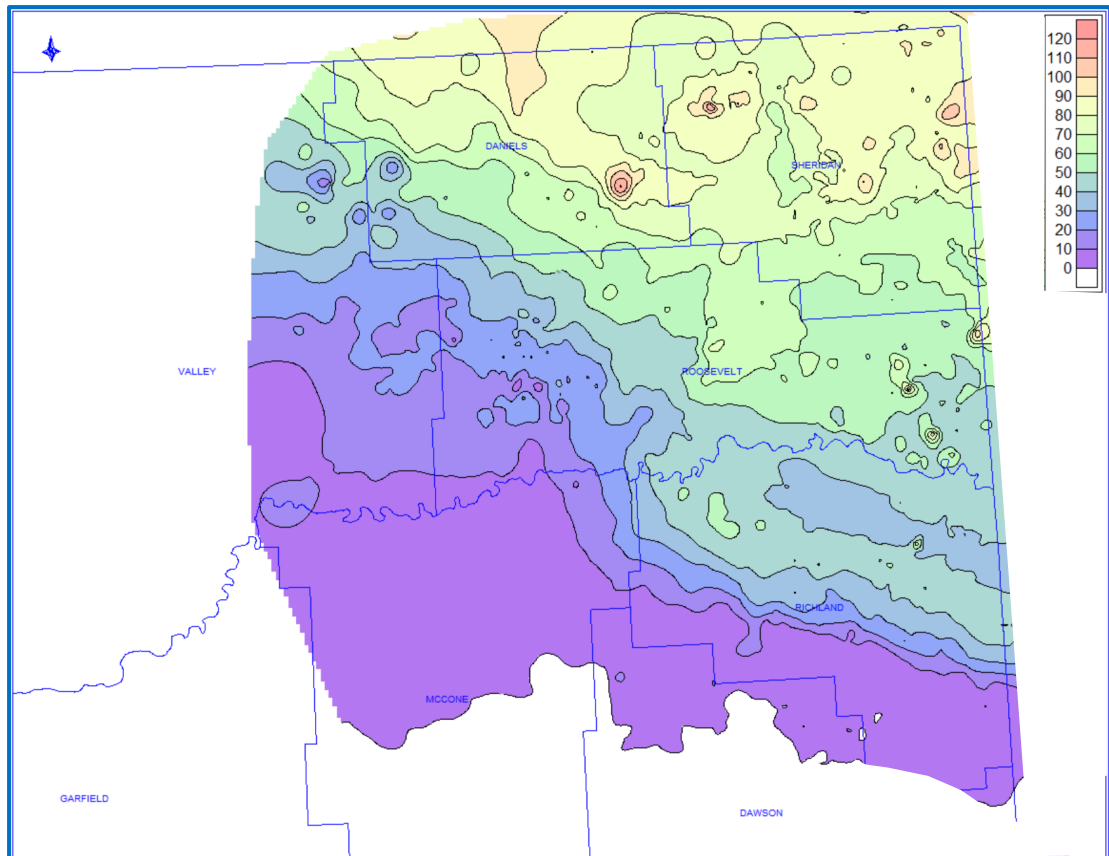


Figure 2. Thickness of the Bakken Formation in northeastern Montana.

3) Enhanced Oil Recovery (EOR) Study

There are approximately 350 oil fields distributed across seven key petroleum producing basins in Montana. An analysis of 50 fields was undertaken to estimate the original oil in place (OOIP), cumulative production, and remaining oil reserves. For the 50 fields evaluated, the total OOIP was estimated to be 4.16 billion stock tank barrels (STB), the cumulative production was approximately 640 million STB, leaving a remaining oil in place of 3.52 billion STB – approximately 85% of OOIP.

For additional oil recovery, Enhanced Oil Recovery (EOR) methods such as gas injection (CO_2 or hydrocarbon) or chemical floods (polymers or surfactants) are needed. Based on historical EOR projects, the additional recovery is expected to be 5% to 10% of the OOIP for a properly implemented EOR project. These 50 fields, therefore, have the potential for an additional 200 of 400 million STB of oil recovery using EOR methods.

Phase 2 of the project is to evaluate the Breed Creek field in Central Montana, which possesses a relatively straightforward reservoir structure and complete data for a detailed CO_2 injection simulation. The results from the Breed Creek study will improve the assessment of the potential increase in recovery expected from EOR implementation.