



Topaz Project: Technical Brief

100% Pulsar Helium Inc.
Minnesota, USA

Topaz is the flagship asset in Pulsar's portfolio, having been drilled and flowed 10.5% helium

Location

The mineral rights are located approximately 100 km northeast of Duluth, in Lake County Minnesota, USA. Road access is good, being 500m from an existing haul road, then 10km to the Voyageur Highway which leads to Lake Superior and onward to Duluth. The nearest town is Babbitt, located 20km to the northwest, which services the nearby taconite (iron ore mines) of northern Minnesota. The vicinity has significant infrastructure to service the large-scale iron ore mines, including electricity and water.



Helium Discovery

In 2011, a previous explorer was drilling a series of boreholes targeting nickel and platinum group element (PGE) mineralization when they unexpectedly encountered a pocket of high-pressure gas in at a depth of 1,778 feet (541m) in borehole LOD-6. The gas pressure was sufficient to blow the core tube and associated drill fluid out of the hole and is therefore considered to be an over-pressured reservoir. The borehole was allowed to flow with the expectation the pocket would be depleted in a matter of hours, however the gas flow persisted for four continuous days with no obvious drop in pressure. The gas flow velocity was measured using an anemometer designed for domestic wind speed, reaching its maximum speed recording of 150 km/hr prior to breaking under the gas pressure.

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Two gas samples were collected from the flowing LOD-6 borehole. The samples were analyzed by Dr. Barbara Sherwood-Lollar at the University of Toronto and at Pace Laboratories. All samples showed some air contamination as can be expected given the underprepared field conditions in which they were collected. Nonetheless, gas compositions reported by the two labs were in good agreement, with the least air-contaminated sample composition measuring 73.8% CO₂, 13.2% N₂, 10.5% helium, 0.1 % O₂ and 2.4 % methane and other hydrocarbon gases. After analyses of the gas confirmed that it was non-combustible, LOD-6 was sealed with bentonite and permanently abandoned.

Geology

The Topaz Project is located within the Mid-Continent Rift Zone (MCRZ) in northeastern Minnesota, USA. The MCRZ is a 1.1 billion-year-old rift that extends from Kansas through Minnesota and into western Ontario, Canada. The Topaz Project is situated within the Bald Eagle Intrusion (BEI) of the Duluth Complex, a large mafic igneous body that intruded into the Biwabik Formation of the Paleoproterozoic Animikie Group. The Duluth Complex can attain a thickness of over 15 km and is associated with the MCRZ.

The geology of the Topaz Project includes some of the oldest rocks in North America, suggesting excellent helium source rock. The stable tectonic conditions prevailing over the last billion years in the Topaz area may have allowed significant helium volumes to accumulate. The Bald Eagle Intrusion, a troctolite intrusion on the western flank of the Duluth Complex and the target of mineral exploration, forms a series of sill-like emplacements. It contains thin chromite seams and has intruded into the upper Duluth Complex locally in the Topaz Project. The BEI and Duluth Complex are both mafic igneous bodies with low reported uranium and thorium contents, and are not expected to be the primary source of the helium. However, helium has been identified in a well located 160km to the south, suggesting elevated occurrences of helium across the MCRZ, which are thought to have been generated in the Lower Precambrian shield granites and then migrated upwards along fractures in the MCRZ.

Geophysics

Previous geophysical acquisition for mineral exploration, including VTEM and magnetic data, over the Topaz region have been useful, though insufficient to effectively map the Topaz helium discovery. Pulsar, in 2022 acquired a high-resolution (300m line spacing) Airborne Gravity Gradient and magnetics survey over the Topaz project. This data has allowed detailed structural interpretation, including fine-scale interpretation of the fault network. Subsurface structural highs have been mapped which correlate with the deeper tectonic pattern shown by the regional gravity data.

Data in Pulsar's Possession

- FALCON Airborne Gravity Gradient and magnetics, 2022
- VTEM (Versatile Time Domain Electromagnetic), 2010
- Regional magnetics and bouguer gravity
- Borehole logs and geochemical assays (LOD-6)
- Gas geochemistry (LOD-6)
- Satellite gas species detection data from Dirt Exploration

Licensing

Pulsar has an exclusive lease with a private mineral rights holder for a 100% working interest over 1,040 net acres that includes the location of the 2011 helium discovery hole. In addition, Pulsar has an exclusive option to lease for an additional 2,092 net acres with the same private mineral rights holder, valid until October 2024. The lease gives Pulsar the rights to non-hydrocarbon gases, defined as any raw gas (including without limitation, helium), primarily for its salable non-hydrocarbon gas content. Additional licence applications have been lodged with the Federal and State governments.

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