

Additional Revenue Stream Potential for the Oil and Gas Industry

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Summary

The potash, diamond, coal, petroleum and natural gas resources in the Phanerozoic of Saskatchewan are well known and are relatively well understood. Of lesser notoriety, but of significant economic value, is the potential for the industrial minerals bromine, iodine, lithium, magnesium and potassium, and for helium gas. Price increases in these commodities have led to renewed exploration by industry worldwide and as a result the Saskatchewan Geological Survey (SGS) is investigating the potential of these plays in Saskatchewan.

Formation brines are a source of bromine, iodine, lithium, magnesium, and potassium in other sedimentary basins around the world. The primary source of information for formation brine in Saskatchewan would be from oil and gas wells, but routine oil and gas analysis do not typically assay these trace elements and therefore Saskatchewan's potential for these minerals is not well known. The SGS undertook a well-head sampling project examining a small portion of the wells that produce from the Lower Paleozoic formations in southeastern Saskatchewan in the summer of 2011 and 2012. The purpose of this study is to investigate the potential for naturally occurring minerals in the subsurface brines, as well as to elucidate brine migration. These geochemical analyses are to populate a public "exploratory" inventory (database) of trace mineral concentrations present in the province's brines.

In 1958, an anomalous natural gas occurrence was recorded in southwestern Saskatchewan. Helium enriched natural gas was found in sediments 2,000 m below the Earth's surface in Deadwood Formation (Upper Cambrian) silicified siltstones and mudstones, that are on a basement topographic high about 13 kilometres miles north of Swift Current. Tests from this zone indicated an inert gas, which flowed at a rate of 1 to 5 million cubic feet per day, and was composed of 97% nitrogen, 2 % helium and 1 % carbon dioxide. In 1960, a second helium producing area was discovered in the Wood Mountain area, roughly 115 kilometres southeast of Swift Current. A drillstem test over a 20 foot sand zone gave flow rates of 16.3 to 20 million cubic feet of inert gas per day and was composed of 96.35% nitrogen, 1.08 % helium and 2.5% of other gases (exact composition unknown). Production, initiated in 1964 and continued until 1975, was limited to 4 wells in the Swift Current area, producing a combined total of 16.5 Bcf of gas ($464.9 \times 10^6 \text{ m}^3$). It is not known what percentage of this production was helium. With the higher prices of helium, along with the known success of the Wood Mountain area, there has been renewed interest in its potential in Saskatchewan in the last couple of years.

The SGS is currently developing a database that contains the helium concentrations found in gas analyses from oil and gas wells across the province.