

Solution Mining Research Institute Spring 2018 Technical Conference
Salt Lake City, Utah, USA, 18 June 2018

The History and Evolution of the Patience Lake Solution Potash Mine, Saskatchewan, Canada

Tanner Soroka and Caitlyn Lahonen
Nutrien Ltd., Saskatoon, Canada

Abstract

The Patience Lake mine operated continually as a conventional underground potash mine from 1965 to 1987. In that time, more than 600 km (373 mi) of underground tunnels were created using room and pillar mining techniques over an area spanning more than 50 km² (19.3 sq mi).

In early 1986, an inflow of brine into the mine threatened the underground operation. By January 1987, the continual escalation in inflow rates proved unmanageable, and the underground mine was abandoned and allowed to flood. Patience Lake re-opened soon after in 1988 as Saskatchewan's first converted solution potash mine.

Potash is now produced at Patience Lake during the winter months by circulating brine through the old mine workings using a network of brine injection wells. The injected brine is saturated with respect to sodium chloride (NaCl) and undersaturated with respect to potassium chloride (KCl). As the brine circulates, it warms and sylvite (KCl) is selectively leached from the mine walls. The KCl-rich brine is then brought to surface through recovery wells and sent to large surface ponds where it cools under cold weather conditions. The decrease in brine temperature results in sylvite preferentially recrystallizing in the ponds to form a subaqueous potash bed. The potash is subsequently harvested by mechanical dredgers, and the slurry is sent to the surface plant for processing. The cold KCl-depleted pond brine is then re-heated and injected back underground to repeat the solution mining process.

This paper provides a high-level overview of the 60-year history, evolution, and operation of the Patience Lake potash mine.

Key words: Geology, Potash, Solution Mining, Saskatchewan, Canada

©2022 – Solution Mining Institute

Full Paper is Available in the SMRI Library(www.solutionmining.org)