

AN OVERVIEW OF THE GEOLOGY OF SOLUTION MINING OF POTASH IN SASKATCHEWAN

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Abstract

Presently, there is great interest in exploring for, and developing, potash deposits around the world. This interest has created record levels of interest in potash deposits within the Elk Point Basin sequence of Saskatchewan. Potash has been mined in the province since 1959 and, presently, there are 10 operating mines, 8 of which are underground extraction mines, 1 which is a flooded underground mine (PCS Patience Lake), but presently operating as a solution mine, and 1 solution mine located at Belle Plaine Saskatchewan. It is estimated that there are some 8 billion short tons of recoverable KCl reserves (5 billion short tons K_2O equivalent) using conventional (underground techniques, but some 110 billion short tons of recoverable KCl reserves (65 billion short tons) solution mining techniques. Numerous permits for ground that industry considers as prospective for further potash extraction have been taken since 2005; however, the majority of these lands are along the “Conventional Mining Belt,” the trend where the beds are extractable using underground mining techniques.

The trend of lands amenable to solution mining are located to the south of the “Conventional Mining Belt” further into what is termed the “Williston Basin” of Saskatchewan and the northern plains states of the United States.

The potash deposit itself consists of generally flat-lying sedimentary deposits of interbedded halite, sylvite, carnallite, clay, and minor anhydrite and dolomite beds that can be mapped from central Alberta through to Manitoba, North Dakota, and Montana.

In the 1960s, most of the ground in central Saskatchewan considered prospective for potash mineralization was held by a wide variety of companies experienced in the methods of conventional underground mining, such as International Minerals and Chemicals Corporation and Potash Company of America. Along the trend considered too deep for conventional mining, while a number of resource companies held permits, and several pilot solution mining projects were undertaken, such as the work of Imperial at Findlater Saskatchewan, Lumsden Potash at Bethune, and Lynbar Mining at Duval, the only company to proceed with a commercial solution mining operation was Pittsburgh Plate Glass (PPG) at Belle Plaine.

This paper presents a summary resource characterization for two such abandoned pilot test sites. The mineral resource for these sites (net of areas where geophysical surveys suggest dissolution and collapse structures) is estimated at 5 to 6 million tonnes of K_2O equivalent per section. This is equivalent to 2.04 tonnes of K_2O per square meter or 2,040,000 tonnes per square kilometre.

Key words: Bedded Salt Deposits, Canada, Elk Point Basin, Evaporites, Geology, Potash, Potassium Minerals (Carnallite, Potassium Chloride), Prairie Evaporite Formation, Saskatchewan, Solution Mining and Potash