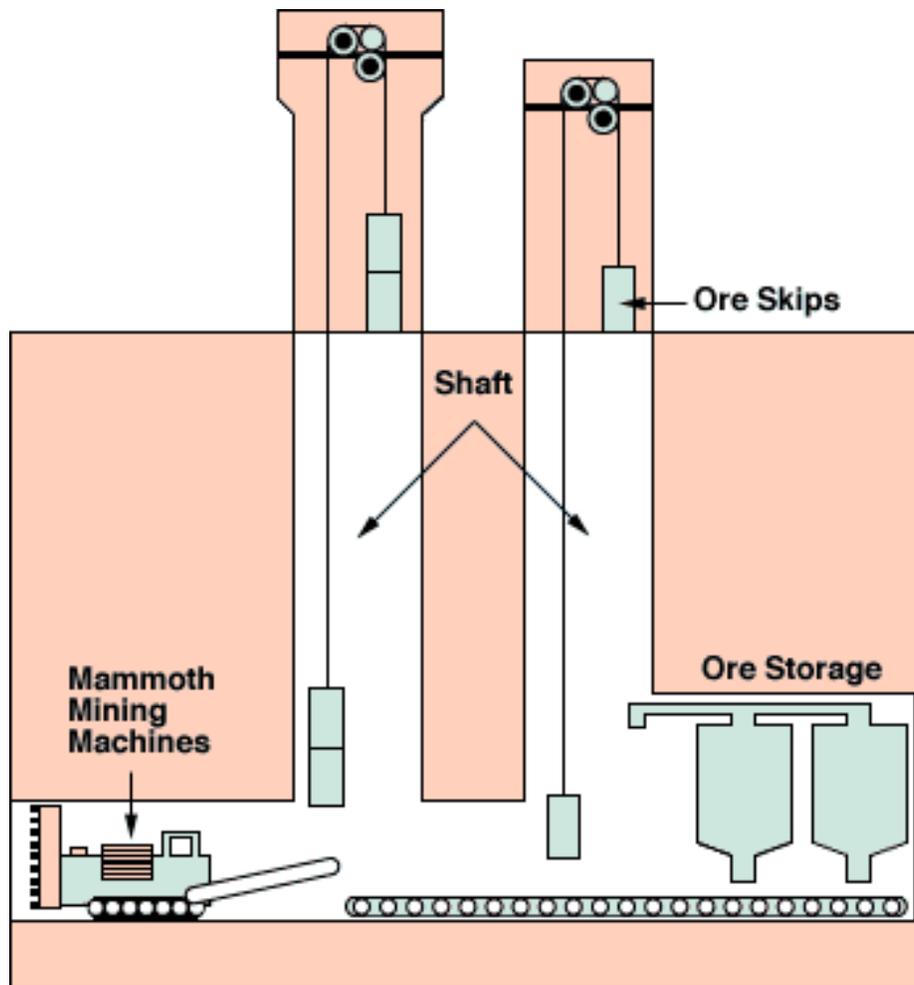


Extraction of Potash Ore and Manufacturing Potassium

Conventional Underground Mining

Miners begin their day by traveling about 1,000 meters (3,281 feet) straight down into the earth. Then they travel as far as six kilometers (four miles) by jeep through underground tunnels before they arrive at their worksite. They mine the ore by machine, and then it is transported through a maze of tunneled roads and brought to the surface to be milled.



The Shaft Miners travel to the mining level in a cage down through a shaft. The shaft is vertical, dug from ground surface to the mining level, generally from four to six meters (thirteen to twenty feet) in diameter. Each mine has two shafts, one for transporting people and one for transporting product.

Potash is mined using two-and four-rotor continuous boring machines. They can mine up to 882 tonnes per hour, making paths of up to 7.9 meters (26 feet) wide and 2.4 meters (8 feet) high. PotashCorp has automated some machines to automatically measure ore grades and mine only the richest ore.

Conveyor belts carry the ore to underground bins, where it is stored until transported to the loading pocket of the shaft hoist.

The skips are boxes in the production shaft that each hold about 23 tonnes. They are hoisted to the surface at speeds of 550-1,100 meters per minute (1,804 - 3,608 feet per minute). The hoist consists of four head ropes with two skips per side. While one unloads ore on the surface, the other is loaded at the bottom.

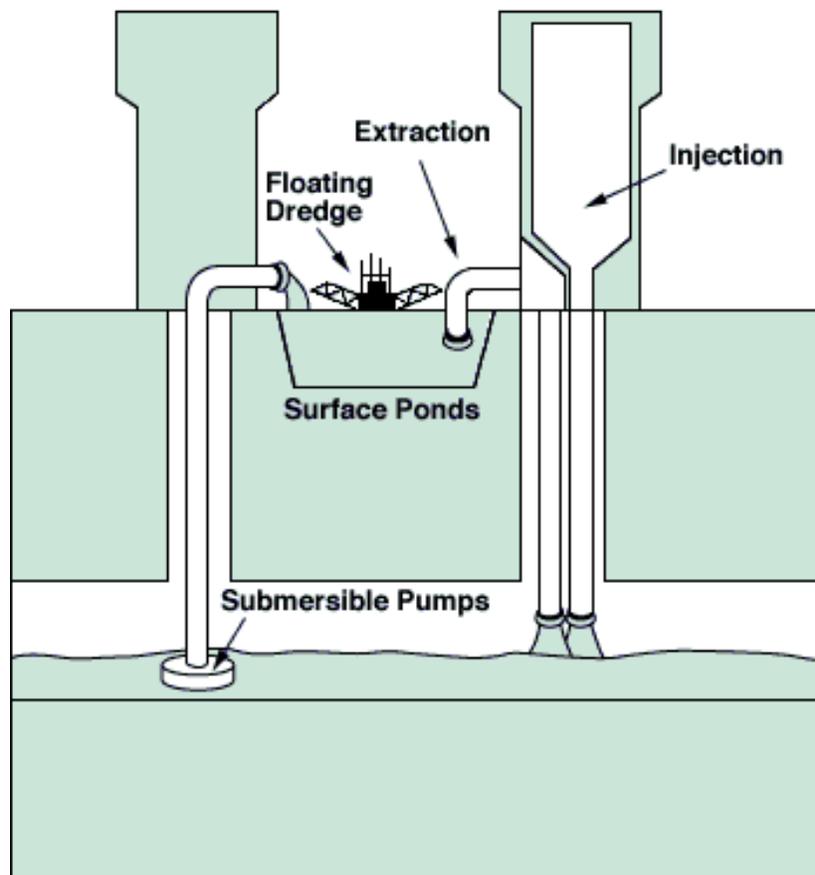
Solution Mining

At Patience Lake, a solution mine, the Patience Lady is a dredge that recovers potash from the crystallization ponds. When conventional underground mines become flooded and unworkable, potash can be extracted using solution mining. Water is injected as a brine (a salt and water solution). It is then circulated throughout the mine workings to dissolve potash and salt from the original pillars and walls.

The brine is pumped to an evaporation pond. Submersible pumps are used, each pumping about 9,000 litres per minute (2,376 gallons per minute). As the liquid cools, the potash and salt crystals settle to the bottom of the pond. The cool brine is then heated and reinjected into the mine to start dissolving potash again. The remaining potash in the ponds is removed with floating dredges and pumped to the mill.



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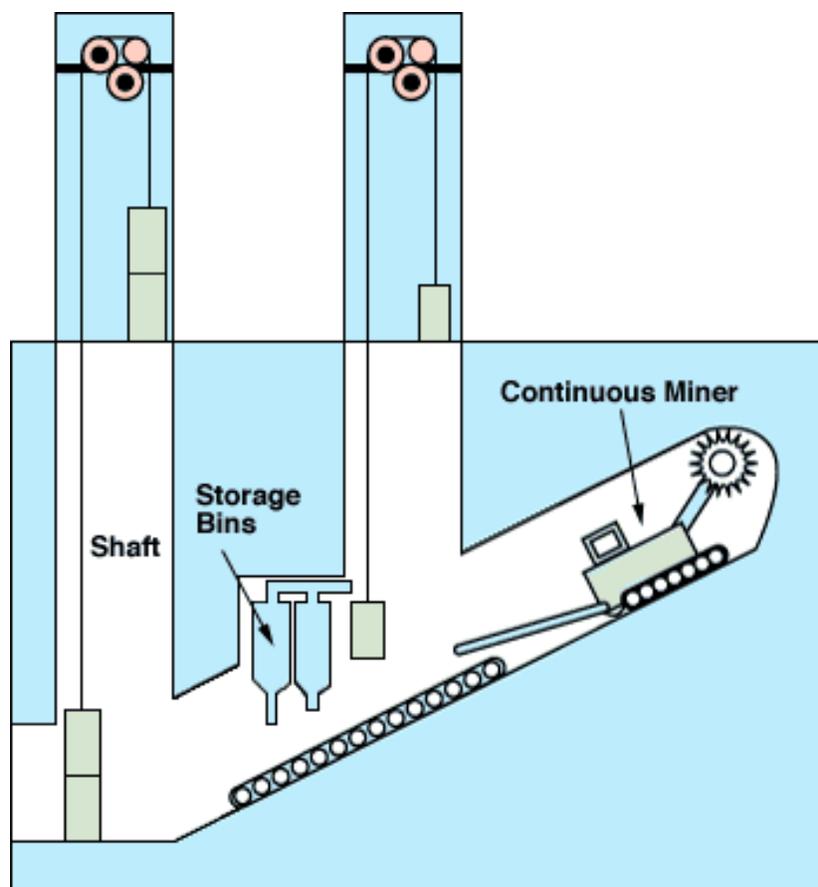
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Cut-and-Fill Stope Method

Potash deposits at New Brunswick are shallow compared to Saskatchewan's deep mines. Its deposits are worked at depths of 400 to 700 meters (1,312 to 2,297 feet) within five kilometers (three miles) of the main shaft.



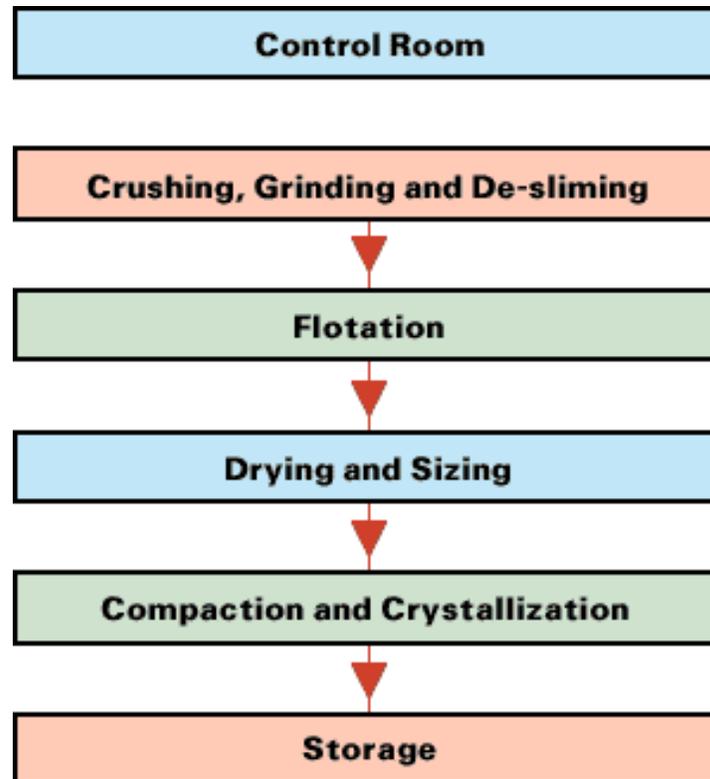
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Potash deposits are mined by a continuous mining machine in cut-and-fill stopes. The ore is mined in a step-like excavation of successive layers. Fresh tailings are used to create a new floor for further mining. Rock salt is also extracted by the continuous miner.

Ore is contained in storage bins until it is loaded into skips and hoisted to the surface for processing.

The Mill

Once potash ore is extracted, all PotashCorp mines essentially follow the same milling process at the surface. Potash ore contains 30 to 40 percent potassium chloride (KCl), the actual nutrient used in fertilizers. The rest is made up of insolubles, clays and salt.



The "nerve centre" of the mill, the control room monitors the ores throughout the refining process. One employee operates the control room and communicates problems to the operators in the plant.

The ore is dry-crushed and put into a brine solution much like sea water. It is then ground into distinct particles of potash and salt, pumped into tanks and agitated to "wash" the clay off the ore.

Substances are added to the salt and potash mixture to separate the particles. The potash particles rise to the surface and are skimmed off. The salt particles sink to the bottom and are drawn off. The brine is recycled back into the milling process.

Potash particles are dried in natural gas fired kilns, then classified according to size by passing the particles through a screen with a specific mesh size. They are classified as granular, coarse, standard or suspension.

Fine particles of potash are compacted to a larger size for blending with other fertilizer materials. Potash dust is dissolved, pumped into a crystallizer and cooled. The potash crystals grow and separate out. Some are redissolved and recrystallized to produce a refined product with very few impurities.

Huge warehouses at the mines collectively provide storage for over one million tonnes of potash products. This much potash would fill a train with over 12,000 cars stretching 120 miles.

Reference

<http://www.potashcorp.com/>