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Environmental Protection Agency
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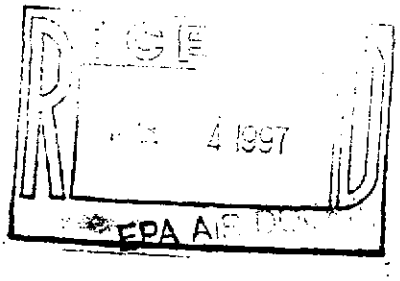
Washington D.C. 20460



Re: Potash Solution Mining on WIPP Reservation

Gentlemen:

It has been suggested that I submit in writing my testimony at the WIPP/EPA hearing held in Albuquerque, February 20, 1997. As you may, or may not know, IMC Kalium has potash mining leases that border the WIPP reservation. In fact, IMC has received payment in lieu of relinquishing potash reserves, that we planned on mining, which are now part of the WIPP reservation site. I am at present, and have been chief chemist for IMC Kalium for the past 18 years. I am very familiar with the chemistry and mineralogy of the Nash Draw potash ore body but am not an expert on the extent and grade of the ore reserve on the WIPP site.

Solution mining to be economical requires the following:

1. Cheap Energy. Solution mining requires energy to increase the ambient temperature of the injected water to increase the dissolved salt capacity of the resulting saturated brine. This is usually accomplished by taking advantage of geothermal heat found in deep mines and wells, Our solution mine at Belle Plains, Saskatchewan is in excess of 3000 feet deep. The potash bearing ore at the WIPP site is found between 650 and 800 feet below the surface. Energy is also required to evaporate water from the resulting hot or warm brine exiting the mine to precipitate potash salts. This process is accomplished by the use of evaporators/ crystallizer or solar evaporation ponds. Solar evaporation ponds if not energy intensive are capital intensive.

2. Bed Depth. Solution mines would prefer ore bed depths to be thick, in excess of 10 feet or more to minimize the solvating of unwanted minerals and displacement of clay in solubles. Bed depths of the potash bearing seams on the WIPP site are 6 feet or less.

3. Simple Solution Phase Chemistry. To be economical, the exiting brine from the mine should precipitate only product. The tailing brine is then usually pumped back underground. If the precipitant is a mixture of chemicals and minerals, further refinery separation steps must be undertaken to recover the commodity. The more steps taken

from brine to finished product, the more complicated and capital intensive the refinery. Most potash solution mines are simple sylvite/halite ore bodies. The ore body at WIPP contains not only these two minerals but many sulfate minerals as well, langbeinite being the most common. Brine solutions made from these minerals have complex phase chemistry, are unstable and have a remarkable ability to supersaturate. They will precipitate salts that are not found in the original ore body, potassium sulfate being one example. Since the ore body changes in mineral content and type, it is sometimes difficult to predict the mineral that will be precipitated.

Ease of Solution. Not all minerals dissolve in water easily or readily. Langbeinite dissolves very slowly, hours in comparison to the chloride salts that dissolve in fractions of a minute.

Water. Solution mining requires access to large quantities of fresh water. Salty or brackish water will slow down solvation of the ore. Fresh water is at a premium in the WIPP geographical area and require the obtaining of water rights. These water rights are expensive if they can be obtained at all. I would rather think that these water rights would be better used in human or agricultural usage.

Ore Reserves. The building of any potash mine, refinery and auxiliary facilities would require a capital investment in excess of 100 million dollars. This usually requires ore reserves in excess of 25 years. The ore reserves on the WIPP reservation are of low grade and have limited life expectancy.

In conclusion, no one should underestimate the folly of another human being, but the rational choice for extracting the WIPP potash ore reserves would be by conventional room and pillar mechanical means, carried out by mines which are already in existence. If someone would like to mine halite, for road, industrial or human consumption, it would be more economical and environmentally sound to recover halite tailings from the various mines located in this area.

Regards;

Douglas W. Heyn
(IMC Kalium Chief Chemist)