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Martell, Mary Alena

From: Prichard, David A. - Lake Forest [daprichard@imcglobal.com]
Sent: Sunday, April 06, 2003 11:44 AM
To: 'Mary-Alena Martell'
Subject: FW: Question about Potash Solution Mining

Dear Ms. Martell, *MM 4/14/03*

This is in response to your request for information on solution mining near the WIPP. It is safely stated that solution mining of these ores are and will remain uneconomic far into the future. Several factors contribute to the unsuitability of these reserves for extraction by solution mining.

1) The mineral of greatest value in this area is Langbeinite (2MgSO4 * K2SO4). The predominate gangue mineral present is halite (NaCl) which is much more readily soluble than Langbeinite (Lang). This relative reluctance of Lang to go into solution makes it impossible to recover in any meaningful quantities using solution mining.

2) The only underground potassium ore in the world mined by solution methods is Sylvite (KCl). Although some Sylvite is mixed into the ores that exist in this area, recovery by solution mining is highly unlikely for the reasons listed below:

* The ore zones are shallow (from 1500 to 1800 feet deep) and at a fairly cool temperature (about 80 degrees F). The solution mining that IMC performs in Michigan and Saskatchewan are at greater depths and greater temperatures. Rock temperature is critical to the success of a solution mining endeavor.

* Solution mining (and subsequent re-crystallization) is energy intensive. Unless the cost of labor increases much faster than the cost of energy, the economics will not get better.

* The capital cost to start a solution project is sizeable, another roadblock considering the underutilized capacity of potash producers world wide.

* Variable concentrations of confounding minerals (such as kainite and leonite) will cause problems with the brine chemistry.

* Solution mining requires significant amounts of water. Water is a commodity becoming more scarce in New Mexico and therefore more costly

Although the future in matters such as these cannot be fully known, it is very unlikely that any company will ever attempt solution mining the ores found in or near the WIPP.

-----Original Message-----

From: Martell, Mary Alena [mailto:mmartel@sandia.gov]
Sent: Thursday, March 20, 2003 5:17 PM
To: 'daprichard@imcglobal.com'
Subject: Question about Potash Solution Mining

Mr. Prichard, On March 4, 2003 you provided me an email regarding the use of drill-and-blast mining methods at the Carlsbad potash facility. Your email was extremely helpful. I would like to ask for your assistance in another matter concerning solution mining in the vicinity of the WIPP. In 1997 Douglas W. Heyn, chief chemist, at IMC Kalium Carlsbad, produced for the

Sandia WIPP certification project a letter listing the reasons why solution mining at the WIPP site would be unattractive to a company. The letter outlined:

1. Economics for solution mining.
2. Bed depth
3. Simple solution phase chemistry
4. Water requirements
5. Ore reserves at WIPP

Could you provide an update to this letter to support the WIPP position that solution mining is unattractive for the potash reserves at the WIPP site. We have stated that the mineable ore reserves, nor the mining techniques used to obtain potash have not changed since the CCA. The prospect of using solution mining techniques for potash has been identified in the region, but has not been implemented. From a WIPP perspective, these proposed activities have no impact to current FEP screening arguments and decisions. It remains to be seen if this project (or others like it) ever progress beyond the planning phase. Construction of facilities for solution mining is a very expensive undertaking, and its use as a final recovery method implies that marginal (residual) ore quantities are available and recovery profitable. Because the CPD mines are in their mature stages (declining) of production, the significant financing required may not become available. Nonetheless, at the time of this FEPs reassessment, this technology is not being employed.

I would appreciate your help in this matter.

Thank-you, Mary-Alena Martell, SMTS
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