

Operational and Regulatory Opportunities in Brine Mining and Underground Storage Facilities

Jug Manocha, Caverns & Storage Engineer
Petroleum Resources Centre

Ontario Ministry of Natural Resources, London, Ontario, Canada

ABSTRACT

Ontario's first salt discovery occurred in 1866 while drilling for oil. Currently there are three solution mining facilities producing approximately 1 million tonnes of salt annually. There are 73 hydrocarbon storage caverns storing 3.8 million m³ (24 million barrels) of petrochemicals and liquefied natural gas feed stocks.

Salt solution mining has contributed to the economy both locally and provincially. The storage of hydrocarbons including petrochemicals in salt caverns provides tremendous cost saving and environmental advantages compared to above ground storage. However, during the past century there have also been some historic incidents. These include, formation of a sinkhole, uncontrolled mining, subsurface collapse, uncontrolled leaching fluids, poor extraction efficiencies, and release of fluids from wellheads. These incidents have prompted the industry and the regulators to better conduct the solution mining and underground cavern storage operations.

Recognizing the need for environmental protection, safety protection and resource management viewpoints, Ontario has developed more stringent regulations. Ontario in conjunction with the industry has developed and adopted standards for solution mining. These standards require development of a sound mining plan, operational procedures, routine sonars and demonstration of hydraulic closure of cavern systems. Ontario is also actively involved in the development of Canadian Standards Association Code Z341 - Hydrocarbon Storage in Geological Formations and it has adopted this standard into the regulations.

The technical standards approach of regulating the industry provides some advantages and opportunities. The standards are subject to peer technical reviews and critiques. The standards provide the minimum requirements that the industry and regulators are prepared to accept. The standards more accurately reflect the field realities. There is also the benefit of peer pressure from other operators who are in compliance with the standards. However, the provincial statutes still provide for compliance and enforcement remedies to ensure standards are being met for exceptional circumstances.

The current trends include the salt solution mining to be conducted under a mining plan and the integrity of the facilities to be confirmed routinely. The design and construction of wells by salt solution-mining companies are to be in accordance with Storage of Hydrocarbons in Underground Formations of the Canadian Standards Association for future use as storage caverns. There is tremendous potential for further developing solution mined caverns for storage of petrochemicals and natural gas. There are opportunities for the regulators, consultants and the industry to improve the design and operation of salt solution mining and associated storage caverns to improve public safety and environmental protection and to better manage the salt resources.