SOLUTION MINING RESEARCH INSTITUTE
679 Plank Road
Clifton Park, NY 12065, USA

Telephone: +1 518-579-6587
www.solutionmining.org

Technical Conference Paper

1965 – 2025

Solution Mining for Geologic Hydrogen

Franek Hasiuk, Don Conley, Anna Snider Lord,

Sandia National Laboratories

SMRI Fall 2025 Technical Conference
29-30 September 2025
Wichita, Kansas, United States

Solution Mining Research Institute Fall 2025 Technical Conference
Wichita, Kansas, United States 29-30 September 2025

Solution Mining for Geologic Hydrogen

Franek Hasiuk, Don Conley, Anna Snider Lord
Sandia National Laboratories

Abstract

Geologic hydrogen has been proposed to be the least expensive and least carbon-intensive form of hydrogen by the U.S. Department of Energy's Advanced Research Projects Agency for Energy (ARPA-E). In addition, the U.S. Geological Survey has suggested that broad areas of the United States are prospective for geologic hydrogen production. While there is active exploration in many locations around the world for hydrogen accumulated in conventional subsurface reservoirs (i.e., sandstones and limestones), there is also significant research into methods for stimulating hydrogen production from hydrogen "source rocks" (e.g., mafic and ultramafic rocks) largely by trying to accelerate the process of serpentinization. The technologies and workforce needed to operationalize these stimulation systems fit naturally into the core competencies of the solution mining industry, presenting new opportunities for growth. Current research is examining the effects of different fluid chemistries, temperatures, and pressures; the effects of microbes and catalysts; the use of steam and carbon dioxide as working fluids, as well as the effects of different technologies for inducing fractures in the subsurface to maximize reactive surface areas. This presentation will review the proposed stimulation systems within the context of the geochemistry of natural hydrogen production processes (i.e., serpentinization, radiolysis, deep degassing, cataclasis) and the mineralogy/petrology of source rocks to provide a guide with respect to what systems might work best in which types of deposits. SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525.
Key words: Geologic hydrogen