

# Experimental and Thermodynamic Modeling Solubility of Lead in the Carbonate System to High Ionic Strengths<sup>A, B</sup>

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The Waste Isolation Pilot Plant (WIPP) is a U.S. Department of Energy (DOE) repository in southeast New Mexico for defense-related transuranic (TRU) waste. The repository, which opened in March 1999, is located at a subsurface depth of 655 m in the Salado Fm., a Permian bedded-salt formation. It is planned to use a significant amount of lead as a radiation-shielding material for wastes with significant  $\gamma$ -radiation placed in the WIPP.

Carbonate is an important inorganic ligand in the WIPP brines such as Generic Weep Brine (GWB) from the Salado Fm. at the stratigraphic horizon of the repository, and Energy Research and Development Administration (WIPP Well) 6 (ERDA-6) from the underlying Castile Fm. When lead is corroded under anoxic conditions in carbonate-containing brines, lead carbonate, cerussite ( $\text{PbCO}_3(\text{cr})$ ), is expected to form. Therefore, the accurate knowledge of solubilities of cerussite in a wide range of ionic strengths has important bearings on the chemical behavior in the repository.

We conducted a long-term study on the solubilities of cerussite in  $\text{NaHCO}_3 + \text{NaCl}$  solutions.

We are in the process of modeling solubilities of cerussite in  $\text{NaHCO}_3 + \text{NaCl}$  solutions using EQ3/6 Version 8.0a. In our modeling, we plan to test and revise the Pitzer parameters related to lead species in a recent publication.

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