

Prediction of Long-Term Settlement For Uranium Tailings Impoundments, Gas Hills, Wyoming

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ABSTRACT

Settlement analyses are typically performed on tailings impoundments for the purpose of reclamation design. The predicted settlements are used to analyze cover performance such as clay cover cracking potential or the development of flow concentration zones in riprap erosion protection covers. This paper presents the results of settlement analyses performed for Umetco Minerals Corporation (Umetco) on two separate uranium tailings impoundments at their Gas Hills Wyoming location. These impoundments were constructed using different methods and are at different stages of reclamation construction.

Settlement at the previously reclaimed Above-Grade Inactive tailings impoundment at Umetco's Gas Hills, Wyoming uranium mine and millsite was analyzed using a one-dimensional finite difference technique for predicting time-rate consolidation. Settlement was predicted at various points of known soil conditions and was used to develop settlement contours for evaluating differential settlement. A two-dimensional finite element seepage model (SEEP/W) was also used to predict time rate of pore pressure dissipation.

Settlement at the A-9 Below-Grade Repository at Umetco's Gas Hills uranium mine and millsite was analyzed using coupled two-dimensional finite element seepage and stress-strain models (SEEP/W-SIGMA/W). The model was used to predict long-term settlement due to construction of the proposed cover system. Cover cracking potential was evaluated directly from the two-dimensional profile.

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