ALTA 2022 26
20-27 May | Perth, Australia | Online

SIMULATION OF IN-SITU RECOVERY OF COPPER AT KAPUNDA USING COMSOL MULTIPHYSICS

By

[1,2]Hang Wang, [1]Chaoshui Xu, [1]Peter Dowd and [2]Leon Falkner

[1]The University of Adelaide, Australia
[2]EnviroCopper Ltd, Australia

Presenter and Corresponding Author

Leon Falkner

ABSTRACT

The copper in-situ recovery (ISR) project at Kapunda, South Australia, is the first non-uranium ISR project in Australia, with an inferred copper resource of 119,000 tonnes being potentially ISR-amenable according to an ASX announcement in 2018. The project is currently undergoing a scoping study, in which an initial evaluation of the potential ISR operation is required given the orebody and its geological settings. The scoping study requires a prediction of the copper production in various potential ISR operation scenarios. The copper production depends mainly on the fluid flow and the leaching reactions in the ISR process; reactive transport modelling can be used to simulate this process and predict the copper production.

This paper presents simulations of the ISR of copper at Kapunda to predict potential copper production. COMSOL Multiphysics was used to model the reactive transport process, in which the copper leaching by the injected lixiviant and the solution transport over the mining area were modelled considering the well operations (injection and extraction). Solution transport through the underground workings that exist at the mining area (from historical mining operations that ceased in 1877) was also considered in the model. Simulations at two different scales (block-scale and orebody-scale) were conducted.

In the block-scale simulations, ISR operations with three different well distances were modelled to compare the corresponding annual copper production, whereas in the orebody-scale simulation, an integrated simulation of reactive fluid flow through different domains, including wells, underground workings and fractured rock masses was performed to investigate the overall potential copper production. These simulations present a new modelling approach for production prediction in ISR operations using COMSOL Multiphysics.

Keywords: In-situ recovery, ISR modelling, Kapunda Cu ISR, COMSOL