Climate change impact on the closure design for the rehabilitation of the former Rum Jungle Uranium Mine

Danielle O'Toole SLR Consulting, Australia

Jackie Harnett Northern Territory Government Department of Industry, Tourism and Trade, Australia

Peter Cupitt SLR Consulting, Australia

Peter Georgiou SLR Consulting, Australia

Augusto Riascos SLR Consulting, Australia

Abstract

The former Rum Jungle Uranium Mine located approximately 100km south of Darwin, Northern Territory, Australia, operated between 1954 and 1971 and underwent rehabilitation from 1983 to 1986. The rehabilitation addressed significant environmental impacts caused by acid metalliferous drainage (AMD) and achieved objectives related to aesthetic improvements and reducing public health hazards. Recent studies documented that the original rehabilitation works do not meet modern environmental standards meaning further rehabilitation work would be required for site closure and relinquishment.

Since 2009, the Northern Territory and Australian governments have undertaken investigative works to develop an improved rehabilitation strategy that is consistent with the views and interests of stakeholders and meets contemporary environmental and mined-land rehabilitation standards. The rehabilitation design involves relocation of potentially acid forming (PAF) waste rock to new surface waste storage emplacement facilities (WSFs) and a water and tailings filled pit, treatment of contaminated pit and groundwater, and the realignment of the East Branch Finniss River (EBFR) to follow its original course back through the pit.

There is now widespread acceptance that human activities are contributing to observed climate change. Continued emissions of greenhouse gases are highly likely to cause further warming and changes in all components of the climate system. Mean, minimum and maximum temperatures are predicted to keep increasing with very high confidence, along with the frequency of hot spells and droughts. While overall rainfall is predicted to result in both wetter and drier periods depending upon regional geographical influences, climate modelling predicts with high confidence that heavy rainfall events will become more intense. Rising temperatures and prolonged hot spells are predicted to lead to an increase in the frequency and intensity of bush fires. Relevant to the Rum Jungle mine's location, climate change may alter evapotranspiration, soil moisture and runoff.

The effect of the above climate change-related factors has been studied to ascertain the robustness of the rehabilitation design of the mine. Presented here are some of the key outcomes of the study, in particularly the impact of climate change on the hydrological processes informing the EBFR flow path design and the design of the landform and cover system for the proposed WSFs.