

Conceptual Sealing Strategy and Initial Performance Assessment for the Chandler Storage and Isolation Facility.

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Tellus Holdings Ltd (Tellus) creates economic, social and environmental value from salt, clay and waste resources. Tellus is proposing to develop an underground rock salt mine with complementary storage and waste disposal business. Products to be stored at the site (surface and underground) include potentially retrievable bulk commodities, equipment, archives and licensed waste storage which could be either retrievable or non-retrievable. The main project site for the underground repository is approximately 120km south of Alice Springs. As part of the incoming supply chain arrangements the project includes a dual use salt and waste storage and transfer facility adjacent to the main Adelaide to Darwin railway line where waste acceptance procedures will be performed.

The project site will develop the 500 million year old Chandler salt bed which is a flat, 800 m deep salt bed with a thickness of up to 300m lying within the Amadeus Basin. The area has been previously explored by deep drilling and seismic survey for oil and gas. In 2013/14 Tellus drilled a number of deep exploration holes and established a 309 million tonnes halite Measured Resource. In 2015 Tellus drilled a further nine holes as stage one of a comprehensive hydrogeological programme to support planning, Environmental Impact Statement activities and a future monitoring programme. The salt to be exploited is of export quality and will be sold into growing Asian markets and the domestic Australian market. Waste will be stored/disposed in packaged form, typically bags, drums and other specialised packages or by hydraulic backfill techniques. It is assumed for planning purposes approximately half of the waste will be placed by hydraulic backfill over the life of the project.

A comprehensive set of trade off studies at FEL 2 level undertaken by multiple specialist parties during 2015/2016 evaluated access to the underground areas of the facility by vertical shafts (common in Europe) or by access by a long driveable decline and ancillary access shafts (common in Australia). Using multi criteria decision analysis (MCDA) the decline access method was ultimately selected however the MCDA score between the two methods were very close, with economic considerations tipping the decision. The underground mining and storage/disposal horizon will utilize a long room and pillar layout extracted by heavy duty drum type continuous miners at a height of approximately 6m.

The demonstration of the long-term containment of underground storage and disposal of wastes in rocksalt is principally undertaken by designating the salt as the barrier rock. The salt due to its low permeability fulfils the requirement of being virtually impermeable to gases and liquids, and of being able to encase the waste because of its convergent behaviour and confining it entirely at the end of the transformation process. The wastes need to be isolated permanently from the biosphere so it is important that the integrity of the geological barrier is maintained and no pathways are formed by which water would be able to contact the wastes, or by which the wastes, or components of the waste, would be able to migrate to the biosphere. To meet this objective it is also imperative to effectively seal any surface to underground connections at the end of the operational phase of the facility which may act as pathways for the ingress of water or brine into the facility and for the release of contaminants.

Tellus has recently undertaken an initial geomechanical stability assessment and site specific risk assessment for both the operational and post-operational phases. The overall approach followed international best practice, in accordance with the requirements of Australian and international regulations, and assessments of underground facilities in countries other than Australia. The assessments have provided confidence that, for the proposed categories of wastes and with appropriate design, operation and closure, there will be no significant risks in terms of the operational and post closure environmental safety of the facility. The paper presented will set out the geological and hydrogeological context for the project, the assumed waste inventory to be disposed and conceptual designs for the facility including the assumed and assessed sealing strategy. Results of the geomechanical analysis, operational and post closure assessments will be presented and conclusions drawn.