



MODELLING WASTE PILES

Energy Resources Australia (ERA) Ranger Mine in Kakadu National Park in the Northern Territory uses Vulcan™ for stockpile modelling in preparation for reclamation and rehabilitation.



Ranger Mine is one of the most scrutinised mine sites in the world. Located in the middle of a protected national park, the open pit uranium mine must meet strict Australian government regulations.

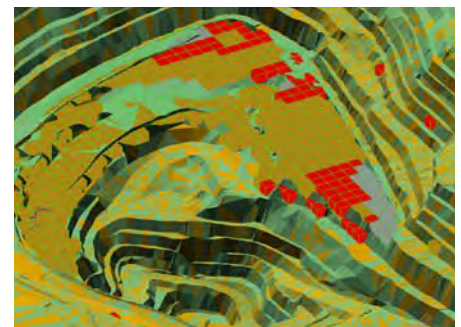
Mining commenced in 1981, with the original orebody mined out by the end of 1995. A second orebody, Pit 3, commenced operations in 1997.

Waste and low grade stockpiles have been kept on site for rehabilitation since the start of mining operations. Loss of corporate knowledge meant little data was kept on the contents of the stockpiles.

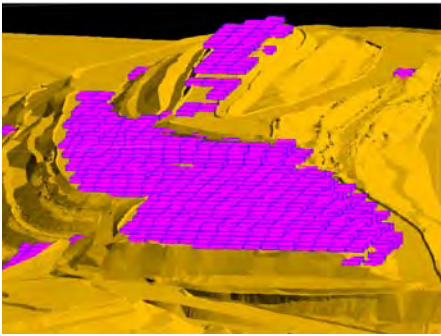
From 2006 to 2011 ERA undertook successive drilling campaigns to identify the composition of the stockpiles. Holes were gamma probed and chemically assayed on 1 metre intervals. Grade estimation into a stockpile resource block model was performed using Ordinary Kriging.

However as stockpiles change over time, the characteristics differ from an insitu resource model. Assumptions had to be made regarding grade distribution.

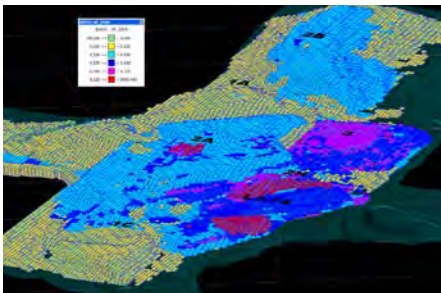
Senior Resource Geologist, Stephen Pevely, decided that there had to be a better way to keep track of the grade stored in stockpiles and enlisted Maptek help to integrate data from a variety of sources in Vulcan.



Multi element data sourced from insitu MIK model regularised between same EOM surfaces



New incremental model created between old and new quarterly EOM topographic surfaces



Grades estimated into blocks using parameters from 2010 drilling studies, showing current and previous models merged

Using a lava script, ERA was able to take data from an SQL database used for monitoring truck movements around the mine. From this a Vulcan samples database was created, providing the ability to sequentially flag block models and polygons to record each stage. This enabled estimation of the grade within the incremental block model.

Each load dumped by a truck has a discriminated grade value. Using the X,Y coordinates and resetting the value of the Z in the SQL database, the GPS truck data is of great value when tracking the movement of material to the stockpiles.

The stockpile model is current, robust, relevant and usable for end of year resource and reserves reporting, mine scheduling, and closure and rehabilitation studies.

Ex-pit multi element data sourced from the insitu MIK model is regularised between the same end of month surfaces. This is then used to populate multi-element variables in the stockpile block model.

The stockpile destination polygon names are flagged and put into the model. The grades are estimated into blocks using Ordinary Kriging parameters derived from the original drilling studies. This new incremental stockpile is then added to the previous model, providing an overview of the changes in the stockpile over time.

Since this method is highly dependent on the integrity and accuracy of modelled topography, advanced techniques such as laser scanning would be beneficial for optimising volume reconciliations and speeding up survey pickups.

This innovative approach to stockpile monitoring allows Energy Resources Australia to schedule low grade stocks as mill feed as backfilling progresses. It adds value and certainty to the backfill and reclamation process, which is imperative on a mine site where environmental and rehabilitation standards are paramount.

*Thanks to Stephen Pevely
Resource Geology Leader, ERA
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