MAPTEK™ Vulcan™

CASE STUDY

Heathgate Resources improves grade estimation

Heathgate Resources Pty Ltd operates the Beverley Uranium Mine. This is located 600 km north of Adelaide, South Australia, on the plains between the northern Flinders Ranges and Lake Frome.

Isometric view of the Beverley operation, showing outline of orebody projected on surface, in red

HIGHLIGHTS

- Vulcan's 3D grade estimation approach gives improved results
- Extremely large datasets handled with ease
- Best practise from other resources applied to in-situ uranium mine

The Beverley deposit is low to medium grade, lying in permeable sands contained in the saline Beverley aquifer, some 125 metres below the ground surface. The paleochannel-hosted uranium is mined using in situ recovery (ISR) technology.

The Beverley mine, which commenced operation in November 2000, is a technologically advanced ISR mine, operated in accordance with stringent safety and environmental standards. The mine is currently licensed to export 1500 tonnes of uranium (U_3O_8) per annum.

Heathgate Resources purchased Maptek Vulcan™ in 2007 for geological modelling and resource estimation, and now runs 5 Vulcan licences.

ISR uranium mines have traditionally used a 2D grade thickness by area method to calculate resources and reserves.

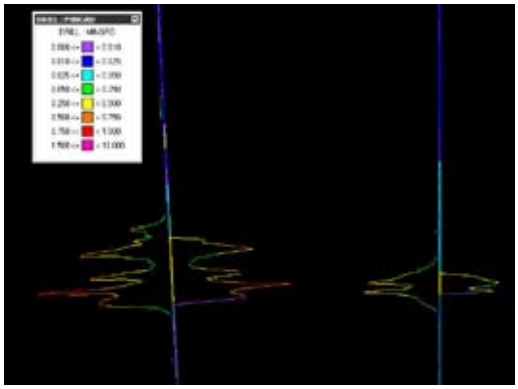
Heathgate Resources calculates these by 3D modelling of the orebody and ordinary kriged block models using 'unfolding' techniques across the paleochannel morphology.

Key benefits

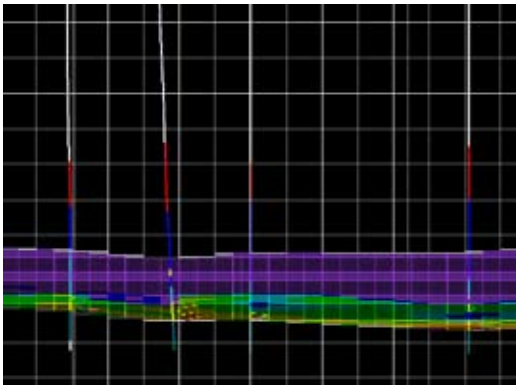
- Better understanding of orebody geometry and mineralisation controls.
- True scale cross and long-section interpretation of drillhole lithologies from geophysical downhole data and logged drill cuttings within a 3D environment.
- Domaining of mining areas and variography studies to optimise wellfield delineation drillhole spacing.
- Grade estimation in three dimensions .

Data is read from the Access database via an ODBC link into Vulcan. Due to the high density of downhole geophysical data collected, the files can be more than 1.5 GB in size. Drillhole data is typically displayed with lithology on the drill trace, and up to 4 electrical logs, as well as grade data, from both Gamma tools and Prompt Fission Neutron (PFN) tools.

Working in a 3D environment gives Heathgate Resources access to state of the art grade estimation methods and an improved understanding of the deposit.



Drillhole data displayed with lithology on the drill trace

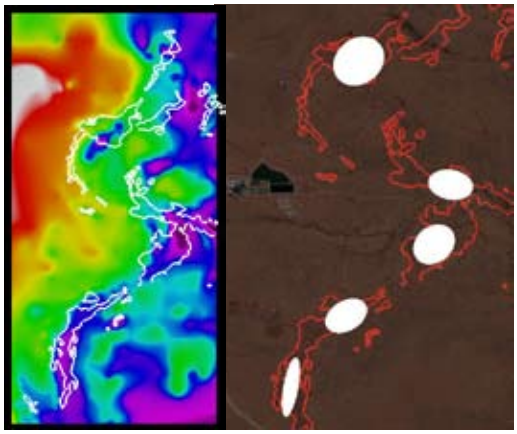


Block model slice showing intersecting drillholes

TESTIMONIAL

Vulcan allows densely sampled downhole geophysical data stored in an ISIS or ODBC linked database to be displayed adjacent to drillholes stored in another database, without impacting on the speed and usability of the drillhole.

ISR amenable sand solids are generated from the combination of all the data displayed. Variography is conducted using these surfaces to control the sample search, which extends the range of grade continuity compared to a traditional planar search ellipse. This variography also shows greater continuity along the palaeochannel than across it.



Erosional unconformity surface topography directly underlying the Beverley Sequence with resource outlines (above left) and search ellipsoids for modelling using unfolding techniques (above right)

Grade estimation is carried out using Vulcan's unfolding technique and ordinary kriging (using the search ellipse defined by the variography) with multi-threading turned on. This feature reduces the time taken to estimate values into a block model.

Multiple processors accelerate the grade estimation process and an option to allow 3 GB processing helps users working with extremely large Vulcan datasets.

Moving Window analysis of methods for resource estimation