

# Project vulcan



**ASSIGN  
BUSTER**

The requirement of this group project: Learning Outcomes It is intended that by the end of this project, students will be able to: ? Understand the structure of exploration data files, ? Create, validate and composite a drillhole database, ? Build a block model, ? Estimate grades to blocks using Inverse Distance Technique, ? Generate the reserves, and ? Become familiar with an orebody modelling and resource estimation software package. The Deposit The deposit is a gold mineralisation which lies horizontally beneath the surface.

A “ first-pass” drilling campaign has been completed with 26 boreholes being drilled on a series of north south sections using a single RC Drilling Rig. The sections are 25 metres apart and start at 5922 m E and 5036 m N. The main lithology of the area consists of soil, sandstone, siltstone, breccia and basalt from the surface. Files provided Each group will be provided with a set of project files compiled from the exploration process by a geologist. These files contain the necessary data for creating a drillhole database and block model to be used for resource estimation. Descriptions of these files are given below.

File Name | | Collar. csv | | Survey. csv | | Assay. csv | | Geo. dsf| | Reeboreholes. geo. isis| | Reeboreholes. geo. isix| Topo. 00t | | Resource\_estimation. dg1| Required Tasks ? Examine the data files, ? import data files into the software package, ? load and view the drillhole database both graphically and in database format, ? composite the drillhole database, ? define the shape of the orebody from the drillholes, ? build a block model and assign grades using inverse distance grade estimation method, ? calculate the reserve for the interpolation method, ? Display a

Grade-Tonnage Curve, and submit a group report. Project Interview and Report ? All the members of the team must be present (0 mark will be awarded to any member of the team who is not present), ? Interview will be conducted in the computer lab where the students need to show the results of the project on the computer, ? Students will be expected to demonstrate ability to use software, ? This process will take about 10 minutes. ? Students are required to give a Summary Report for the project (max 5 pages), ? The report should contain appropriate views of the progress of building the block model and a reserve table, ?

Report to be submitted by Friday May 25th (Week 12). ? The Project Interviews will be held in Thursday May 24th (the meeting roster will be posted later). Group Project 2 – Orebody Modelling and Reserve Estimation  
 Group members: DevireddyNataraj Feng Fan Li Zha  
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 chapter title (level 3) Introduction The objective of this group project is to  
 demonstrate the ability to use a block model calculating possible ore reserve  
 using the provided drillhole database. To achieve this objective, the orebody  
 data has to be calculated independently using triangulation and block model  
 reserving techniques in Vulcan software. The data given was originally the

result of 26 different exploration holes drilled by a single RC drill rig in the north south sections of the deposit.

The main lithology of the area consists of soil, sandstone, siltstone, breccia and basalt according to the analysis of the drillhole data. Gold mineralization occurred in different stages of in this area but the exact detail of the mineralisation is still unclear. 'Vulcan' will be used in order to plot given drillholes, composite the data and determine orebody position and geometry, and eventually generate a block model and grade/tonnage estimate. Objective The key objective of this task is to develop an understanding and familiarity with the orebody modelling and resource estimation software package 'vulcan'.

There are several key stages crucial in developing our knowledge. First the structure of exploration of data files must be examined and validated; these files can then be composited using the software for future interpretation. From the composited drillhole data an interpretation of orebodies present will be correlated and a suitable block model can be created. Using the generated suitable block model, the resource grades and total tonnage will be generated. It is through these aforementioned steps that the key objective of the project will be achieved. Methodology

Getting started 1. The first step in the creation of the resource model is to initiate the 'Vulcan' software tool and to import the Project 2 data file. This file contains all the required data for the project. 2. Select the design file 'Reeboreholes. geo. isis' when prompted. This design file contains all of the required drillhole database files for the resource model. Drillholes 3. Before the drillholes can be displayed a suitable legend must be created in order to

display variances in ' au' content within the drillholes. This is achieved by the following procedure: i.

Analyse> Legend Edit> Legend editor ii. Double-click ' new legend' under the ' drillholes' heading and name the new legend accordingly, i. e. 'drillholes' iii. See Figure 1 for values. 4. Once the legend has been created and saved the next step is to load the drillholes. i. Geology> Drilling> Load Drillholes ii. See Figure 2 for the view of the loaded drillholes Compositing 5. With any raw data it is important composite the data before proceeding any further. This is the next step in the creation of our resource model. Assay intervals of 2m intervals were chosen in this particular instance.

The creation a composition database was achieved through the following the following steps: i. Geology> Compositing> Compositing ii. Figure 3-11 in show the values input to composite the drillholes iii. Click Apply the Run to create the composite database. iv. To load compositing: Geology > Compositing> Display and then select the created composite database. See Figure 12 and 13. v. See Figure 14 for a view of the loaded drillhole composites. Triangulation 6. With the drillholes composited, we are able to begin the process of correlating and triangulation of the orebodies.

To do this the drillholes must be viewed in single section: i. View> Create Section ii. Under ' select Plane by' choose ' Easting' and use the ' Digitise' button to choose a point on the map west of the drill holes. See Figure 15. iii. This will give a 2D sectional view of the drillholes looking east. 7. With the composited drillholes now viewable in 2D section it is possible to draw and correlate the surface of the orebodies, using the polygon tool. During this

stage of the resource estimation there is room for variation in how the orebodies are interpreted.

This process of drawing in the orebodies using the polygon tool is used for each orebody separately. i. Open the ' Overview' and ' Slice' toolbars. \* ' Overview' gives a birds-eye view of the drill holes, showing the currently viewed section. \* ' Slice' toolbar is used to step back and forth between sections. Choose a suitable step size, i. e. 50m. ii. Now select the ' polygon' tool and join the correlating orebodies. Repeat for each section view. See Figure 16. 8. Once each orebody has been outlined and identified they are turned into solids using the triangulation solid tool. i.

Model> Triangulation Solid> Create ii. Check ' construct first end plate' and ' Construct last end plate' in pop-up and click ' OK'. iii. Using the cursor each individual polygon is selected to join to correlating polygons in each section to create a solid. This process creates the solid orebody. iv. This process was repeated for all interpreted orebodies. v. See Figure 17 in the Appendix for the final view of the interpreted orebodies. Block modelling 9. Now that the orebodies have been defined the next step of the estimation process is to create a suitable block model for the given deposit.

The first step in block modelling is creating a block definition to be used in the model. This step involves defining the block orientations, block sizes for parent and subblocks, variables, boundaries and limits. Through trial and error it was decided that a suitable parent block size would be 10? 10? 4m, with subblock dimensions of 5? 5? 2m, as these sizes gave the most detailed visual grade. i. Block> Construction> New Definition ii. See Figure 18-22 for

the values input during the block definition process iii. Click save and exit.  
10.

Once the blocks are defined the next step is to create the resource estimate using inverse distance method. This is achieved through the estimation editor function: i. Block> Grade Estimator> Estimation Editor ii. Choose your created block definition iii. Name the estimation file, i. e. estimation. def iv. See figure 23-30 for specific values and steps taken in the estimation Editor. v. Click 'Save and Run' to create estimation file. 11. Now an appropriate colour legend must be created for the block model: i. Analyse> Legend Edit> Legend Editor ii.

Double-click ' new legend' under the ' blocks' heading and name it accordingly, i. e. 'Block' iii. See Figure 31 input values. Use ' Get Range' button to find maximum data range. iv. Save and exit. 12. Once the legend is created the blocks can be added to the display. i. Expand ' Block Models' on the ' Windows Explorer' toolbar ii. Right click the block definition file and choose ' Load' to load block definition, iii. Right click the block definition file again and choose 'View Block', see Figure 32&33 for specifications. iv. When prompted select the triangulated orebody to create a block model. . Repeat for all orebodies. See Figure 34. Grade/tonnage Report 13. We can now generate a grade/tonnage report. This report outlines tonnages and average grades for specific cut-off grades for each of the orebodies and is used in the final evaluation of the resource. i. Block> Advanced Reserve> Advance Grade/Tonnage Report ii. See Figure 35-41 for input values iii. This will create an Excel spreadsheet of the grade/tonnage results. See Figure 42-22. This

completes the process for the orebody block modelling and resource estimation of the given gold mineralisation. Summary