Using RockWorks for Dredge Mining

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Step 1 – Creating a Borehole Manager Database

Create a RockWorks Borehole Manager Database containing Bore Location information and %Sand Assay data. This data can be entered into the Borehole Manager by hand, or can be imported via Excel or an ASCII file.

Data in the Locations table include Eastings, Northings, Elevations and Total Depths for your holes. Because all of these holes have been drilled in water, the elevation for the top of each hole is 0 (sea level), and the total depth is the total depth of the water plus sediments.
Data in the I-Data Table includes interval-based percentage information for Sand, Silt and Clay. In the exercises below, we’ll be focusing on the % Sand data. Intervals in water are assigned a value of 0 for Sand, Silt and Clay.
Step 2 – Creating a Borehole Location Map.

Use the Map/Borehole Locations program to create a borehole location map. Examine this map to make sure that all of the borehole locations are in their proper position.

![Figure 3: RockWorks borehole location map](image)

Step 3 – Creating 2D Striplogs

Create a striplog for a given borehole by using the Striplogs/Single Log (2-D) program.

In this example, we have turned on the scalebar and the Sand I-Data column. We have used a “Variable” color scheme for the Bar Graph so that the color of each bar corresponds to the measured % Sand value for that interval.

![Figure 4: RockWorks 2D striplog](image)
Step 4 – Creating a 3D View of your Bores

Use the Striplog/Multi-log 3D program to create a 3D View of your Sand data.

In the example below, we used a “Variable” Color Scheme and “Oblate” Shape.

At this point, we strongly recommend that you study this diagram to make sure that everything seems to be plotted in the right place with appropriate grade values.

![Figure 5: RockWorks 3D striplogs](image)

Step 5 – Creating a Solid Model

Use the I-Data/Model program to interpolate a solid model based on the downhole % Sand values. Set the name for this model to "Sand.Mod". The model is depicted in the diagram below.

![Figure 6: RockWorks I-Data Model diagram](image)
The image below shows the same solid model, but is rendering an isosurface of 75. This means that any parts of the model with a sand value below 75 are transparent.

**Figure 7: RockWorks I-Data Model diagrams, filtered**

**Step 6 – Creating an “Acceptable Sand” Boolean model**

Use the Solid/Boolean Operations/Boolean Conversion tool in the RockWorks Utilities to set all node values less than 75% sand to a value of “0” and all values above 75% to a value of “1”. Boolean models only contain values of 0 and 1. Save these values in a new model called "Acceptable_Sand.Mod"

**Figure 8: Solid model Boolean filtering options**

The resulting model is plotted below.
Step 7 – Creating a Sand Isopach Map

Convert the "acceptable sand" solid model to a 2D grid model in which the cell values represent the thickness of material in which the sand content is greater than 75%. This is accomplished by using the Solid/Convert/Ore Thickness->Grid program in the RockWorks Utilities. Contours and node values in the map below represent total ore (sand >75) reserve thicknesses.
Step 8 – Digitizing a “Mine Plan” Polygon

Define a polygon that shows the area that you wish to dredge. Save the digitized polygon at a RockWorks Polygon Table.

![Figure 11: Digitizing a polygon in RockPlot2D](image)

Step 9 – Clipping the Sand Thickness Grid with the Polygon

Use the Utilities Grid/Filters/Polygon-Clip program to remove (change to zero) all of the grid nodes outside of the dredging polygon.

![Figure 12: Color contour map representing clipped isopach model](image)
Step 10 – Generate a Volumetrics Report

Use the Grid/Statistics program to generate a model report. The volumes are based on your percentage cutoffs (75% sand) and mine plan polygon outline.

**Special Note** Please note that you can do much more than has been shown in this case study. For example, we could have also included downhole lithology and other additional assay parameters. We could have used some of the fancier overburden/interburden filters. We could have used the density conversion features to computes masses rather than volumes next time.

Figure 13: Statistical report for the filtered isopach grid