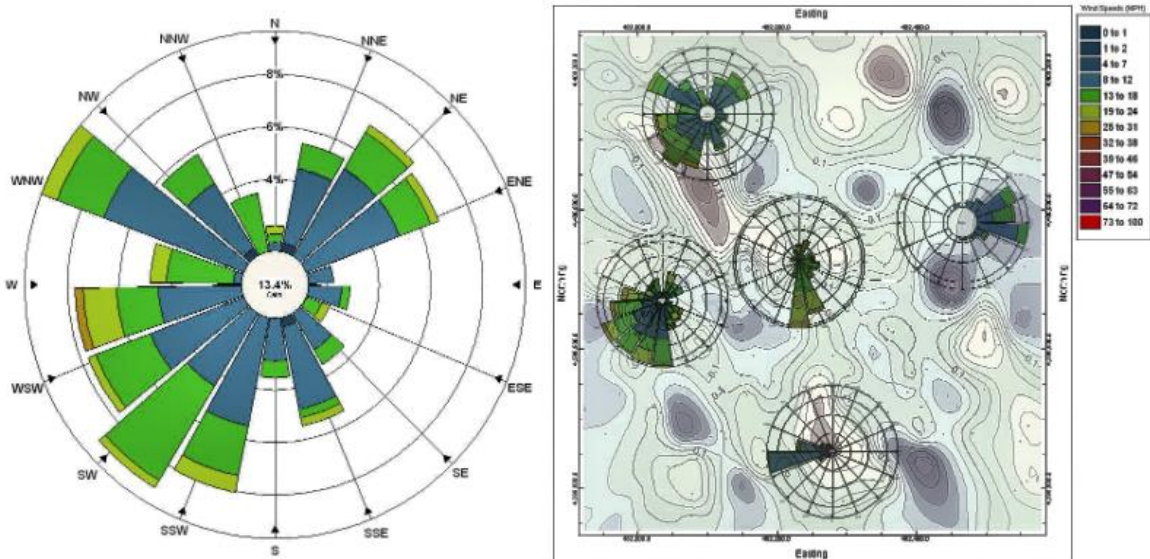


Changes Made to RockWorks in 2024

1/8/25

Mapping

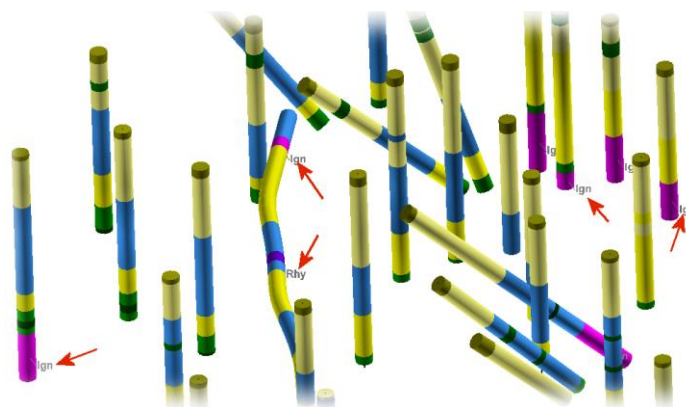
- The *Map Overlay Polygons* can now be plotted in the foreground or the background of the diagram.
- The eastern border annotation within maps now expands to accommodate “anchored” text if the *Automatic dimensions* setting is used.
- The new *Proportional Shapes* map option in the Point Map and Borehole Map menus (replacing Bubble maps) can plot points as Circle, Square, Triangles, Diamonds or Stars with variable colors and sizes.
- A *Wind-Rose Mapping* program has been added to create maps featuring rose diagrams that depict wind directions at one or more data collection sites.



Wind Rose Diagram and Wind Rose Map

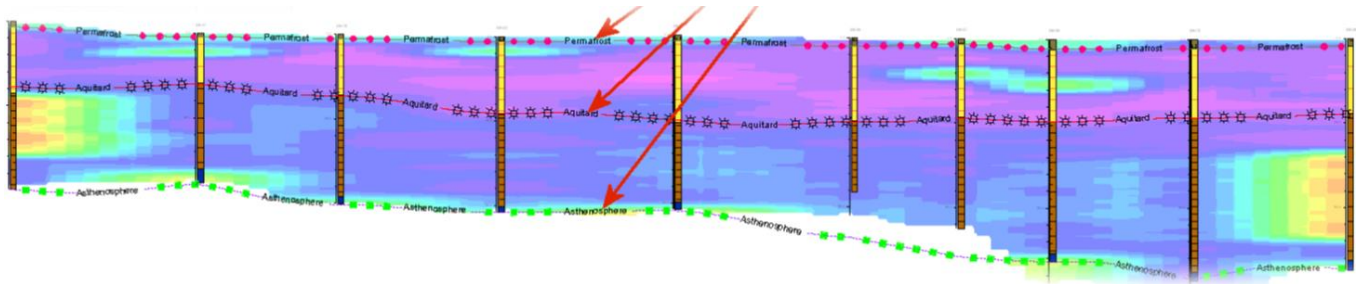
Logs, Sections, and Profiles

- A new option has been added to the *3D Log Designer / Lithologic Interval Labeling* that can be used to limit the labeling to lithologies with specific g-values. This provides a means to highlight specific lithologies of interest.



Selective Lithology Labeling

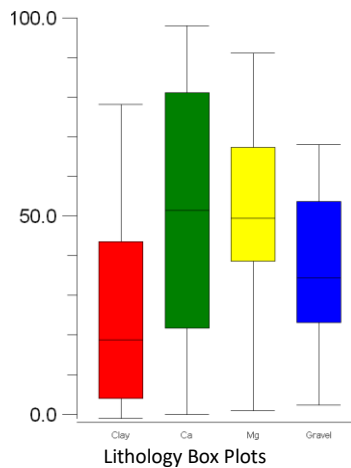
- An option has been added to the 2D Log Designer that plots the P-Data color-fill between the maximum and the right edge of the designated column. This provides a means for highlighting low values while preserving the relative scaling.
- The *Miscellaneous Options* sub-menu within the 2D and 3D Log Designers now include an option for Omitting stratigraphic data above the borehole collar elevation and below the Total Depth (TD). This allows the user to add extra contacts above or below the borehole to be used for modeling purposes. This data will not be plotted in boreholes if the omit option is enabled.
- An option titled *>2 Grids* has been added to the programs that create profiles, sections, and projected sections. This new feature can be used to overlay an infinite number of labeled and/or symbolled profiles based on grid models listed within the datasheet.



Cross-Section With Profiles for Three Grids

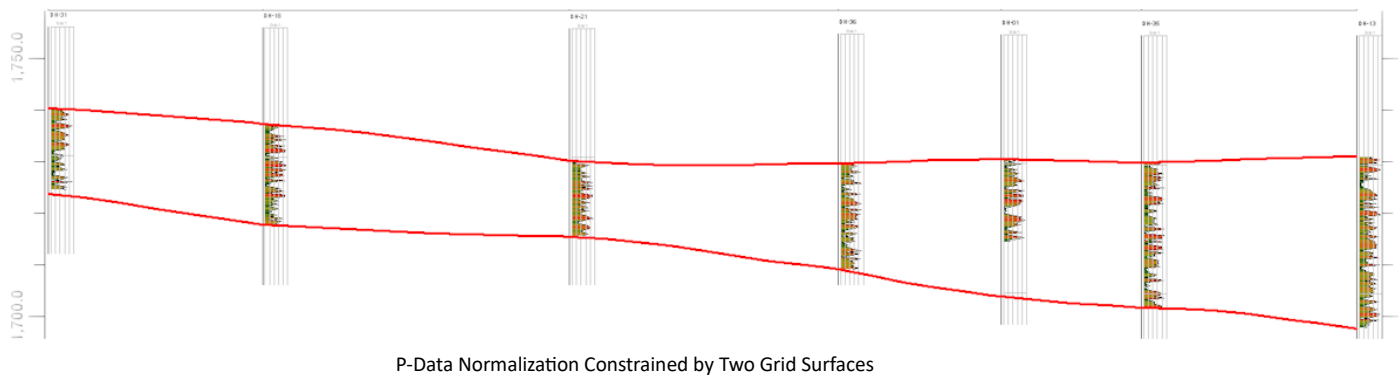
Borehole Manager Database

- *Box Plots* (also known as Box and Whisker Plots) can now be created based on I/P/T-Data. These can include multiple components or multiple boreholes.



- The editor for Litho, Strata, Aquifer and Construction Types has been improved, now allowing data to be imported and exported through the Datasheet.
- Numerous improvements have been made to the *Borehole Manager Text/Excel Import* templates. Templates now include the option to appending or replacing I/P/T data and also include an option to be saved to the Playlist.
- The *LAS File Import Wizard* now includes an input field for the *Collar Elevation*.

- It is now possible to restrict *Normalization* of P-data to a region between two grid models.



- The *Export All Tracks* tool for I/P/T-Data has been enhanced to export only those borehole tracks with data, thus eliminating empty columns in the export.
- The *Row-Based Imports* into the Borehole Manager now allows multiple blocks of a given data type to be imported. For example, it can import 3 blocks of Interval-Text data.
- The Borehole Manager export, for *Multiple Tables to Leapfrog* will export Interval and Survey data in addition to the Location, Lithology, Stratigraphy, and Point data.
- The Borehole Manager *Check Data Integrity* option has been improved to better deal with T-Data and errors in Lithology data.
- It is now possible to hide successive warnings if a required field is missing when importing borehole data.
- The *Optimize Columns* button in the Borehole Manager now uses column headers and the value places to determine column widths.

Stratigraphy/Lithology

- An option titled *Rosegrams* has been added to the symbol options for all programs that create 2-D maps from borehole data. This new capability produces maps that depict lithology or stratigraphy as radial bar graphs without the need for any modeling.
- The *Litho and Strata Types Tables* now include columns for horizontal (HK) and vertical (VK) hydraulic conductivities. These can be used to create Hydraulic Conductivity models.

G-Value	Keyword	Pattern	Fill Percent	Density	Show in Legend	HK	VK
2.0	Clay		100	2.2	<input checked="" type="checkbox"/>	0.0E-1	0.0E-1
5.0	Gravel		100	2.8	<input checked="" type="checkbox"/>	1.157E-2	1.157E-3
9.0	Ignimbrite		100	2.5	<input checked="" type="checkbox"/>	1.0E-6	1.0E-7
6.0	Mudstone		100	2.6	<input checked="" type="checkbox"/>	1.157E-8	1.157E-9
8.0	Rhyolite		100	2.1	<input checked="" type="checkbox"/>	1.0E-6	1.0E-7
4.0	Sand		100	2.7	<input checked="" type="checkbox"/>	5.787E-3	5.787E-4
3.0	Silt		100	2.1	<input checked="" type="checkbox"/>	1.157E-6	1.157E-7

New Horizontal & Vertical Hydraulic Conductivity Fields Within LithoTypes Table

- Several new options have been added to the *Multivariate Lithology Map* menu.



Multivariate Lithology Pie-Chart Map

- The *Borehole Operations / Lithology / Volumetrics* program has been completely rewritten to create a more graphical and condensed report.
- The constraining surface in the Stratigraphy model is now clipped when Polygon Clipping is selected.
- The Lithology Volumetrics program has been modified so that for each interval, the area computation for a given lithotype represents the plan-view extent of the lithotype.

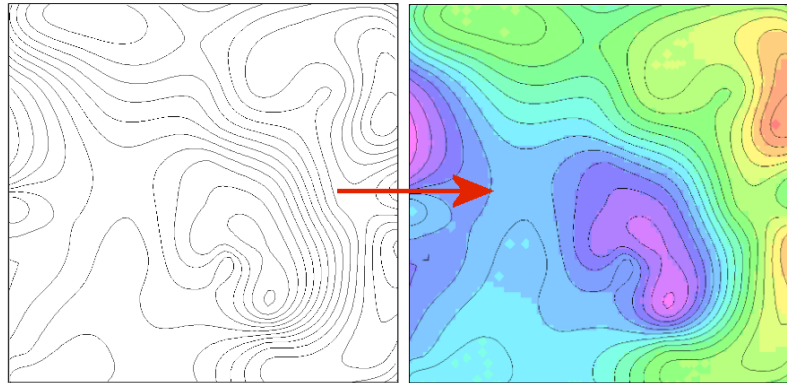
Volumetrics Report							
Interval Elevation (Meters)	Lithology	% (By Volume)	G-Value	Nodes	Area (Square Meters)	Volume (Cubic Meters)	Mass (Tonnes)
1,770.0	Clay	21.0	2.0	1,696.0	169,600.0	755,250.0	1,661,550.0
	Sand	20.0	4.0	1,685.0	168,500.0	706,000.0	1,906,200.0
	Gravel	59.0	5.0	4,293.0	429,300.0	2,143,750.0	6,002,500.0
	Siltstone	.0	7.0	33.0	3,300.0	8,250.0	20,625.0
1,720.0	Clay	9.0	2.0	1,063.0	106,300.0	438,750.0	965,250.0
	Sand	23.0	4.0	2,512.0	251,200.0	1,119,500.0	3,022,650.0
	Gravel	.0	5.0	11.0	1,100.0	2,750.0	7,700.0
	Siltstone	17.0	7.0	1,611.0	161,100.0	797,250.0	1,993,125.0
	Ignimbrite	51.0	9.0	5,374.0	537,400.0	2,446,750.0	6,116,875.0
1,670.0	Ignimbrite	100.0	9.0	4,805.0	480,500.0	2,162,250.0	5,405,625.0
1,670.0	Totals for All Lithologies						
	Clay	12.0	2.0	2,759.0	2,759.0	2,759.0	2,759.0
	Sand	18.0	4.0	4,197.0	4,197.0	4,197.0	4,197.0
	Gravel	19.0	5.0	4,304.0	4,304.0	4,304.0	4,304.0
	Siltstone	7.0	7.0	1,644.0	1,644.0	1,644.0	1,644.0
	Ignimbrite	44.0	9.0	10,179.0	10,179.0	10,179.0	10,179.0
	Grand Totals:			22,082.0	22,082.0	22,082.0	22,082.0

Interval-Based Lithology Volumetrics Report

Grid Models

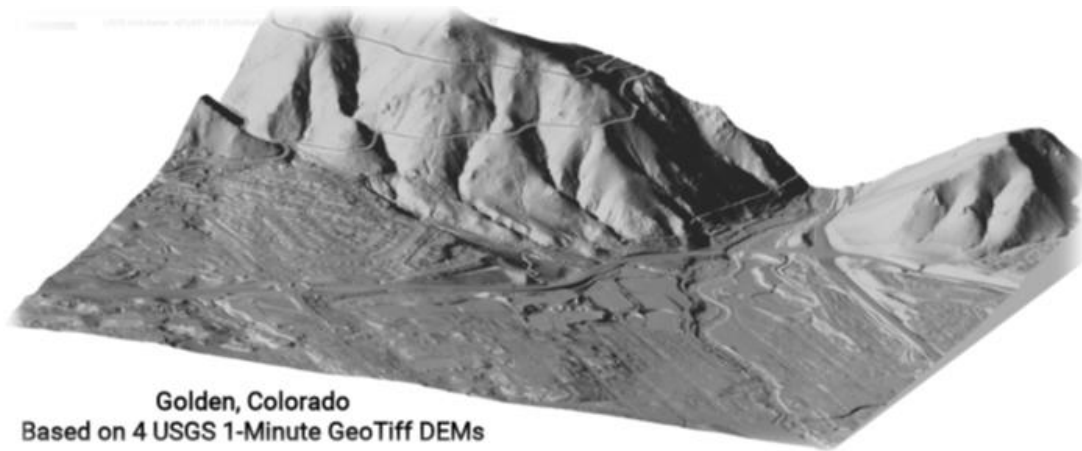
- A new interpolation method titled *Radial Basis* has been added to the gridding algorithm list. This new algorithm produces smooth models that honor the data.

- The new *ModOps Contours to Grid* program will convert the polyline data within a RxDat or a RxD2D file into a grid model based on a triangle network algorithm.



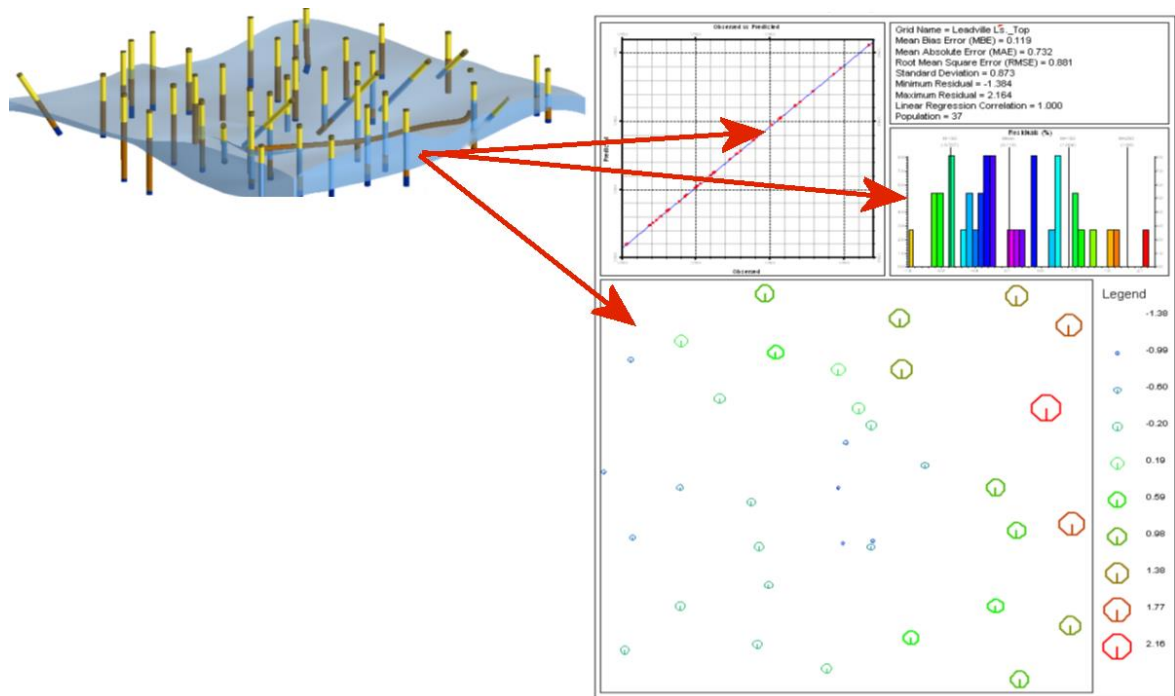
Polyline Data Converted to Grid Model

- The *ModOps / Grid / Import* menu structure has been re-organized to include the following:
 - **Raster** – Used to import georeferenced raster files (such as GeoTIFFs) into RockWorks Grids
 - **Images** – Used to convert non-georeferenced images into RockWorks grids
 - **USGS GeoTIFF** – Used to mosaic up to four 1-meter USGS GeoTIFFs into a RockWorks grid



- **Legacy** – Used to import older grid formats such as Surfer and ArcASCII

- A new program titled *Grid Evaluation* has been added for quantifying the "goodness-of-fit" for an interpolated grid model. The program generates a report with diagrams that depict the accuracy of a grid model relative to the original control points used to interpolate the grid values.

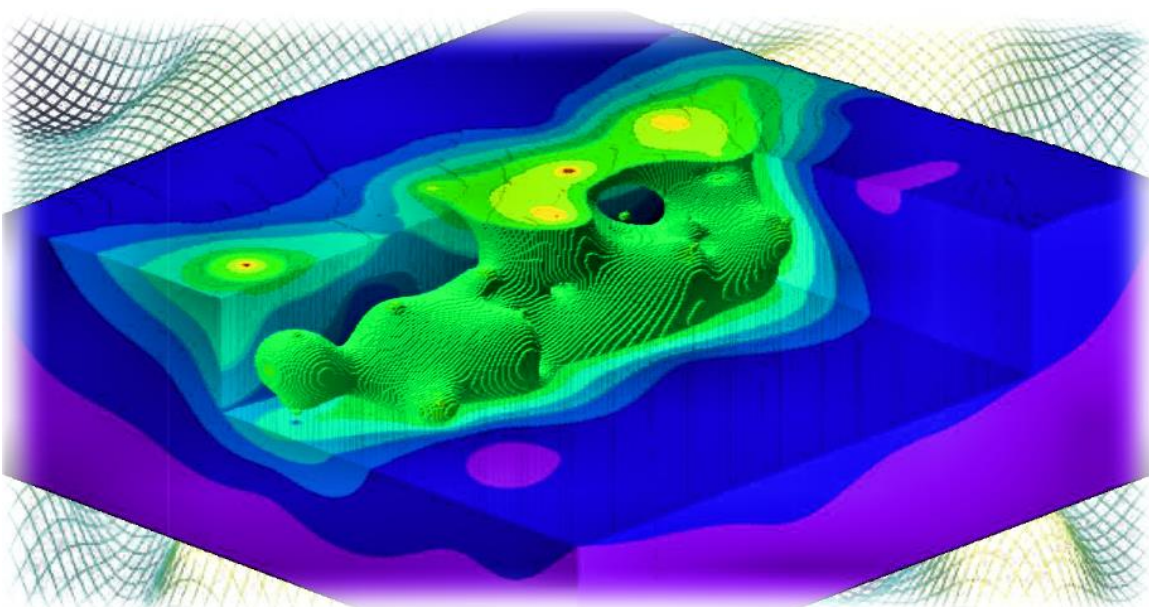


Grid Evaluation (Goodness of Fit) Report

- The *Variogram Editor* now adjusts the width of the Sill and Nugget columns to allow for very large numbers. An option to change the number of decimal places for the Nugget and Sill has been added.

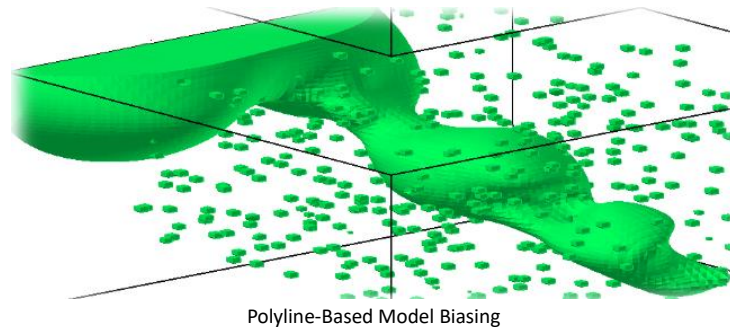
Solid Models

- A new interpolation method titled *Radial Basis* has been added to the 3D block model algorithm list. This new algorithm produces smooth models that honor the data.

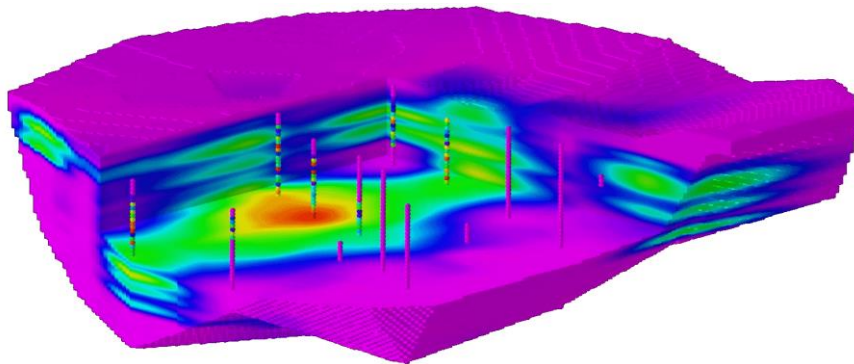


Model Interpolated Using Radial Basis Function (RBF) Algorithm

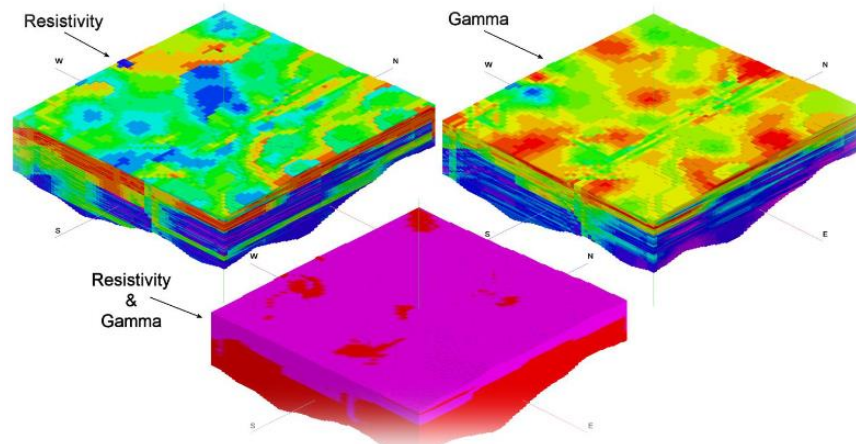
- The *Solid Modeling Directional Algorithm* now contains four sub-algorithms, allowing for Automatic, Line-Based, Polyline-Based and User-Defined biasing.



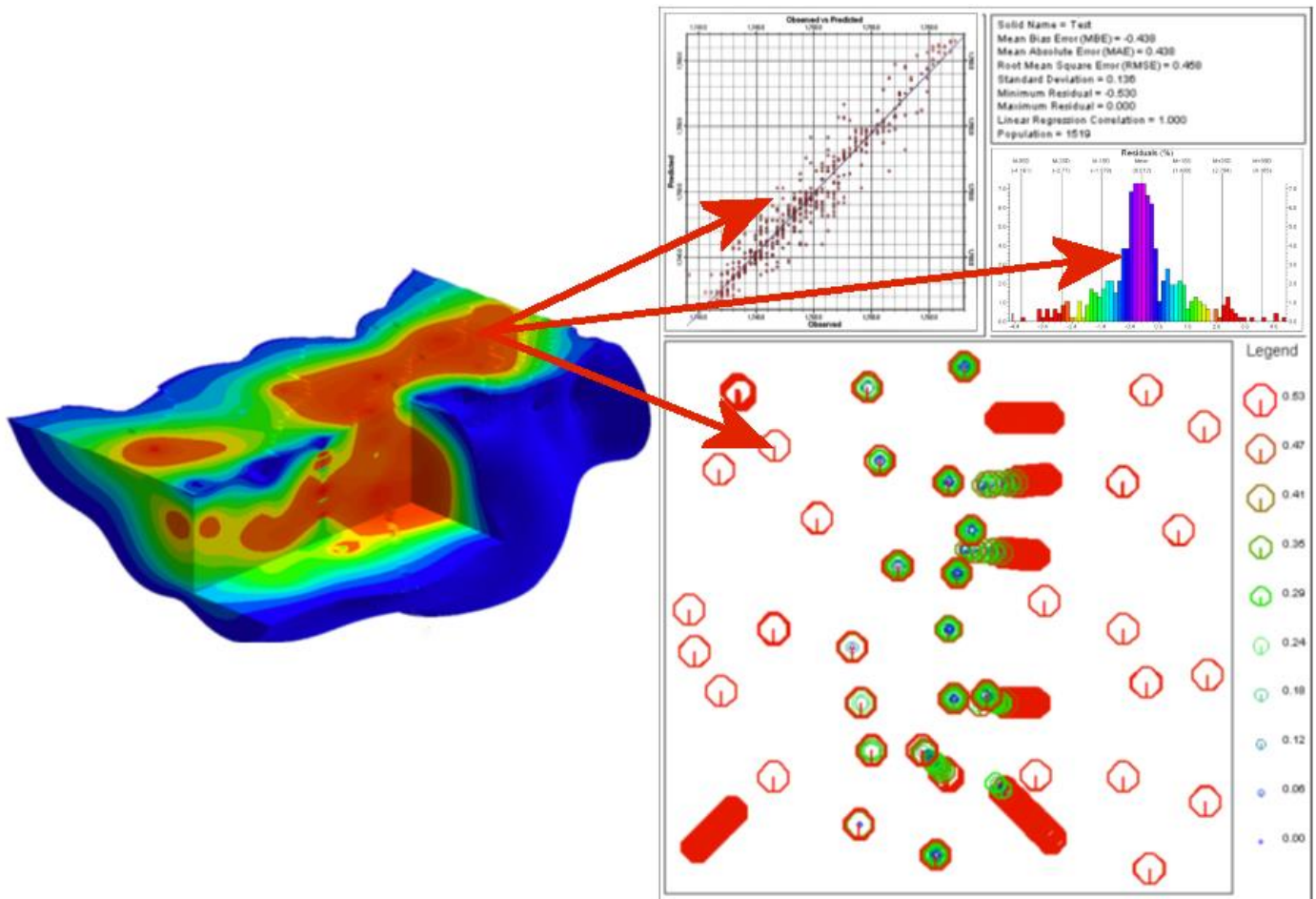
- A new program titled *Soundings* → *Boolean Solid* has been added to the *ModOps / Solid / Create* pull-down menu. This program constructs a Boolean solid based on the spatial extents of vertically aligned points (e.g. resistivity soundings). This solid may then be used to constrain the subsequent modeling.



- The *ModOps / Solid / Extract Grids / Solid* → *Thickness Grid* program (previously *Solid* → *Total Ore Grid*) now includes the option to limit the values of voxels used during the isopach grid creation. This program also now includes a smoothing option.
- A program titled *K-Means Clustering* has been added to the *ModOps / Statistics* sub-menu. This tool performs a multi-dimensional cluster analyses to divide voxels into groups based on their similarities.



- A new program titled *Solid Evaluation* has been added for quantifying the "goodness-of-fit" for an interpolated solid model. The *Solid Evaluation* program generates a report with diagrams that depict the accuracy of a solid (block) model relative to the original control points that were used to interpolate the voxel values.

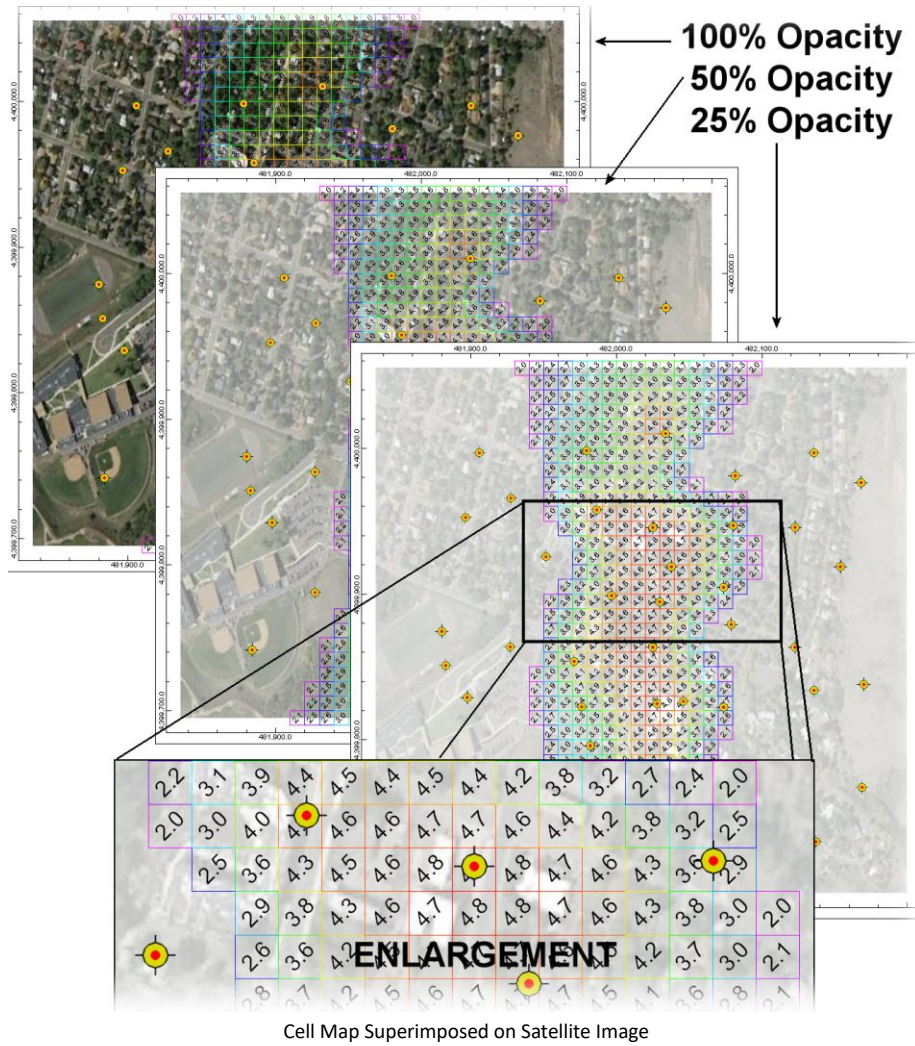


Solid Evaluation (Goodness-of-Fit) Report

RockPlot2D

- Numerous improvements have been made to *RockPlot2D Scalebars*, making them easier to add to existing diagrams and to resize.
- Many improvements have been made to *RockPlot2D Color, Pattern and Index Legends*.
- RockPlot2D now includes a *Text Search* which allows users to find Boreholes or data points by their labels, making it easier to locate boreholes or other labels in larger or more densely labeled diagrams.
- The new RockPlot2D *Shape* item (replacing the "Circle" item) can be drawn as a Circle, Square, Triangle, Diamond or Star.

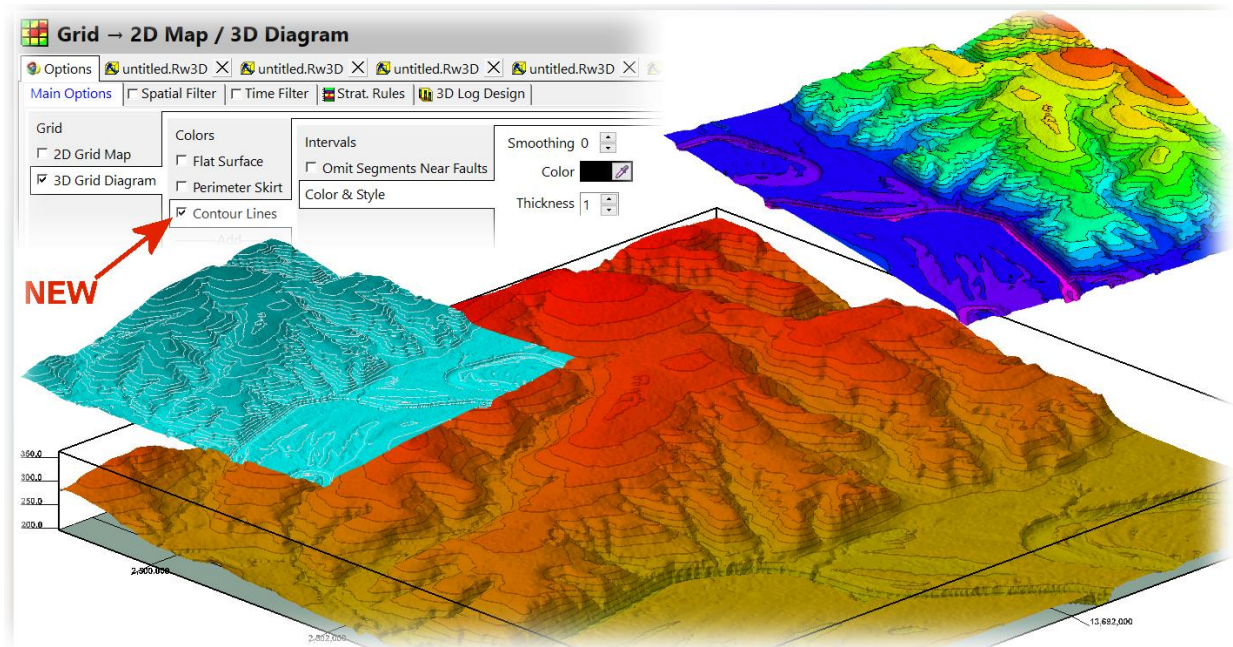
- It is now possible to adjust the opacity of the background image within two-dimensional maps.



RockPlot3D/3D Objects

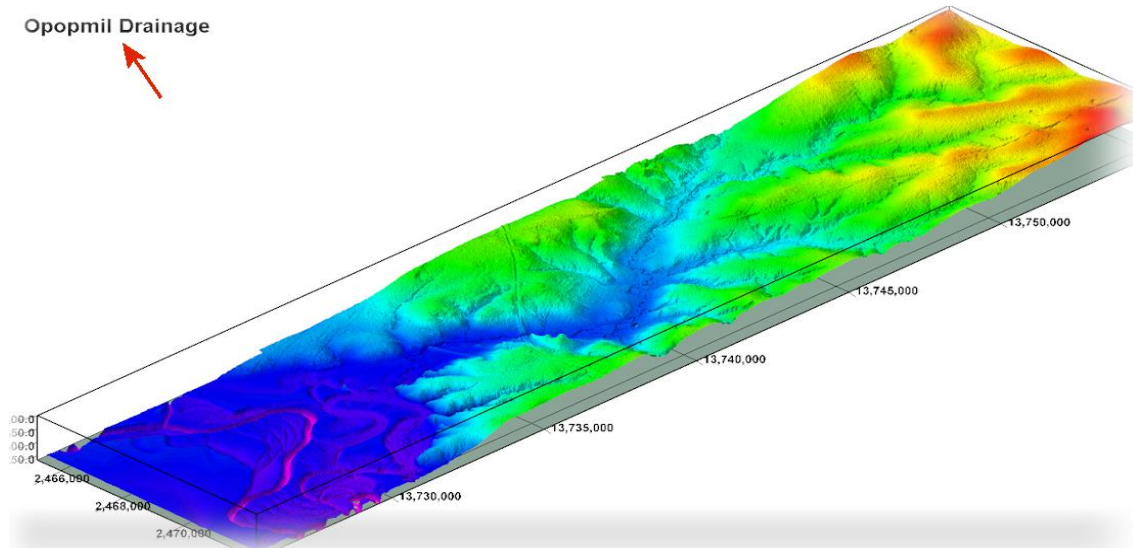
- The Cage options which are used to add perimeter annotation to 3D diagrams now include an option to add a small north arrow to the diagram.

- Contour lines may now be added to 3D surface (grid) diagrams.



Contour Polylines Superimposed on 3D Surfaces

- Titles may now be added to 3D diagrams.



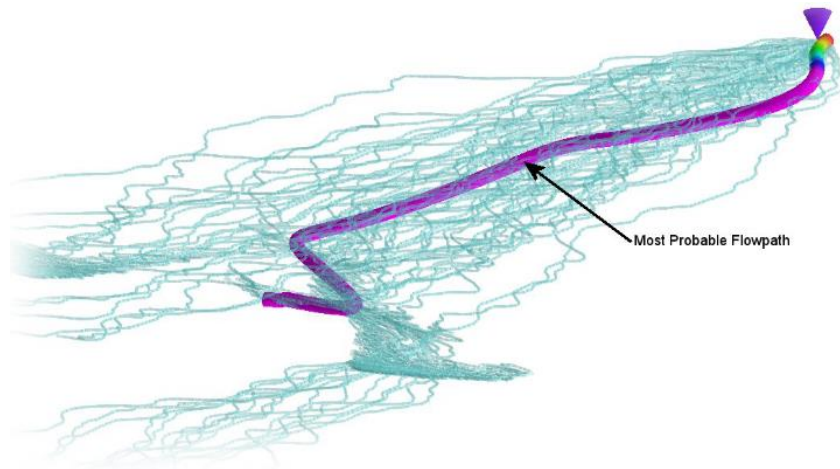
Contour Polylines Superimposed on 3D Surfaces

- The elevation for an imported image within the *Graphics / Images / Float* program can now be automatically set to the *Project* minimum or maximum elevation.

Utilities

- A new program called *GeoCylinders* has been added to the *Utilities / 3-D* sub-menu. This program is used to plot geologic units encountered within boreholes or measured as color-coded vertical cylinders based on data stored in the Datasheet.
- A *Box Plot* program (also known as Box and Whisker plots) has been added under the *Stats* menu.

- The new *FlowPath Simulation* and *FlowPath Tubes* programs simulate groundwater or fluid flow through geological models. It uses hydraulic conductivity data (indicating how easily fluids move through materials) to generate flow paths in a 3D model.

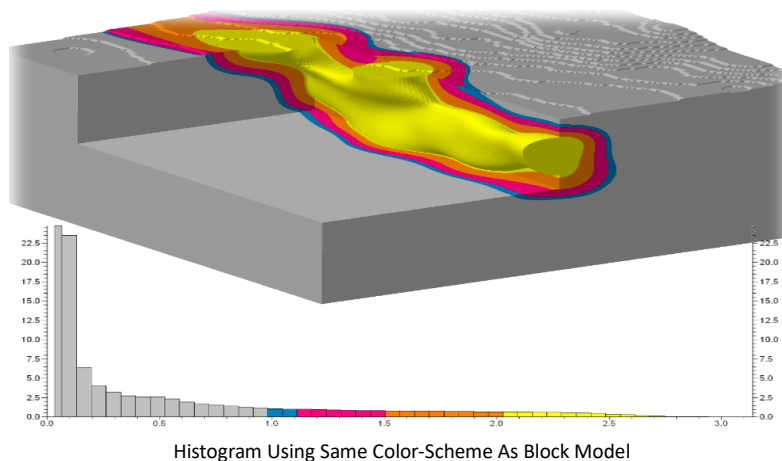


Stochastic and Most-Probable Groundwater Flowpaths

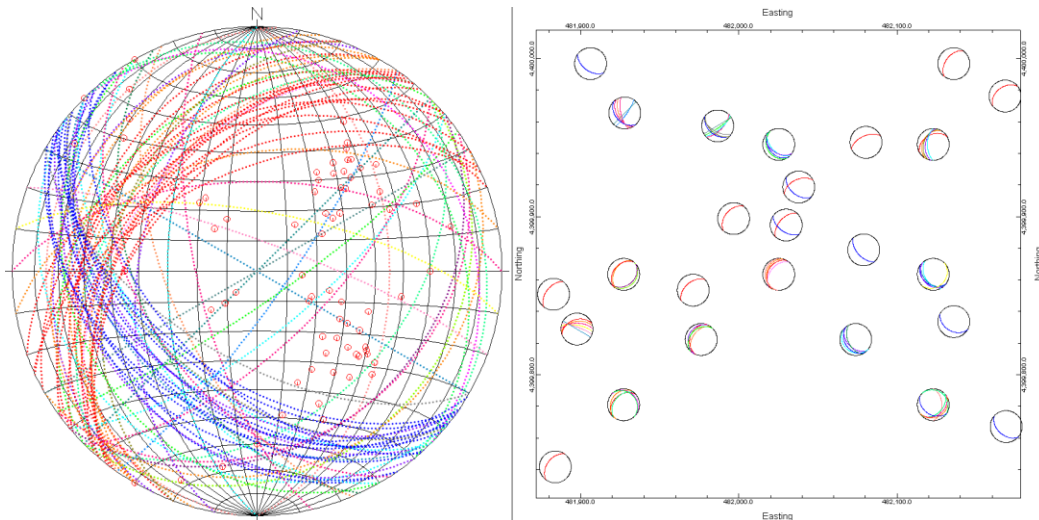
- A new program titled *DXF → Polygon Table* has been added to the *Utilities / Misc* menu. This program will extract one or more polygons from a DXF file into one or more RockWorks polygon tables that are stored within the SQLite database.
- RockWare's Aq•QA data file (*.aqq) can now be imported into the Utilities Datasheet through the *File / Import / Aq•QA* menu.
- The *Scattergram* menu has been redesigned to accept dates for the x-axis.
- The *Utilities / Coords / Azimuths to Quadrants* program has updated conversions.
- The *Flow Path Map / 3D Flow Diagram / Flow Table* and *Upgradient Drainage Area* programs within the *Utilities Hydrology* sub-menu now process more quickly.

Miscellaneous

- *Histograms* created through the Utilities and the Borehole Manager database now include new color schemes and the option to plot additional statistical calculations in the legend.

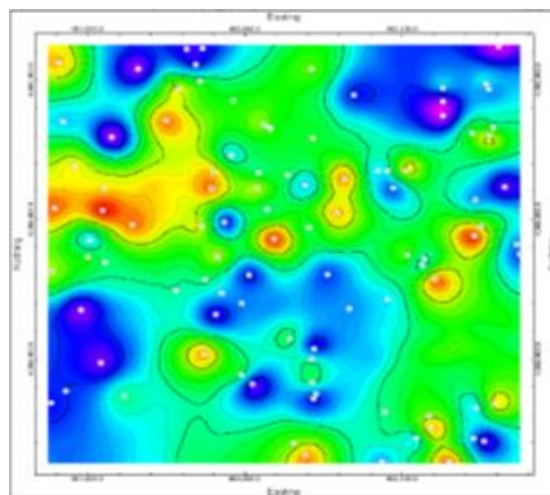


- The *T-Data Time Graph* program now has the option to specify the Date/Time format.
- The *Spatial Filter* tab that is used within many programs menus now includes an option to set the XYZ minimum and maximums to the Project Dimensions.
- The search function for *Other Coordinate Systems* has been improved. The updated search function will search the database that is part of the PROJ generic coordinate transformation software and can now more easily identify EPSG and ESRI codes.
- The *Borehole Manager / Fractures / Stereonet* and *Stereonet Map* programs now provide a means to adjust the great circle color and thickness.



Multicolored Stereonet Great Circles

- *PRJ* files can now be exported through the *Coordinates* tab.
- The new *Gravity -> Bouguer Points* program converts gravity observations to Bouguer Anomaly values for subsequent gridding into Bouguer Anomaly contour maps.



Bouguer Anomaly Model

- An additional PNG file can now be added to the right of exported PDF and PNG files. This allows the user to add additional information such as logos to the right of exported diagrams.
- The *Dimensions / Scan* programs now include an option to add a buffer around the suggested project dimensions.

Playlist Improvements

- The option to Auto-Save was added to the Playlist menu so that any changes to the playlist will be automatically saved.
- When you select several Playlist items, you can enable or disable them all. The selected items can also be edited as text vs. editing the entire Playlist.
- Upon completion, the Playlist now scrolls to the first checked item in the list. This makes it easier to test items within long playlists.
- Programs within the Playlist that can't create 3D logs due to lack of data will no longer interrupt the processing and will be added to the Execution History listing.
- When editing an item within the Playlist, the program will list the new title (if it is changed) when displaying the message stating that the edited item is being saved.
- The Playlist now displays user comments in yellow without a check box.
- Keystrokes (arrows) are now recognized while editing the Playlist and its menus.

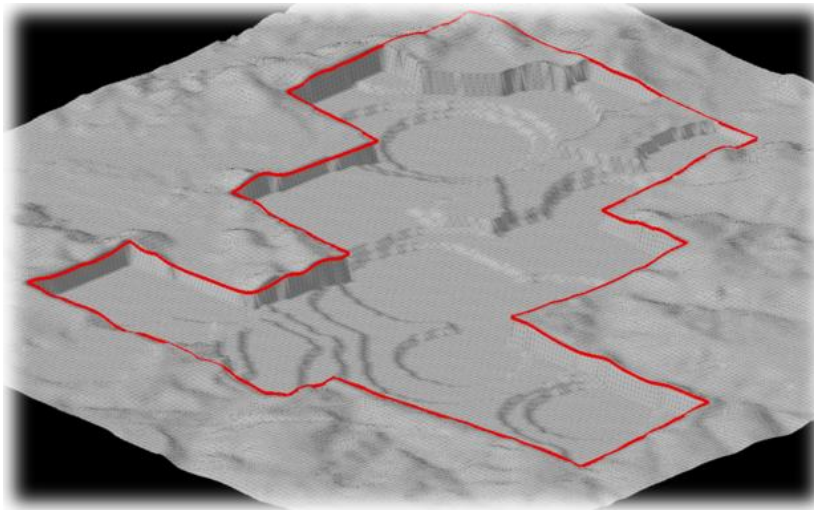
Help and Documentation

- The *Search* program is now updated to show the menu location found items, the number of "hits" at the top, and the program name.
- RockWorks will start on the screen where it was last closed and adjust the size to fit in the active computer screen. It will make adjustments to address instances where monitors have been added or removed or other changes have been made to the monitor display settings.
- A button titled *RockWare Knowledge Base* has been added along the right edge of the main menu bar. Clicking on this button will load the RockWare Knowledge Base into your web browser.

Other Fixes & Improvements

- **Fix:** The *Prefix* and *Suffix* settings for the South label within the *Radially Labeled Points* menu now work correctly.
- **New:** The 2D and 3D *Contour Line Tables* are now updated to use different variables.
- **New:** The *ModOps / Grid Import / ASCII DEM to Grid* menu now includes options to specify the input (DEM) coordinate system.
- **Improved:** The default value for the *Interpolate Undefined Nodes* option within the *ModOps / Grid / Import / GeoTiff(s)* program has been changed to "False".
- **Improved:** The *ASCII DEM Grid* program is significantly faster when extracting portions of a *DEM* to a grid based on the *Project Dimensions*.

- **Improved:** The ModOps Grid / GeoTiff importer now allows you to select between one and four GeoTiff files defined by the Project Dimensions into a RockWorks grid file.
- **Fix:** Pop-up menus within the *Borehole Manager / QuickMap* tab are now correctly displayed.
- **Improved:** The main form will now auto-adjust to fit within the desktop even when switching between multi-monitor and single-monitor systems.
- **Improved:** The *Borehole Operations / Lithology / Volumetric* program has been completely rewritten to create a more graphical and condensed report.
- **Improved:** The editor for Aquifer Names can now import and export various data types to the Datasheet.
- **New:** It is now possible to add titles to the *Rosegrams* produced by programs that create 2D maps from borehole data.
- **New:** Exporting to *Global Mapper* or other GIS programs now includes an option to export a *PRJ* file.
- **New:** It is now possible to overlay unlimited grid profiles onto profiles and sections.
- **Fix:** The *3D Log Designer / Lithology / Label Intervals / Center Text* option now works correctly.
- **New:** The *Comments* section is no longer included if all of the comments in the *Peripherals / Title Block* are blank.
- **New:** The *Projected Section* program now displays multiple *I-Data* values.
- **New:** Unused *I-Data, P-Data, T-Data, I-Text, or P-Text* fields are now removed after a database restoration.
- **Fix:** The Borehole Manager import from Excel as Row Based / Replace option works as expected and the duplicate borehole issue has been resolved.
- **Improved:** The Peripherals menu is now shown when displaying I/P/T-Data as Box Plots for multiple boreholes.
- **Fix:** An empty log used for the Borehole Operations Map program will no longer cause an error and the program will now omit the borehole from the map.
- **Improved:** The *ModOps / Solid / Create three grids to solid* program menu options are now updated.
- **Improved:** The *Lithology Volumetrics program / Solid Modeling Algorithm* Directional tab options are now updated.
- **Improved:** The *ModOps / Volume / Extract Via Surface Excavation* program keeps the pit inside the lease boundary and honors pit edges.



Lease Boundary & Pit Plan

- **Improved:** Exporting a RockPlot2D file to a shape file includes an agreeing Polygon.prj file to existing location files.
- **Improved:** Exporting shape files with a prj file that uses State Plane coordinates.
- **New:** Images for 2D Peripherals can now be saved in the current project or a different folder.
- **Improved:** Raster Symbols in RockPlot2D are now exported based on their center point.
- **Improved:** RockPlot2D color fill contour bands now have an updated color scheme to match the contour lines.
- **Improved:** The 2D Log Designer - P-Data color-fill options have been enhanced.

- **Improved:** The ReportWorks caption now updates when the “Save As” option is used.
- **Improved:** The Plot3D ‘Min-Max’ Color Legend displays the top interval even when the maximum value isn't divisible by the chosen interval.
- **Fix:** The RockPlot3D Color Legend plots values correctly for descending or ascending values.
- **New:** Renaming items within the Project Manager now re-sorts items alphabetically based on the file type.
- **Improved:** The default color for the symbol label background color in the Utilities Point Symbol map is not required to be black.
- **Improved:** The Filter / Remove Disabled Rows tool creates smaller files.
- **New:** A Bayes' Theorem Formula calculator has been added to the Widgets / Finance tools.
- **New:** A new check-box titled "Add missing borehole" allows the user to import only data that applies to an existing borehole.
- **Improved:** The Sink Removal (Closed Depression) program has been improved to run significantly faster.
- **Improved:** The Box Plot programs now support logarithmic scaling and a title can be added.
- **Improved:** Editing selected playlist items will now copy the items back to the same location in the list without advancing to the next option.