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1983
Product Catalog




RockWare, Inc.
GEOLOGICAL SOFTWARE FOR MICROCOMPUTERS

1984 Geological Software Catalog




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Geological Software Catalog Winter 1987




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Geological Software Catalog Spring '88



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Geological Software Catalog Fall/Winter '89 - '90




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GEOLOGICAL SOFTWARE FOR MICROCOMPUTERS




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The Scientific Software Catalog



RockWare
The 1991 Earth Science Software Catalog

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The Scientific Software Catalog



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
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The 1993 Scientific Software Catalog



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Earth Science Software Summer '95


New Products!
LogPlot98
Stratos 3D
Visual Pro

The Geochemist's Workbench v. 3.0



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
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Geoscience Software, Consulting & Training

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Use these symbols to find products by industry



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Hydrology



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RockWare Consulting

RockWare was founded in 1983 to provide geoscientific software and consulting to a variety of markets, including environmental, civil engineering, mining, and petroleum. RockWare consists of geoscientists

with a wide variety of technical knowledge and real world experience upon which customers rely for assistance with their projects, fast reliable analysis of their data, and litigation support using videos

and graphics. RockWare's ability to quickly create scientifically accurate, understandable, and appealing analyses, diagrams and videos has provided enormous benefit for our satisfied customers.

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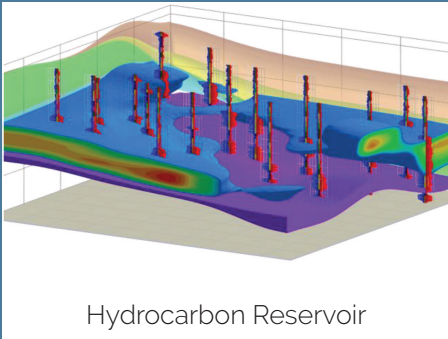
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- Geochemistry
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- Groundwater Modeling
- And much more

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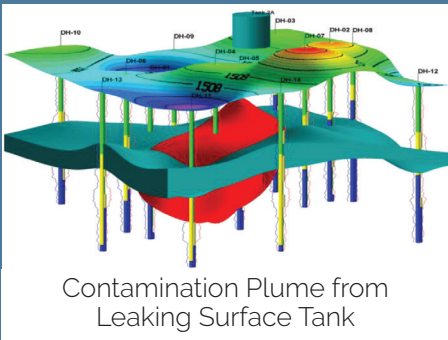
- Site Characterization
- Contaminant Plume Modeling
- 3D Visualization
- Virtual Tour/Flyover Videos
- Field Mapping
- Ore Bodies
- Reserve Estimates
- Reservoirs
- Digital Well/Borehole Log and Cross-Section Creation
- Well/Borehole Geophysics

You provide the data, we'll provide the...

Three-Dimensional
Diagrams

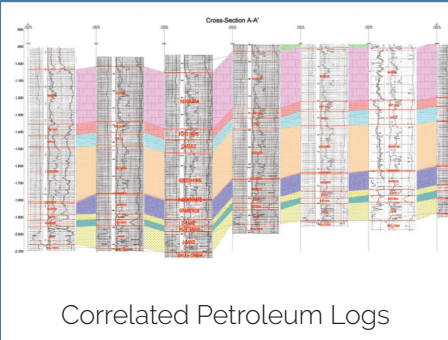


Hydrocarbon Reservoir

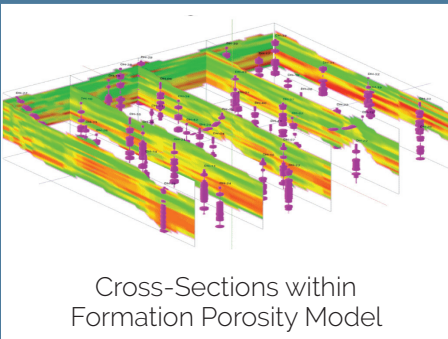


Contamination Plume from
Leaking Surface Tank

Cross-Sections



Correlated Petroleum Logs

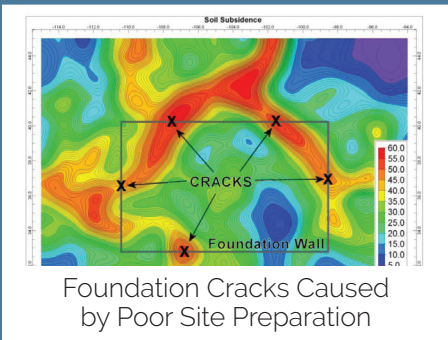


Cross-Sections within
Formation Porosity Model

Maps

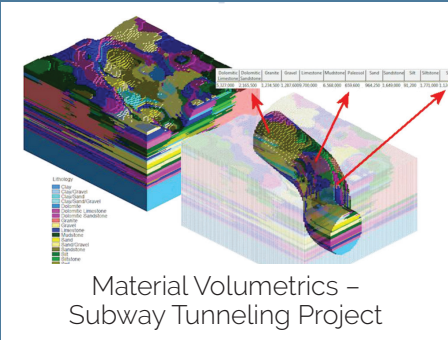


Insurance Risk –
Flood Susceptibilities

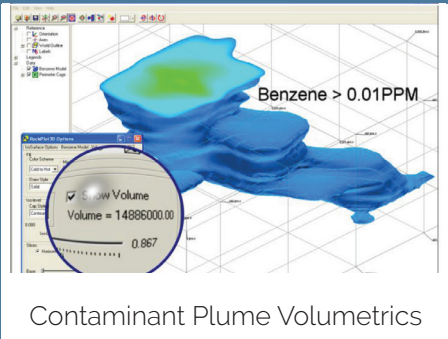


Foundation Cracks Caused
by Poor Site Preparation

Volumetric Computations

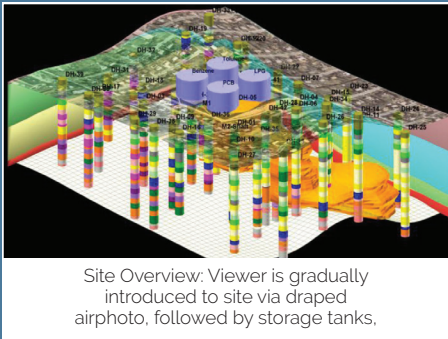


Material Volumetrics –
Subway Tunneling Project

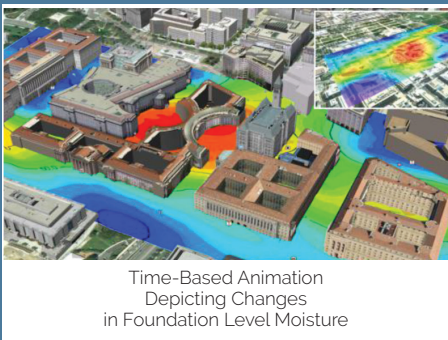


Contaminant Plume Volumetrics

Video Animations

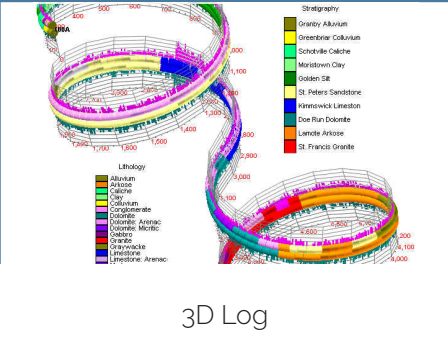


Site Overview: Viewer is gradually
introduced to site via draped
airphoto, followed by storage tanks,

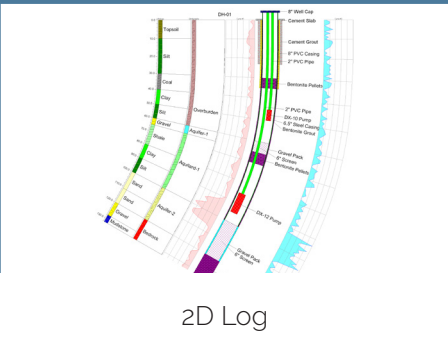


Time-Based Animation
Depicting Changes
in Foundation Level Moisture

Log Digitizing



3D Log



2D Log



Case Study: Using RockWorks to Identify Contiguous Zones of Favorable Hydraulic Conductivity Based on Borehole Resistivity Data

The purposes of this study are to illustrate how RockWorks may be used to show variations in short-normal resistivity within the Upper Pierre Aquifer, identify porous zones for optimal water production, demonstrate the use of grids as constraining surfaces when creating block models, delineate contiguous hydraulically-communicative zones of high resistivity, and establish resistivity cutoff values for comparison with other aquifers.

Obtaining the Raw Data: A dataset of well locations and Log ASCII Standard (LAS) files created by the Colorado Division of Water Resources (CDWR) were downloaded from the Colorado Geological Survey website at the URL listed below.

<https://coloradogeologicalsurvey.org/2017/1262-water-resources-upper-pierre-aquifer>

Displaying the Raw Data: The locations and associated LAS files (Figure 1) from 167 of the CDWR wells were imported into a RockWorks database. Please note that the CDWR data includes 226 wells, however this study only used the 167 wells with associated LAS files.

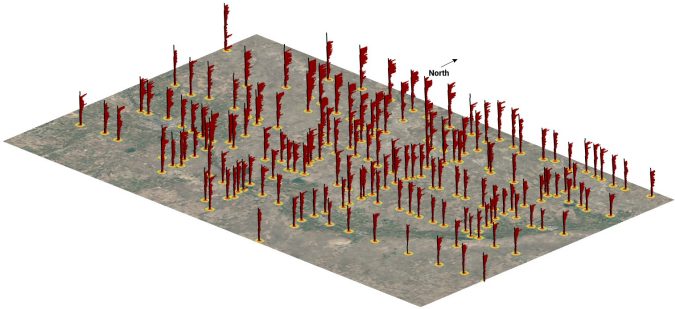


Figure 1. Well Locations & Resistivity Logs – Vertical Exaggeration – 16X

Cleaning the Data: A histogram of the initial 630,695 short-normal resistivity data point (Figure 2) showed that the outlier values needed to be truncated in order to properly evaluate the data. Accordingly, values less than 1.5 ohm-meters were discarded while values greater than 20 ohm-meters were truncated to 20 ohm-meters. As a consequence, a histogram of the data (Figure 2) exhibits an expected log-normal distribution.

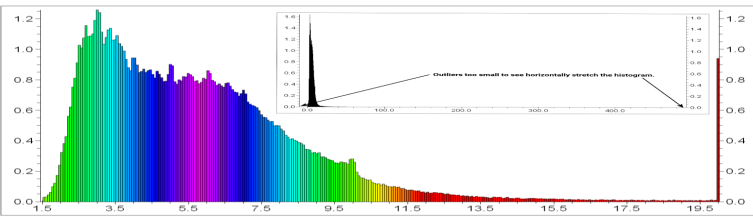


Figure 2. Distribution of Resistivity Values After Truncating Outliers

Constraining Surfaces: Grid models representing the top and base of the aquifer (Figure 3) were kriged to serve as constraining surfaces for subsequent resistivity modeling. These contacts were identified by using the interactive Stratigraphy Picker.

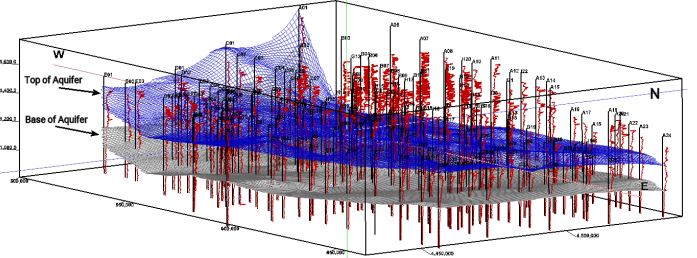


Figure 3. Constraining Surfaces Representing the Top & Base of the Upper Pierre Aquifer – Vertical Exaggeration = 40X

Creating the Resistivity Model: A horizontally-biased inverse distance weighting algorithm as constrained and "warped" by the aquifer base and top grids was used to create a block model based on the truncated resistivity values (Figure 4). The 8.8 million voxels within this model measure 1,000 x 1,000 x 2 meters (3,281 x 3,281 x 6.6 feet).

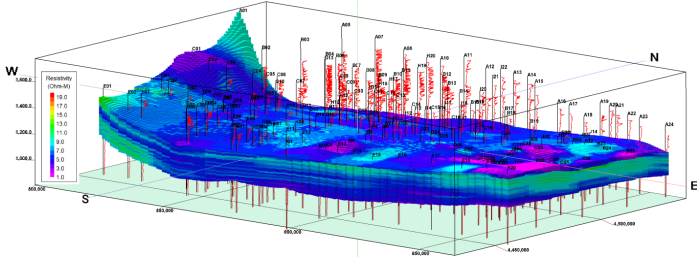


Figure 4. Resistivity Block Model – Vertical Exaggeration – 40X

Resistivity Within the Aquifer: A histogram of the resistivity model voxels (Figure 5) shows a mean value of 7 ohm-m with a standard deviation of 1.8.

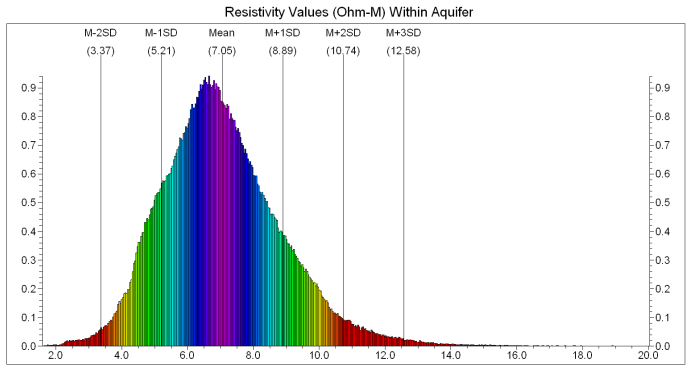


Figure 5. Histogram of Resistivity Model Node Values



Identifying Optimal Zones Within the Aquifer: In an effort to categorize porosities within the aquifer, the resistivity values were assigned colors based on the following statistical groupings:

- Yellow (Low Porosity): Resistivities less than the mean minus one standard deviation.
- Orange (Medium Porosity): Resistivities between the mean minus one standard deviation and the mean plus one standard deviation.
- Red (High Porosity): Resistivities greater than the mean plus one standard deviation.

The color-coded inferred porosities were displayed as a block diagram with cutouts to view inside the model (Figure 6) and as a fence diagram (Figure 7).

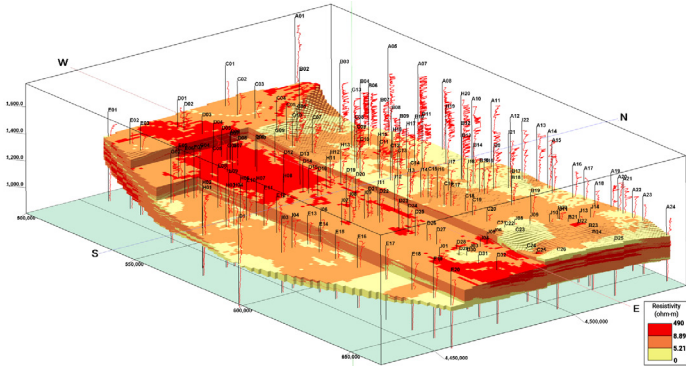


Figure 6. Cutaway Rendering of Resistivity Block Model Color-Coded by Statistical Groupings – Vertical Exaggeration = 40X

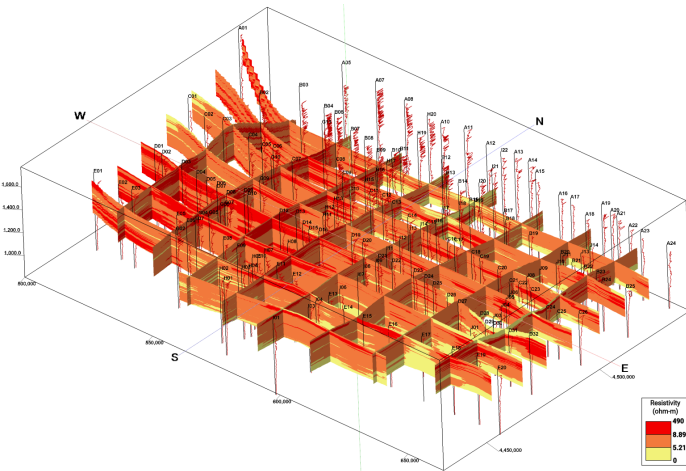


Figure 7. Fence Diagram Depicting Vertical Slices Within Resistivity Model Color-Coded by Statistical Groupings – Vertical Exaggeration = 40X

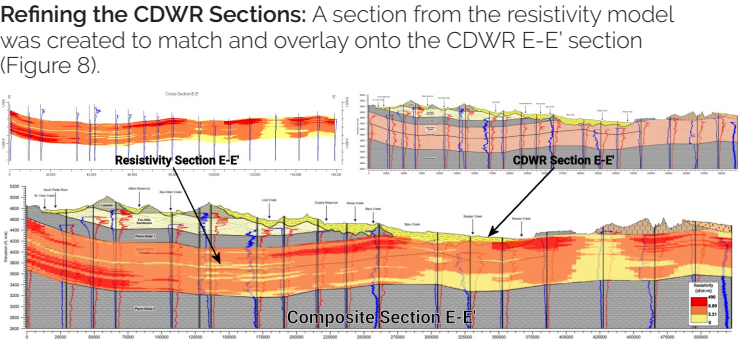


Figure 8. Resistivity Overlay on CDW Section E-E' - Vertical Exaggeration = 40X

Creating a Grade x Thickness Aquifer Isopach: Aquifer Isopach: In order to accommodate the variations in the aquifer thickness, a Grade Thickness (GT) grid model (Figure 9) was created in which every voxel within the resistivity block model was multiplied by the voxel height and the sum of each column of voxels was calculated. This is a tool that is used within the uranium industry to qualify resource estimates by assigning proportional weighting to zones that are both thick and higher grade. In this application, the GT map shows where the aquifer is both thick and porous based on the assumption that resistivity is proportional to porosity. Note the differences between this map and the aquifer isopach. This map is intended to serve as an exploration tool when placing water wells for optimal production.

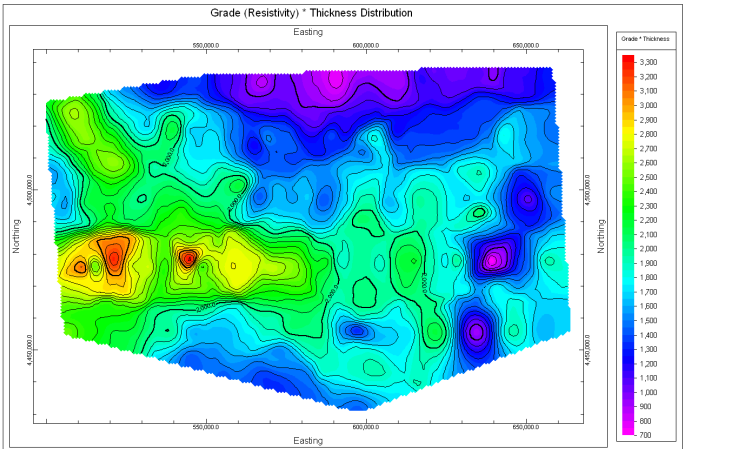


Figure 9. Resistivity * Thickness (GT) Map



Identifying Contiguous Zones: Finally, a "geobody" filter was used to identify the three largest contiguous high-resistivity (>8.9 ohm-m) zones based on the assumption that these bodies represent connected zones of optimal porosity/permeability (i.e., zones that hydraulically communicate). Although a three-dimensional diagram (Figure 10) suggests that these geobodies are connected, two-dimensional vertical slices (Figure 11) illustrate their disconnectedness.

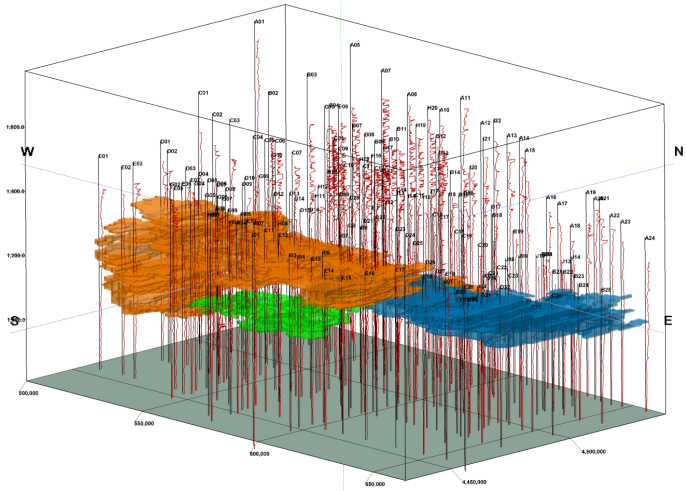


Figure 10. Three Largest Geobodies – Vertical Exaggeration = 100X

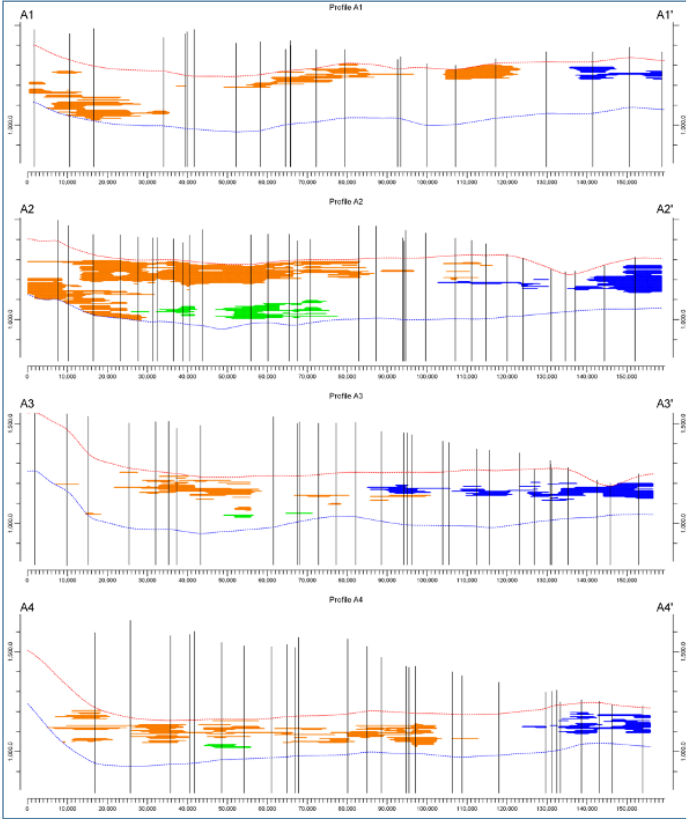


Figure 11. Cross-Sections Depicting Three Largest Geobodies – Vertical Exaggeration = 50X

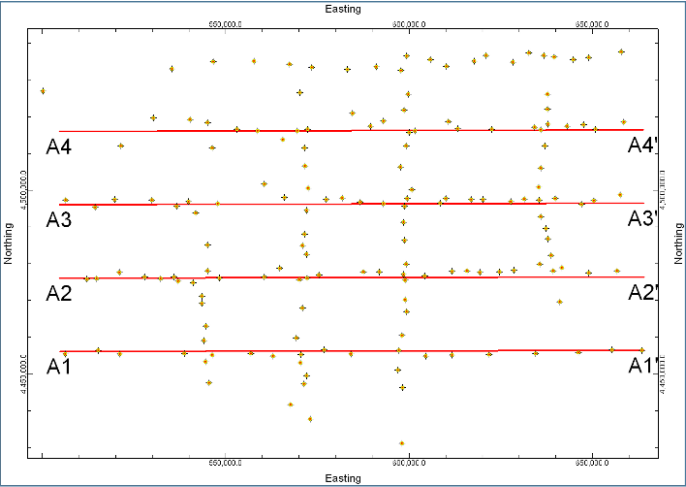


Figure 12. Cross-Section Locations

Automating the Process: All of the steps that were used to produce the models and diagram were saved within a RockWorks playlist (Figure 13).

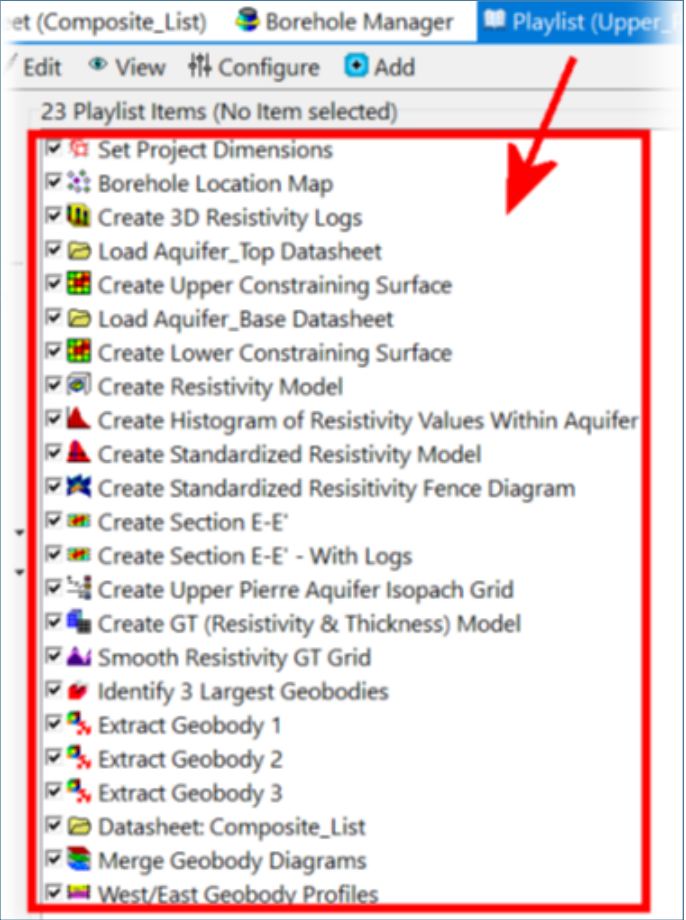
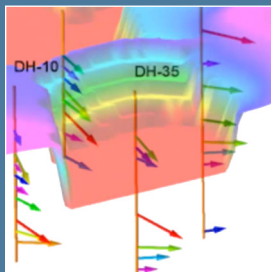


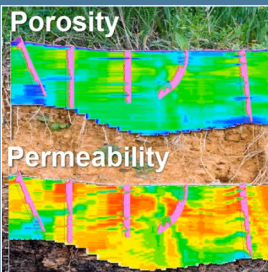
Figure 13. Playlist Used to Generate Models & Diagrams Within This Report

RockWare Videos

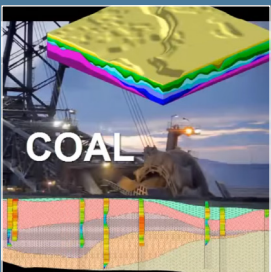
Watch hands-on training exercises, industry specific applications, new features, webinars and instructions at <https://www.rockware.com/training-videos/>



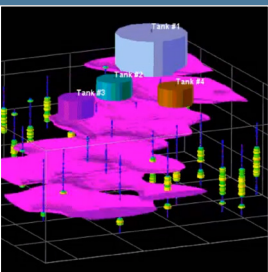
Dam Sites



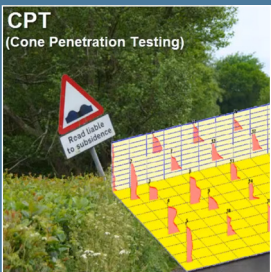
Geotechnical Soil Investigations



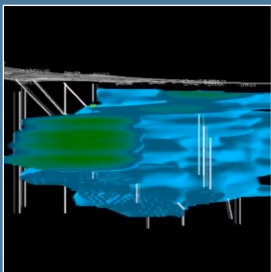
Coal Multi-Seam / Multi Attribute Modeling



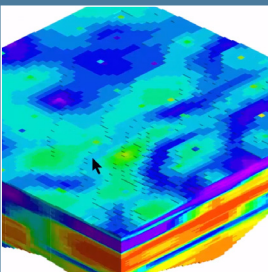
Contaminant Plume Modeling



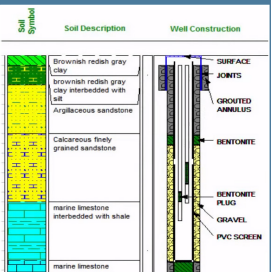
Cone Penetration Testing



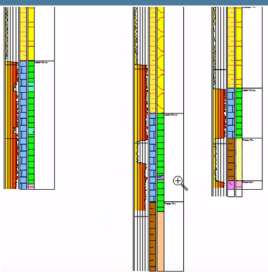
RockWare Litigation Support



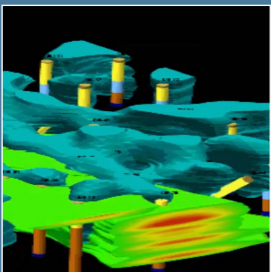
RockWorks Overview



LogPlot 8 Overview



Training Videos



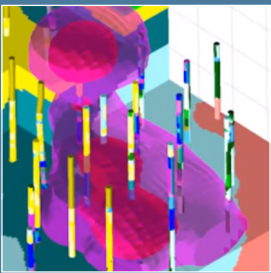
RockWorks New Features



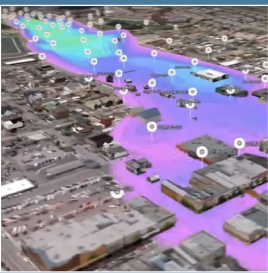
Mining



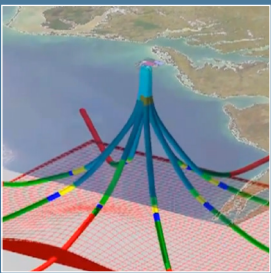
Tunneling



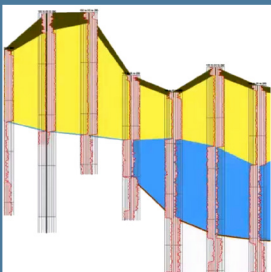
Landfills



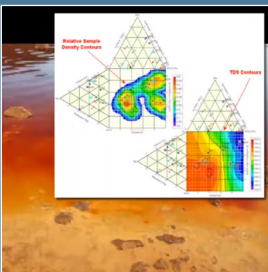
Groundwater Contamination



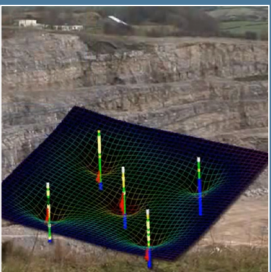
Oil & Gas Production



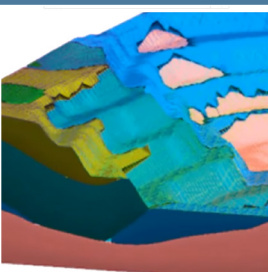
Hydrocarbon Exploration



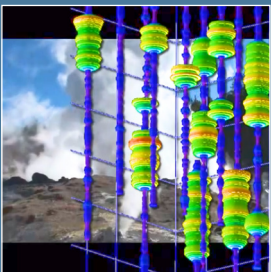
Hydrochemistry



Groundwater

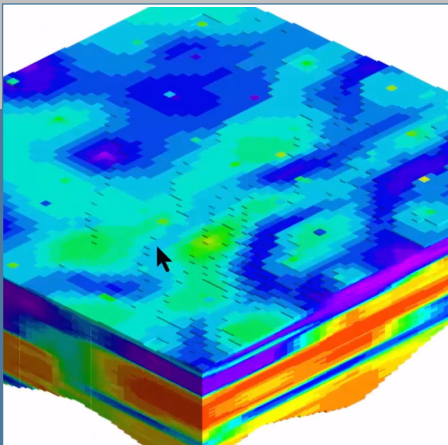
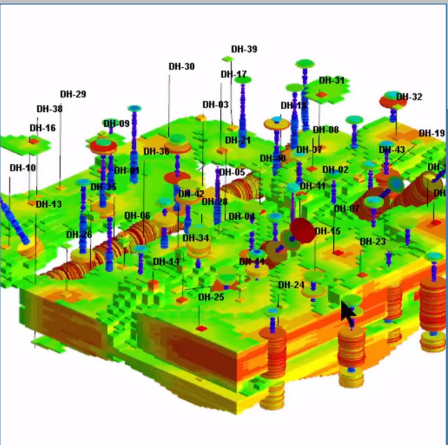
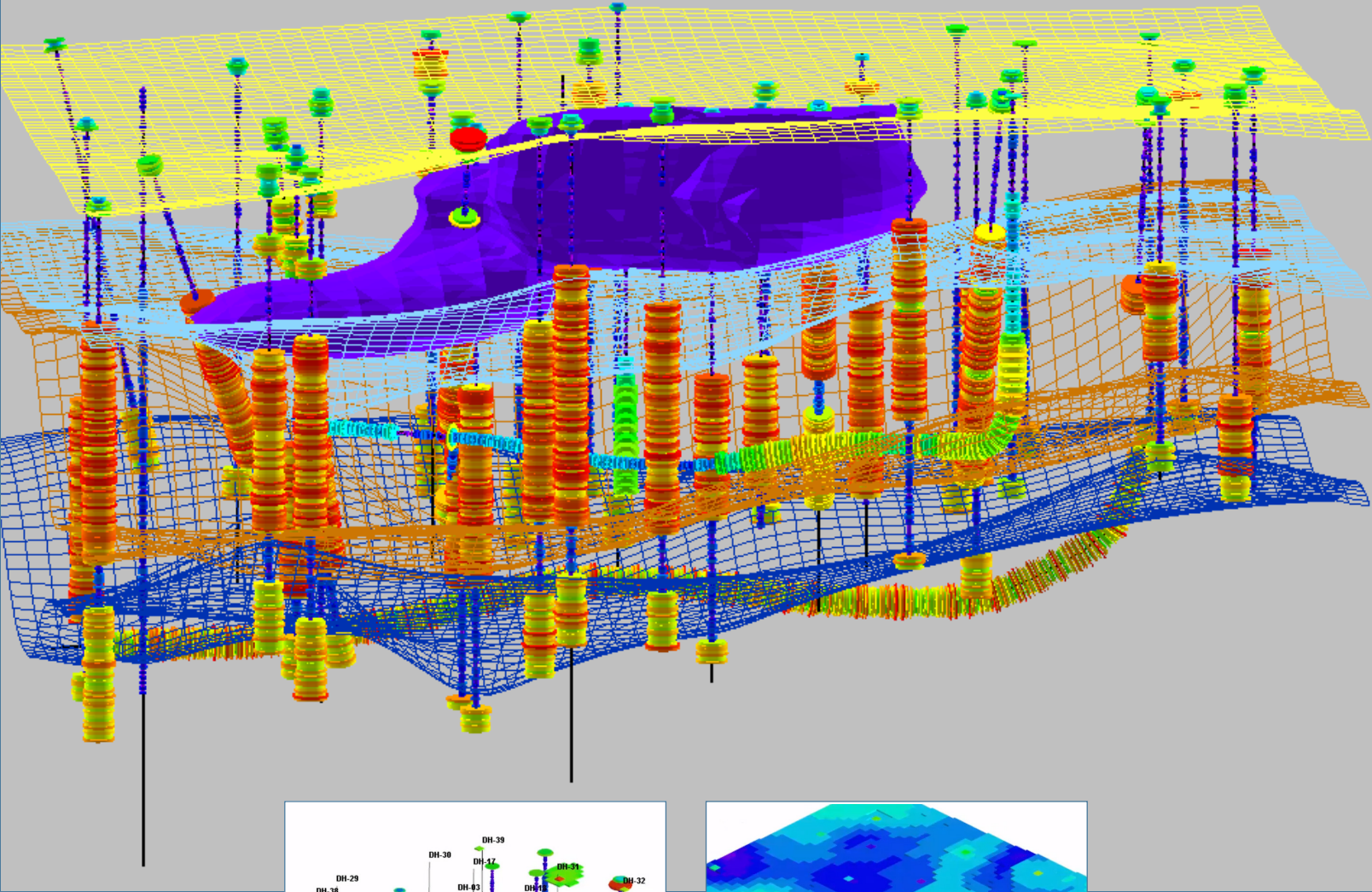


Industrial Minerals



Geothermal

RockWorks 2023®



RockWorks is a comprehensive program that offers visualization and modeling of spatial data and subsurface data. Whether you are a petroleum engineer, environmental scientist, hydrologist, geologist or educator, RockWorks has what you need.



RockWorks contains tools that will save time and money, increase profitability and provide you with a competitive edge through high-quality graphics, models and plots. See what's new!

New Features

Mapping

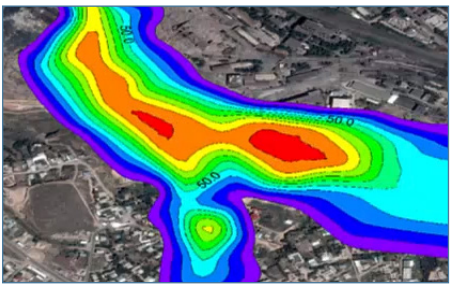
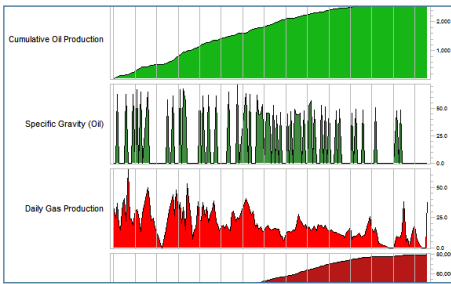
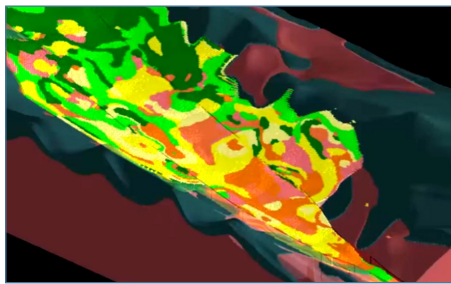
- New "Block Labels" can be used for Borehole and Point Symbol maps. These labels can incorporate multiple lines of text with a perimeter, leader line and anchor point.
- A halo effect option has been added to all text labels in RockPlot2D. This helps make labels more visible when plotted on top of aerial photos or other types of colored backgrounds.
- A new section Location Map tool has been added to the Borehole Operations | Map menu. This program creates a location diagram showing profile, section and fence diagram lines stored in the project database.
- A new type of multi-variate map called "Radial Diagrams" has been added to the Utilities Map Menu.
- New "Bubble Maps" have been added to the Borehole Operations mapping menus. Create scaled and colored bubble maps based on downhole borehole data in the I/P/T-Data tables.

Logs, Sections and Profiles

- Users can now specify to show the Log Title at the top of the log, base of the log, or top and base on 3D Log Design tab when building a 3D Striplog diagram.
- Improved TVD plotting in Sections and Projected Sections.
- Enhancements to the Stratigraphy and Lithology picker windows allow for more space for graphic display.
- Wrap raster images around 3D logs.
- Edit 3D Log title size directly in RockPlot3D.
- Convert label units in 3D Striplog Depth bars (convert from meters to feet or feet to meters).
- Drastically improved multi-profile diagrams, with better options for plotting Titles, surface profiles and diagrams with vertical exaggeration.

Borehole Manager Database

- Improved editing tools are now available through the Datasheet buttons in the Borehole Manager.
- New tools for managing and transferring Lithology, Stratigraphy, Aquifer and Well Construction types, including a new Pattern Assistant for storing standard keywords and patterns, and access to Industry standard soil classification systems.
- Speed improvements to coordinate conversion tools and XYZ calculations.
- Tons of improvements to imports and exports (LAS, Excel, Database, etc.)
- Create normalized tracks for geophysical data using the new P-Data | Normalize menu.
- Copy enabled boreholes from one database to another.



Stratigraphy/Lithology

- Improvements and updates to the Lithologic Lateral Blending modeling algorithm, allowing varying degrees of randomization.
- Improved sorting for Lithology legends in RockPlot3D.
- New block modeling tools for layered Stratigraphy models, including the option to specify fault G-values.
- New visualization tools for Lithology models in RockPlot3D, including the option to filter based on lithology type name.
- Improved modeling using the Dip Algorithm, which now honors fault locations.
- Improved plotting of stratigraphic contacts for non-vertical wells, with options to plot along the borehole trace or at the borehole collar location.

I/P/T Data

- Improved multi-column exports that give users control over decimal places and column order.
- The Borehole Manager / T-Data / Multiple Solids program is now available within the Standard version of Rockworks.
- A new Gaussian Concentration option is now available for the Inverse Distance interpolation algorithm. When enabled, a non-linear weighting exponent based on distance is applied during modeling, which results in concentrations grading to 0 with distance from control points.
- Improvements to 3D Isomesh display options.

Grid Models

- An ESRI Shape file containing polygons can now be turned into a RockWorks grid file based on a numeric attribute.
- New GeoTIFF import tools to convert DEMs to RwGrd files.
- New and improved grid replacement tools allow replacements based on a table or based on a donor RwGrd file.

Solid Models

- A program titled "Surface Map" has been added to the ModOps / Solid sub-menu.
- A new program titled "Distance to Point" has been added to the ModOps / Solid / Filters menu. This program will replace non-null nodes with values equal the straight-line distances between the nodes and a specified point source.
- An option titled "Isolate Geobody that Includes Point Source" was added to ModOps Solid menu.
- The ModOps / Solid / Logic / Solid -> Boolean Solid program now includes options for creating a Boolean solid based on a color model.
- The Solid Editor now provides dynamic volume calculations under the Edit tab.

Faulting/Fractures

- Use the new Group column in the Fault table to enable/disable Faults based on a Group value or pattern.
- Export 2D and 3D faults to DXF and Shapefile formats.
- Clip faults in 2D maps based on a grid extent or the project dimensions.
- Improved Fracture Modeling tools now available through the Borehole Manager.

RockPlot2D and ReportWorks

- Greatly improved raster and PDF exports.
- RockPlot2D Color Legend plotting has been improved, especially for diagrams that are vertically exaggerated.
- New "Add Margin" button in RockPlot2D allows user to create extra space for annotations, legends, etc.
- ReportWorks scalebars can now be plotted using an Engineering Scale.



RockPlot3D

- The OBJ export (used to created models in Sketchfab) has been improved to include more legend options, better text and to better handle smaller project areas.
- Perimeter cage coordinate labels can now be plotted in either feet or meters.
- Programs that create 3D diagrams now include an option to specify the title that will appear within the 3D plotting window.

Help and Documentation

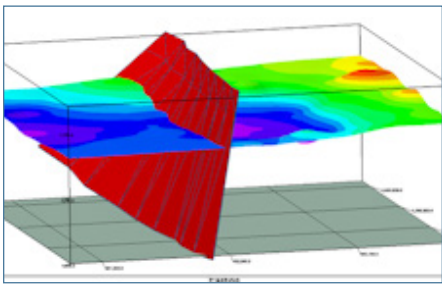
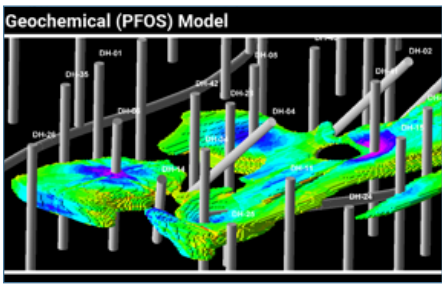
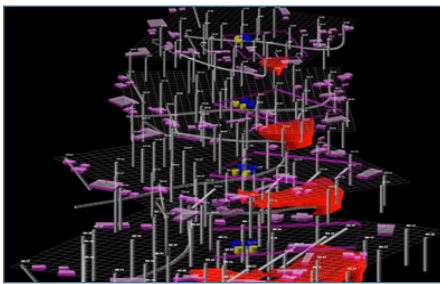
- New Help buttons have been added to multiple menus. Click on the blue question marks to get details about how menu items will affect program output.
- A new option titled "How To" has been added to the title bar at the top of the main RockWorks menu. This option will access numerous "How To" videos and PDF files related to training and documentation.

Images and Animations

- A new program for Digitizing downhole Geophysical logs has been added to the Images menu. Once digitized, this data can be transferred to the P-Data table in the borehole Manager.
- The Images | Vertical programs, used for creating profiles and curved sections of images in RockPlot3D, have been enhanced to work with images that have margins.
- A new program called "Migration Simulation" has been added to the Animation menu. Using an RwMod file of contamination as input, this program will create animations in which the low values migrate to the high values or vice-versa.

Miscellaneous

- Several new features in the Sieve Analysis program
- A new program for creating Schoeller diagrams.
- New unit conversion tools for Hydrochemistry programs to convert between mg/L and meq/L
- New tools for copying and pasting column titles and data into the Datasheet from the Windows Clipboard.
- An improved process for creating new projects based on existing database and files.
- New options in the Survey programs, allowing for negative dip values to point downward.
- Enhanced statistical tools that now allow include the minimum non-null value in reports.
- New options to save polygons directly to tables when importing from Google Earth or using the Enclosing Polygon program.
- New display of multi-threading progress – the program now gives a more accurate display of where each thread is in the modeling process.
- New options available for plotting 3D tubes, including the option to wrap images around tubes.



Program Automation

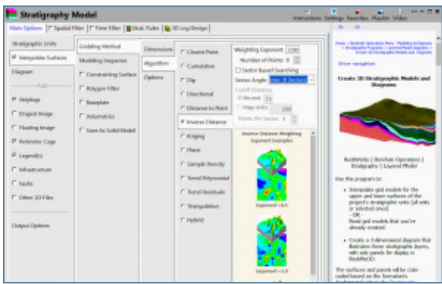
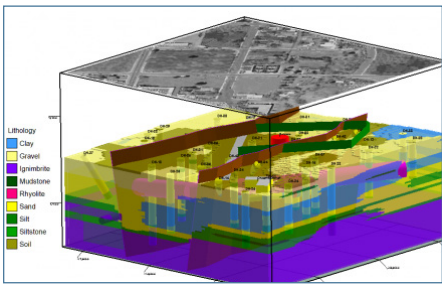
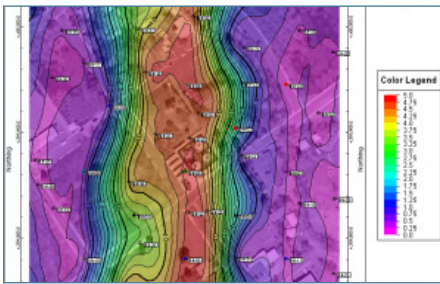
The RockWorks Playlist offers easy automation—just click a button to add a program to the current Playlist. Then, click a button to run your Playlist to create models, maps, diagrams while you have lunch. Available for Basic (5 items), Standard (5 items) and Advanced (unlimited items).

The Playlist provides:

- A **memory aid** for projects that are infrequently re-visited.
- An **audit trail** to serve as a record of what was done and all of the associated menu settings.
- **Turn-key tools** for colleagues or clients who need to use RockWorks capabilities without any downtime spent learning how to use it.
- A **template** for processing different data sets/sites using a streamlined workflow.

Recent Playlist Improvements:

- The **Playlist output tabs** have been revamped. Double clicking on a playlist output tab will detach the page into a separate dialogue that fills the main monitor.
- When making a **change to your playlist** in a text editor, you will be prompted to write it back to the current Playlist or save to a new one.
- The Playlist / **Dimensions options** now include a button that will copy the current project dimensions into the respective fields.
- A new **Subsite** option has been added to the Playlist / Add sub-menu. This option provides a means for switching to sub-sites within a Playlist.
- Tools for editing Playlists as texts have been improved. Edit your Playlist in an editor and load changes back into the currently opened Playlist.



New & Improved

Borehole-Related Operations

- Maps
 - Borehole Symbols
 - Optional Fields
 - Striplog Map
 - Striplogs - Plan View
 - Total Depth Grid
 - Google Earth BH Map Simple
 - Google Earth BH Map Advanced
 - Striplogs
 - 2D Striplog
 - 2D PDF Striplog
 - 2D Striplog Profile
 - 2D Striplog Section
 - 2D Projected Log Section
 - 3D Striplog
 - Stratigraphy Fence - Simple
 - Google Earth Logs - Simple
 - Google Earth Logs - Advanced
 - Endpoint Comparison
 - Surface Intersections
 - Lithology Picker
 - Stratigraphy Picker
 - Borehole Survey
 - Datasheet → Borehole Survey
 - Pay Zone → Optimum Path
 - XYZ → Optimum Well Path
 - Lateral Geosteering
 - Lithology
 - Lithology Types
 - Solid
 - Surface Map
 - Plan Map
 - 2D Isopach
 - 3D Isopach
 - Superface Grid
 - Subface Grid
 - Profile
 - Section
 - Projected Section
 - Fence
 - Multivariate Map
 - Volumetrics
 - Lithology → I-Data
 - Lithology → I-Data (Table)
 - Consolidate
 - Lithology/Stratigraphy By XY
 - Stratigraphy
 - Stratigraphy Types
 - Layered Model
 - Surface Map
 - Plan Map
 - Structure Grid
 - 3D Stratigraphic Contacts
 - Isopach
 - Isopach Map
 - 3D Isopach Diagram
 - Profile
 - Section
 - Linear Correlations
 - Model-Based
 - Projected Section
 - Fence
 - Model-Based
 - Hole-to-Hole
 - ESRI - Model-Based
 - ESRI - Hole-to-Hole
 - Grids Volumetrics
 - Solid Volumetrics
 - Consolidate
 - Fill

- GT Compositing
 - Resample
- T-Data
 - T-Data Types
 - Solid
 - Multiple Solids
 - Profile
 - Section
 - Hole-to-Hole Interpolations
 - Model-Based
 - Projected Section
 - Fence
 - Surface Map
 - Plan Map
 - Statistics
 - Histogram
 - Statistics Map
 - Time Graph
 - Time Graph Map
 - Billboards
 - Volumetrics
- P-Data
 - P-Data Types
 - Solid
 - Profile
 - Section
 - Hole-to-Hole Interpolations
 - Model-Based
 - Projected Section
 - Fence
 - Surface Map
 - Plan Map
 - Statistics
 - Histogram
 - Histograms by Lithology
 - Statistics Map
 - Standardize
 - Add Random Numbers
 - Logarithmic Conversion
 - CPS → eU3O8 → I-Data
 - GT Compositing
 - Resample
 - Create Predictive Model
 - Apply Predictive Model
- Fractures
 - Solid
 - Surface Map
 - Plan Map
 - Profile
 - Section
 - Projected Section
 - Fence
 - Rose Diagram
 - Rose Map
 - Stereonet
 - Stereonet Map
- Aquifers
 - Aquifer Names
 - Grid-Based Model
 - Plan Map
 - Profile
 - Section
 - Projected Section
 - Hydrograph
 - Hydrograph Map
 - Hydrograph Billboards
- Colors
 - Solid
 - Surface Map
 - Plan Map

- Polygon List → Grid
- Shape Polygons → Grid
- Single Elevation/Dip → Grid
- ASCII LIDAR → Grid
- XYZ → Google Earth Cell Map
- Grid → 2D Map / 3D Diagram
- Profile
- Single Grid
- Multiple Grids
- Grids → Profile
- Section
- Grid → Fence
- Single Grid
- Multiple Grids
- Directional
 - Flow Path Map
 - 3D Flow Diagram
 - Flow Table
 - Upgradient Drainage Area
 - Slope Grid
 - Aspect
 - Second Derivative
 - Slope/Aspect Analysis
 - Gradient Vector Map
 - Strike & Dip Map
 - Rose Diagram
 - Stereonet
 - Trend Surface Report
 - Trend Surface Residuals
- Math
 - Grid Math
 - Grid Intersections
 - Thickness → Mass
 - Resample
 - Statistics
 - Stats - Single Grid
 - Stats - Multiple Grids
 - Grid Metadata
 - Histogram
 - Scattergram
 - Residuals
 - Normalize
 - Standardize
 - Correlate
 - Extract Values From Grid
 - Multivariate Anomalies
 - Grid Filters
 - Boolean
 - Distance Clipping
 - Fill Sinks
 - Gradational Margins
 - Truncate
 - Minimum Area
 - Polygon Clip
 - Range Filter
 - Replace
 - Round
 - Smooth
 - Pinchout Filter
- Import
 - ASCII (Text)
 - Bitmap (BMP,PNG,JPG,etc.)
 - Digital Elevation Model (DEM)
 - ESRI ASCII Grid
 - Geosoft GXF
 - GeoTiff
 - RockWorks15
 - RockWorks7
 - Surfer
 - ZMAP

- Grids → Solid
- Mosaic
- Solid
 - Create
 - XYZG → Solid
 - ASCII XYZG → Solid
 - Faults → Boolean Solid
 - Fractures → Solid
 - Images → Solid
 - Polygons → Solid
 - Survey → Solid
 - Display as IsoShells
 - Paper Solid
 - Profile
 - Section
 - Projected Section
 - Fence
 - Plan Map
 - Math
 - Solid & Solid
 - Solid & Grid
 - Resample (Coarse-to-Fine)
 - Resample (Fine-to-Coarse)
 - Statistics
 - Report
 - Multiple Solid Statistics
 - Solid Metadata
 - Histogram
 - Normalize
 - Standardize
 - Residuals
 - Scattergram
 - Extract Values From Solid
 - Volumetrics
 - Filters
 - Range Filtering
 - Geobody
 - Surface Stripping
 - Distance Clipping
 - Gradational Margins
 - Fade With Depth
 - Polygon Clipping
 - RockPlot Polygon Filter
 - Solid && Grid(s)
 - Solid && Boolean Grid
 - Merge
 - Replacement Table
 - Replace Nodes
 - Round
 - Smooth
 - Tube
 - Borehole Clipped Solid
 - Fill Voids
 - Logic
 - Solid → Boolean Solid
 - Min. Ore Zone Thickness
 - Min. Total Ore Thickness
 - Maximum Waste
 - Max. Stripping Ratio
 - Mass
 - Extract Grid(s)
 - Solid → Grid
 - Solid → Grids
 - Solid + Grids → Zone Grids
 - Total Ore Thickness Grid
 - Solid → Total Waste Grid
 - Solid Layer → Grid
 - Solid → GT Grid
 - Import
 - microMODEL

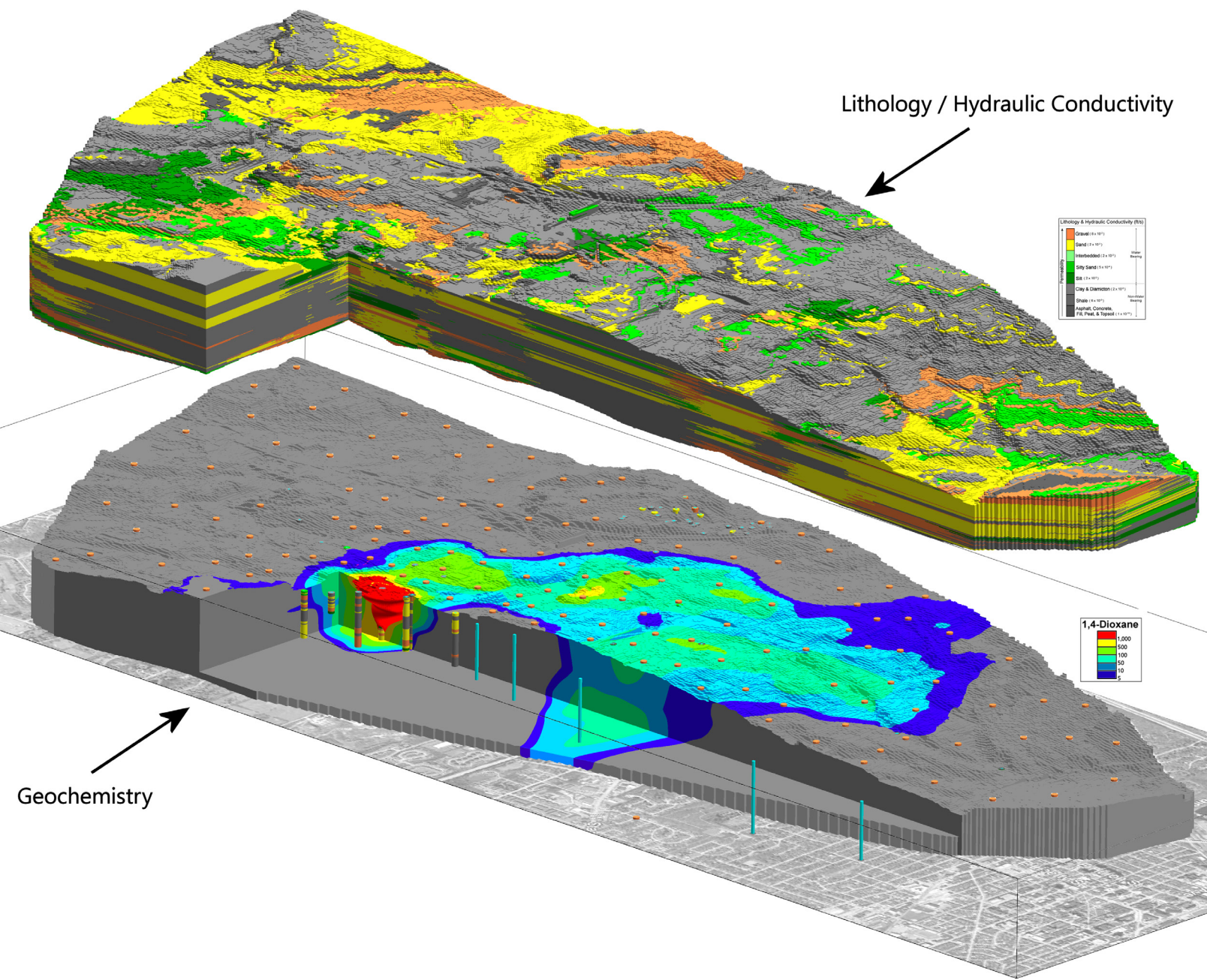
Color Legend: NEW IMPROVED

- Time-Based Volumetrics
- Time-Based Math
- Utilities
 - Maps
 - Point Symbols
 - Triangulation Contours
 - Barcharts
 - Faults (From 2D Fault Table)
 - Infrastructure
 - Land Grid
 - Lineations/Arrows
 - Mining Claims
 - Oil Leases
 - Piecharts
 - Spider Diagrams
 - Starburst Diagrams
 - Single Polyline
 - Multiple Polylines
 - Seismic Shotpoints
 - Single Polygon
 - Polygons
 - Polygons From Table
 - 3-Point Contours
 - 3-D
 - Points
 - Triangulation Surface
 - Cage
 - Connected Polygons
 - Infrastructure
 - Oriented Samples
 - Perimeter/Wall
 - Polyline/Pipeline
 - Tubes
 - Horizontal Tubes
 - Vertical Tubes
 - LIDAR → Triangle Mesh
 - Triangle Mesh
 - SpherePlot
 - 2D Cylindrical - Points
 - 2D Cylindrical - Polylines
 - 2D Spherical - Points
 - 2D Spherical - Polylines
 - 3D Sphere - Points
 - 3D Sphere - Polylines
 - Earth
 - Sample Point Icons
 - Circles
 - Cones
 - Cylinders
 - Lines/Arrows
 - Mining Claims
 - Oil & Gas Leases
 - Parabolic Arrows
 - Parabolic Lines
 - Parabolic Tubes
 - Pipeline - Single
 - Pipelines - Multiple
 - Polyline - Single
 - Polylines - Multiple
 - Polygon - Single
 - Polygons - Multiple
 - Predefined Polygons
 - Tubes
 - Public Land Grid
 - Hydrology
 - Drawdown Calculator
 - Drawdown Surface
 - Hydrograph
 - Flowpath Tubes
 - Hydrochem
 - Durov

- Beta Pairs
- Polylines → Planes
- Rotate Dips
- Strike → Dip Direction
- XYZ & Dips → Profile
- Stats
 - Univariate
 - Normalize
 - Standardize
 - Histogram
 - Histogram Matrix
 - Scattergram
 - Ternary
 - Ternary Map
 - XYZ Analysis
 - Variography
 - Sieve Analysis
 - QAPF Diagram
 - Volcanic Classification
 - Random
 - Survey
 - XYZ
 - Map
 - 3D
 - Panels
 - Tubes
 - Survey Data → KMZ Points
 - Survey Data → KMZ Polygons
 - Triangulation
 - Setup XY Stations
 - Interpolated Points Along Line
 - Movement Analysis
 - Mining Claim Area
 - Oil Lease
 - Coords
 - Quick Locator
 - Convert Point
 - Convert Points
 - Polar → XY
 - XY → Polar
 - XYZ → Polar
 - Azimuths → Quadrants
 - Quadrant → Azimuth
 - Rescale XY Data
 - Rotate XY Data
 - Shift XY
 - Public Land Survey → XY
 - Local Origin Lon/Lat
 - Dates → Stardates
 - Merge Time-Stamped Data
 - Widgets
 - Misc
 - Copy Files
 - HTML Builder
 - Graphics
 - Embellish
 - 3D Diagram
 - Chart
 - Map
 - Profile or Section
 - 2D Tools
 - Clip
 - Reproject
 - Montage
 - Rescale
 - Import
 - AGL
 - DLG
 - DXF
 - Shape
 - Export

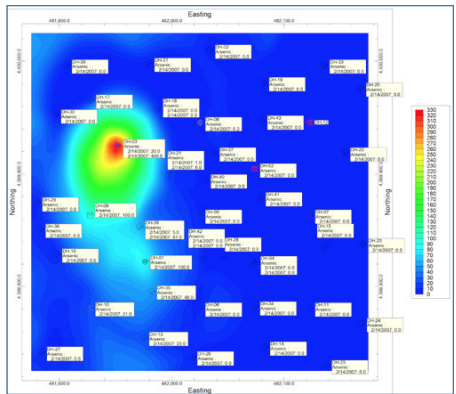
- Solids → 3D IsoShell Animation
- Solid Reveal
- RockPlot3D File → Animation
- Images → Animation
- Slideshow
- Google Earth Flyovers
 - Camera Looking Forward
 - Camera Looking At Midpoint
 - Spiral From Space
 - Flyover - Simple Tour
 - Command Driven
 - Circular
 - Golf Ball Flight Simulation
 - Clipboard → Circular Flyover
 - Clipboard → Forward Flyover
 - Google Earth Drape Animation
 - Google Earth Float Animation
 - Google Earth Sea-Level Change
- Images
 - Image → Map
 - Drape
 - Float
 - Vertical
 - Single
 - Multiple
 - Single Curved
 - Multiple Curved
 - Vertical Images → XYZG
 - Georeference
 - Digitize
 - Reformat/Enhance
 - Google Earth
 - Drape - Single Midpoint
 - Drape - Two Corner Points
 - Drape - Raster Labels
 - Float - Single Midpoint
 - Float - Two Corner Points
 - Vertical - Single Midpoint
 - Vertical - Two Pts. Simple
 - Vertical - Two Pts. Advanced
 - Vertical - 90-Degree Images
 - Legend: Add Image As Legend
- Borehole Manager / Import
 - ADO (ActiveX Data Object)
 - AGS
 - CSV/ASCII Text
 - Colog → P-Data
 - Database Import
 - Excel
 - Fugro CPT
 - Geoprobe DI (Direct Image)
 - GDS
 - IHS Energy Group
 - Kansas Geological Survey
 - LAS (Log ASCII Standard)
 - LogPlot
 - SHP (ESRI Shapefile)
 - Spectrum SC900 CPT
 - Tobin WCS
- Datasheet / Import
 - ASCII (Text)
 - CSV
 - Database Import
 - DBF (dBase,ArcGIS)
 - DXF (AutoCAD) Lines
 - DXF (AutoCAD) Lines & Points
 - Excel
 - Garmin TXT
 - Geonics EM38
 - Google Earth (Clipboard/KML/KM

- ASCII (Text)
- DBF (dBase,ArcGIS)
- XLS (Excel)
- Fault Manager
- 2D Map
- 3D Diagram
 - Import Dips
 - Import Grid
 - Import Line 2D
 - Import Line 3D
 - Import Polyline 2D
 - Import Polyline 3D
 - Import Contours
 - Import Triangles
 - Import XYZ
 - Export to Triangles
- Playlist
 - RockPlot2D / Import
 - AGL (ASCII Graphics Language)
 - ALG (USGS Digital Line Graph)
 - AXF (AutoDesk Data eXchange Fmt)
 - AOO (ESRI Arc/Info)
 - AHP (ESRI ArcView Shape File)
 - Raster Image (BMP,JPG,PNG,etc.)
 - RockPlot2D / Export
 - BMP (Microsoft BitMaP)
 - JPEG (Joint Photo. Experts Group)
 - PNG (Portable Network Graphics)
 - TIFF (Tagged Image File)
 - PDF (Portable Document Format)
 - ESRI Shape Files (shp,shx,dbf)
 - MIF (MapInfo MIF/MID)
 - KMZ (Google Earth Map,Section,etc.)
 - EMF & WMF (MicroSoft Metafile)
 - ReportWorks
 - RockPlot3D
 - Paint Program
 - RockPlot3D / Import
 - DXF (AutoDesk Data eXchange Form
 - RockPlot3D / Export
 - AVI (Video)
 - Animated GIF
 - Raster (BMP,JPG,PNG,TIF)
 - PDF (Portable Document Format)
 - DXF (AutoDesk Data eXchange Form
 - ESRI Shape Files (shp,shx,dbf)
 - KMZ (Google Earth)
 - DAE (Collada)
 - OBJ (Wavefront/Sketchfab)
 - ReportWorks
- NEW
- IMPROVED



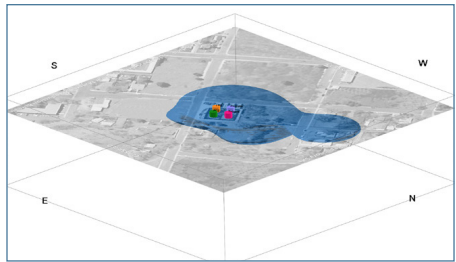
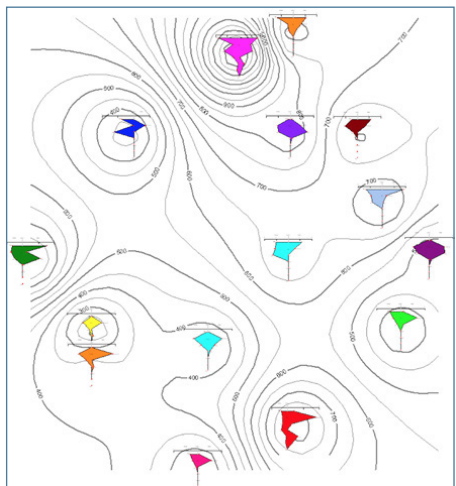
Mapping Tools

- Borehole location maps with detailed data labels
- Contaminant concentration maps with lines and color fills, custom color tables, date filters
- Plan- and surface-based slices from 3D models
- Stiff diagram maps
- Time-graph maps for user-selected analytes
- Potentiometric surface maps
- Flow maps in 2D and 3D
- Coordinate systems/conversions: lon/lat, UTM, State Plane, local, custom



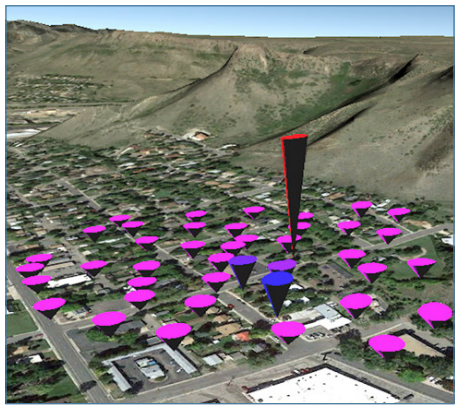
Borehole Database Tools

- Cross sections: multi-panel projected and hole to hole, with borehole logs and/or interpolated panels
- Correlations: model-based and "EZ" panels, snapping tools for hand-drawn correlations
- Borehole logs in 2D and 3D
- 3D fence diagrams
- Surface modeling of stratigraphic layers and water levels
- Plume modeling of analytical data, with display as voxel or isosurface diagrams, 2D plan and section slices
- Solid modeling of lithologic materials, geophysical and geotechnical measurements
- Volume reports of lithologic and stratigraphic models, contaminant extraction models
- Bulk data imports from Excel, text, LAS, other databases

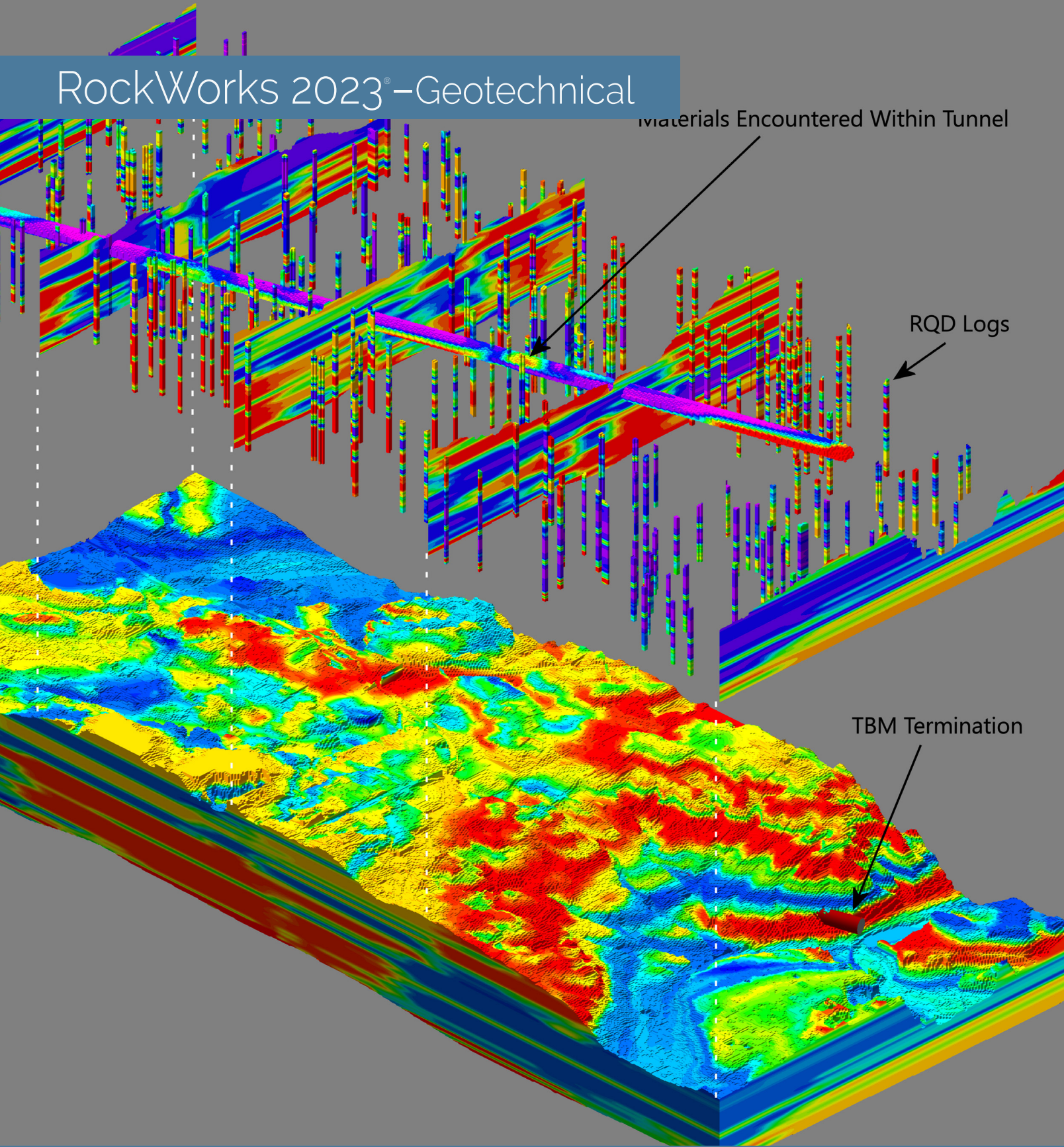


Other Tools

- Time-based animations
- Piper and Durov diagrams with TDS circles, Stiff diagrams for multiple samples
- Water level drawdown diagrams and surfaces
- 2D editing tools: contour lines, text, shapes, legends, images
- Composite scenes in 3D with maps, logs, surfaces, solids, panels, surface objects
- Page layout program for small to large format presentations and posters
- Exports to GIS Shapefiles, CAD DXF, raster formats, Google Earth
- Image import and rectification
- Program automation
- Google Earth output directly from data: points, cones, lines, polygons, images, flyovers



Borehole logs, cross sections, concentration maps, plume models, geology models, time-based animations, geochemistry diagrams and more. RockWorks will help the environmental professional along the path from site characterization to remediation planning and execution.



RockWorks offers geotechnical and civil engineers graphical and analytical tools for evaluating construction and excavation sites. Create borehole logs and cross sections, dozens of different types of maps, structural diagrams, geological/geotechnical/fracture/color models, volume reports and more.



Mapping Tools

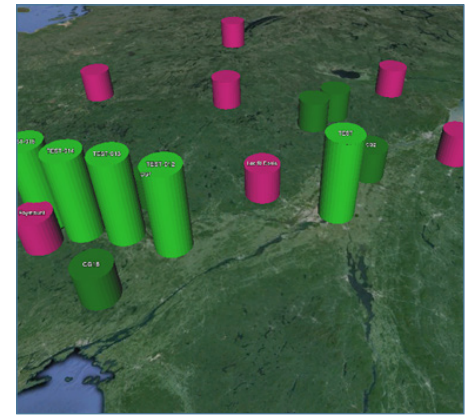
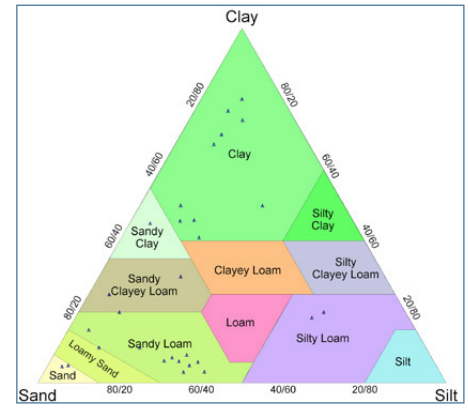
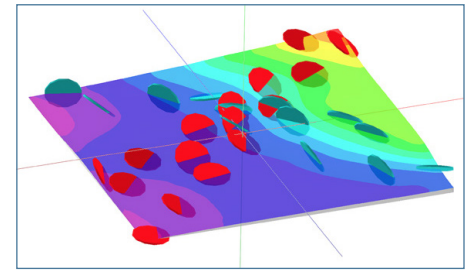
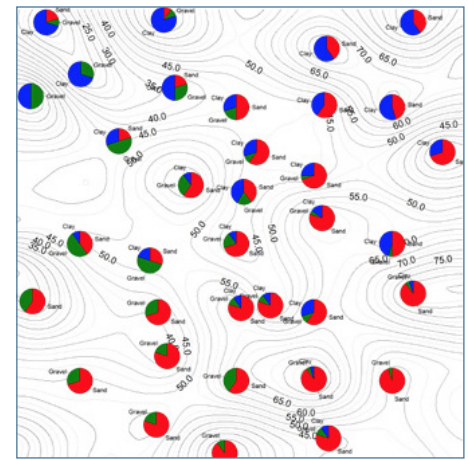
- Multiple components in piechart, spider maps
- Point maps with detailed data labels
- Topographic contour maps with lines and color fills, custom color tables
- 3D surface displays
- Strike and dip maps in 2D and 3D
- Coordinate systems/conversions: lon/lat, UTM, State Plane, local, custom

Borehole Database Tools

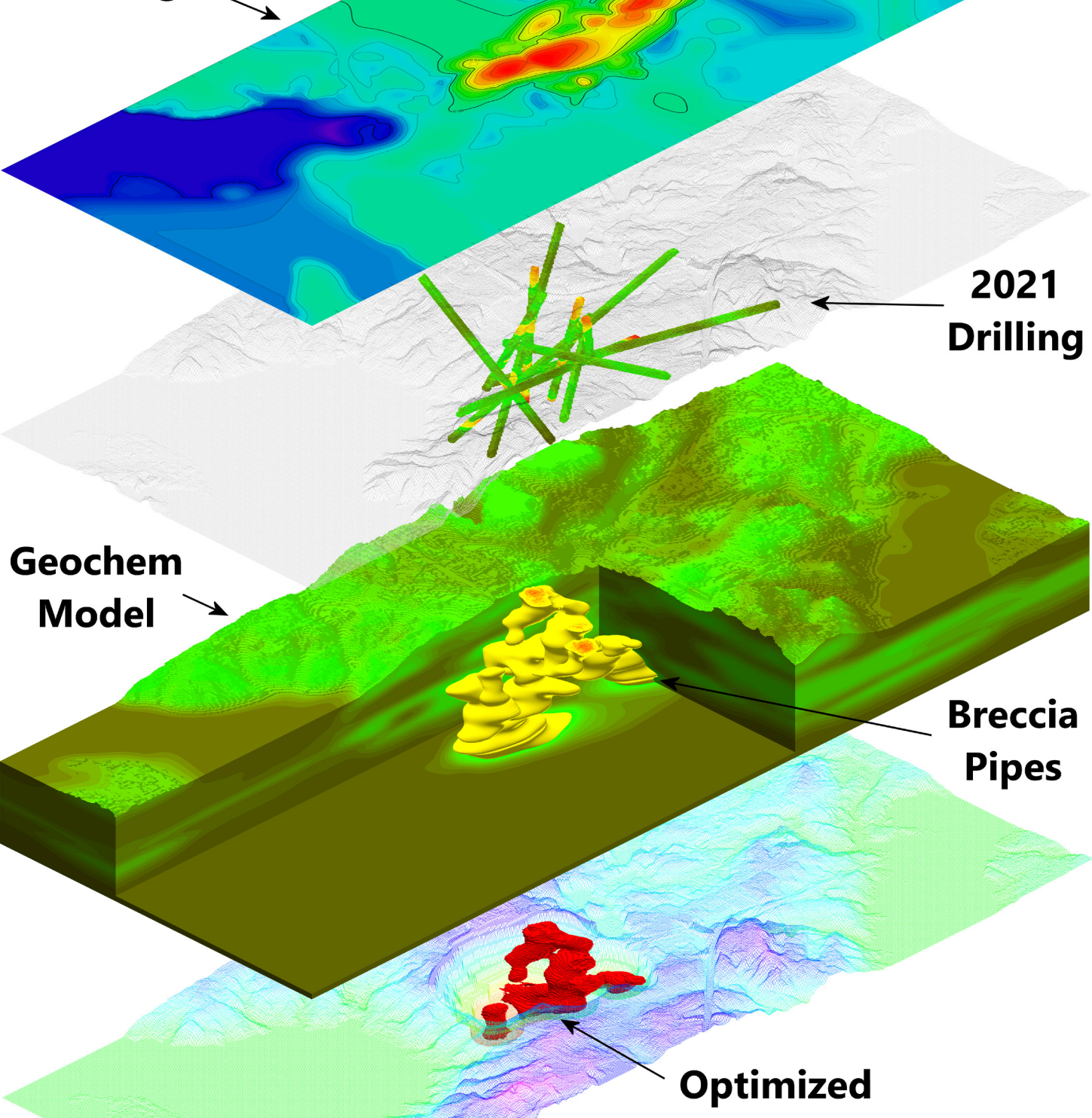
- Cross sections: multi-panel projected and hole to hole, with borehole logs and/or interpolated panels
- Correlations: model-based and "EZ" panels, snapping tools for hand-drawn correlations
- Borehole logs in 2D and 3D
- 3D fence diagrams
- Surface modeling of stratigraphic layers and water levels
- Solid modeling of lithologic materials, fractures, and geophysical, geotechnical, geochemical data, with display as voxel or isosurface diagrams, 2D plan and section slices
- Geology maps: plan slices from stratigraphy or lithology models
- Volume reports of lithologic, stratigraphic, excavation models
- Fracture display and modeling, stereonet maps, rose diagram maps
- Munsell colors for display in logs and interpolation into color models
- Data imports: Excel, AGS, Colog, Fugro CPT, gINT, LAS, Penetrometer, other databases

Other Tools

- Sieve diagrams, ternary diagrams with classification overlays
- Stereonet and rose diagrams
- Slope/aspect analysis on grid models
- Predictive tools: lithology materials from curves, interval data (porosities, strength, cohesion) from lithology
- 2D editing tools: contour lines, text, shapes, legends, images
- Composite scenes in 3D with maps, logs, surfaces, solids, panels, surface objects
- Page layout program for small to large format presentations and posters
- Exports to GIS Shapefiles, CAD DXF, raster formats, Google Earth
- Image import and rectification
- Program automation
- Google Earth output directly from data: points, cones, lines, polygons, images, flyovers



Aeromag



2021
Drilling

Geochem
Model

Breccia
Pipes

Optimized

Mining professionals rely on RockWorks point and contour maps, 2D and 3D log displays, projected sections, block model interpolating and editing, detailed volume calculations, and import/export tools in both exploration and production phases of their projects.



Mapping Tools

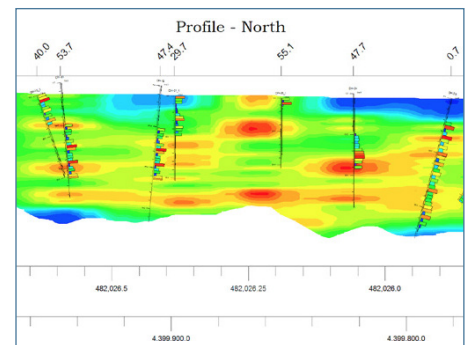
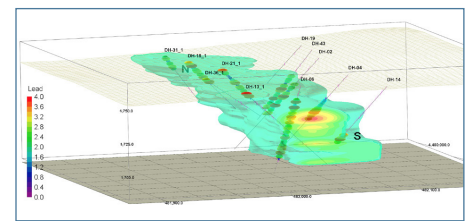
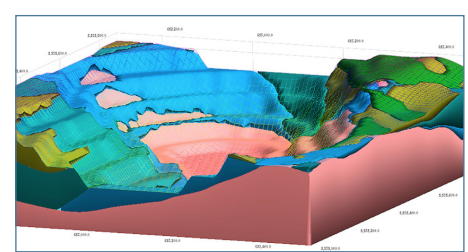
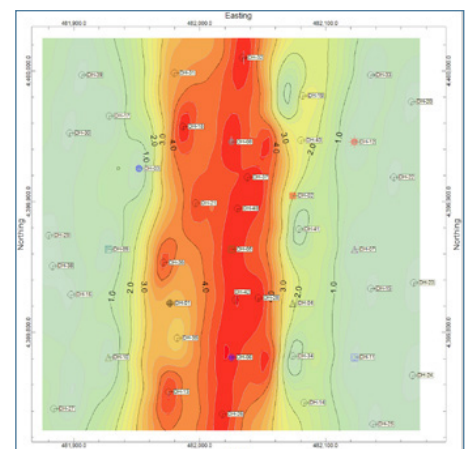
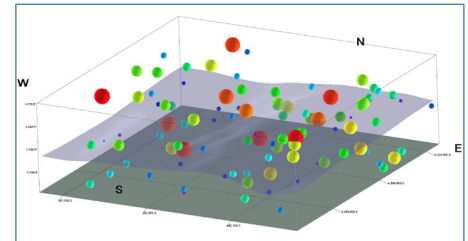
- Drillhole location maps with detailed data labels
- Assay, concentration maps with lines and color fills, custom color tables
- 3D surface displays: topographic surfaces, stratigraphic units
- 3D point maps
- Geology maps: plan or surface-based slices from block models
- Multivariate maps: pie chart, bar chart, starburst, spider maps
- Coordinate systems/conversions: lon/lat, UTM, State Plane, local, custom

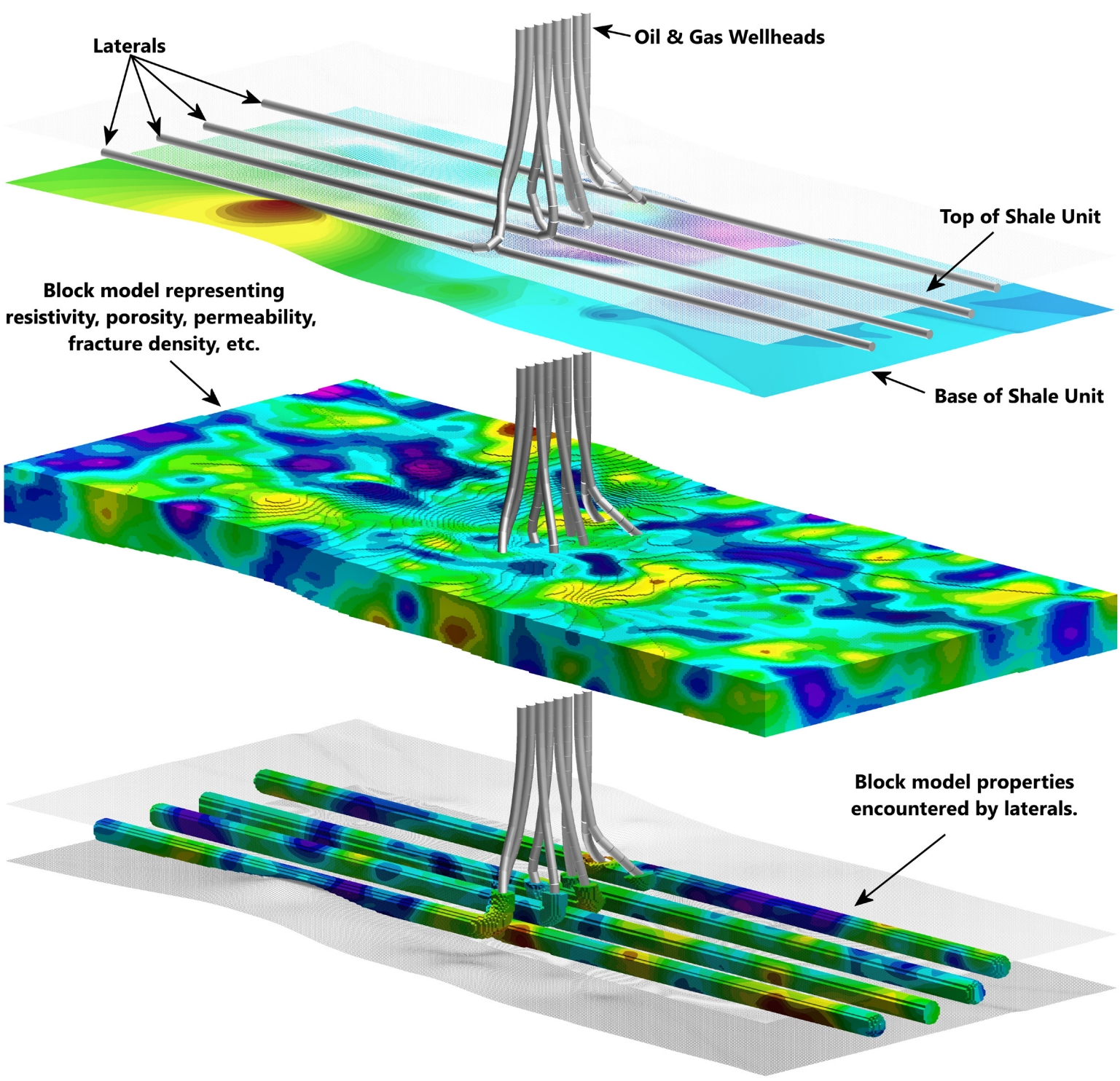
Borehole Database Tools

- Projected cross sections showing drillhole orientation
- Correlation panels: stratigraphy, lithology, grade/concentration, geophysics
- Drillhole logs in 2D and 3D with lithology, stratigraphy, bargraphs/disks, curves, color intervals, text
- Block model interpolation from XYZG point or drillhole data, display as voxels, isosurfaces, fence diagrams, 2D plan and section slices
- Surface model interpolation of stratigraphic units
- Downhole fracture display and modeling—closest fracture and closest fracture intersection
- Volume reports of lithologic, stratigraphic models
- Data imports: Excel, LAS, acQuire, Newmont, other databases

Other Tools

- Block model editor: 3D voxel/polyhedron editor or slice-based
- Volume calculations: grade statistics by level, extraction reports, GT calculators, floating cones model extraction tools
- Fracture display and modeling, stereonet and rose diagrams
- Ternary diagrams, frequency histograms for source data and models
- Graphic output: 2D and 3D output to RockWorks, Google Earth
- 2D editing tools: contour lines, text, shapes, legends, images
- Composite scenes in 3D with maps, drillhole logs, surfaces, blocks, panels
- Page layout program for small to large format presentations and posters
- Exports to GIS Shapefiles, CAD DXF, raster formats, Google Earth
- Image import and rectification
- Program automation





RockWorks gives the petroleum geologist the tools to get the job done: well spotting, mapping (bubble, structure, isopach, land grid, log maps), cross sections, stratigraphic modeling, reservoir modeling and much more.



Mapping Tools

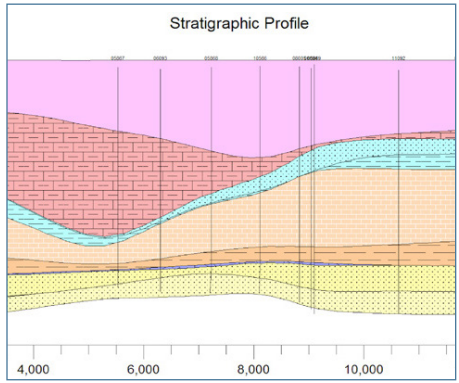
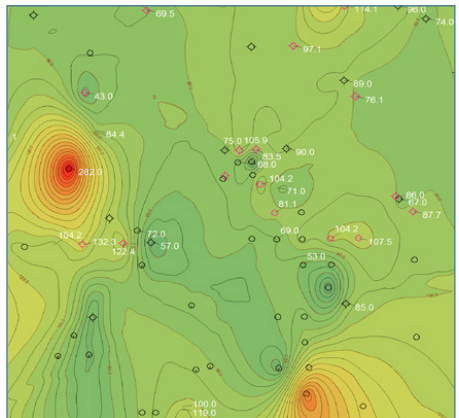
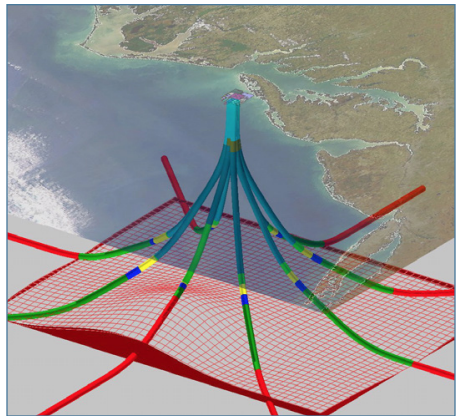
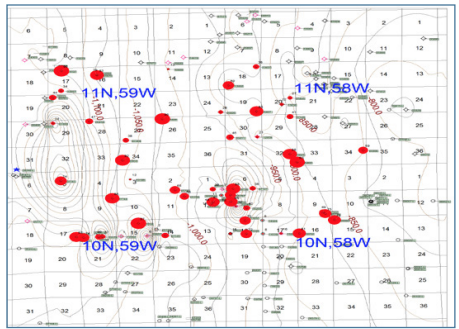
- Structure and isopach maps: contour maps with lines and color fills, custom color tables
- 3D surface displays
- Bubble maps of any well data (production, etc.)
- Well and lease spotting from Range, Township, Section descriptions
- Land grid and lease maps with section boundaries
- Coordinate systems/conversions: lon/lat, UTM, State Plane, local, custom
- Well location maps: customized symbols (e.g. well status), plan-view horizontal well traces
- Gridding algorithms: kriging, triangulation, inverse-distance, trend polynomial
- Grid model tools: filters, math operations, editor, imports and exports

Well Database Tools

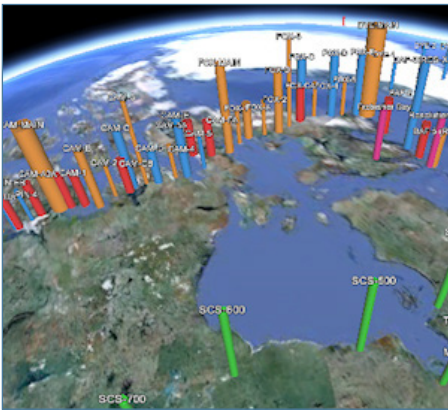
- Cross sections: hole to hole and projected
- 3D fence diagrams
- Correlations: model-based and "EZ" panels
- Horizontal and vertical wells: 2D and 3D, flexible log layout
- Stratigraphic modeling of all/selected formations
- Solid modeling of lithologic, geophysical, geotechnical, geochemical data, with display as voxel or isosurface diagrams
- Geosteering: optimal well paths based on target formations, lateral and 3D displays
- Well database for well locations and miscellaneous well data, formation contacts, raster images, geophysical data, lithology, well construction and production
- Data imports—Excel, LAS, LogPlot, IHS, KGS, Tobin, other databases
- Stratigraphic contacts from digital elog data or raster logs

Other Tools

- Structural geology diagrams
- Graphic output: 2D and 3D output to RockWorks, Google Earth
- 2D editing tools: contour lines, text, shapes, legends, images
- Snapping tools for hand-drawn correlations
- Composite scenes in 3D with maps, logs, surfaces, solids, panels, surface objects
- Page layout program for small to large format presentations and posters
- Exports to GIS Shapefiles, CAD DXF, raster formats, Google Earth
- Image import, rectification, depth-registration
- Program automation using the new Playlist feature



RockWorks 2023® Feature Levels

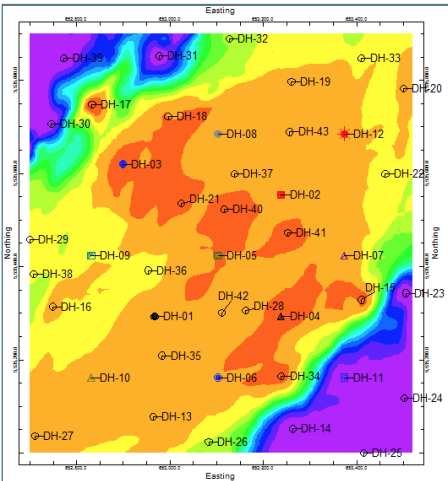


RockWorks is offered with three different feature levels: Basic, Standard, and Advanced.

All three levels include the RockWorks Datasheet and the ModOps, Utilities and Graphics menus. These menus offer numerous programs for mapping XYZ data, modeling XYZG points, creating stereonet and rose diagrams, creating Piper, Stiff and Durov plots, and much more.

All feature levels also include the three Graphic Output programs: RockPlot2D, RockPlot3D and ReportWorks.

All three levels also include the Borehole Manager and its local database for storing and managing borehole-based data.



RockWorks Basic

With Basic, the borehole processing tools are limited to observed data—no modeling: Borehole location maps, 2D and 3D strip logs, and striplog profiles and cross sections. Simple correlation panels are offered for Stratigraphy, I-Data and P-Data in 2D section diagrams. 5 items per playlist and 3 faults.

RockWorks Standard

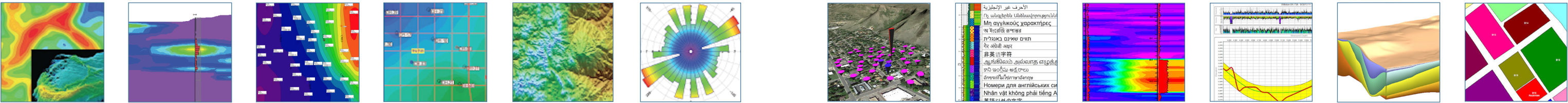
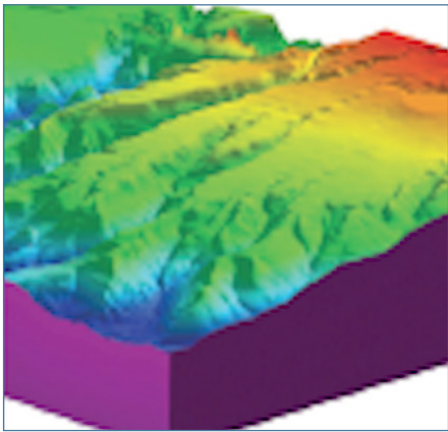
All Basic level tools, plus Borehole Manager modeling: lithology, stratigraphy, geophysical/geochemical/geotechnical, aquifers, colors, fractures. 5 items per playlist, 3 faults.

RockWorks Advanced

All Standard level tools, plus SQL-server database support, program automation (scripting), Borehole Manager petroleum production diagrams. Unlimited items per playlist, unlimited faults.

Academic

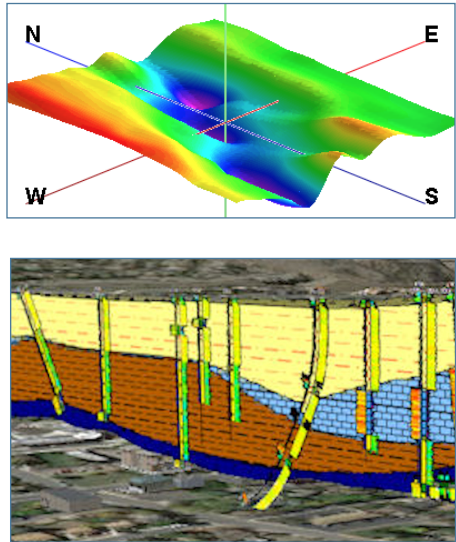
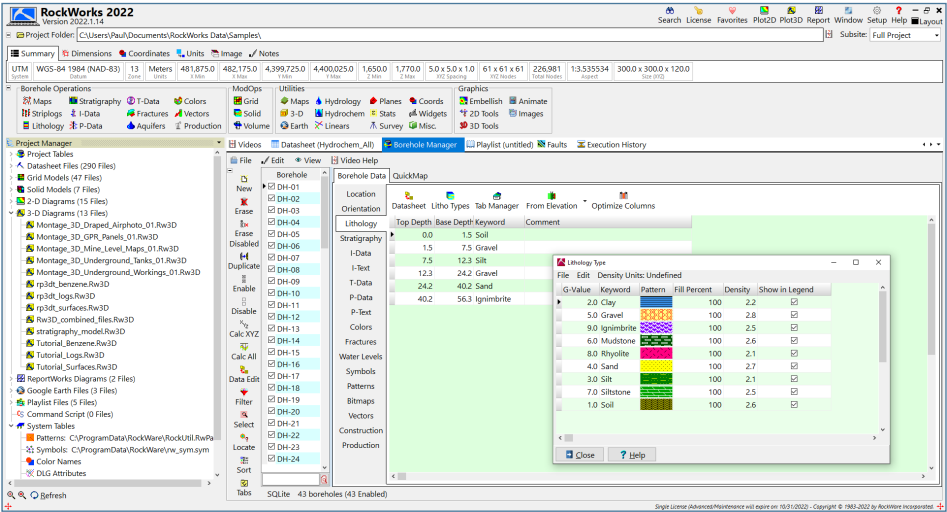
Ask us about our free college curriculum datasets, exercises, and significant academic discounts (see web site). These “canned” classes represent extended versions of the RockWorks training exercises tailored for educators. A great teaching resource. .

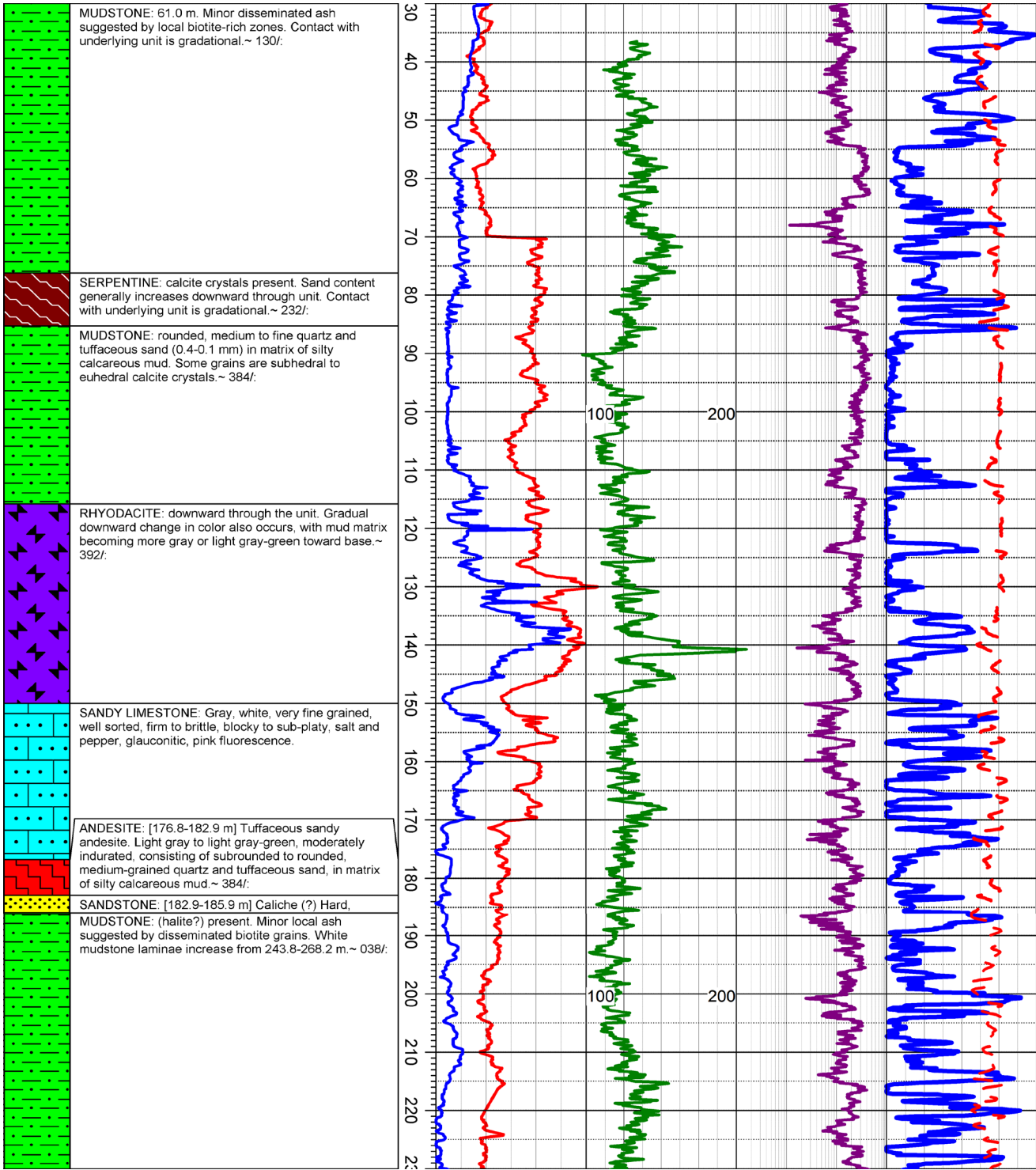


RockWorks 2023® Pricing



RockWorks Feature Levels		Download free trial at rockware.com		
License Level		Basic	Standard	Advanced
Single License price starting at		\$1,500	\$3,000	\$5,000
-or- Network License price starting at		\$2,625	\$5,250	\$8,750
-or- Annual Rental price		\$650	\$1,300	\$2,200
ModOps, Utilities and Graphics menus		✓	✓	✓
Logs and Sections		✓	✓	✓
Borehole-Based Modeling		—	✓	✓
SQL Server; Command Script Automation		—	—	✓
Playlist Automation		5 items	5 items	unlimited
3D Faults		3 faults	3 faults	unlimited
See https://www.rockware.com/product/rockworks/ for Academic Pricing				





New Streamlined Interface

The LogPlot Data Editor, Log Designer and LogViewer have been Redesigned for use on Multiple Monitors and to make the creation and modification of logs easier than ever. Improvements to many of the import/export tools (PDF, Excel Multi-sheet, LAS)



Single \$999 Network \$1,748 Academic \$333
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The Log Designer

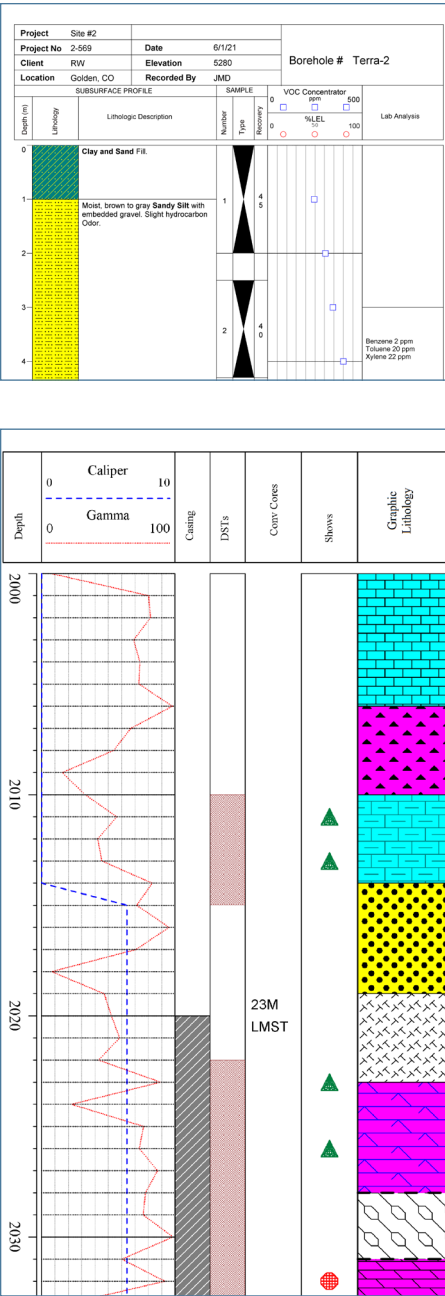
- The Log Designer allows you to quickly design borehole and well logs and modify existing design templates.
- Easy to use, with point, click, multiple-select and alignment capabilities
 - Multi-pane re-vamped design window displays headers, footers and log body
 - Two header and footer designs, full page report header
 - Well information linking between data file and header/footer fields
 - Macros for dates, page numbers and well locations
 - Header/footer images, patterns, symbols, curve and bargraph legends, notes and text
 - The log body can include any number and combination of columns, including lithology patterns and descriptions, cuttings percent columns, single and cross-plot curves, bargraphs, interval and point-based text, tadpoles, fracture traces (NEW), well construction, raster images, fillbars, water levels and other symbols and scale bars

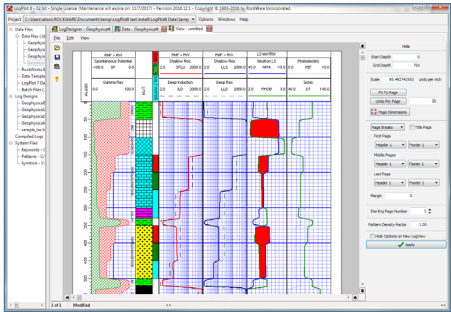
The Data Editor

- Type, copy/paste and or import your log data into the Data Editor.
- Tabbed data sheets with a flexible layout, for easy data entry
 - Data sheets added on the fly, or automatically updated from the log design
 - Double-click access to RockWorks borehole records, data can now be extracted from and written directly to the RockWorks database
 - Data import from LAS, Excel, DBF, AGS and text
 - Data export to LAS, Excel and RockWorks
 - Data types: lithology/stratigraphy, interbeds, cuttings percentages, curves, interval and point-based data and text, general comments, header/footer text and notes, symbols, fillbars, downhole survey, tadpoles, fractures and well construction
 - Easy linking of keywords ("sandstone") to graphic patterns and colors

The Log Viewer

- Create paginated or continuous logs
- Compile and display multiple logs at once
- Quickly re-display logs at any scale and adjust header/footer settings
- Use your mouse to view depth/elevation at any point on the log
- Graphic export options include PDF, HTML (for display online), BMP, JPG, TIFF and PNG
- Print your log, export an image of a single page or export all pages in a single image

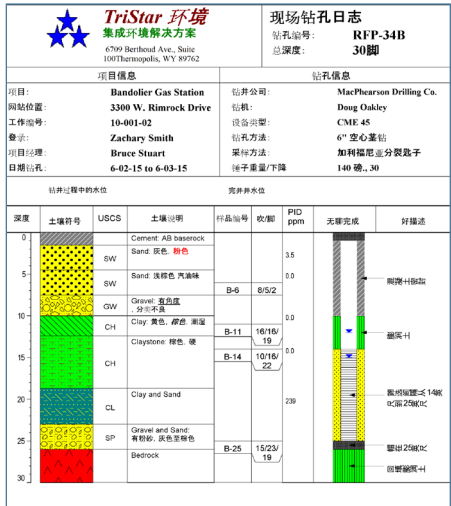




New Features in LogPlot

Log Design Template

- A Column Legend option has been added to the Log Design Header that draws a rectangle around the title the user chooses. The rectangle will also move and size itself to a linked log body column.
- A body outline has been added and can be used to surround a depth bar or the entire log body. Users can choose a line style and color and optionally select a solid fill.
- The title in the Column Legend can now be oriented vertically, either descending or ascending.
- Users can now add a second line for Titles they wish to show in the Header Column.
- The Curve column can now be displayed with Symbols and Fill.
- LogPlot Curves now wrap when the values go below the minimum value of the range.

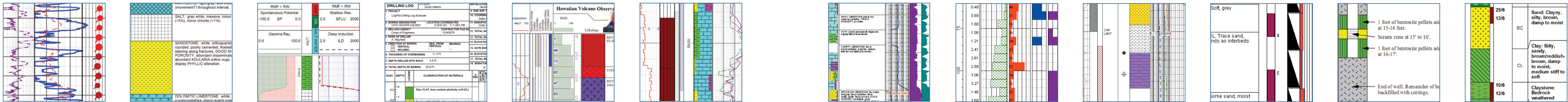
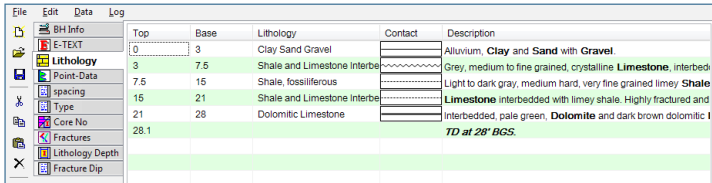
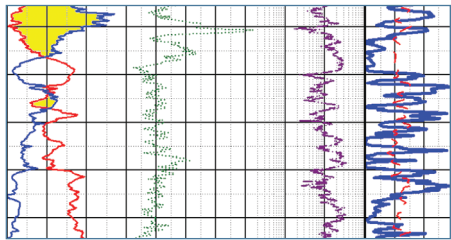


Log Data Files

- A Static Text (#s) item macro has been added to the short data file name without an extension.
- LogPlot now retains the number of decimals originally entered for interval values displayed as text.
- Users can create a template to enable and disable features in the LAS Import.

User Interface

- Users can drag and drop files from the Windows File Explorer to quickly open a new log design or data file.
- The new "Single Page" export option allows users to export a paginated log (with a header and footer on each page) as a single page PDF with the header and footer included at the top and bottom of the log.
- Exported pattern fill on log body now more closely match the patterns on screen.
- LogPlot now uses the path of the existing file in the Save As dialog for Log Design, Log View, Data Edit and Template files. If the current file hasn't been saved the path will default to the Project Folder.
- When importing RockWorks saved types into the Keyword editor you can now choose between the new entry and the current entry when there is a duplicate. The Keyword editor will also prompt you to save when exiting the dialog.

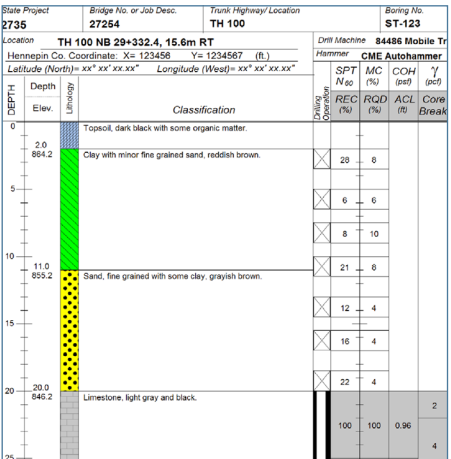
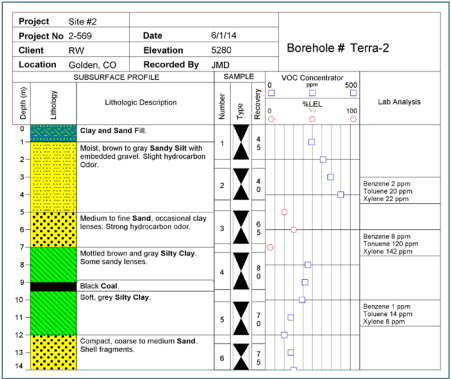
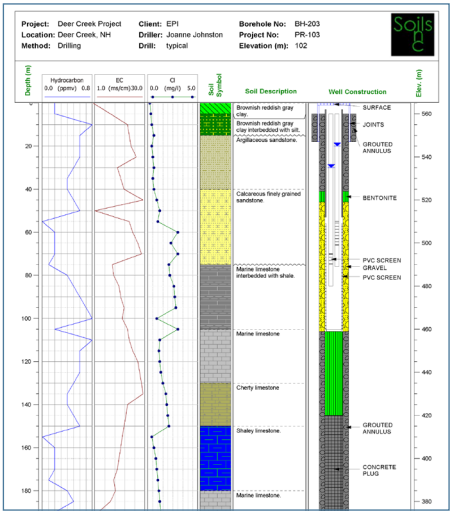
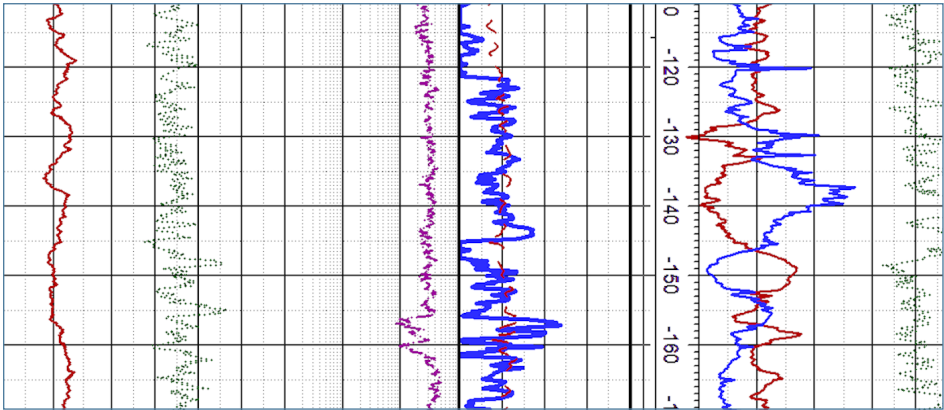


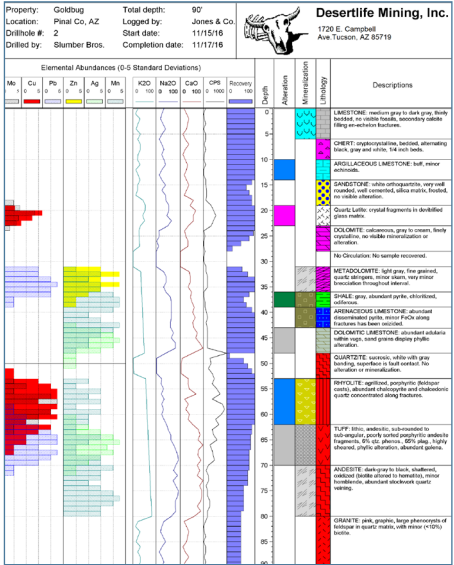
Environmental

- Soil and rock type symbols and descriptions
- Sample symbols, names, descriptions and data
- VOC data collected from MIP or other sampling devices
- OVA/PID data
- Borehole geophysics
- Detailed well construction diagrams, including nested wells
- Water level data
- Water and soil contamination information
- Blow counts, RQC and other geotechnical parameters

Oil & Gas

- Well/borehole geophysics
- Gas curves
- Drilling rate, RPM and Weight on Bit
- Lithologic Cuttings data
- Formation tops and descriptions
- Casing and perforation diagrams
- Drill Stem Test intervals
- Fossils
- Core data, including intervals and fractures
- Pay zones and show intervals



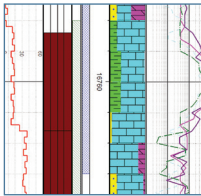
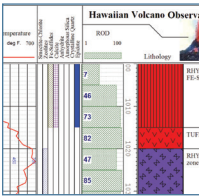
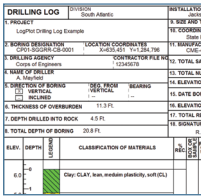
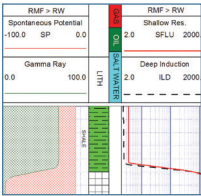
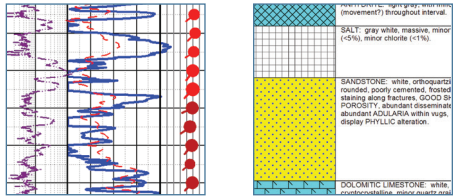
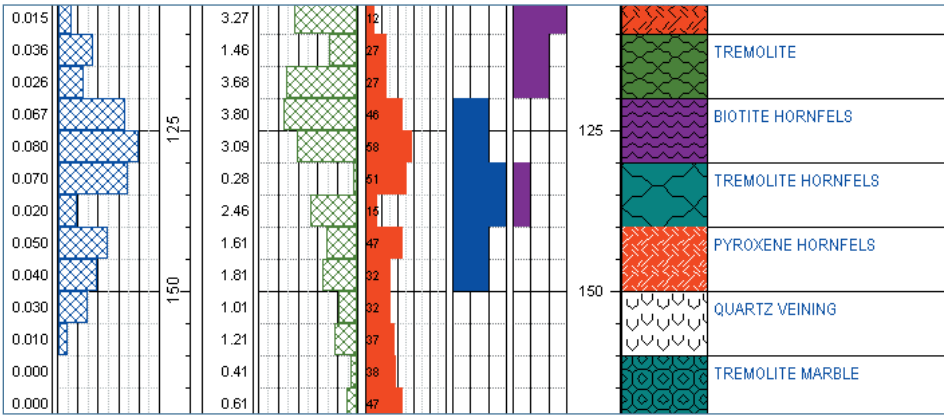
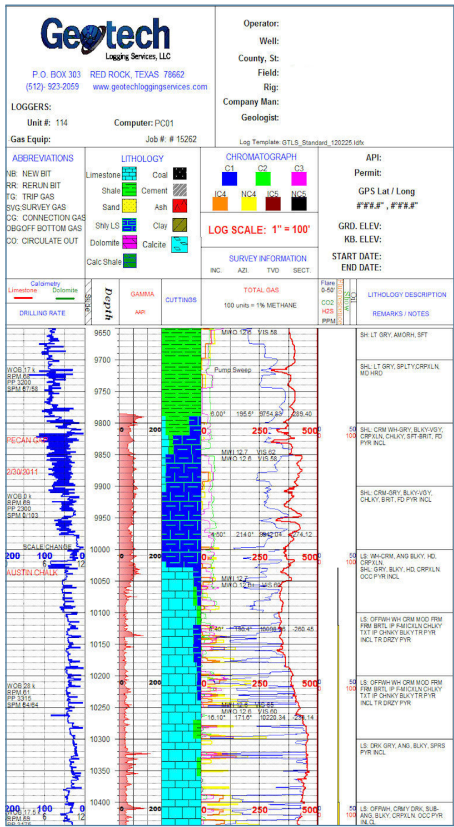


Mining

- Soil and rock type symbols and descriptions
- Core symbols and data, including Recovery and RQD
- Assay results
- Munsell Color Codes
- Fracture spacing, filling and orientation
- Alteration, mineralization and oxidation values
- Casing and well construction
- Water level data

Geotechnical

- Soil and rock type symbols and descriptions
- Blow counts, RQD and other geotechnical parameters
- Core symbols and data, including Recovery and RQD
- Fracture information, including spacing, orientation and aperture
- Sample symbols, names, descriptions and data
- Borehole geophysics
- Atterburg Limits
- Grain Size and sieve analysis results
- Water level data
- Water and soil contamination information
- CPT data, plotted as curves or colored intervals



\$349

Download free trial at rockware.com

Still storing your water analysis in Excel®? AqQA was created with water engineers and aqueous geochemists in mind—or for that matter, anyone who keeps water chemistry data in a spreadsheet. Analyzing your water testing data is as easy as 1, 2, 3 with AqQA:

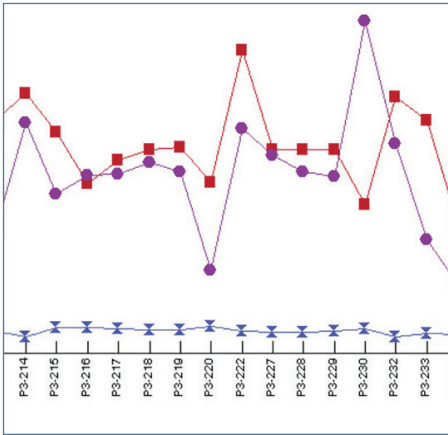
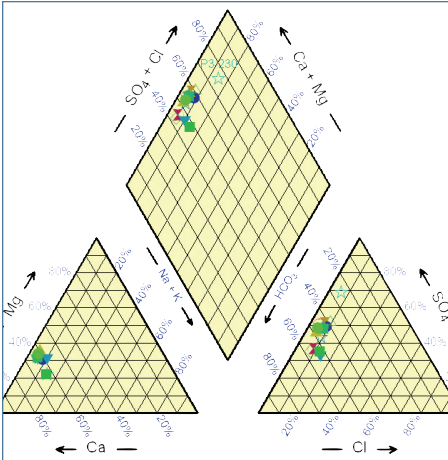
- 1) Paste your water analysis data in the "Data Sheet" tab
- 2) Click on the "Data Analysis" tab to check water testing data for internal consistency, and view other calculated water properties
- 3) Use the "New Graph" tab to create publication quality graphics—includes Piper diagram, Stiff diagram and nine other plot types

AqQA features

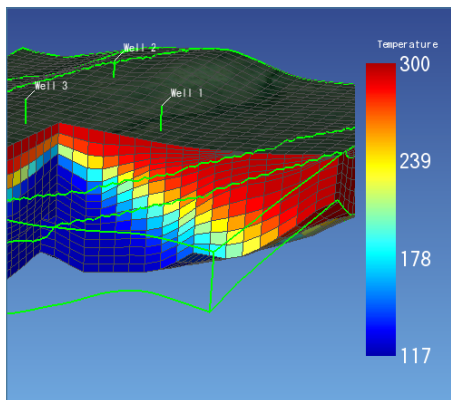
- Six tests for water data consistency according to AWWA 1030-E Standard Methods
- 11 plot types: Series, Time Series, Cross Plot, Ternary, Stiff, Piper diagram, Durov, Schoeller, Ion Balance, Pie Chart and Radial Plot
- Calculates carbonate equilibria, TDS, density, conductivity, hardness and more
- Flags violations of water quality standards
- Check replicates and standards
- 200 pre-defined analyte types—inorganic, organic, biological assay, radioactivity, isotopes—or define your own

With the AqQA spreadsheet, you can:

- Paste data directly from Excel
- Convert units with a mouse click—no more keying in mole weights
- Use common spreadsheet tools such as copy, paste, transpose, sort and many others
- Compare replicate analyses and check standards
- Mix samples
- Flag exceedances of regulatory limits
- Check for internal consistency against AWWA standards
- Calculate fluid properties such as water type, TDS, hardness, conductivity and carbonate speciation
- Calculate calcite saturation and CO2 fugacity
- Quickly create Piper, Stiff, Ternary, Durov and seven other plot types



▼ Fluid Properties			
Water Type	C ₆ H ₁₂ O ₆		
Dissolved Solids	1330 mg/kg	1347.4 mg/L	Measured
Density	0.99805 g/cm ³		Calculated
Conductivity	1330 µmho/cm		Measured
Hardness (as CaCO ₃)			
Total	811.69 mg/kg	810.1 mg/L	Calculated
Carbonate	811.69	810.1	
Non-Carbonate	0.0	0.0	
▼ Internal Consistency			
Primary Tests			
Anion-Cation Balance			
Anions	15.2		
Cations	17.4		
% Difference	6.669		
Measured TDS = Calculated TDS			Not within ± 5%
Measured	1330.000		
Calculated	1280.810		
Ratio	1.034		OK
Measured EC = Calculated EC			
Measured	1330.000		
Calculated	1405.529		
Ratio	0.982		OK
Secondary Tests			
Measured EC and Ion Sums:			
Anions	1103298		Not within preferred range (0.9-1.1)
Cations	1200960		Not within preferred range (0.9-1.1)
Calculated TDS to EC ratio	0.928		Not within preferred range (0.55-0.7)
Organic Mass Balance	0.978		Not within preferred range (0.55-0.7)
DOC ≥ Sum of Organics			
DOC unavailable			
► Carbonate Equilibria			



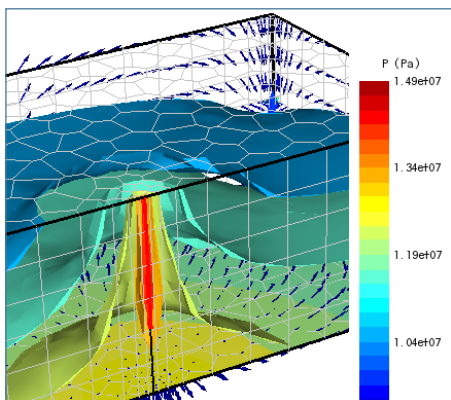
NEW VERSION

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Solve Challenging Subsurface Flow Problems with PetraSim

PetraSim is the graphical interface for the TOUGH family of simulators. Developed at Lawrence Berkeley National Laboratory, TOUGH2 and its derivatives are recognized for their broad range of subsurface simulation capabilities, including heat and multi-phase flow and reactive transport. PetraSim helps you access the power of TOUGH2 in an integrated 3D environment that includes mesh generation, parameter definition, execution and display of results. Save valuable time and increase model reliability with PetraSim.



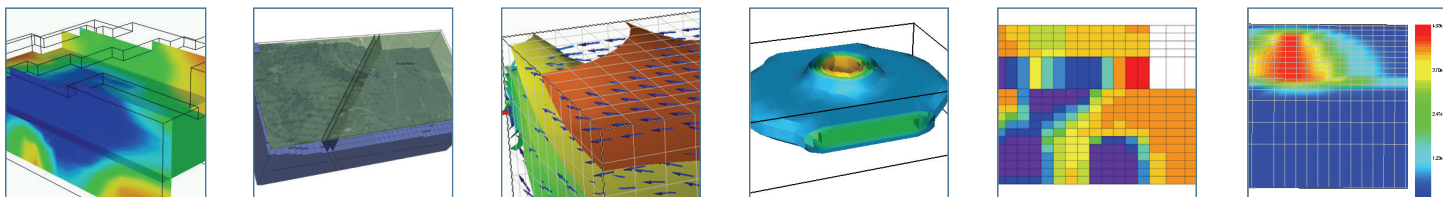
Interfaces

- **TOUGH2/TOUGH3*** – for multi-phase fluid and heat flow in porous and fractured media
- **T2VOC** – for 3-phase flow of water, air and a volatile organic compound
- **TMVOC** – for 3-phase flow of water, gas and a multicomponent mixture of volatile organic compounds
- **TOUGHREACT*** – for coupled modeling of subsurface multiphase fluid and heat flow, solute transport and chemical reactions

*Use of TOUGH v2.1 or v3 and TOUGHREACT v2 or v3.32/4.13 requires the purchase of the simulator through Lawrence Berkeley National Laboratory in addition to the PetraSim interface.

Applications for PetraSim and the simulators it supports include:

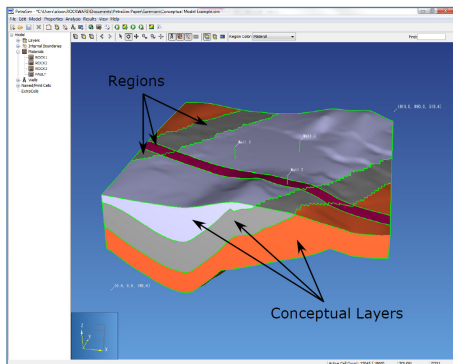
- Coupled process modeling (thermal, hydrologic, chemical, mechanical, biological)
- Carbon sequestration and hydrocarbon recovery
- Performance assessment of nuclear waste repositories
- Geothermal reservoir studies
- Vadose zone hydrology
- Fate and transport of volatile organic compounds
- Design and analysis of laboratory and field experiments



PetraSim Features

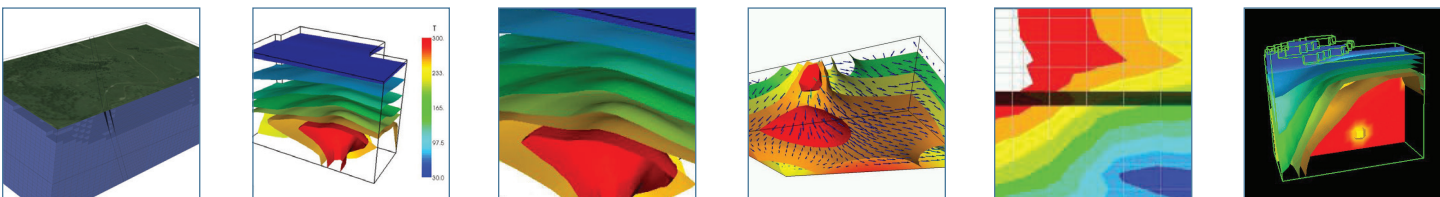
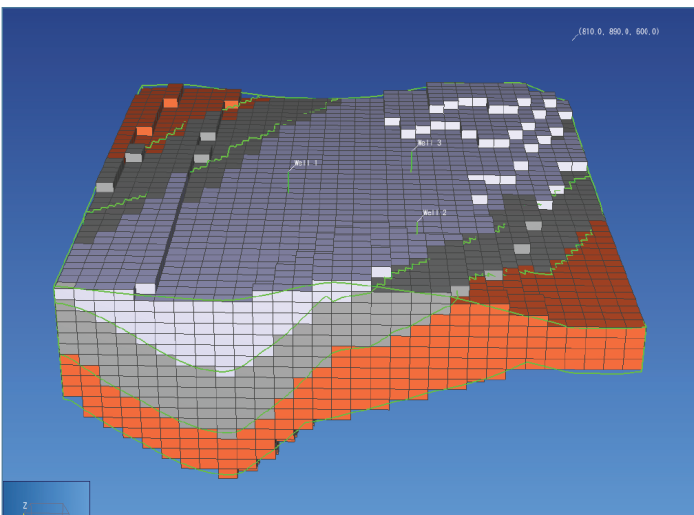
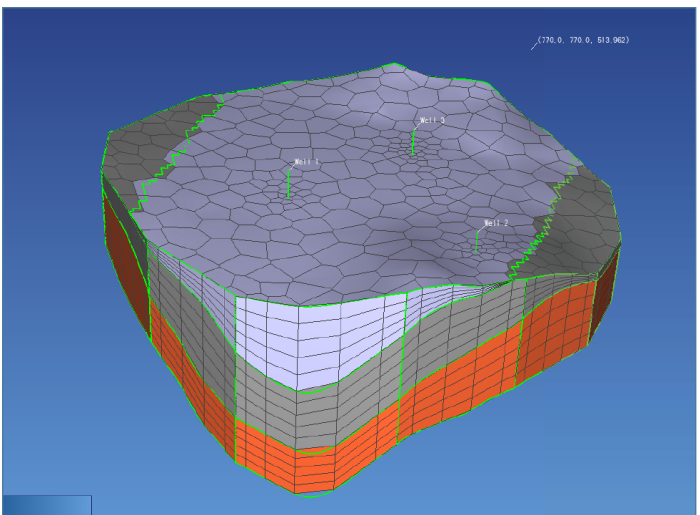
3D Conceptual Model Creation

- Define LAYERS and REGIONS as high level geometric entities
- Layers can be broken up into regions using INTERNAL BOUNDARIES, which are surfaces or planes that typically intersect many layers
- Use Layer and Regions to define material properties and physical and chemical initial conditions and spacing of cells in the Z direction
- Create wells to represent well completions through multiple adjacent cells.
- Flow in or out of the model can be evenly apportioned across the cells that intersect the completion interval evenly, or based on thickness and permeability



Mesh Generation and Editing

- Create rectangular, polygonal and simple radial meshes
- Vary the spacing of rectangular meshes in the X and Y directions using a spacing factor or a list of cell dimensions
- Define the dimensions of polygonal meshes based on maximum area and refinement areas around wells or other user-define refinement points
- Create meshes with flat cell layers, or warp cell layers to match conceptual model layer boundaries
- Create non-geometric "Extra" cells to represent special boundary conditions
- Use numerous interactive cell selection tool to assign cell-based properties, including sinks/sources, material type, permeability, porosity, cell volume, print properties and TOUGHREACT zones
- Cell selection tools include layers, regions, statistics regions, intersection with well lines or internal boundaries, material type, sinks/source, print or fixed state cells, and cell layers, columns, rows or vertical columns

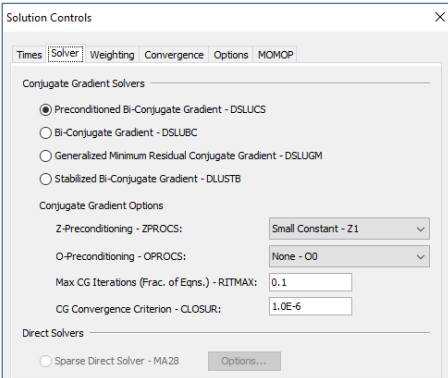
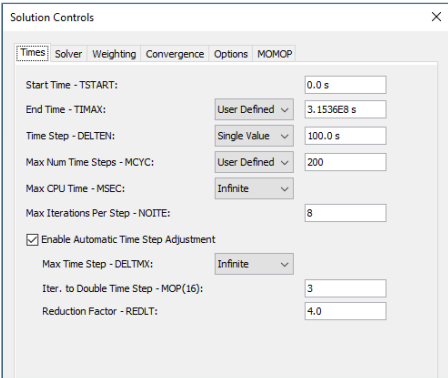
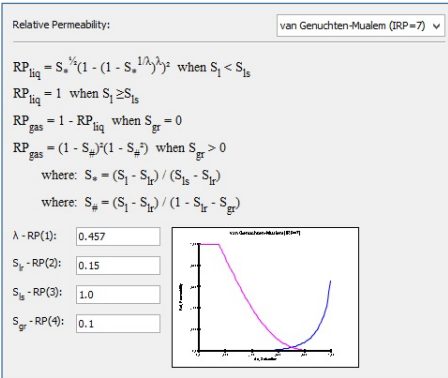




PetraSim Features continued

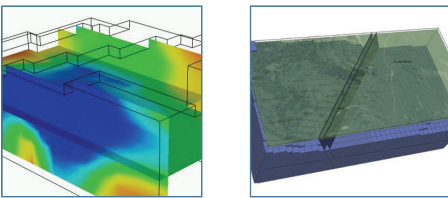
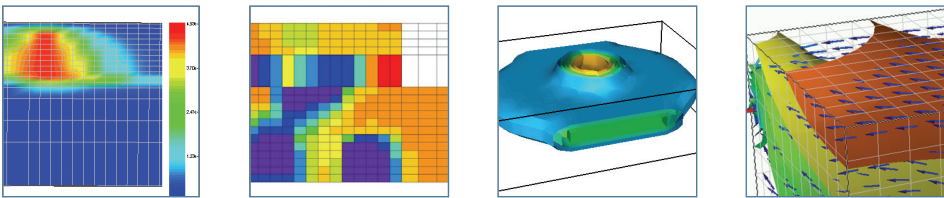
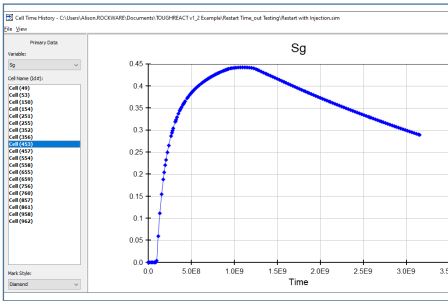
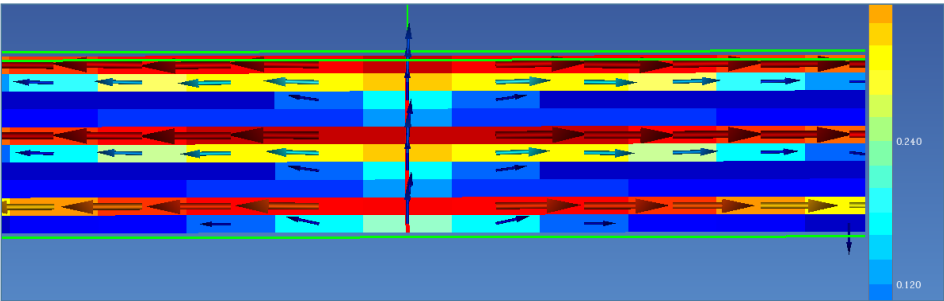
Intuitive Simulation Input

- Define material types/properties, simulation options and solver settings through an intuitive interface
- Dynamic previews of most Relative Permeability and Capillary Pressure curves
- Use a hierarchical system to establish global, layer-based or cell-based initial conditions
- Supports manual entry of new TOUGH3 blocks including the OUTPU and MOMOP tools
- Easily restart model by loading a SAVE or INCON files as cell-based initial conditions
- Link to a TOUGHREACT thermodynamic database to create water chemistry and mineral zones



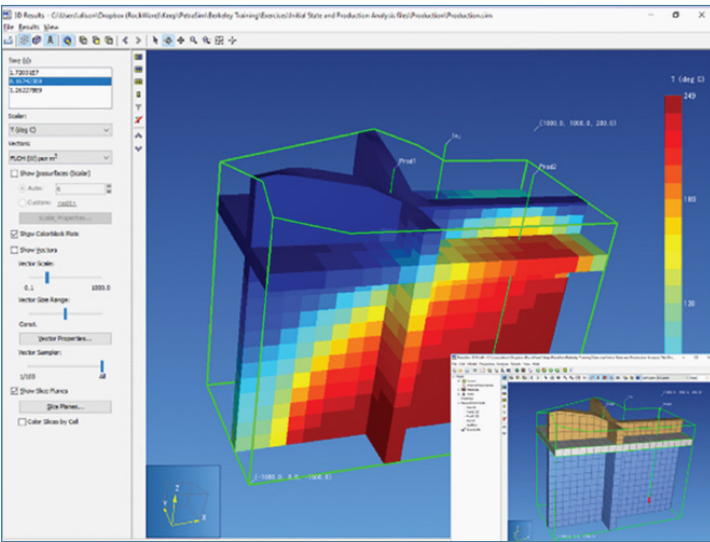
Integrated Result Visualization

- View 3D model results as isosurfaces, cell plots, slices and vectors
- 2D plots include cell-history plots, well plots and connection plots
- Create line-plots along wells or user-defined traces
- Export data as CSV files for visualization in Excel, TecPlot or other programs



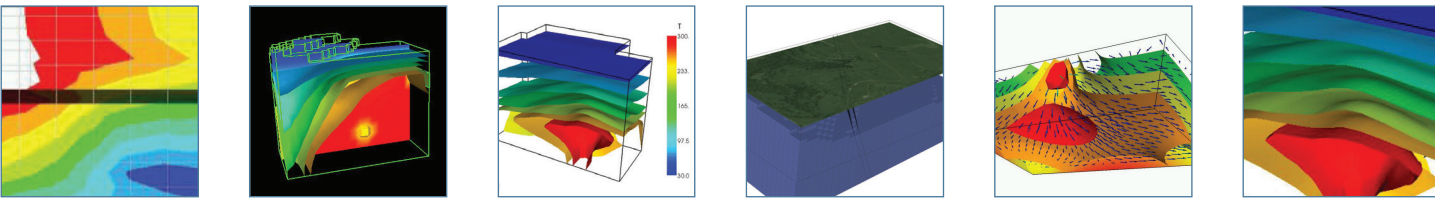
With PetraSim you can:

- Create complex flow, reactive transport and heat transfer models
- Dramatically reduce TOUGH2 model creation time
- Eliminate TOUGH2 input errors
- Use the intuitive toolbar for step-by-step guidance
- Select from the many fluid property options for your model
- Use enhanced TOUGH2 simulators available only with PetraSim
- Import well data in batch ASCII files
- Interactively create and edit 3D and axisymmetric grids
- Import rotated XYZ layer geometry and define conforming grids, or import Petrel/Eclipse grids
- Define irregular model boundaries and grids using Voronoi tessellation
- View graphs of relative permeability and capillary pressure functions
- Use dialogs to define solution and output controls
- Seamlessly run TOUGH simulators using the executables integrated into PetraSim
- Graphically monitor the solution progress
- Display 3D iso-surfaces, 3D block plots and vertical and horizontal slices
- Create time history plots of individual cell results, connections and wells
- Use line plots to display results along any 3D line or well trace
- Export result data in comma separated variable format



Fluid Properties Modules

Fluid Property Module	Module Description	Simulator
EOS1	Two Phase Water	TOUGH and TOUGHREACT
EOS2	Water and CO2	TOUGH and TOUGHREACT
EOS3 and EOS4	Water and Air	TOUGH and TOUGHREACT
EOS5	Water and Hydrogen	TOUGH
EOS7	Water, Brine and Air	TOUGH
EOS7R	Water, Brine, Air and Radionuclides	TOUGH
EOS8	Water, Air, "Dead" Oil	TOUGH
EOS9	Saturated/Unsaturated Flow	TOUGH and TOUGHREACT
EWASG	Water, NaCl, Non-Condensable Gas	TOUGH
ECO2N	Water, CO2 and NaCl	TOUGH and TOUGHREACT
ECO2M	Water, CO2, and NaCl, including super- and sub-critical conditions, and phase change between liquid and gaseous CO2	TOUGH (V2.1/V3 only)
EOS7C	CO2 or Nitrogen in natural gas (methane) reservoirs	TOUGH (V2.1/V3 only)
T2VOC	Water, Air, and Volatile Organic Compound	T2VOC
TMVOC	Water, Air, and up to 19 Volatile Organic Compounds	TMVOC





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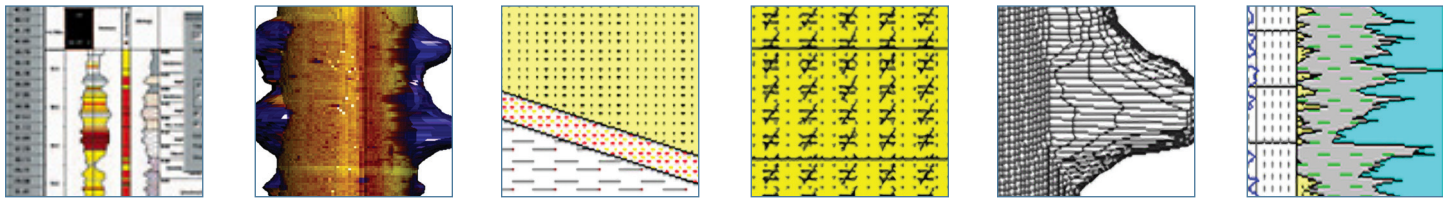
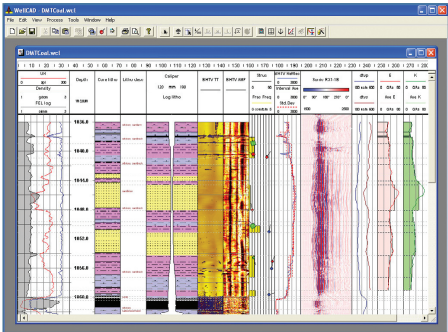
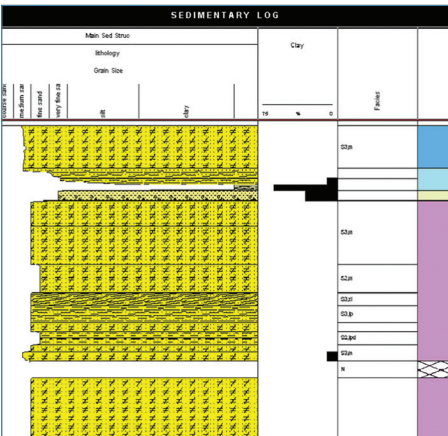
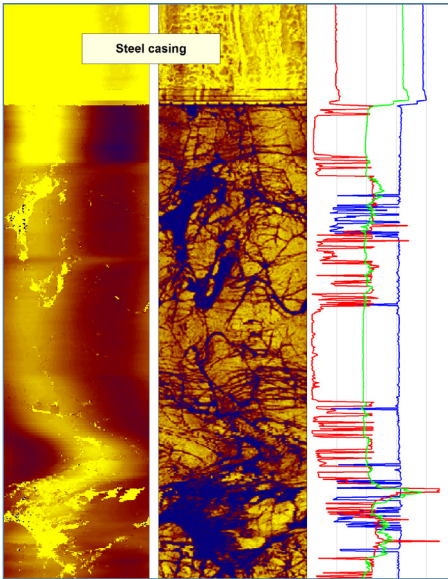
WellCAD is a PC-based composite log package, which combines comprehensive graphic editing mechanisms and data processing tools. Combining technically excellent display, editing and analysis capabilities for well data, WellCAD has become the standard log composite software in the Mining, Oil and Gas and Geotechnical industries and is used in a wide range of applications.

Features

- **Import/Export** – ASCII, CSV, TXT, LAS, BMP, JPG, TIF, GIF, plus many more industry specific formats
- **Data Presentation** – 2D and 3D borehole display of images, curves, intervals, points, lithology, stratigraphy, text, symbols, stacking patterns, biostratigraphy, engineering details and more
- **Depth Management** – Multiple depth management (time, depth, TVD) plus an advanced depth matching tool
- **Editing** – Slice, shift, merge, resample, and filter curves with results displayed alongside the original data
- **Computations** – Formula parser (curve calculator with multiple discriminators)

Optional Modules

- **Image & Structure Interpretation Module** – Borehole Image and Structure/Breakout Analysis
- **CoreCAD** – Interactive digital core description
- **Full Wave Processing Module** – Sonic Data Processing and Velocity Analysis
- **LIS/DLIS Module** – Import LIS/DLIS data
- **Deviation Module** – 3D well path visualization
- **Multiwell Module** – Borehole and correlated cross-sections
- **ODBC Connector Module** – Load and save data from/to ODBC compatible databases
- **Automation Module** – Automate your workflow using COM components
- **Casing Integrity Module** – Process multi-finger caliper and ultrasonic televiewer data
- **NMR Data Processing Module** – Derive total porosity, fluid volumes, and permeability from T2 distribution data



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The best 2D Geostatistics Software Available.

GS+ provides multiple interpolation options:

- Ordinary Kriging
- Conditional Simulation
- Simple and Indicator Kriging
- Inverse Distance Weighting (IDW)
- Cokriging

GS+ works for you

GS+ is geostatistics, which provides a way to better understand the autocorrelation inherent in spatial data — and to use this knowledge to create optimal, unbiased maps with known error.

GS+ provides easy access to these computationally intensive analyses. Whether analyzing oil deposits, plankton distributions, sun spot patterns, infectious disease outbreaks, or soil resources, GS+ provides the power of geostatistics.

- Powerful variogram models with full user control
- Customized maps, easily exported
- Fast kriging and conditional simulation
- Over 1 million input records

Mapping

GS+ provides 3D, 2D, and 1D maps of interpolated spatial data. Display maps with different contouring schemes, rotate 3-dimensional maps on the fly, and zoom in to view a transition or other map feature. Display estimation error as variance or standard deviation of interpolated means and display original data locations as sample postings.

Semivariance Analysis (Variograms and Semivariograms)

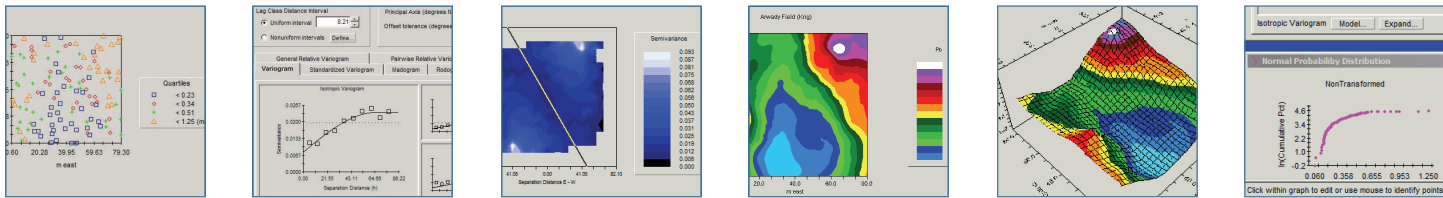
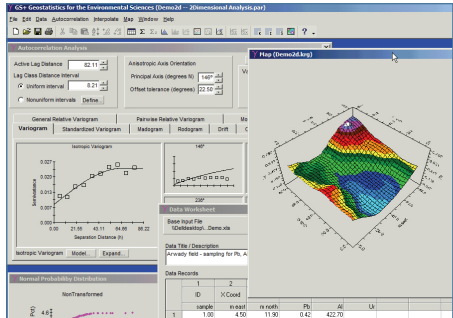
GS+ provides semivariance analyses as both isotropic and anisotropic variograms (also called semivariograms). Take complete control over separation intervals to create optimal variograms. Choose constant interval classes or define different breakpoints for every lag class. Anisotropic directions can be individually targeted, and variograms can be scaled to sample variance.

Quick Geostatistical Analysis

Whether analyzing oil deposits, plankton distributions, sun spot patterns, infectious disease outbreaks, or soil resources, GS+ allows ready access to the power of geostatistics.

Import Export Flexibility

GS+ interpolation files can be read by many other types of mapping programs. Enter data using Excel spreadsheets, database files, or cut and paste from your favorite source. The GS+ data worksheet accepts over a billion records. Output is written to ASCII files that can be subsequently used by GS+, ArcView®, RockWorks®, or other mapping and GIS programs.





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AQTESOLV is the original all-in-one package for the design and analysis of aquifer tests. From entry of field data to test analysis and report generation, AQTESOLV offers a complete and easy-to-use set of tools for the interpretation of pumping tests, slug tests and constant-head tests. AQTESOLV is the only aquifer testing package to feature an important new solution by Tartakovsky and Neuman (2007) for pumping tests in unconfined aquifers including effects from the unsaturated zone.

Recently Added Features:

- Agarwal method for recovery analysis, distance drawdown plots, horizontal wells, groundwater mounding tools
- Automatic image well generation for bounded aquifers

A Complete Package

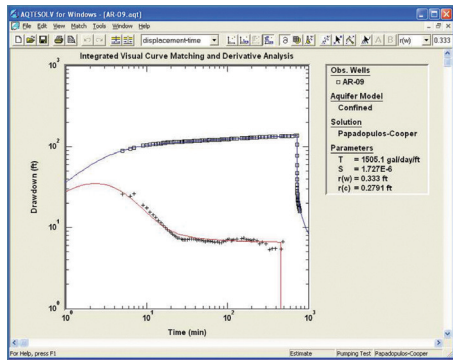
- Data entry wizards
- Import wizard
- Diagnostics and derivative analysis
- Solution expert
- Visual curve matching
- Automatic curve matching
- Interactive sensitivity analysis
- Statistical analysis of results
- 17 plots and reports
- Contouring
- Test design and drawdown prediction
- Context-sensitive help

Comprehensive Test Methods

- Pumping tests
- Variable-rate tests
- Recovery tests
- Intermittent pumping tests
- Injection tests
- Step-drawdown tests
- Single-well tests
- Slug tests
- Constant-head (constant-drawdown) tests

Advanced Solutions

- Double-porosity models
- Single-fracture models
- Generalized radial flow model
- Horizontal wells
- Interceptor trenches
- Confined/unconfined conversion
- Water-table aquitard
- Wedge-shaped aquifers
- Channel aquifers
- Nonuniform aquifers
- Oscillatory slug tests
- Groundwater mounding



Single \$299 Academic \$199

Igpet provides tools for teaching and research in Igneous Petrology, allowing users to develop their own data files and use graphics routines to discover and interpret patterns of geochemical variation.

Igpet comes with several data sets, including low pressure cotectic data, moderate pressure cotectic data, MORB glasses, and several suites of calc-alkaline rocks from Central American volcanoes.

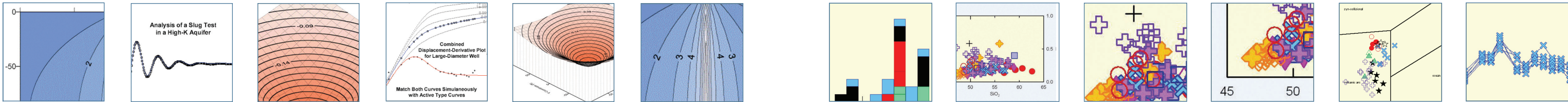
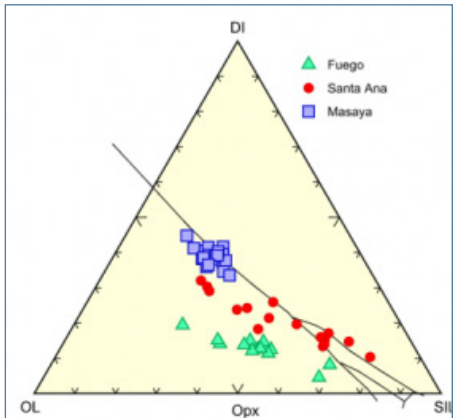
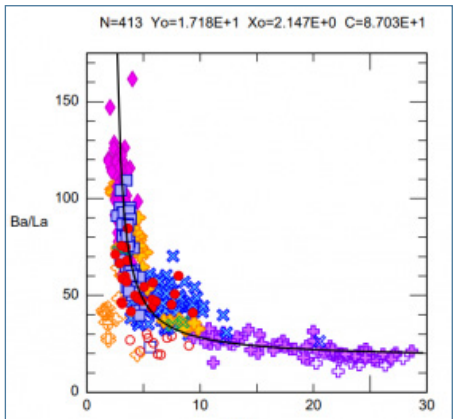
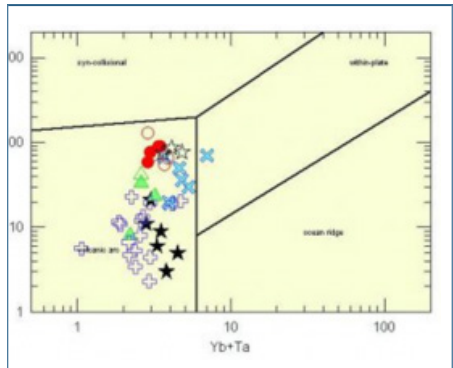
Igpet draws most types of petrologic diagrams, including Harker, Fenner, triangular and log plots. A calculator includes (- / *), Log, square, square root, ppm and chondrite functions. Special purpose diagrams, e.g. the Irvine and Baragar (1971) rock classification scheme, are stored in control files that can be expanded easily. CMAS projections include O'Hara, Walker, Grove, Baker and Eggler etc. Spider diagrams include REES, Wood, Thompson, Sun and McDonough, etc.

Here are a few of Igpet's Features

- Discrimination diagrams for rock types and tectonic settings
- Publication quality output for transfer to draw programs
- Simple data format with easy transfer of data to/from Excel
- Igpet draws most types of petrologic diagrams, including Harker, Fenner, triangular and log plots. Spider diagrams include REE element ratio plots, Wood, Thompson, Sun and McDonough etc.
- CIPW norms within Igpet; fractional crystallization and magma mixing calculations in Mixing.exe
- Simple X-Y plots that allow Melt modeling, AFC modeling, hyperbolic mixing, linear regression
- Mixing, Melting and AFC modeling of multiple elements and isotope ratios simultaneously using the element suite in popular spider-diagrams — this is where Igpet gets powerful!

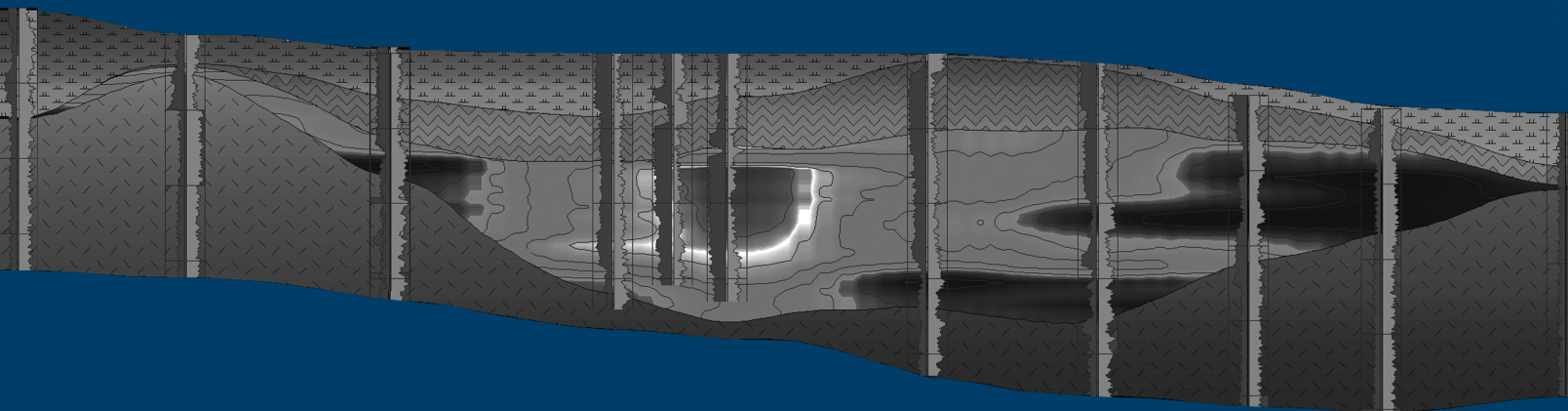
Available for PC or Mac users.

- The latest versions of the Mac OS including Monterey and Ventura are supported.
- Igpet for Windows is compiled simultaneously from the source code using XoJo which improves graphics output and eases installation.





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