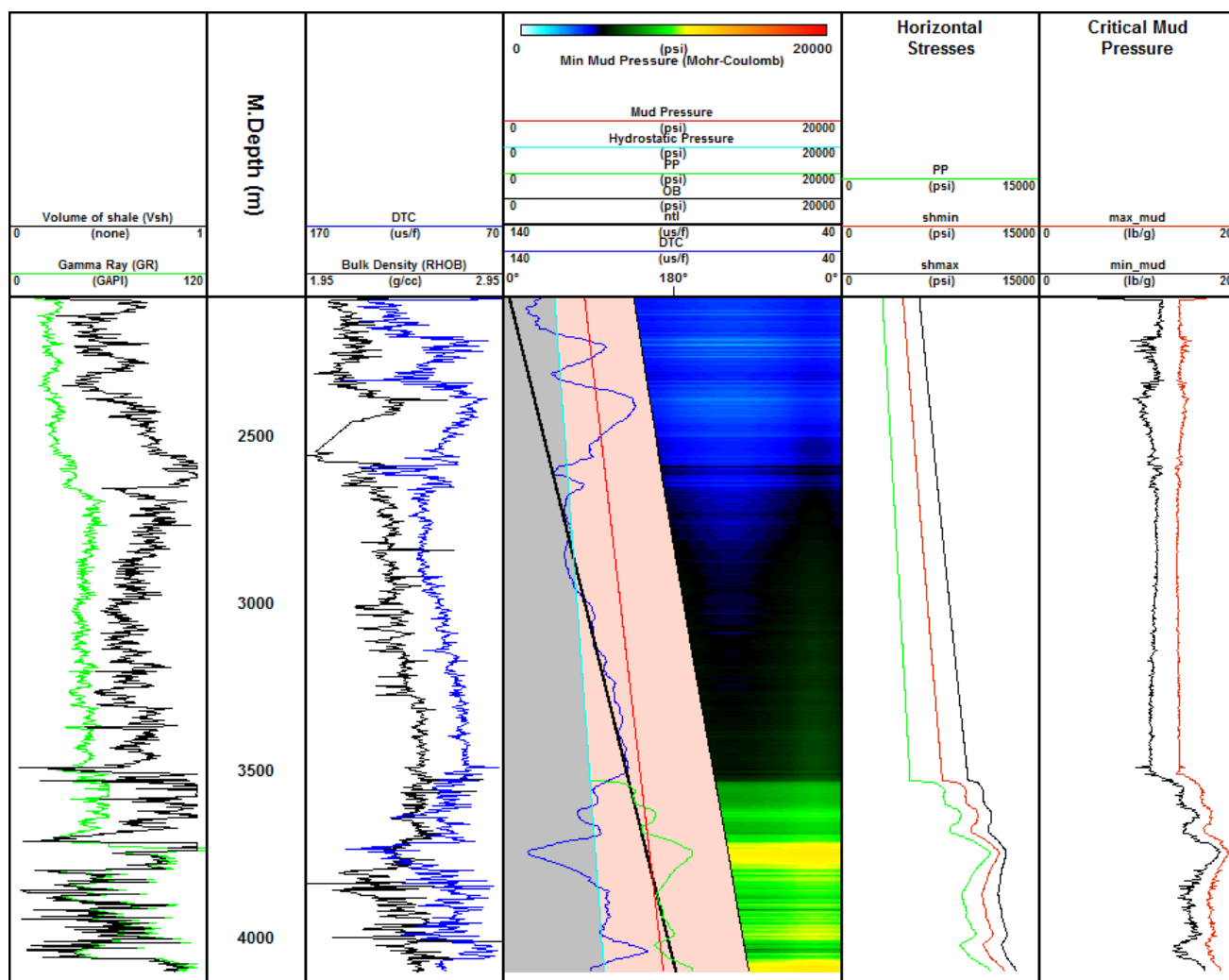


## Pressure Modeling and Borehole Stability

Determining the appropriate pressure regime within a well is important for several reasons. These include the understanding of potential hole conditions and problems that may be encountered in the drilling process. In conjunction with the dip analysis and borehole image interpretation modules, it also allows for the identification of critically stressed fractures for enhancing recovery and for fracking procedures.



### Input Data

Standard logging tools, pressure tests and breakout information are among the data used by the module. Input data formats supported for data are LAS, LIS and DLIS.

### Models

Pore pressures can be modeled with the Eaton, Bowers and other methods. The module provides for the modeling of fracture pressures with a choice of models including Eaton and Matthews & Kelly. The capability to analyze pressure test data such as leakoff tests is also present. This allows the user to interactively identify the fracture and closure pressure points. The fracture pressures so picked can be displayed on the pressure modeling track to help in guiding the modeling process.



Maximum Stress can be computed from breakout size and direction, or it can be modeled. Stress data can then be used to highlight critically stressed fractures on stereonet and Mohr plots when used in combination with the Dip Analysis module.

Finally the critical mud pressure window can be modeled under one of four different failure criteria: Linearized Mohr-Coulomb, Modified Lade, Circumscribed and Inscribed Drucker-Prager. Output can be as pressure or equivalent mud weight (EMW).

### **Display**

A track dedicated to pressure modeling is provided within the IMAGELog environment. This allows any template to incorporate pressure modeling data. That includes templates used in cross section displays. A selection of borehole stress displays can be presented within the track such as Sigma-Max, Sigma-Min, Sigma-Z-Z and more.

With the use of the DEXTR and Mapping modules it becomes possible to quickly map areas for potential pressure problems.

### **Support and Training**

TERRASCIENCES provides immediate telephone and email support by trained earth science professionals. A regularly updated web site, electronic newsletter, and training courses are also available. All product upgrades are included in the maintenance and support fee.

## **Product Specifications**

- ✓ Curve data loading from LAS, LIS, ASCII and DLIS files.
- ✓ Computation of overburden, hydrostatic and pore pressures.
- ✓ Interactive picking of normal trend line from user selected reference curve.
- ✓ Analysis of LOT/XLOT, FIT and other pressure test data. Interactive picking of closure and fracture pressure points.
- ✓ Pore pressure models include Eaton, Bowers and Equivalent Depth methods.
- ✓ Horizontal stress computation – generates SHmin and SHmax. Fracture pressure models supported include Eaton and Matthews & Kelly, Poroelasticity . Compute Khmax at breakout edges.
- ✓ Computes rock properties – Poisson's Ratio, Young's and other moduli. Large number of region specific UCS models provided. Brittleness Index computation.
- ✓ Computes critical mud pressure curves. Failure Criteria supported are Linearized Mohr-Coulomb, Modified Lade, Circumscribed and Inscribed Drucker-Prager.
- ✓ Critically stressed fracture display on stereonet and Mohr diagrams.
- ✓ Borehole Stress display options are: Minimum Mud Pressure, Sigma-min, Sigma-max, Sigma-theta-theta, Sigma-Z-Z, and Tau-theta-Z.
- ✓ Pressure Model tracks can be incorporated into any composite log design and display.
- ✓ Pressure modeling can be displayed in cross section by utilizing other modules within the TerraStation.
- ✓ Graphics output to CGM, Postscript, PDF, EMF, BMP, JPEG, TIFF, and more.



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