

OPTV Tool™ Optical Televiewer



2010 Special Meritorious Award for Engineering Innovation.

Benefits

- Continuous High-Resolution image
- 360° Borehole image
- Oriented to True North
- Borehole Inclination and Azimuth
- Core Views
- Fracture, Bedding ID with Strike/Dip
- Air Hole Environment
- Horizontal Log with Tractor

As if you were downhole with a flashlight, ruler, compass and magnifying glass.

Case Study

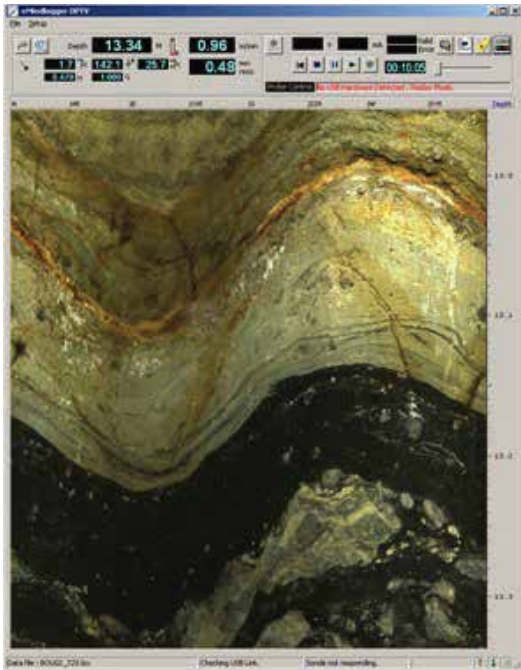
A large U.S. independent operator was using horizontal air-hole drilling technology to drill several laterals off a single pad, to maximize production and avoid the added expense of drilling with fluid. Lateral azimuth directions were selected based on information gathered from existing vertical producing wells and geologic analysis of the fracture systems. Not wanting to load these laterals with fluid, the operator was seeking the highest-quality imaging log data to (1) confirm geologic modeling, (2) fully interpret the fracture systems encountered, (3) distinguish open, naturally producing fracture systems from non-productive systems (comparing the images to basic open air-hole hole logging suites and spinner logs), (4) aid in completion and stimulation design, and (5) determine location and azimuth of future lateral placements.

Before logging horizontally, the operator wished to compare the OPTV™ with a traditional micro-resistivity imaging device, using a vertical pilot hole drilled through the target formations. Both tools were run over the same intervals and the quality of images compared. The operator was satisfied that the OPTV image quality run in air was superior to those obtained by the micro-resistivity device run in fluid, especially in identifying the fractures. The horizontal project proceeded as designed, with the horizontal section drilled and logged on air.

Job participants estimated that using the OPTV system to obtain required images from an air-filled borehole yielded savings of 48 hours of rig time, \$10,000 in fluid and removal, and \$25,000 in wireline logging, conveyance, and interpretation. The method also allowed the operator to avoid formation damage and associated risk.

Real Time Acquisition

Real time acquisition view includes: Orientated Image (Vertical or Horizontal), Depth, Logging Speed, Resolution, Accelerometer Readings, Magnetometer Readings, Borehole Deviation and Azimuth.



**Post Acquisition
Devonian Sand Shale Bedding
Sequence**

The OPTV products are JPG, BMP, or PDF files that can be viewed, printed, or imported into graphic software programs. The entire logged interval or smaller specific intervals can be chosen giving different geologic perspective.

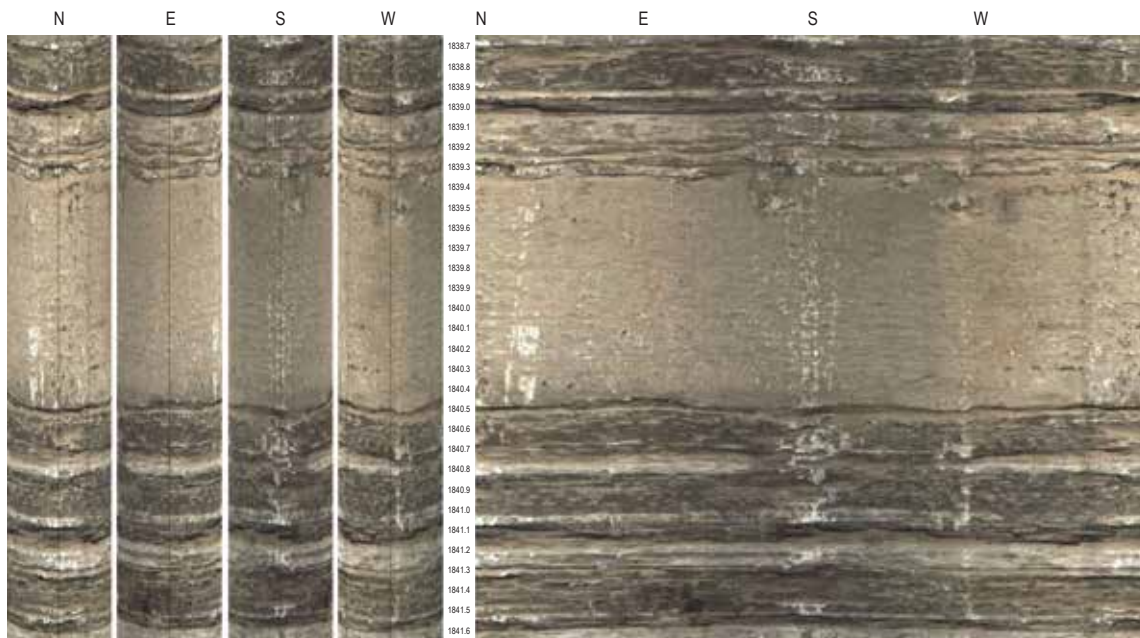
Differentiating acoustic or micro-resistivity imaging, with the OPTV all inferences made are geologic, you "see" exactly what is there.

The orientated image can be viewed in 3 ways:

Flat View NESWN for Vertical, URDLU for Horizontal.

4 Core View Image is made into cores and presented in 90° offset views with initial angle user chosen.

Single Core View The image is presented as a single core which can be "rotated" in 5° or 45° increments.



4 Core View

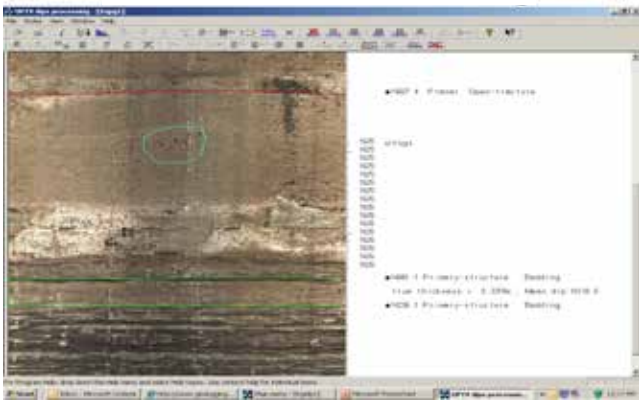
Flat View

Single Core View

Basic Processing

Dip Processing is done via a user friendly interface. Features are identified with customizable user controlled labeling. Strike and Dip of the feature is calculated and presented in standard or custom formats.

Any geologic feature such as bedding, vugs, fractures, clasts, etc. may be chosen for processing. Feature thickness can be calculated. Picks can be edited, added, or deleted at anytime. Processing is saved and can be revisited and revised at your convenience.



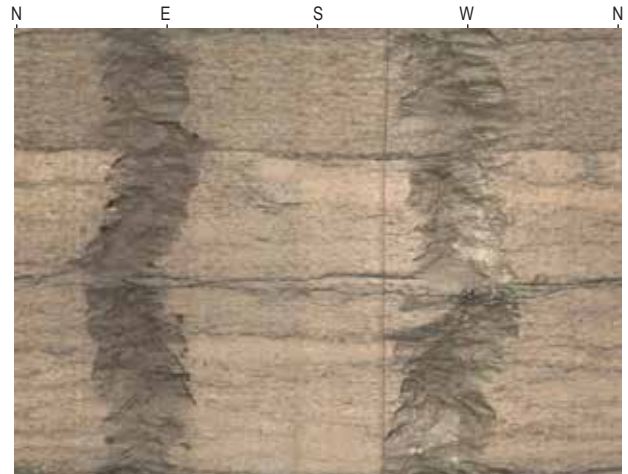
Basic Interpretation

Once features have been chosen and processed, a printable log is made. The interval processed can be of any length desired. Any or all of the views and plots can be chosen: Core View, Flat Image View, Arrow Plot, 2 Stick Plots (different angles), Labeling and comments chosen in Processing Borehole Deviation plot log are made and can be printed in JPG, BMP, or PDF format.

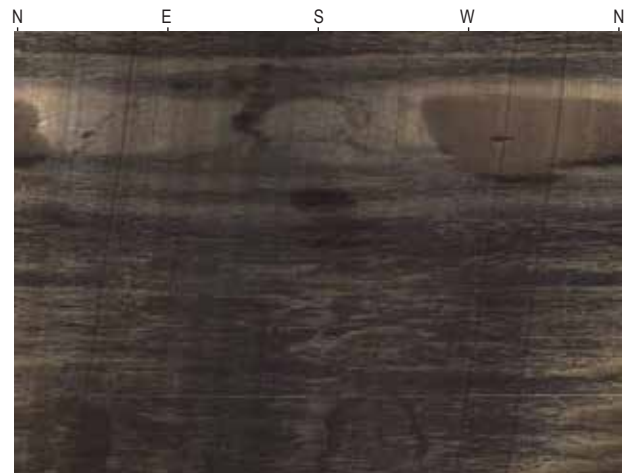


Horizontal Fracture Lower Huron Shale

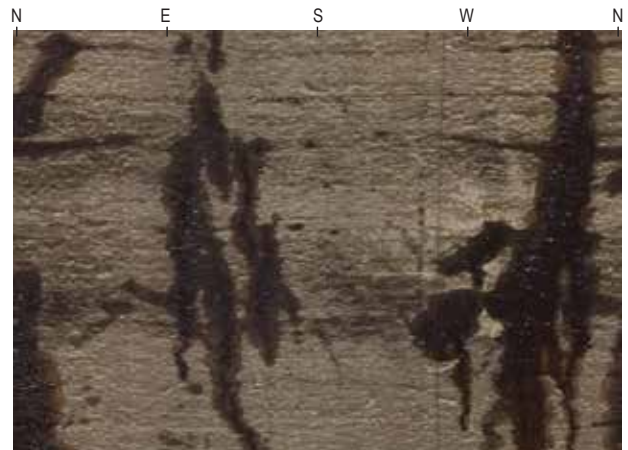
OPTV Image Examples



Borehole Breakout



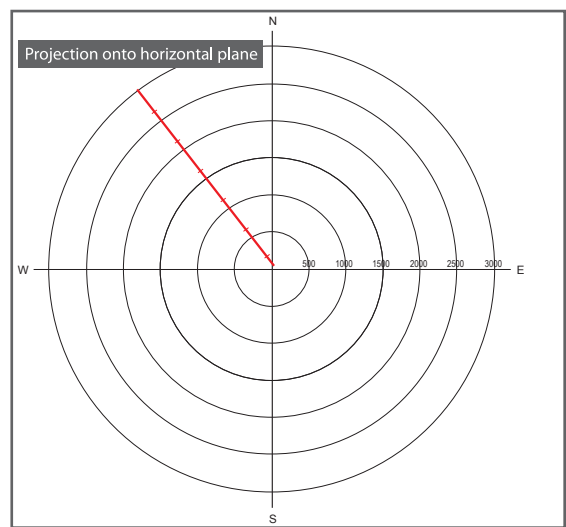
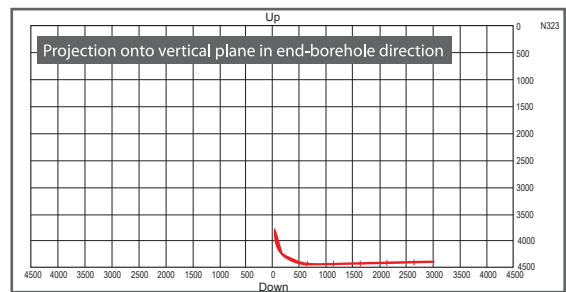
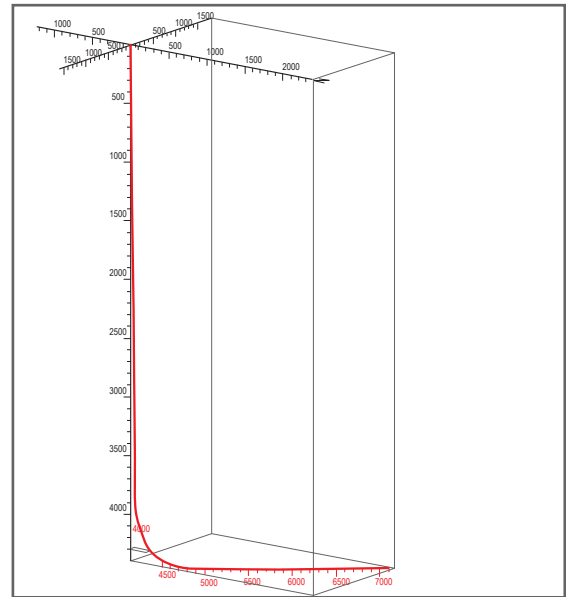
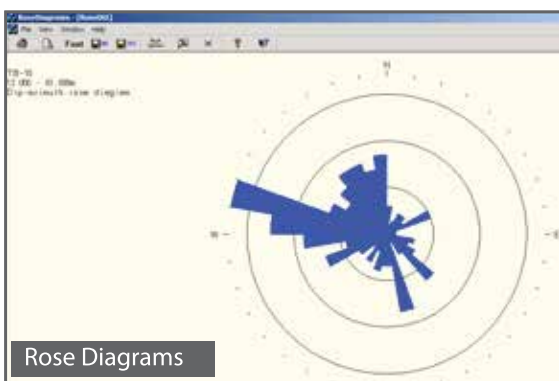
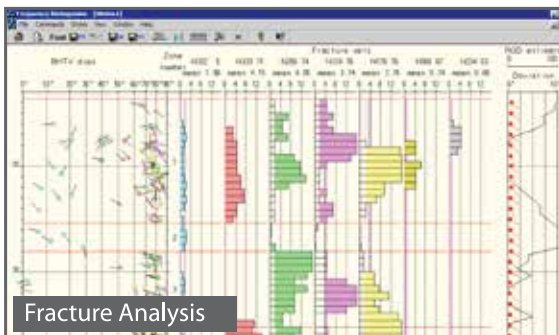
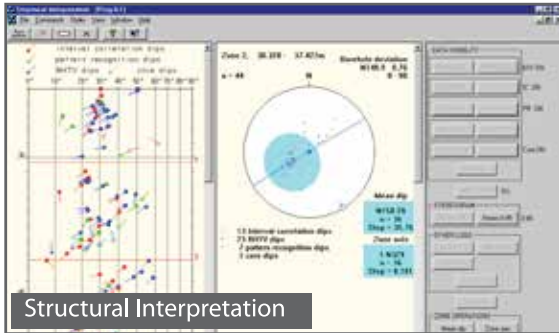
Vertical Fracture, Cherry Valley – Marcellus Shale



Oil Entry

Advanced Interpretation

Several enhanced geological interpretation tools can be utilized.



Borehole Directional Plots and LAS