

## X-tended Range Micro Imager (XRMI™) Tool

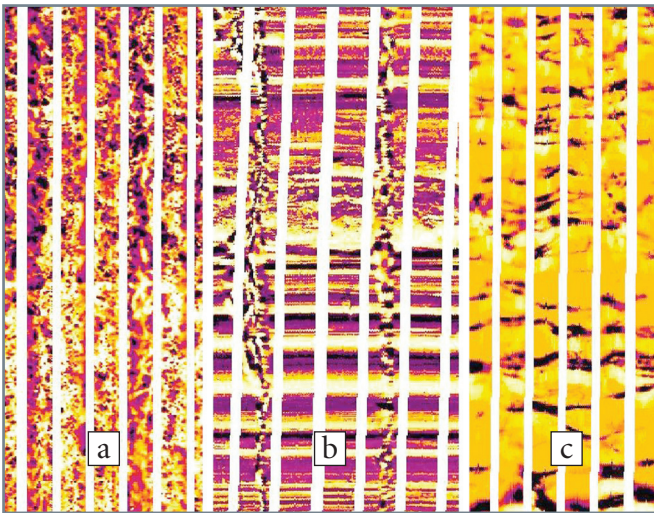
For Superior Borehole Images Even in Highly Resistive Formations

The X-tended Range Micro Imager (XRMI™) tool, a wireline borehole imaging tool, is designed to obtain quality images even in environments with a high formation resistivity to mud resistivity ( $R_t:R_m$ ) ratio. The expanded operating range of the XRMI tool over conventional electrical imaging services is achieved through its state-of-the-art 32-bit digital signal acquisition architecture combined with a large increase in available power for the excitation current (EMEX).

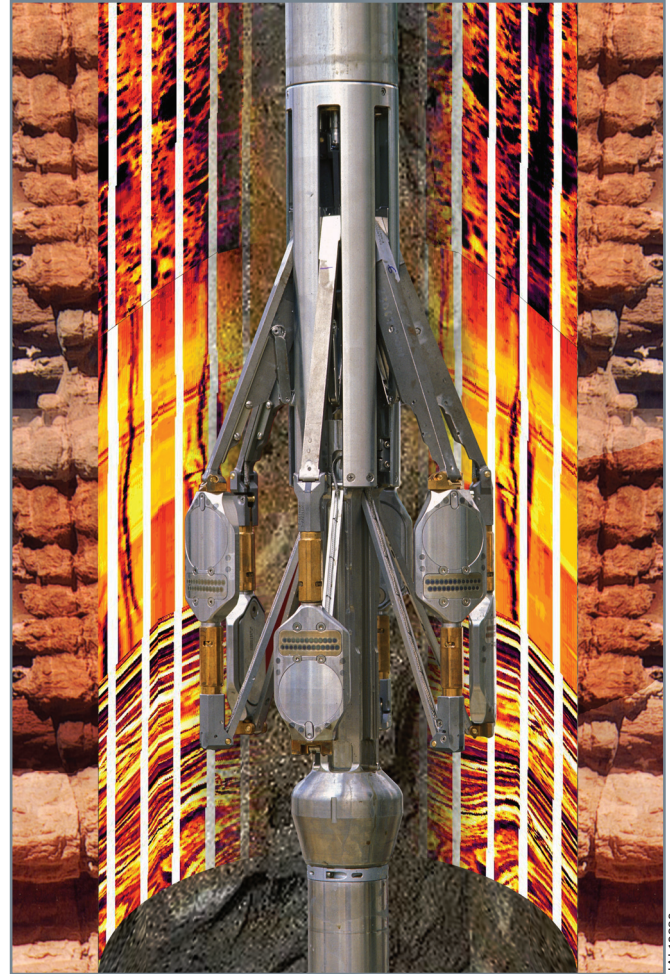
As a result, the signal-to-noise ratio of the raw measurements is improved by a factor of up to five, and the dynamic range is expanded by a factor of up to three. The resulting images offer superior fidelity, even in highly resistive formations ( $R_t > 2,000$  ohm-m) or relatively salty borehole fluids ( $R_m < 0.1$  ohm-m).

### Tool Design and Superior Image Quality

Besides the new electronics, the mandrel architecture derived from Halliburton's highly successful EMI™ imaging tool greatly helps the XRMI tool generate superior-quality borehole images. Pads mounted on six independently articulated arms help maintain pad contact in rugose, washed-out, elliptical, or highly deviated boreholes. Further, a high sampling rate (120 samples per foot) and borehole coverage help obtain high-resolution pictures of the borehole walls.



High-resolution XRMI™ tool images showing the micro-textural geological details in the fabric of a limestone section in a test well from the Permian Basin in west Texas: (a) vugular open porosity; (b) open natural fractures, and (c) stylolites. The  $R_t:R_m$  ratio exceeds 100,000 in this borehole.



### Reduction in the E&P Risks

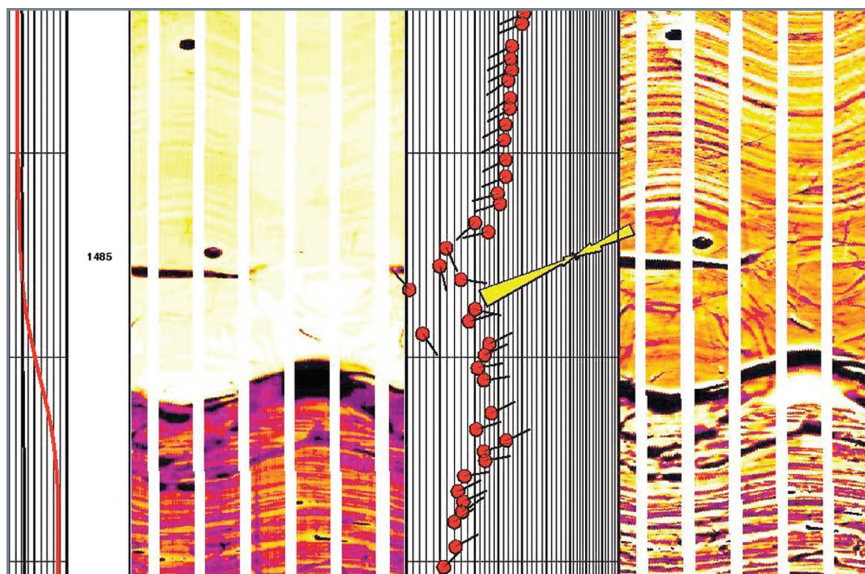
The XRMI tool reduces E&P risk by helping:

- Take the guess-work out of identifying the subsurface sedimentary sequence
- Describe the reservoir facies just like "cores," the ground truth
- Show bedding dips that help rationalize the choice for the next drilling location
- Choose the sidewall core zones, formation testing zones, and perforation intervals accurately by integrating images with other open-hole logs
- Compute accurate, high-resolution net-to-gross

**Benefits**

Halliburton's XRMI tool can:

- Optimize offset well placement by evaluating structural and stratigraphic features and bedding orientation
- Improve net-to-gross estimations in laminated shaly sands and carbonates by delineating thin beds and laminations
- Rationalize the well stimulation and formation testing decisions by characterizing the secondary porosity (e.g., fractures and vugs) in reservoirs
- Optimize the drilling efficiency by evaluating and orienting borehole breakout
- Optimize the completion tactics and reservoir management by providing characterization of rock texture and electrofacies



*An XRMI formation evaluation answer product. The first image track shows the static-equalized image, and the second image track exhibits the texture-enhanced high-resolution image. The central dip-track shows the results of an automated dip-picking application. The sharp change in the dip azimuths from west to east is due to "slump faulting." The base of the channel sand is also a scoured surface.*

XRMI™ Tool Dimensions and Ratings			
<b>Maximum Temp:</b>	350°F (177°C)	<b>Maximum Press:</b>	20,000 psi (137 MPa)
<b>Maximum OD:</b>	5 in. (12.7 cm)	<b>Minimum Hole Size:</b>	6 in. (15.24 cm)
<b>Length:</b>	24.18 ft (7.37 m)	<b>Maximum Hole Size:</b>	21 in. (53.34 cm)
<b>Weight:</b>	496 lb (225 kg)	<b>Borehole Coverage:</b>	57% in. 8.5 in hole
Borehole Conditions			
<b>Borehole Fluids:</b>	Salt <input checked="" type="checkbox"/>	Fresh <input checked="" type="checkbox"/>	Oil <input type="checkbox"/> Air <input type="checkbox"/>
<b>Tool Positioning:</b>	Centralized <input checked="" type="checkbox"/>	Eccentrized <input type="checkbox"/>	

**For more information on how Halliburton's X-tended Range Micro Imager (XRMI) Tool can give you superior images, even in highly resistive formations or relatively salty borehole fluids, talk to your Halliburton representative.**

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