Cost efficient, time-efficient, source-efficient VSPs are acquired with the multi-level GeoRes Downhole Seismic System. Crosswell Tomography provides high definition reservoir characterization analysis between boreholes. Crosswell Reflection Imaging yields thin-bed imaging and high definition reservoir characterization analysis between boreholes. Uniwell or Single Well acquisition combines the downhole receivers and downhole source (orbital vibrator) in the same borehole. Microseismic monitoring technique yields real-time location and mapping of fracture events that occur during hydraulic fracturing of hydrocarbon-bearing reservoirs. The GeoRes DownHole System is the industry’s most advanced multi-level digital downhole seismic data acquisition system designed for real-time, high-sampling, full wave-field, continuous, data acquisition providing high-resolution seismic reservoir monitoring systems to the “oil and gas reservoir explorationist and productionist”.

Multi-Level Downhole System features:
- Up to 96 downhole channels @ 1/4 ms
- Up to 24 levels of 3-C / 4-C @ 1/4 ms
- Up to 48 levels of 3-C / 4-C @ 1/2 ms

Flexible Level Configuration
- 3, 5, 6, 9, 12, 15 ... up to 50 meters spacing

High Sampling Rate in Real-Time
- 1/4, 1/2, 1, 2, 4ms
- Ultra high-speed data transmission in fiber-optic wireline enables continuous real time recording

Field Proven DDS-250 Downhole Tool
- 4-Channel 24 Bit Digitization in each Tool
- 3-C or 4-C Sensor Options
- Ultra-low electronic noise floor
- Dual-element Omni-directional Geophones at each channel provide high output sensitivity

The GeoRes Downhole System is designed for superior deep borehole reliability and performance. The use of fiber optics for data transmission enables continuous, high-sampling real time recording, precision system synchronization and superior system reliability. The architecture of GeoRes Downhole System enables the system to be configured for all types of downhole seismic acquisition.
The system may be configured with flexible cable inter-connects or rigid tubing interconnects between DDS-250 shuttles which enables short aperture (3 meter) or long aperture (up to 50 meters) downhole seismic acquisition.

**General Specifications:**

- Up to 96 channels @ 1/4 ms
- Optical Data Transmission 12 MBits per sec
- Complete Downhole (DDS-250) System Diagnostics and Testing
- Maximum Temperature Rating 150 °C
- Maximum Pressure Rating 20,000 psi

FIELD PROVEN RELIABILITY

Since their introduction in 2001, GeoRes Downhole Systems have successfully recorded hundreds of downhole seismic surveys.

**OPTICAL FEATURE NO 1**
Optical telemetry operates at 12 Mbps for both system control (Down) and Data transmission (Up) providing precision system synchronization and large channel-count, high sampling rate downhole seismic acquisition.

**OPTICAL FEATURE NO 2**
Optical telemetry provides ability to transmit 12 Mbps data transmission over long distances (30000 feet)

**OPTICAL FEATURE NO 3**
Unlike electrical telemetry which is susceptible to leakage causing telemetry malfunction, fiber optic telemetry is NOT susceptible to leakage providing enhanced reliability and less maintenance cost for the downhole operator.

Remote Wireline Unit
Remote or Offshore Unit with fiber optic augmented wireline

GeoRes downhole seismic system
Specializing in Multi-Level, Real-time, Continuous High Definition Downhole Seismic Acquisition

Digital Downhole Shuttle
4-Channel, 24-Bit Digitizer with 3-axis CNR®-2400 Geophone with optional DEEPENDER 5000 Hydrophone

4CH x 4C Downhole DDS-250 Digitizer

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-amplifier Gain (K-Gains)</td>
<td>0, 8, 19, 31 dB</td>
</tr>
<tr>
<td>Maximum Input Signal</td>
<td>0.635 vrms @ 0 dB K-gain</td>
</tr>
<tr>
<td>Equivalent Input Noise (2 ms sample rate)</td>
<td>0.344 ppi rum @ 0 dB K-gain</td>
</tr>
<tr>
<td>Gain Accuracy</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>3 to 1.6 KHz</td>
</tr>
<tr>
<td>Anti-alias Filter</td>
<td>88% Nyquist</td>
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<tr>
<td>Instantaneous Dynamic Range</td>
<td>120 dB</td>
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<tr>
<td>Cross-feed Isolation</td>
<td>&gt;100 dB</td>
</tr>
<tr>
<td>THD</td>
<td>0.0019%</td>
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<tr>
<td>System Timing Accuracy</td>
<td>1 PPM</td>
</tr>
<tr>
<td>Maximum Temperature</td>
<td>150 °C</td>
</tr>
</tbody>
</table>

Augmented fiber optic / electrical wireline is field proven enabling real time, continuous data acquisition for large downhole channel-counts over long distances.