DATA SHEET

HALLIBURTON

Borehole seismic services

FORMATION EVALUATION | GEOPHYSICS

Pumpdown seismic

Putting the bit on surface seismic in real time

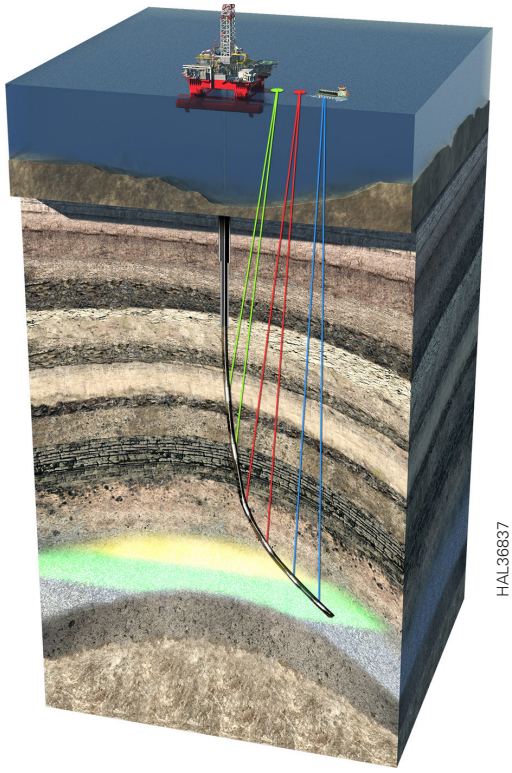
CHECK-SHOT AND VSP APPLICATIONS AND BENEFITS

- Accurate time/depth correlation
- Improved velocity analysis for surface-seismic processing
- Wellbore position verification placing the drill bit on the seismic section
- High-resolution imaging in straight and deviated wells, and complex structures
- Prediction ahead of the bit
- Q studies of acoustic attenuation
- True seismic wavelet well-tie to validate and calibrate surface seismic using phase, frequency, time/depth and multiple identification

Halliburton Borehole Seismic Services (BHS) provides pumpdown seismic as a reliable and cost-efficient conveyance method for challenging and hostile environments.

The complete package

Halliburton uses the latest technology in data acquisition coupled with advanced VSP software to provide quality images of the borehole and its vicinity. From presurvey plan design to data acquisition, processing and interpretation, our fully trained professionals work with you from start to finish to optimize the value on every project.



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Check-Shot Survey

Pumpdown seismic

Halliburton slim geophone tools are connected via wireline, deployed inside drillpipe, and pumped down by using time-tested and proven technology. Pumpdown methodology can be used in vertical to horizontal wells or any in between. After the geophone tools are pumped down to TD, the acquisition is performed in much the same way as standard wireline-deployed tools.

Full-waveform data is recorded in real time via wireline and can be processed on-site or sent via satellite for near-real-time solutions. There is no need to trip drillpipe prior to pumpdown seismic tool operations, or after seismic-while-drilling (SWD) memory data, which can result in considerable rig-time savings.

Data processing

Halliburton iBHS™ next-generation data processing software incorporates advanced proprietary processing techniques to address the basic to the most complex reservoir imaging challenges.

For pumpdown seismic, data can be processed in near-real time to assist in quick drilling decisions.

Data acquisition

To obtain an accurate and comprehensive geological picture of the well, field or reservoir, Halliburton BHS combines industry-leading borehole seismic energy sources and downhole array technologies with experienced, dedicated experts worldwide to provide operators with improved data quality while reducing rig time.

Seismic recording systems

Avalon and Sercel PC-based systems provide digital and analog recording with full QC capabilities, and interface with vibrator electronics and digital airgun source controllers. This technology helps ensure optimization of sources and frequency bandwidth, and enables users to monitor S/N ratio, first-arrival picks and critical velocity data.

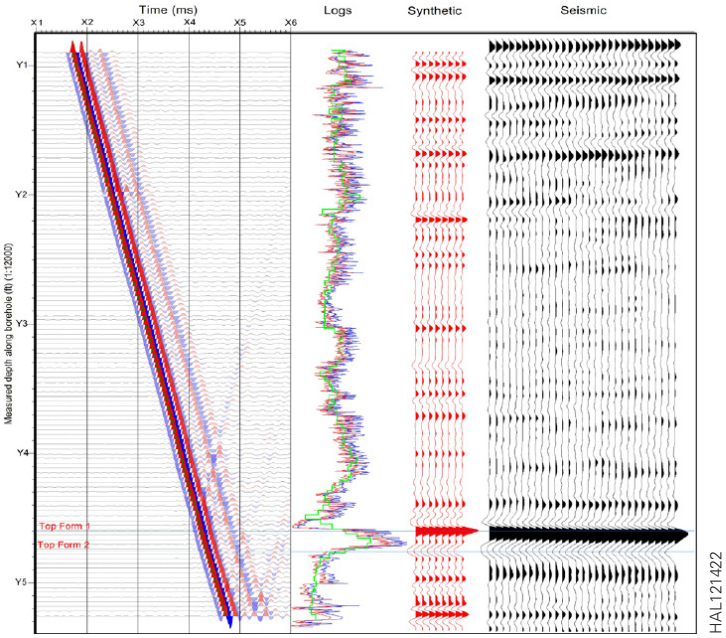
Energy sources for marine and land applications

Halliburton BHS provides the full range of auxiliary equipment including compressors, airgun array source controllers with constant real-time tuning, near- and far-field signatures, gun pressure and depth. In addition, we offer a range of tuned gun arrays designed to optimize peak/peak-to-peak barm output, peak-to-bubble ratio, with broad, flat frequency spectrum and source directionality.

Our land vibroseis units use advanced vibrator electronics to deliver repeatable and reliable broadband results to match surface-seismic acquisition parameters.

Downhole tools

Halliburton BHS downhole tools are designed for use in open and cased holes using 7-conductor wireline. All tools are 3-component with various options of gimbal, and fixed packages in single-, dual- and quad-receiver package configurations with a high locking- force-to-weight ratio. BHS tools can be deployed via wireline, pumpdown, tool-pusher logging (TPL) and tractors.



Time/Depth Correlation (Courtesy of Anadarko)

Tool specifications

TOOL ARRAY	MAXIMUM NUMBER OF SONDES	LENGTH	DIAMETER	MAXIMUM PRESSURE	MAXIMUM TEMPERATURE	WEIGHT
		IN. (MM)	IN. (MM)	PSI (MPA)	°F (°C)	LB (KG)
ASR-HP	2	35 (889)	3 (76)	25,000 (172)	400 (204)	38 (17.2)
Geochain™ 60	60	35 (889)	3 (76)	25,000 (172)	356 (180)	38 (17.2)
GeochainX™ 60	60	35 (889)	3 (76)	25,000 (172)	385 (195)	38 (17.2)
ASR-EHT	2	35 (889)	3 (76)	25,000 (172)	435 (224)	38 (17.2)
GeochainSlim™ 100	100	45 (1,143)	1 11/16 (43)	20,000 (138)	356 (180)	10 (4.5)
ASR-EHP	2	35 (889)	3¼ (83)	30,000 (297)	400 (204)	51 (23.1)
Geochain™ EHP 60	60	35 (889)	3¼ (83)	30,000 (297)	356 (180)	51 (23.1)
GeochainX™ EHP 60	60	35 (889)	3¼ (83)	30,000 (297)	385 (195)	51 (23.1)
ASR-EHT-EHP	2	35 (889)	3¼ (83)	30,000 (297)	435 (224)	51 (23.1)
MaxiWave®	100	17 (432)	3½ (89)	17,400 (120)	275 (135)	17.6 (8.0)

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com