

From: Skripnikova, Galina  
Sent: Mon Mar 08 14:10:06 2010  
To: Zamorouev, Alexander V  
Cc: Nguyen, Binh Van; Bondurant, Charles H; Homby, Brian; Bodek, Robert; Ritchie, Bryan  
Subject: FW: Schlumberger Wireline Sonic  
Importance: Normal  
Attachments: sonic\_scanner\_deliverables.ZIP; SSCAN\_SORAC\_no\_prices.xlsx;  
SonicScanner\_CodeDescriptions\_200.pdf; Oilfield Review 2006 Spring, Sonic Investigation In and Around  
the Borehole, and Borehole Acoustic Waves.zip

Sasha,

Can you please forward the email to completion people who will be interested in wireline  
sonic deliverables and quality.  
We have an option to run DSI or Sonic Scanner. The second is \$86,000 more expensive.

Usually in GOM we run DSI tool and as I guess quite happy with the results. We ran Sonic  
Scanner on Kodiak 2 only but as I was told nobody has analyzed Sonic Scanner advantages  
yet.

Please find responses I got for my posted question about the advantages (1 from Oman and  
2 from Trinidad - see below). There are also two good articles on Sonic Scanner attached.  
Long story short: Sonic Scanner is a new generation of DSI with deeper depths of  
investigation - reading un-altered by drilling and mud invasion rocks - more accurate  
measurements and anisotropy understanding.

To run Sonic Scanner on Macondo I need support from completion and seismic users of  
sonic data.

Thank you in advance.  
Best regards,

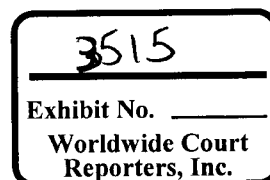
Galina

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Dear eCLIPS user,  
A new Response has been posted by John Hassall to the following question that you have  
asked:  
Schlumberger Wireline Sonic  
To view this Response please click here

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**From:** Elliott, Robert L (ANC)  
**Sent:** Friday, February 19, 2010 10:32 AM  
**To:** Skripnikova, Galina  
**Cc:** Williams, John  
**Subject:** FW: Schlumberger Wireline Sonic

Hi Galina,

We have routinely run SonicScanner through openhole and cased hole intervals for well tie, geomechanics, and rock properties work in Trinidad. We have them across 5 key wells and the data quality, including azimuthal anisotropy, has been excellent. There is, of course, a lower signal/noise in the cased hole and some occasional loss of shear data but the SonicScanner definitely represents an improvement over the DSI in this regard.

I was able to get Schlumberger Trinidad to offer a proposed mapping of the new SORAC codes to the old Answer Products. I've attached this table (with the prices removed) and this might help you decide what you're getting as a starting point. Keep in mind this may not be binding outside Trinidad but I thought the mapping relative to the SORAC costs looked reasonable. We only ran the Expert service in Trinidad - no need for Advanced which were considerably more expensive.

I've also included a deliverables table that I had worked out with SLB - the upper table includes all the curves I would expect in the final LAS file. All of those and the ones in the lower table make it into the final DLIS file. This doesn't include the anisotropy curves which we didn't initially request for this particular well.

(I'm replying outside of eCLIPS since I'm discussing contractual rather than technical issues).

Regards,

Rob

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**From:** sswCLIPS@bp.com [mailto:sswCLIPS@bp.com]  
**Sent:** Thursday, February 18, 2010 6:15 PM  
**Subject:** Schlunberger Wireline Sonic

Dear eCLIPS user,  
A new question has been asked by Galina Skripnikova on Petrophysics, Operational Petrophysics. To respond, or view, this question including any attachments click on the link below.

**View Question/Post Response Add to myCLIPS**

For explorer users please cut and paste the following into a suitable web browser;  
<http://oe.bpweb.bp.com/eClips5/question/vquestion.aspx?pg=question/question.aspx&forumId=118&category=8148&subject=3919&qquestion=93266>

Click [here](#) to reply offline via email

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**Question**

Schlumberger Wireline Sonic

Hello,

Has anyone got any experience of advances of running Sonic Scanner in Advanced Mode (SORAC WL-OH-0082-ETX-001288\_OPER) over Sonic-Advanced (WL-OH-0080-ETX-001281\_OPER).

The second can be run with using DSI or Sonic Scanner. Is there any preferences as well?

We run sonic for rock properties and completion studies.

Thank you,

Galina

Do you know someone else who may be able to answer this, if so please forward this email to them.

This email has been sent to the following distribution lists

G BPA Petrophysics

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## Sonic Scanner Product Code Description

Updated July 2008 – Version 1.2

This document provides a description of each one of the answer products which are delivered from Sonic Scanner. This document can be shared with clients.

Please note that the description of some products may be different from what you have been delivering in your geomarket. This description is consistent with the SKK-3640-MAST Appkit that was released in July 2008.

### Basic Answers

#### Well Integrity

##### **SONIC-SCAN-CBL** Cement Bond Log

Description – Field product allowing for the evaluation of the cement quality in the casing formation annulus. The two near monopole transmitters provide a BHC measurement where a discriminated attenuation can be calculated. The attenuation is compared to the synthetic attenuation expected from cement properties. This product is determined from data acquired by the short tool configuration.)

#### Fundamental Sonic

##### **SONIC-SCAN-BHC** Borehole Compensated Sonic

Description – Field Product to evaluate a compressional slowness, determined from a first motion detection BHC measurement. The arrival times from the two monopole firings (Upper and Lower) for two near receiver spacings (3.5 ft and 5 ft) are determined using first motion detection. From these 4 travel times a compressional slowness is determined. This product is determined from data acquired by the short tool configuration.

##### **SONIC-SCAN-LSS** Long Spacing Sonic

Description – Field Product to evaluate a compressional slowness, determined from a first motion detection from far spacing receivers (11 ft and 12.5 ft far monopole), along with a borehole correction derived from the near spacing slownesses. This product is determined from data acquired by the full tool configuration.

##### **SONIC-SCAN-MPN** Near Monopole Compressional & Shear

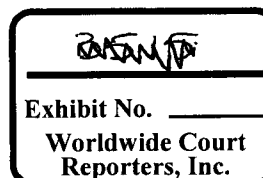
Description- Field Product to evaluate compressional and shear slownesses, determined through slowness time coherence (STC) processing of near spacing monopoles (both upper and lower monopoles). Only near spacing monopole results and waveforms delivered. This product is determined from data acquired by the short tool configuration.

##### **SONIC-SCAN-MPF** Far Monopole Compressional & Shear

Description – Field Product to evaluate compressional and shear slownesses, determined through STC processing of far spacing monopole. Only far monopole results and waveforms are delivered. This product is determined from data acquired by the full tool configuration. *This product comes with the Advisor report.*

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## **Advanced Acoustic Answers**

### **SONIC-SCAN-DEPTH**

Sonic Scanner – Advanced Acoustic Answer Package – Depth Only

*An Sonic Scanner Advisor report is delivered whenever any of these products are ordered.*

## **Sonic**

### **SONIC-SCAN-P/S**

#### **Compressional & Shear (Monopole P & Dipole S)**

Description – this product provides an evaluation of formation compressional and shear velocities from waveform data acquired using both monopole and dipole sources. The optimal processing in terms of filters, dispersive or non-dispersive semblance processing, and resolution is provided. Interval transit time, transit time integration are included.

### **SONIC-SCAN-ANI**

#### **Shear Velocity Anisotropy Analysis**

Description – this product provides compressional from far monopole transmitter as well as an evaluation of shear anisotropy along the borehole axis. The analysis provides the fast shear and slow shear slownesses as well as the azimuth of the fast shear. It also includes the display of fast and slow shear wave dispersion plots, a.k.a. Slowness Frequency Analysis (SFA).

## **Reservoir**

### **SONIC-SCAN-FAM**

#### **Fracture Anisotropy Modeling**

Description - this product provides an integrated methodology designed to characterize fractures from both sonic and wellbore images. This method provides a consistent approach to interpretation by integrating borehole images and sonic logs (from cross-dipole and low-frequency monopole) that probe the formation at different depths of investigation around the borehole. With this information you can discriminate fractures and stress effects, and thus plan a completion program to avoid damaging natural fractures, predict complex hydraulic fracture geometry, and calibrate seismic and reservoir attributes for future well placement. This product requires interpreted images from borehole imaging tools.

### **SONIC-SCAN-FS**

#### **Permeability (Stoneley)**

Description – this product provides an analysis of the attenuation and slowness variation of the Stoneley wave over a wide frequency band to estimate formation fluid mobility (permeability / fluid viscosity) taking the tool presence into consideration.

### **SONIC-SCAN-FRAC**

#### **Stoneley Fracture Analysis**

Description – this product provides an analysis of the measured Stoneley wave-train compared to a modelled wave-train that takes account of the borehole shape and lithology, to identify natural fractures crossing the wellbore.

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## **Rock Mechanics**

### **SONIC-SCAN-RES      Reservoir logging & sample optimization**

Description – this product provides the radial variation of compressional velocities (Compressional Radial Variation Profiling) to identify altered intervals, for the optimal selection of logging, pressure, rock and fluid sampling intervals and the optimisation of completion design, perforation strategy and gun selection.

### **SONIC-SCAN-MP      1D Mechanical Properties**

Description – this product provides mechanical properties along the wellbore using a 1D isotropic model. Poisson's ratio is estimated from P&S. Dynamic Young's modulus is estimated from P&S and formation density. Dynamic Young's modulus can be converted into static Young's modulus using either proprietary or public empirical correlations between logs and core tests. Minimum horizontal stress is derived from Poisson's ratio and the overburden stress using the poroelastic equation, and the overburden stress is estimated by integrating density over depth. This product requires combination with measurements not obtained with Sonic Scanner such as density and gamma ray.

### **SONIC-SCAN-CA      Completion (Alteration)**

Description – this product provides an evaluation of the radial variation of compressional velocities (Compressional Radial Variation Profiling) and fast and slow shear velocities (Shear Radial Variation Profiling) to identify altered intervals, for the optimisation of completion design, perforation strategy and gun selection.

### **SONIC-SCAN-CP      Completion Plus**

Description – this product provides mechanical properties from sonic and density data using an anisotropic model (Young's modulus and Poisson's ratio). It also includes radial variation profiling of three shear velocities (fast, slow and horizontal) which are necessary to calculate mechanical properties in anisotropic formations.

## **Geophysics**

### **SONIC-SCAN-SEI      Synthetic Seismic Seismogram (P or S)**

Description – Synthetic seismic seismogram for P wave or for S wave.

### **SONIC-SCAN-GEO      Polar Anisotropy Parameters**

Description – this product provides estimates of the fast and slow shear velocities in the two orthogonal planes containing the borehole axis using cross-dipole sonic data; and a third shear velocity in the borehole cross-sectional plane using the monopole Stoneley data. These shear velocities together with the measured compressional velocity can provide 3 TI-parameters from sonic data in a borehole parallel to the TI-symmetry axis; and 4 combinations of TI-parameters from data in an inclined borehole with respect to the TI-symmetry axis. These anisotropy parameters help in describing formation polar anisotropy by combining the sonic either with surface seismic data or using a 3-parameter description of TI-medium (ANNIE approximation).

### **SONIC-SCAN-BARS      Borehole Acoustic Reflection Survey (Sonic Imaging)**

Description – an evaluation of formation structures (such as formation boundaries and faults) through the imaging of waveform data. If you need more information, please send an email to [SonicScanner@slb.com](mailto:SonicScanner@slb.com).

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