

# ACE™ Advanced Cement Evaluation Process

## PROVIDES QUICK, ACCURATE INFORMATION ABOUT CEMENT BOND

### OVERVIEW

The Halliburton ACE™ advanced cement evaluation process helps provide quick, accurate information concerning cement bond for all standard logging tools and procedures for any type of cement mixtures, including foam, latex, and other complex slurries.

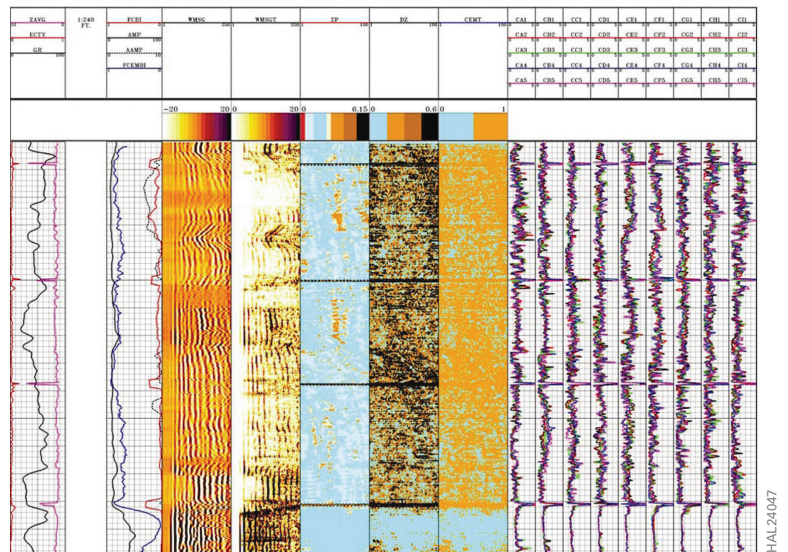
Traditional cement sheath interpretation, using the standard cement bond log (CBL) or any other cement evaluation tool, has severe limitations when used to evaluate complex cements. Lightweight, foamed, or complex cements affect the traditional methods of determining zonal isolation, which may create the misleading impression that the cement bond is inadequate. This can lead to the ordering of expensive and completely unnecessary remedial cementing.

The ACE process is a new way of interpreting the cement evaluation tool data that is already being recorded during the logging runs. Although the ACE process was originally developed for lightweight cements, experience and experiments have shown that it provides a superior method for interpreting any type of cement. Above all, it gives clear answers to the most urgent questions:

- » How good is my zonal isolation?
- » Do I need a squeeze job?

The ACE process yields its greatest benefit when evaluating both the cement-to-pipe bond and the cement-to-formation bond. To properly evaluate the cement-to-casing bond, the CAST™ ultrasonic tools along with the ACE process provide the best solution. However, both segmented and radial bond tools can be evaluated with the ACE process and still provide excellent information regarding the cement-to-pipe bond.

The CBL and other sonic tools are used to determine the cement-to-formation bond along with the cement-to-casing bond. The ACE process uses the sonic waveforms to highlight the differences between bonded, partially bonded, micro-annulus, and free pipe. The ACE process can help determine the presence of cement between two casing strings, which was extremely difficult to quantify with previous logs and/or interpretation procedures.



- 1) Track 1 presents correlation data (GR), quality control (ECTY), and the average impedance (ZAVG), which provides a quick interpretation of the cement placement.
- 2) Track 2 presents the amplitude (AMP), amplified amplitude (AAMP), filtered cement bond index (FCBI), as well as the computed cement bond index (FCEMBI).
- 3) Track 3 contains a standard CBL waveform display (WMSG).
- 4) Track 4 is the total CBL waveform (WMSGT), which is the ACE™ processing which highlights the collar response.
- 5) The ultrasonic impedance map (ZP) is presented in Track 5, which indicates the impedance of the material behind pipe.
- 6) Track 6 (DZ) is the variance of the impedance map, which highlights the differences between solids (cement) and liquids.
- 7) Track 7 (CEMT) shows the result of both the impedance and variance in determination of solids vs. fluids. Fluids are designated as blue, while cement is indicated by the brown color.
- 8) Tracks 8 to 16 provide 5 segmented curves from the impedance image broken into 9 segments around the wellbore. High activity indicates solids, and low activity indicates fluid. In the zone F, notice how the curves have both low impedance and low activity compared to the data immediately above it in zone C.

These extraordinary results are the product of a new technique based on a statistical-variation process to distinguish cement from fluid, even when both have the same raw value. This process actually will use two different methods to determine zonal isolation — the original tool data and the activity level of the data. Through this process, the activity level is determined and will allow easy differentiation between solids

and fluids. In addition, new bond-index curves and special log presentations have been developed to make interpretation quick and unambiguous. The ACE process works on every cement evaluation tool that Halliburton offers as well as effectively evaluating data from other service companies. Not only does this method work on data from both the rotating (FASTCAST, CAST-V tools), and/or stationary ultrasonic logs (PET tool), it also provides detailed information using standard CBL logs, sonic logs, dipole sonics, segmented bond logs, and the newer generation of radial bond logs (RBT).

ACE analysis has been proven effective on cementing jobs in all parts of the world and on every type of cement now in use. It saves time and money by eliminating countless unnecessary squeeze jobs and associated expenses. Reducing the amount of unnecessary remedial cement operations will allow the customer to reduce operational expenses and contribute to the bottom line.

## **BENEFITS**

- » The ACE process uses statistical variation to help determine if the material behind the casing is either fluid or solid. The ACE process has been used not only with Halliburton logs, but can be used with data from ALL service companies for all cement evaluation tools in existence.
- » Works for any cement — conventional, complex, lightweight, or foam
- » Saves time and money by helping eliminate countless unnecessary squeeze jobs and associated expenses
- » Reduces the customer's operational expenses and contributes to the bottom line by helping to eliminate unnecessary remedial cement operations

## **FEATURES**

- » Uses every cement evaluation tool to provide detailed information about cement bond
- » Works with existing logging procedures
- » Enhances current logs to achieve a better understanding of zonal isolation
- » Delivers a reliable cement bond index
- » Helps improve cement interpretation for multiple casing strings
- » Delivers answers in minutes on location, using your log or data tape
- » Helps provide accurate and dependable cement bond interpretation regardless of the service company

For more information, contact your local Halliburton representative or visit us on the web at [www.halliburton.com](http://www.halliburton.com)

---

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

H02266 8/16 © 2016 Halliburton. All Rights Reserved.