

About That Wireline Guy

During my quarter of a century plus years of running and analyzing Cased Hole Wellbore Integrity Logs, I often get questioned on some of the "strange" responses seen on these logs.

This series of Technical Bulletins is intended to share and put some light onto these log anomalies. I hope you find these as interesting and enlightening as I do.

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That Wireline Guy Services

- Cased Hole Integrity Log Analysis
- Cased Hole Tool Concept Design & Development
- Integrity Monitoring Program Development
- Cased Hole Wireline Operations Training and Consulting Services
- Oilwell Perforating Safety Training (PSAC COP & API RP 67)
- Canadian Explosive Licensing & Compliance



this issue

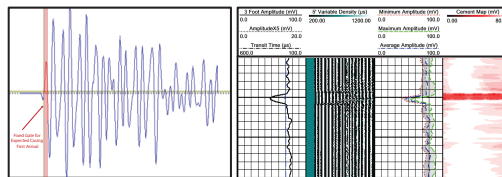
Acoustic Cement Bond Tools –
The integrity tool that works
when it's not working.

Acoustic signal attenuation and why it's crucial for good bond.

Did you know that, when we run Acoustic Cement Bond logs, we are actually hoping the tool fails to respond as designed in order to see hydraulic isolation?

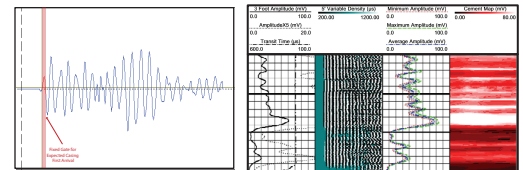
Contrary to what many believe, a cement bond tool doesn't actually log hydraulic isolation directly, what it is designed to see is casing signature within the reflected acoustic waveform from the transmitter to the receivers. When this signature is not observed on the acoustic receiver, we are then able to infer the presence of cement bonding and as such, good hydraulic isolation within the wellbore. So how does this actually work?

When we induce a sonic signal to the wellbore and the casing is not bonded (Free Pipe), the return sonic signal is a strong ringing and mirrors the transmitter pulse very closely, this is a case of no Attenuation or dampening of signal, thus no cement present.



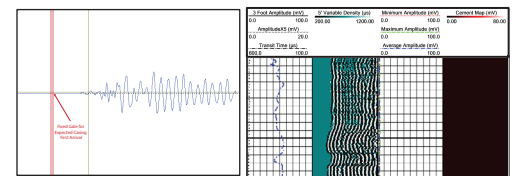
Free Pipe Signal – No Attenuation

When there is partial bond, we observe the same pulse response but now there is a component of shear wave (formation wave) signature in the receiver response and the casing signal has partial Attenuation or loss of signal amplitude.



Partial Bond – Partial Attenuation

Lastly, when the casing pulse is fully Attenuated and we no longer see those compressional casing waves, the casing is now fully Attenuated or fully bonded. This also causes the Transit Time floating gate to cycle skip and trigger on the shear wave (formation) instead of the casing E₁ waveform.



Bonded Casing to Formation – Fully Attenuated

So, when you have a perfect response from a bond tool in a well bonded section of the wellbore, the CBL tool is actually not responding to the conditions of Calibration, instead, experiencing signal loss (amplitude attenuation) and transit time slowing (cycle skip) causing the absence of casing acoustic signatures and thus a cemented or bonded section of pipe.



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