# Borehole Acoustical Reflectivity Surveys, Case Studies for Unconventional Resources

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Borehole Acoustical Reflectance Surveys for horizontal well logging have been under investigation since the late 1980's (ref 1,2). The sonic measurements have improved dramatically since that time through changes in tool mandrel design, multifrequency transducers and effective electronics. The data was shown to be useful in mapping bed boundaries as far as 50ft from the wellbore (ref 3). Since this time the process has been run in unconventional resources specifically to map open fractures both near and away from the wellbore, as well as wellbore placement in the lateral section. This poster will show case examples of open natural fractures away from the wellbore. Intersection with the wellbore must be established with an imaging device as the sonic data processing does not include the wellbore face. A case is also shown for the evaluation of problems with hydraulic fracturing of the formation. In this case the completion casing was pulled from the lateral section and the images show fractures at some stages intersecting the wellbore and at other stages closed near wellbore. Borehole acoustic imaging shows these sections to be open away from the wellbore. Conductivity to the fractures near the wellbore had been lost. In this case explaining the reason for poor production of the same stage.

The ability to image open fractures away from the wellbore with casing in the well has been considered. No success cases are available to date but continues to be attempted. A driving factor for this is the difficulty in fullbore cementing in horizontal wells. Cement imaging and quality workflow is shown to provide the audience with potential process to further consider this ongoing application.

1) Kurkjian, A. and Chang, S. (1986). "Acoustic multipole sources in fluid-filled boreholes." GEOPHYSICS, 51(1), 148–163.

2) Hornby, B. (1989). "Imaging of near-borehole structure using full-waveform sonic data." GEOPHYSICS, 54(6), 747–757. doi: 10.1190/1.1442702
3) Jakob B.U., Fuping Zhu, Nobuyasu Hirabyashi, William H. Borelnad, Hari Kurniawan, Hiroki Yamamoto, Khalid Al-Ghammari, Richard T. Coates, Borehole acoustic reflection survey (BARS) using full waveform data. Fb (first break volume 28, July 2010)