Identification of Natural Fractures from Conventional Wireline Logs

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Fracture Identification Using Non-Imaging Open Hole Logs

The accurate identification of natural fractures is a critical part of many reservoir evaluations. The ability to properly identify such features is critical in better evaluating the economic viability of many reservoirs by adding a second “porosity and permeability” system to a matrix based reservoir. Apparently tight, non porous reservoirs can be shown to be productive due to the presence of natural fractures.

Although some techniques exist to utilize conventional logging data to identify natural fractures, the tendency today is normally focused on the acquisition and processing of wellbore imaging logs. This process can be very expensive and time consuming when you consider all the costs associated with this data acquisition (including rig time and associated costs). In addition, wellbore stability oftentimes precludes the ability to run these tools.

Fracture Intensity Vision (FIV) is an analysis that takes conventional log data and subsequently extracts information as to the presence and density of natural fractures in a wellbore. Examples of this application in both vertical and horizontal wells will be shown in addition to cases where apparent dry holes were turned into producing wells based on the identification of fractures using this technology.
Traditional Imaging Logs - Lots of good data but,
• Additional open hole logging runs
• Additional costs and rig time
• Additional mechanical risks
• NOT POSSIBLE IN CASED WELLS
*Image & Core Comparison*

*Eagle Ford Example*

Fracture Identification using whole core or Interpreted Image Log and FIV analysis
**FIV vs. Image Tool – Fracture ID possible without Imaging logs**

Good match of Fracture Intensity from Image Log data and FIV analysis from open hole triple combo data.
Open Fracture @ 7589.5' (Log Depth 7602-07' on Image log)
6952 unit mudlog show
MC 9.9# to 7.7#
FMI shows 82-83 degree SE dip
And NW/SW orientation
Fractured Carbonate Production
FIV “Enhancement”

Without FIV = 20’ of thin, non-connected stringer pay
With FIV = Over 60’ of continuous reservoir

Georgetown

Gas Completion
IP 4.5 MMCFPD

South Texas
Hunton Example well #1

Example well #1 has 11.5 fracture feet and initial production of ~2MCFPD

Knepper 8
Haskell County, OK (Kinta Field)

Both Hunton & Viola < 3% porosity & similar fracture response. Hunton directly below source rock making it by far the better reservoir.

Austin Chalk Fracture Interval
Backed by Historical Drilling Results and Production

South Texas
Mississippian Examples

Garfield County
Comparison of natural fracture response from open logs to offset well with core data.

Logged 1982
Perf. 6003-6449' IP 30 BO, 10 MCF & 107 BW
Cum 200 MMCF & 2284 BO

Logged 1963
Perf. 6350-98' IP 61 BO & 2 BW
Cum 542 MCF & 1807 BO

Note: These wells are located 3000' apart
Note: Reported perf interval missed primary reservoir.

Natural fracture picks not possible in this well due to limited log data.
Alfalfa County
Comparison of natural fracture response from open logs to core data.

1964
Natural fracture picks were possible in this. Better dataset than previous 1963 example.
Flat-lined core perm, Near zero FIV response
Core perm higher than Matrix perm, Highly active FIV response

Grant County
Comparison of natural fracture response from open logs to core data.

1967
Perf. 5188 94’ & 5203’ – 5207’
IP 72 BO & 196 BW pd

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Garfield County – Left Behind Pay?

606 ft of Miss

Perf. 5500', 5612.50' & 6074-110'
IP 3 BO, 48 MCF & 90 BW

Significant naturally fractured section unperforated