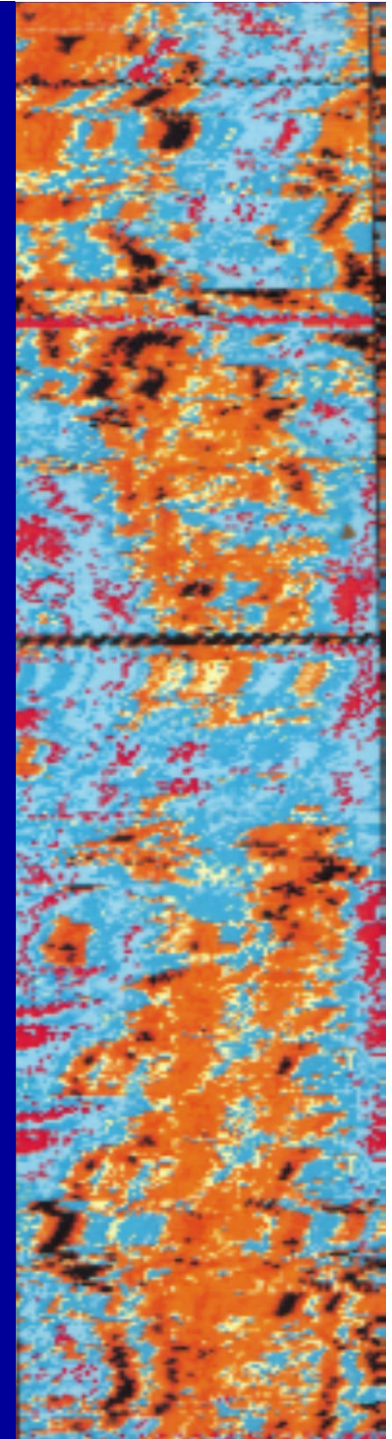


Ultrasonic Log Interpretation



Bond Log Interpretation

- Hang Log On Wall
- Quality Control Checks (3)
- Observe (6)
- Investigate Shear Bond (3)
- Reason (2)
- Interpret

Ultrasonic Quality Control Checks

- Eccentricity of Tool
- Inner Casing Shine
- Inner Casing Radius

Observe

- Calculated Impedance
 - *instead of casing ring*
- Channels
 - *instead of formation signals*

Quality Control Check

Step 1 – Check Eccentricity

Step 2 – Check Amplitude Map

Step 3 – Check Transit Time Map

Observe

Step 4 – Impedance Values

Step 5 - Channels

Step 6 - Compare with the Pressure Pass

Step 7 - Find TOC

Step 8 - Observe it UP AND DOWN

Step 9 - Observe it SIDE TO SIDE

Shear Bond

Step 10 - Check Shear Bond - Casing

Step 11 - Check Shear Bond - Cement

Step 12 - Check Shear Bond - Post Job

Reason

Step 13 - Check for Formation Affects

Step 14 - Evaluate Cementing Operations

Interpret

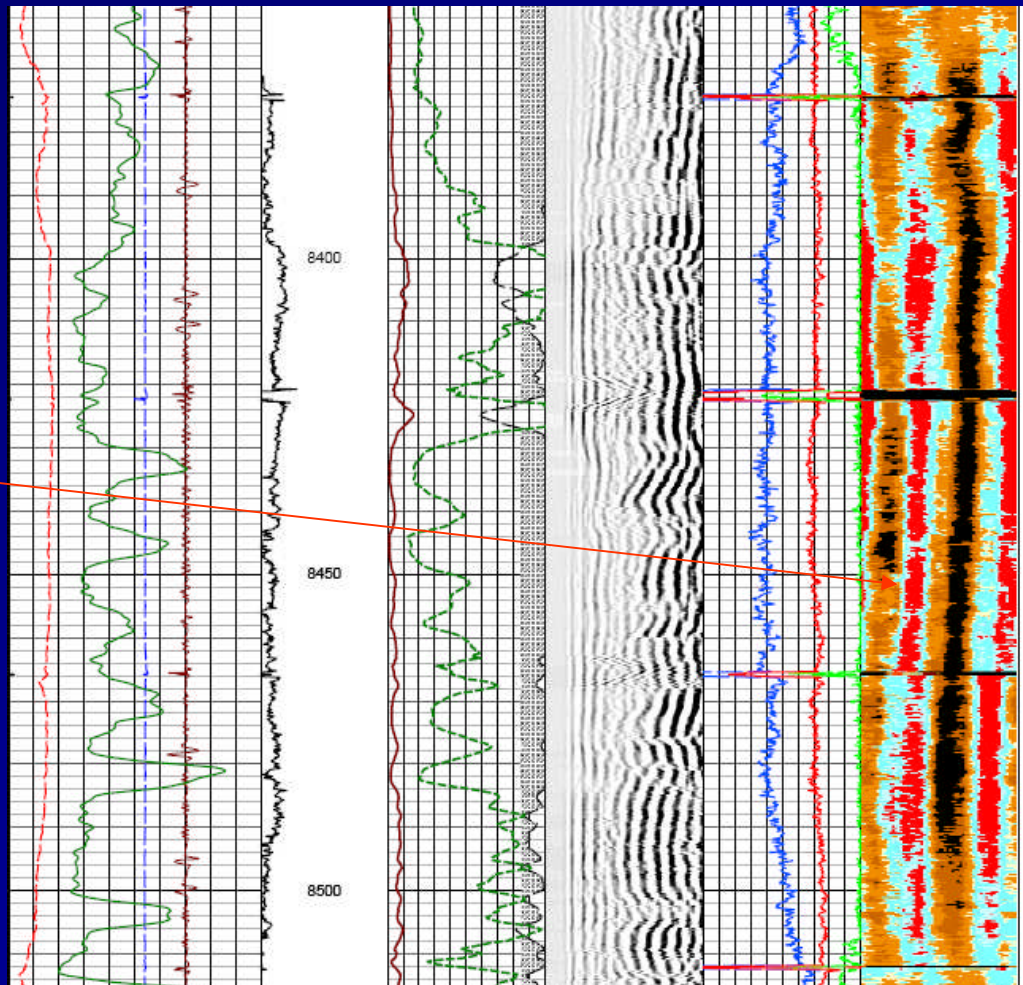
- What has happened ?
- Why did it happen ?
- Should we squeeze ?
 - How should we squeeze ?
- What do we change to make the next well better ?

Quality Control

Step 1

■ Check Eccentricity

- > 0.5 inches ?
- Double Track Impedance



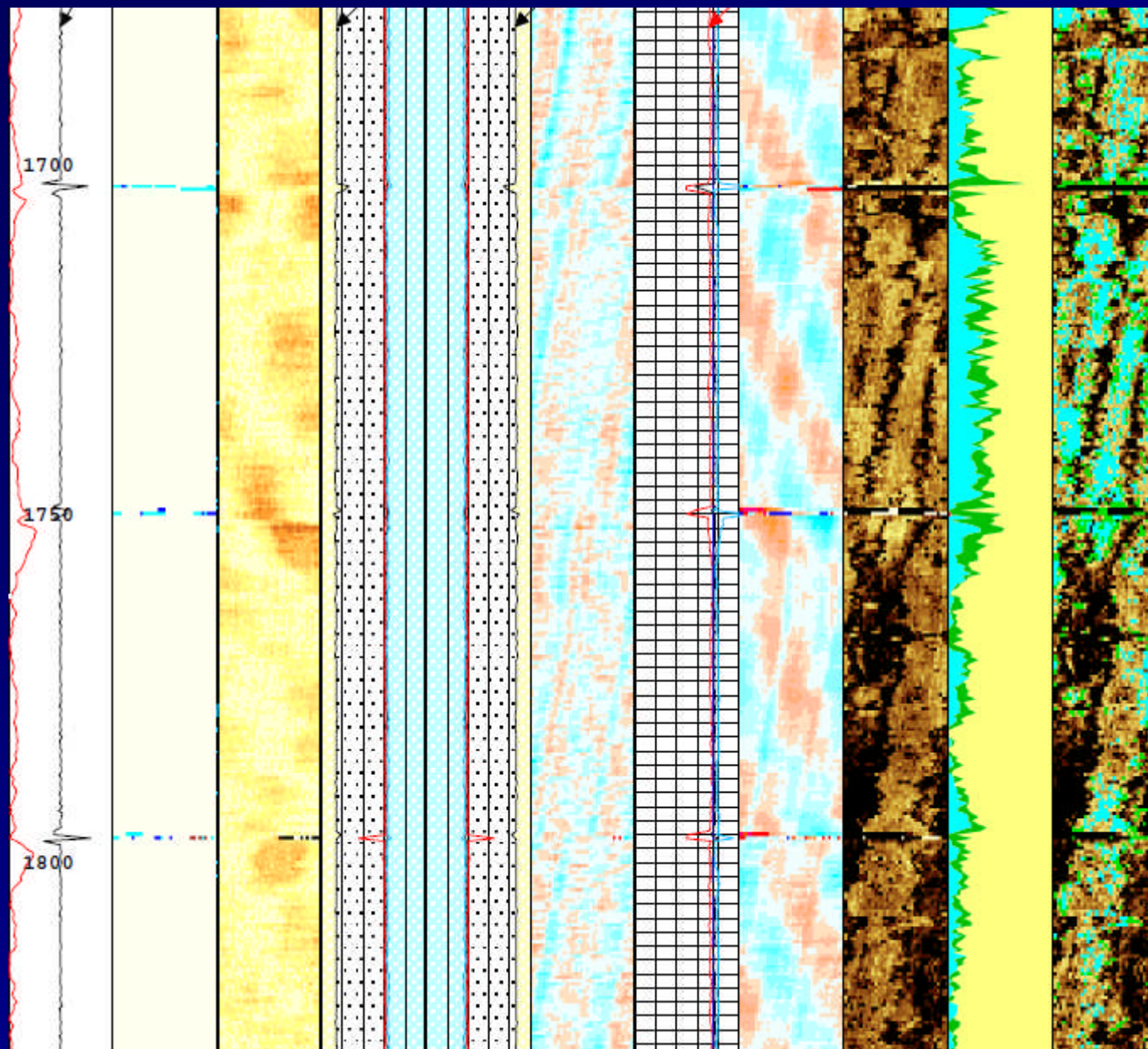
Step 3

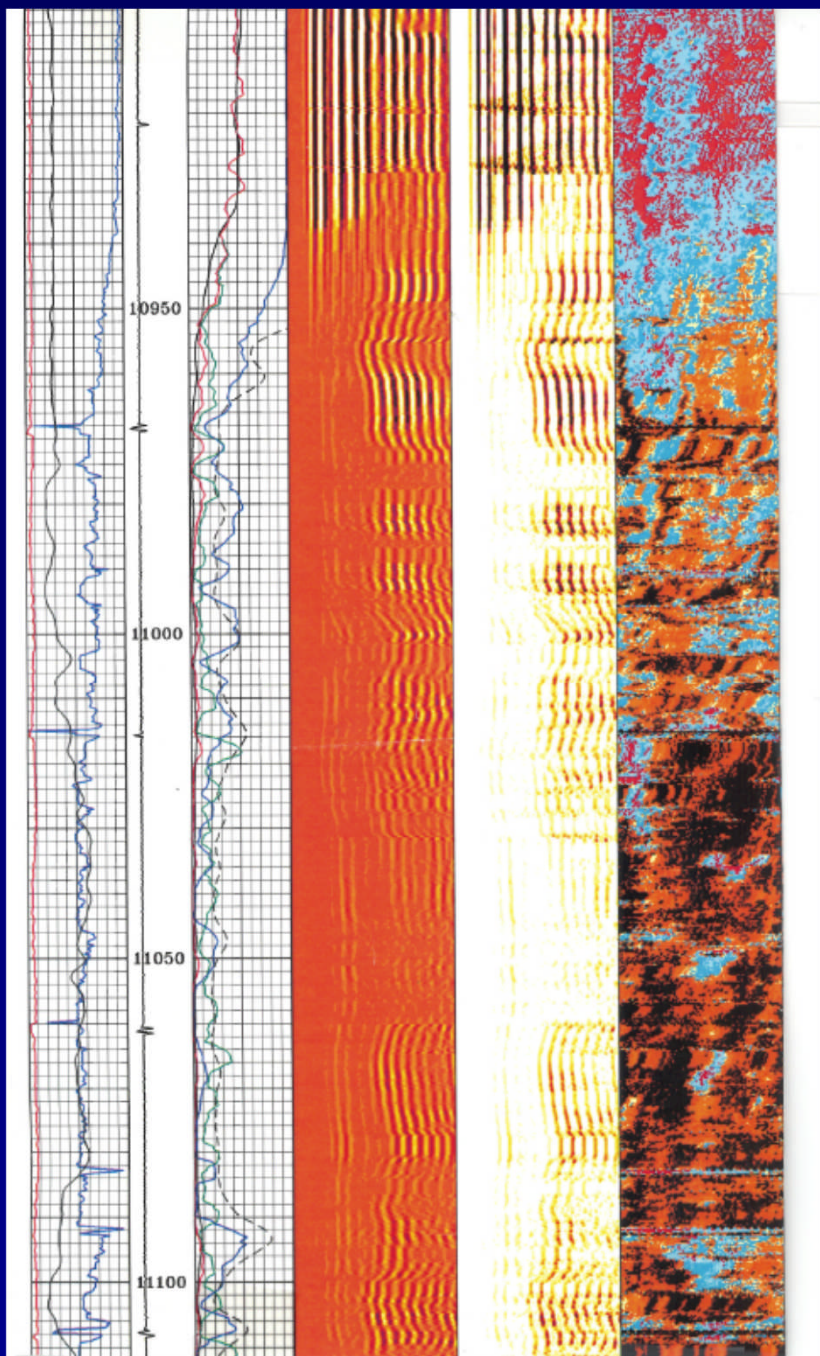
- Check Transit Time / Radius Map
 - Does the inner radius change?
 - Is the Casing Oval ?
 - Does it have similar patterns as the cement ?

Observe

Step 4

- Check Map for Low Impedance
- < 2.6 Mrayls = “Fluid” = Blue
- < 0.3 Mrayls = “Gas” = Red

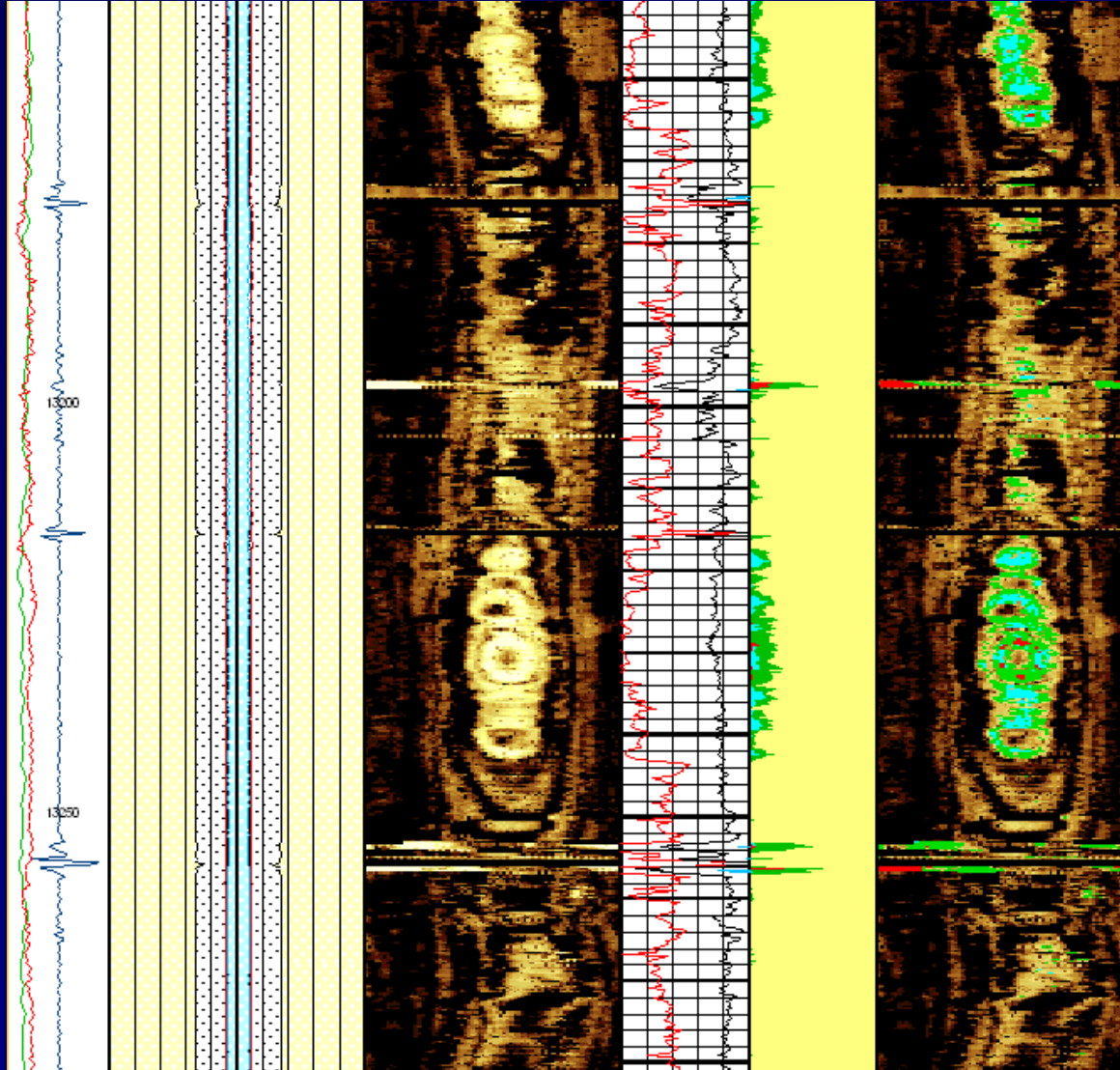


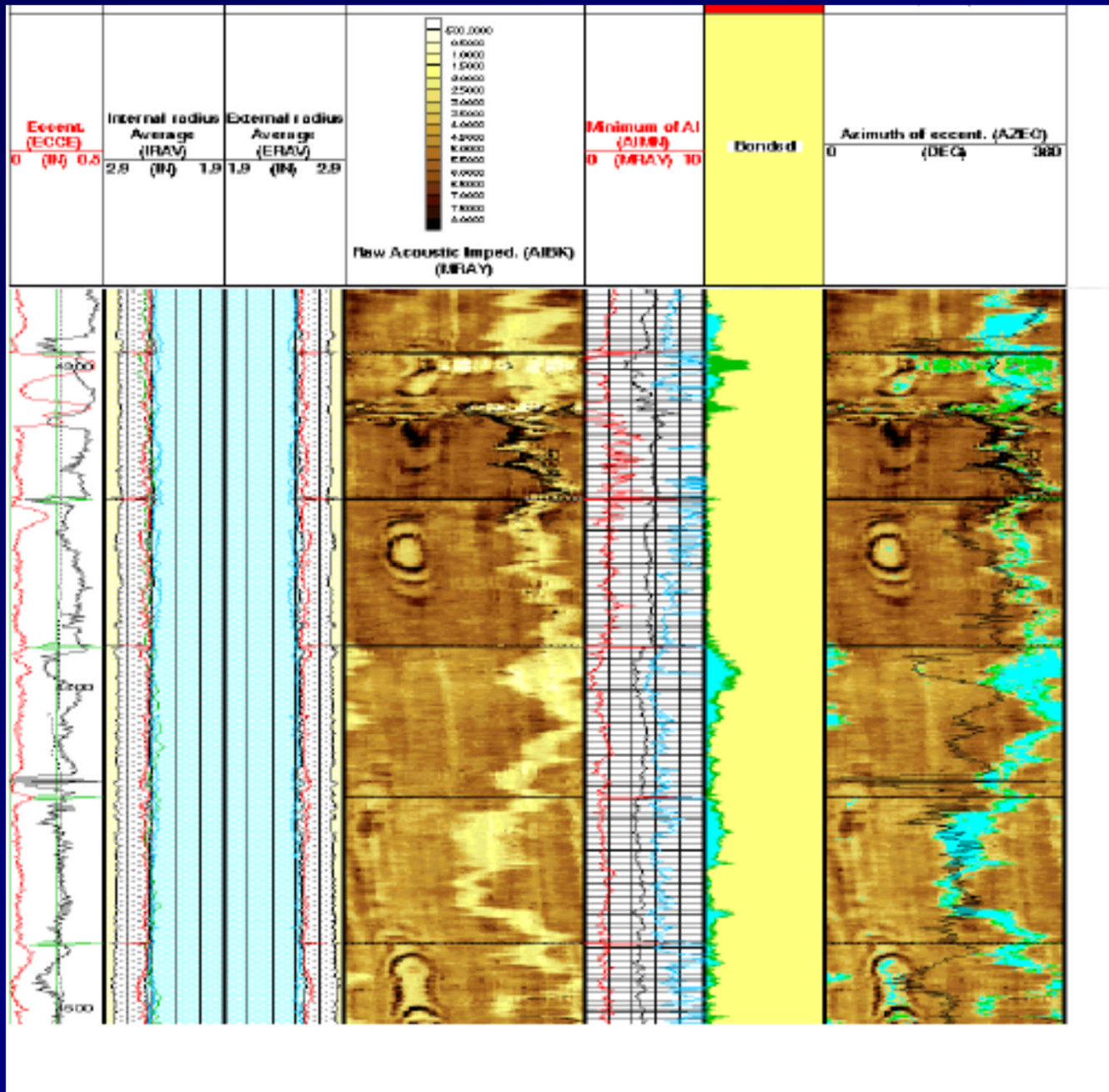


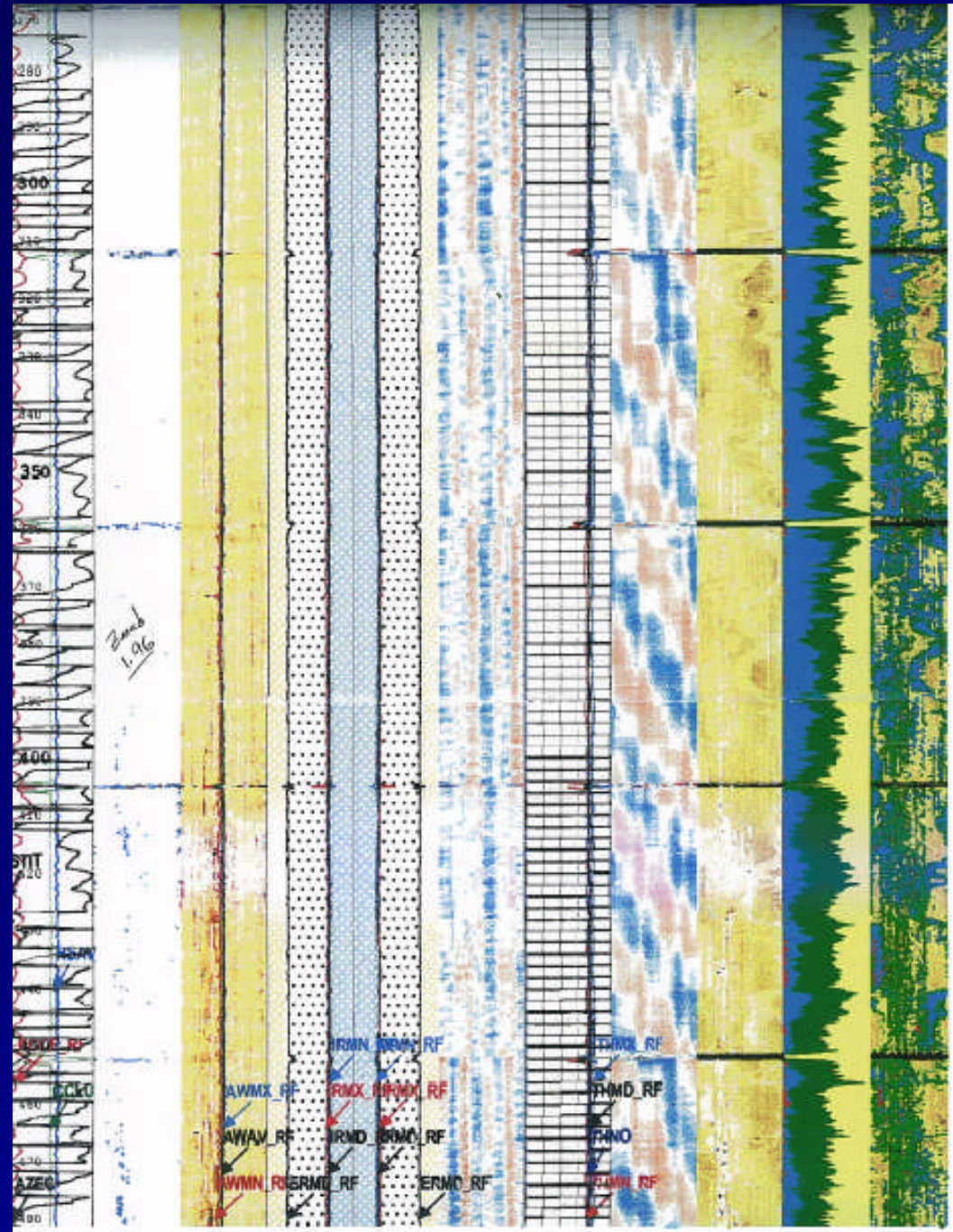
Step 5

Find Channels

Horizontal Well







Step 6

Make a Pressure Pass

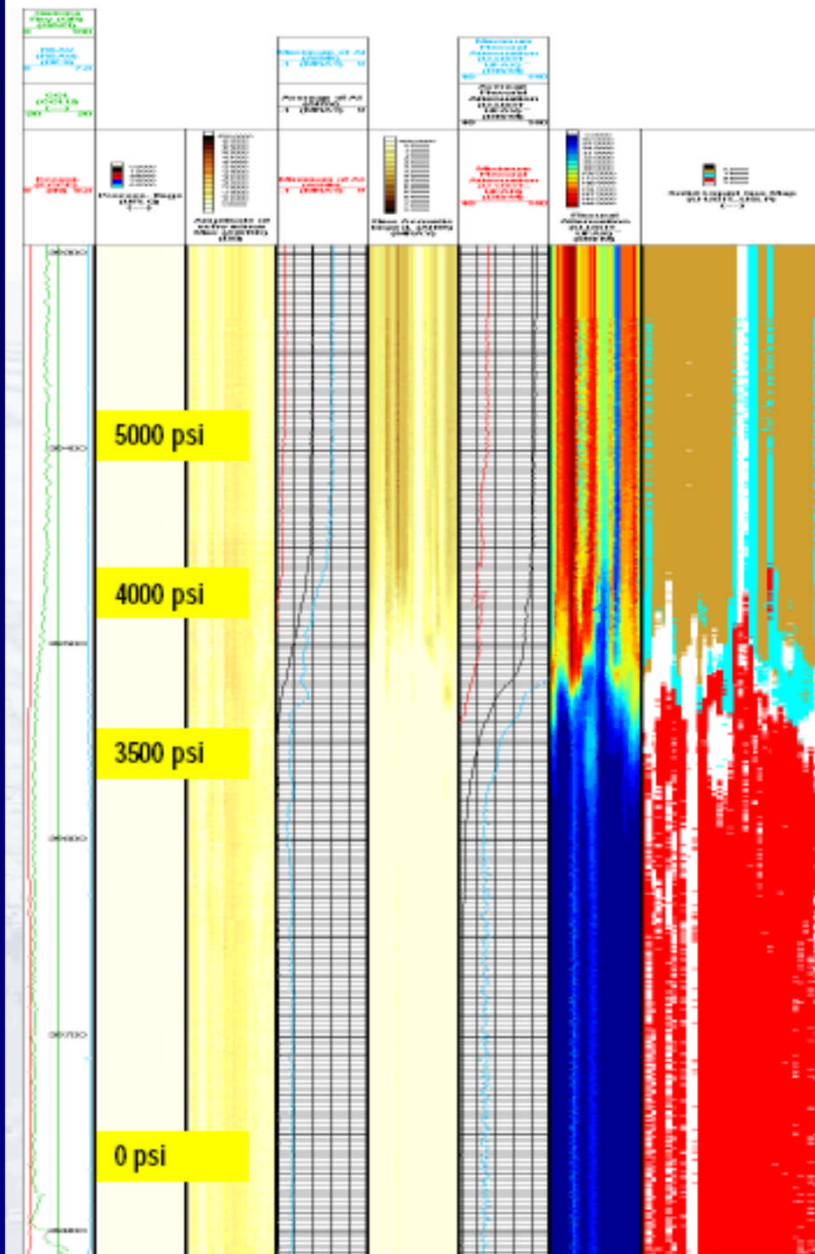
Step 6

- Ultrasonic is also affected by Microannulus
- **Make a Pressure Pass** - *Pressure Casing to 1000 - 1500 psi and make another pass (sometimes more is required)*
- If the log improves, then low shear bond exists

Cementing Best Practice

Run Bond Log @ 0 psi

Repeat Pass @ 1000 – 1500 psi

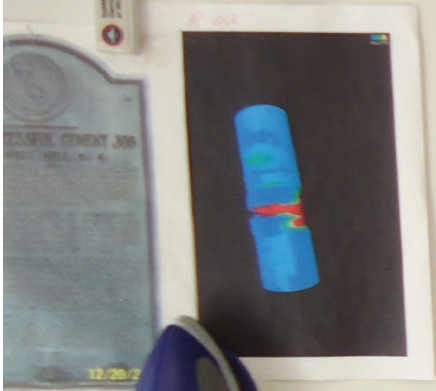


Step 7

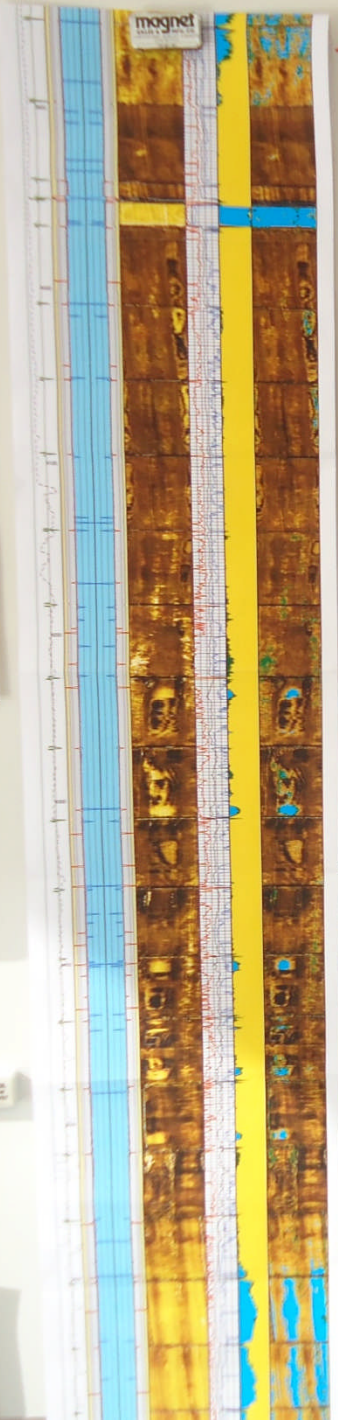
Find Top-Of-Cement
(TOC)

Step 8

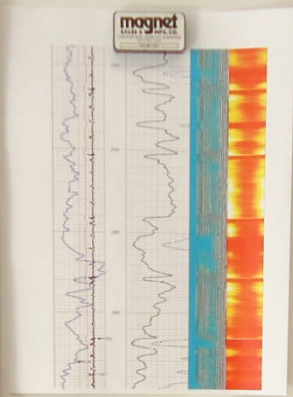
Observe the Log Vertically
*Looking for Changes in the
VDL*



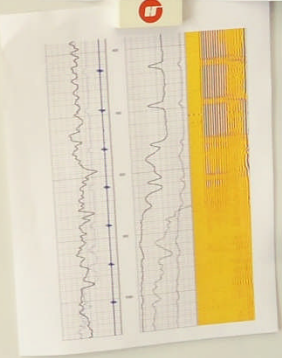
Knaharristo
Deikobks



-COLOMBIA-



ELK HILLS

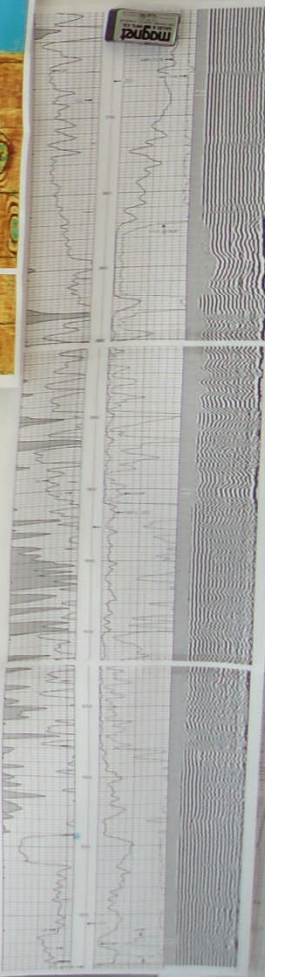
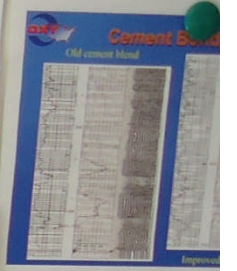


PERMIAN



VINTAGE

Hugo



2014 BEEFING
BEEFING
WORKSHOPS

February 27-28	Elk Hills	Interstate
March 28-30	Permian	Interstate
April 4-6	Elk Hills	Spring Branch
May 27-28	Vintage	Interstate
June 27-29	Permian	Interstate
July 11-13	Open	
August 29-31	Cokeville	Interstate
October 18-19	Open	

Step 8

Draw Horizontal Lines

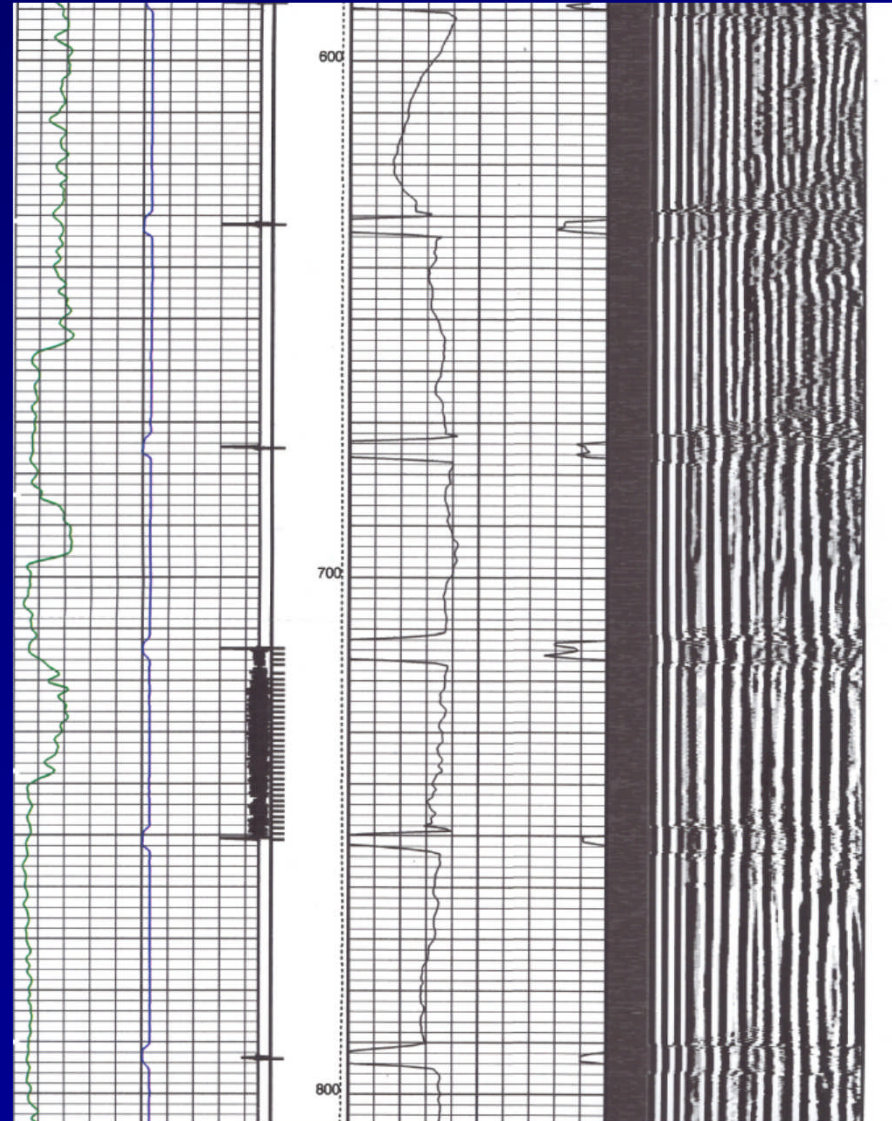
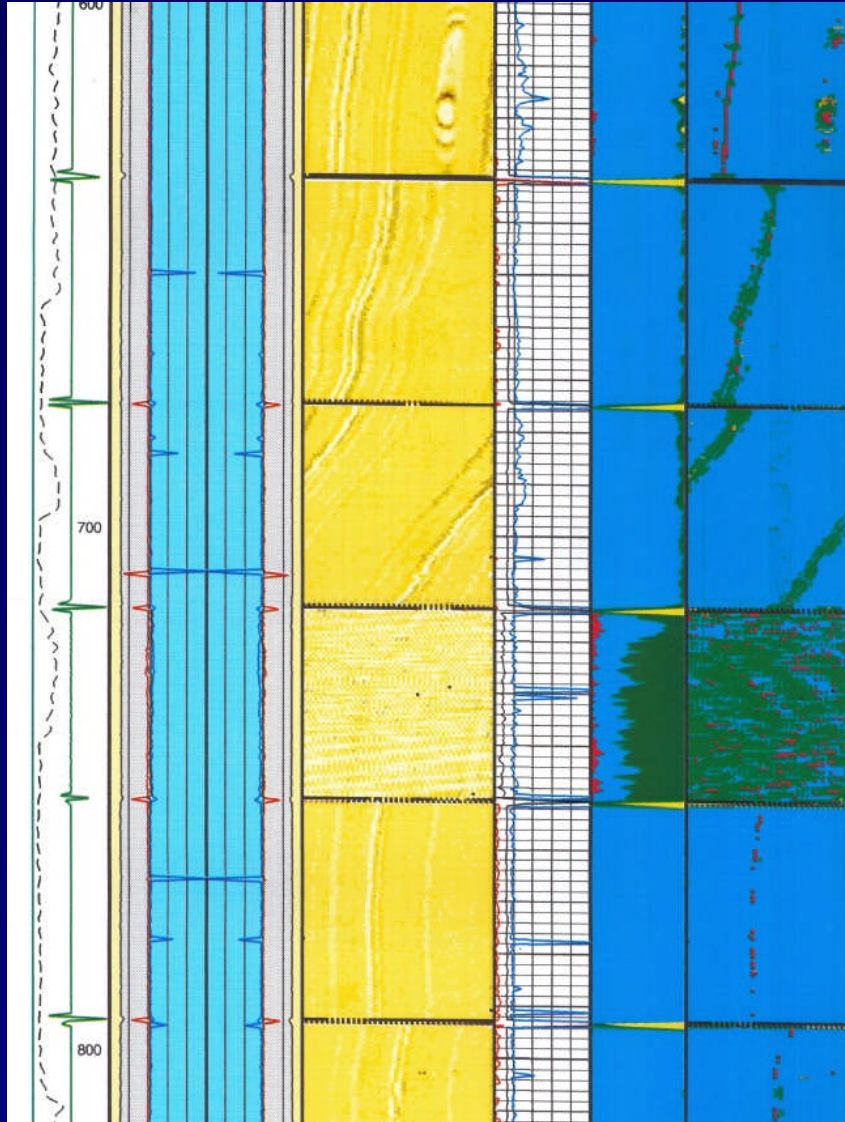
...Where you see those
changes

Step 9

Draw Horizontal Lines At Changes

- Formation Changes
- At Casing Collars
- Centralizer Placement
- Do We Have More Than One Cement Type ?
- Start Solving the Mystery

Draw Horizontal Lines



Shear Bond

Investigate Shear Bond

Perhaps 80 % of all bond logs are affected by ...

- LOW SHEAR BOND or
- Microannulus

Shear Bond



Shear Bond

$$\text{Shear Bond} = F/A$$

F = Force applied to casing to push casing out of cement sheath

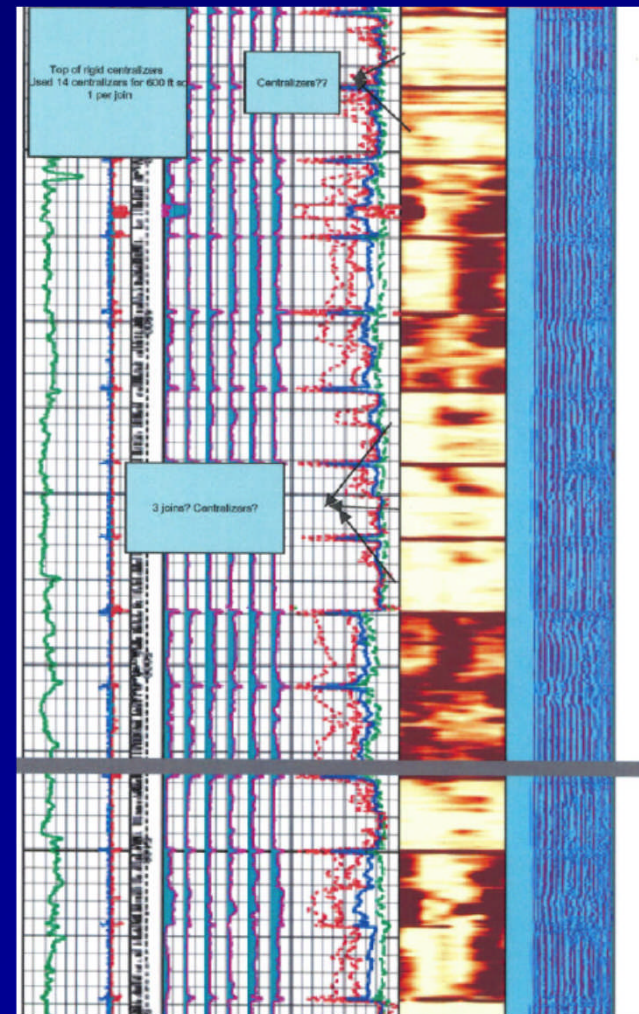
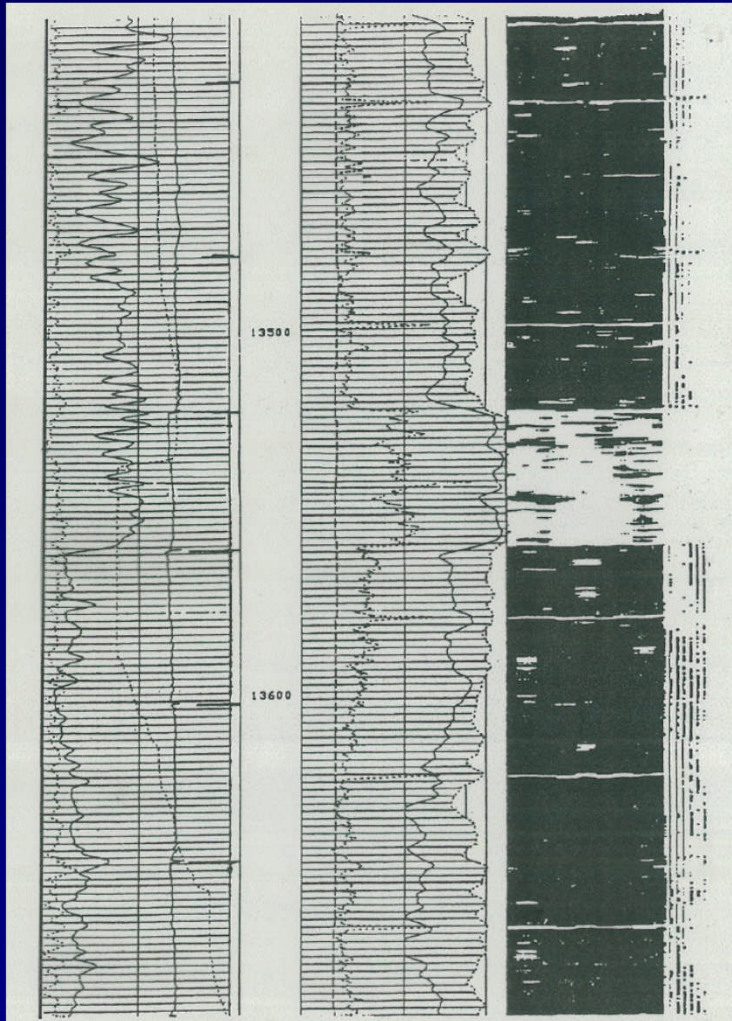
A = Casing OD Surface Area along cemented length

Step 10

Investigate Shear Bond
of the Casing

Shear Bond - Casing

Libya



Step 11

Investigate Shear Bond
of the Cement

Step 12

Investigate Shear Bond of
Post Job Actions

Reason

Step 13

Investigate Formation Affects

Investigate Casing Affects

Step 14

Investigate Formation Affects

- Major and Minimum Stresses
- Channeling from formation to formation

Low Formation Impedance

Tiwary, et al.

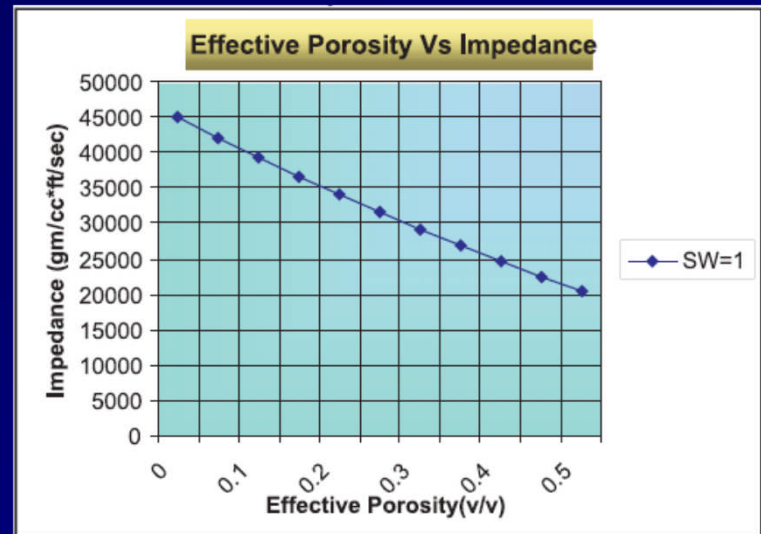
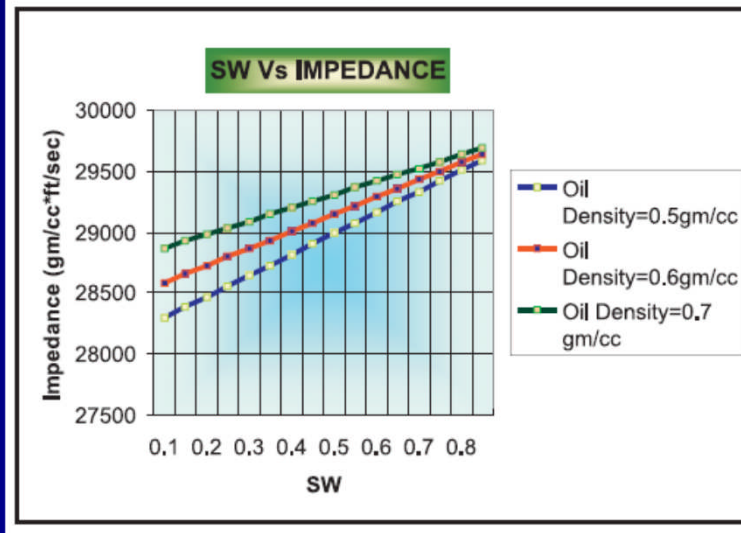


Fig. 1



Step 12

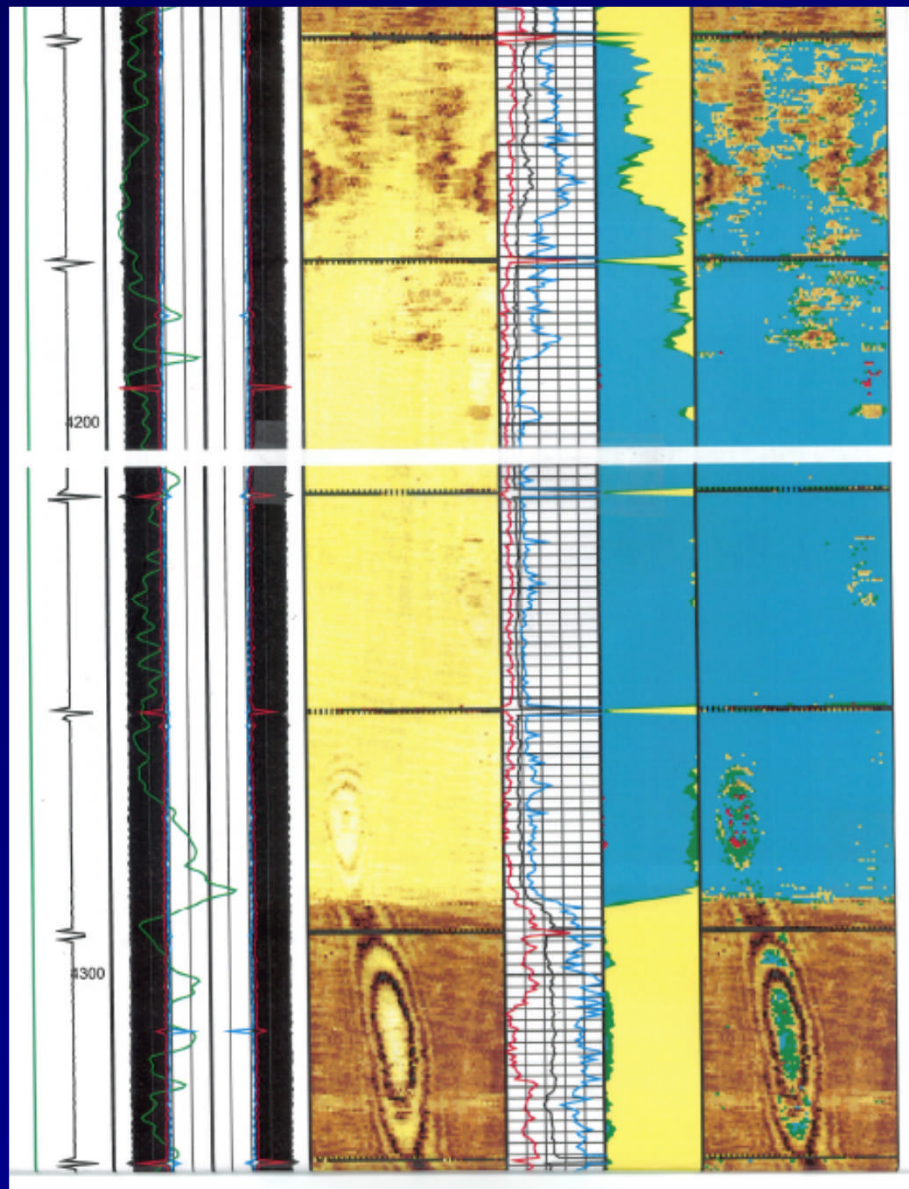
Investigate Cementing Practices

Step 12

Investigate Cementing Practices

- Losses While Cementing
- Cement Returns
- Cement Volume
- Cement Type
- Cement Chart_Slurry Density_Mixing Problems
- Centralizer location
- Zones of Differential Pressure
- Flows After Cementing
- Floats Held
- Mud Type / Properties

Crossflow



Interpretation