

KMS Technologies - KJT Enterprises Inc.

Presentation

Strack, K. – M.

1998 – 1999

**Through Casing Resistivity
Measurements**

**Society of Petroleum Engineers
Distinguished Lecture**

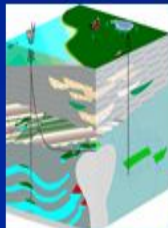
Through Casing Resistivity Measurements



SPE distinguished lecture

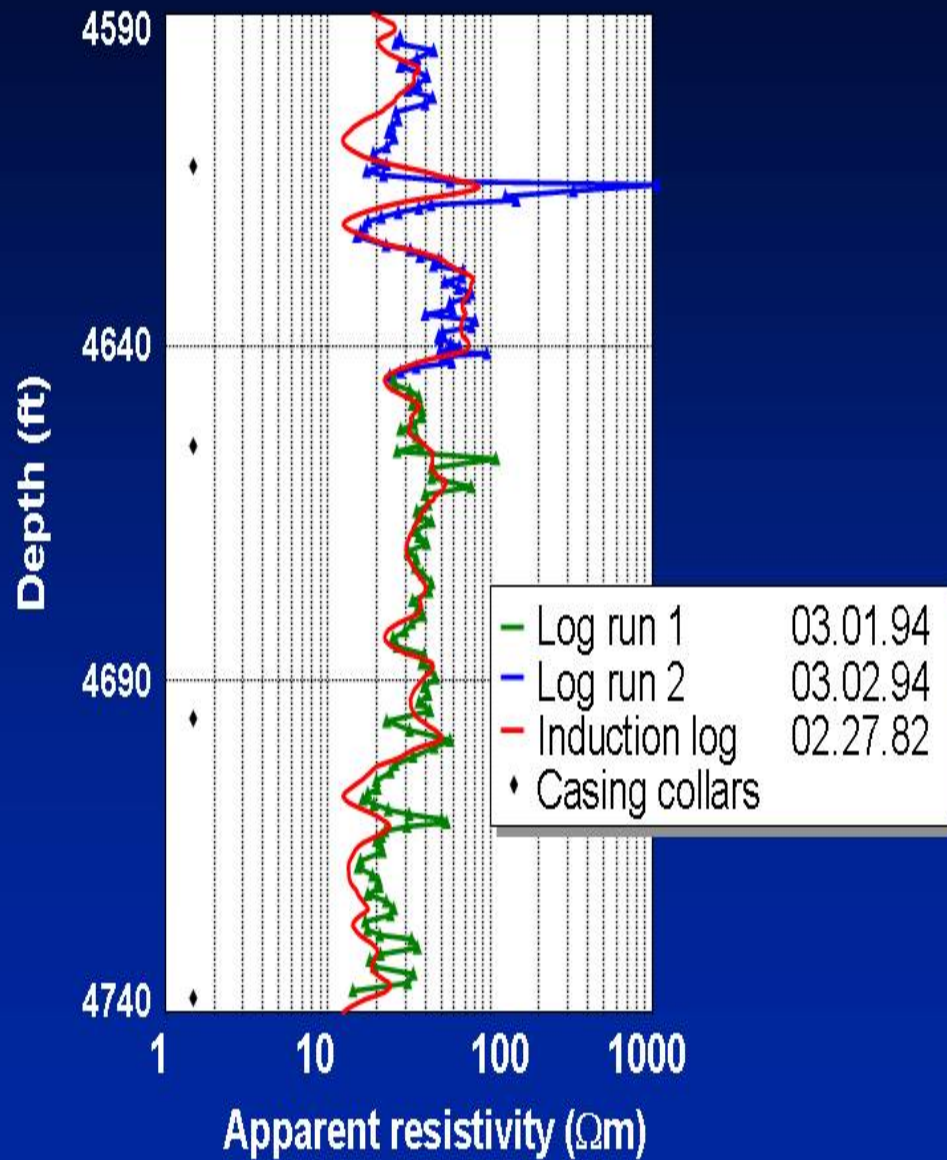
K.-M. Strack

KMS Technologies (sponsored by Baker Atlas)



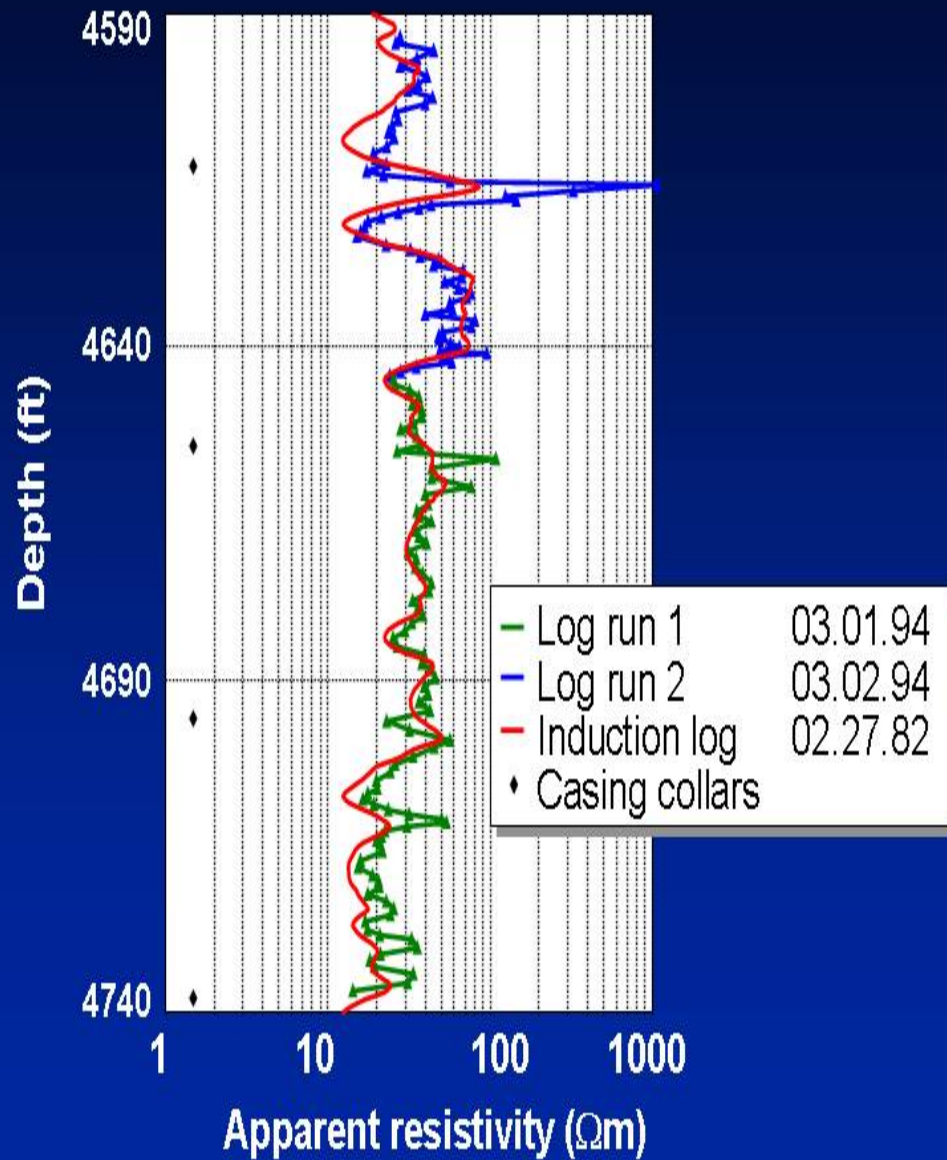
1998-1999

Colorado Test: known test zone



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Colorado Test: known test zone



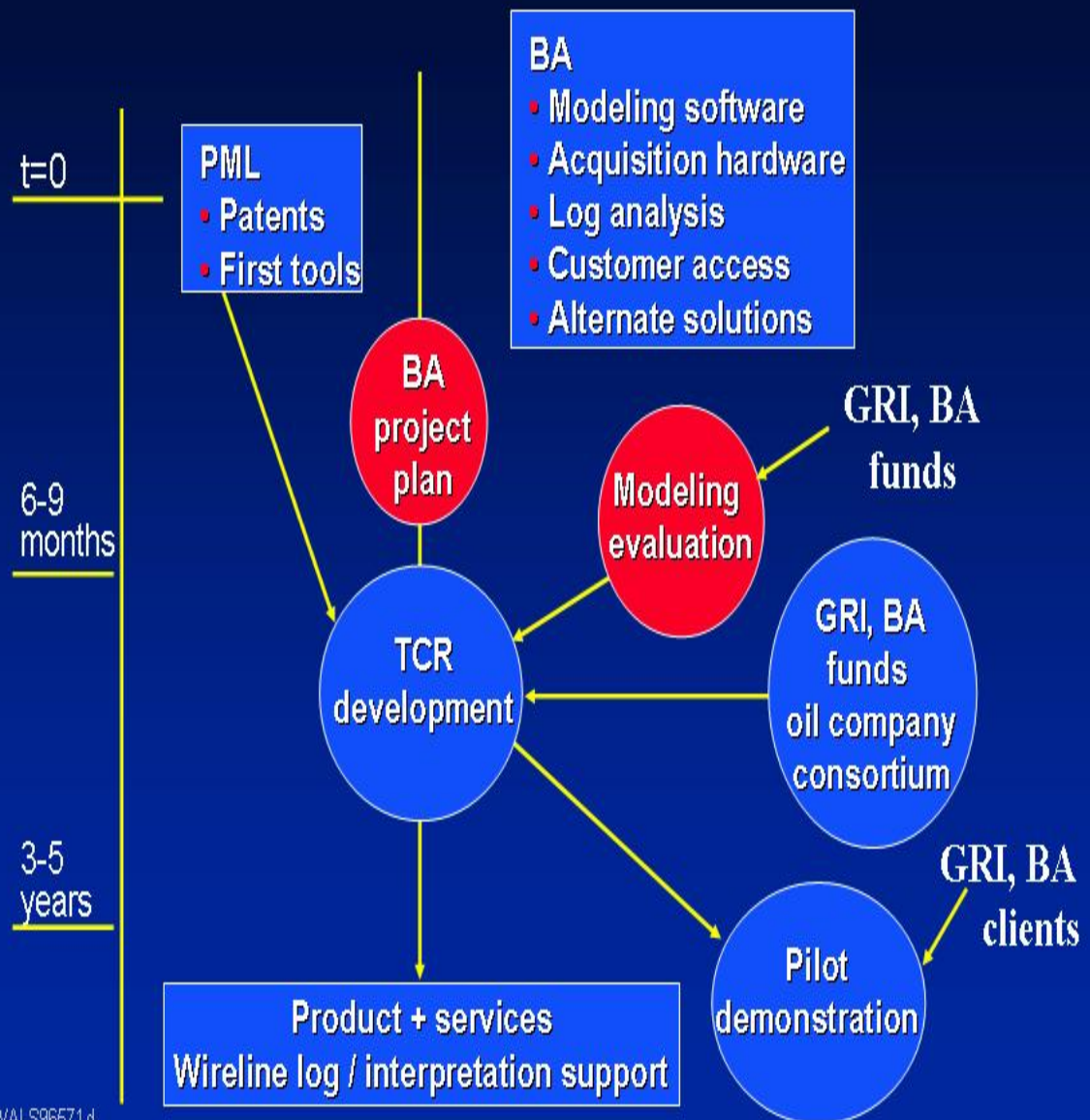
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Basic History

- Three electrode scheme
 - Modern design
 - WA feasibility study
 - Colorado test
 - PML acquisition by BA
 - First digital log, BA Texas
- Alpin (1939)
 - Kaufman (1990)
Vail (1991)
 - May-Nov. 1993
 - Dec. 1993-Mar. 1994
 - Q4 1997
 - 5/98



TCR - Project Components

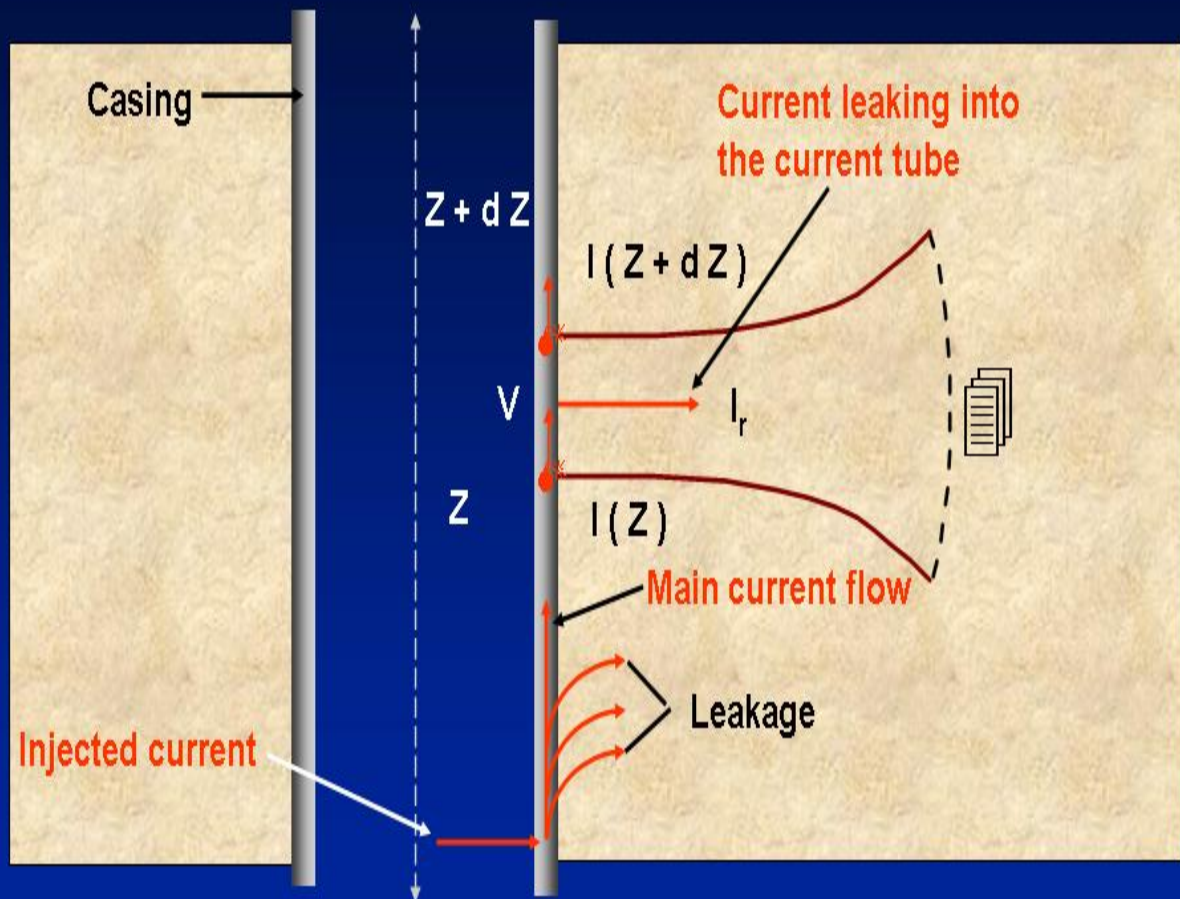


Producer Consortium

- Phillips
- Mobil
- ARCO
- Texaco
- Chevron
- Shell
- BP
- Conoco

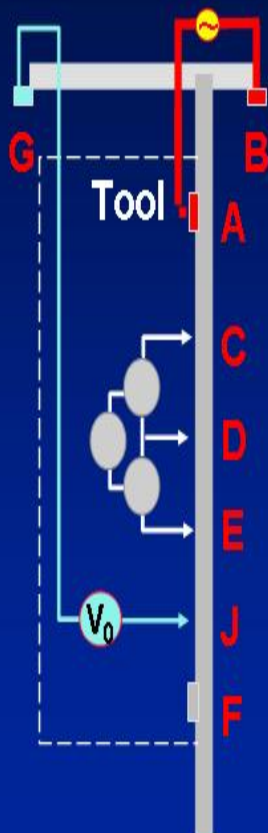
Scope: Act as mentor during the development activities (interpretation)

TCR Principle of Operation

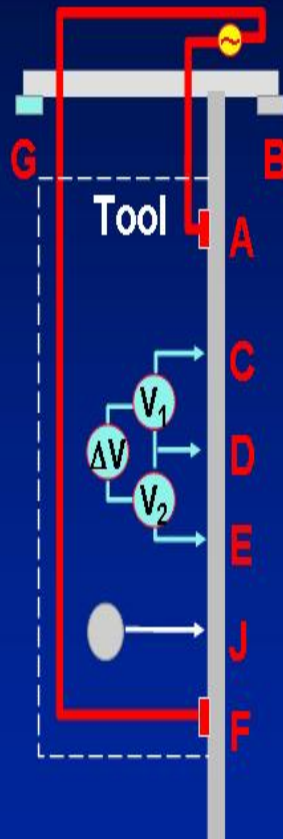


Operational Modes

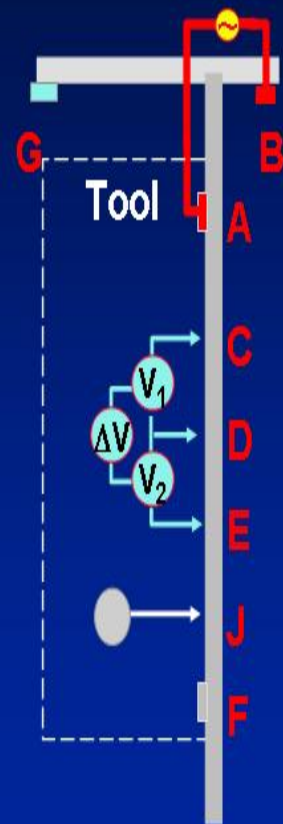
Reference



Calibration



Measurement

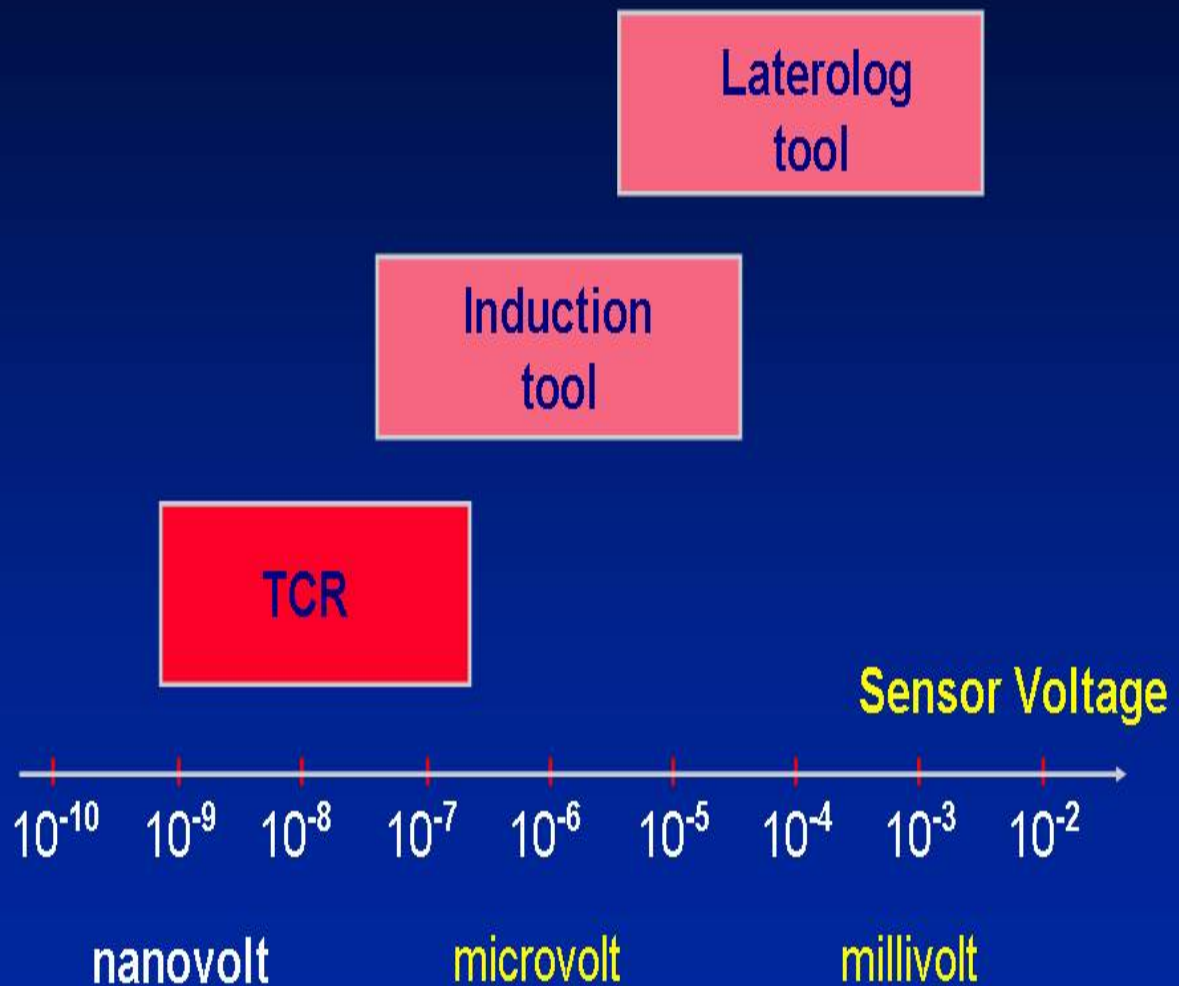


TCR tools at Baker Atlas test well

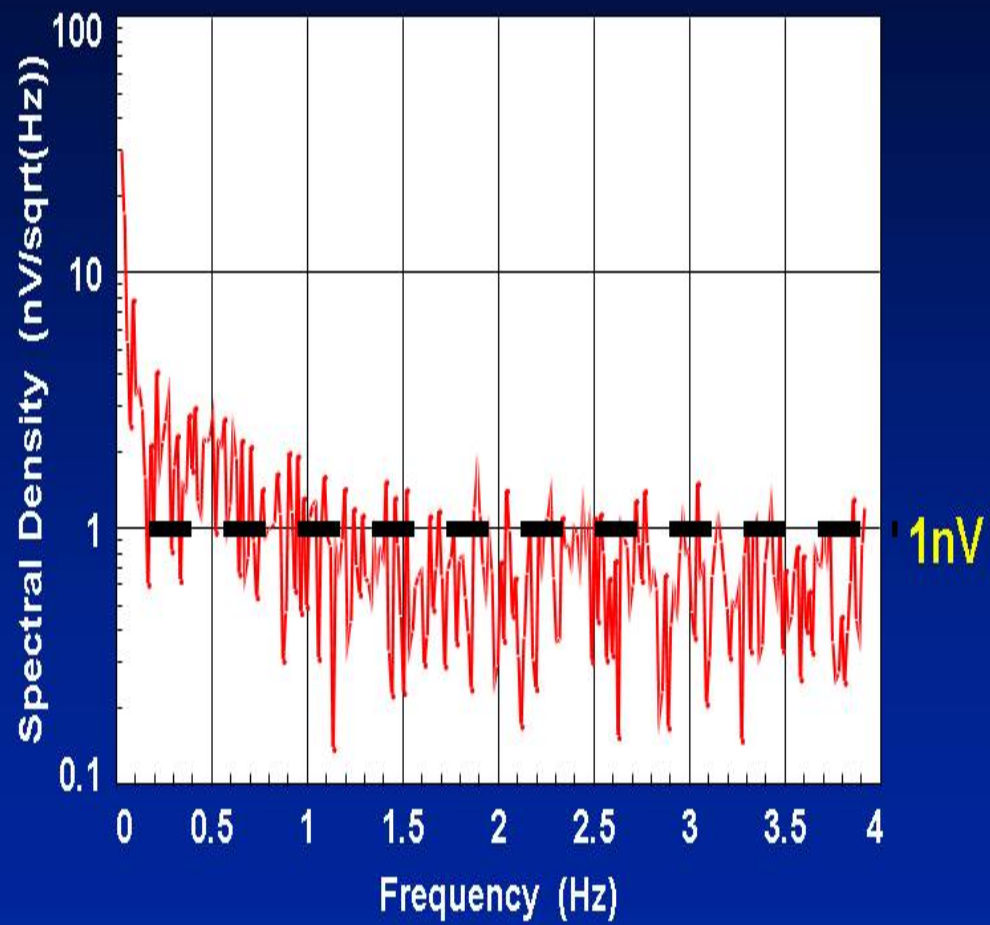


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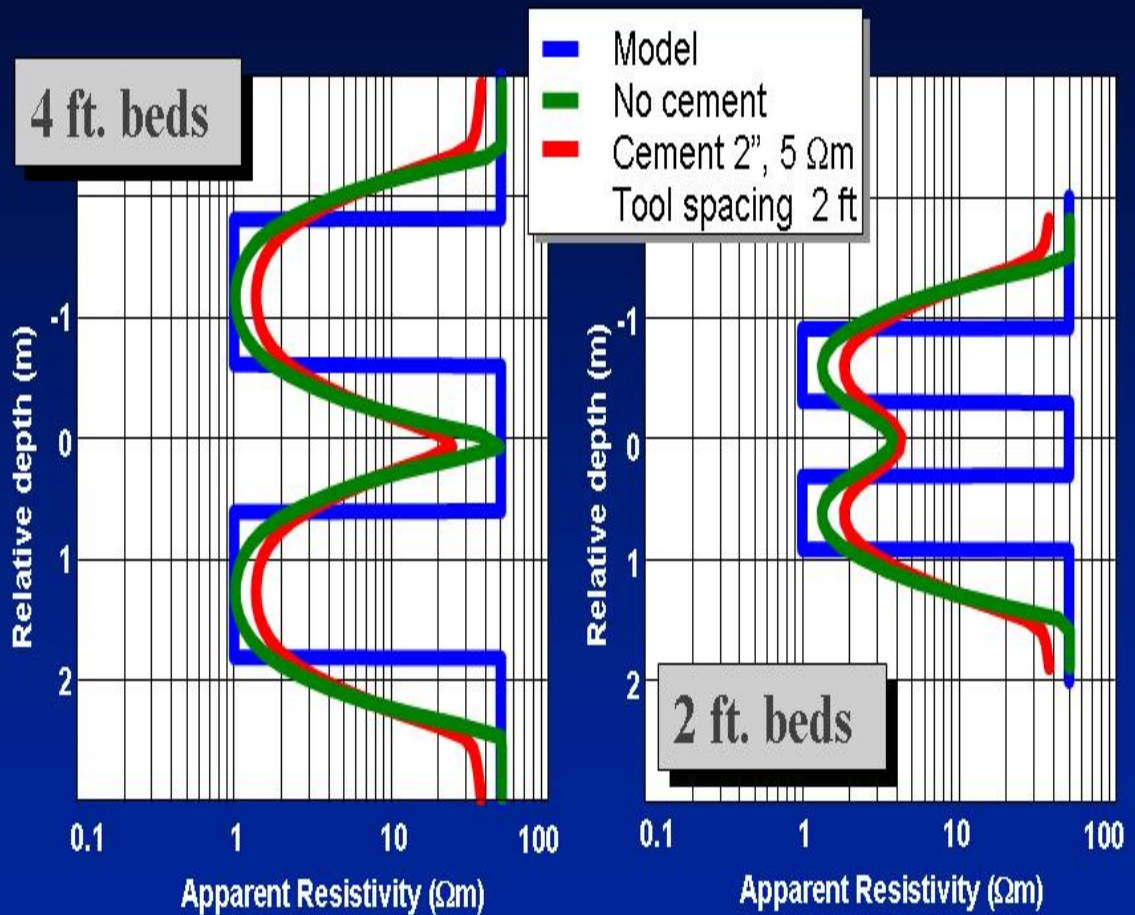
Typical Signal Levels for Electrical Logging Tools



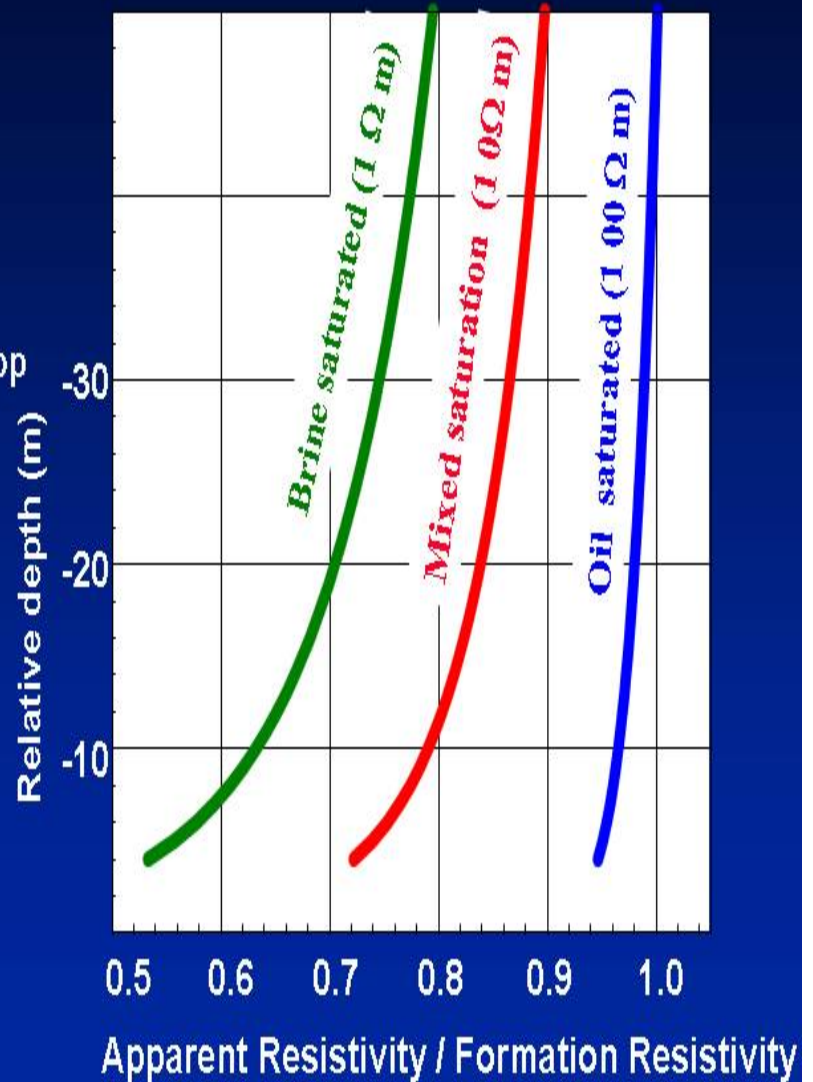
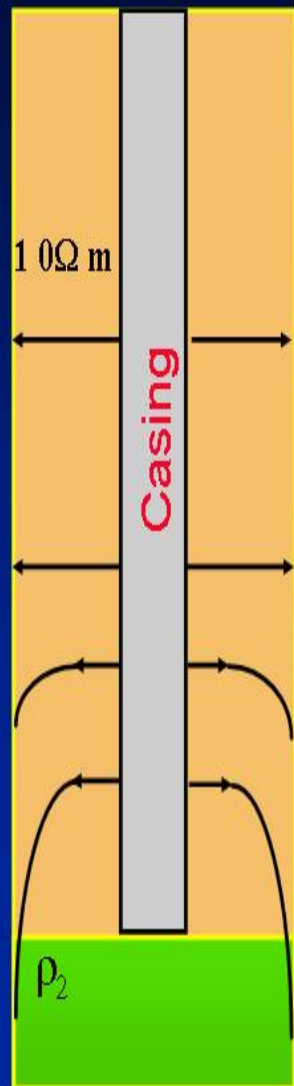
Amplifier Noise



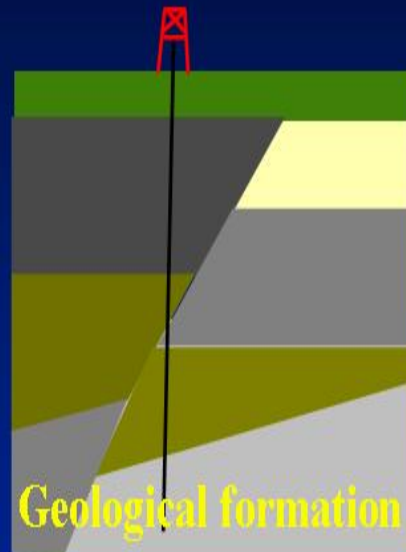
Vertical Resolution Test



Casing Shoe & Reservoir Depletion



Logging process



**Earth model described
by parameters
(resistivity distribution)**



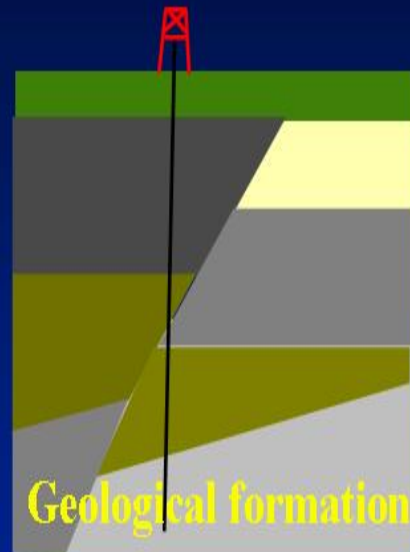
Measurements



Logs



Modeling process for logs



Earth model described
by parameters
(resistivity distribution)



Modeling



Inversion



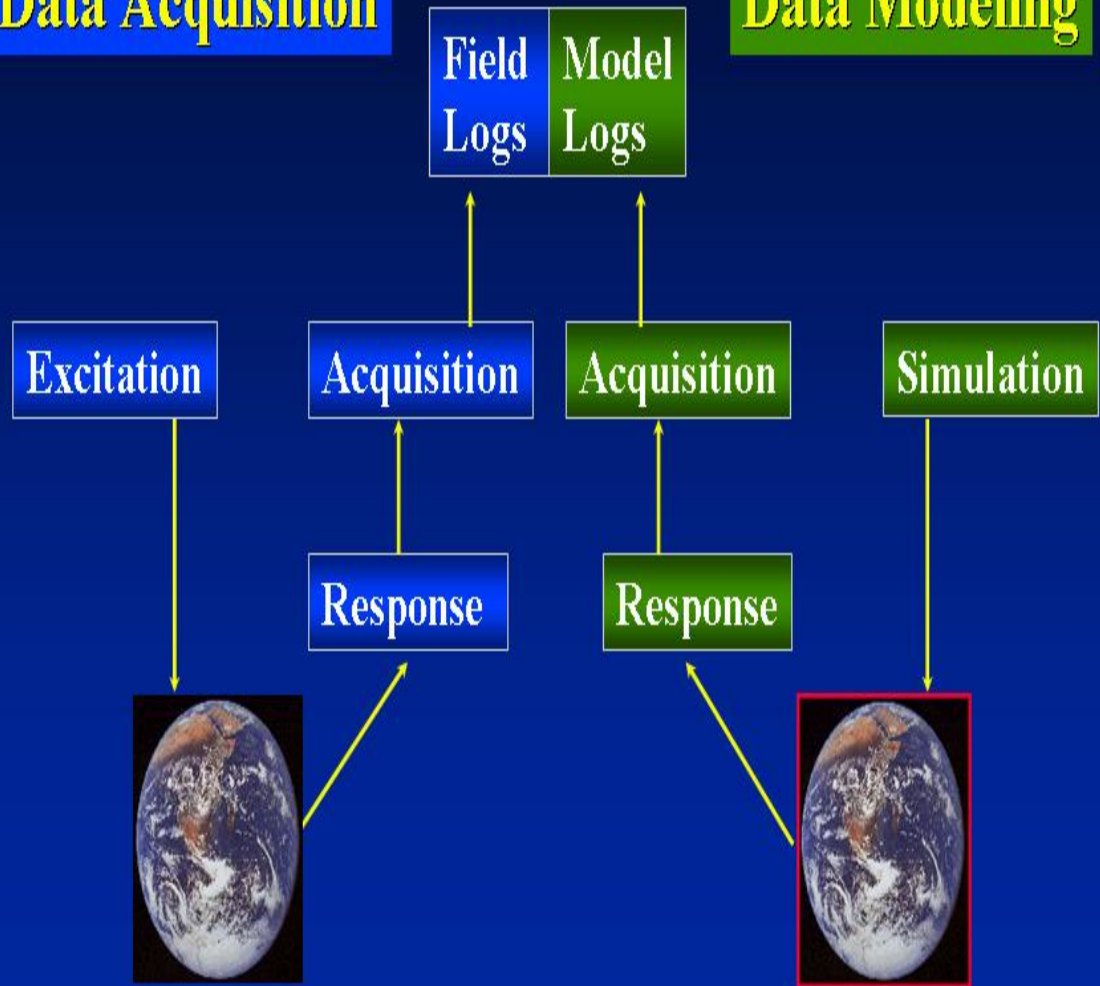
Logs



Inversion: Process flow

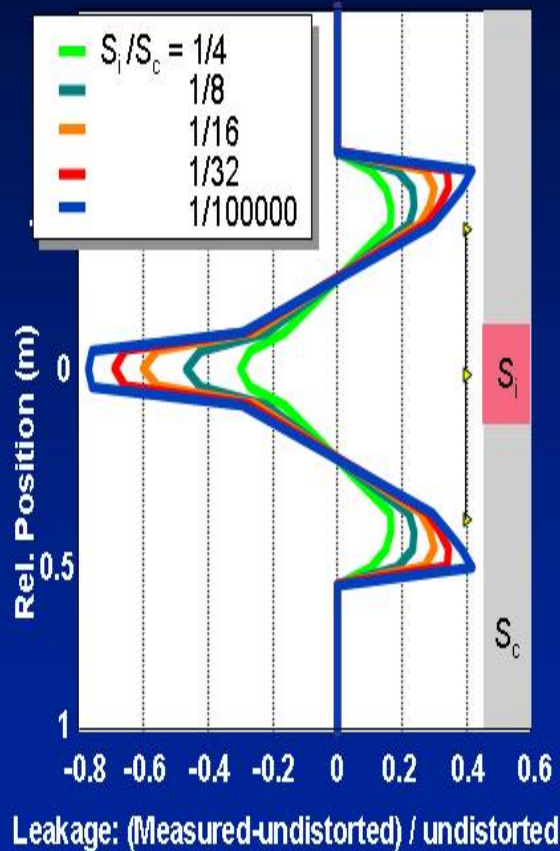
Data Acquisition

Data Modeling

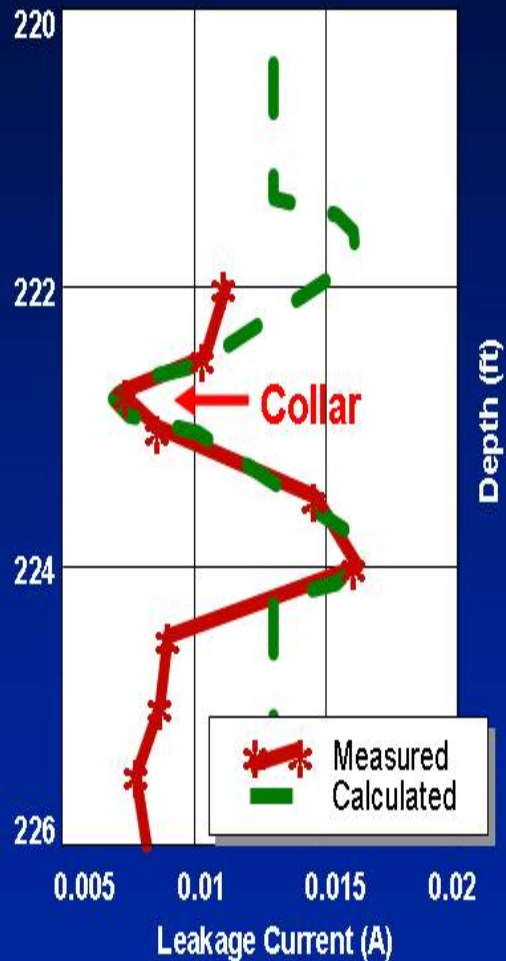


Casing Collar Effect (resistive)

Feasibility Study



Test well

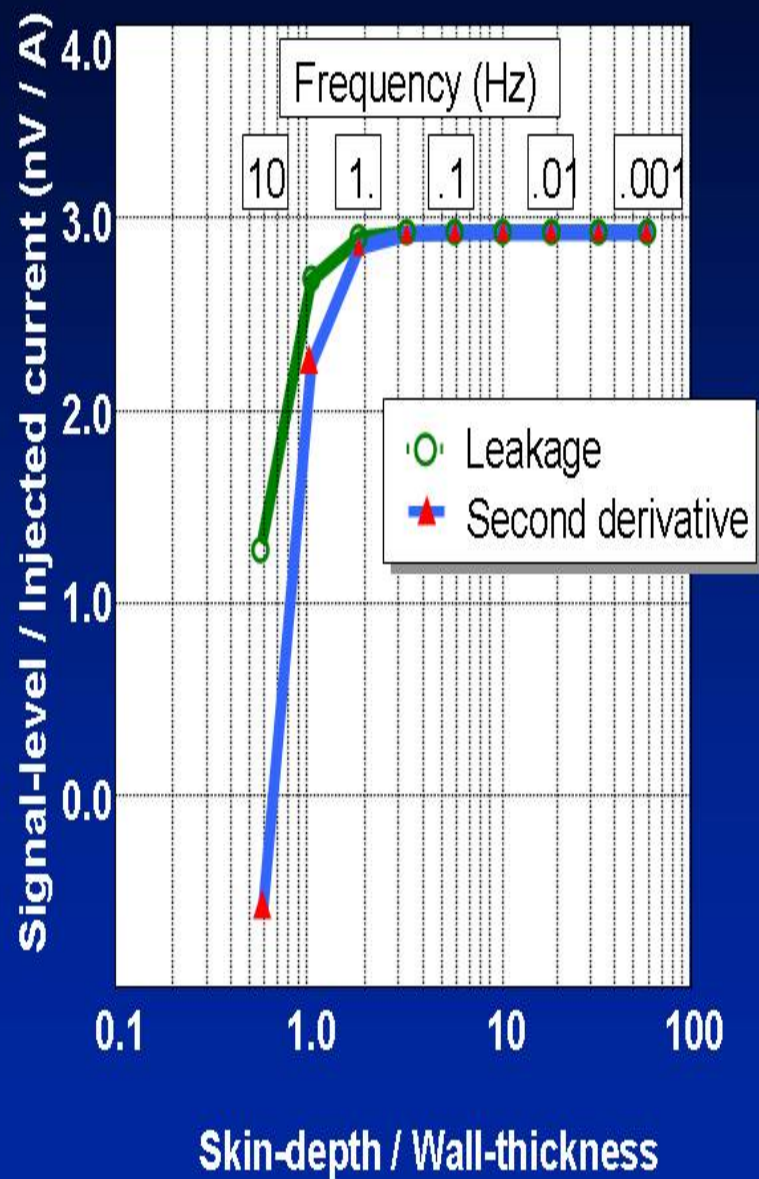


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Confidential

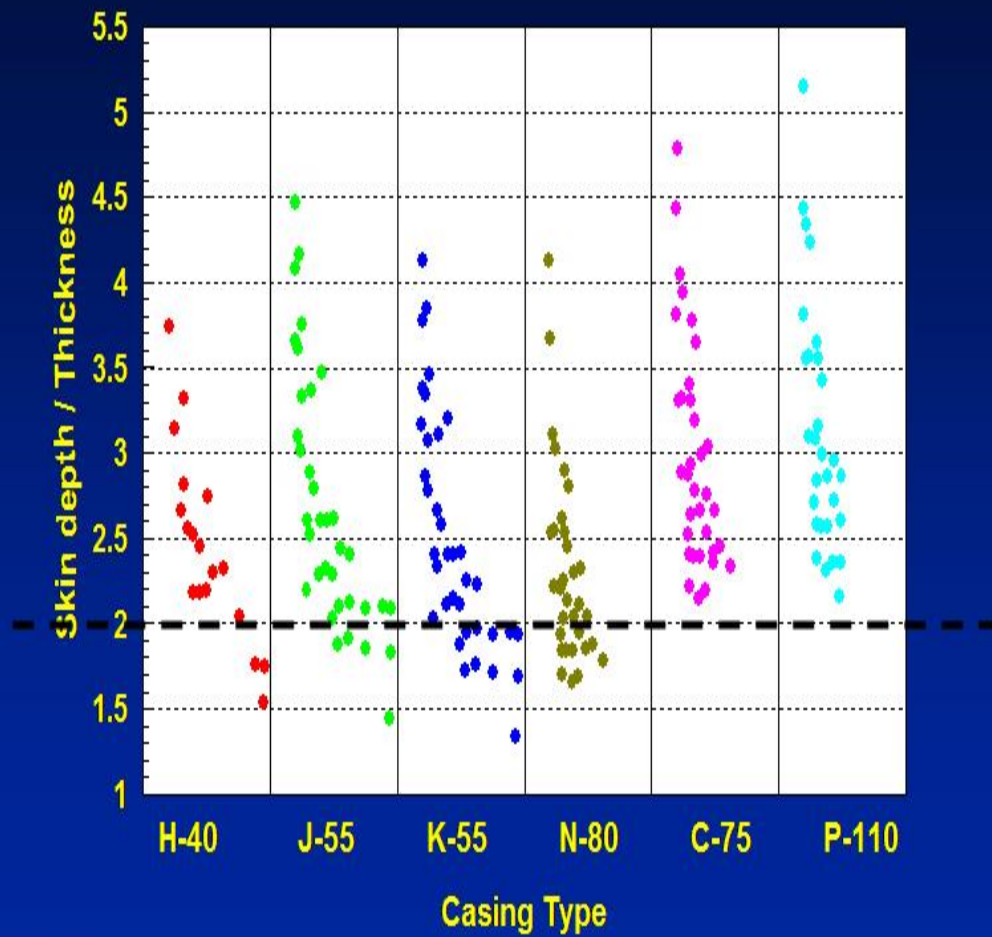
$$R_{app} = \frac{u \cdot \Delta t}{\text{Leakage}}$$

Frequency Limit

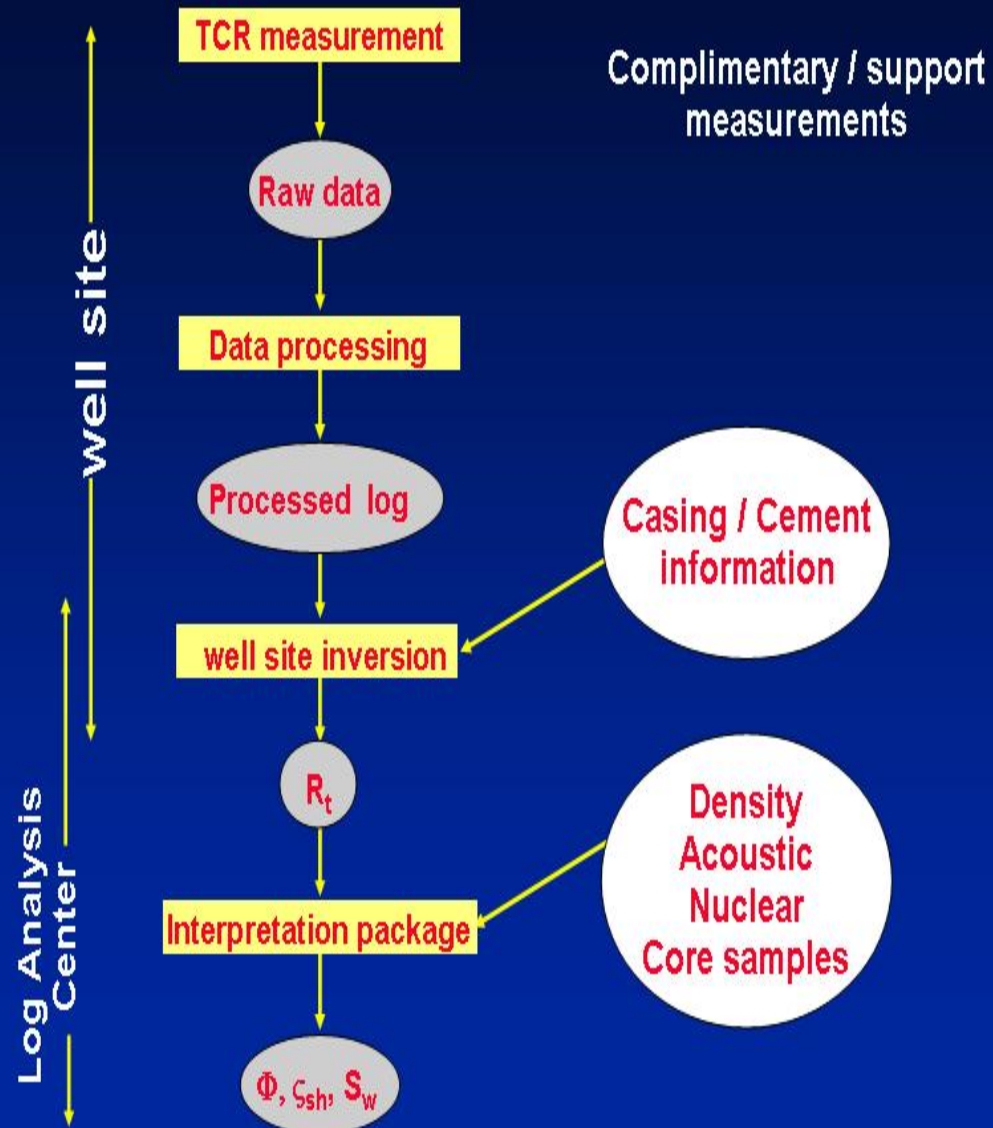


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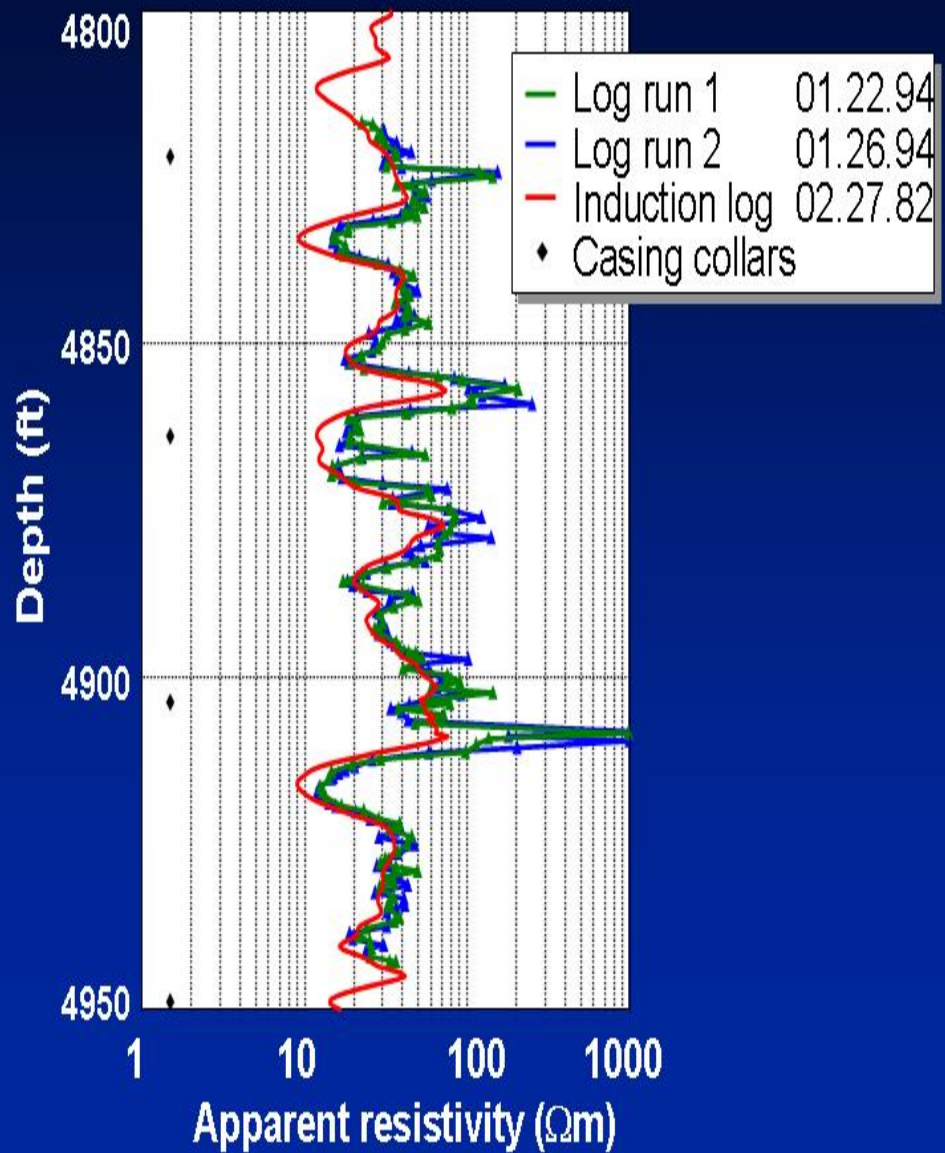
Skin Depth/Casing Thickness Distribution for Different Casing Types, Diameters, Temperature, and Thickness



TCR Interpretation

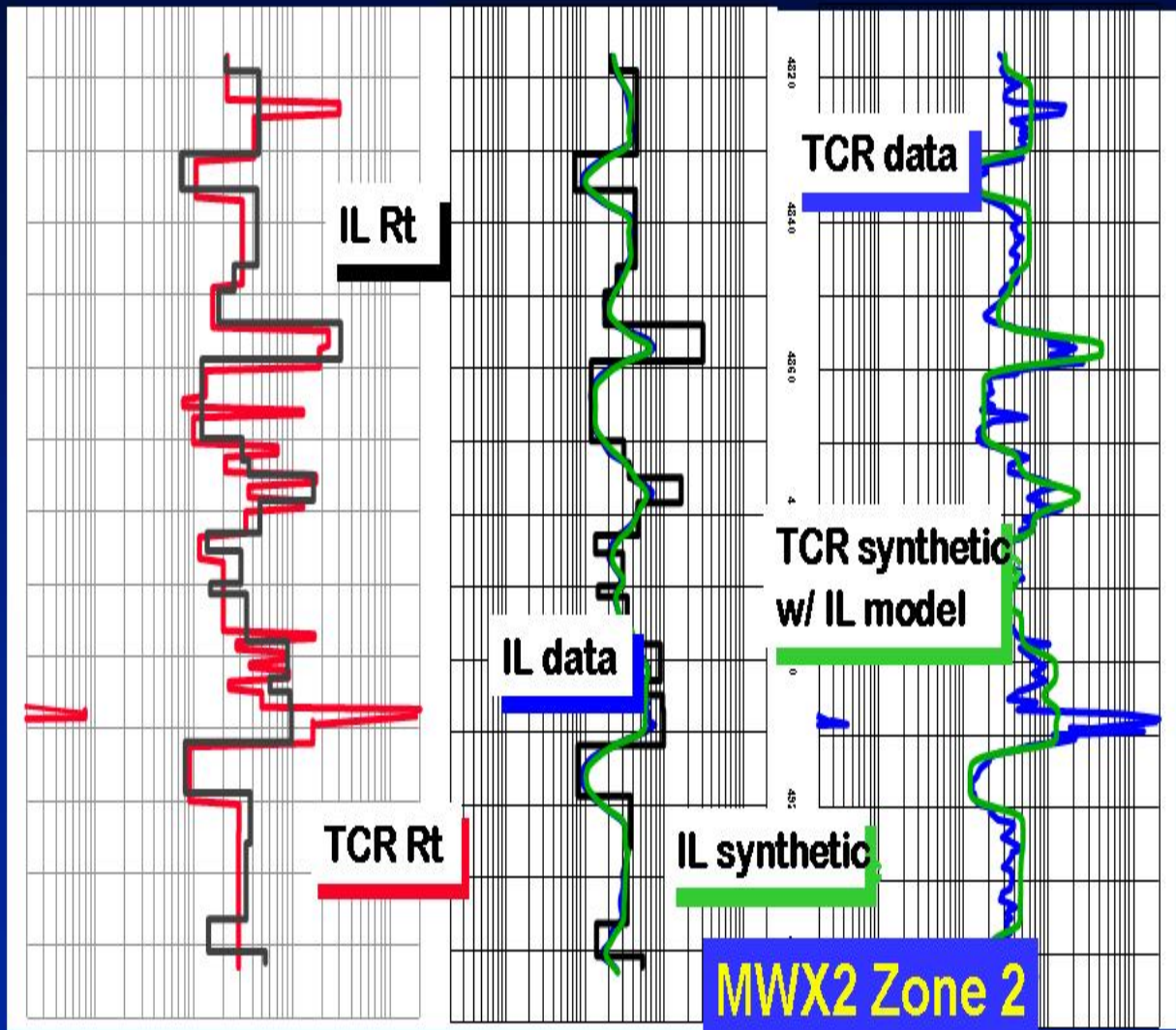


Colorado Test: Blind Test Zone



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Induction - TCR inversion comparison



Inversion Results

Caliper

Gamma ray

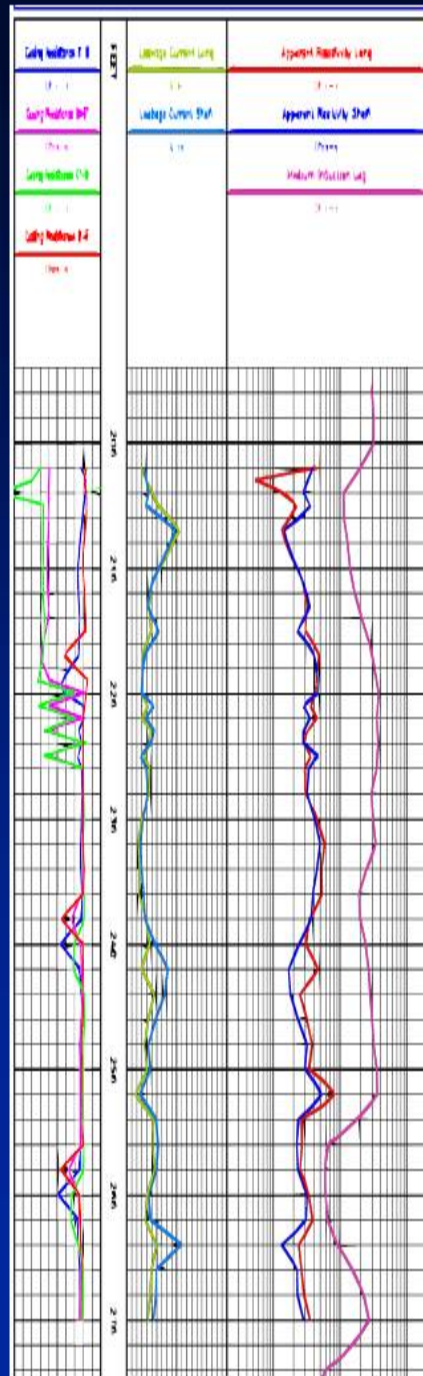
IL Rt

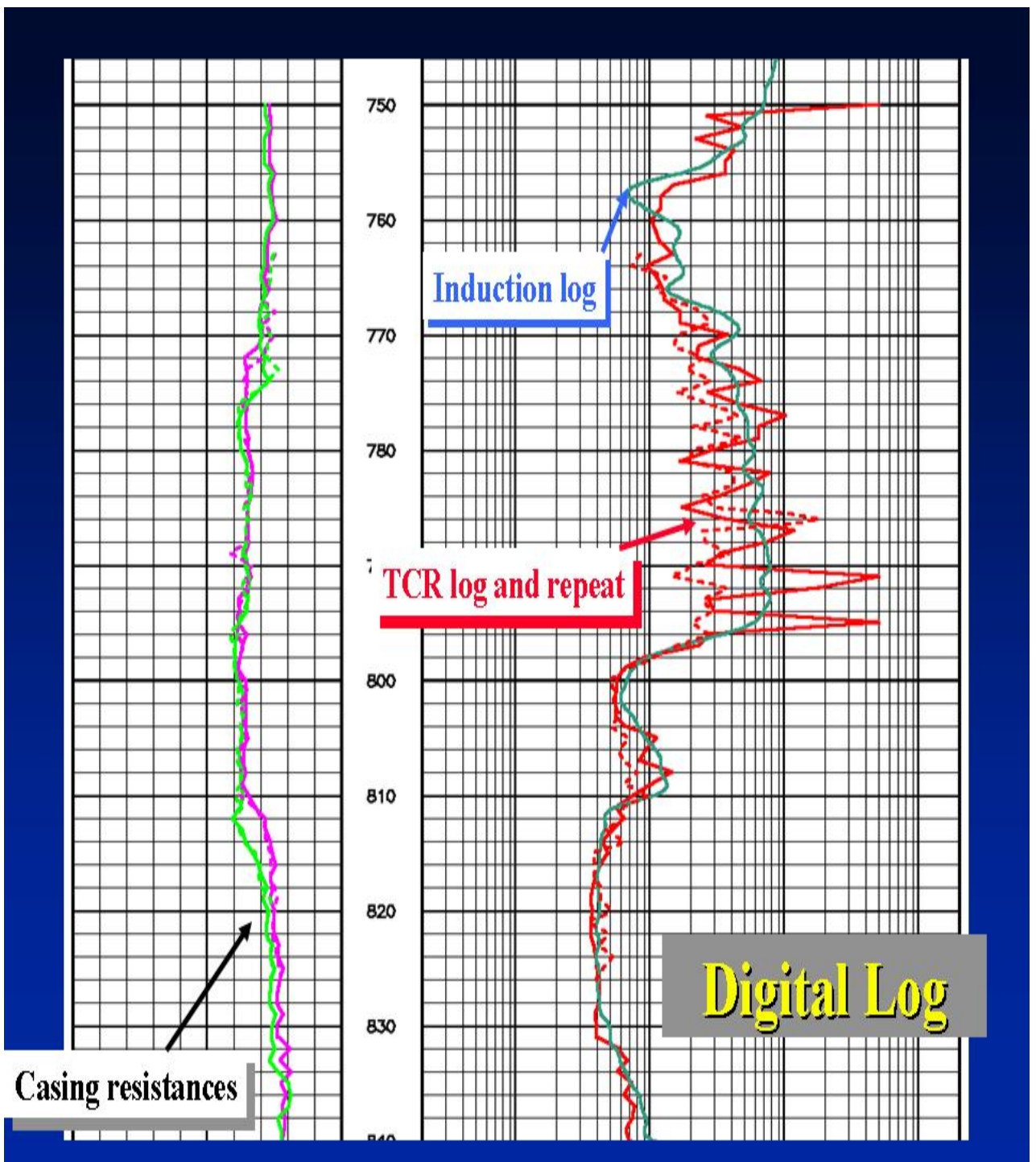
TCR Rt

MWX2 Zone 2

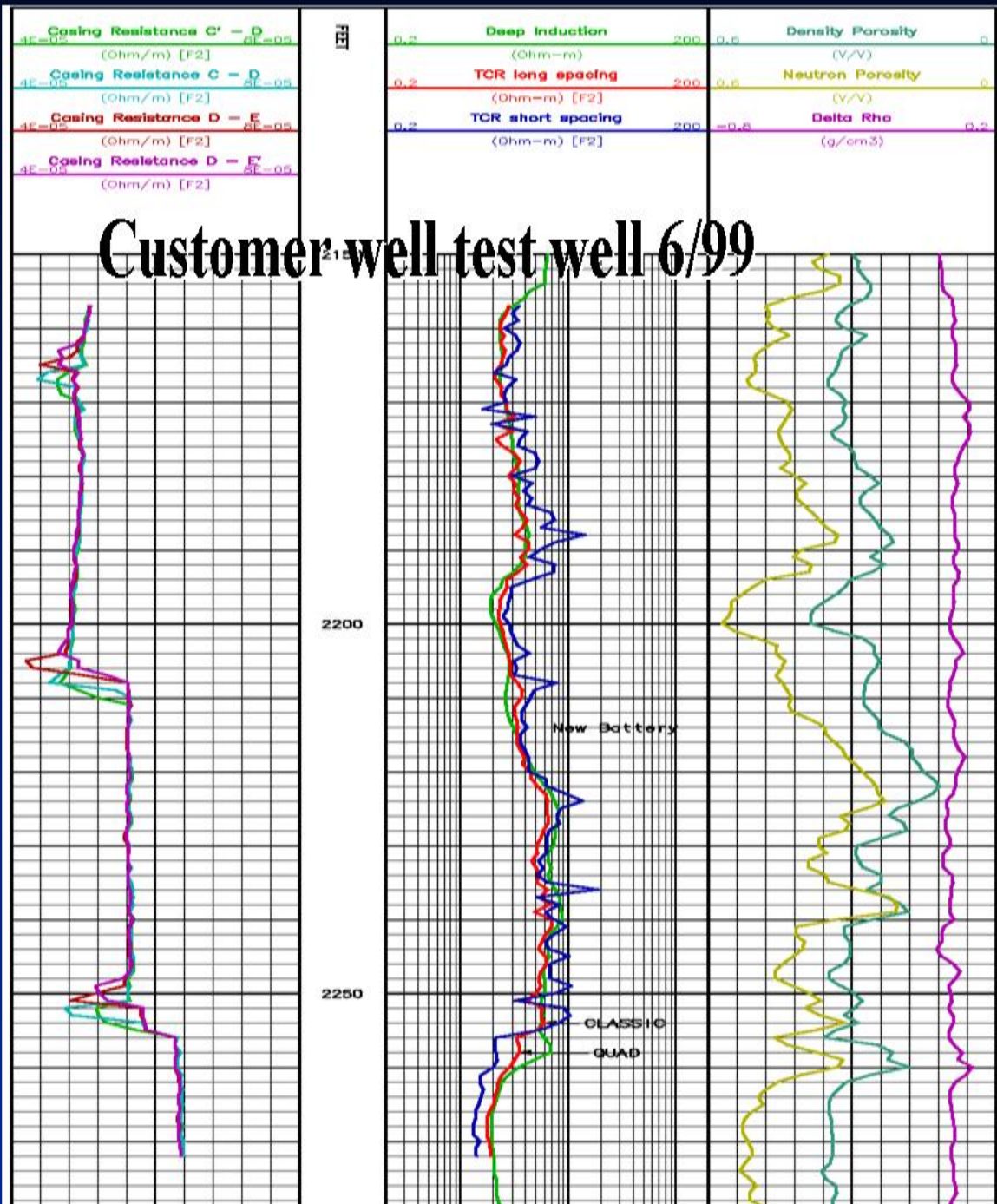
WALS test well First digital log 5/98

WALS965207k-2





Customer well test well 6/99



Summary

- TCR works
- Numerical modeling predicted results
- Test well data matches induction logs
- TCR service feasible

Acknowledgements:

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B.Sh. Zinger**

Gas Research Institute

**TCR Consortium: Arco, BP, Chevron, Conoco, Mobil,
Phillips, Texaco, Shell**

The places 1998



Brisbane



Kuala Lumpur



Miri



Melbourne

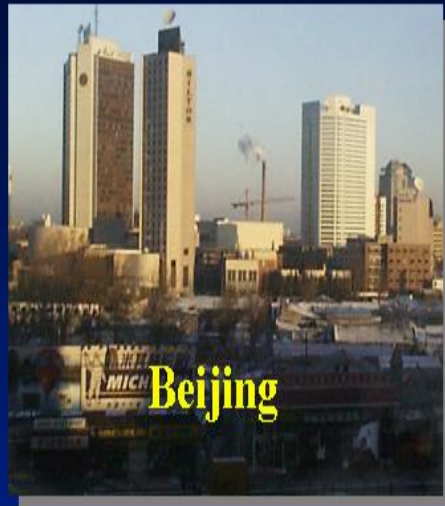


Perth

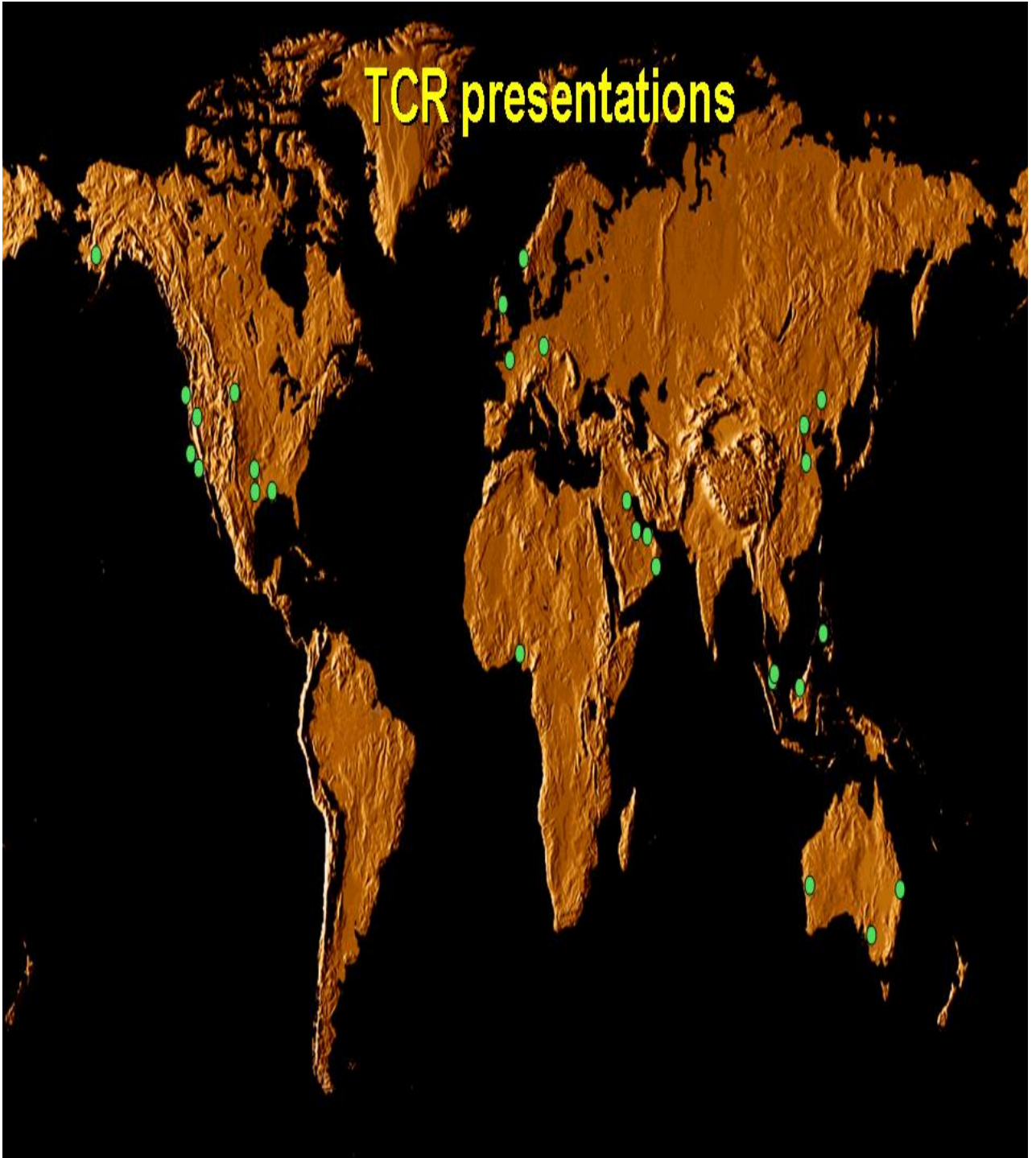
The Places 1998 continued



The Places 1998 continued



TCR presentations



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