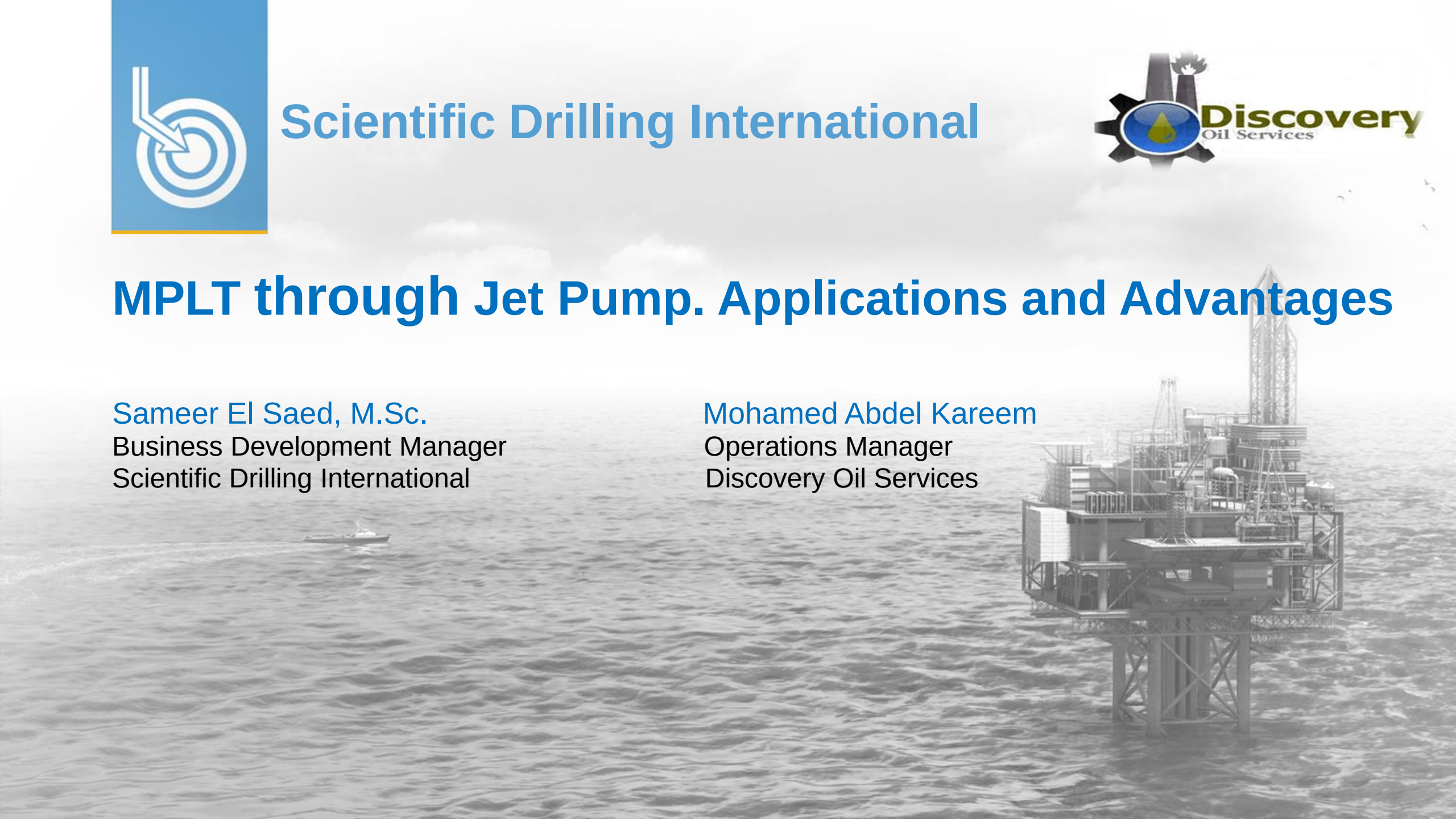
Scientific Drilling International

Discovery Oil Services

MPLT through Jet Pump. Applications and Advantages

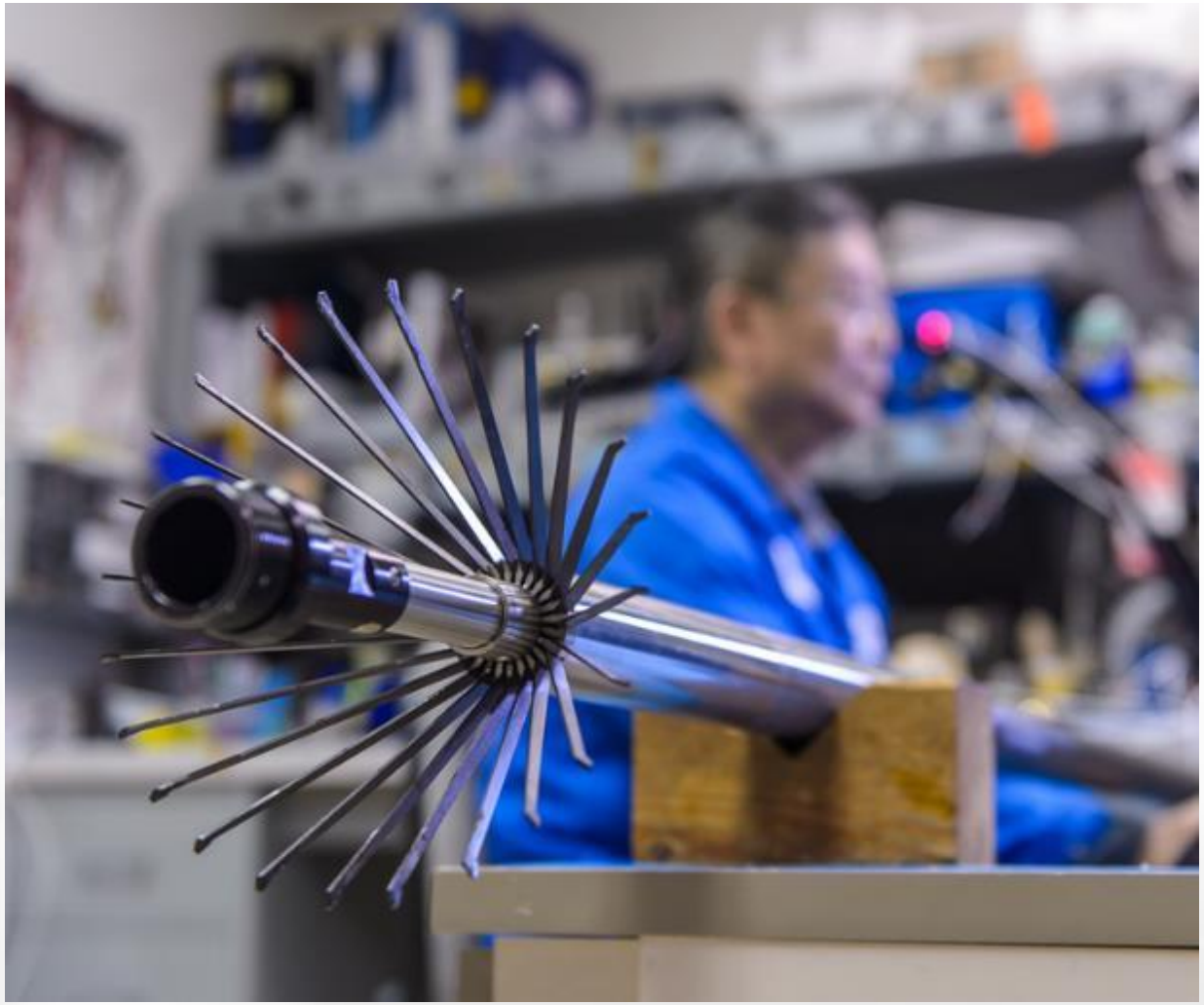
Sameer El Saed, M.Sc.
Business Development Manager
Scientific Drilling International

Mohamed Abdel Kareem
Operations Manager
Discovery Oil Services



Presentation Outlines

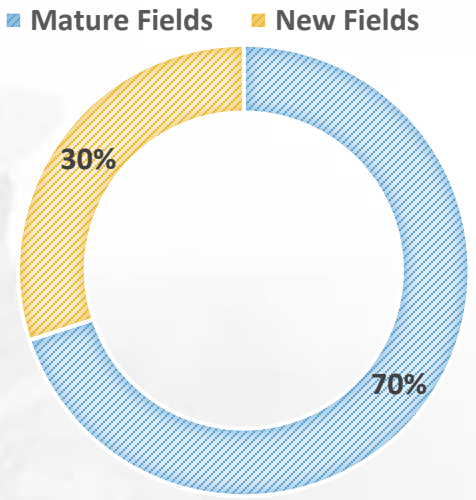
+ Problem: Brown fields challenges
+ Solutions: Cased Hole Logging
+ Flow Jet Pump
+ Case Studies
+ Conclusion

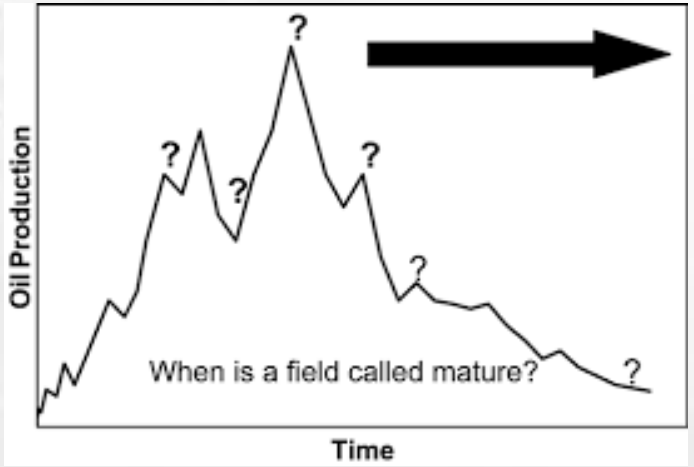


Brown fields production challenges & Production Logs

Increasing Production and ensure integrity

- Unwanted fluid productions and high-water cuts.
- Optimization of fluid production from multiple zones.
- Artificial lift and well intervention challenge.
- Identifying bypassed zones and recoverable fluids.
- Leak and annulus pressures
- Casing and tubing deformation.
- Corrosion monitoring and scale deposition.





Brown fields production challenges & Production Logs

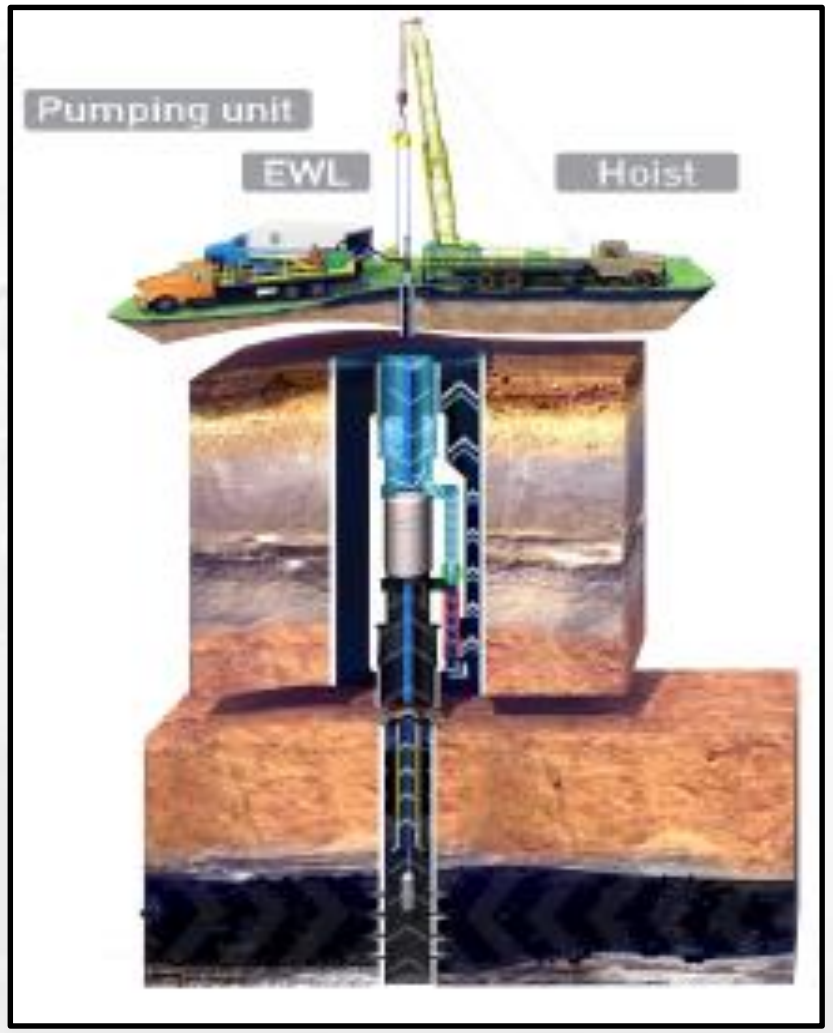
Brown Fields Challenges	Production Logging Solutions
Unwanted fluid productions and high-water cuts.	**Production Logging Services (Spinner, Density…etc)**
Optimization of fluid production from multiple zones	**Production Logging coupled with spectral noise logs**
Artificial Lift and well intervention challenges	**Flow Jet Pump Deployment**
Identifying bypassed zones and recoverable fluids.	**Pulse Neutron saturations logs coupled with PLT**
Leak Detection and Sustainable Annulus Pressure	**PLT, Noise logs and High ResolutionTemperature Surveys**
Casing and tubing deformation. Accessibility issues	**Multi Finger Caliper and Closed Spaced Directional survey**
Corrosion monitoring	**Multi Finger Caliper and Electromagnetic corrosion**

Brown fields production challenges & Production Logs

PLT through Flow Jet Pump Technique

Problem:

Most of artificially produced wells have no Y-tool or dual wellhead completion. Therefore, it is **NOT POSSIBLE** to perform production logging in such wells, once pump is pulled from the well, well obviously cannot produce.

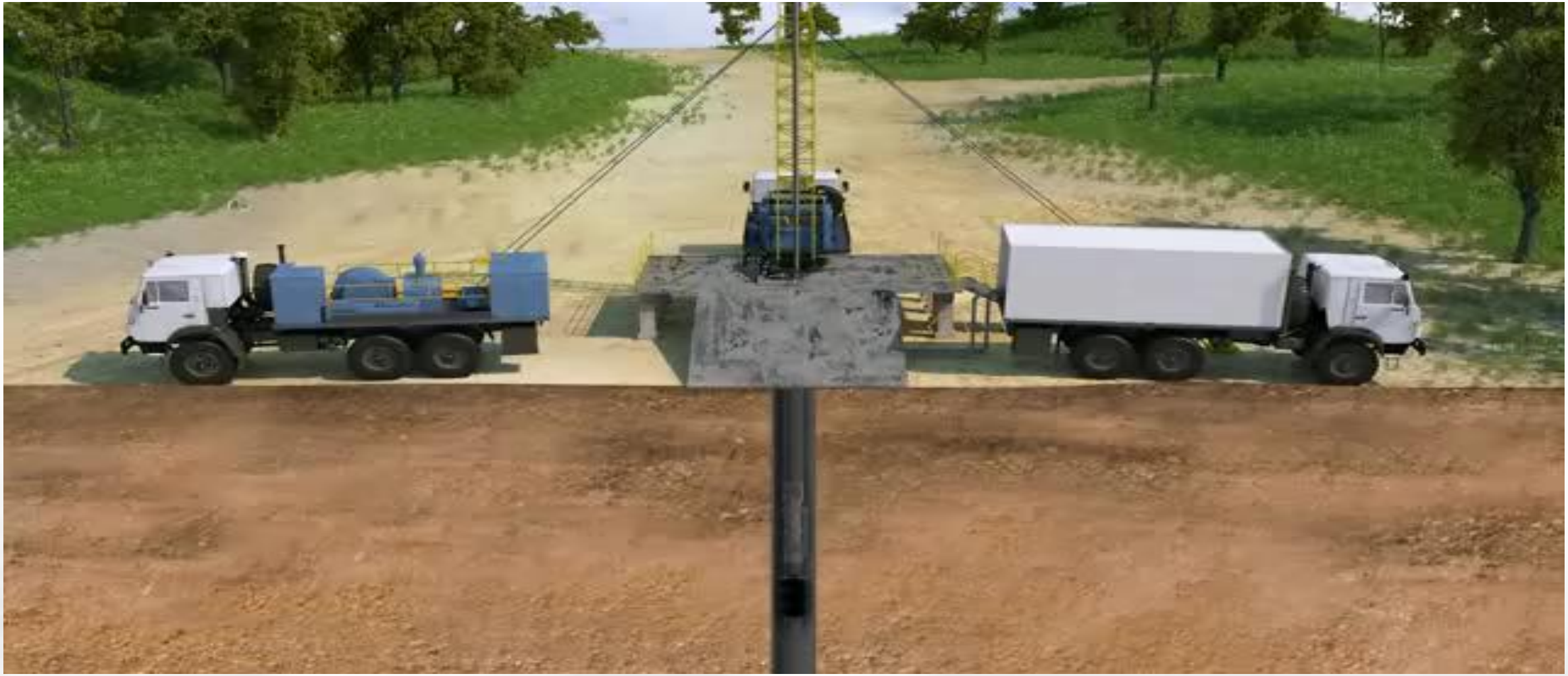


Solution:

The new technique will use jet pump while work-over to lift the well during production logging survey.

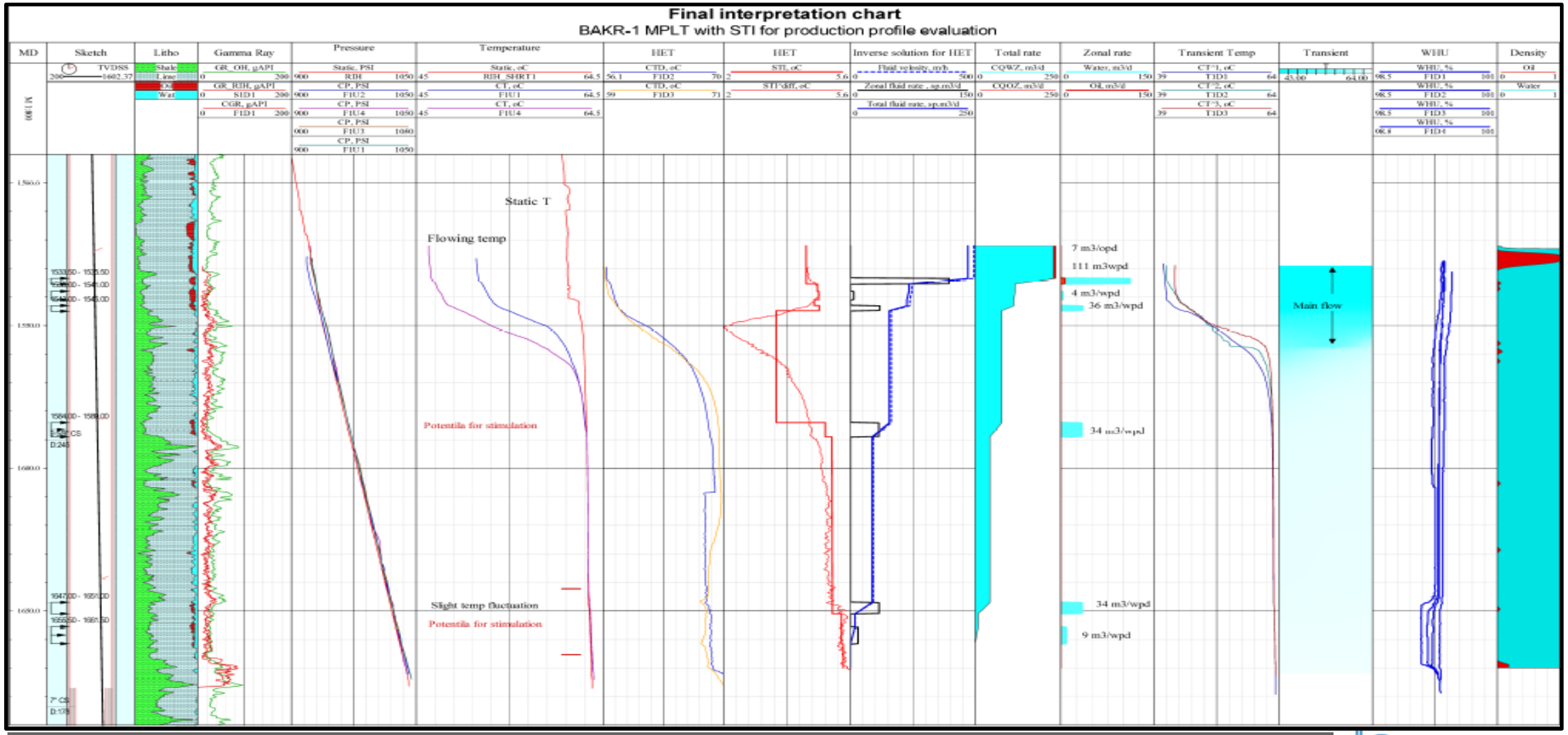
Brown fields production challenges & Production Logs

Flow Jet Pump Operations



Brown Fields problems and Production Logging Solutions

Case Study: Bakr-Ds-1X Identify zonal contribution for each perforation & water source



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Brown Fields problems and Production Logging Solutions

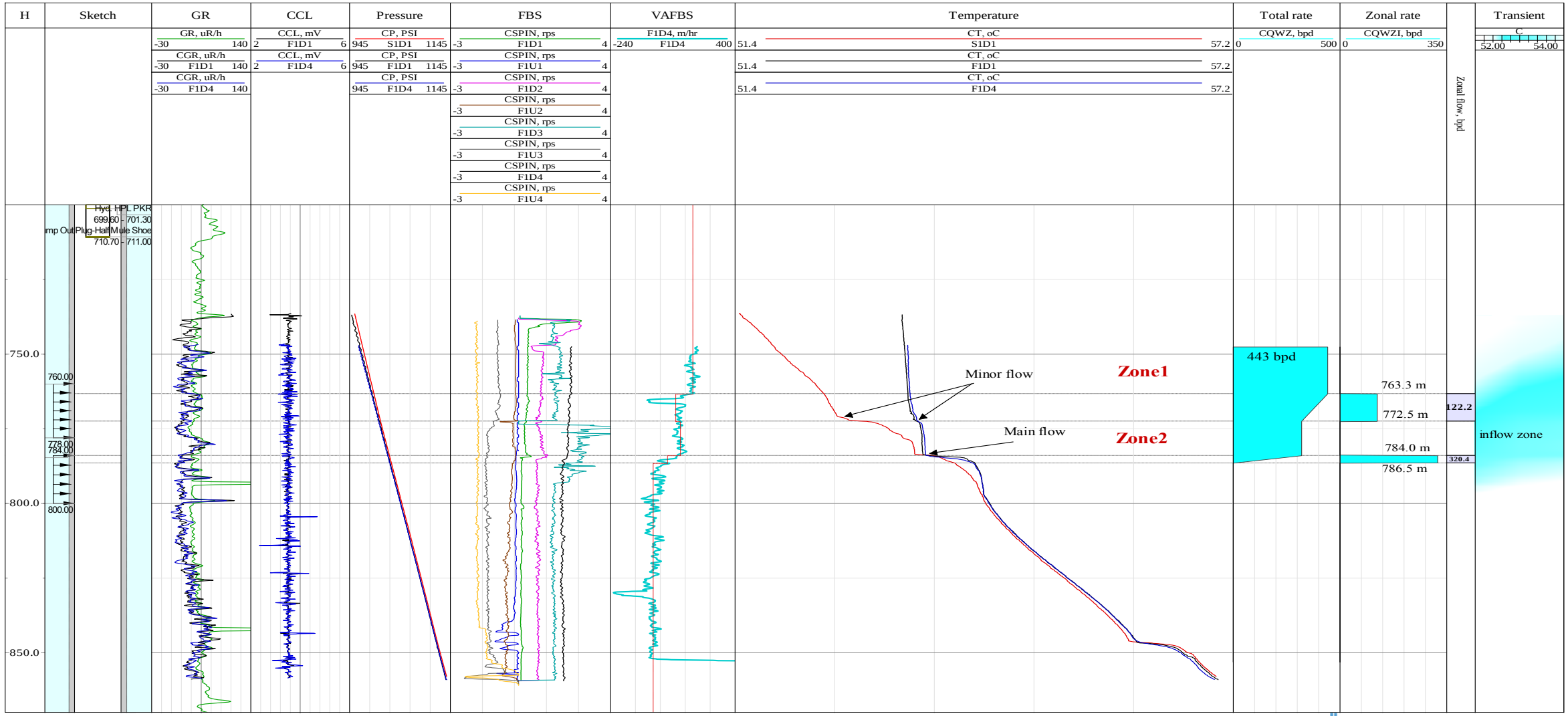
Case Study: Bakr-Ds-1X Identify zonal contribution for each perforation & water source

Bakr-Ds-1X Results and workover recommendations:

- PLT shows water production across all intervals
- PLT shows effective contribution from all perforated intervals which reinforced an effective acid treatment.
- Based on PLT results and the offset well production, the water movement is most probably lateral. So, it was decided By GPC to isolate the watered out perfs and perf new intervals
- The well is producing now 650 BOPD, W.C 15 %.

Brown Fields problems and Production Logging Solutions

Case Study: Bakr-52 Identifying water sources



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Brown Fields problems and Production Logging Solutions

Case Study: Bakr-52 Identifying water sources

Bakr-52 Results and recommendations:

- PLT shows water production across few meters from the perforated intervals which contributed without acid stimulation which could be fracture zones.
- Another study was performed on offset well confirms the existence of open vertical fractures in this area.
- W.O plan was prepared to validate these results.

Brown Fields problems and Production Logging Solutions

Case Study: Cross Flow and non contributing lower Perforations

+ CUSTOMER CHALLENGE

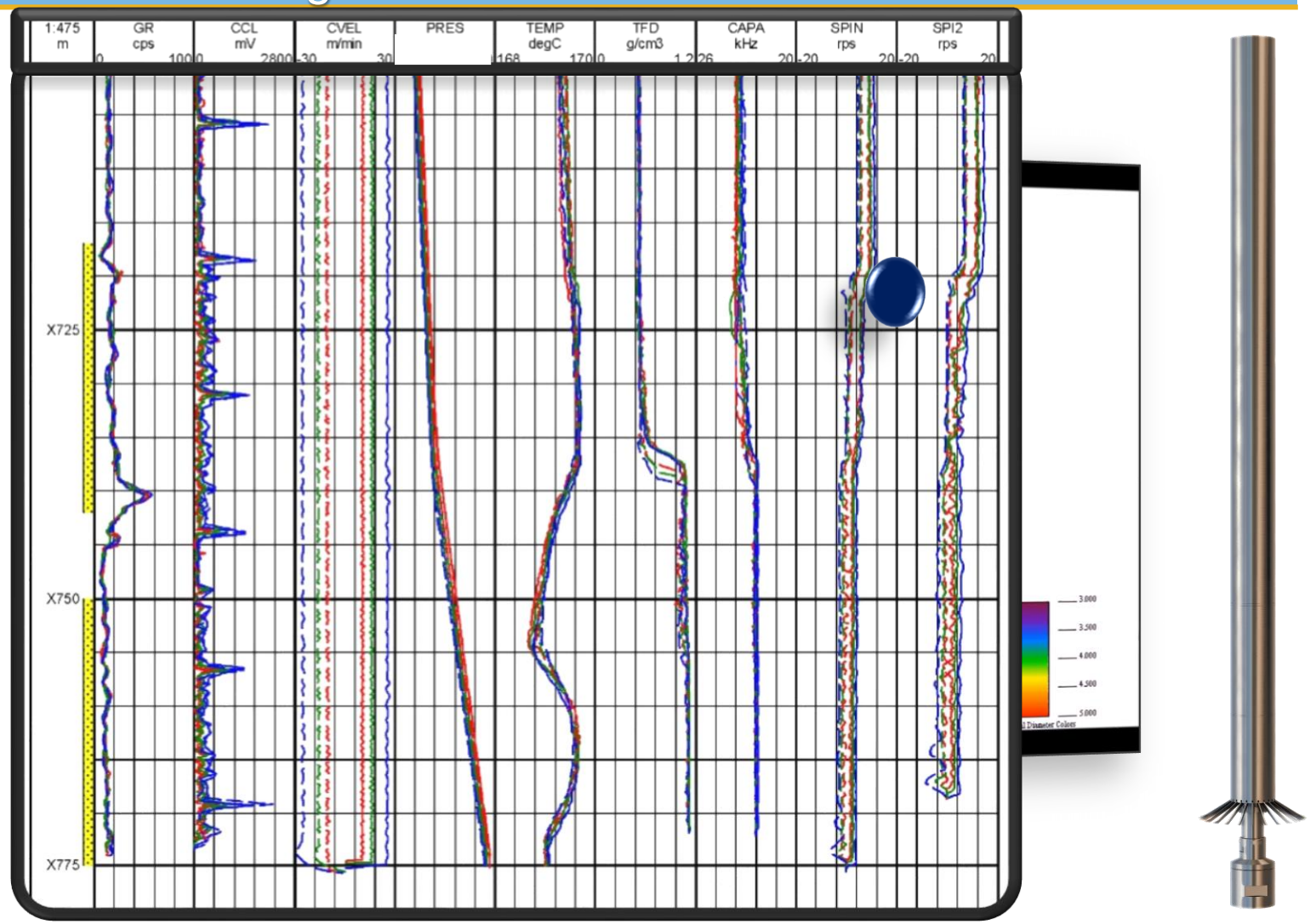
170ºC (338ºF) | Cross-flow between two sets of perforated formations | **High-pressure lower formation not producing any flow** | MPLT showed downward cross-flow from top section upper perfs to bottom section upper perfs | **No flow across lower perfs** | Need to confirm lower zone perforated as expected | **HT MFC required**

+ SDI SOLUTION

Mempry Production Logs and Multi Finger Caliper

+ CUSTOMER VALUE

MFC proved lower zone shot as anticipated | No blockage as cause of poor productivity | **3D imaging shows perforations were successfully mapped & spiral phasing was captured** | Single vendor for MPLT & MFC | **All logging on slickline**



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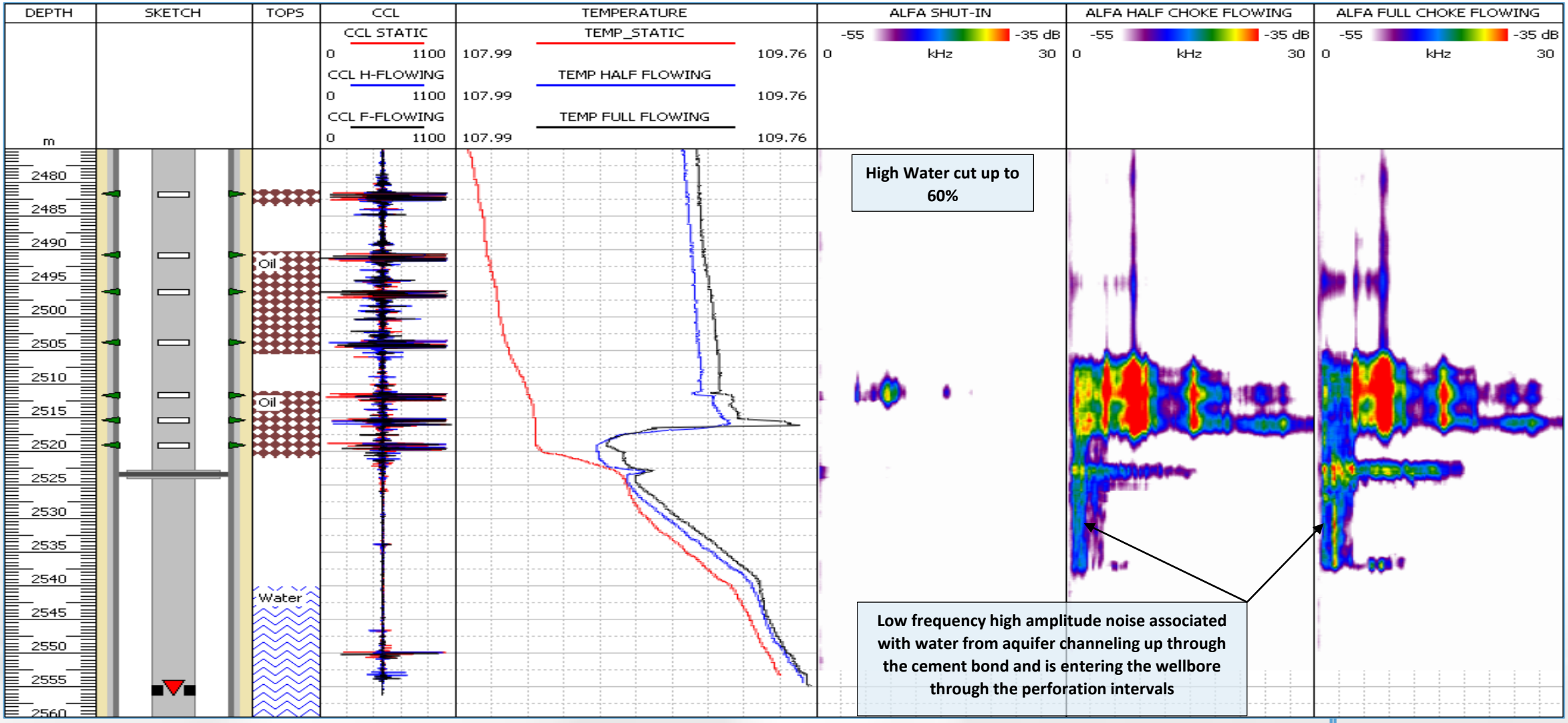
Brown Fields problems and Production Logging Solutions

Case Study: Behind casing water entry identification by Noise Logging.



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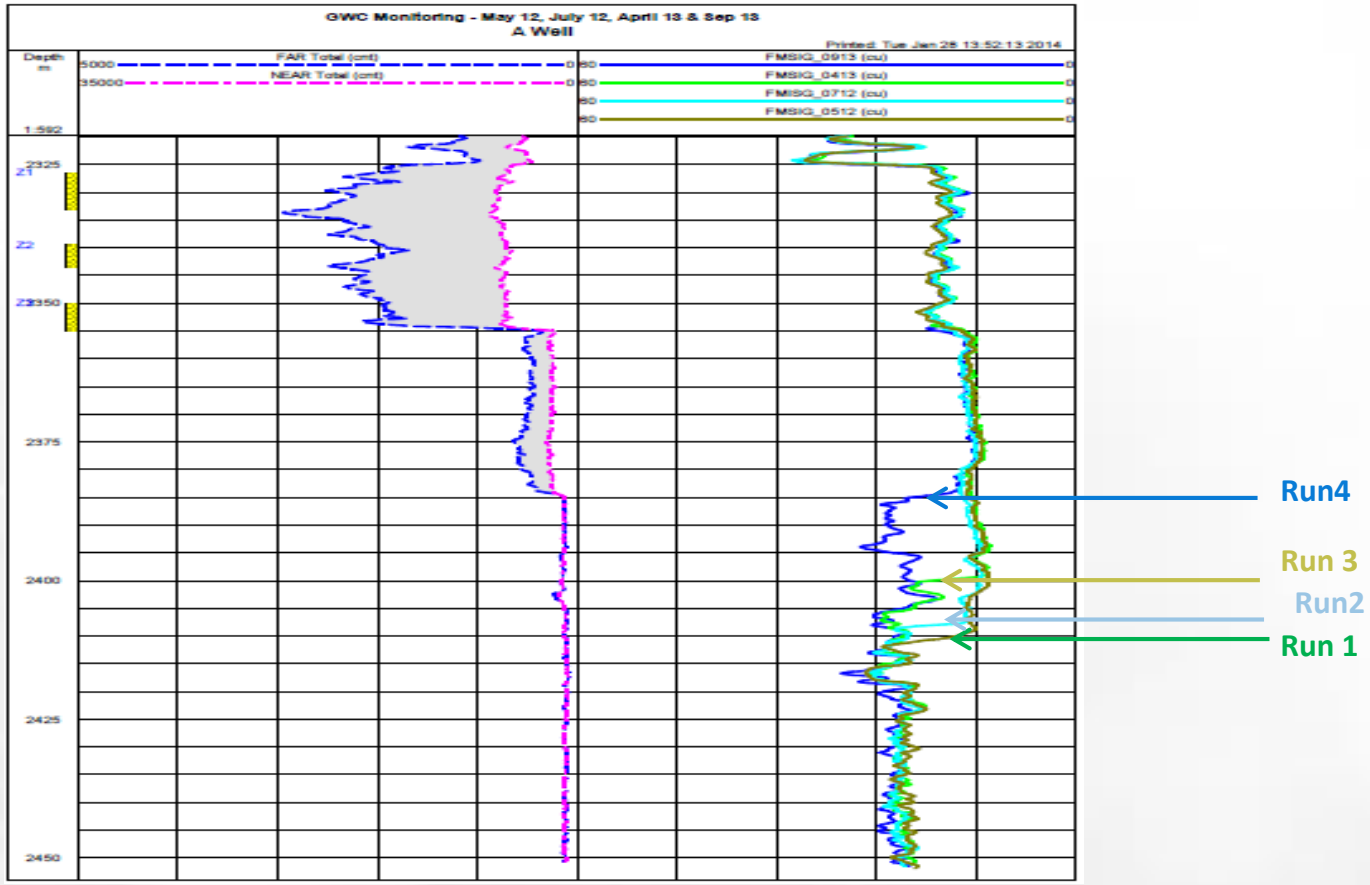
Brown Fields problems and Production Logging Solutions

Case Study: Gas Water Contact monitoring by Memory Pulse Neutron Neutron

- 15% porosity & 120 kppm salinity
- Liquid level base of perfs
- Four runs over 18 months
- GWC clearly identified every run
- Very good agreement in Sigma response above and below contact
- Near/Far count rate separation good indicator of gas



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Brown Fields problems and Production Logging Solutions

Operation flexibility and cost effective MPLT & Memory Pulse Neutron combo

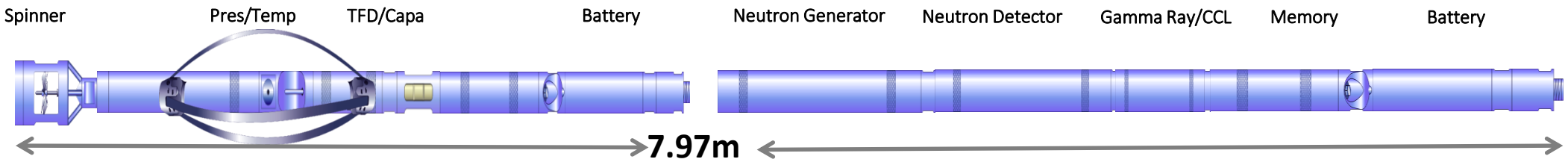
Introducing the most compact, combined MPLT & Memory Pulsed Neutron tool-string available today, the innovative design minimizes well interventions saving time and money whilst reducing HSE risks.

DELIVERING THE ULTIMATE VALUE

+ Minimum combined tool-string length less than 8m
+ Tool positions interchangeable
+ Optional fast response temperature gauge
+ Single-engineer operation

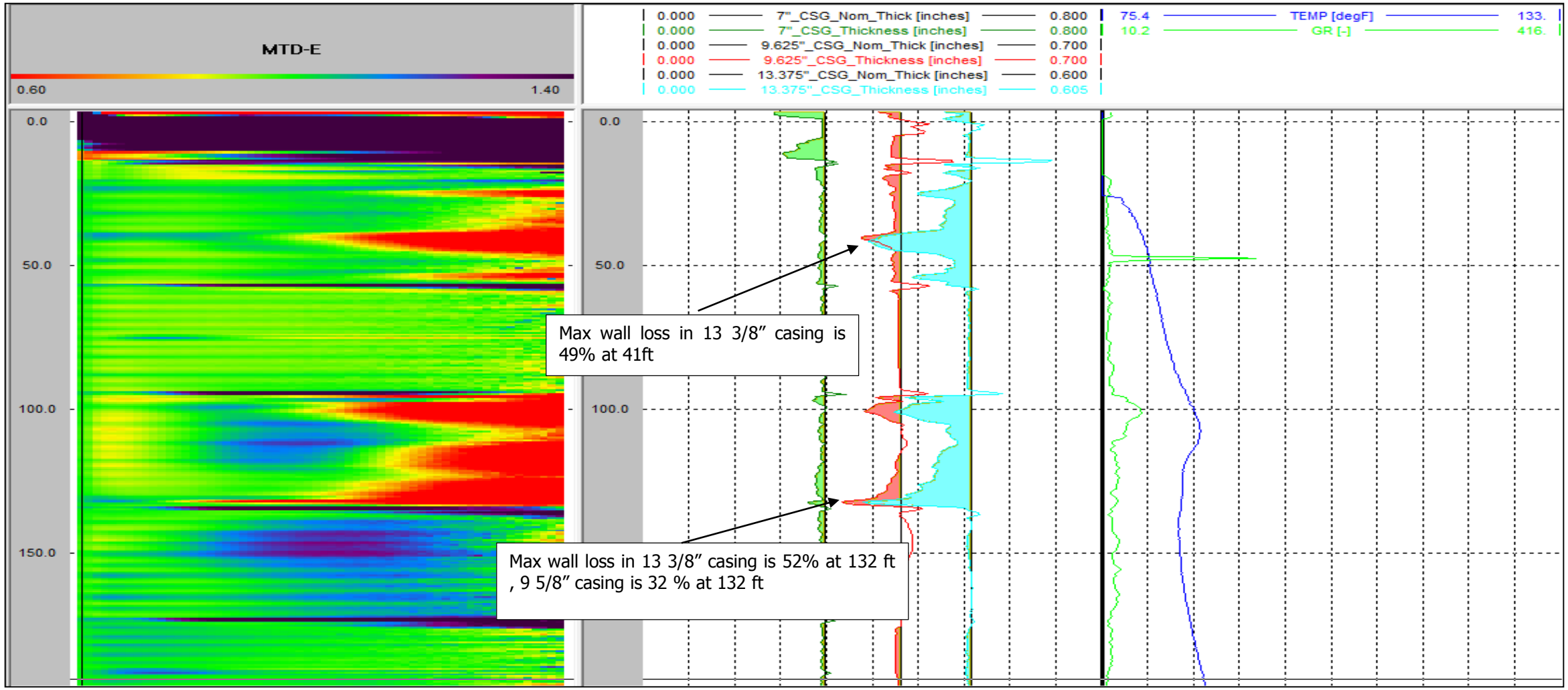
TARGET APPLICATIONS

- Water shut-off & time lapse monitoring
- GWC, Sigma monitoring with dual-phase flow profiling
- Daylight-only operations
- Limited rig-up space



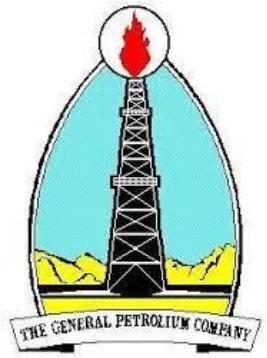
Brown Fields problems and Production Logging Solutions

Case Study: Multi Barrier Corrosion monitoring without removing tubing



Logging Experience (Scientific Drilling and Discovery Oil)

Global Customers



Brown Fields Problems and Production Logging

Conclusion

- Production Logs like MPLT, MPNN, and noise logs can provide comprehensive insights for better reservoir monitoring and surveillance
- Production Logging through Flow Jet Pump optimize the data acquisition practices for data driven workover and remedial production optimization techniques.
- Maximizing production returns and reducing the cost of produced water.
- Optimizing artificial lift designs for future runs.
- Mitigate well integrity issues such as corrosion and leak reduce environment impact.

Thank you, Questions ?

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