

# MATURE FIELD SERVICES

[chs@scientificdrilling.com](mailto:chs@scientificdrilling.com)





# MAXIMIZE PRODUCTION POTENTIAL

Maximizing the production potential of a hydrocarbon-producing field is the realization of efficient and focused reservoir and production management.

Scientific Drilling International (SDI) offers customized services to help operators achieve their field production objectives when pressures and reserves decline to levels that make economic recovery marginal. In close collaboration with industry experts and suppliers of leading technologies, SDI can provide the ultimate solution for the needs of your field or reservoir. As the lifecycle of the field or well nears its end, SDI has tailor-made solutions for safe and cost-effective plug and abandonment (P&A) operations.



# AT YOUR SERVICE

Scientific Drilling International offers the following fit-for-purpose services, tailored and scaleable to fit Operator needs.

- + Expert data analysis with crucial insights into your challenges, providing the foundation for best-in-class solutions
- + Expertise to provide guidance for the delivery and implementation of fit-for-purpose solutions
- + Technologies that can unlock unrealized potential and address the causes of production decline
- + Cost-effective technical solutions for P&A data requirements and well abandonment

## TARGET APPLICATIONS

Bi-passed hydrocarbon evaluation • Water shut-off • Barrel chasing  
Artificial lift operating lifetime extension • Plug and abandonment



# CASE HISTORY

Water Shut-off



## CLIENT CHALLENGE

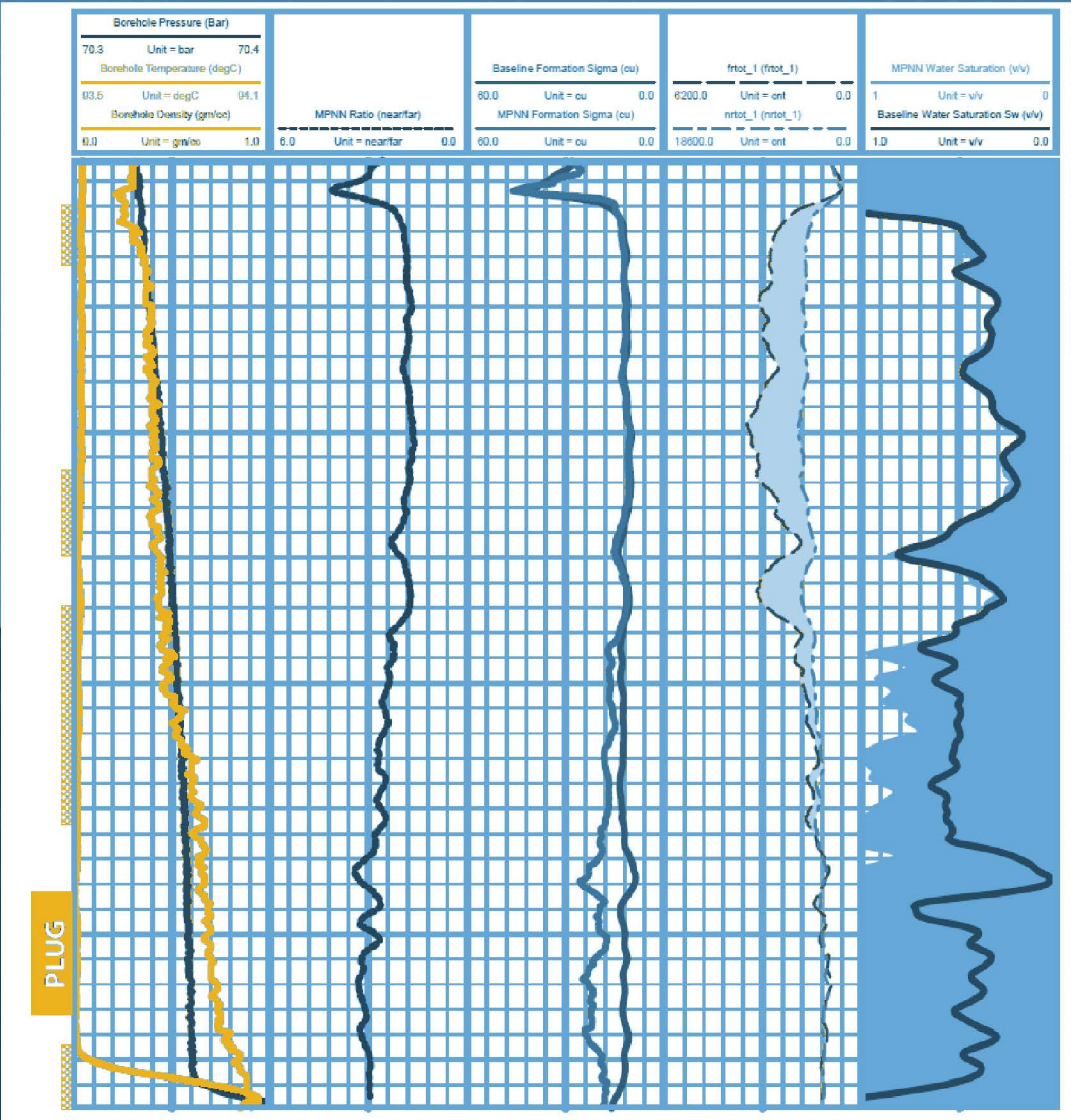
An operator’s gas producer well was producing at a progressively higher water/gas ratio (WGR), with a water rate of 189 sm3/d. In order to reduce the water production and extend the production lifetime of the well, the operator planned water shut-off activities. To determine the source of water production, a pulsed neutron log was required to be run for comparison with a baseline log run several years previously. Much of the borehole was now gas-filled meaning that pulsed neutron gamma (detector) technology would be unreliable. For cost-effective operations, the client preferred slickline as the method of conveyance.

## SCIENTIFIC SOLUTION

Scientific Drilling’s MPNN provided the data gathering solution to the customer’s challenges. With neutron detectors as opposed to gamma-ray, the tool is highly reliable in gas environments. The memory mode of the tool provided the cost-effective option of slickline conveyance. Two passes were completed across the interval of interest and the data stacked for enhanced statistical accuracy. A comparison with the baseline pulsed neutron log data clearly indicates the water saturated zone providing confidence to the operator for the subsequent remedial WSO activities. This was confirmed with the updated water saturation results, which showed that the bottom perforated zone had become completely water saturated.

## CLIENT VALUE

A plug was set above the main water-producing zone (at the depth indicated) and the subsequent well test revealed that the water rate had reduced by 42% to 110 sm3/d. This extended the lifetime of the well, significantly enhancing its monetization potential. In addition, the reduced water production eased the burden of dealing with the produced water, reducing cost and saving time. All was achieved without having to resort to expensive electric-line and its associated pressure control risk factor and environmental impact.





# CASE HISTORY

## Barrel Chasing



### CLIENT CHALLENGE

A velocity string was installed in a gas producer to help enhance performance that had become hindered by water production. The operator wanted to evaluate the downhole flow profile and identify gas and water entries across the perforated 5" liner, choosing to deploy a memory production logging tool (MPLT). The presence of a 1.688" restriction limited the options for deployment of PLT technology that could be relied upon to acquire high quality measurements in the 5" liner.

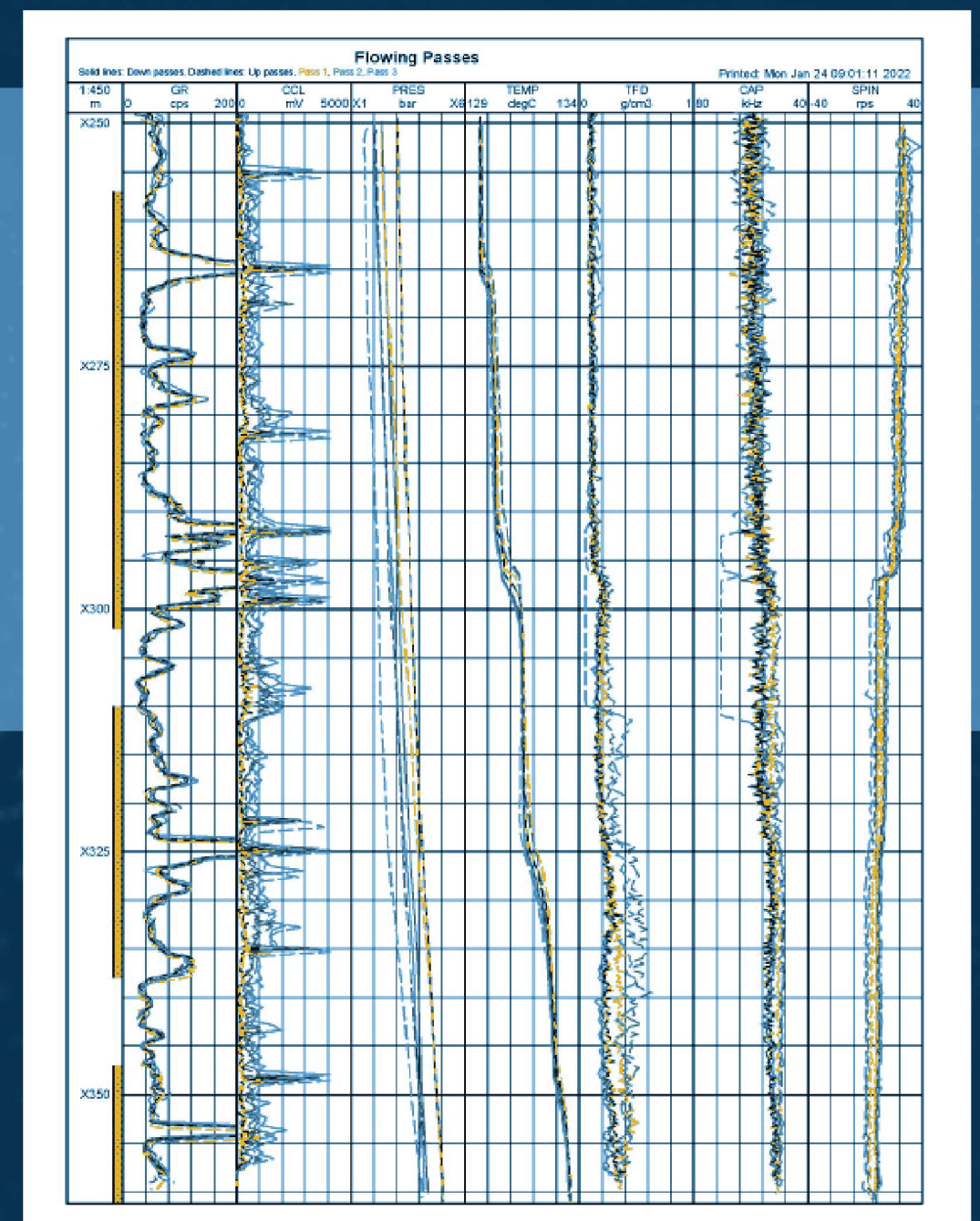
### SCIENTIFIC SOLUTION

SlimFlow is Scientific Drilling's slimline MPLT system. With a maximum outside diameter of 1.5", it was ideal for the well parameters. The tool comprises the standard sensors found in a PLT string including Tuning Fork Density, Capacitance, In-line spinner and Fullbore spinner.

A comprehensive logging program was followed with passes performed in shut-in and two flow rates. Complete data was retrieved from the tool and the response from all of its sensors were of high quality as can be observed in the log plot data.

### CLIENT VALUE

By utilizing the SlimFlow MPLT system, the client benefited from a slim MPLT technology solution without compromising data quality. The slim tool-string configuration provided the added benefit of reducing the disturbance of the flow regime in comparison with a conventional PLT.





CASE HISTORY | Bi-Passed Hydrocarbon Evaluation



CLIENT CHALLENGE

A well with existing perforations was identified as a candidate for perforation of a previously non-tested zone. Open hole logs several years earlier appeared to show the zone to be gas bearing. The customer wished to confirm this, and to also ensure no change in formation saturation had occurred, by logging the zone with a pulsed neutron tool in thermal decay/ Sigma mode. The borehole was gas-filled and the client preferred slickline as the method of conveyance. The customer sought a memory pulsed neutron tool which was not reliant on a high salinity water-filled borehole for accurate results.

SCIENTIFIC SOLUTION

With SDI's MPNN system, the customer had the ideal solution for their data acquisition requirements. Being a neutron-detecting tool, it works very effectively in gas environments with the neutron counts maximized, providing far greater statistical accuracy than gamma-ray-detecting pulsed neutron technology. The tool was logged across the interval of interest twice and the pass data stacked to improve the signal-to-noise-ratio.

CLIENT VALUE

By utilizing neutron-detecting pulsed neutron technology, the client was able to avoid the costs associated with filling the borehole with water and risking damage to the formation across the existing perforated zone. The results from the MPNN confirmed the presence of a gas zone and on this basis the customer proceeded with perforating the zone. Upon perforating the zone, additional gas production of 480,000 Nm3/day was observed.

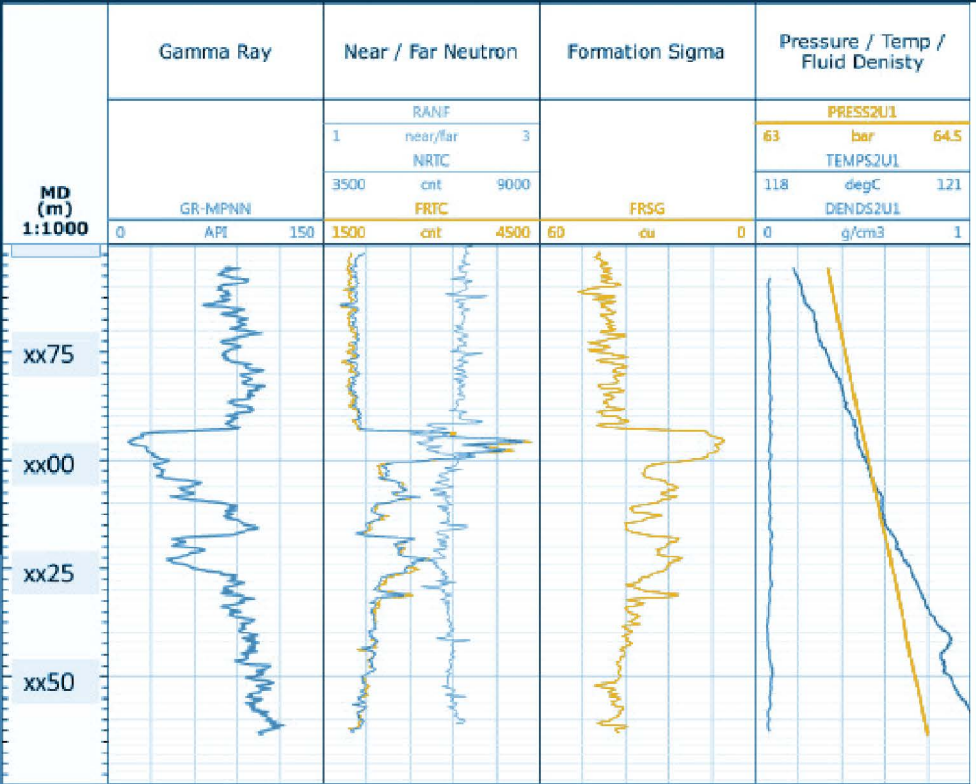


Fig.1: MPNN data over z one of interest shows presence of porous and hydrocarbon bearing zone

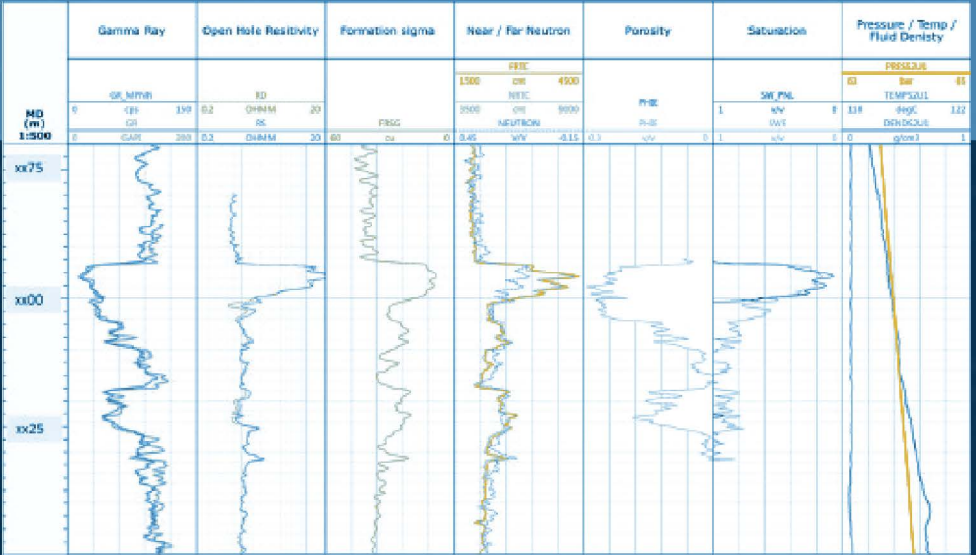


Fig.2: Comparison of MPNN and Open hole data show good agreement between Gamma, Resistivity vs Sigma and Neutron readings



# CASE HISTORY

## Artificial Lift Lifetime Extension



### CLIENT CHALLENGE

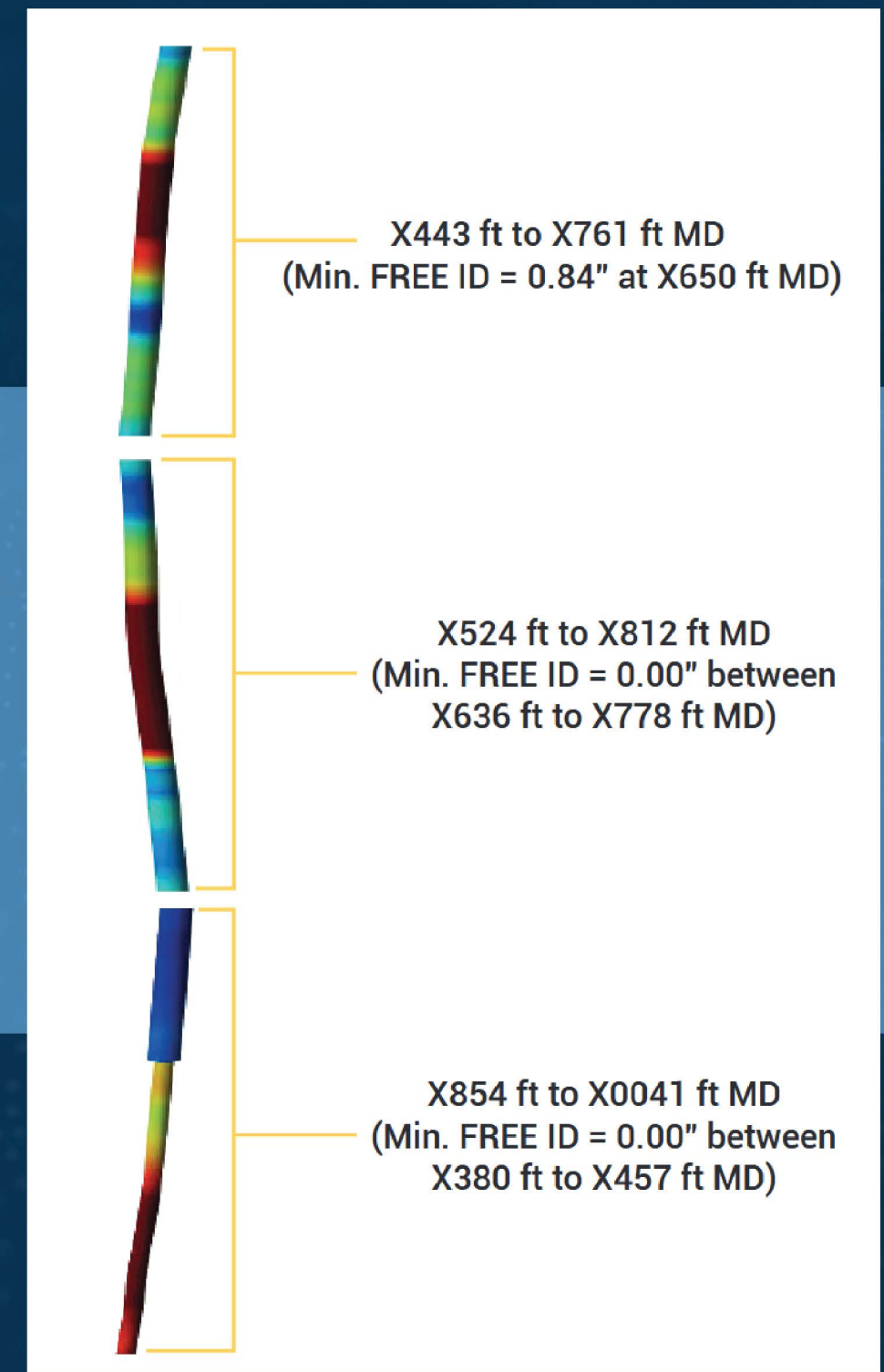
The client's well had a history of premature electrical submersible pump (ESP) failures. Most recently, an ESP that was installed in April 2020 failed one month later. To diagnose the cause of failure, the customer decided to obtain insight into areas of mini-dog legs/tortuosity within the 7" Casing (Surface to X082 ft MD), and 5" liner (X854 ft MD to X0041 ft MD) prior to deployment of another ESP of 130.7 ft length and 4.56" OD.

### SCIENTIFIC SOLUTION

The client used Scientific Drilling's DuraSet service, which utilizes a close interval, directional survey to model the wellpath at high depth resolution increments (e.g. 1 ft). This allows identification of mini dog-leg severity/tortuosity and FREE ID calculations for various BHA lengths to determine whether a force/bending moment would be required to get downhole and whether an ESP set across an interval be subject to bending forces. Using proprietary 3D software modeling, these short-interval measurements provide FREE ID logs for the given ESP dimensions. Scientific Drilling conducted a wireline tortuosity survey (in-run and out-run) at a speed of 80 ft/min to acquire survey stations approximately every 1 ft.

### CLIENT VALUE

Prior to receiving the DuraSet data, the customer had decided to set the ESP at X900 ft. However, the DuraSet data revealed that the FREE ID at that depth would apply bending forces to the ESP components and that a better option would be to set the ESP at X300 ft. The ESP was subsequently set at the newly recommended depth and has been functioning effectively ever since. The resultant extension of the operating window of the ESP equates to cost savings of approximately \$250K.



3D images of effective FREE ID (ESP length of 130.7 ft and ESP OD of 4.56 in)



# ARE YOU FACING MATURE FIELD CHALLENGES?

---

Contact a Mature Field Services Expert at: **CHS@ScientificDrilling.com**

To learn more about Scientific Drilling International's expanded Cased Hole Services and capabilities, please visit [www.scientificdrilling.com/CHS](http://www.scientificdrilling.com/CHS)

