

## Production Log Interpretation Results

**Company:** University of Utah  
**Well:** Forge 16B(78)-32  
**Field:** Wildcat  
**County:** Beaver, Utah  
**Log Date:** 28-Aug-2024  
**Log Analyst:** Leonid Kolomytsev / Casey Chadwick



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## Objectives:

The main objective is to locate downhole water entries and provide a production profile.

## Well / Job Information:

Casing: 7", 38#, VSTP-110M @ 10208' MD

Tubing: None

Perforations: 8774'-8778' MD (top), 9769'-9773' MD (bottom)

Primary Depth Reference: Perforations as reported University of Utah

Tool String: Di Drill geothermal pressure temperature and spinner probe (SRO).

## General Logging Procedure:

- 1) Confirm stable production at surface. Report and record surface production rates at regular intervals (at least every 30 minutes) during logging operations. Send all LAS log data to SLB Domain Champion.
- 2) RU & RIH @ 100 fpm to 5700' MD (KOP). Pinch production if needed to drop tool, then return to full production as soon as possible. Record Station (at least 30 min) to confirm stable production defined as 15 psi or less change in pressure over 30 minutes. If not stable, continue station until stable.
- 3) Record Spinner Calibration passes, 4D/4U, from 5700'-5500' MD @ 60/90/120/150 fpm.
- 4) Record Down Pass One (D1) @ 100 fpm to Bottom Log Interval (BLI) @ 9873' MD (100' below bottom shot) or depth of tool refusal. Immediately send D1 data to SLB Domain to confirm depth correlation.
- 5) Record Up Pass One (U1) @ 100 fpm from BLI to Top Log Interval (TLI) @ 8674' MD (100' above top shot). Send U1 data to SLB Domain to confirm depth correlation.
- 6) Record Down Pass Two (D2) @ 100 fpm from BLI to TLI. Send data
- 7) Record Stations (2 minutes each) starting at BLI then as outline by Utah Forge team (see Figure 4 below) (blue and red) (between each cluster and stage). Add station @ 8625' MD.
- 8) Confirm data quality with Domain Champion. Additional passes or stations may be requested.
- 9) WOO (Wait on Orders) before recording ROH pass @ 100 fpm.

## Interpretation Remarks

This interpretation is based on Hi-Temp Di Drill memory PLT data conveyed on SLB wireline on 28-Aug-2024 by Danya Al Hassan, SLB Senior Field Engineer.

Color coding for curves: Red (Down 1), Dark Blue (Up 1), Green (Down 2). Station stops were made at the same flowing condition and are presented as circles (one per second) at their respective depths.

Initial depth correlation is by the field engineer/specialist. Minor log depth shifting and log depth matching is applied by the log analyst as needed to improve the correlation. Correlation to the reported perforations.

Top Log Interval (TLI) @ 8500' MD. Bottom Log Interval (BLI) @ 9242' MD.

Downhole Pressure (PPRE) is stable during flowing logging operations. Average pressure from stable passes is used in the interpretation calculations.

Downhole Temperature (TEMP) trends are repeatable between logging passes and supports most entries. Down passes are used preferentially in the interpretation calculations.

Spinner (SPIN) is working for all logging passes. All spinner passes are used in the spinner calibrations with the most repeatable (stable) passes used for velocity calculations.

Downhole rate (Q) is calculated using the velocity (V) from the spinner times the pipe area (A) using nominal ID, or  $Q = V \times A$ . Rates are presented in downhole barrels on the log snapshots and then converted to surface rates at standard conditions for the results table.

Overall, data quality is good, unless noted, and the downhole environment is relatively stable resulting in a high level of confidence in the interpretation calculations and results.

## Interpretation Results: Surface Flowrate Results – Stage

Stage	Perforations		Water (bpd)	Water (%)
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5	9270	9276	3112.2	25.8%
4	9320	9493	4573.9	37.9%
3	Below 9240		4388.3	36.3%
2				
1				

Totals			12074.4	100.0%
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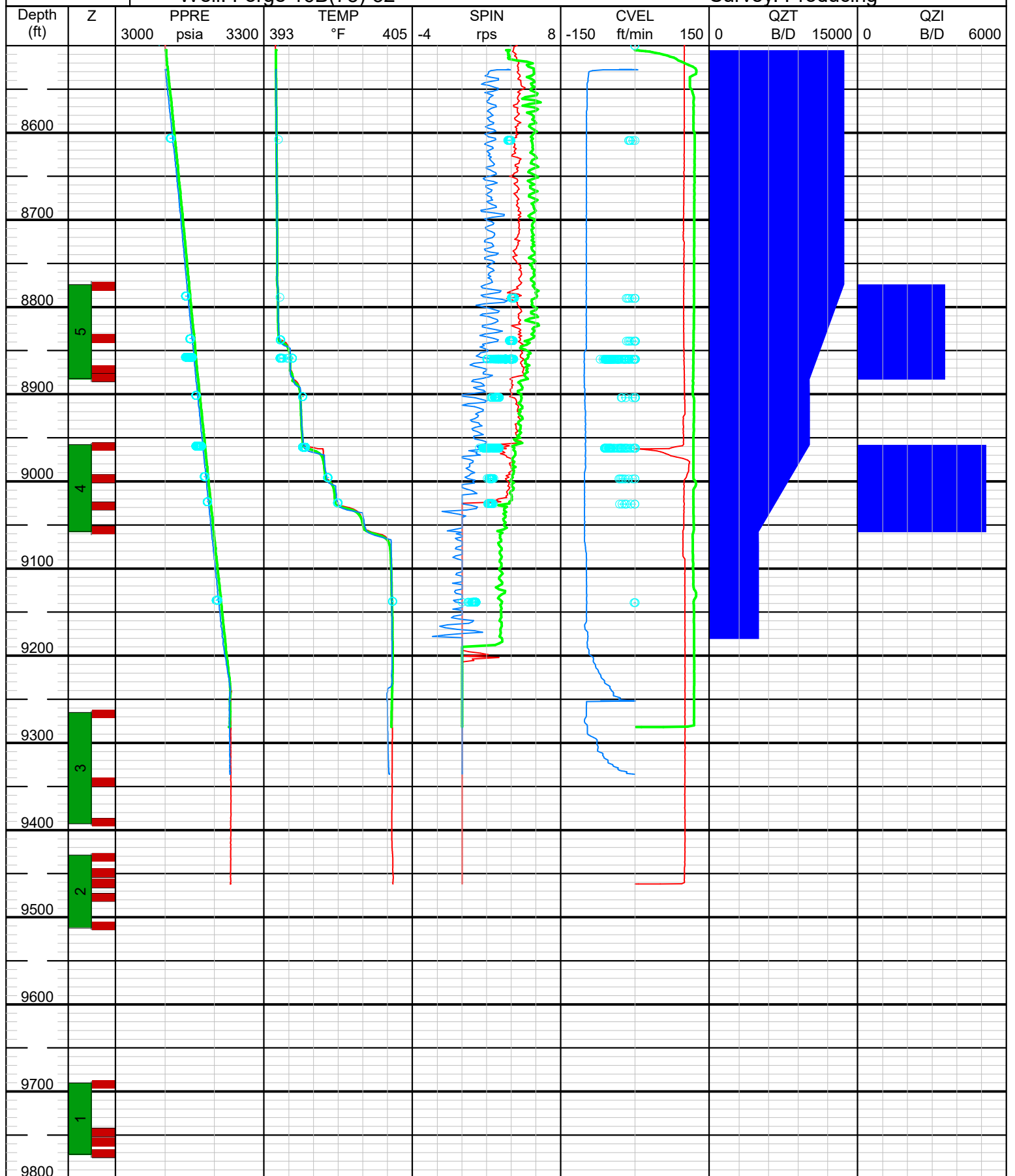


# Hi-Temp PLT - Interpretation - Stage

Utah Forge 16B(78)-32 HiTemp P...

Company: University of Utah  
Field: Wildcat  
Well: Forge 16B(78)-32

Test: HT PLT (Di Drill)  
Date: 28-Aug-2024  
Survey: Producing



## Interpretation Results: Surface Flowrate Results – Detail

Stage	Perforations	Water (bpd)	Water (%)
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5	8774	8778	trace	trace
	8834	8838	1309.0	10.8%
	8870	8874	314.2	2.6%
	8879	8883	1489.0	12.3%
4	8958	8962	1381.2	11.4%
	8995	8999	765.9	6.3%
	9026	9030	1439.9	11.9%
	9054	9058	986.9	8.2%
3	Below 9240		4388.3	36.3%
2				
1				

Totals		12074.4	100.0%
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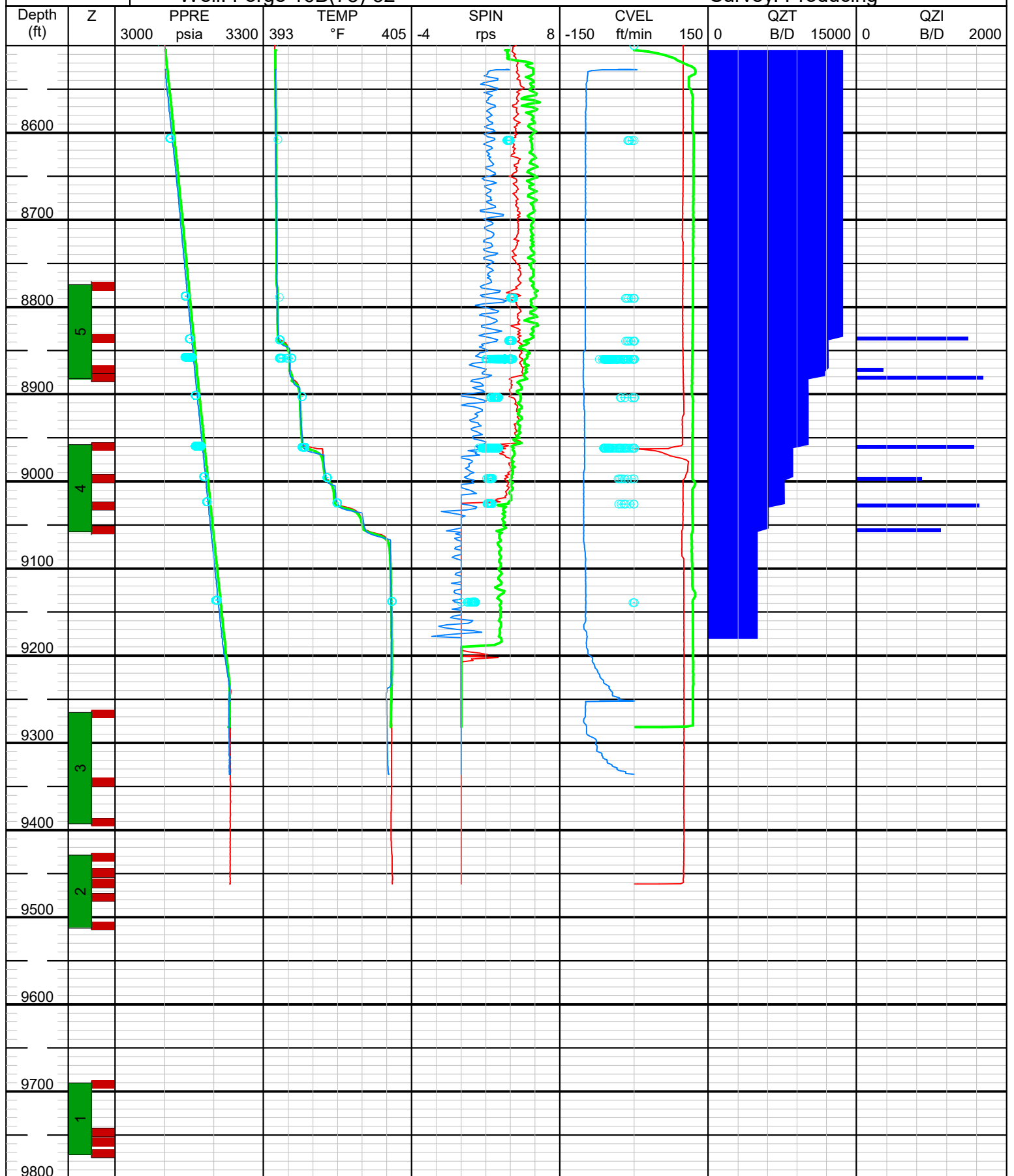


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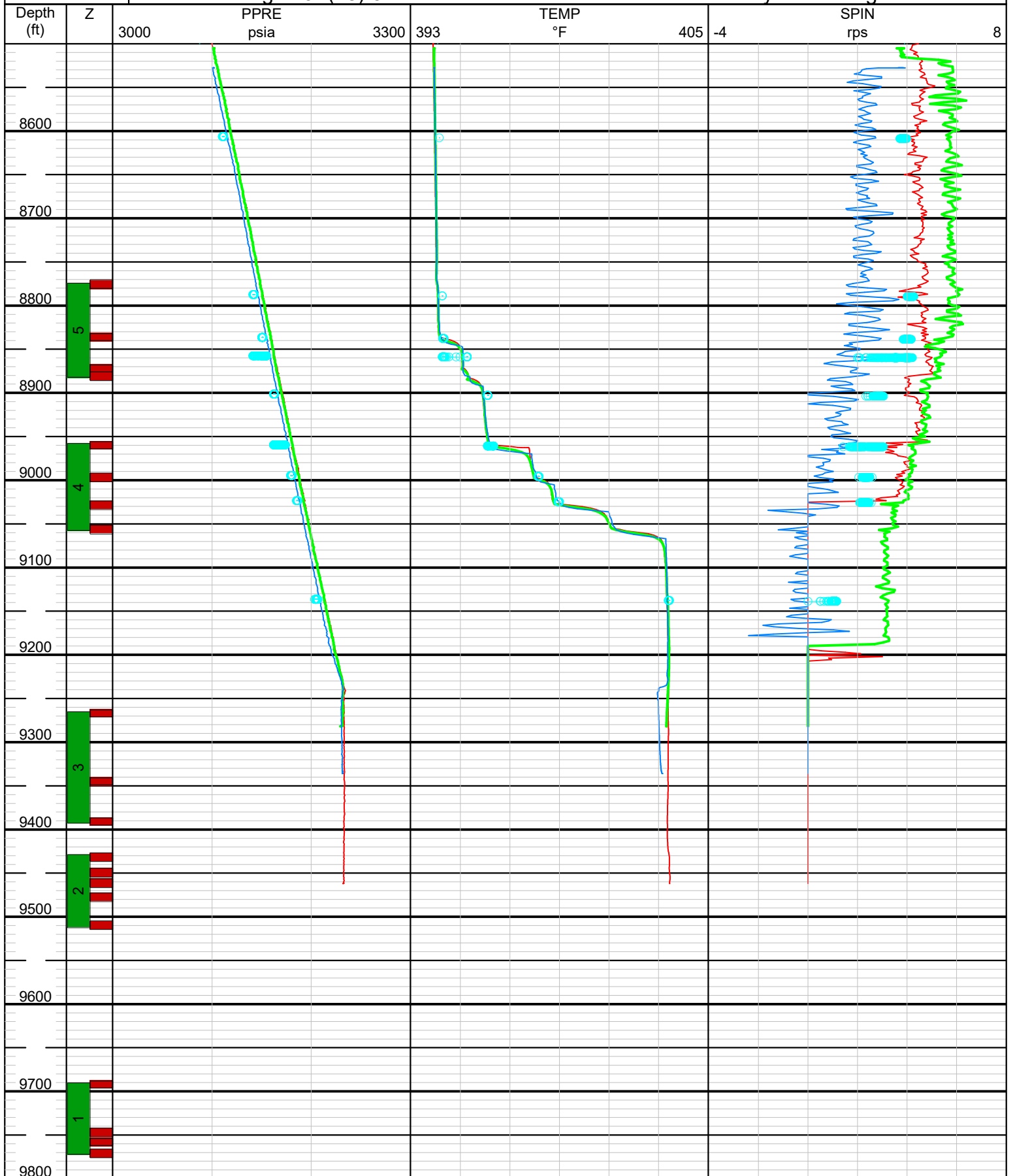


# Hi-Temp PLT - Pressure & Temperature

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Test: HT PLT (Di Drill)  
Date: 28-Aug-2024  
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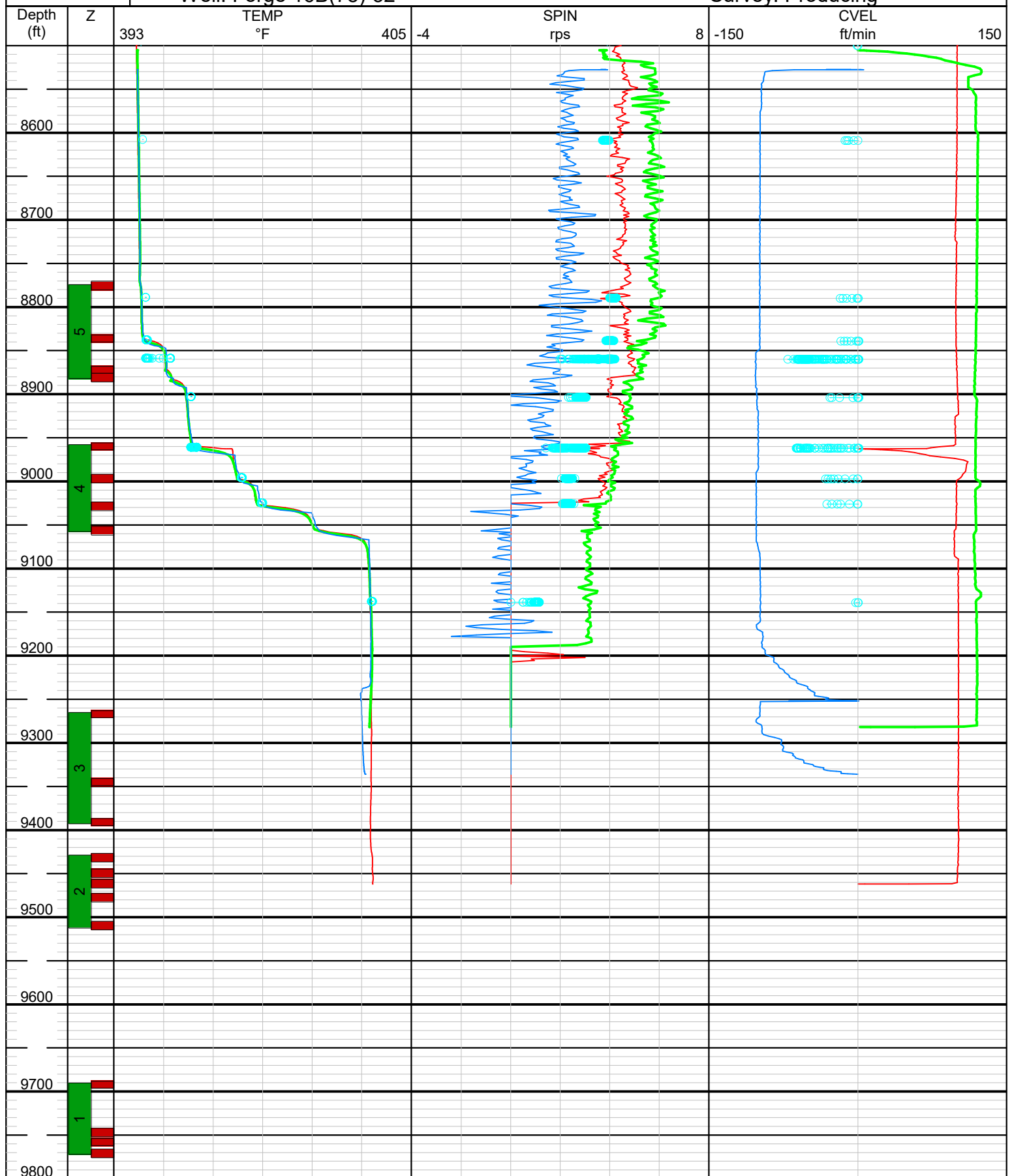


# Hi-Temp PLT - Spinner & Cable Velocity

Utah Forge 16B(78)-32 HiTemp P...

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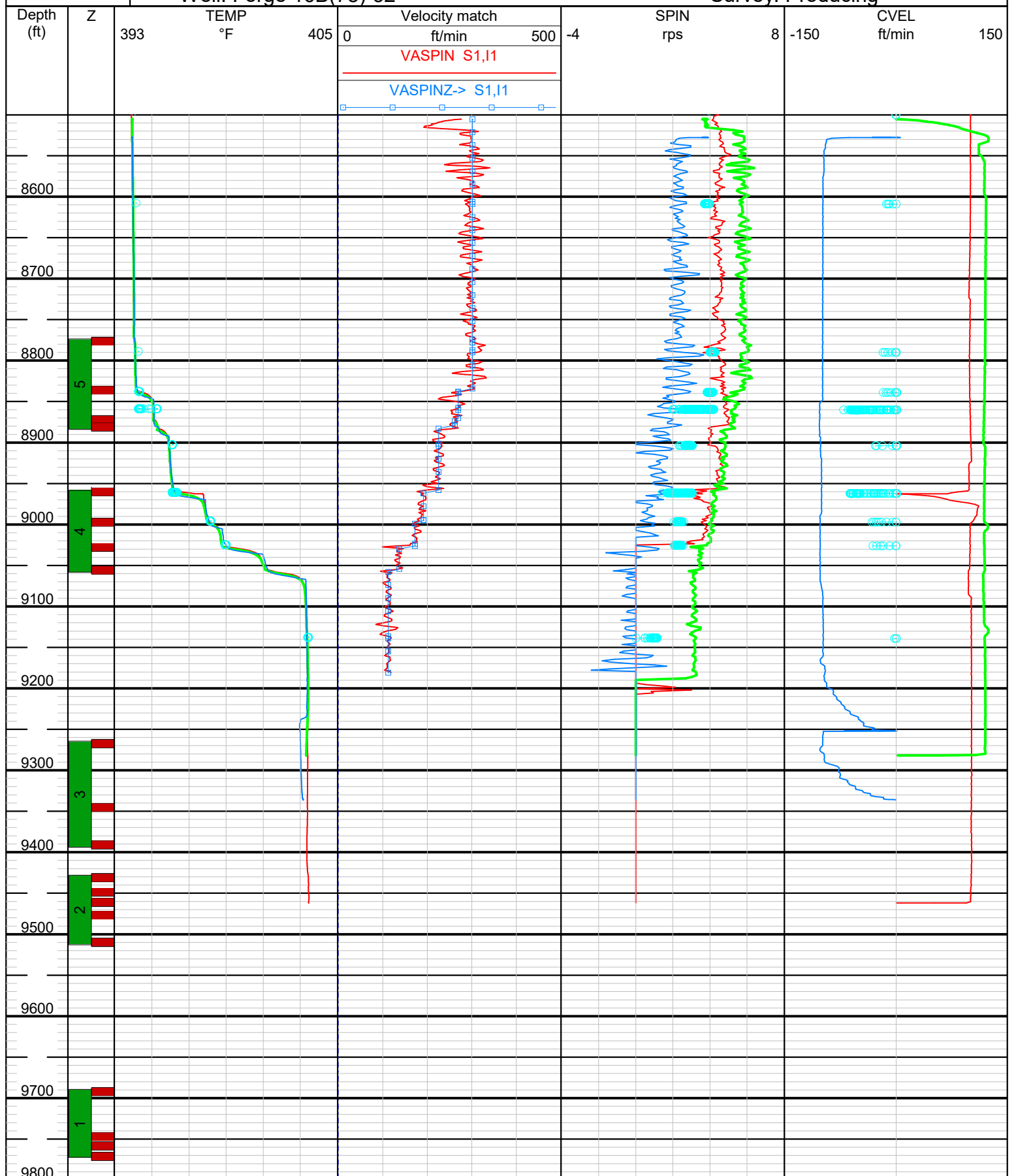


# Hi-Temp PLT - Spinner & Velocity Match

Utah Forge 16B(78)-32 HiTemp P...

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Well: Forge 16B(78)-32


Test: HT PLT (Di Drill)  
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Survey: Producing



## Tool Sketch

Tool Description : Di Drill Geothermal Pressure Temperature and Spinner Probe (SRO)

Geothermal Pressure Temperature and Spinner Probe (SRO)



MAIN FEATURES

MEASUREMENT SPECIFICATIONS

Number of Data Points	1,400,000 Sets
Minimum Sample Rate	1 Second
Interface	USB

RUNNING GEAR SPECIFICATIONS

Outside Diameter	1.75"
Outer Housing Collapse Pressure	5,000 PSI

TEMPERATURE SENSOR SPECIFICATIONS

Downhole Temperature Rating	6 hours @ 300°C/570°F
	4 hours @ 350°C/660°F
Accuracy	(+/- 0.25°C)
Resolution	.0001°C
Response Time	1.5 Sec/10°C
Sensor Type	Resistive Thermal Device(RTD)

PRESSURE TRANSDUCER SPECIFICATIONS

Range	5,000 PSI
Accuracy	0.024% F.S.
Resolution	0.0003% F.S.
Transducer Type	Piezo resistive

FLOWMETER SPECIFICATIONS

Outside Diameter	2 1/8" and 1 11/16"
Resolution	1 RPM
Flow Sensing	Directional
Threshold	300 RPM (Min)/20,000 RPM (MAX)


**TOOL DESCRIPTION:**

Di Drill Survey Services PTS sensor is a subsurface, high temperature instrument designed to continuously record downhole pressure, temperature, and flow. The instrument can operate down hole for up to 6 hours at 570°F and 4 hours at 660°F. The electronic section of the instrument is encased in a pressure housing, which thermally protects the temperature sensitive components from the high geothermal temperatures it will be subjected to. The pressure transducer senses wellbore pressure through an attached capillary tube, while the RTD sensor remains exposed to the wellbore for accurate and fast response times for temperature sensing and recording. Interchangeable flow meters and impellers allow the user to choose the best configuration for conditions.

- Entirely designed and manufactured in the U.S.A.
- Robust electronics section
- Rugged, accurate, and independently compensated piezoresistive transducer
- Fast response external RTD temperature sensor
- Redundant memory
- Battery management system within the software
- Depth data with serial encoder for Pressure/Time vs. Depth/Time
- All materials meet NACE MRO 175 specifications for corrosive wellbore media

**OPERATION MODES:**

Real time Surface Recording – The tool is run on a single conductor electric line which provides power and bi-directional communication to the tool.



## Table of Abbreviations

### Tool Mnemonics List

PSP	Production Services Platform
PBMS	Production Basic Measurement Sonde (Temperature, Pressure, CCL, GR)
PCMS	Production Compression Measurement Sonde
PGMC	Production Gradio Manometer Carrier (Density)
PFCS	Production Flowmeter Caliper Sonde (Holdup, Caliper, Full Bore Spinner)
PILS	Production In-Line Spinner
DEFT	Digital Fluid Entry Tool (Electrical Probes)
GHOST	Gas Holdup Optical Sensor Tool (Optical Probes)
FSI	Flow Scanner Imager

### Data/Sensor Mnemonics List

CALI_FSI	Flow Scanner Caliper
CCLC/CCLD	Casing Collar Locator
CVEL/SCVL	Cable Velocity
D1RB DEFT	Relative Bearing Probe 1
DFBFx_FSI (0-5)	FSI Vertical DEFT Bubble Count Array (0=Bottom,5=Top)
DFBM	PSP Mean DEFT Bubble Count
DFBx (1-4)	PSP Individual Probe DEFT Bubble Count
DFHFX_FSI (0-5)	FSI Vertical DEFT Water Holdup Array (0=Bottom,5=Top)
DFHM	PSP Mean DEFT Water Holdup
DFHx (1-4)	PSP Individual Probe DEFT Water Holdup
GHBFX_FSI (0-5)	FSI Vertical GHOST Bubble Count Array (0=Bottom,5=Top)
GIBM2	PSP Mean GHOST Bubble Count
GHBx (5-8)	PSP Individual Probe GHOST Bubble Count
GHHFX_FSI (0-5)	FSI Vertical GHOST Gas Holdup Array (0=Bottom,5=Top)
GHHM2	PSP Mean GHOST Gas Holdup
GHHx (5-8)	PSP Individual Probe GHOST Gas Holdup
GR	Gamma Ray
HTEN	Head Tension/Compression
MWFD	Pressure Derived Density
PFC1	PSP Caliper 1 (X)
PFC2	PSP Caliper 2 (Y)
RB_FSI	FSI Relative Bearing
SPIN/SPI1	Full Bore Spinner / Inline Spinner
SPIFX_FSI (0-4)	FSI Vertical Micro-Spinner Array (0=Bottom,5=Top)
WFDE	Gradio Well Fluid Density
PPRE	Well Pressure
TEPM	Well Temperature

### Interpretation Mnemonics List

QGD/QGZT	Gas Rates (down hole unless otherwise stated)
QWD/QGZT	Water Rates (down hole unless otherwise stated)
QOD/QOZT	Oil Rates (down hole unless otherwise stated)

Color Coding is typically the same for all the curves that belong to the same pass.

RED – Pass One / Dark Blue – Pass Two / Green – Pass Three / Light Blue – Pass Four

## References

For more information, please visit:

### **FloScan Imager (FSI)**

<https://www.slb.com/-/media/files/wireline-production-services/brochure/flow-scanner-br.ashx>

### **Production Services Platform (PSP)**

<https://www.slb.com/-/media/files/fe/product-sheet/ps-platform-ps.ashx>

### **Reservoir Saturation Tool - Water Flow Log (RST-WFL)**

<https://www.slb.com/-/media/files/fe/brochure/rstpro-brochure.ashx>

### **TuffTRAC iX Tractor (TTiX)**

<https://www.slb.com/products-and-services/innovating-in-oil-and-gas/well-intervention/slickline-and-wireline-intervention/wireline-tractors/tufftrac-ix-intelligent-extreme-wireline-tractor>

## End of Report