Schlumberger

Company: TUG HILL OPERATING, LLC

Well: EINSEL TRUST 1 SWD

Field: MARTIN

County: KIOWA State: KANSAS

County: KIOWA
Field: MARTIN
Location: SHL: 200' FSL & 634' FWL
Well: EINSEL TRUST 1 SWD
Company: TUG HILL OPERATING, LLC

PLATFORM EXPRESS

ARRAY INDUCTION

GAMMA RAY - SP

| Location: | | | |
|---|---|---|---|
| SHL: 200' FSL & 634' FWL | Elev. | K.B. | 2318.00 ft |
| | | G.L. | 2294.00 ft |
| | | D.F. | 2318.00 ft |
| Permanent Datum: | Ground Level | Elev.: | 2294.00 f |
| Log Measured From: | Kelly Bushing | 24.00 ft | above Perm.Datum |
| Drilling Measured From: | Kelly Bushing | | |

| API Serial No. | Section: | Township: | Range: |
|---|---|---|---|
| 15-097-21727 | 8 | 27 S | 20 W |

| | | | | | | |
|---|---|---|---|---|---|---|
| Logging Date | | | 11-Jul-2012 | | | |
| Run Number | | | 1 | | | |
| Depth Driller | | | 5456.00 ft | | | |
| Schlumberger Depth | | | 5444.00 ft | | | |
| Bottom Log Interval | | | 5436.00 ft | | | |
| Top Log Interval | | | 984.00 ft | | | |
| Casing Driller Size @ Depth | | | 9.625 in @ 984.00 ft | | | |
| Casing Schlumberger | | | 984 ft | | | |
| Bit Size | | | 8.75 in | | | |
| Type Fluid In Hole | | | Water Based Mud | | | |
| MUD | Density | Viscosity | 9.6 lbm/gal | 52 s | | |
| | Fluid Loss | PH | 19 cm3 | 10.6 | | |
| | Source of Sample | | Active Tank | | | |
| RM @ Meas Temp | | | 0.29 ohm.m @ 78.8 degF | | | |
| RMF @ Meas Temp | | | 0.22 ohm.m @ 68 degF | | | |
| RMC @ Meas Temp | | | 0.44 ohm.m @ 68 degF | | | |
| Source RMF | RMC | | Calculated | Calculated | | |
| RM @ BHT | RMF @ BHT | | 0.17 @ 138 | 0.11 @ 138 | | |
| Max Recorded Temperatures | | | 138 degF | | | |
| Circulation Stopped | Time | | 11-Jul-2012 | 02:00:00 | | |
| Logger on Bottom | Time | | 11-Jul-2012 | 13:00:09 | | |
| Unit Number | Location: | | 3082 | ELK CITY, OK | | |
| Recorded By | | | Laura Sullivan / Zach Hagan | | | |
| Witnessed By | | | Brad Prickett | | | |

## Disclaimer

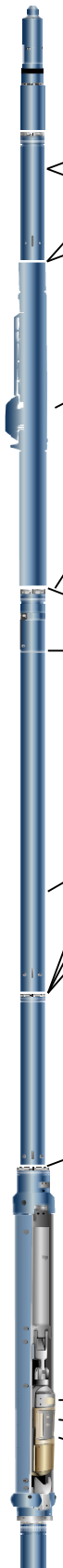


## Contents

# Remarks and Equipment Summary

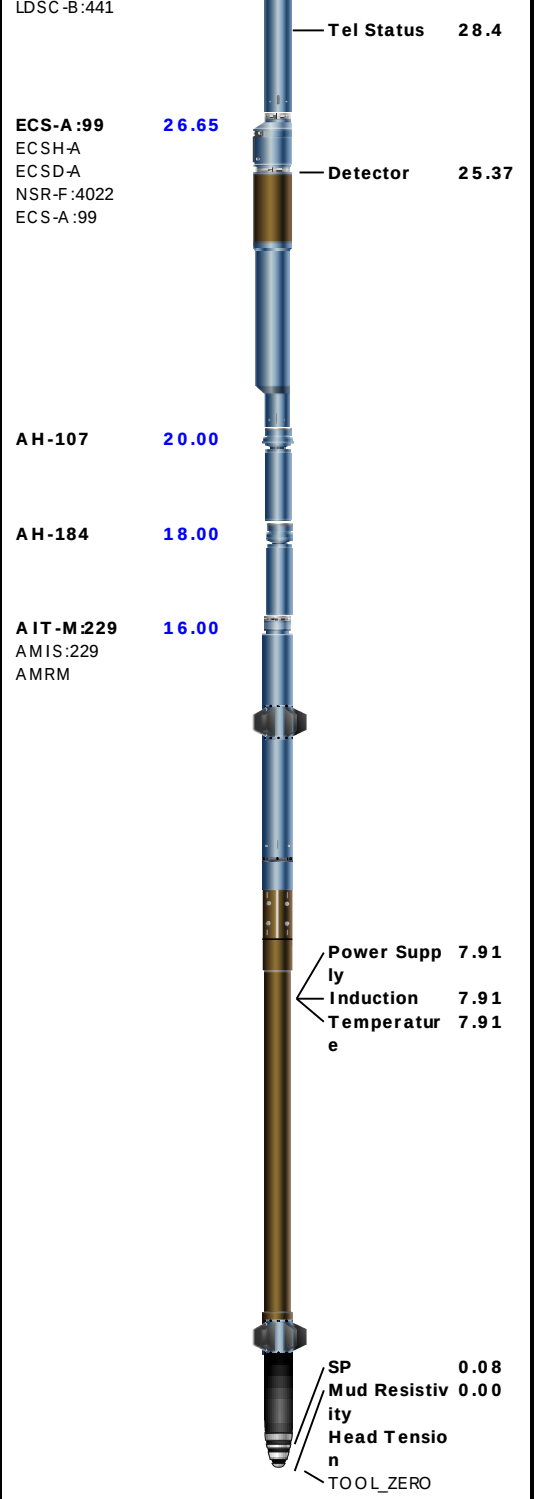
## 1A: Toolstring

| Equip name | Length | MP name | Offset |
|---|---|---|---|
| **LEH-QT:3077** | **65.3** | | |
| LEH-QT:3077 | | | |
| **DTC-H:8187** | **62.38** | | |
| ECH-KC:10469 | | | |
| DTC-H:8187 | | | |
| | | **CTEM** | **61.48** |
| | | **HV** | **0.00** |
| | | **TelStatus** | **59.38** |
| | | **ToolStatus** | **59.38** |
| **MLT-B:11** | **59.38** | | |
| MLT-B:11 | | | |
| | | **Micrologs Pad** | **55.97** |
| | | **Micrologs Status** | **51.8** |
| **HGNS-H:3819** | **51.8** | **Temperature** | **51.77** |
| HGNH:2844 | | | |
| NSR-F:5226 | | | |
| NPV-N | | | |
| HGNS-H:3819 | | **GR** | **51.06** |
| HMCA-H | | | |
| HACCZ-H:2102 | | | |
| | | **CNL Porosity** | **44.73** |
| | | **HMCA** | **42.39** |
| | | **HGNS** | **42.39** |
| | | **Accelerometer** | **0.00** |
| **HDRS-H:3964** | **42.39** | | |
| ECH-MEB:3747 | | | |
| HRCC-H:4709 | | | |
| HRMS-H:3964 | | | |
| HRGD-H:4700 | | | |
| GPV-Q | | | |
| Long Spacing:28548 | | | |
| Short Spacing:27727 | | **HRCC** | **38.39** |
| GSR-J:5347 | | | |
| Backscatter:26832 | | | |
| | | **MCFL** | **32.96** |
| | | **Caliper** | **32.48** |
| | | **TLD Density** | **32.09** |
| **LDSC-B:441** | **30.15** | | |
| LDSH-A:475 | | | |



## 1A: Remarks

| |
|---|
| Tool String ran as per Tool Sketch |
| Density Limestone Matrix 2.71 g/cc |
| Log Data affected by washout |
| Hole Cement Volume Computed using Future Casing Diameter of 7" Casing |
| Max Recorded Temperature 139 deg F |
| Your crew today: Kojo, Arona, Johnathan and Andrew. |
| Thank you for choosing Schlumberger of Elk City, OK. |
| 580-339-6535 |




Lengths are in ft
Maximum Outer Diameter = 5.875 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

## Depth Summary

| | | | |
|---|---|---|---|
| **Depth Control Parameters** | 1A | | |
| Conveyance Type | Wireline | | |
| Log Sequence | FIRST RUN IN HOLE | | |
| **Depth Remark Parameters** | 1A | | |
| Depth Remark 1 | ALL SCHLUMBERGER DEPTH PROCEDURES FOLLOWED AS PER STANDARD | | |
| Depth Remark 2 | IDW USED AS PRIMARY DEPTH MEASUREMENT & Z-CHART USED AS SECONDARY | | |
| **Depth Measuring Device** | 1A | | |
| Type | IDW-B | | |
| Serial Number | 900 | | |

| | | | |
|---|---|---|---|
| Calibration Date | 09-JAN-2012 | | |
| Calibrator Serial Number | 33 | | |
| Calibration Cable Type | 7-39P LXS | | |
| Wheel Correction 1 | -3 | | |
| Wheel Correction 2 | -3 | | |
| **Tension Device** | **1A** | | |
| Type | CMTD-B/A | | |
| Serial Number | 2549 | | |
| Calibration Date | 09-JUN-2012 | | |
| Calibrator Serial Number | 1018 | | |
| Calibration Points | 10 | | |
| Calibration RMS | 14 | | |
| Calibration Peak Error | 27 | | |
| **Logging Cable** | **1A** | | |
| Type | 7-39P-LXS | | |
| Serial Number | U712016 | | |
| Logging Cable Length ( ft ) | 18000.00 | | |

# 1A

# Main Pass 2" = 100'

## Integration Summary

| Output Channel(s) | Output Description | Input Parameter | Output Value | Unit |
|---|---|---|---|---|
| ICV | Integrated Cement Volume | GCSE_UP_PASS, FCD | 1079.67 | ft3 |
| IHV | Integrated Hole Volume | GCSE_UP_PASS | 2273.59 | ft3 |

## Software Version

| Acquisition System | Version |
|---|---|
| MaxWell | 3.0.9609.0 |
| Application Patch | SP-20120409-3.0.9609.1919 |
| | EXP_APL-OPElevation-3.0.9609.1966 |
| | EXP_APL-ADT-3.0.9609.1558 |

| Computation | Description | Version |
|---|---|---|
| Borehole | Borehole Ensemble provides common Borehole Parameters and Channels | 3.0.9609.1919 |

| Tool Elements | Description | Software Version | Firmware Version |
|---|---|---|---|
| HGNS-H | HILT Gamma-Ray and Neutron Sonde, 150 degC | 3.0.9609.1919 | 2.0 |
| AMIS | Array Induction Sonde - M | 3.0.9609.1919 | 1 |

## Pass Summary

| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | Depth Shift | Include Parallel Data |
|---|---|---|---|---|---|---|---|---|
| 1A | Log[7]:Up | Up | 840.60 ft | 5453.07 ft | 11-Jul-2012 1:07:06 PM | 11-Jul-2012 2:59:11 PM | 0.00 ft | |

All depths are referenced to toolstring zero

## Log

1A: Log[7]:Up B3DD9F04-81D7-4F00-9E61-A7066FF11CF0

Description: AIT Basic Log Two Format: Log ( AIT Basic Log Two ) Index Scale: 2 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:01

| Channel | Source | Sampling |
|---|---|---|
| AF20 | AIT-M:AMIS:AMIS | 3in |
| AF60 | AIT-M:AMIS:AMIS | 3in |
| AFCO60 | AIT-M:AMIS:AMIS | 3in |

| | | |
|---|---|---|
| GR | HGNS-H:HGNS-H:HGNS-H | 6in |
| ICV | Borehole | 6in |
| IHV | Borehole | 6in |
| SP | AIT-M:AMIS:AMIS | 6in |
| TIME_1900 | WLWorkflow | 0.1in |

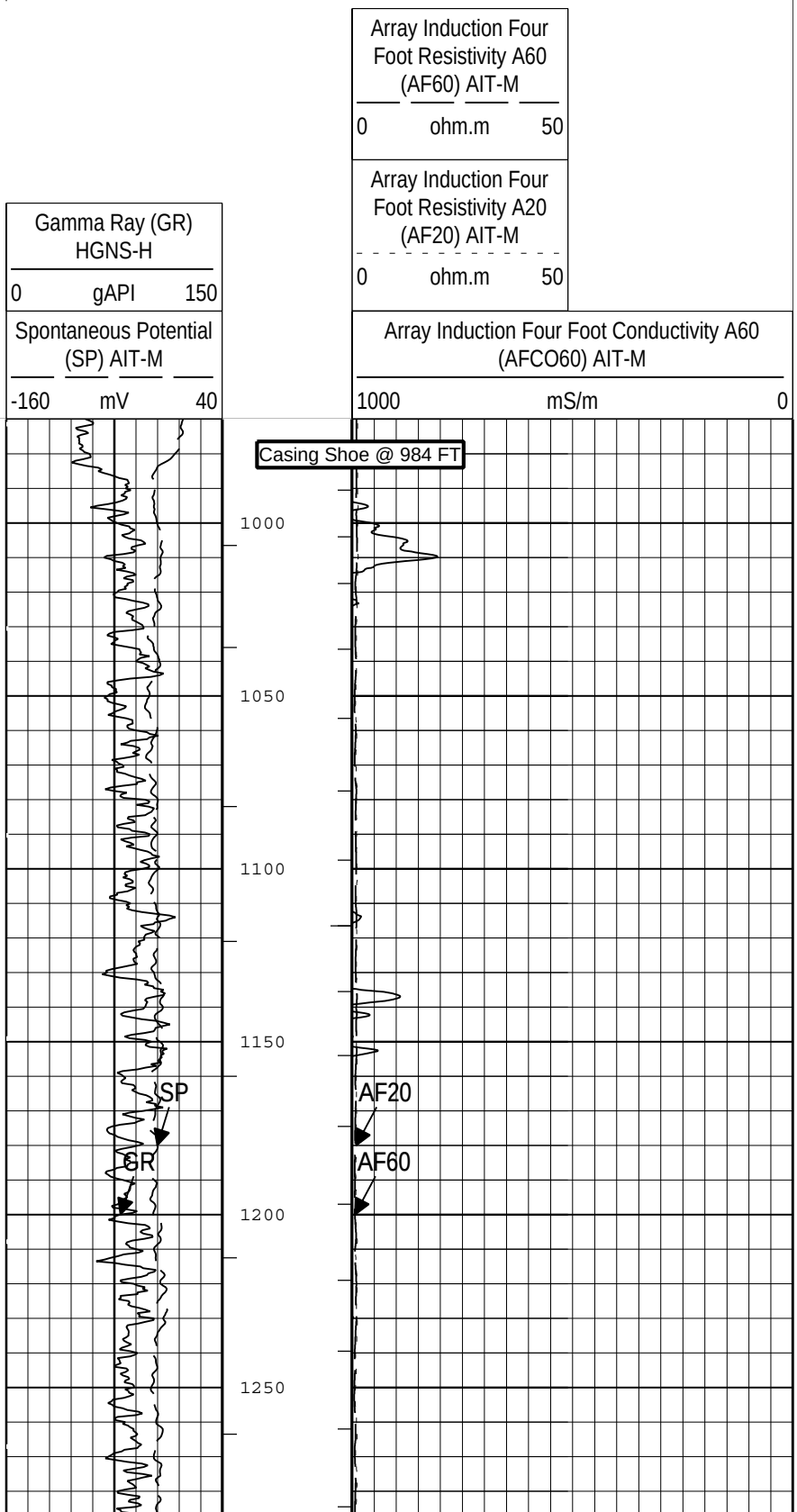
IHV - Integrated Hole Volume every 10.00 (ft3)

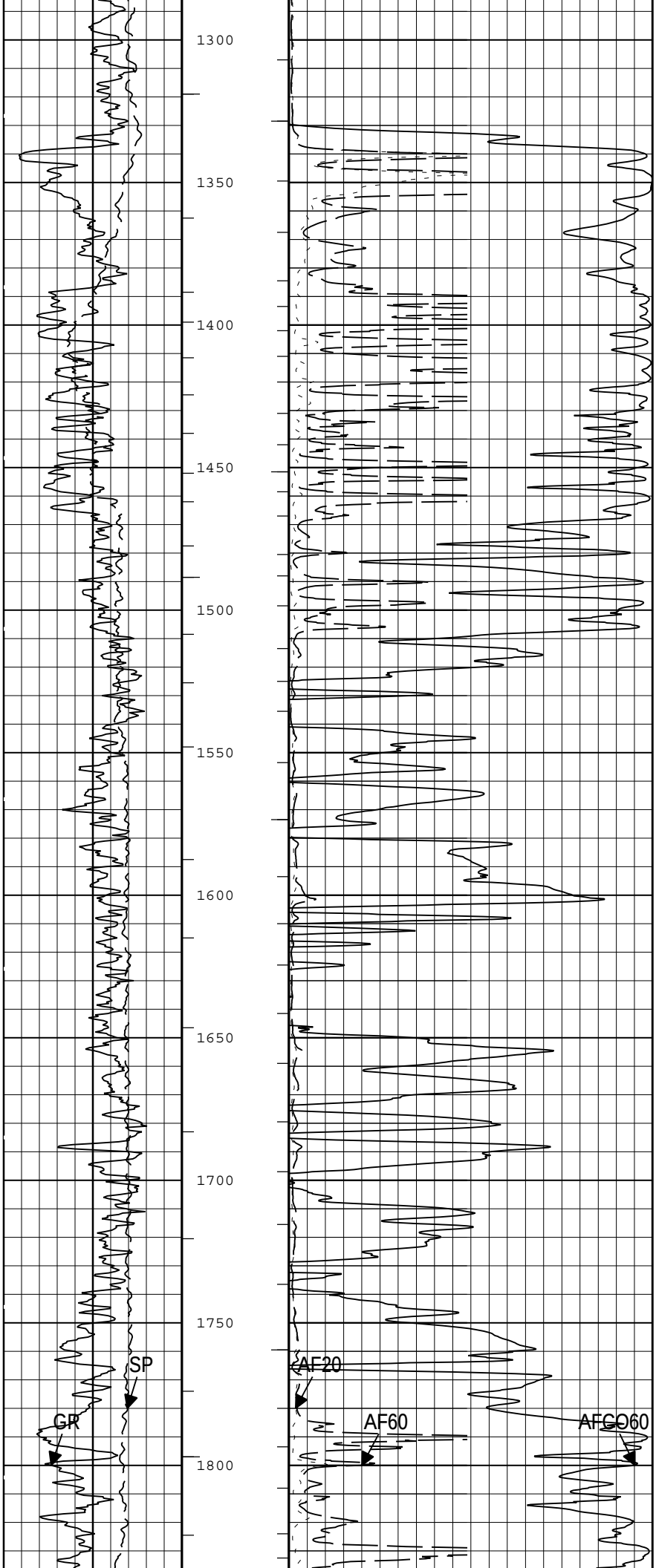
IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

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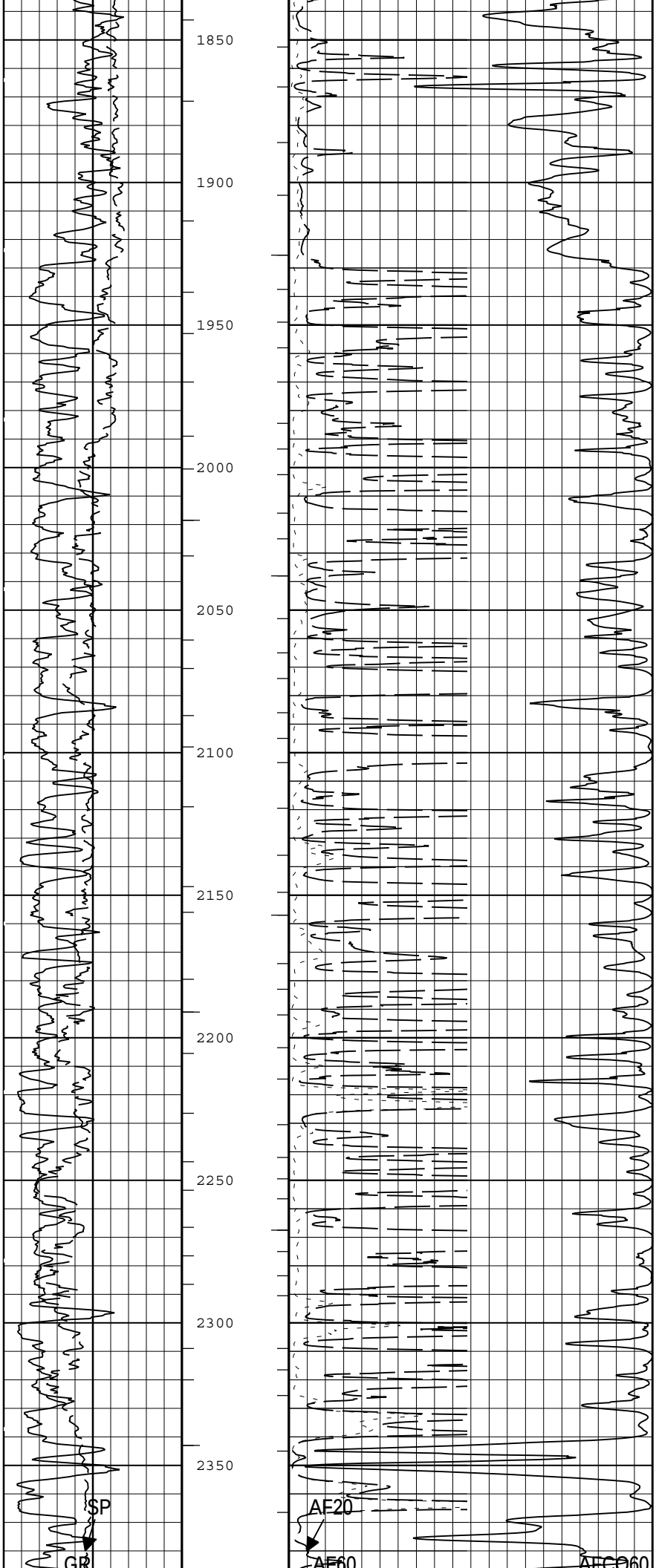
1800
SP
GR
AF20
AF60
AFCO60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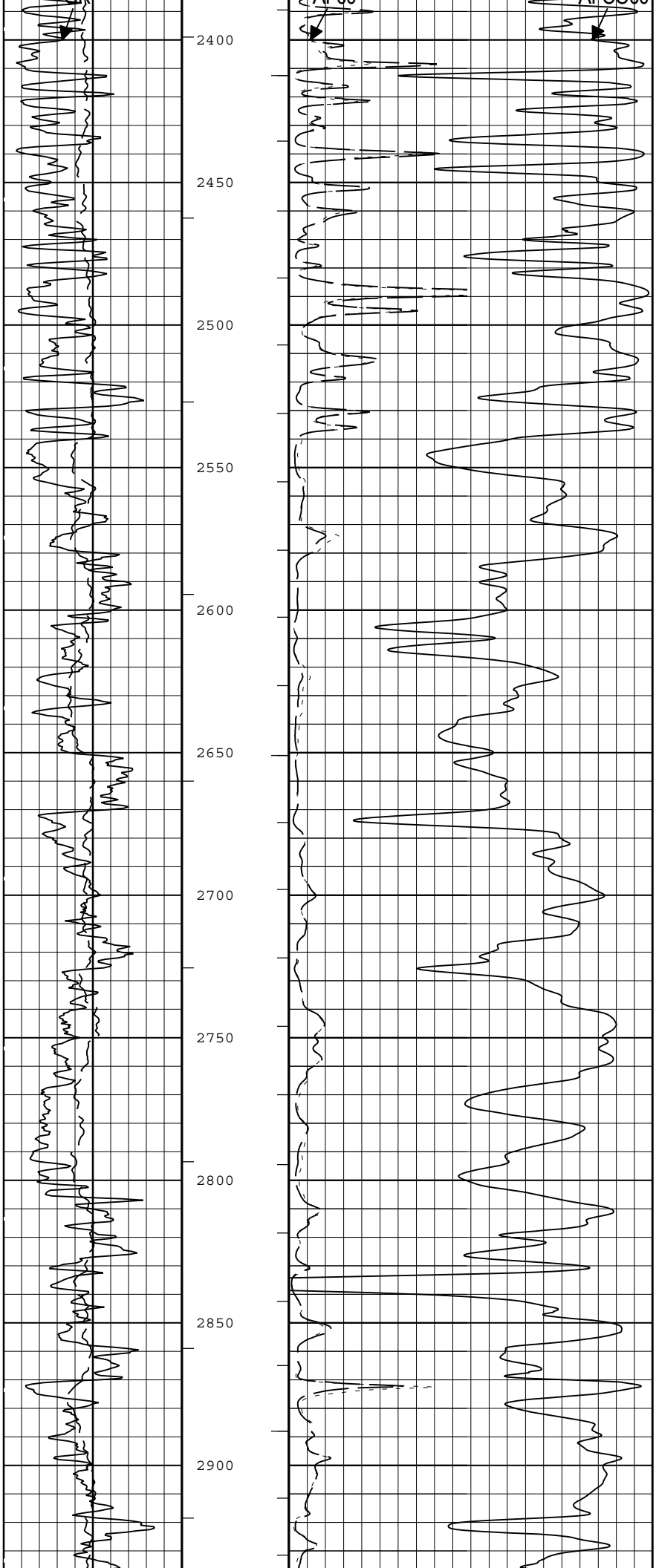
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2750
2800
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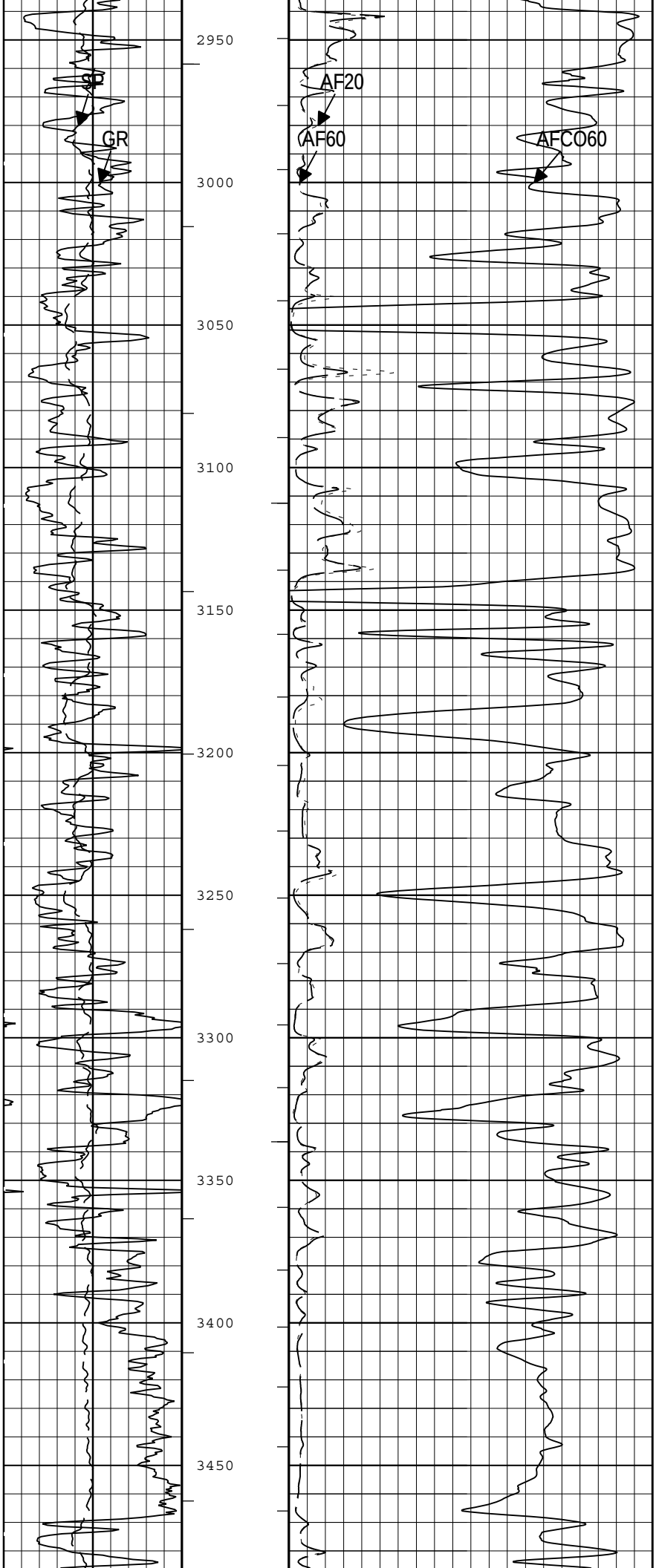
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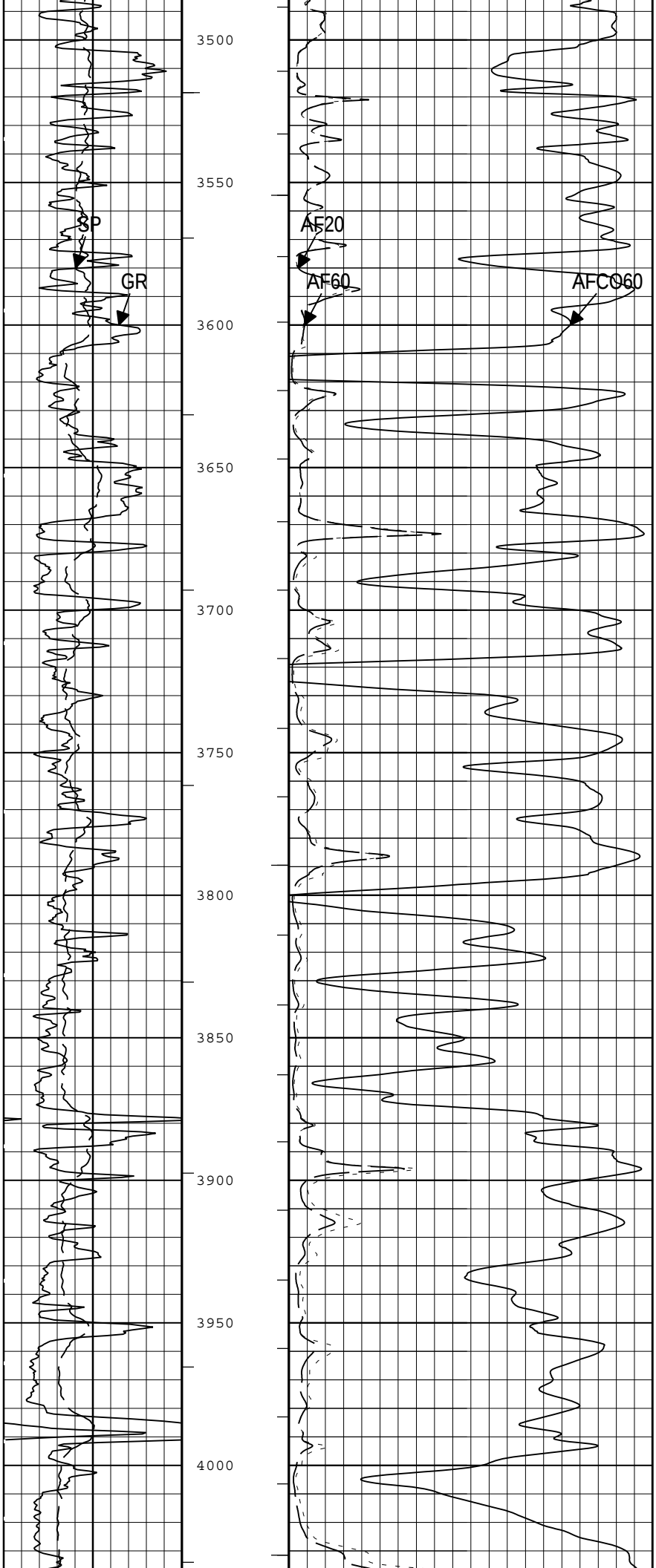
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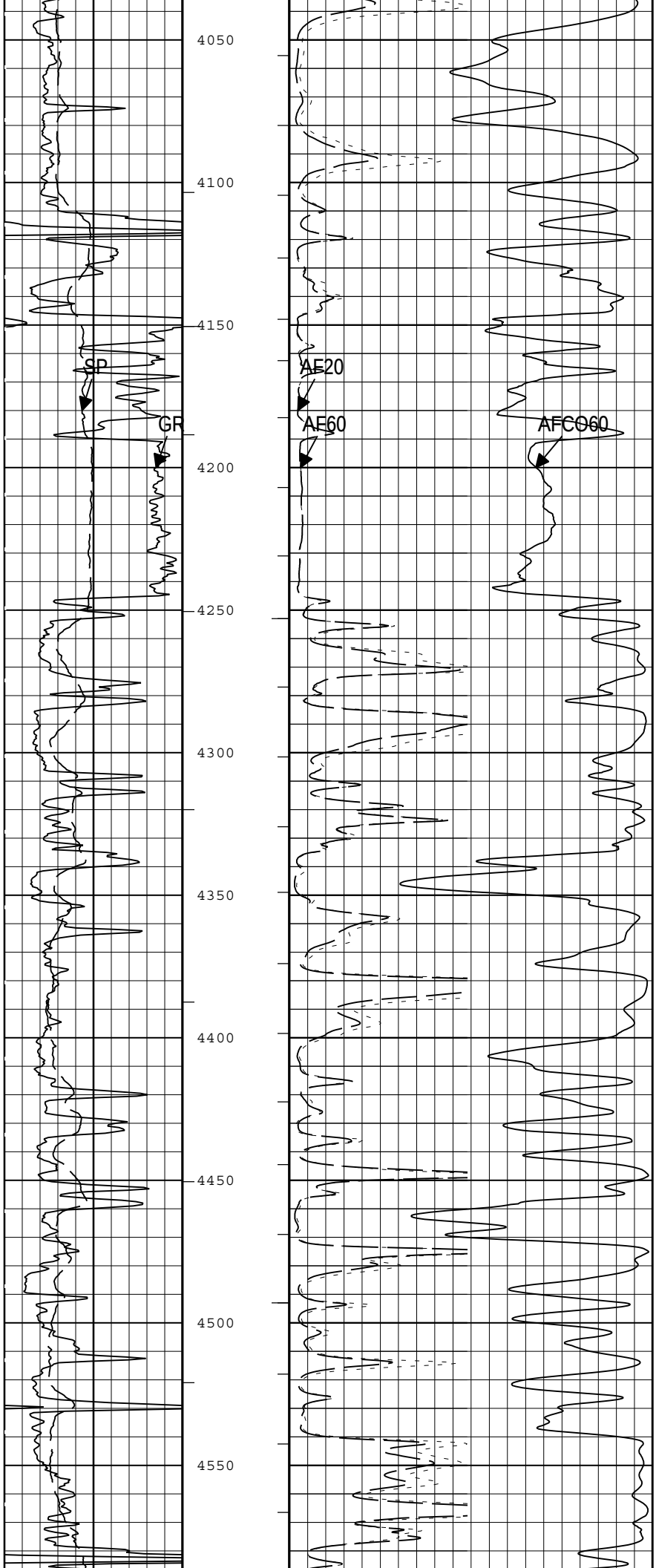
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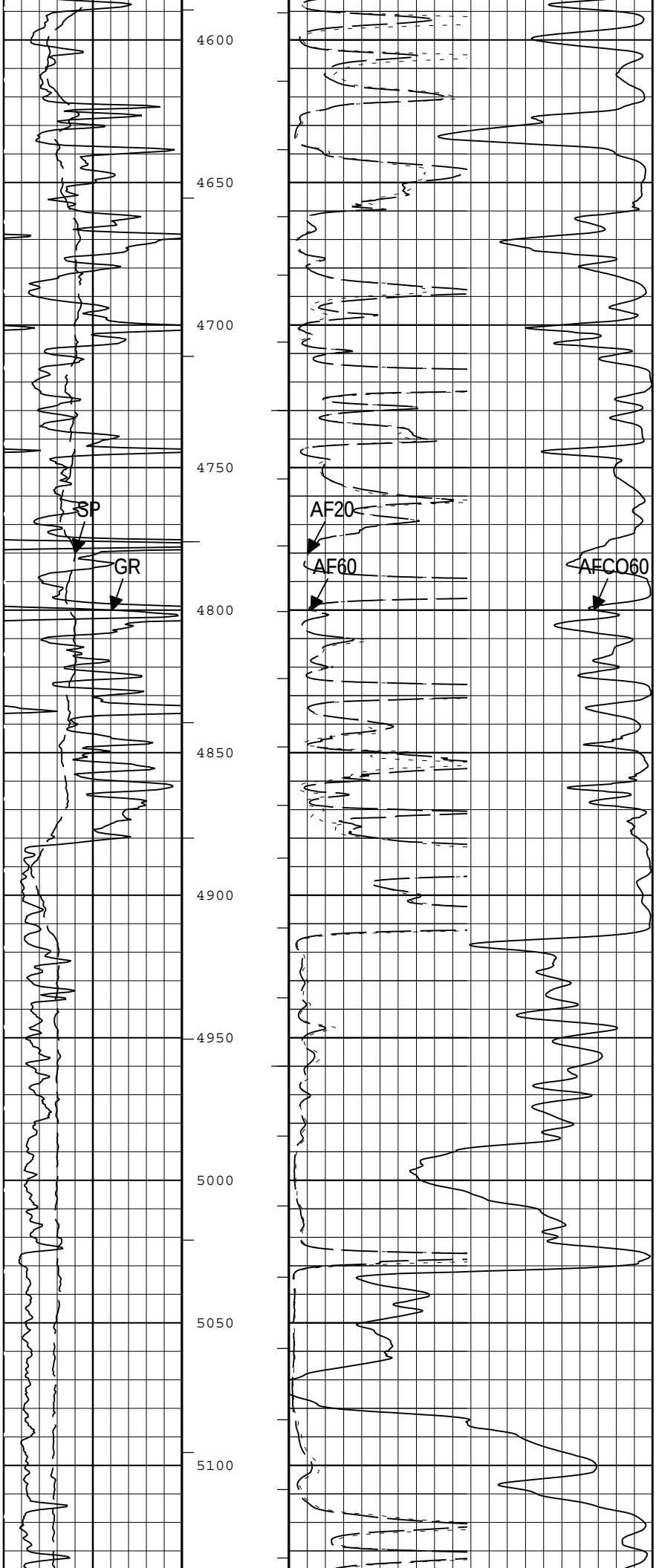
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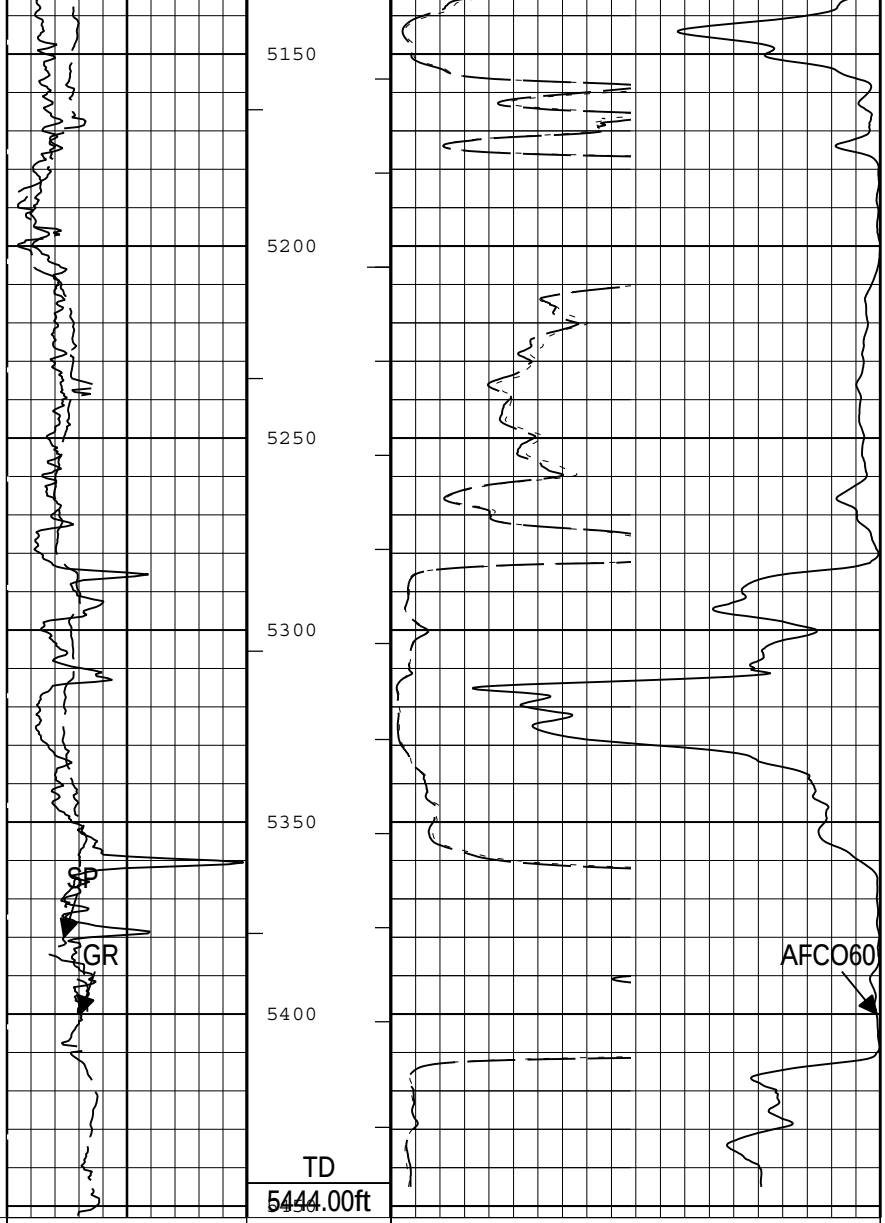
AFCO60




Gamma Ray (GR) HGNS-H

0 gAPI 150

Spontaneous Potential (SP) AIT-M

-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M

1000 mS/m 0

Array Induction Four Foot Resistivity A60 (AF60) AIT-M

0 ohm.m 50

Array Induction Four Foot Resistivity A20 (AF20) AIT-M

0 ohm.m 50

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log ( AIT Basic Log Two ) Index Scale: 2 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:01

## Channel Processing Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| ABHM | Array Induction Borehole Correction Mode | AIT-M:AMIS:AMIS | Compute Standoff | |

| | | | | |
|---|---|---|---|---|
| ABLM | Array Induction Basic Logs Mode | AIT-M:AMIS:AMIS | Normal | |
| ACDE | Array Induction Casing Detection Enable | AIT-M:AMIS:AMIS | Yes | |
| ASTA | Array Induction Tool Standoff | AIT-M:AMIS:AMIS | 1.1 | in |
| BARI | Barite Mud Presence Flag | Borehole | No | |
| BHS | Borehole Status (Open or Cased Hole) | Borehole | Open | |
| BS | Bit Size | COMPLETION | 8.75 | in |
| CALI_SHIFT | CALI Supplementary Offset | HDRS-H:HRCC-H:HRCC-H | 0 | in |
| CBLO | Casing Bottom (Logger) | COMPLETION | 984 | ft |
| CDEN | Cement Density | HGNS-H:HGNS-H:HGNS-H | 2 | g/cm3 |
| CSODDRL | Casing Outer Diameter - Zoned along driller depths | COMPLETION | 9.625 | in |
| DFD | Drilling Fluid Density | Borehole | 9.6 | lbm/gal |
| FCD | Future Casing (Outer) Diameter | COMPLETION | 7 | in |
| GCSE_DOWN_PASS | Generalized Caliper Selection for WL Log Down Passes | Borehole | BS | |
| GCSE_UP_PASS | Generalized Caliper Selection for WL Log Up Passes | Borehole | CALI | |
| GRSE | Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity | Borehole | AMF | |
| SOCO | Standoff Correction Option | HGNS-H:HGNS-H:HGNS-H | Yes | |
| SP_SHIFT | SP Shift | AIT-M:AMIS:AMIS | 40 | mV |
| SPDR | SP Drift Per Foot | AIT-M:AMIS:AMIS | 0 | mV/ft |

## Tool Control Parameters

## 1A

## Main Pass 5" = 100'

### Integration Summary

| Output Channel(s) | Output Description | Input Parameter | Output Value | Unit |
|---|---|---|---|---|
| ICV | Integrated Cement Volume | GCSE_UP_PASS, FCD | 1079.67 | ft3 |
| IHV | Integrated Hole Volume | GCSE_UP_PASS | 2273.59 | ft3 |

### Software Version

| Acquisition System | Version |
|---|---|
| MaxWell | 3.0.9609.0 |
| Application Patch | SP-20120409-3.0.9609.1919 |
| | EXP_APL-OPElevation-3.0.9609.1966 |
| | EXP_APL-ADT-3.0.9609.1558 |

| Computation | Description | Version |
|---|---|---|
| Borehole | Borehole Ensemble provides common Borehole Parameters and Channels | 3.0.9609.1919 |

| Tool Elements | Description | Software Version | Firmware Version |
|---|---|---|---|
| HRCC-H | HILT High-Resolution Control Cartridge, 150 degC | 3.0.9609.1919 | 2.0 |
| HGNS-H | HILT Gamma-Ray and Neutron Sonde, 150 degC | 3.0.9609.1919 | 2.0 |
| AMIS | Array Induction Sonde - M | 3.0.9609.1919 | 1 |

### Pass Summary

| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | Depth Shift | Include Parallel Data |
|---|---|---|---|---|---|---|---|---|
| 1A | Log[7]:Up | Up | 840.60 ft | 5453.07 ft | 11-Jul-2012 1:07:06 PM | 11-Jul-2012 2:59:11 PM | 0.00 ft | |

All depths are referenced to toolstring zero

### Log

1A: Log[7]:Up B3DD9F04-81D7-4F00-9E61-A7066FF11CF0

Description: AIT Basic Log One Format: Log ( AIT 5 ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:03

| Channel | Source | Sampling |
|---|---|---|

| | | |
|---|---|---|
| AT20 | AIT-M:AMIS:AMIS | 3in |
| AT30 | AIT-M:AMIS:AMIS | 3in |
| AT60 | AIT-M:AMIS:AMIS | 3in |
| AT90 | AIT-M:AMIS:AMIS | 3in |
| BS | Borehole | 6in |
| CALI | HDRS-H:HRCC-H:HRCC-H | 1in |
| GR | HGNS-H:HGNS-H:HGNS-H | 6in |
| ICV | Borehole | 6in |
| IHV | Borehole | 6in |
| SP | AIT-M:AMIS:AMIS | 6in |
| TENS | WLWorkflow | 6in |
| TIME_1900 | WLWorkflow | 0.1in |

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Cable Tension (TENS)

10000 lbf 0

Mudcake

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Spontaneous Potential (SP) AIT-M

-160 mV 40

Bit Size (BS)

6 in 16

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

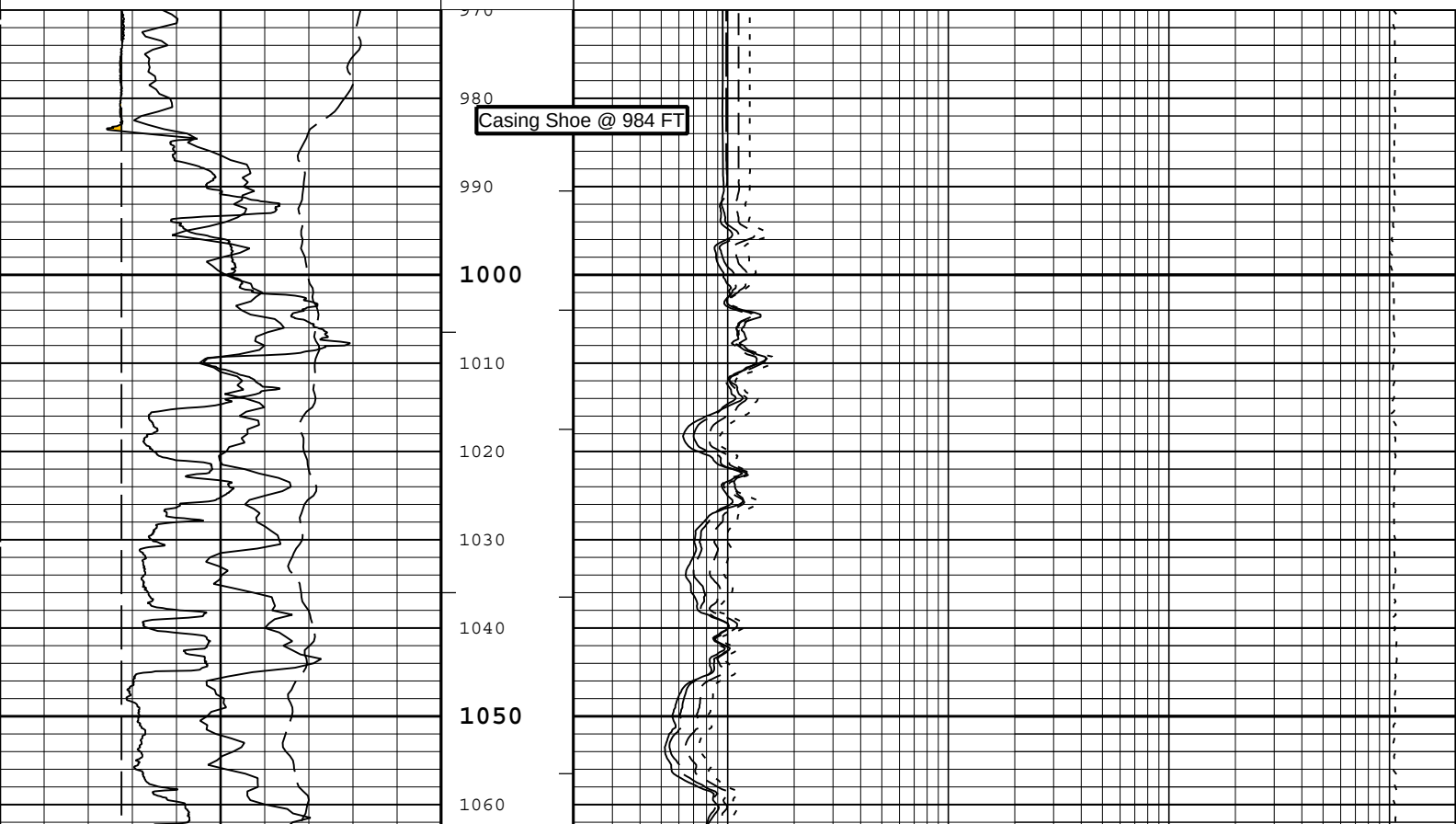
0.2 ohm.m 2000

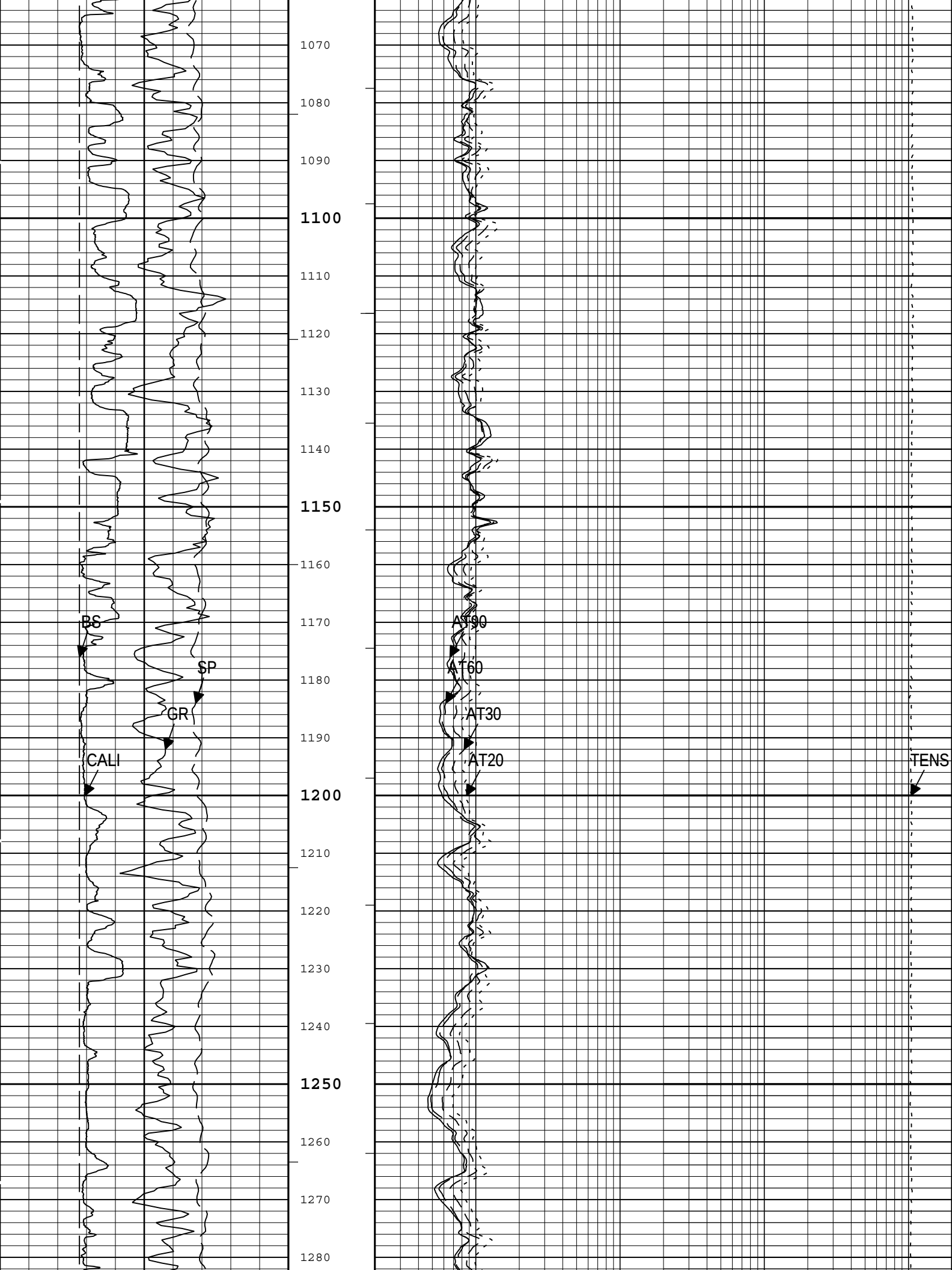
Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

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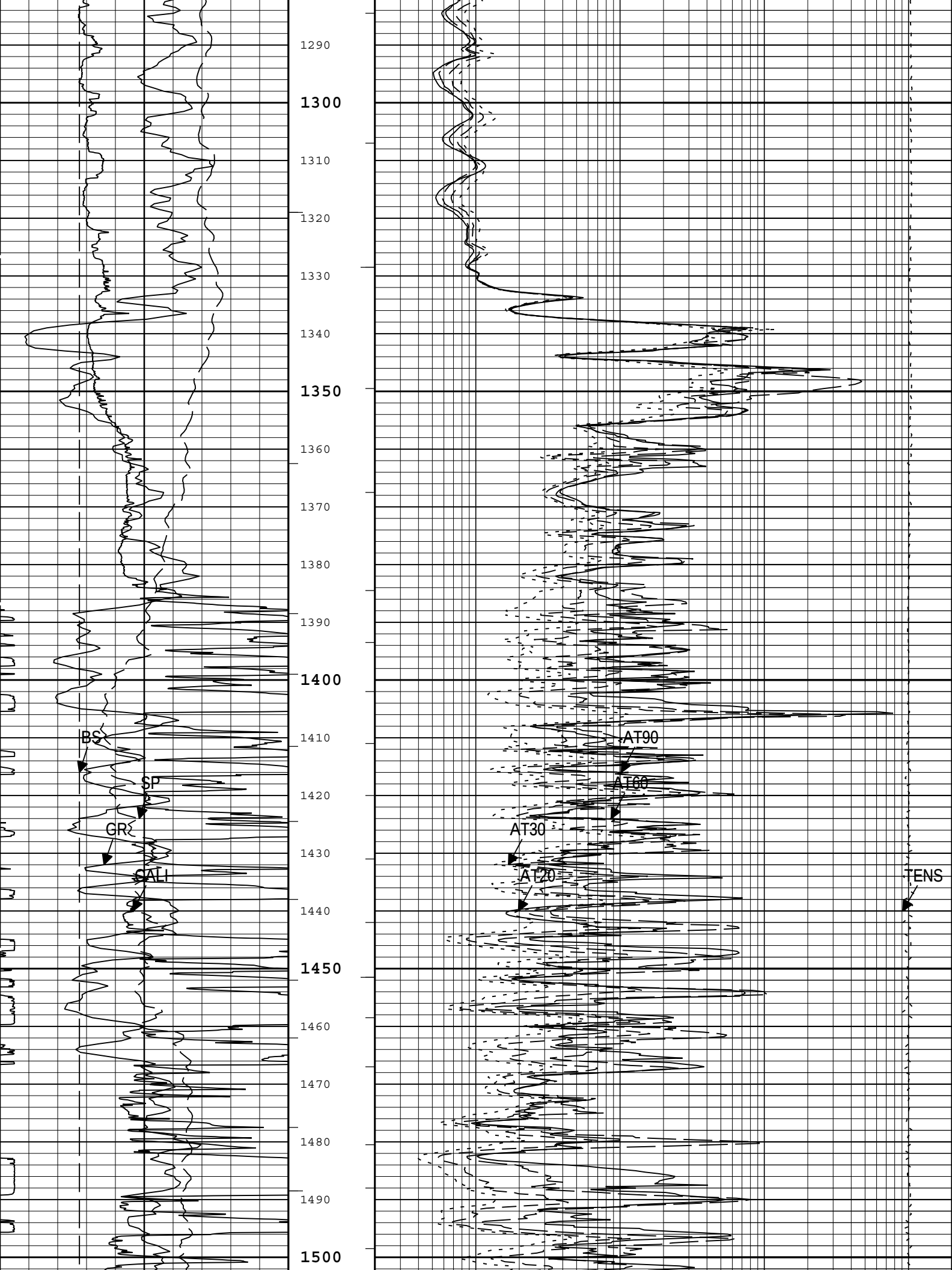
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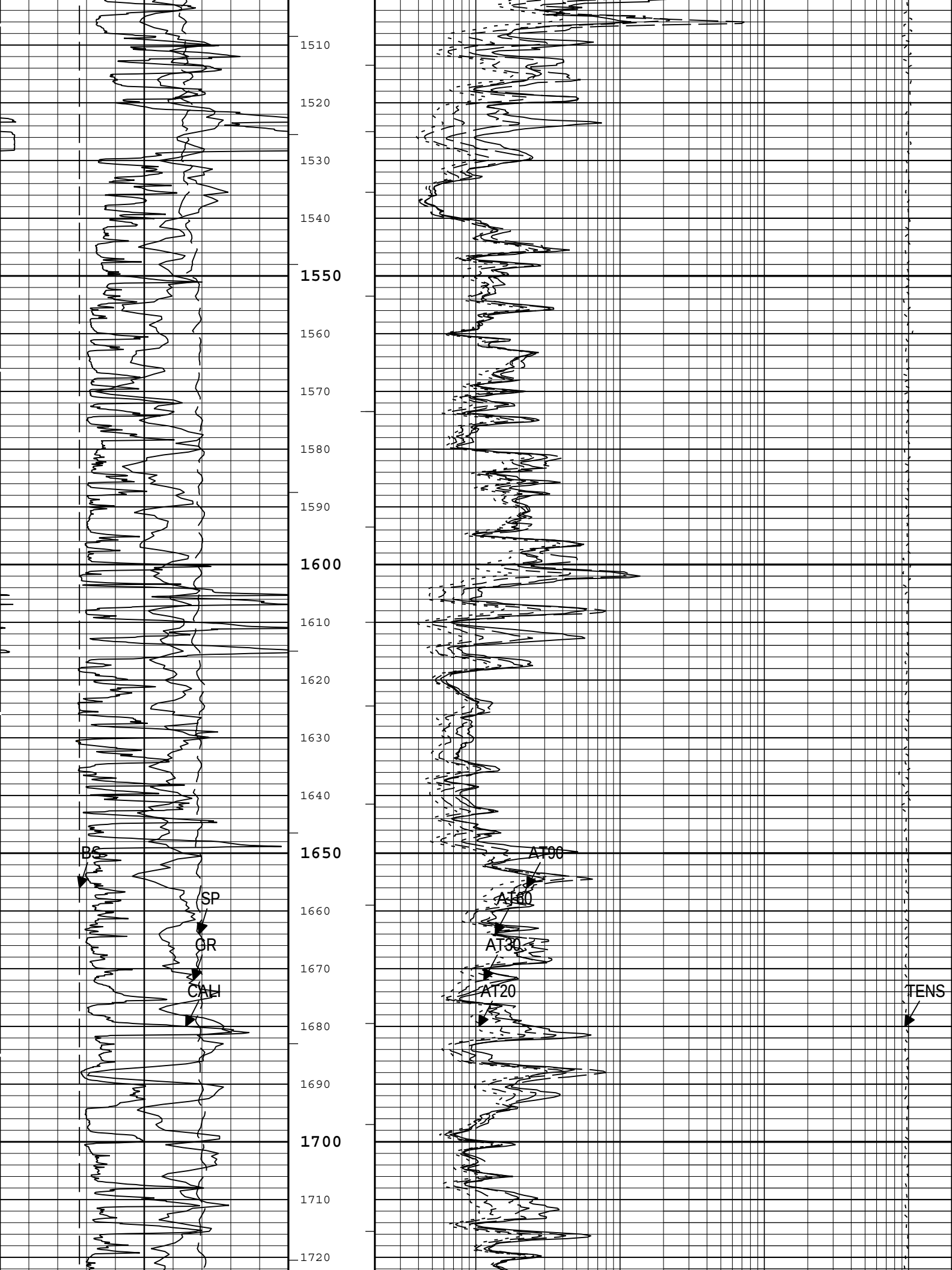
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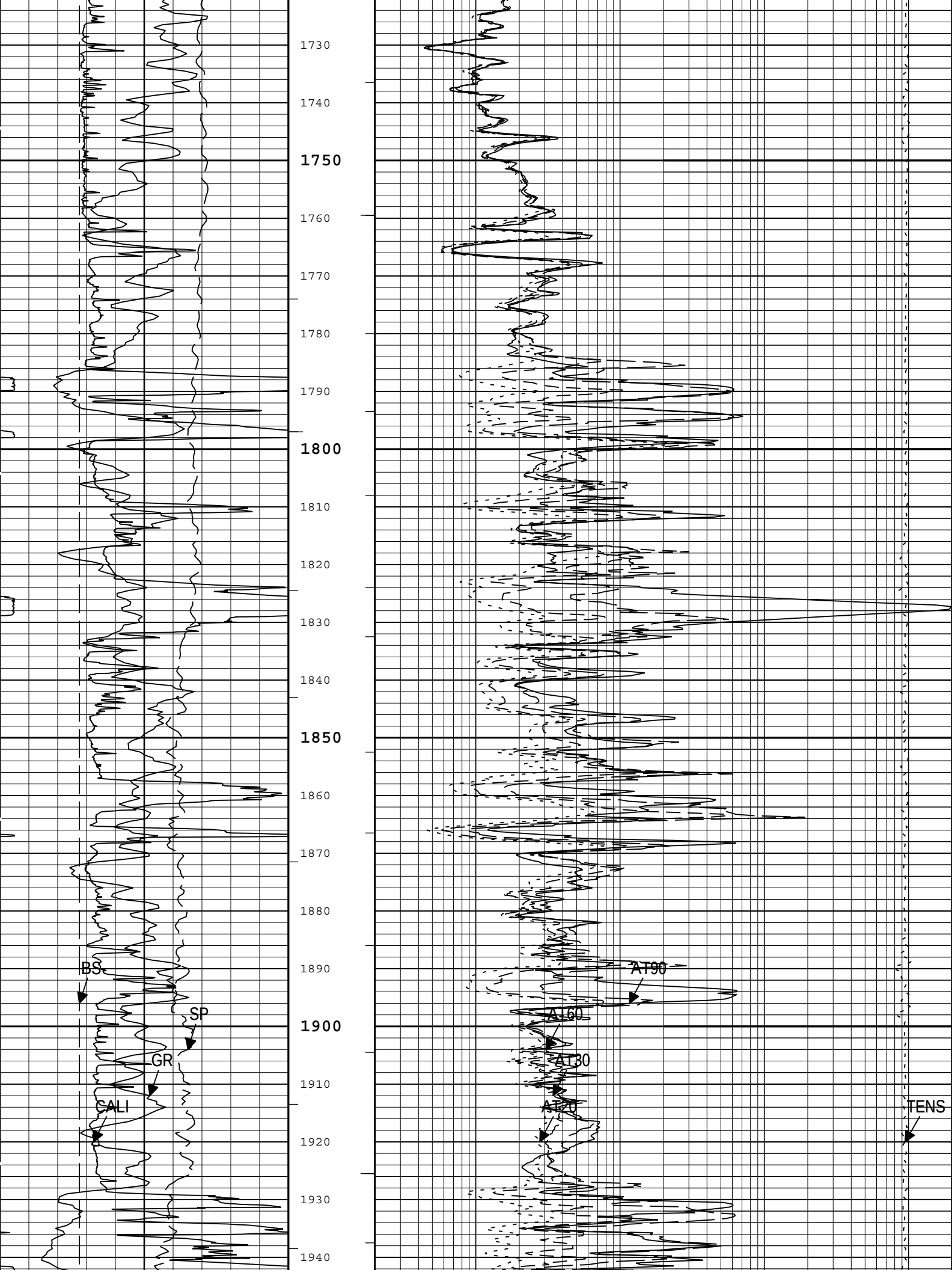
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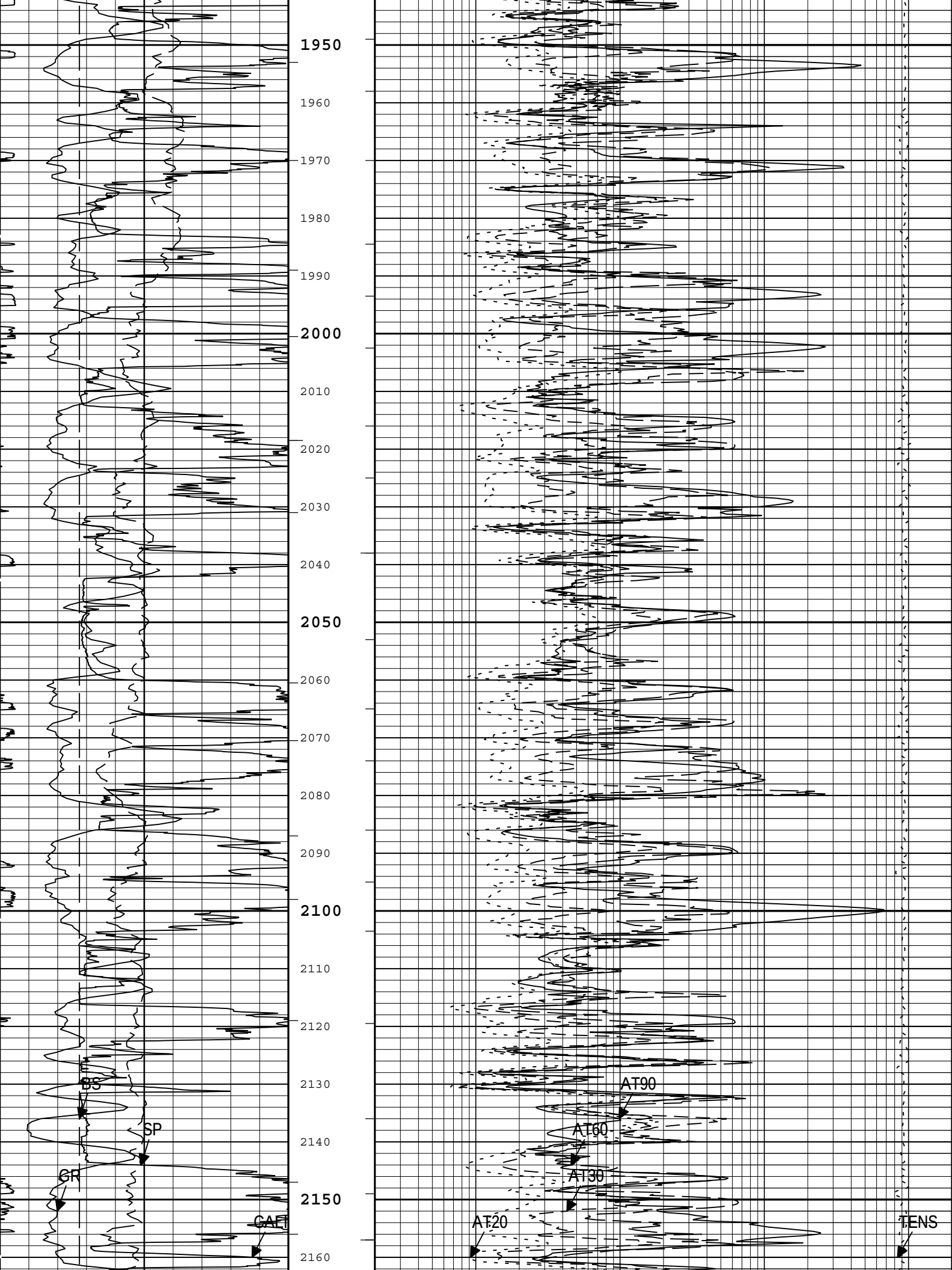
TENS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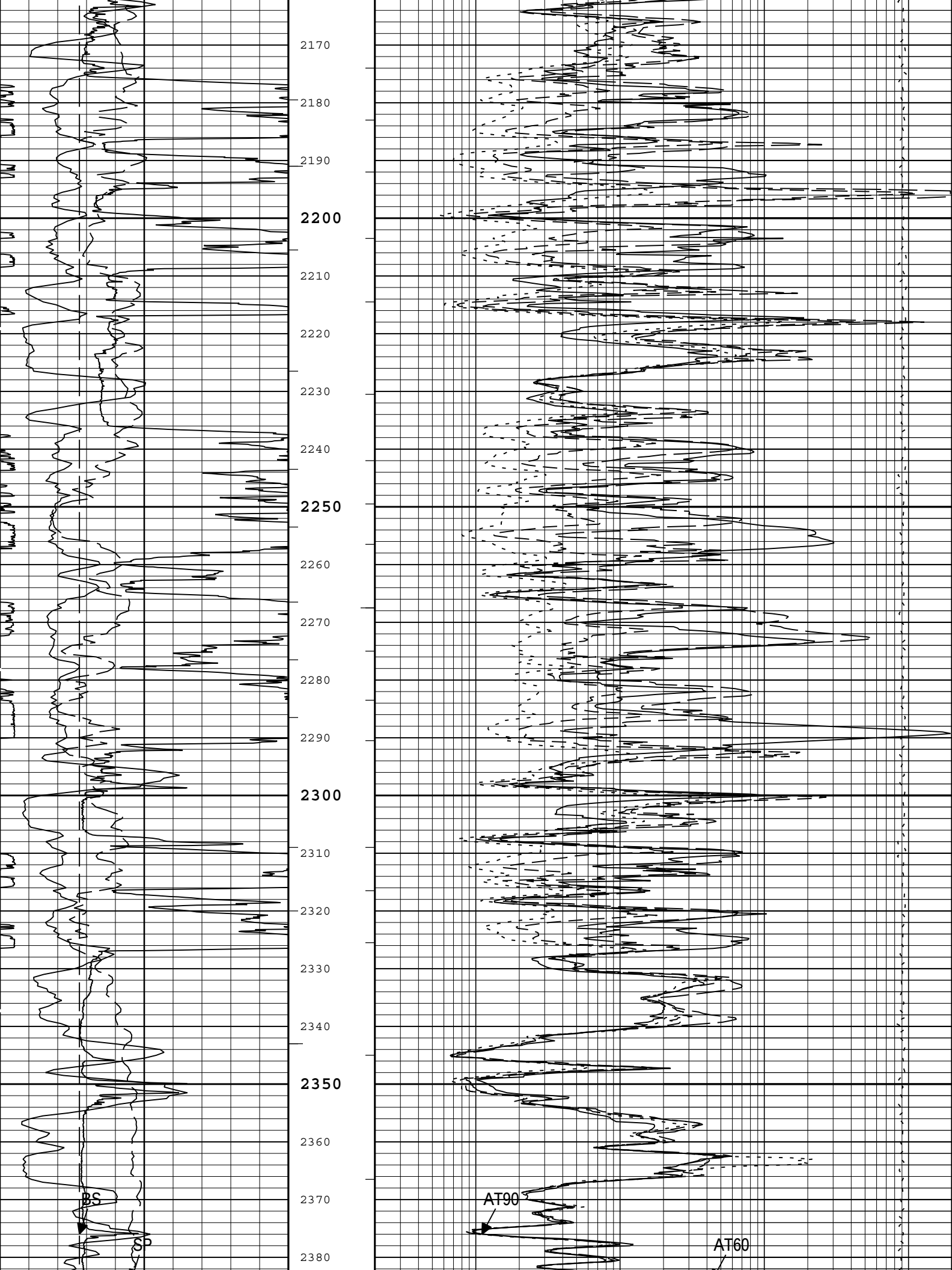
2140
2150
2160
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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2180
2190
2200
2210
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2240
2250
2260
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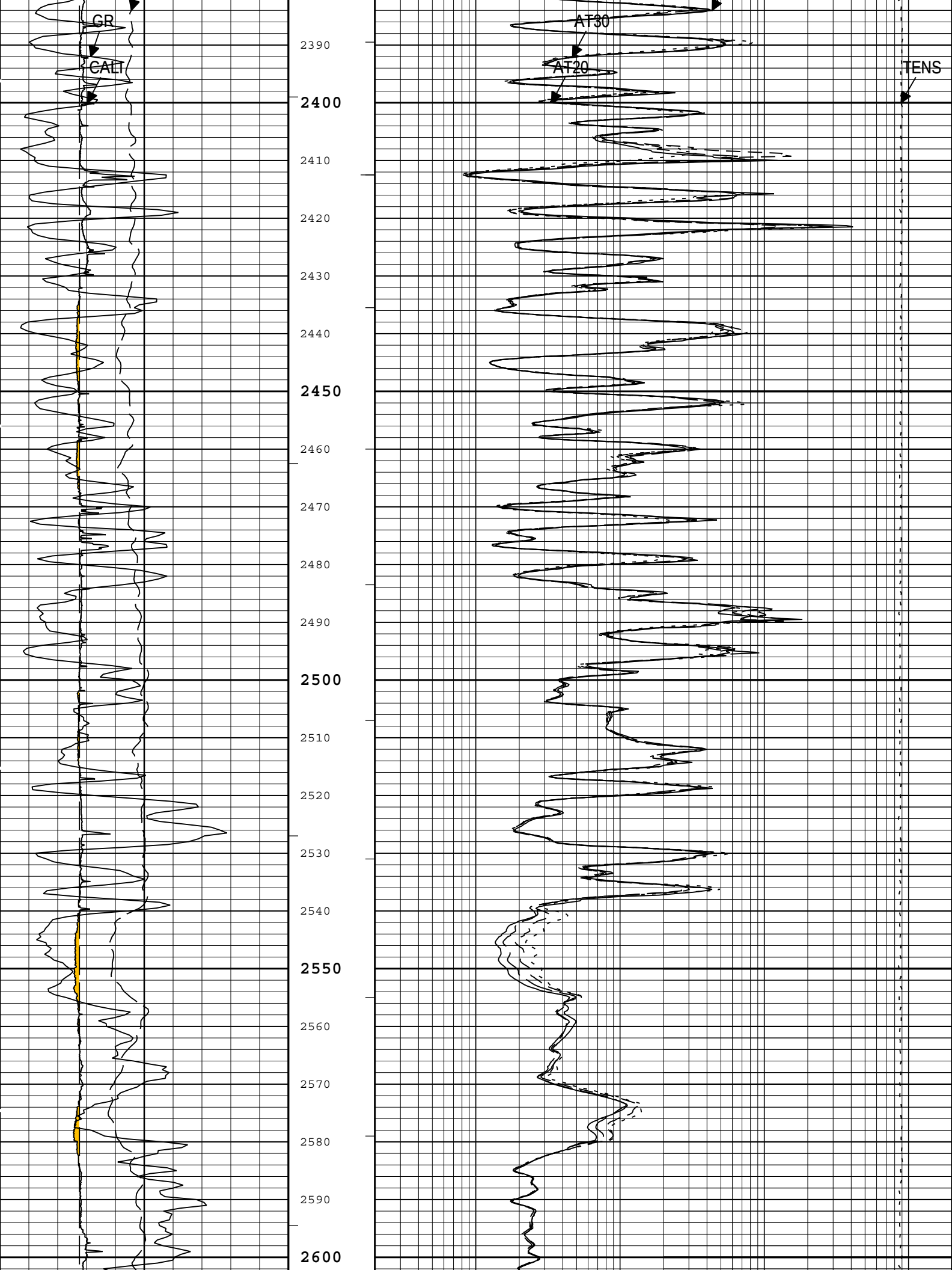
2350
2360
2370
2380
BS
SP
AT90
AT60


GR
CALI
AT30
AT20
TENS
2390
2400
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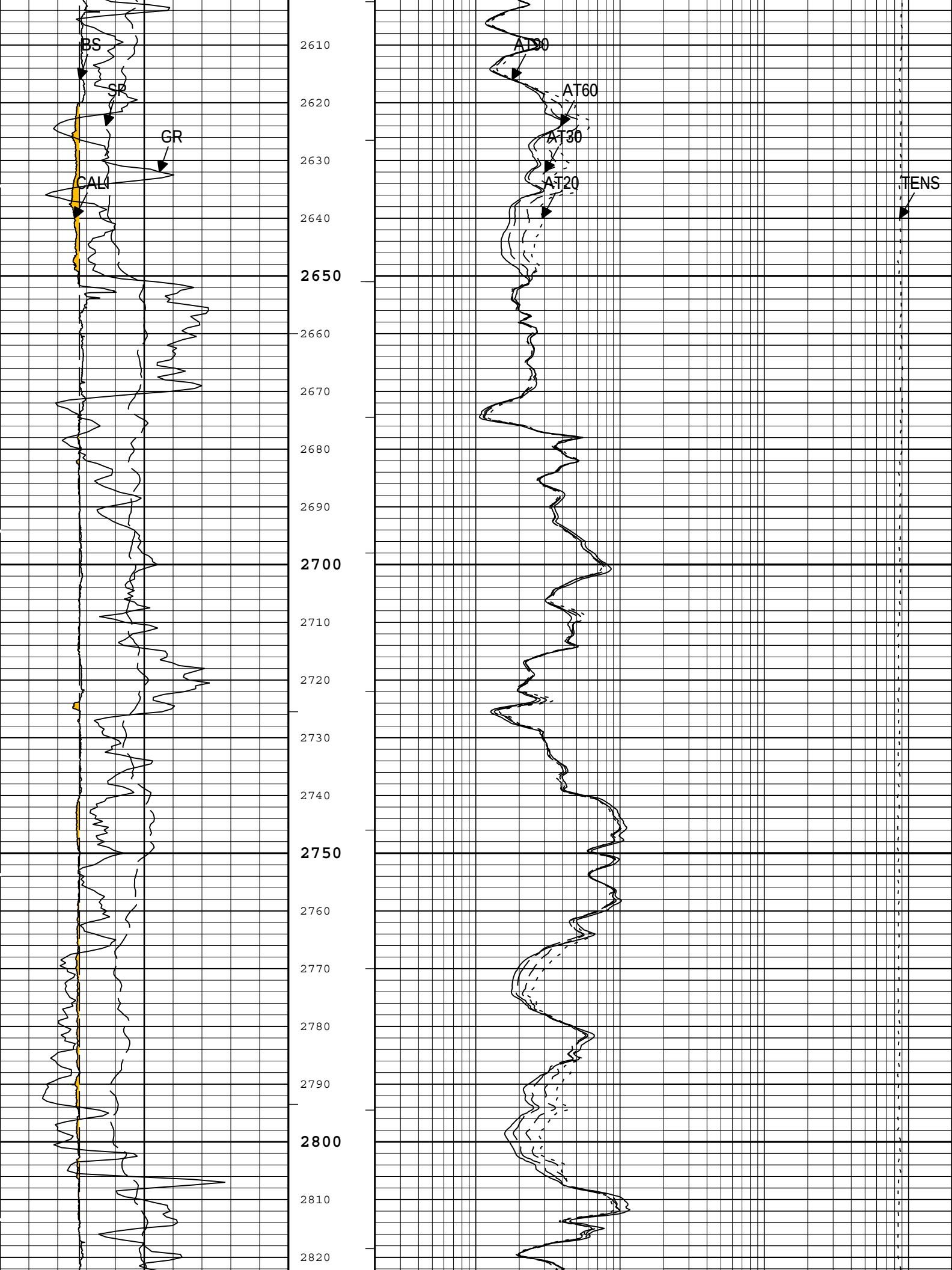
2600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SP
GR
CALI
AT90
AT60
AT30
AT20
TENS
2610
2620
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2640
2650
2660
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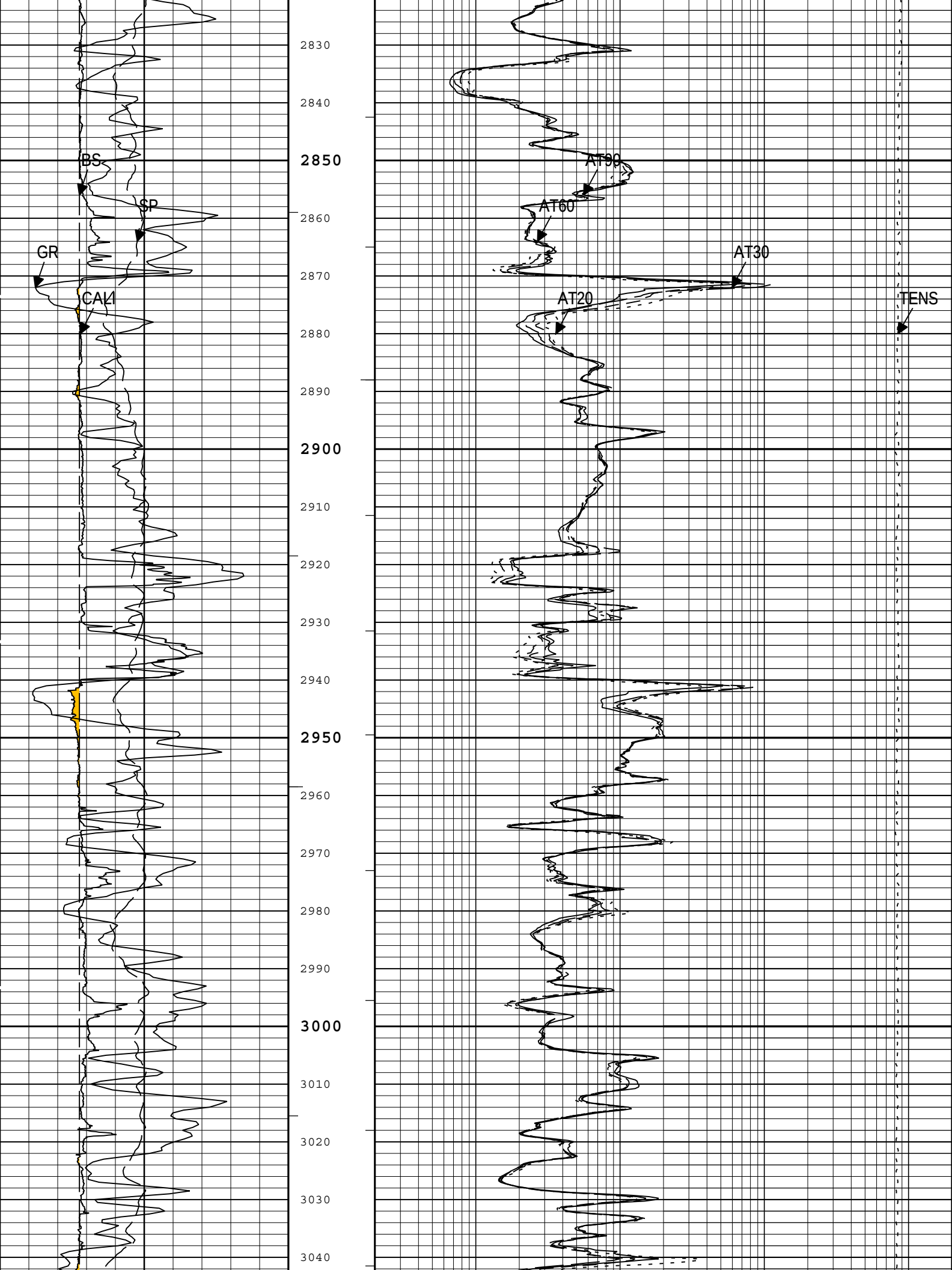
2790
2800
2810
2820


BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS
2830
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2860
2870
2880
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2990
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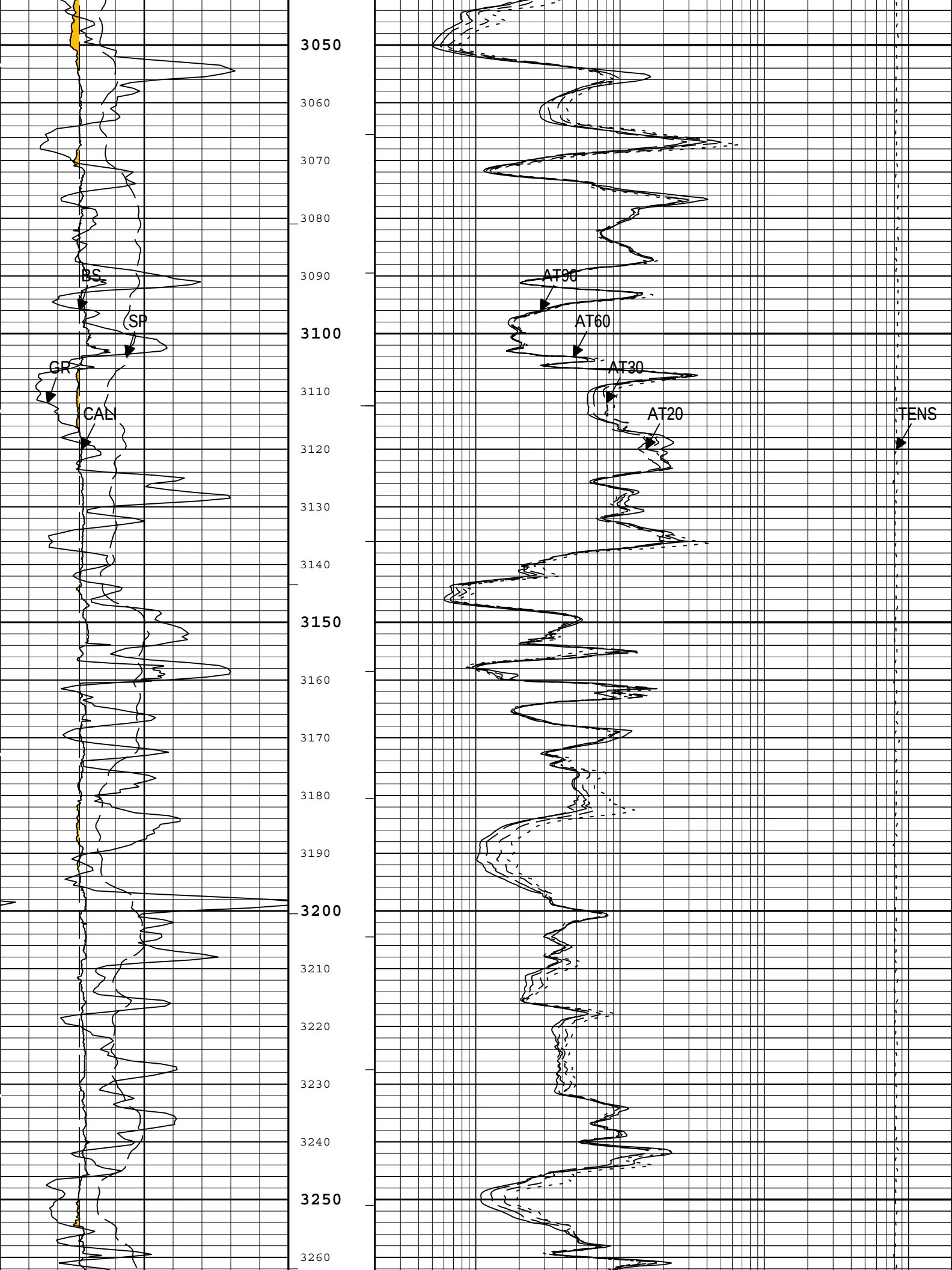
3030
3040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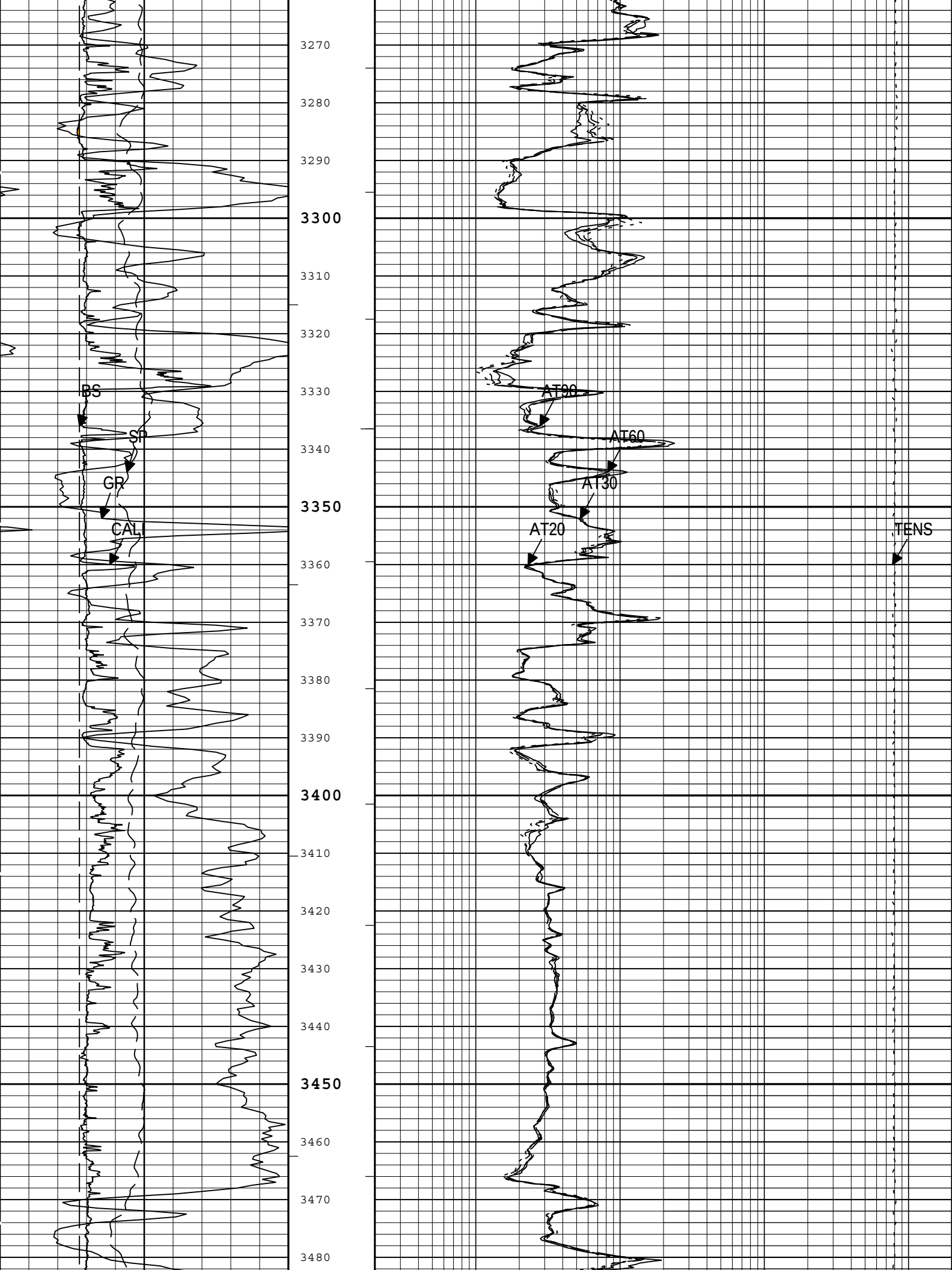
3120
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
3250
3260
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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3390
3400
3410
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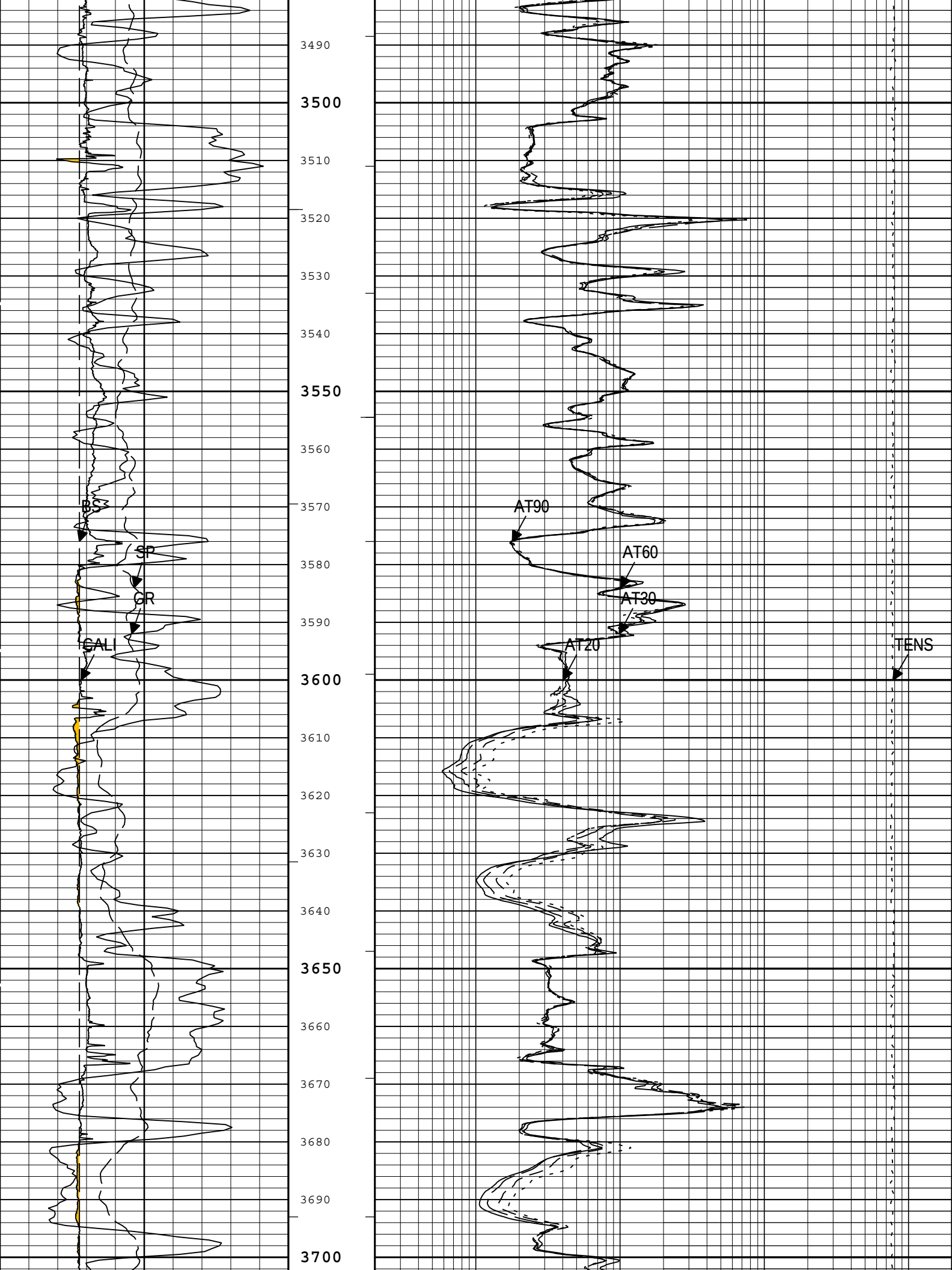
3480
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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3600
3610
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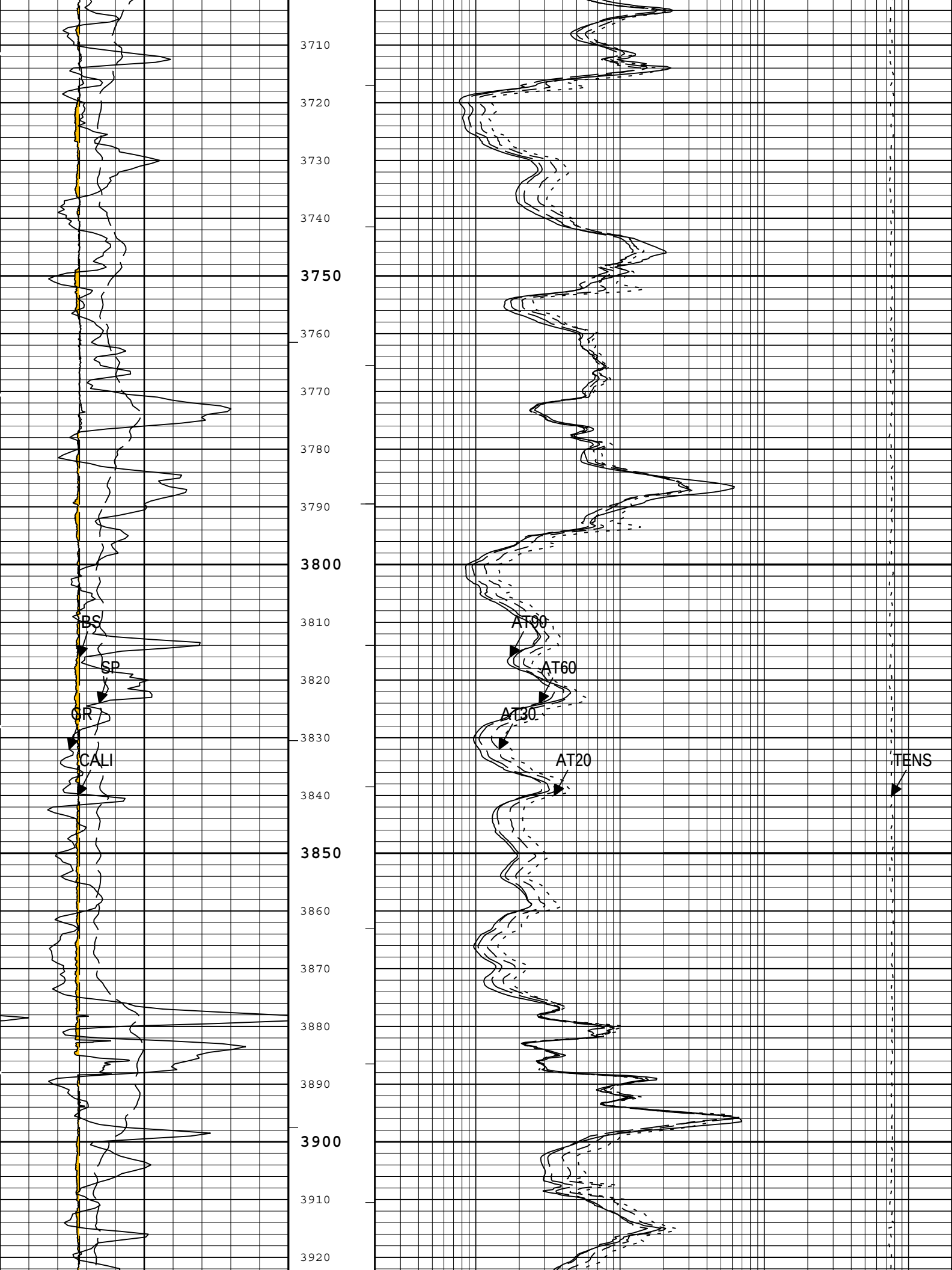
3680
3690
3700
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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3850
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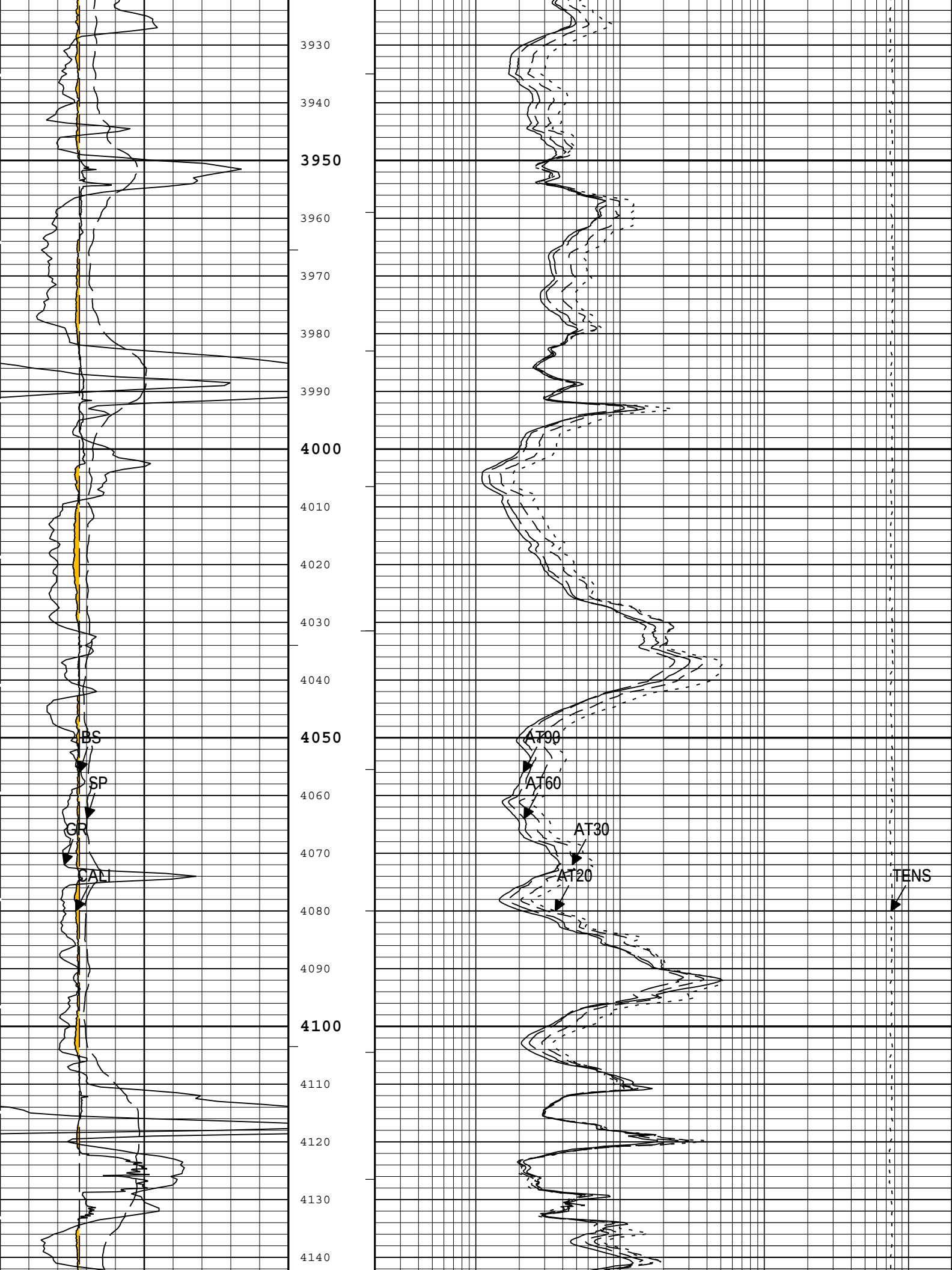
3900
3910
3920
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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4060
4070
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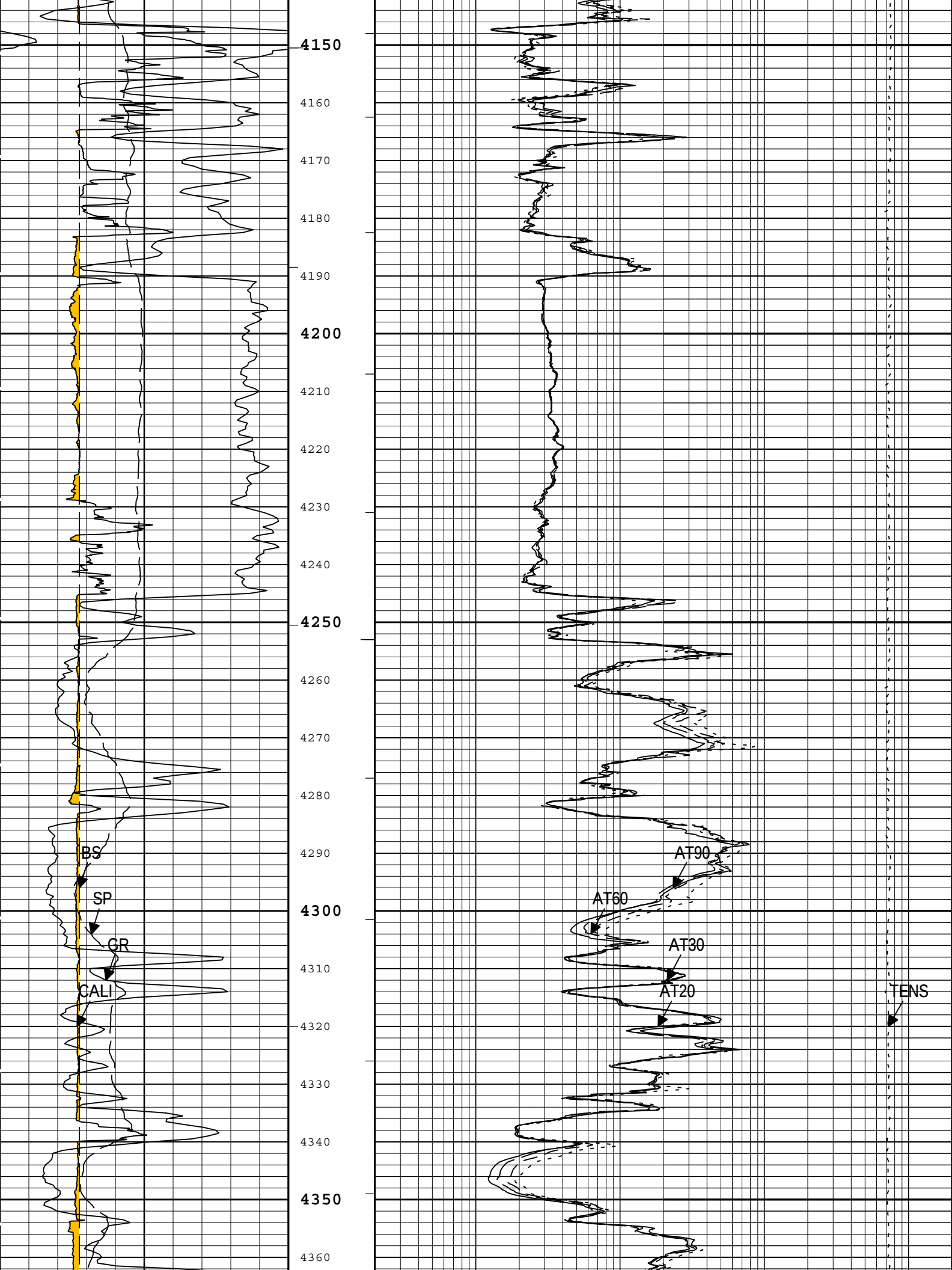
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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4240
4250
4260
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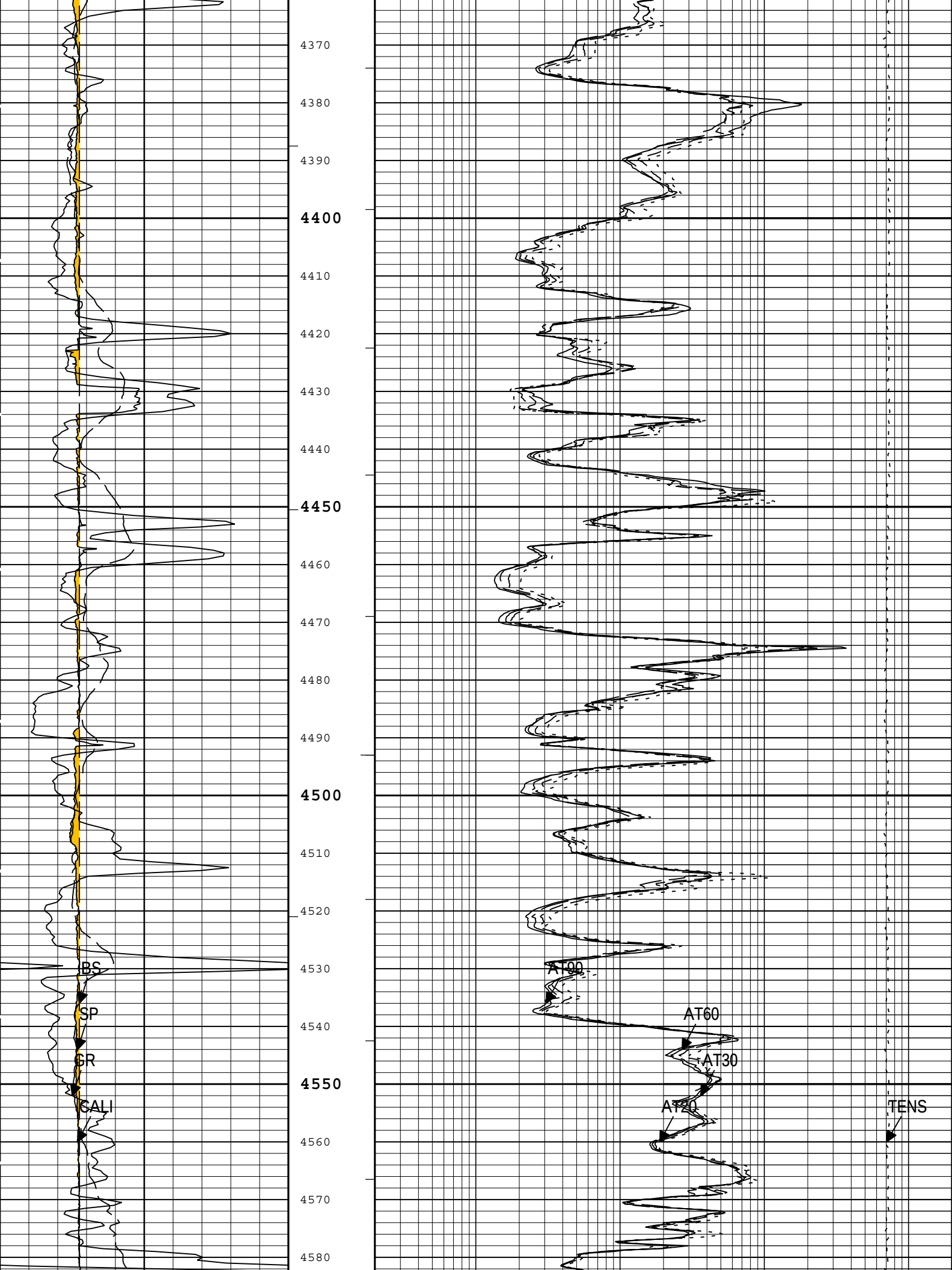
4280
4290
4300
4310
4320
4330
4340
4350
4360
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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4510
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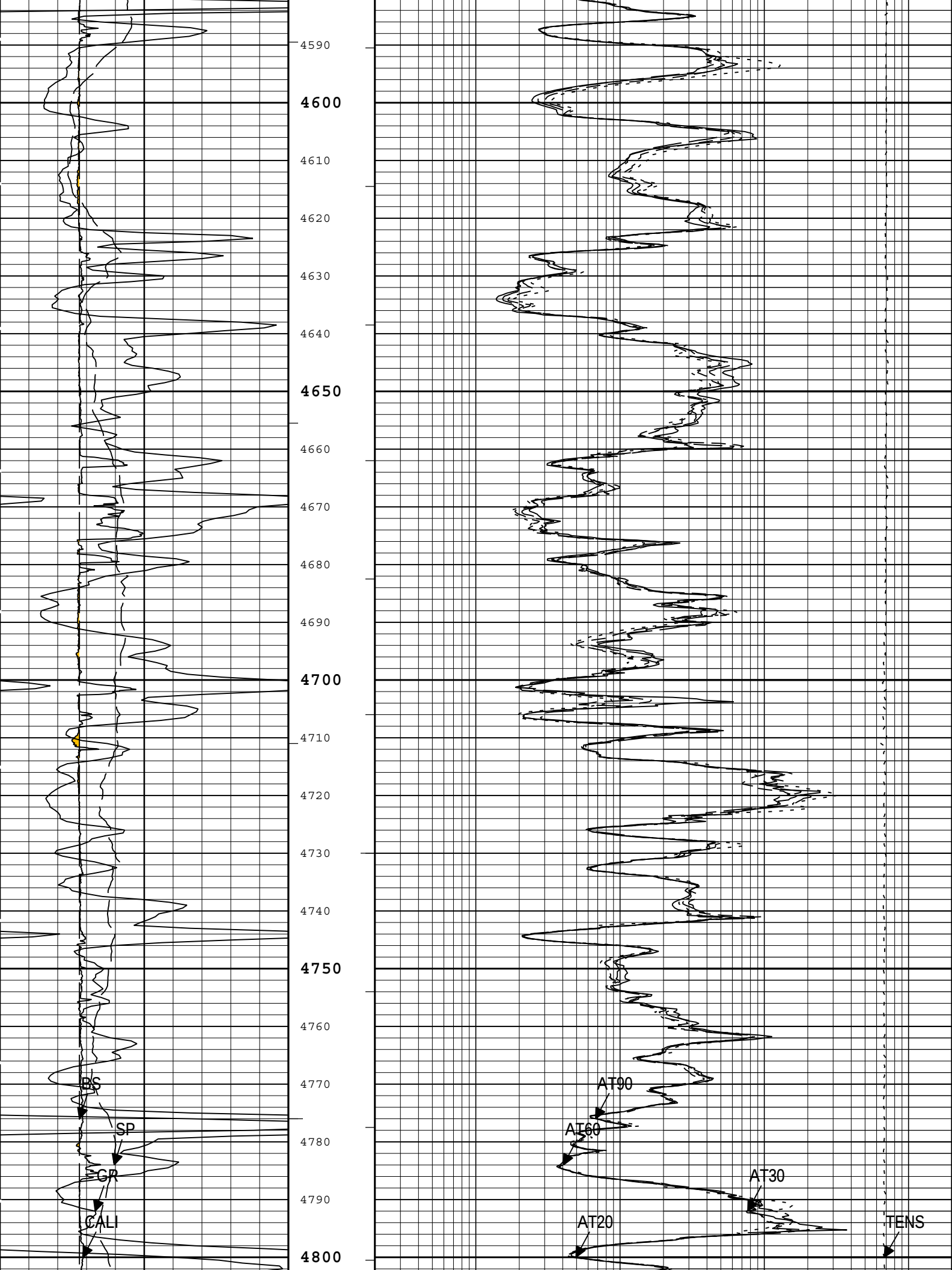
4580
IBS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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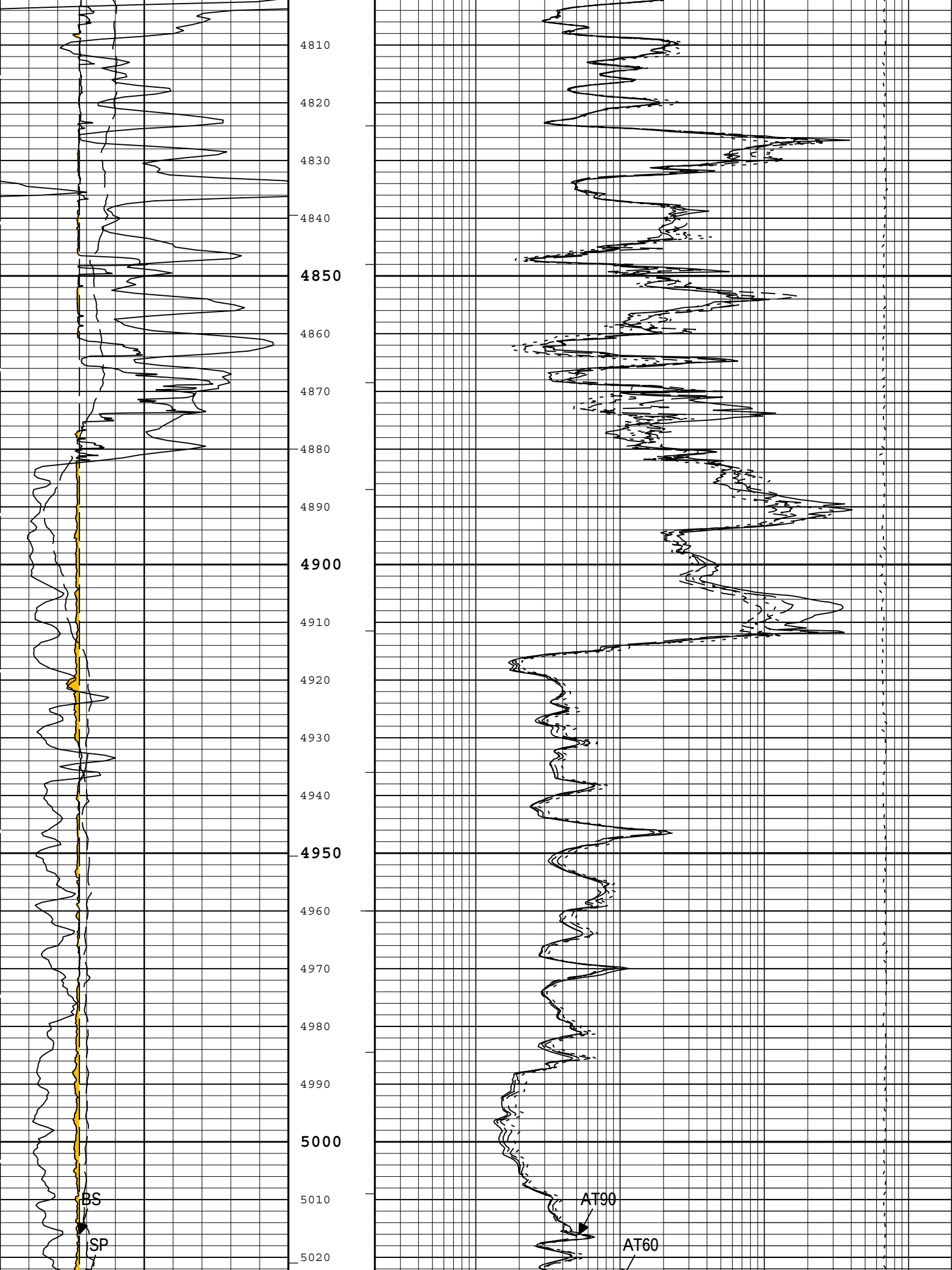
4790
4800
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS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4900
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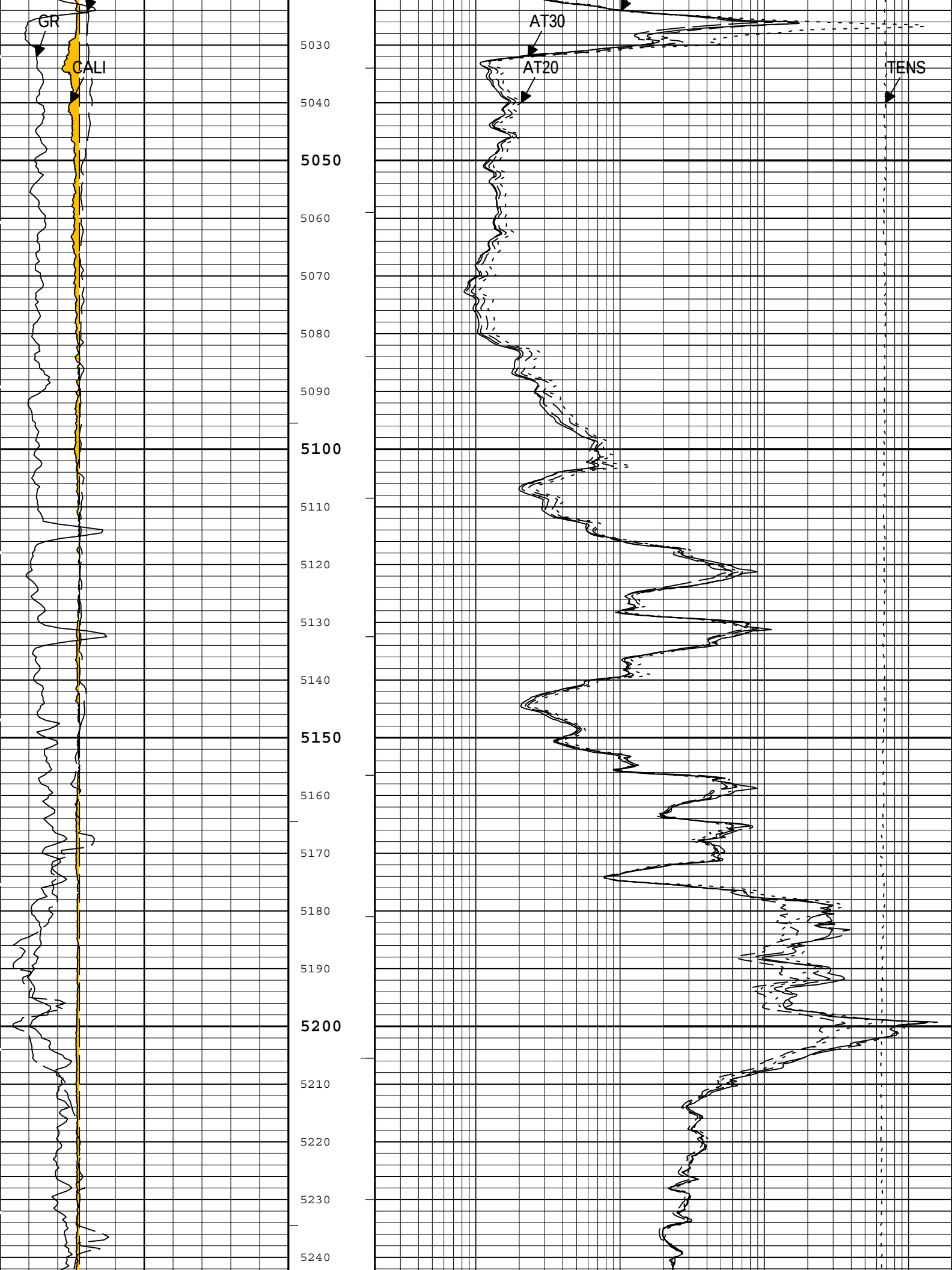
4990
5000
5010
5020
BS
SP
AT90
AT60


GR
CALI
AT30
AT20
TENS
5030
5040
5050
5060
5070
5080
5090
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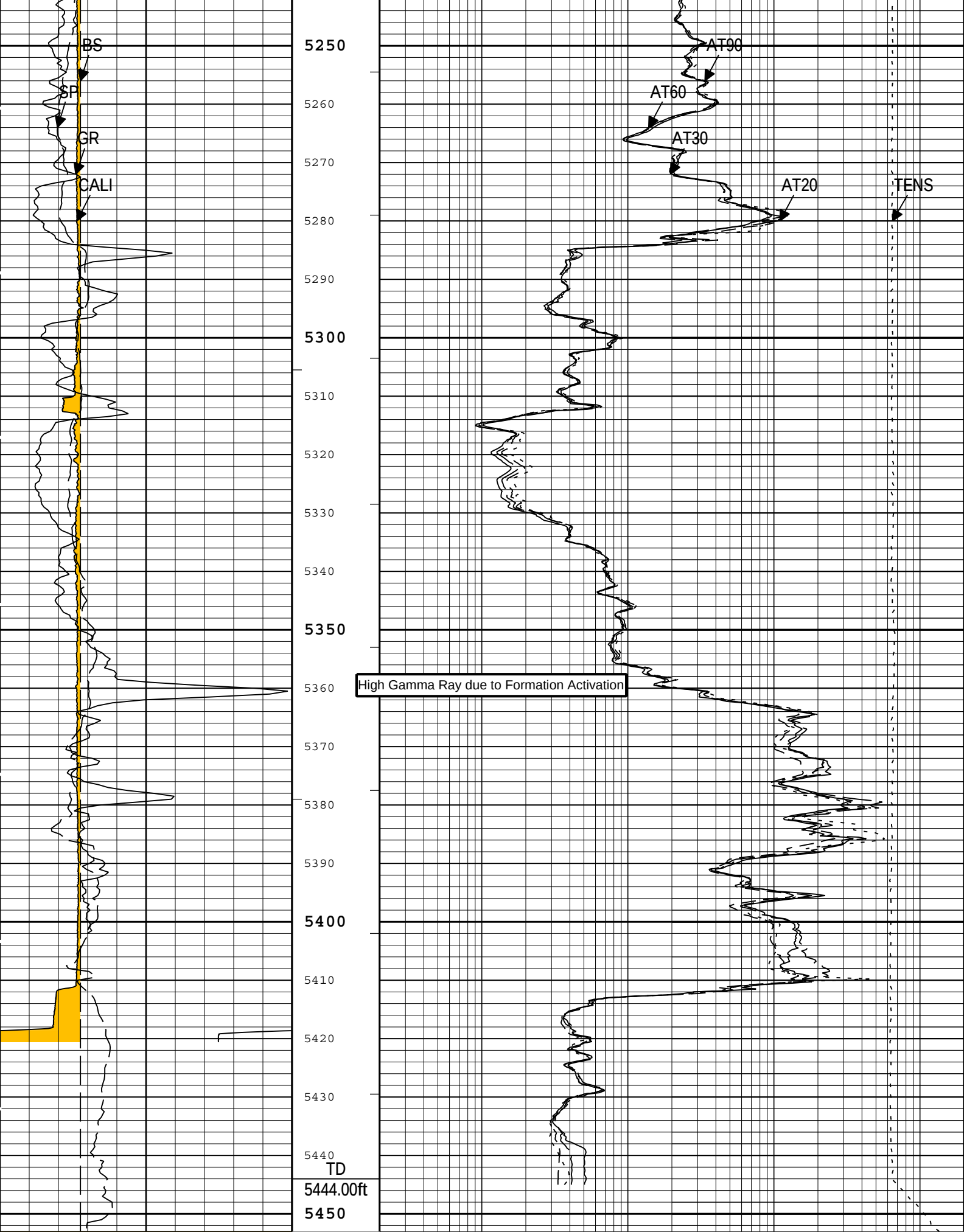
5220
5230
5240


BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS
5250
5260
5270
5280
5290
5300
5310
5320
5330
5340
5350
5360
5370
5380
5390
5400
5410
5420
5430
5440
TD
5444.00ft
5450
High Gamma Ray due to Formation Activation
Mudcake
Caliper (CALI) HDRS-H
Array Induction Two Foot Resistivity A20 (AT20) AIT-M
0.2
ohm.m
2000

| Caliper (CALI) HDRS-H | | |
|---|---|---|
| 6 | in | 16 |

| Gamma Ray (GR) HGNS-H | | |
|---|---|---|
| 0 | gAPI | 150 |

| Spontaneous Potential (SP) AIT-M | | |
|---|---|---|
| -160 | mV | 40 |

| Bit Size (BS) | | |
|---|---|---|
| 6 | in | 16 |

| Array Induction Two Foot Resistivity A30 (AT30) AIT-M | | |
|---|---|---|
| 0.2 | ohm.m | 2000 |

| Array Induction Two Foot Resistivity A60 (AT60) AIT-M | | |
|---|---|---|
| 0.2 | ohm.m | 2000 |

| Array Induction Two Foot Resistivity A90 (AT90) AIT-M | | |
|---|---|---|
| 0.2 | ohm.m | 2000 |

| Cable Tension (TENS) | | |
|---|---|---|
| 10000 | lbf | 0 |

- ICV - Integrated Cement Volume every 100.00 (ft3)
- ICV - Integrated Cement Volume every 10.00 (ft3)
- IHV - Integrated Hole Volume every 100.00 (ft3)
- IHV - Integrated Hole Volume every 10.00 (ft3)
- TIME_1900 - Time Marked every 60.00 (s)

Description: AIT Basic Log One Format: Log ( AIT 5 ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:03

## Channel Processing Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| ABHM | Array Induction Borehole Correction Mode | AIT-M:AMIS:AMIS | Compute Standoff | |
| ABLM | Array Induction Basic Logs Mode | AIT-M:AMIS:AMIS | Normal | |
| ACDE | Array Induction Casing Detection Enable | AIT-M:AMIS:AMIS | Yes | |
| ASTA | Array Induction Tool Standoff | AIT-M:AMIS:AMIS | 1.1 | in |
| BARI | Barite Mud Presence Flag | Borehole | No | |
| BHS | Borehole Status (Open or Cased Hole) | Borehole | Open | |
| BS | Bit Size | COMPLETION | 8.75 | in |
| CALI_SHIFT | CALI Supplementary Offset | HDRS-H:HRCC-H:HRCC-H | 0 | in |
| CBLO | Casing Bottom (Logger) | COMPLETION | 984 | ft |
| CDEN | Cement Density | HGNS-H:HGNS-H:HGNS-H | 2 | g/cm3 |
| CSODDRL | Casing Outer Diameter - Zoned along driller depths | COMPLETION | 9.625 | in |
| DFD | Drilling Fluid Density | Borehole | 9.6 | lbm/gal |
| FCD | Future Casing (Outer) Diameter | COMPLETION | 7 | in |
| GCSE_DOWN_PASS | Generalized Caliper Selection for WL Log Down Passes | Borehole | BS | |
| GCSE_UP_PASS | Generalized Caliper Selection for WL Log Up Passes | Borehole | CALI | |
| GRSE | Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity | Borehole | AMF | |
| SOCO | Standoff Correction Option | HGNS-H:HGNS-H:HGNS-H | Yes | |
| SP_SHIFT | SP Shift | AIT-M:AMIS:AMIS | 40 | mV |
| SPDR | SP Drift Per Foot | AIT-M:AMIS:AMIS | 0 | mV/ft |

## Tool Control Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| MAX_LOG_SPEED | Toolstring Maximum Logging Speed | | 1800 | ft/h |

## 1A

## Repeat Pass 5" = 100'

## Integration Summary

| Output Channel(s) | Output Description | Input Parameter | Output Value | Unit |
|---|---|---|---|---|
| ICV | Integrated Cement Volume | GCSE_UP_PASS, FCD | 36.54 | ft3 |
| IHV | Integrated Hole Volume | GCSE_UP_PASS | 106.99 | ft3 |

## Software Version

| Acquisition System | Version |
|---|---|
| MaxWell | 3.0.9609.0 |
| Application Patch | SP-20120409-3.0.9609.1919 |
| | EXP_APL-OPElevation-3.0.9609.1966 |
| | EXP_APL-ADT-3.0.9609.1558 |

| Computation | Description | Version |
|---|---|---|
| Borehole | Borehole Ensemble provides common Borehole Parameters and Channels | 3.0.9609.1919 |

| Tool Elements | Description | Software Version | Firmware Version |
|---|---|---|---|
| HRCC-H | HILT High-Resolution Control Cartridge, 150 degC | 3.0.9609.1919 | 2.0 |
| HGNS-H | HILT Gamma-Ray and Neutron Sonde, 150 degC | 3.0.9609.1919 | 2.0 |
| AMIS | Array Induction Sonde - M | 3.0.9609.1919 | 1 |

## Pass Summary

| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | Depth Shift | Include Parallel Data |
|---|---|---|---|---|---|---|---|---|
| 1A | Log[4]:Up | Up | 5106.24 ft | 5465.45 ft | 11-Jul-2012 12:01:26 PM | 11-Jul-2012 12:14:25 PM | 2.98 ft | |

All depths are referenced to toolstring zero

## Log

1A: Log[4]:Up A70DF01F-FEB0-4DF0-B104-87FA8DE1C44C

Description: AIT Basic Log One Format: Log ( AIT 5 ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:07

| Channel | Source | Sampling |
|---|---|---|
| AT20 | AIT-M:AMIS:AMIS | 3in |
| AT30 | AIT-M:AMIS:AMIS | 3in |
| AT60 | AIT-M:AMIS:AMIS | 3in |
| AT90 | AIT-M:AMIS:AMIS | 3in |
| BS | Borehole | 6in |
| CALI | HDRS-H:HRCC-H:HRCC-H | 1in |
| GR | HGNS-H:HGNS-H:HGNS-H | 6in |
| ICV | Borehole | 6in |
| IHV | Borehole | 6in |
| SP | AIT-M:AMIS:AMIS | 6in |
| TENS | WLWorkflow | 6in |
| TIME_1900 | WLWorkflow | 0.1in |

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Mudcake

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Spontaneous Potential (SP) AIT-M

-160 mV 40

Bit Size (BS)

Cable Tension (TENS)

10000 lbf 0

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

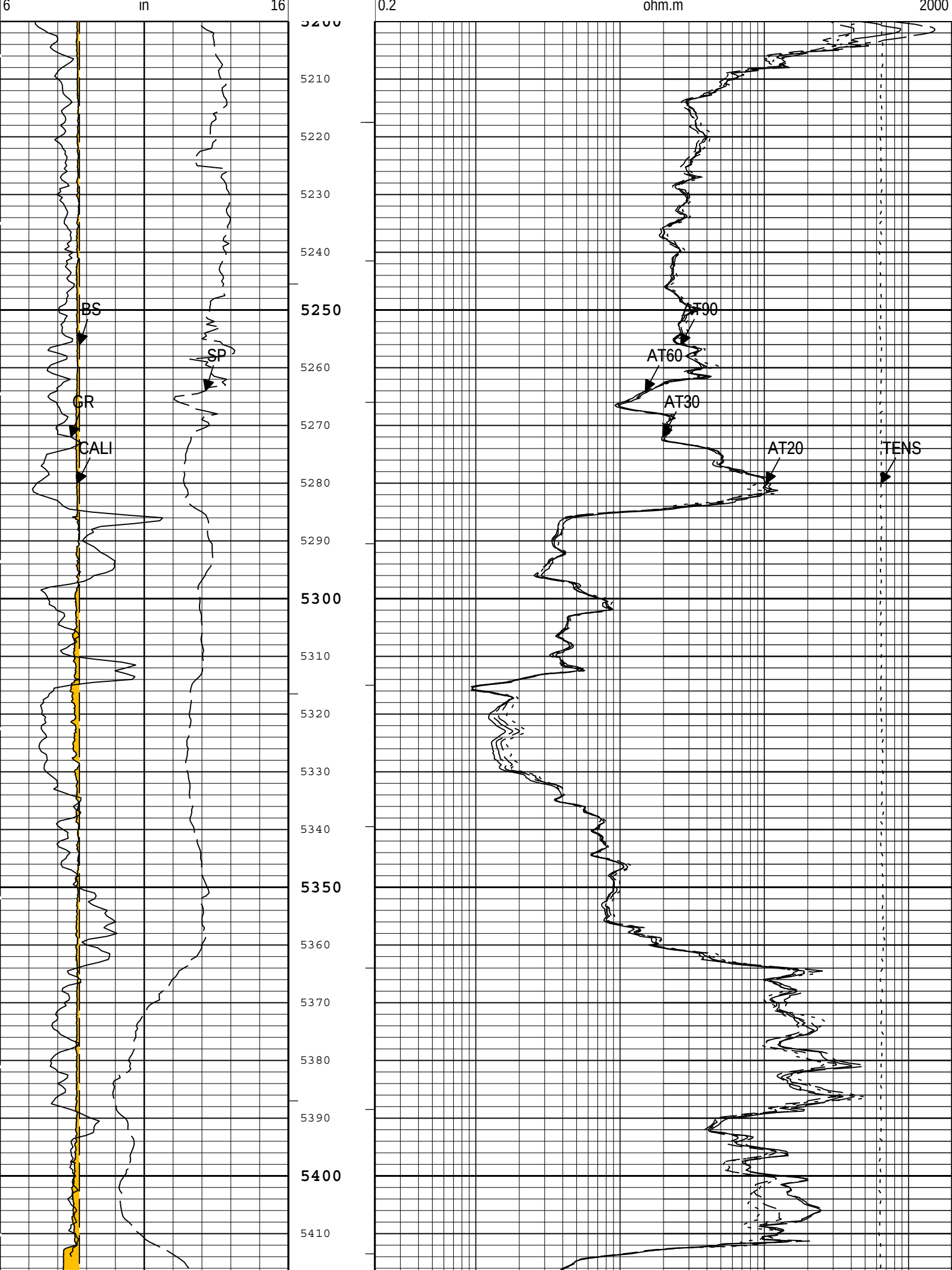
Array Induction Two Foot Resistivity A30 (AT30) AIT-M

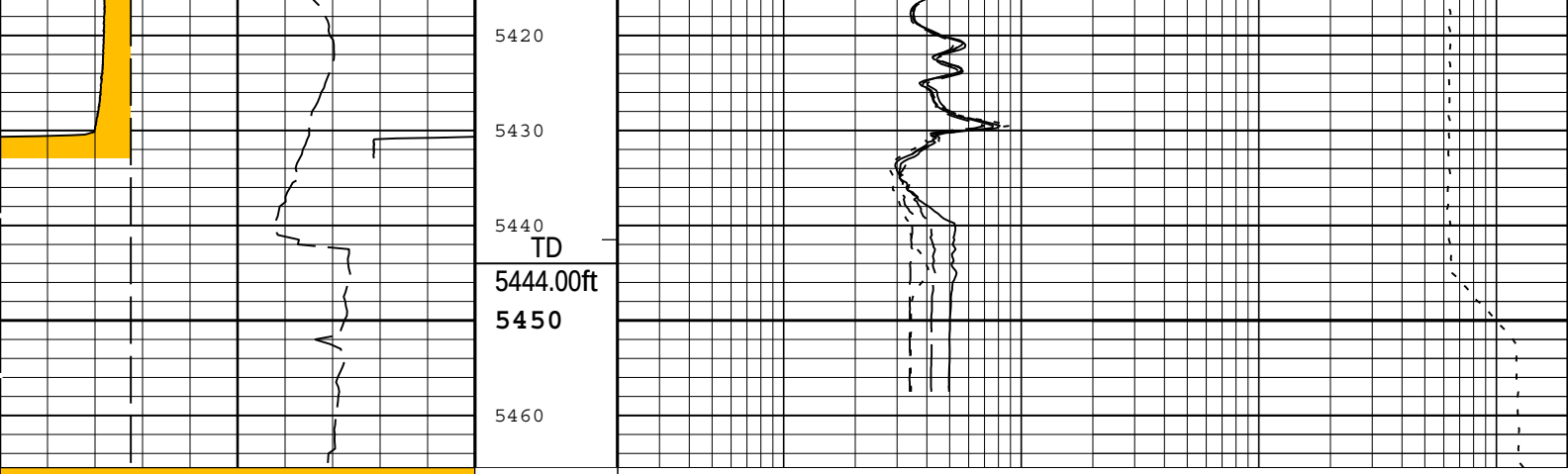
0.2 ohm.m 2000

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M


6
in
16
0.2
ohm.m
2000
5200
5210
5220
5230
5240
5250
5260
5270
5280
5290
5300
5310
5320
5330
5340
5350
5360
5370
5380
5390
5400
5410
BS
SP
GR
CALI
AT90
AT60
AT30
AT20
TENS




Mudcake

Caliper (CALI) HDRS-H

6 in 16

Gamma Ray (GR) HGNS-H

0 gAPI 150

Spontaneous Potential (SP) AIT-M

-160 mV 40

Bit Size (BS)

6 in 16

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Cable Tension (TENS)

10000 lbf 0

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Description: AIT Basic Log One Format: Log ( AIT 5 ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:07

## Channel Processing Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| ABHM | Array Induction Borehole Correction Mode | AIT-M:AMIS:AMIS | Compute Standoff | |
| ABLM | Array Induction Basic Logs Mode | AIT-M:AMIS:AMIS | Normal | |
| ACDE | Array Induction Casing Detection Enable | AIT-M:AMIS:AMIS | Yes | |
| ASTA | Array Induction Tool Standoff | AIT-M:AMIS:AMIS | 1.1 | in |
| BARI | Barite Mud Presence Flag | Borehole | No | |
| BHS | Borehole Status (Open or Cased Hole) | Borehole | Open | |
| BS | Bit Size | COMPLETION | 8.75 | in |
| CALI_SHIFT | CALI Supplementary Offset | HDRS-H:HRCC-H:HRCC-H | 0 | in |
| CBLO | Casing Bottom (Logger) | COMPLETION | 984 | ft |
| CDEN | Cement Density | HGNS-H:HGNS-H:HGNS-H | 2 | g/cm3 |
| DFD | Drilling Fluid Density | Borehole | 9.6 | lbm/gal |
| FCD | Future Casing (Outer) Diameter | COMPLETION | 7 | in |
| GCSE_DOWN_PASS | Generalized Caliper Selection for WL Log Down Passes | Borehole | BS | |
| GCSE_UP_PASS | Generalized Caliper Selection for WL Log Up Passes | Borehole | CALI | |
| GRSE | Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity | Borehole | AMF | |
| SOCO | Standoff Correction Option | HGNS-H:HGNS-H:HGNS-H | Yes | |
| SP_SHIFT | SP Shift | AIT-M:AMIS:AMIS | 40 | mV |
| SPDR | SP Drift Per Foot | AIT-M:AMIS:AMIS | 0 | mV/ft |

## Tool Control Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| MAX_LOG_SPEED | Toolstring Maximum Logging Speed | | 1800 | ft/h |

# 1A

## Repeat Analysis

## Pass Summary

| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | Depth Shift | Include Parallel Data |
|---|---|---|---|---|---|---|---|---|
| 1A | Log[4]:Up | Up | 5106.24 ft | 5465.45 ft | 11-Jul-2012 12:01:26 PM | 11-Jul-2012 12:14:25 PM | 2.98 ft | |
| 1A | Log[7]:Up | Up | 840.60 ft | 5453.07 ft | 11-Jul-2012 1:07:06 PM | 11-Jul-2012 2:59:11 PM | 0.00 ft | |

All depths are referenced to toolstring zero

## Log

1A: Log[4]:Up A70DF01F-FEB0-4DF0-B104-87FA8DE1C44C

Description: AIT Basic Log One Format: Log ( AIT 5 RA ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:08

| Channel | Source | Sampling |
|---|---|---|
| ICV | Borehole | 6in |
| IHV | Borehole | 6in |
| TIME_1900 | WLWorkflow | 0.1in |

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A90 (AO90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A60 (AO60) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Caliper (CALI) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A30 (AO30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Gamma Ray (GR) HGNS-H

0 gAPI 150

GR CALI

Main To Repeat

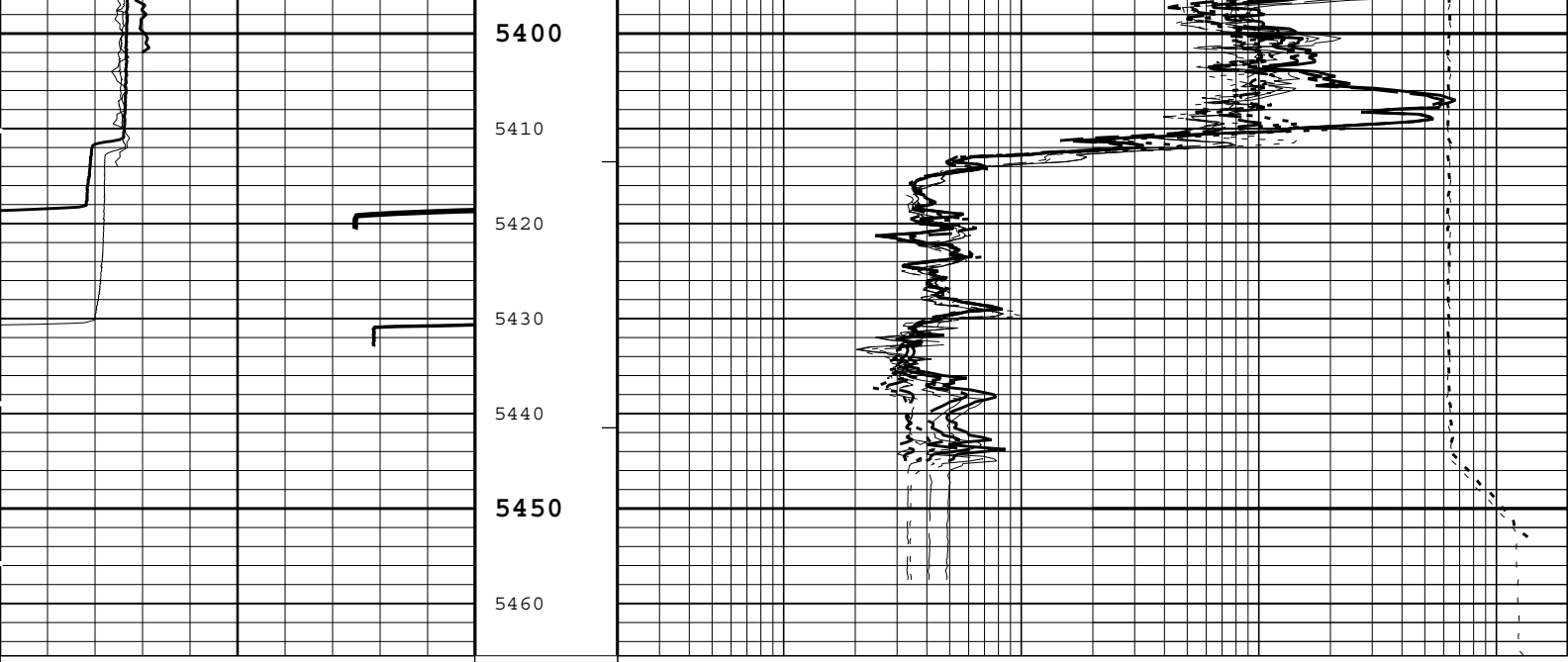
Repeat To Main

Array Induction One Foot Resistivity A20 (AO20) AIT-M

0.2 ohm.m 2000

TENS

5200
5210
5220
5230
5240
5250
5260
5270
5280
5290
5300
5310
5320
5330
5340
5350
5360
5370
5380
5390




Main To Repeat

Repeat To Main

Caliper (CALI) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Gamma Ray (GR) HGNS-H

0 gAPI 150

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A90 (AO90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A60 (AO60) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A30 (AO30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction One Foot Resistivity A20 (AO20) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log One Format: Log ( AIT 5 RA ) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:08

# Calibration Report

## AIT-M (Array Induction Tool - M) Calibration - Run 1A

**Primary Equipment :**

| | | |
|---|---|---|
| Array Induction Sonde - M | AMIS | 229 |

**Auxiliary Equipment :**

| | |
|---|---|
| AITM Rm/SP Bottom Nose | AMRM |

## AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 15:11:35 05-May-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Test Loop Gain - 0 | | Master | 1.000 | 0.950 | 1.018 | 1.050 |
| Test Loop Phase - 0 | deg | Master | 0 | -3.000 | 0.555 | 3.000 |
| Test Loop Gain - 1 | | Master | 1.000 | 0.950 | 1.014 | 1.050 |
| Test Loop Phase - 1 | deg | Master | 0 | -3.000 | 0.593 | 3.000 |
| Test Loop Gain - 2 | | Master | 1.000 | 0.950 | 1.018 | 1.050 |
| Test Loop Phase - 2 | deg | Master | 0 | -3.000 | 0.020 | 3.000 |
| Test Loop Gain - 3 | | Master | 1.000 | 0.950 | 1.014 | 1.050 |
| Test Loop Phase - 3 | deg | Master | 0 | -3.000 | 0.056 | 3.000 |
| Test Loop Gain - 4 | | Master | 1.000 | 0.950 | 0.995 | 1.050 |
| Test Loop Phase - 4 | deg | Master | 0 | -3.000 | 0.078 | 3.000 |
| Test Loop Gain - 5 | | Master | 1.000 | 0.950 | 0.992 | 1.050 |
| Test Loop Phase - 5 | deg | Master | 0 | -3.000 | 1.072 | 3.000 |
| Test Loop Gain - 6 | | Master | 1.000 | 0.950 | 0.996 | 1.050 |
| Test Loop Phase - 6 | deg | Master | 0 | -3.000 | 0.257 | 3.000 |
| Test Loop Gain - 7 | | Master | 1.000 | 0.950 | 1.008 | 1.050 |
| Test Loop Phase - 7 | deg | Master | 0 | -3.000 | 0.263 | 3.000 |

## AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 15:11:35 05-May-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Sonde Error Correction Real - 0 | mS/m | Master | ----- | -231.000 | -89.643 | 119.000 |
| Sonde Error Correction Quad - 0 | | Master | ----- | -2250.000 | -1205.814 | 2250.000 |
| Sonde Error Correction Real - 1 | mS/m | Master | ----- | 114.000 | 160.789 | 204.000 |
| Sonde Error Correction Quad - 1 | | Master | ----- | -625.000 | 183.606 | 625.000 |
| Sonde Error Correction Real - 2 | mS/m | Master | ----- | 66.000 | 108.133 | 156.000 |
| Sonde Error Correction Quad - 2 | | Master | ----- | -350.000 | -137.337 | 350.000 |
| Sonde Error Correction Real - 3 | mS/m | Master | ----- | 39.000 | 49.453 | 89.000 |
| Sonde Error Correction Quad - 3 | | Master | ----- | -250.000 | -16.995 | 250.000 |
| Sonde Error Correction Real - 4 | mS/m | Master | ----- | 15.000 | 26.216 | 35.000 |
| Sonde Error Correction Quad - 4 | | Master | ----- | -63.000 | 1.594 | 63.000 |
| Sonde Error Correction Real - 5 | mS/m | Master | ----- | 4.000 | 12.908 | 24.000 |
| Sonde Error Correction Quad - 5 | | Master | ----- | -50.000 | -4.294 | 50.000 |
| Sonde Error Correction Real - 6 | mS/m | Master | ----- | 5.000 | 9.625 | 15.000 |
| Sonde Error Correction Quad - 6 | | Master | ----- | -30.000 | 5.777 | 30.000 |
| Sonde Error Correction Real - 7 | mS/m | Master | ----- | -5.000 | -0.676 | 5.000 |
| Sonde Error Correction Quad - 7 | | Master | ----- | -30.000 | -2.997 | 30.000 |

## AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 15:11:35 05-May-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Coarse Gain | | Master | 1.000 | 0.800 | 1.166 | 1.200 |
| Fine Gain | | Master | 1.000 | 0.800 | 1.177 | 1.200 |

## AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 15:11:35 05-May-2012 Before (Measured): **04:01:18 10-Jul-2012** **Expired by 1 days** After:

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Thru Cal Mag - 0 | V | Master | ----- | 0.366 | 0.613 | 0.854 |
| | | Before | ----- | 0.366 | 0.613 | 0.854 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.000 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 0 | deg | Master | ----- | 137.000 | -176.494 | -103.000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Before | ----- | 137.000 | -159.185 | -103.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 17.309 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 1 | V | Master | ----- | 0.762 | 1.257 | 1.778 |
| | | Before | ----- | 0.762 | 1.257 | 1.778 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.000 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 1 | deg | Master | ----- | 136.000 | -177.562 | -104.000 |
| | | Before | ----- | 136.000 | -160.257 | -104.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 17.305 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 2 | V | Master | ----- | 0.372 | 0.623 | 0.868 |
| | | Before | ----- | 0.372 | 0.622 | 0.868 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -0.001 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 2 | deg | Master | ----- | 132.000 | 178.884 | -108.000 |
| | | Before | ----- | 132.000 | -163.813 | -108.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.697 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 3 | V | Master | ----- | 0.420 | 0.704 | 0.980 |
| | | Before | ----- | 0.420 | 0.703 | 0.980 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -0.001 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 3 | deg | Master | ----- | 131.000 | 178.122 | -109.000 |
| | | Before | ----- | 131.000 | -164.578 | -109.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.700 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 4 | V | Master | ----- | 0.804 | 1.315 | 1.876 |
| | | Before | ----- | 0.804 | 1.315 | 1.876 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.000 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 4 | deg | Master | ----- | 125.000 | 172.006 | -115.000 |
| | | Before | ----- | 125.000 | -170.703 | -115.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.709 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 5 | V | Master | ----- | 1.176 | 1.916 | 2.744 |
| | | Before | ----- | 1.176 | 1.915 | 2.744 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -0.001 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 5 | deg | Master | ----- | 122.000 | 170.360 | -118.000 |
| | | Before | ----- | 122.000 | -172.353 | -118.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.713 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 6 | V | Master | ----- | 1.176 | 1.913 | 2.744 |
| | | Before | ----- | 1.176 | 1.912 | 2.744 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -0.001 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 6 | deg | Master | ----- | 121.000 | 170.403 | -119.000 |
| | | Before | ----- | 121.000 | -172.311 | -119.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.714 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Mag - 7 | V | Master | ----- | 0.846 | 1.379 | 1.974 |
| | | Before | ----- | 0.846 | 1.380 | 1.974 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.001 | ----- |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | After-Before | ----- | ----- | ----- | ----- |
| Thru Cal Phase - 7 | deg | Master | ----- | 115.000 | 169.622 | -125.000 |
| | | Before | ----- | 115.000 | -173.131 | -125.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | -342.753 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| SPA Zero | mV | Master | ----- | -50.000 | -0.075 | 50.000 |
| | | Before | ----- | -50.000 | -0.016 | 50.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.059 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| SPA Plus | mV | Master | ----- | 941.000 | 994.818 | 1040.000 |
| | | Before | ----- | 941.000 | 994.903 | 1040.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.085 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Temperature Zero | V | Master | ----- | -0.050 | 0.000 | 0.050 |
| | | Before | ----- | -0.050 | 0.000 | 0.050 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.000 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Temperature Plus | V | Master | ----- | 0.870 | 0.922 | 0.960 |
| | | Before | ----- | 0.870 | 0.922 | 0.960 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | 0.000 | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |

## ECS-A (Elemental Capture Spectroscopy Tool) Calibration - Run 1A

**Primary Equipment :**

| | | |
|---|---|---|
| The ECS sonde is used to measure elemental concentrations. | ECS-A | 99 |

**Auxiliary Equipment :**

| | | |
|---|---|---|
| Litho-Density Spectroscopy Cartridge | LDSC-B | 441 |
| Housing for the LDSC | LDSH-A | 475 |
| Housing to contain the ECS Sonde Assembly | ECSH-A | |
| The gamma ray BGO detector is used to detect prompt capture gamma rays for spectroscopy measurement. | ECSD-A | |
| The AmBe source provides neutrons for the prompt capture spectroscopy measurement. | NSR-F | 4022 |

## ECS Background Measurement Check - ECS Calibration Check

Master: Before (Measured): **04:19:53 10-Jul-2012** After:
**Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Detector resolution (20 DegC) | % | Master | 13.000 | 11.200 | NOT DONE | 14.000 |
| | | Before | 13.000 | 11.200 | 11.854 | 14.000 |
| | | After | 13.000 | 11.200 | NOT DONE | 14.000 |
| | | Before-Master | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |

## ECS Spectral Calibration - ECS Spectral Calibration

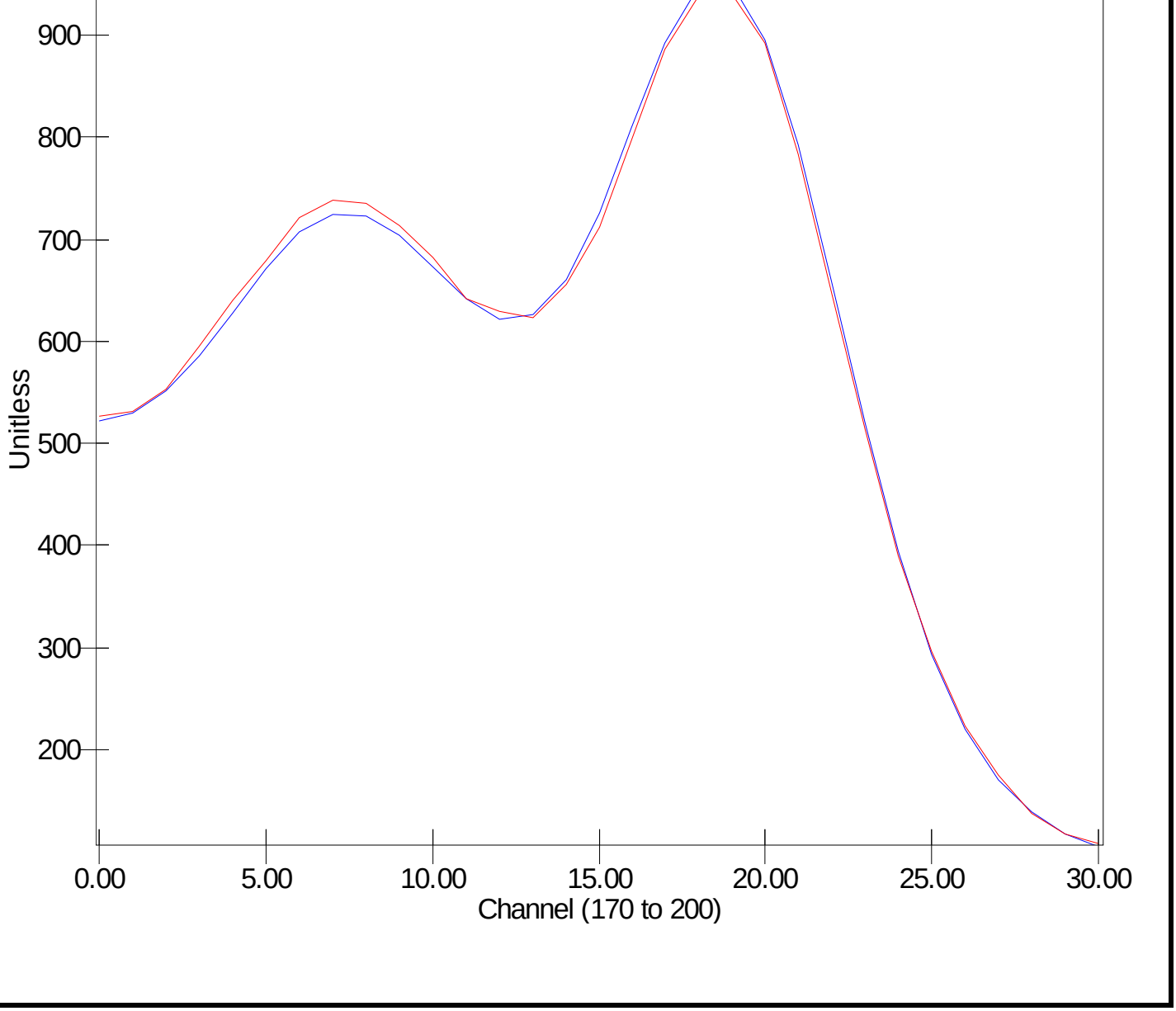
Master (EEPROM): 11:25:29 11-Jul-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Spectral Shift Factor | | Master | 1.000 | -0.500 | 0.018 | 1.500 |

# Spectrum Without Shift Plot

**SHOP**

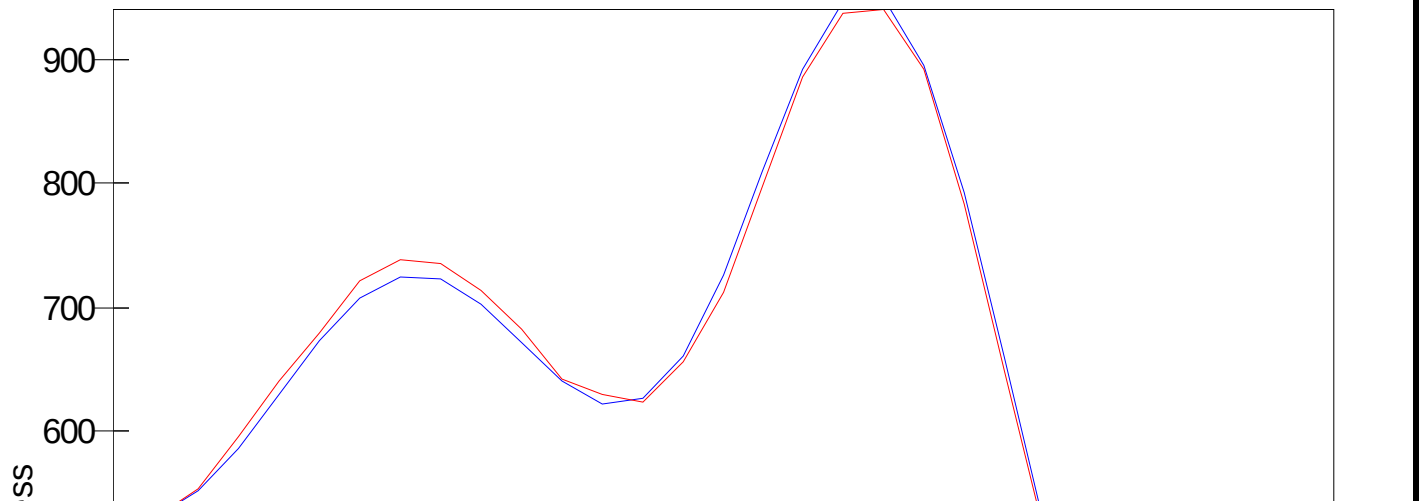
FITTED_SPEC (FITTED_SPEC)
DATA_SPEC (DATA_SPEC)

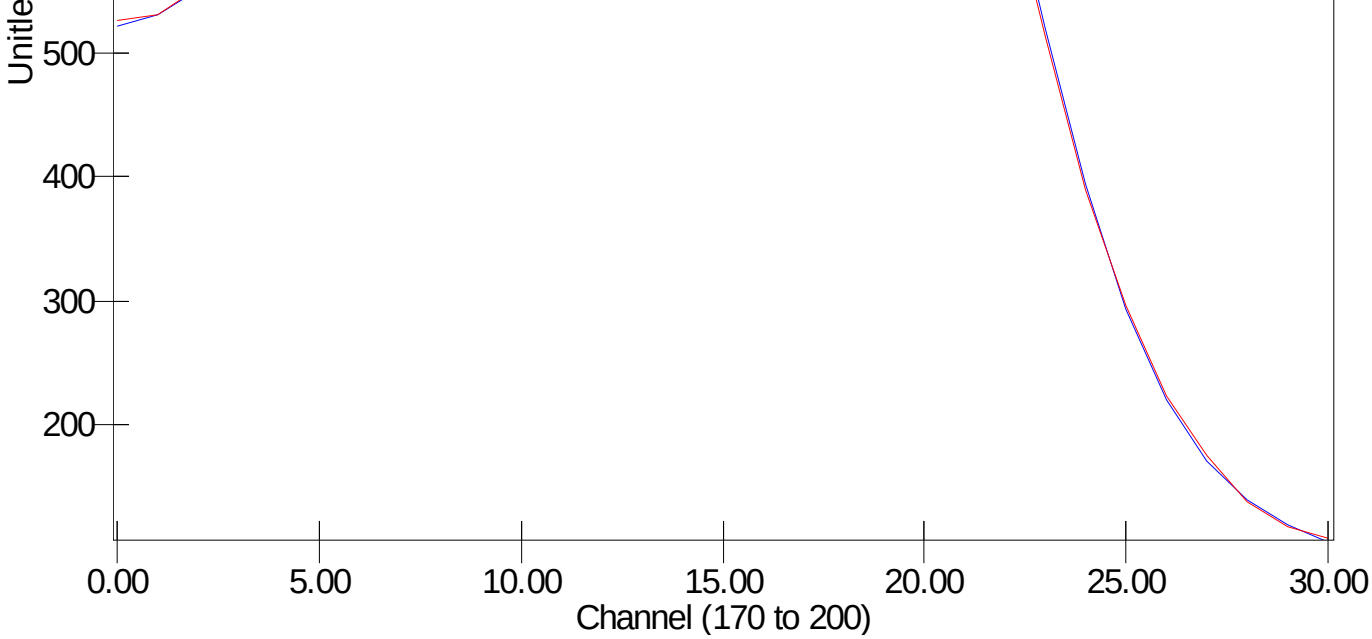



# Spectrum With Shift Plot

## SHOP

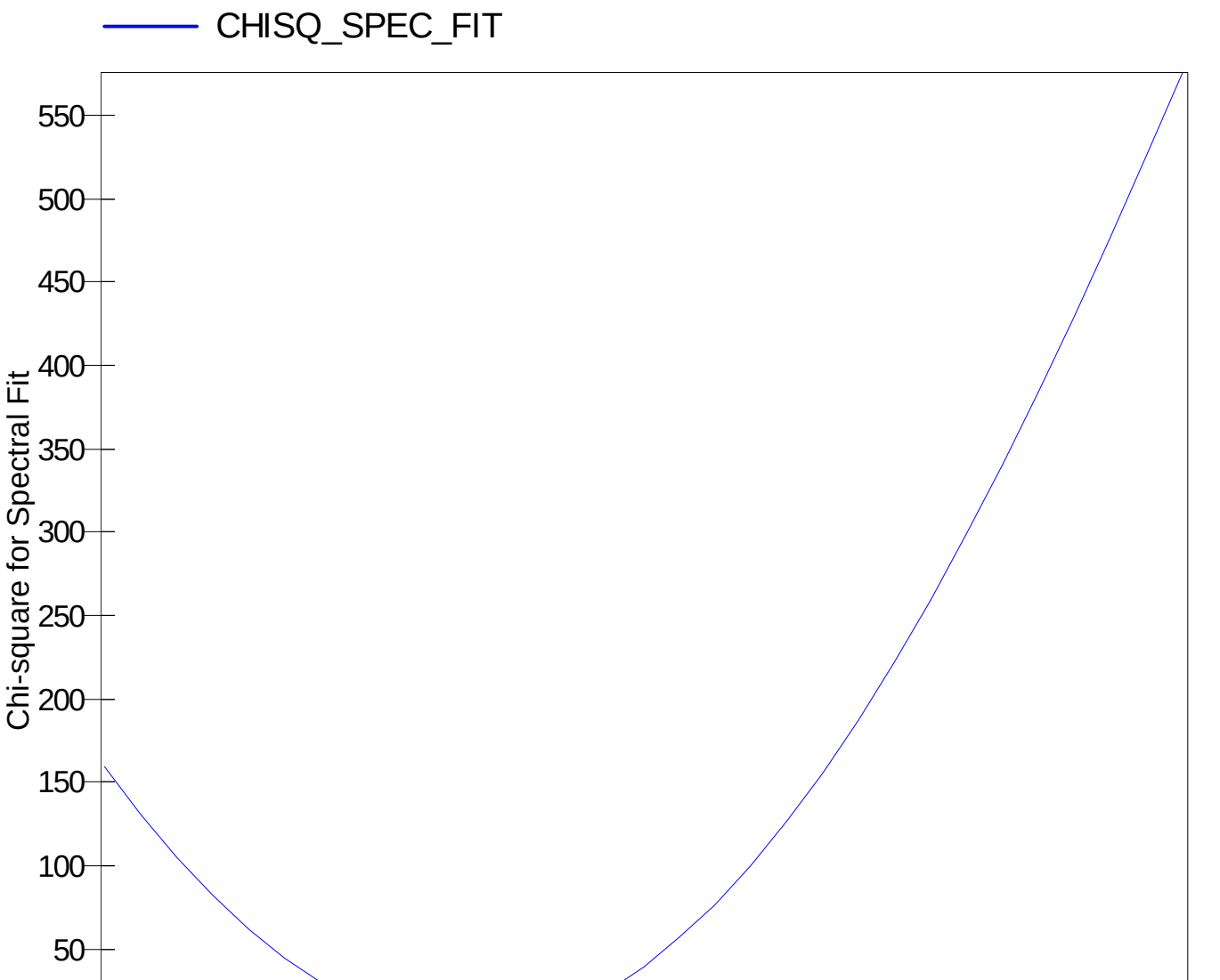
FITTED_SPEC_SF (FITTED_SPEC_SF)
DATA_SPEC_SF (DATA_SPEC_SF)

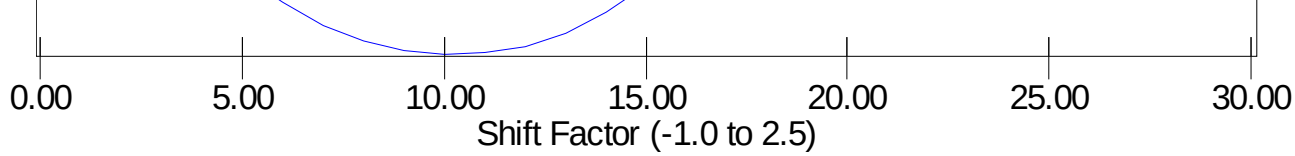





## Chi Square for Spectral Fit Plot

SHOP






## HDRS-H (HILT Density and Rxo Sonde, 150 degC) Calibration - Run 1A

**Primary Equipment :**

| | | |
|---|---|---|
| HILT High-Resolution Control Cartridge, 150 degC | HRCC-H | 4709 |
| HILT Resistivity Gamma-Ray Density Device, 150 degC | HRGD-H | 4700 |

**Auxiliary Equipment :**

| | | |
|---|---|---|
| HRDD Backscatter Detector | Backscatter | 26832 |
| HRDD Long Spacing Detector | Long Spacing | 28548 |
| HRDD Short Spacing Detector | Short Spacing | 27727 |
| Cesium 137 Gamma-Ray Logging Source | GSR-J | 5347 |
| HILT High-Resolution Control Cartridge, 150 degC | HRCC-H | 4709 |
| HILT High-Resolution Mechanical Sonde, 150 degC | HRMS-H | 3964 |

**Calibration Parameter :**

| | |
|---|---|
| Small Ring Size (Caliper Calibration Small Ring) | 8.00 |
| Large Ring Size (Caliper Calibration Large Ring) | 12.00 |

### HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): **04:10:11 10-Jul-2012 Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Small Ring | in | Before | 8.00 | 6.00 | 8.05 | 10.00 |
| Large Ring | in | Before | 12.00 | 9.00 | 12.23 | 15.00 |

### HDRS Density Calibration - Inversion Results

Master (EEPROM): 22:41:48 03-Jul-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Rho Aluminum | g/cm3 | Master | 2.596 | 2.586 | 2.592 | 2.606 |
| Rho Magnesium | g/cm3 | Master | 1.686 | 1.676 | 1.693 | 1.696 |
| Pe Aluminum | | Master | 2.570 | 2.470 | 2.559 | 2.670 |
| Pe Magnesium | | Master | 2.650 | 2.550 | 2.602 | 2.750 |

### HDRS Density Calibration - Deviation Summary

Master (EEPROM): 22:41:48 03-Jul-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| BS Average Deviation | % | Master | 0 | -0.6000 | 0.3308 | 0.6000 |
| BS Max Deviation | % | Master | 0 | -1.6000 | 0.7154 | 1.6000 |
| SS Average Deviation | % | Master | 0 | -1.0000 | 0.8226 | 1.0000 |
| SS Max Deviation | % | Master | 0 | -2.5000 | 1.8450 | 2.5000 |
| LS Average Deviation | % | Master | 0 | -1.5000 | 1.2011 | 1.5000 |
| LS Max Deviation | % | Master | 0 | -3.5000 | 2.9927 | 3.5000 |

### HDRS Density Calibration - Background Summary

Master (EEPROM): 22:41:48 03-Jul-2012 Before (Measured): **04:05:00 10-Jul-2012 Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| BS Window Ratio | | Master | 1.0000 | ----- | 0.7403 | ----- |
| | | Before | 0.7403 | 0.7033 | 0.7427 | 0.7773 |
| | | Before-Master | ----- | ----- | 0.0024 | ----- |
| BS Window Sum | 1/s | Master | 1 | ----- | 24930 | ----- |
| | | Before | 24930 | 23683 | 24925 | 26176 |
| | | Before-Master | ----- | ----- | -5 | ----- |
| SS Window Ratio | | Master | 1.0000 | ----- | 0.4795 | ----- |
| | | Before | 0.4795 | 0.4555 | 0.4803 | 0.5035 |
| | | Before-Master | ----- | ----- | 0.0008 | ----- |
| SS Window Sum | 1/s | Master | 1 | ----- | 10822 | ----- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Before | 10822 | 10281 | 10808 | 11364 | |
| | | Before-Master | ----- | ----- | -14 | ----- | |
| LS Window Ratio | | Master | 1.0000 | ----- | 0.3003 | ----- | |
| | | Before | 0.3003 | 0.2853 | 0.2943 | 0.3153 | |
| | | Before-Master | ----- | ----- | -0.0060 | ----- | |
| LS Window Sum | 1/s | Master | 1 | ----- | 1346 | ----- | |
| | | Before | 1346 | 1278 | 1342 | 1413 | |
| | | Before-Master | ----- | ----- | -4 | ----- | |

## HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 22:41:48 03-Jul-2012 Before (Measured): **04:05:00 10-Jul-2012 Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| BS PM High Voltage | V | Master | ----- | 1000 | 1265 | 2400 |
| | | Before | ----- | 1000 | 1260 | 2400 |
| | | Before-Master | ----- | -100 | -5 | 100 |
| SS PM High Voltage | V | Master | ----- | 1000 | 1646 | 2400 |
| | | Before | ----- | 1000 | 1620 | 2400 |
| | | Before-Master | ----- | -100 | -26 | 100 |
| LS PM High Voltage | V | Master | ----- | 1000 | 1523 | 2400 |
| | | Before | ----- | 1000 | 1534 | 2400 |
| | | Before-Master | ----- | -100 | 11 | 100 |

## HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 22:41:48 03-Jul-2012 Before (Measured): **04:05:00 10-Jul-2012 Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| BS Crystal Resolution | % | Master | ----- | 5.00 | 10.42 | 25.00 |
| | | Before | ----- | 5.00 | 10.42 | 25.00 |
| | | Before-Master | ----- | -1.00 | 0.00 | 1.00 |
| SS Crystal Resolution | % | Master | ----- | 5.00 | 10.61 | 20.00 |
| | | Before | ----- | 5.00 | 10.78 | 20.00 |
| | | Before-Master | ----- | -1.00 | 0.17 | 1.00 |
| LS Crystal Resolution | % | Master | ----- | 5.00 | 9.69 | 20.00 |
| | | Before | ----- | 5.00 | 9.58 | 20.00 |
| | | Before-Master | ----- | -1.00 | -0.11 | 1.00 |

## HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): **04:09:21 10-Jul-2012 Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Main Resistivity | ohm.m | Before | 3875 | 3565 | 3828 | 4185 |
| Deep Resistivity | ohm.m | Before | 3830 | 3524 | 3810 | 4136 |
| Shallow Resistivity | ohm.m | Before | 3830 | 3524 | 3828 | 4136 |

## HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run 1A

**Primary Equipment :**

| | | |
|---|---|---|
| HILT Gamma-Ray and Neutron Sonde, 150 degC | HGNS-H | 3819 |

**Auxiliary Equipment :**

| | | |
|---|---|---|
| HGNS Accelerometer, 150 degC | HACCZ-H | 2102 |
| AmBe Neutron Logging Source | NSR-F | 5226 |

**Calibration Parameter :**

| | |
|---|---|
| Water Temperature | |
| Housing Size | |
| JIG-BKG (Jig minus background reference) | 165 |

## HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 10:47:21 11-Jul-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| AZ Vertical Measurement | ft/s2 | Before | 32.2 | 31.5 | 32.2 | 32.8 |

## HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-Feb-2003

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Accelerometer Manufacturer | | Master | ----- | ----- | QAT_160 | ----- |
| Accelerometer Reference Temperature | degF | Master | ----- | 30.2 | 77.0 | 122.0 |
| Accelerometer Coefficients - 0 | | Master | ----- | ----- | 2847.000 | ----- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Accelerometer Coefficients - 0 | | Master | ----- | ----- | -2847.000 | ----- | |
| Accelerometer Coefficients - 1 | | Master | ----- | ----- | 13.547 | ----- | |
| Accelerometer Coefficients - 2 | | Master | ----- | ----- | -0.002 | ----- | |
| Accelerometer Coefficients - 3 | | Master | ----- | ----- | 0.000 | ----- | |
| Accelerometer Coefficients - 4 | | Master | ----- | ----- | 2.752 | ----- | |
| Accelerometer Coefficients - 5 | | Master | ----- | ----- | 0.000 | ----- | |
| Accelerometer Coefficients - 6 | | Master | ----- | ----- | 0.000 | ----- | |
| Accelerometer Coefficients - 7 | | Master | ----- | ----- | 0.000 | ----- | |
| Accelerometer Coefficients - 8 | | Master | ----- | ----- | 299.200 | ----- | |
| Accelerometer Coefficients - 9 | | Master | ----- | ----- | 1.004 | ----- | |

## HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 16:36:16 01-May-2012 Before (Measured): **04:02:08 10-Jul-2012** After:
**Expired by 1 days**

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Near Zero Measurement | 1/s | Master | 0 | 5.0 | 27.7 | 40.0 |
| | | Before | 0 | 5.0 | 27.1 | 40.0 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | -4.2 | -0.6 | 4.2 |
| | | After-Before | ----- | ----- | ----- | ----- |
| Far Zero Measurement | 1/s | Master | 0 | 5.0 | 28.1 | 40.0 |
| | | Before | 0 | 5.0 | 27.4 | 40.0 |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | -4.2 | -0.7 | 4.2 |
| | | After-Before | ----- | ----- | ----- | ----- |
| Near Plus Measurement - 0 | 1/s | Master | 6031.0 | 4700.0 | 5233.0 | 6900.0 |
| | | Before | ----- | ----- | ----- | ----- |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Far Plus Measurement - 0 | 1/s | Master | 2793.0 | 1900.0 | 2138.0 | 2900.0 |
| | | Before | ----- | ----- | ----- | ----- |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Near Corrected Plus Measurement - 0 | 1/s | Master | ----- | 4700.0 | 5170.0 | 6900.0 |
| | | Before | ----- | ----- | ----- | ----- |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Far Corrected Plus Measurement - 0 | 1/s | Master | ----- | 1900.0 | 2086.0 | 2900.0 |
| | | Before | ----- | ----- | ----- | ----- |
| | | After | ----- | ----- | ----- | ----- |
| | | Before-Master | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |

## HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): **04:14:47 10-Jul-2012** **Expired by 1 days** After:

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| RGR Zero Measurement | gAPI | Before | 30.0 | 0 | 26.4 | 120.0 |
| | | After | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| RGR Plus Measurement | gAPI | Before | 185.4 | 157.1 | 179.2 | 206.3 |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| GR Calibration Gain | | Before | 0.89 | 0.80 | 0.92 | 1.05 |
| | | After | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |

## MLT-B (Microlog Tool) Calibration - Run 1A

**Primary Equipment :**

| | | |
|---|---|---|
| Microlog Tool | MLT-B | 11 |

**Calibration Parameter :**

| | |
|---|---|
| Small Ring Size (Caliper Calibration Small Ring) | 8.000 |
| Large Ring Size (Caliper Calibration Large Ring) | 12.000 |
| Micro Normal Plus Reference (Micro Normal Plus Reference) | 6.72 |

## Caliper Calibration - Caliper Calibration

Before (Measured): 10:38:37 10-Jul-2012

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Caliper Small Ring Measurement | in | Before | 8.000 | 4.000 | 6.173 | 12.000 |
| Caliper Large Ring Measurement | in | Before | 12.000 | 6.000 | 10.199 | 18.000 |
| Caliper Gain | | Before | ----- | ----- | 0.994 | ----- |
| Caliper Offset | in | Before | ----- | ----- | 1.866 | ----- |

## Electrical Calibration - Microlog Calibration

Before (Measured): **04:00:30 10-Jul-2012 Expired by 1 days** After:

| Measurement | Unit | Phase | Nominal | Low Limit | Actual | High Limit |
|---|---|---|---|---|---|---|
| Micro Normal Zero Measurement | ohm.m | Before | 0 | -2.000 | 0.000 | 2.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Normal Plus Measurement | ohm.m | Before | 6.720 | 2.720 | 6.520 | 10.720 |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Normal Gain | | Before | ----- | ----- | 1.031 | ----- |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Normal Offset | ohm.m | Before | ----- | ----- | 0.000 | ----- |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Inverse Zero Measurement | ohm.m | Before | 0 | -2.000 | 0.000 | 2.000 |
| | | After | ----- | ----- | ----- | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Inverse Plus Measurement | ohm.m | Before | 5.000 | 1.000 | 4.865 | 9.000 |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Inverse Gain | | Before | ----- | ----- | 1.028 | ----- |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |
| Micro Inverse Offset | ohm.m | Before | ----- | ----- | 0.000 | ----- |
| | | After | ----- | ----- | **NOT DONE** | ----- |
| | | After-Before | ----- | ----- | ----- | ----- |

# 1A

# Main Pass 1" = 100'

## Integration Summary

| Output Channel(s) | Output Description | Input Parameter | Output Value | Unit |
|---|---|---|---|---|
| ICV | Integrated Cement Volume | GCSE_UP_PASS, FCD | 1079.67 | ft3 |
| IHV | Integrated Hole Volume | GCSE_UP_PASS | 2273.59 | ft3 |

## Software Version

| Acquisition System | Version |
|---|---|
| MaxWell | 3.0.9609.0 |
| Application Patch | SP-20120409-3.0.9609.1919 |
| | EXP_APL-OPElevation-3.0.9609.1966 |
| | EXP_APL-ADT-3.0.9609.1558 |

| Computation | Description | Version |
|---|---|---|
| Borehole | Borehole Ensemble provides common Borehole Parameters and Channels | 3.0.9609.1919 |

| Tool Elements | Description | Software Version | Firmware Version |
|---|---|---|---|
| HGNS-H | HILT Gamma-Ray and Neutron Sonde, 150 degC | 3.0.9609.1919 | 2.0 |
| AMIS | Array Induction Sonde - M | 3.0.9609.1919 | 1 |

## Pass Summary

| Run Name | Pass Objective | Direction | Top | Bottom | Start | Stop | Depth Shift | Include Parallel Data |
|---|---|---|---|---|---|---|---|---|
| 1A | Log[7]:Up | Up | 840.60 ft | 5453.07 ft | 11-Jul-2012 1:07:06 PM | 11-Jul-2012 2:59:11 PM | 0.00 ft | |
| All depths are referenced to toolstring zero | | | | | | | | |

## Log

1A: Log[7]:Up B3DD9F04-81D7-4F00-9E61-A7066FF11CF0

Description: AIT Basic Log Two Format: Log ( AIT Basic Log Two ) Index Scale: 1 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:21

| Channel | Source | Sampling |
|---|---|---|
| AF20 | AIT-M:AMIS:AMIS | 3in |
| AF60 | AIT-M:AMIS:AMIS | 3in |
| AFCO60 | AIT-M:AMIS:AMIS | 3in |
| GR | HGNS-H:HGNS-H:HGNS-H | 6in |
| ICV | Borehole | 6in |
| IHV | Borehole | 6in |
| SP | AIT-M:AMIS:AMIS | 6in |
| TIME_1900 | WLWorkflow | 0.1in |

IHV - Integrated Hole Volume every 10.00 (ft3)
IHV - Integrated Hole Volume every 100.00 (ft3)
ICV - Integrated Cement Volume every 10.00 (ft3)
ICV - Integrated Cement Volume every 100.00 (ft3)
TIME_1900 - Time Marked every 60.00 (s)

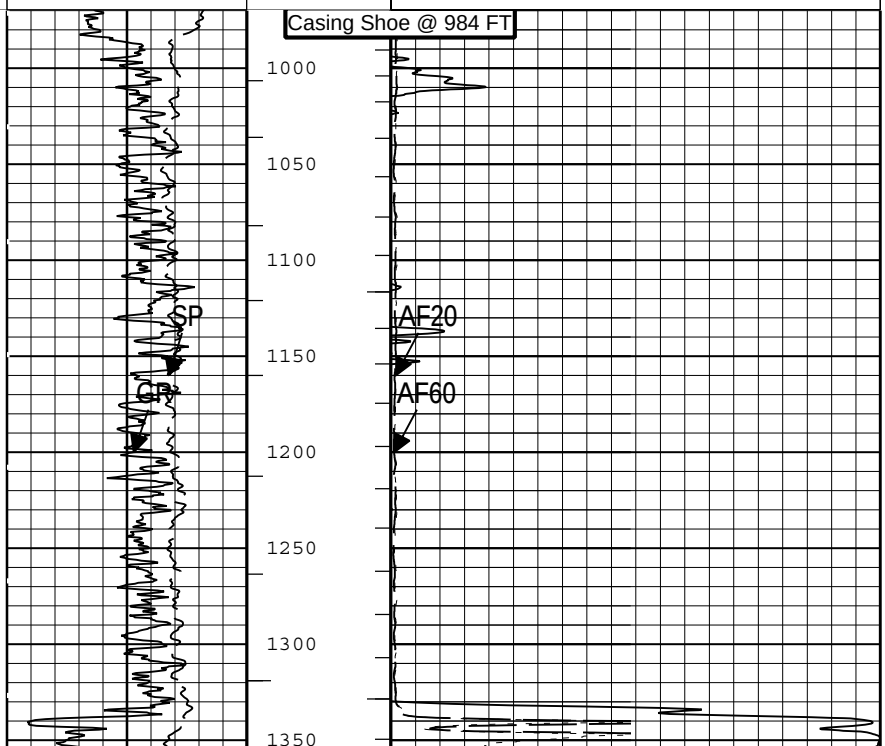
Array Induction Four Foot Resistivity A60 (AF60) AIT-M
0 ohm.m 50

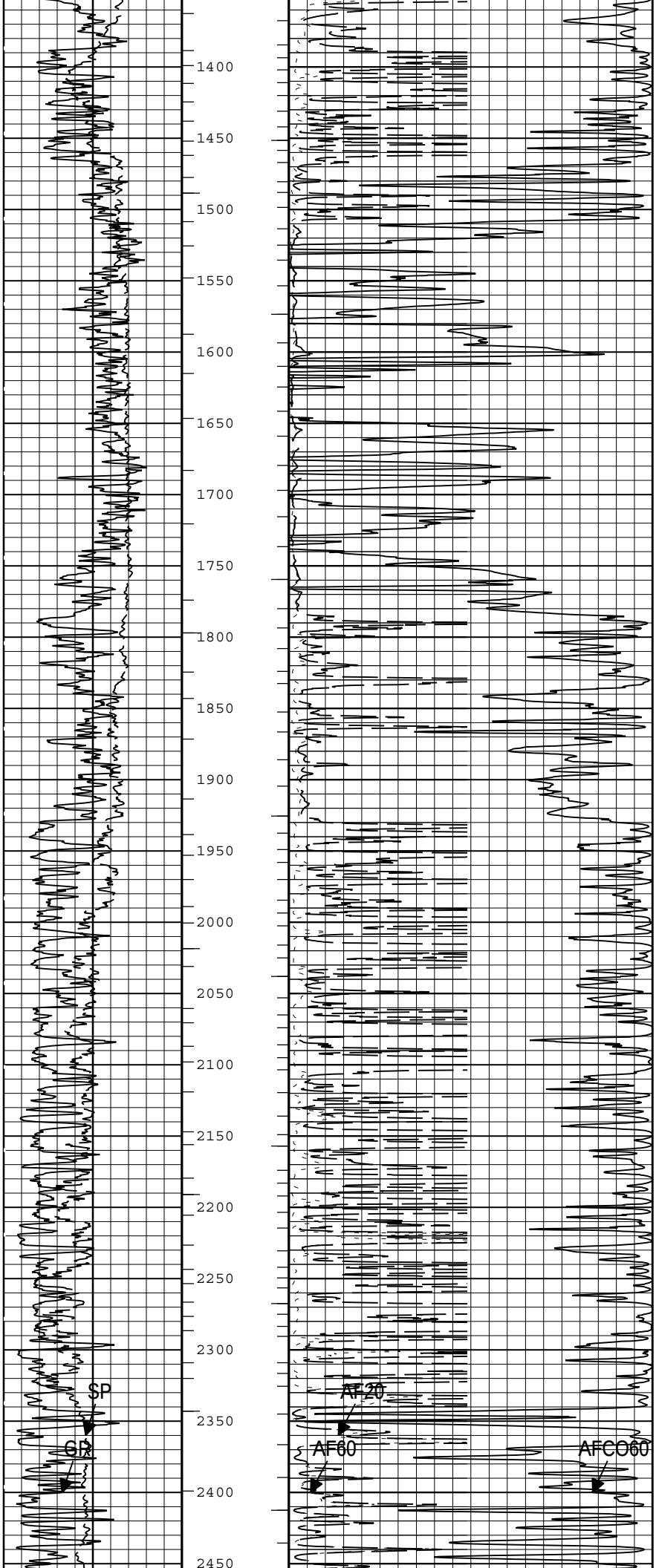
Array Induction Four Foot Resistivity A20 (AF20) AIT-M
0 ohm.m 50

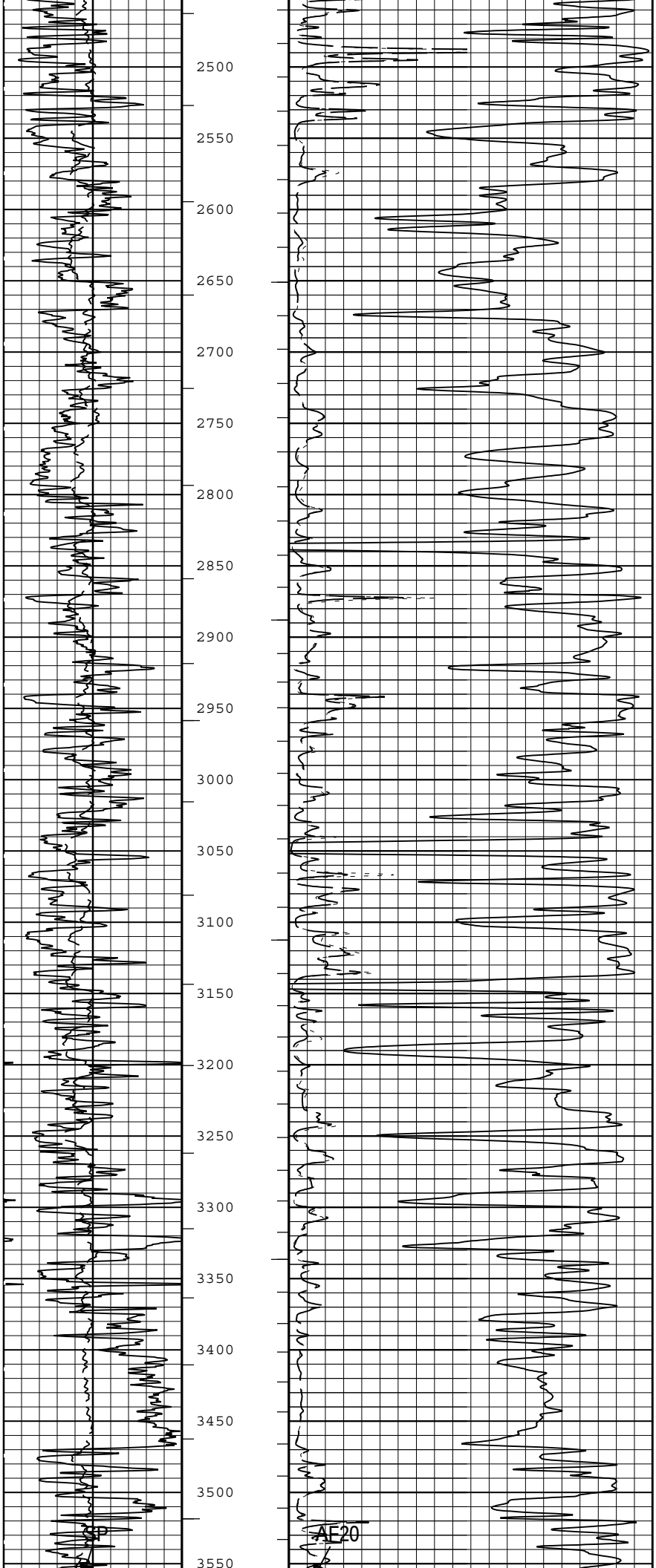
Gamma Ray (GR) HGNS-H
0 gAPI 150

Spontaneous Potential (SP) AIT-M
-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M
1000 mS/m 0




1400
1450
1500
1550
1600
1650
1700
1750
1800
1850
1900
1950
2000
2050
2100
2150
2200
2250
2300
2350
2400
2450
SP
GR
AF20
AF60
AFCO60


2500
2550
2600
2650
2700
2750
2800
2850
2900
2950
3000
3050
3100
3150
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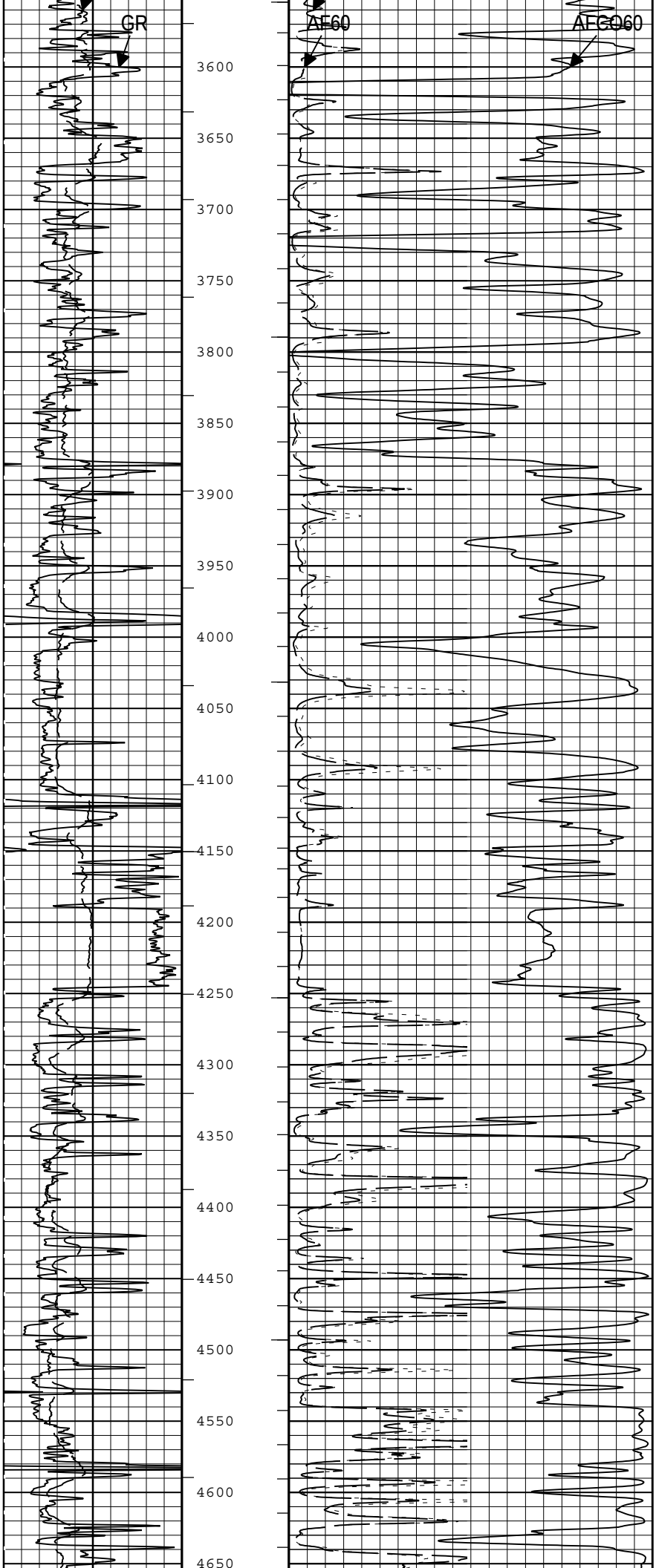
3250
3300
3350
3400
3450
3500
3550
SP
AE20


CR
AF60
AFGO60
3600
3650
3700
3750
3800
3850
3900
3950
4000
4050
4100
4150
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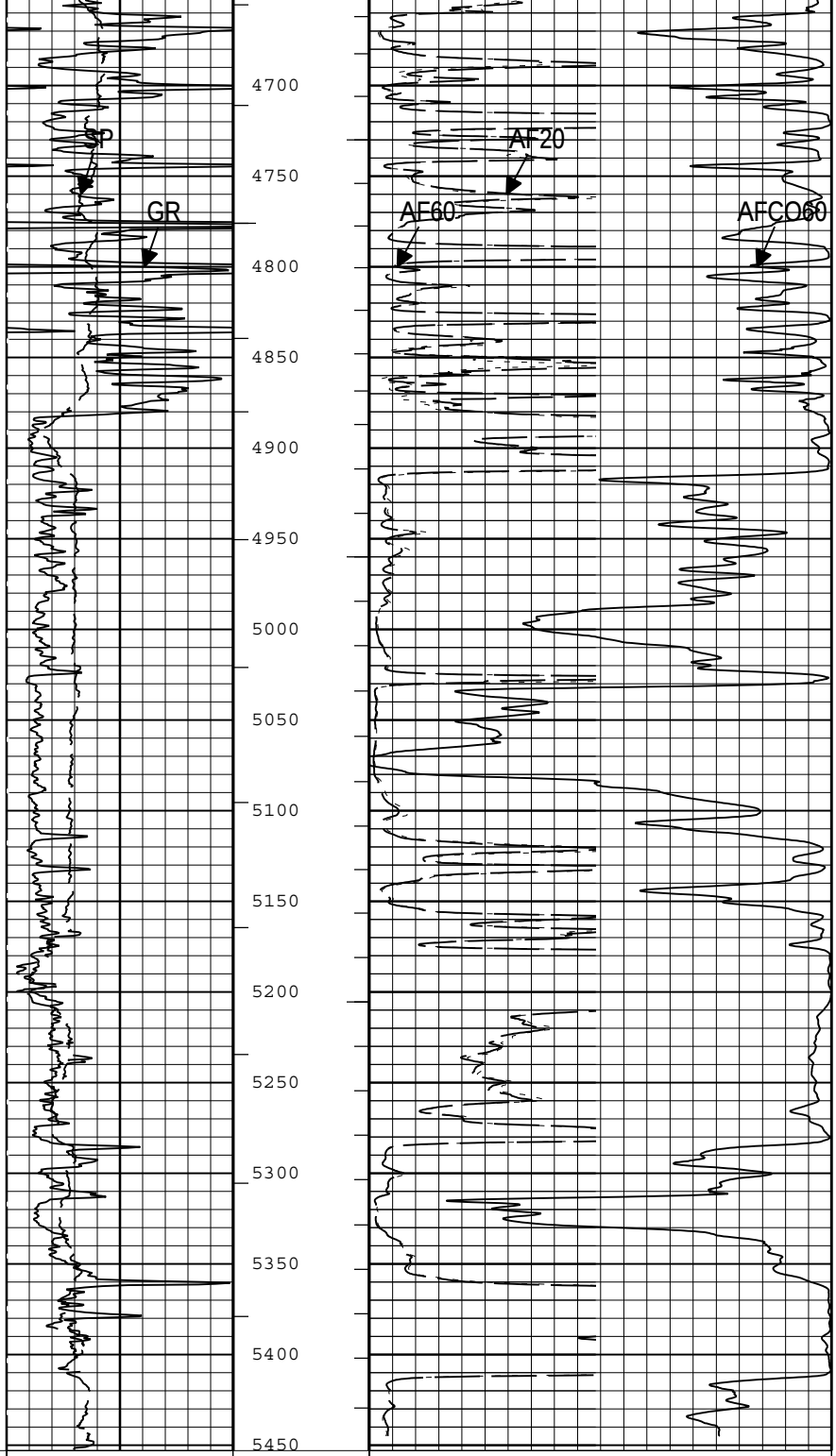
4500
4550
4600
4650




Gamma Ray (GR) HGNS-H

0 gAPI 150

Spontaneous Potential (SP) AIT-M

-160 mV 40

Array Induction Four Foot Conductivity A60 (AFCO60) AIT-M

1000 mS/m 0

Array Induction Four Foot Resistivity A60 (AF60) AIT-M

0 ohm.m 50

Array Induction Four Foot Resistivity A20 (AF20) AIT-M

0 ohm.m 50

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log ( AIT Basic Log Two ) Index Scale: 1 in per 100 ft Index Unit: ft
Index Type: Measured Depth Creation Date: 11-Jul-2012 15:39:21

## Channel Processing Parameters

| Parameter | Description | ToolPath | Value | Unit |
|---|---|---|---|---|
| ABHM | Array Induction Borehole Correction Mode | AIT-M:AMIS:AMIS | Compute Standoff | |
| ABLM | Array Induction Basic Logs Mode | AIT-M:AMIS:AMIS | Normal | |
| ACDE | Array Induction Casing Detection Enable | AIT-M:AMIS:AMIS | Yes | |
| ASTA | Array Induction Tool Standoff | AIT-M:AMIS:AMIS | 1.1 | in |
| BARI | Barite Mud Presence Flag | Borehole | No | |
| BHS | Borehole Status (Open or Cased Hole) | Borehole | Open | |
| BS | Bit Size | COMPLETION | 8.75 | in |
| CALI_SHIFT | CALI Supplementary Offset | HDRS-H:HRCC-H:HRCC-H | 0 | in |
| CBLO | Casing Bottom (Logger) | COMPLETION | 984 | ft |
| CDEN | Cement Density | HGNS-H:HGNS-H:HGNS-H | 2 | g/cm3 |
| CSODDRL | Casing Outer Diameter - Zoned along driller depths | COMPLETION | 9.625 | in |
| DFD | Drilling Fluid Density | Borehole | 9.6 | lbm/gal |
| FCD | Future Casing (Outer) Diameter | COMPLETION | 7 | in |
| GCSE_DOWN_PASS | Generalized Caliper Selection for WL Log Down Passes | Borehole | BS | |
| GCSE_UP_PASS | Generalized Caliper Selection for WL Log Up Passes | Borehole | CALI | |
| GRSE | Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity | Borehole | AMF | |
| SOCO | Standoff Correction Option | HGNS-H:HGNS-H:HGNS-H | Yes | |
| SP_SHIFT | SP Shift | AIT-M:AMIS:AMIS | 40 | mV |
| SPDR | SP Drift Per Foot | AIT-M:AMIS:AMIS | 0 | mV/ft |

## Tool Control Parameters

Company: TUG HILL OPERATING, LLC

Schlumberger

Well: EINSEL TRUST 1 SWD

Field: MARTIN

County: KIOWA

State: KANSAS

PLATFORM EXPRESS

ARRAY INDUCTION

GAMMA RAY - SP