

HALLIBURTON

SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY

| | | | |
|--------------------------|-------------------------|--------------------|---|
| COMPANY | | NOBLE ENERGY | |
| WELL | | PURCELL PC GK11-10 | |
| FIELD | | WATTENBERG | |
| COUNTY | | WELD | |
| STATE | | CO | |
| Permanent Datum | | GL | |
| Log measured from | | KB | |
| Drilling measured from | | KB | |
| Date | 12-Jan-11 | | |
| Run No. | ONE | | |
| Depth - Driller | 7851.00 ft | | |
| Depth - Logger | 7841.0 ft | | |
| Bottom - Logged Interval | 7832 ft | | |
| Top - Logged Interval | 1257 ft | | |
| Casing - Driller | 8.625 in @ 1257.0 ft | | |
| Casing - Logger | 1257.0 ft | | |
| Bit Size | 7.875 in | | |
| Type Fluid in Hole | WBM | | |
| Density | 9.2 ppq | 39.00 s/qt | |
| PH | 8.00 pH | 12.0 cp/m | |
| Source of Sample | FLOWLINE | | |
| Rm @ Meas. Temperature | 1.300 ohmm @ 63.00 degF | @ | @ |
| Rmf @ Meas. Temperature | 0.95 ohmm @ 75.00 degF | @ | @ |
| Rmc @ Meas. Temperature | 0.995 ohmm @ 75.00 degF | @ | @ |
| Source Rmf | CHART | CHART | |
| Rm @ BHT | 0.40 ohmm @ 222.0 degF | @ | @ |
| Time Since Circulation | 8.0 hr | | |
| Time on Bottom | 12-Jan-11 07:05 | | |
| Max. Rec. Temperature | 222.0 degF @ 7841.0 ft | @ | @ |
| Equipment | 10800785 | BRIGHTON | |
| Recorded By | C. BLUE | | |
| Witnessed By | B. FRANK | M. SCANNIELLO | |

| | |
|-----------------|--|
| COMPANY | NOBLE ENERGY |
| WELL | PURCELL PC GK11-10 |
| FIELD | WATTENBERG |
| COUNTY | WELD |
| STATE | CO |
| API No. | 05123323740000 |
| Location | SHL: 1980' FSL & 1980' FEL NWSE LAT: 40.93432° LONG: -104.17001° |
| Other Services: | RWCH GTET CSNG |

Fold here

| | | | | | | | |
|---|------------|--------------------------------|--|---|-----------------|---------------|-----------------|
| Service Ticket No.: 7894387 | | API Serial No.: 05123323740000 | | PGM Version: WL INSITE R3.0.7 (Build 3) | | | |
| CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE | | | | RESISTIVITY SCALE CHANGES | | | |
| Date | Sample No. | | | Type Log | Depth | Scale Up Hole | Scale Down Hole |
| Depth-Driller | | | | | | | |
| Type Fluid in Hole | | | | | | | |
| Density | Viscosity | | | | | | |
| Ph | Fluid Loss | | | | | | |
| Source of Sample | | | | RESISTIVITY EQUIPMENT DATA | | | |
| Rm @ Meas. Temp | @ | @ | | Run No. | Tool Type & No. | Pad Type | Tool Pos. |
| Rmf @ Meas. Temp. | @ | @ | | ONE | ACRT 336-042 | N/A | 0.5" S.O. |
| Rmc @ Meas. Temp. | @ | @ | | | | | |
| Source Rmf | Rmc | | | | | | |
| Rm @ BHT | @ | @ | | | | | |
| Rmf @ BHT | @ | @ | | | | | |
| Rmc @ BHT | @ | @ | | | | | |
| EQUIPMENT DATA | | | | | | | |
| GAMMA | | ACOUSTIC | | DENSITY | | NEUTRON | |
| Run No. | ONE | Run No. | | Run No. | ONE | Run No. | ONE |
| Serial No. | 11215095 | Serial No. | | Serial No. | I332M271 | Serial No. | 11219332 |
| Model No. | GTET | Model No. | | Model No. | SDLT | Model No. | DSNT |
| Diameter | 3.625" | No. of Cent. | | Diameter | 4.5" | Diameter | 3.625" |
| Detector Model No. | 102A | Spacing | | Log Type | GAM/GAM | Log Type | NEU/NEU |
| Type | SCINT | | | Source Type | Cs137 | Source Type | Am241Be |
| Length | 8" | LSA [Y/N] | | Serial No. | 5256GW | Serial No. | DSN 430 |
| Distance to Source | 17' | FWDA [Y/N] | | Strength | 1.5 Ci | Strength | 15 Ci |
| LOGGING DATA | | | | | | | |
| GENERAL | | GAMMA | | ACOUSTIC | | DENSITY | |
| | | | | | | NEUTRON | |

| GENERAL | | | GAMMA | | ACOUSTIC | | DENSITY | | NEUTRON | | | | | | | | | | |
|---|-------|------|--------|-------|----------|-------|---------|--------|---------|----|-----------|-------|----|--------|--------------|---|--|--|--|
| Run | Depth | | Speed | Scale | | Scale | | Matrix | Scale | | Matrix | Scale | | Matrix | | | | | |
| No. | From | To | ft/min | L | R | L | R | | L | R | | L | R | | | | | | |
| ONE | 7841 | 7416 | REC | 0 | 250 | | | | 20% | 0% | 2.65 g/cc | 20% | 0% | SAND | | | | | |
| ONE | 7416 | 7061 | REC | 0 | 250 | | | | 20% | 0% | 2.68 g/cc | 20% | 0% | SAND | | | | | |
| ONE | 7061 | 6700 | REC | 0 | 250 | | | | 20% | 0% | 2.71 g/cc | 20% | 0% | LIME | | | | | |
| ONE | 6700 | 1257 | REC | 0 | 250 | | | | 20% | 0% | 2.68 g/cc | 20% | 0% | SAND | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| DIRECTIONAL INFORMATION | | | | | | | | | | | | | | | | | | | |
| Maximum Deviation | | | | | | | | @ | KOP | | | | | | | @ | | | |
| Remarks: | | | | | | | | | | | | | | | | | | | |
| RWCH/GTET/CSNG/DSNT/SDLT/ACRT RAN IN COMBINATION | | | | | | | | | | | | | | | | | | | |
| ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH PRODUCTION CASING | | | | | | | | | | | | | | | | | | | |
| TENSION PULLS, WASHOUTS, AND BOREHOLE RUGOSITY AFFECT TOOL RESPONSE | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| CREW: J. WALKER, R. PERSHALL, J. BARRAS | | | | | | | | | | | | | | | RIG: CADE 21 | | | | |
| THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES -- BRIGHTON, CO -- (303) 825-4346 | | | | | | | | | | | | | | | | | | | |
| HALLIBURTON DOES NOT GUARANTEE THE ACCURACY OF ANY INTERPRETATION OF THE LOG DATA, CONVERSION OF LOG DATA TO PHYSICAL ROCK PARAMETERS OR RECOMMENDATIONS WHICH MAY BE GIVEN BY HALLIBURTON PERSONNEL OR WHICH APPEAR ON THE LOG OR IN ANY OTHER FORM. ANY USER OF SUCH DATA, INTERPRETATIONS, CONVERSIONS, OR RECOMMENDATIONS AGREES THAT HALLIBURTON IS NOT RESPONSIBLE EXCEPT WHERE DUE TO GROSS NEGLIGENCE OR WILLFUL MISCONDUCT, FOR ANY LOSS, DAMAGES, OR EXPENSES RESULTING FROM THE USE THEREOF. | | | | | | | | | | | | | | | | | | | |
| HALLIBURTON | | | | | | | | | | | | | | | | | | | |



PARAMETERS REPORT

| Depth (ft) | Tool Name | Description | Value | Units |
|------------|-----------|---|-----------|-------|
| TOP | | | | |
| | DSNT | Neutron Lithology | Sandstone | |
| | SDLT | Formation Density Matrix | 2.680 | g/cc |
| 6700.00 | | | | |
| | DSNT | Neutron Lithology | Limestone | |
| | SDLT | Formation Density Matrix | 2.710 | g/cc |
| 7061.00 | | | | |
| | SDLT | Formation Density Matrix | 2.680 | g/cc |
| 7416.00 | | | | |
| | SHARED | Bit Size | 7.875 | in |
| | SHARED | Use Bit Size instead of Caliper for all applications. | No | |
| | SHARED | Borehole Fluid Weight | 9.200 | ppg |
| | SHARED | Oil Based Mud System? | No | |
| | SHARED | Mud Resistivity | 1.300 | ohmm |
| | SHARED | Temperature of Mud | 63.0 | degF |
| | SHARED | Logging Interval is Cased? | No | |
| | SHARED | AHV Casing OD | 5.500 | in |
| | SHARED | Surface Temperature | 20.0 | degF |
| | SHARED | Total Well Depth | 7841.00 | ft |
| | SHARED | Bottom Hole Temperature | 222.0 | degF |
| | SHARED | Navigation and Survey Master Tool | NONE | |
| | SHARED | High Res Z Accelerometer Master Tool | GTET | |
| | SHARED | Temperature Master Tool | NONE | |
| | SHARED | Borehole Size Master Tool | NONE | |

| | | | |
|------|--|----------------|------|
| GTET | Process Gamma Ray? | Yes | |
| GTET | Gamma Tool Standoff | 0.000 | in |
| GTET | Process Gamma Ray EVR? | No | |
| GTET | Potassium | 0.00 | % |
| GTET | Mud Type | Natural | |
| GTET | Tool Position | Standoff | |
| CSNG | Process CSNG Data? | Yes | |
| CSNG | Is Tool Centralized? | No | |
| CSNG | Mud Type? | Natural | |
| CSNG | Percent K in Mud by Weight? | 0.00 | % |
| CSNG | Gamma Enviromental Corrections? | Yes | |
| CSNG | Barite Correction Factor | 1.00 | |
| DSNT | Process DSN? | Yes | |
| DSNT | Process DSN EVR? | No | |
| DSNT | Neutron Lithology | Sandstone | |
| DSNT | DSN Standoff - 0.25 in (6.35 mm) Recommended | 0.000 | in |
| DSNT | Temperature Correction Type | None | |
| DSNT | DSN Pressure Correction Type | None | |
| DSNT | View More Correction Options | No | |
| DSNT | Use TVD for Gradient Corrections? | No | |
| DSNT | Logging Horizontal Water Tank? | No | |
| SDLT | Process Density? | Yes | |
| SDLT | Process Density EVR? | No | |
| SDLT | Is Hole Air Drilled? | No | |
| SDLT | Logging Calibration Blocks? | No | |
| SDLT | SDLT Pad Temperature Valid? | Yes | |
| SDLT | Disable temperature warning | No | |
| SDLT | Weighted Mud Correction Type? | None | |
| SDLT | Formation Density Matrix | 2.650 | g/cc |
| SDLT | Formation Density Fluid | 1.000 | g/cc |
| SDLT | Process Caliper Outputs? | Yes | |
| SDLT | Process MicroLog Outputs? | Yes | |
| ACRt | Process ACRt? | Yes | |
| ACRt | Minimum Tool Standoff | 0.50 | in |
| ACRt | Temperature Correction Source | FP Lwr & FP Up | |
| ACRt | Tool Position | Free Hanging | |
| ACRt | Rmud Source | Mud Cell | |
| ACRt | Minimum Resistivity for MAP | 0.20 | ohmm |
| ACRt | Maximum Resistivity for MAP | 200.00 | ohmm |
| ACRt | Threshold Quality | 0.50 | |



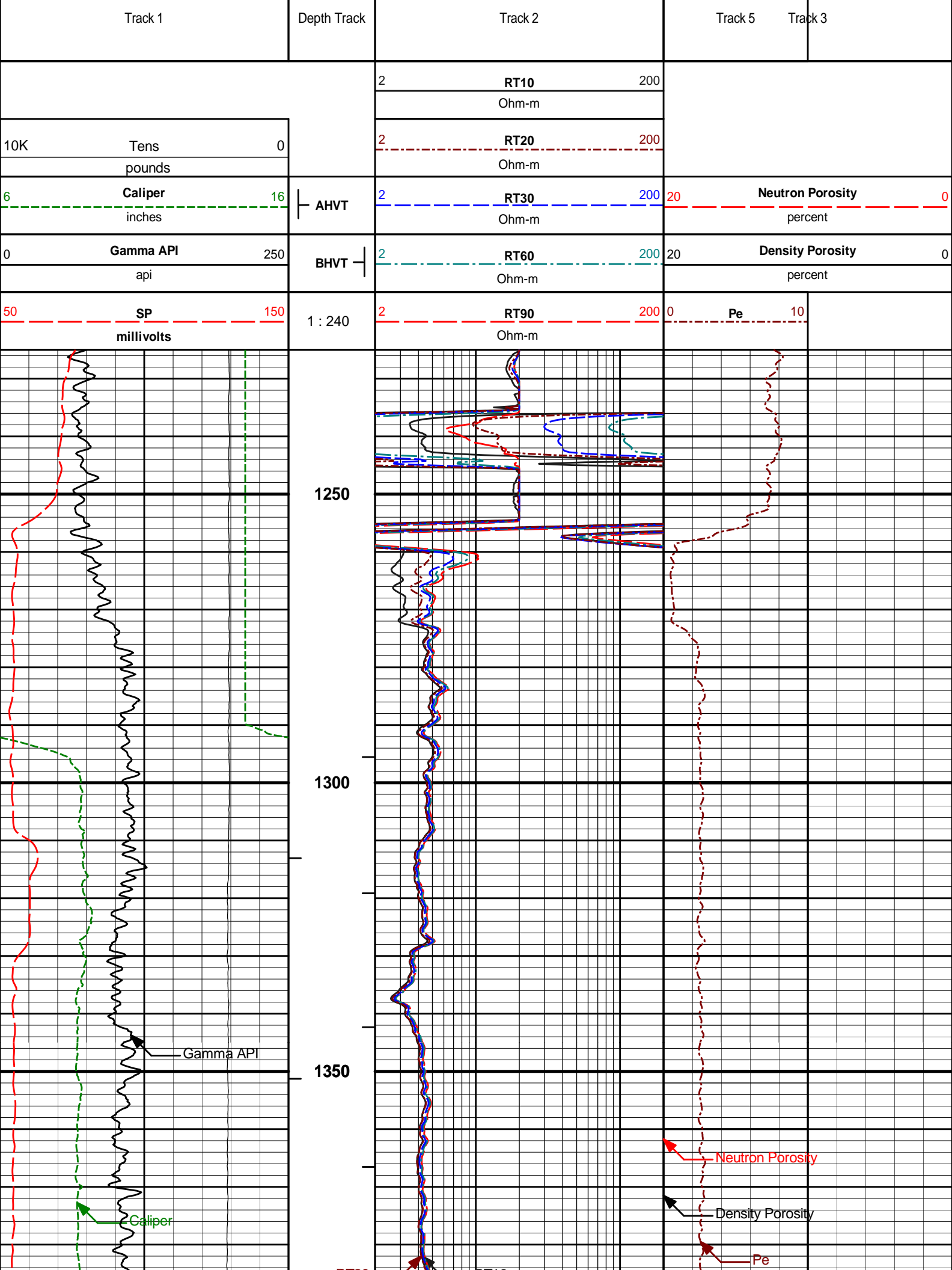
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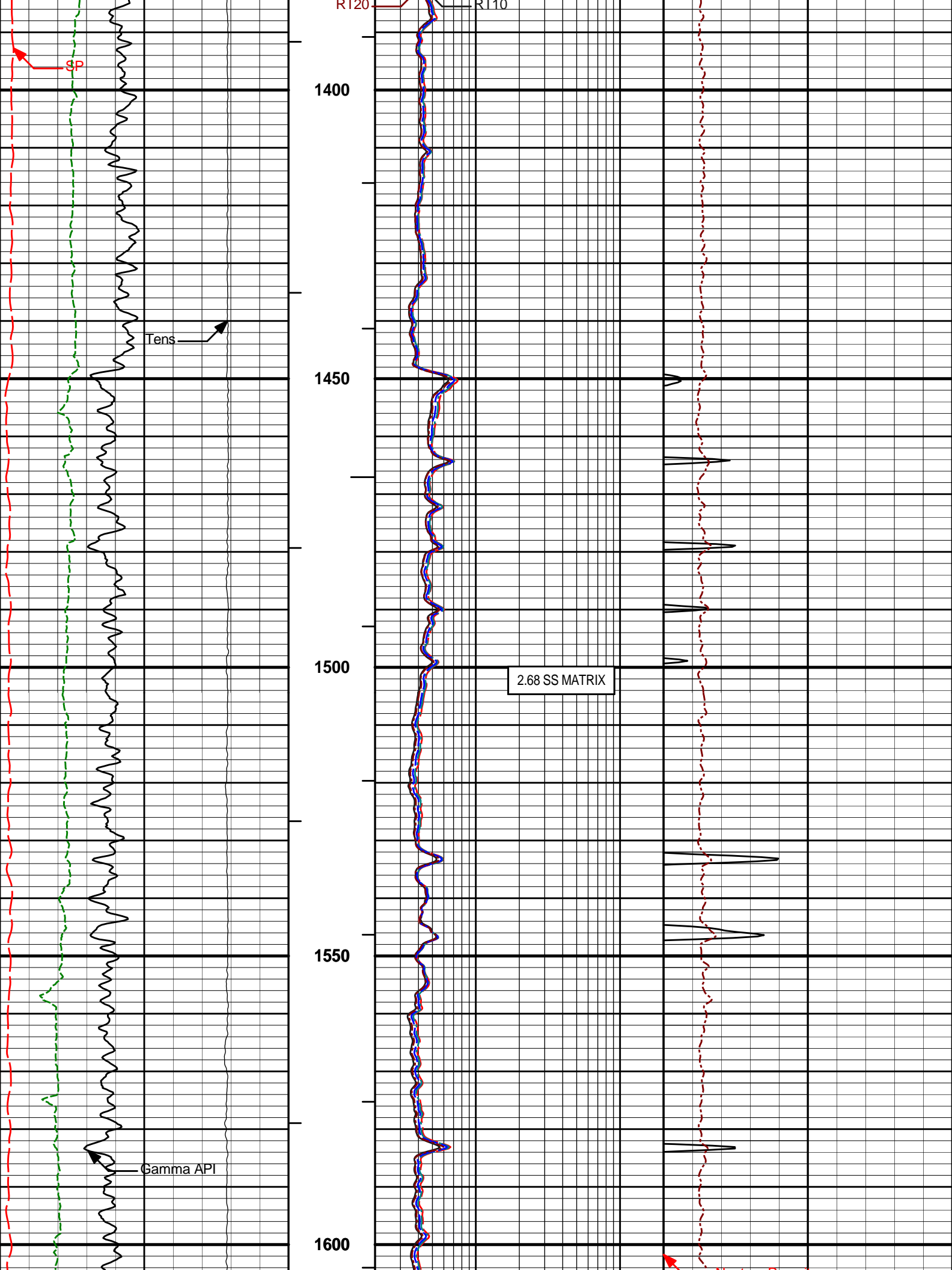
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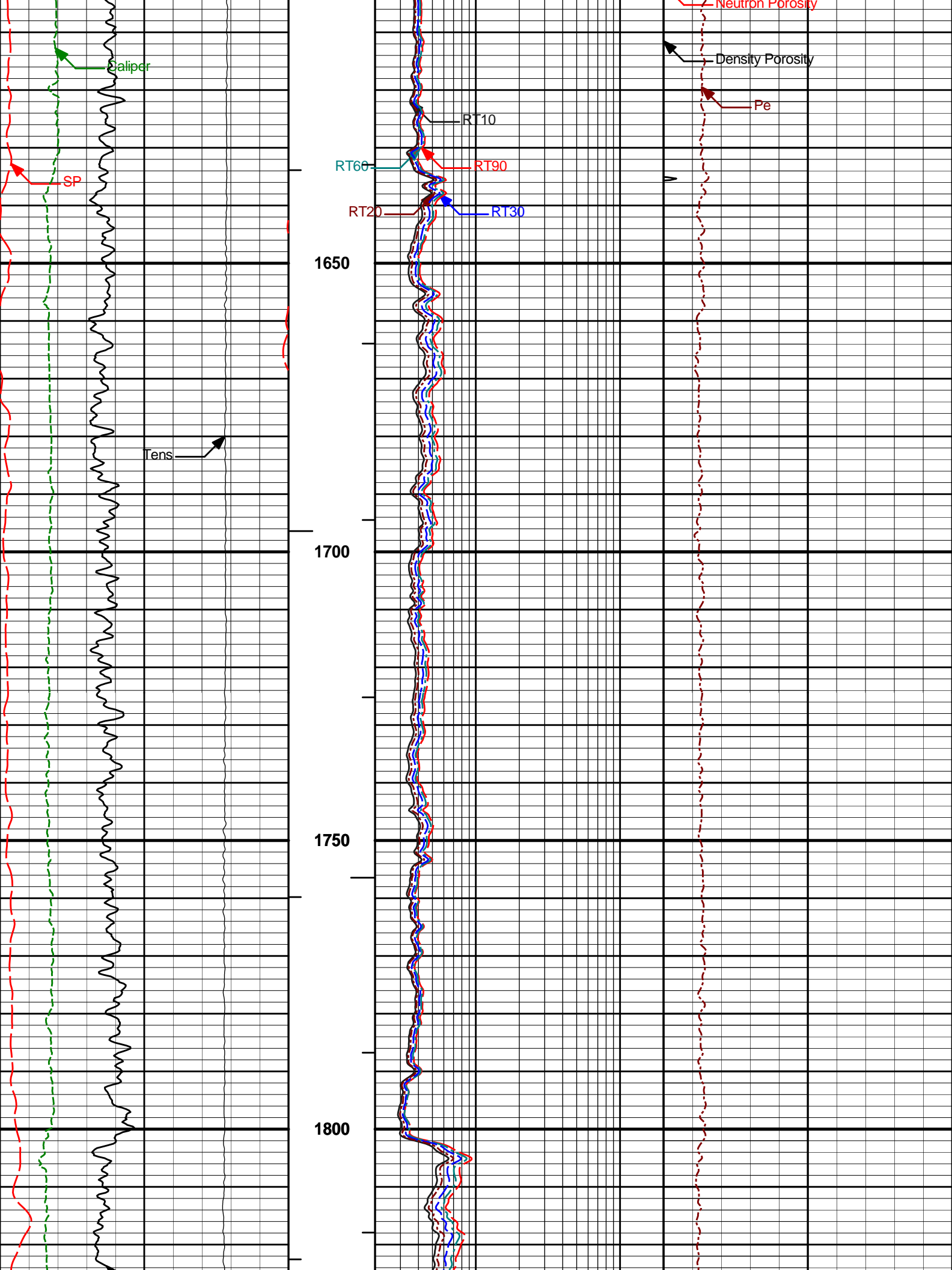
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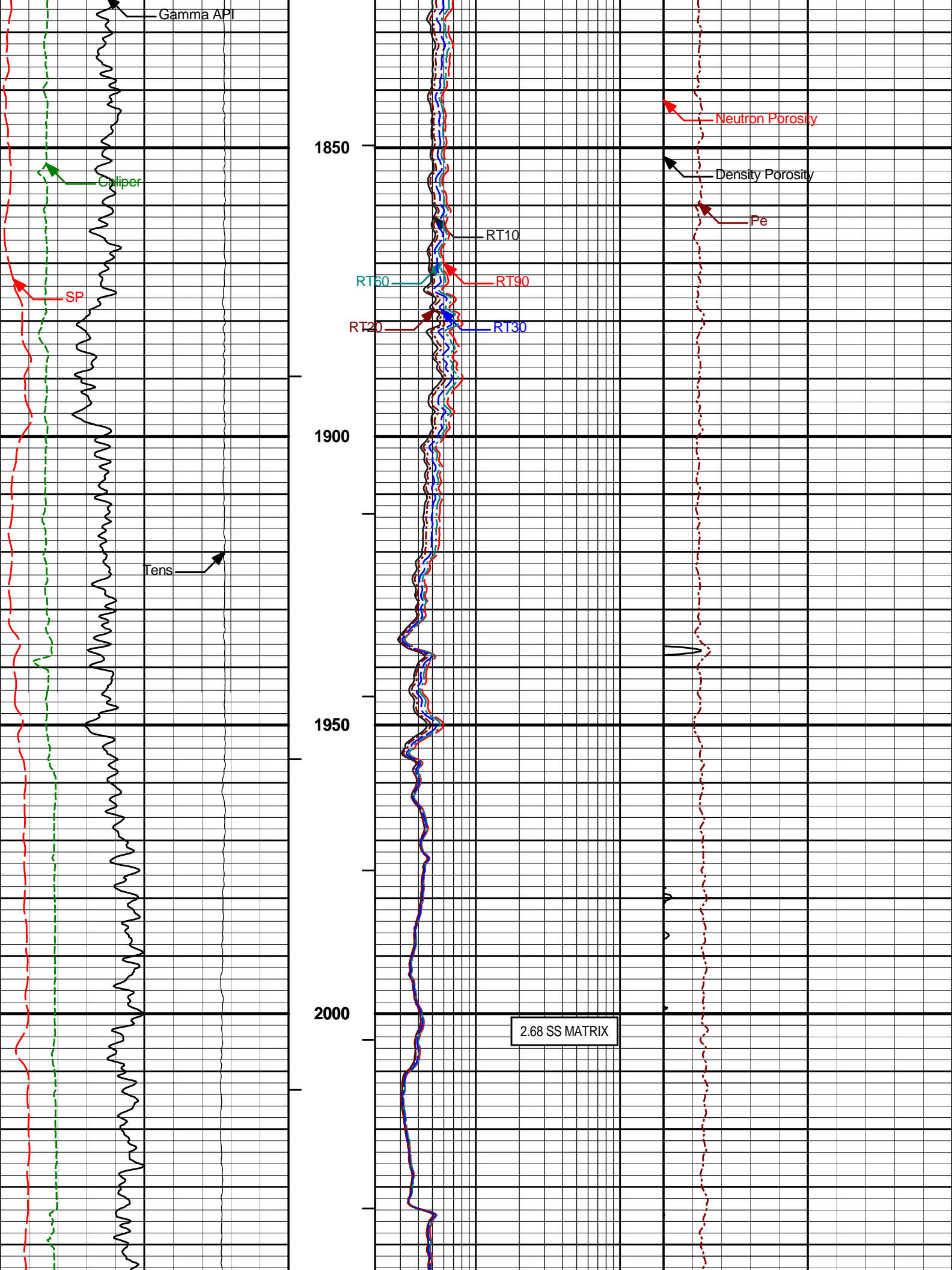
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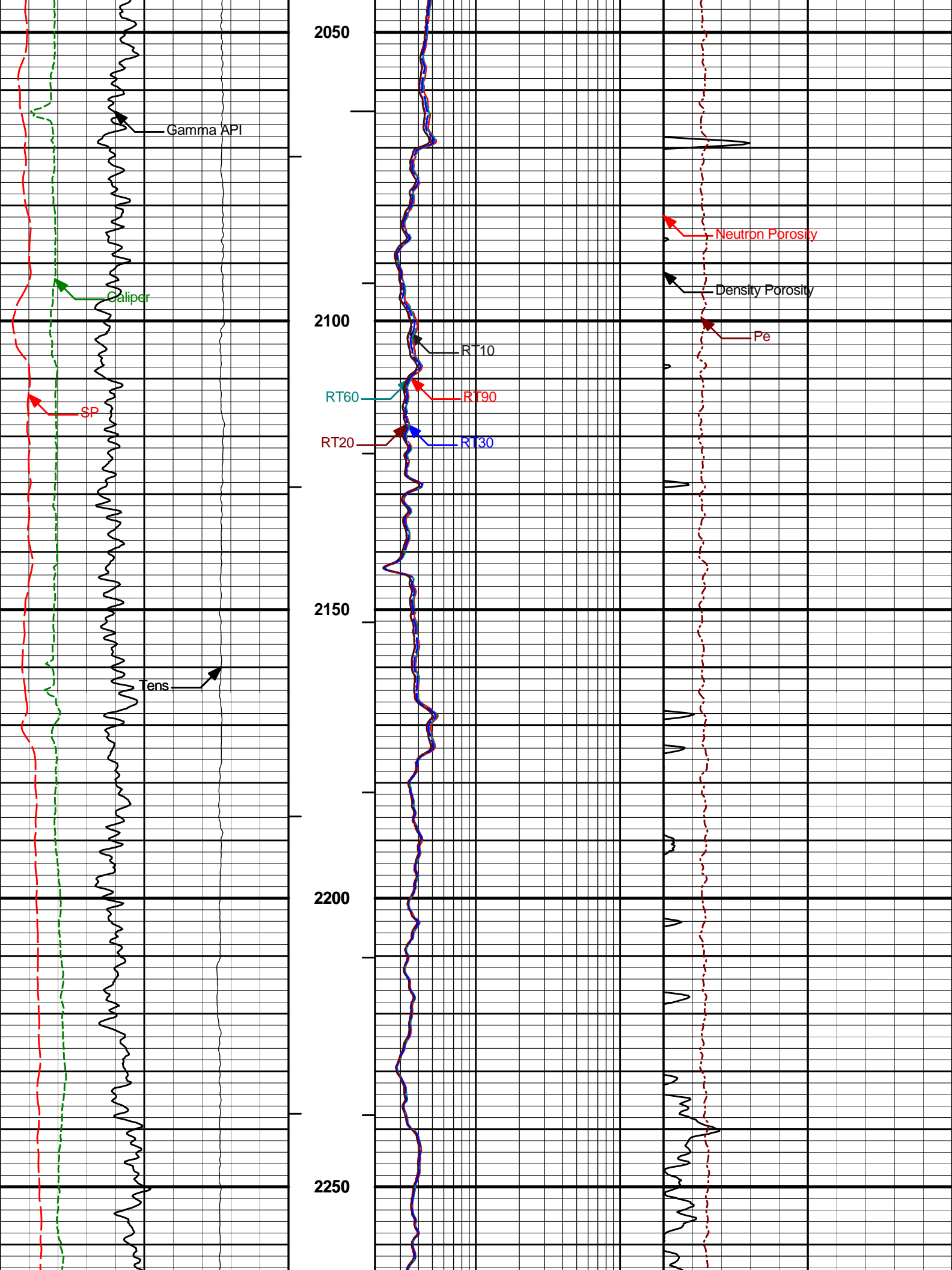
MAIN PASS 5" = 100'

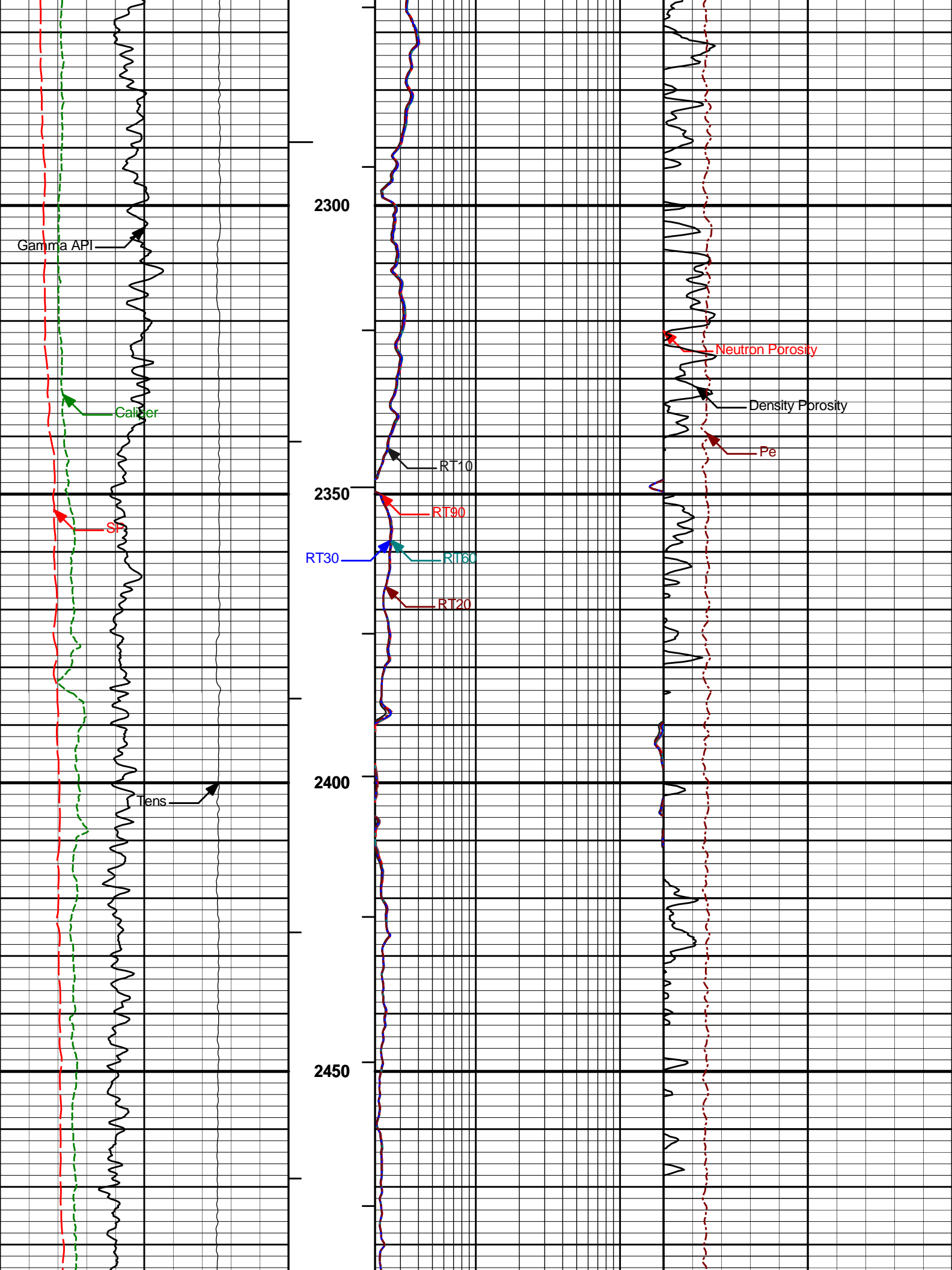


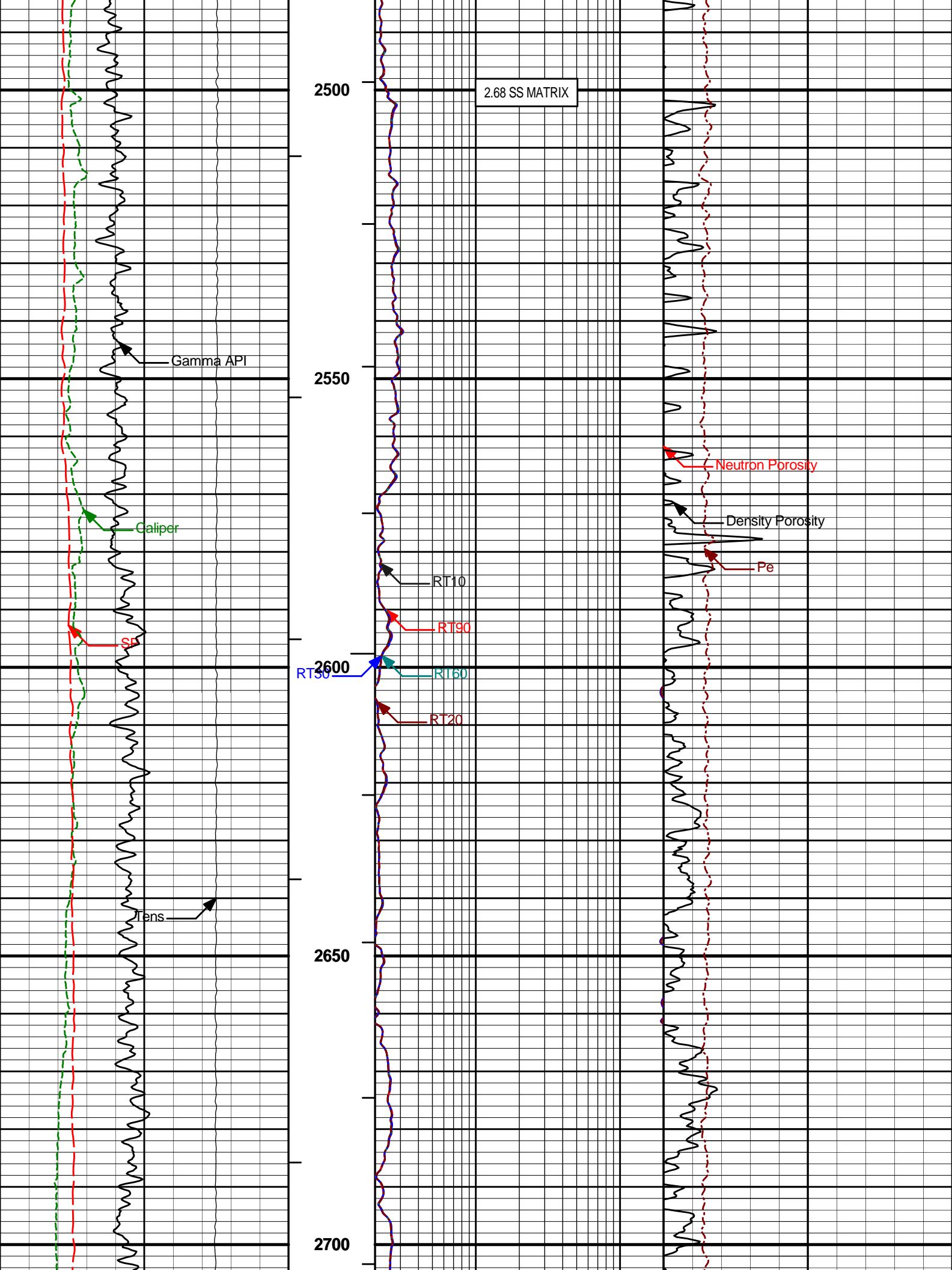


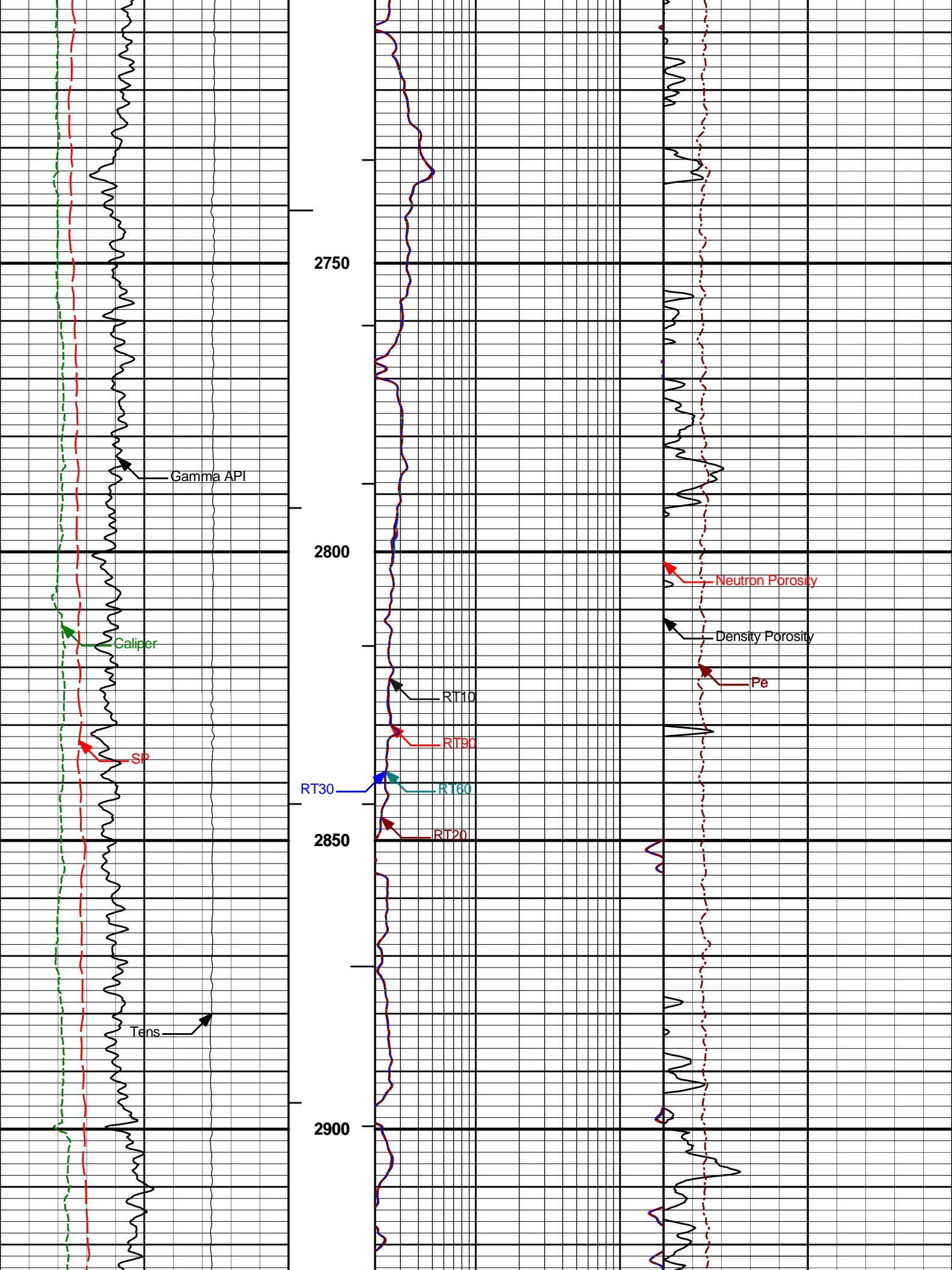


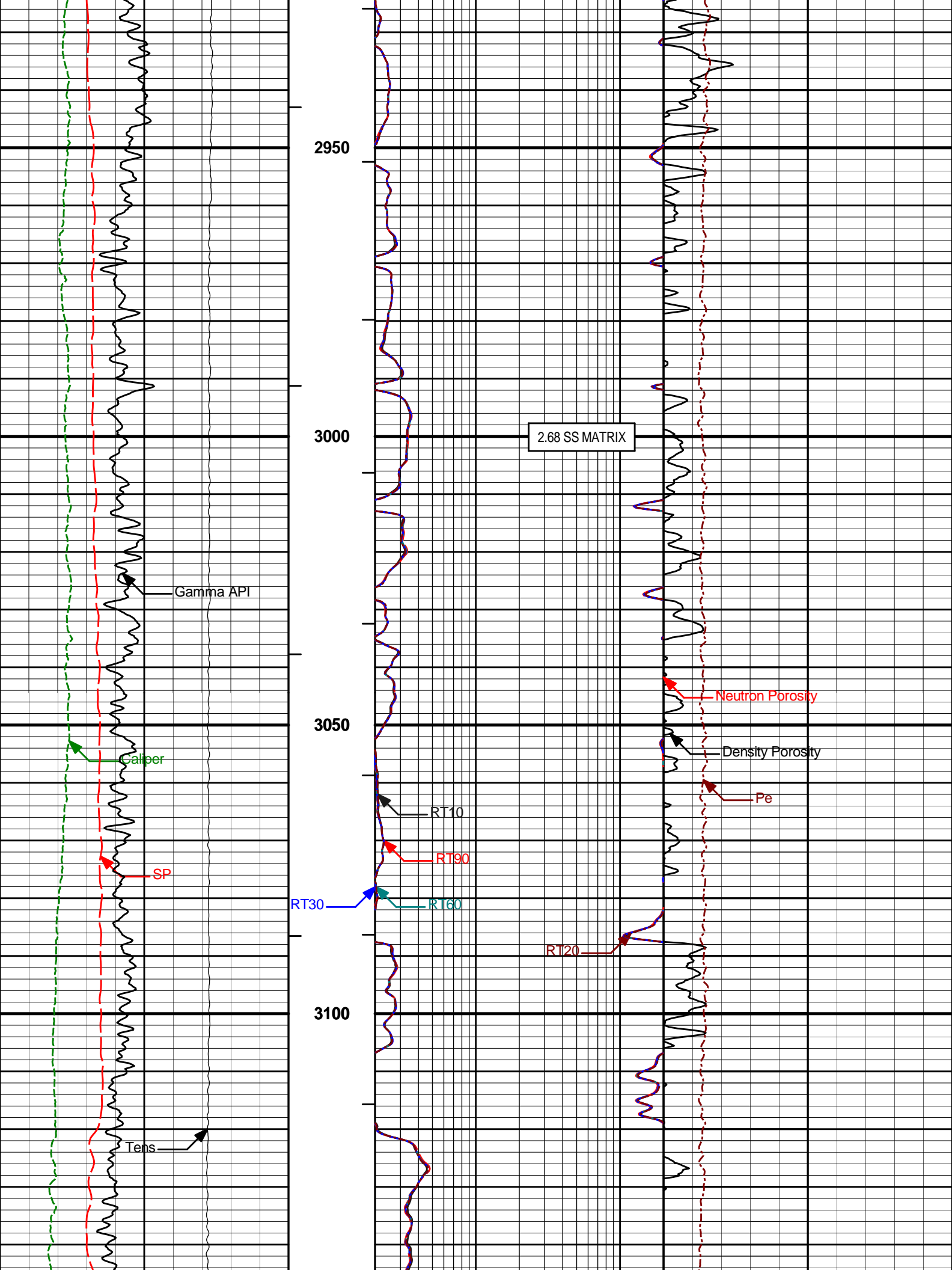


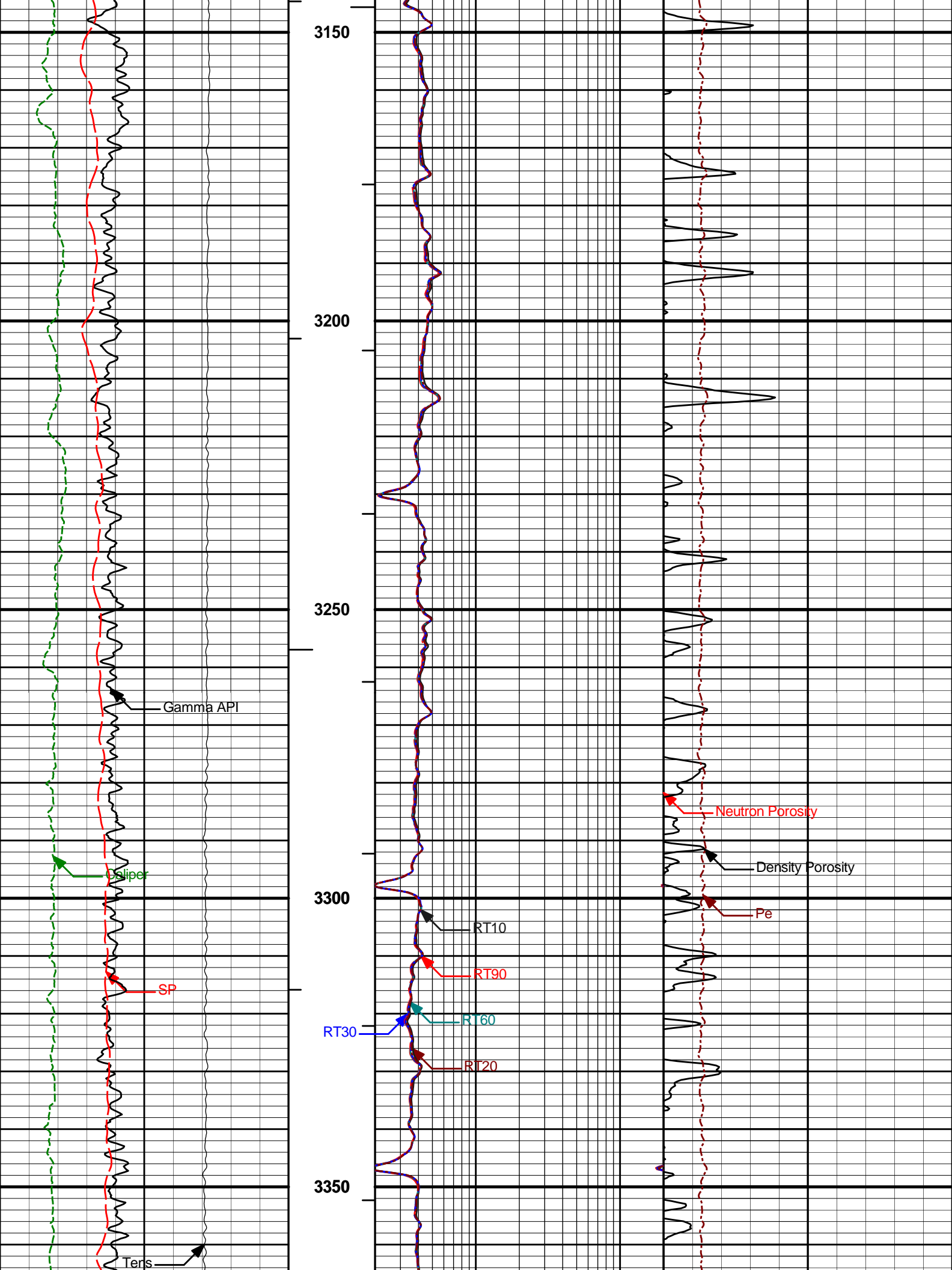


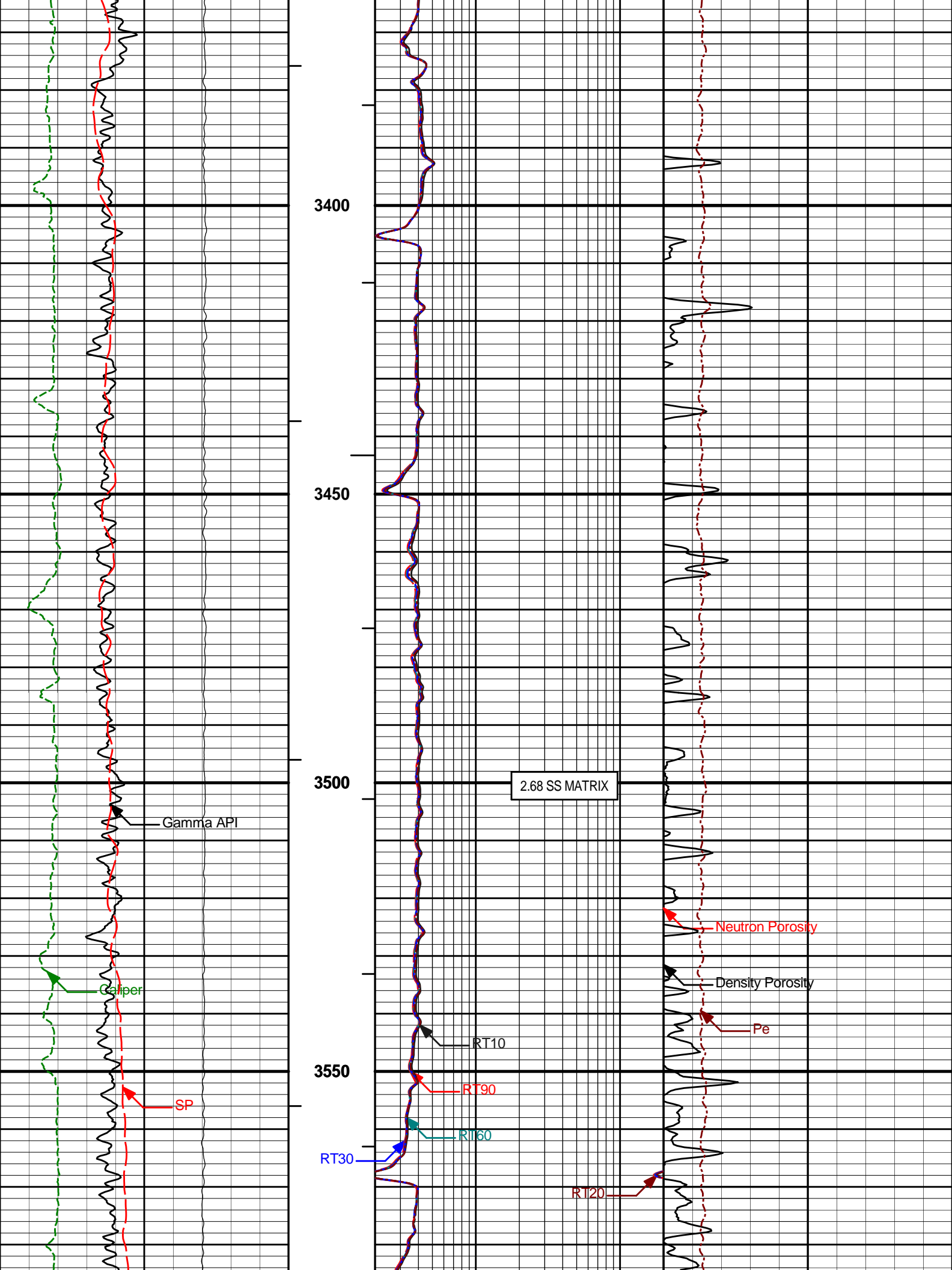


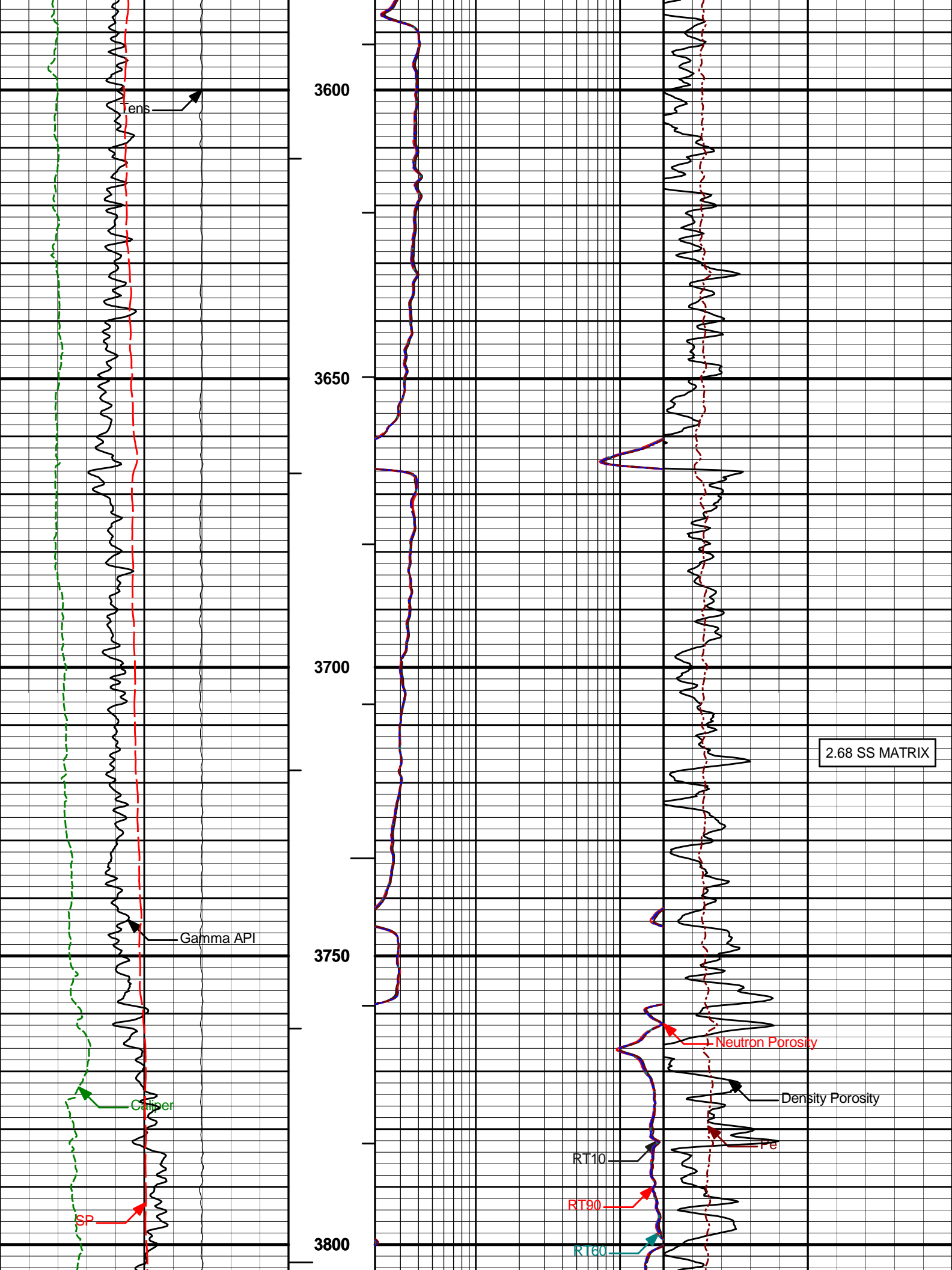


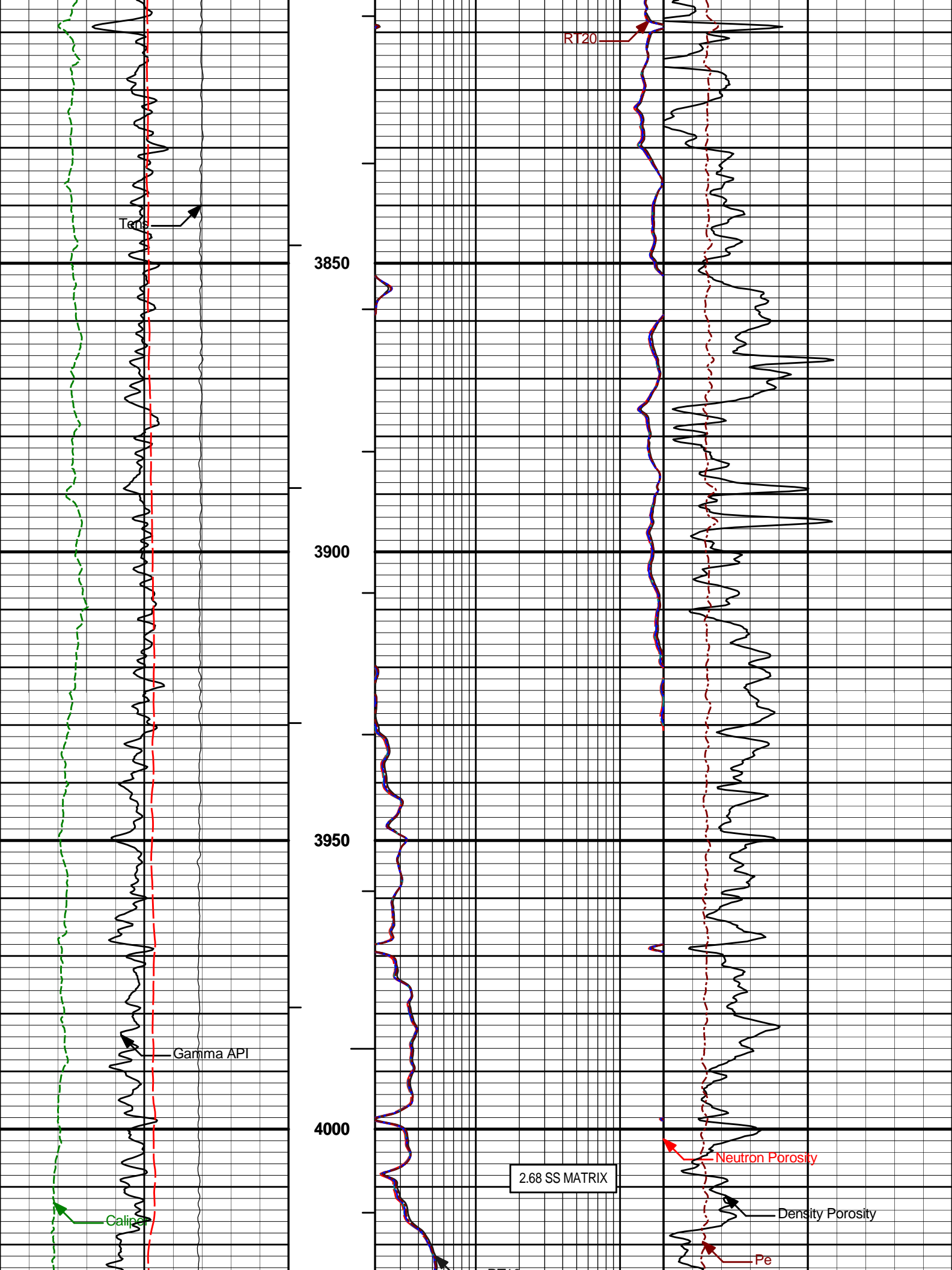


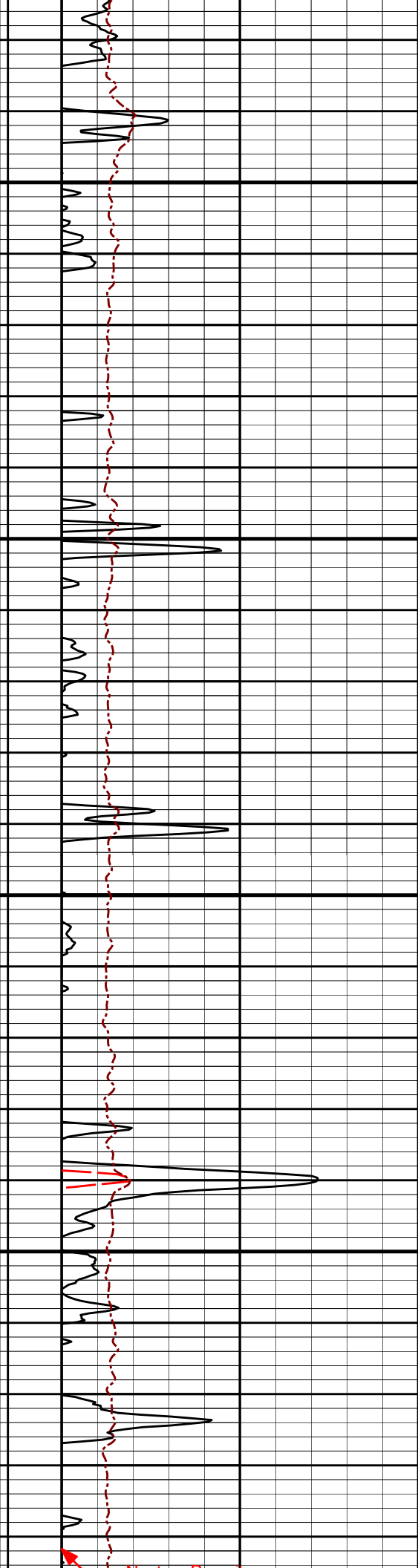
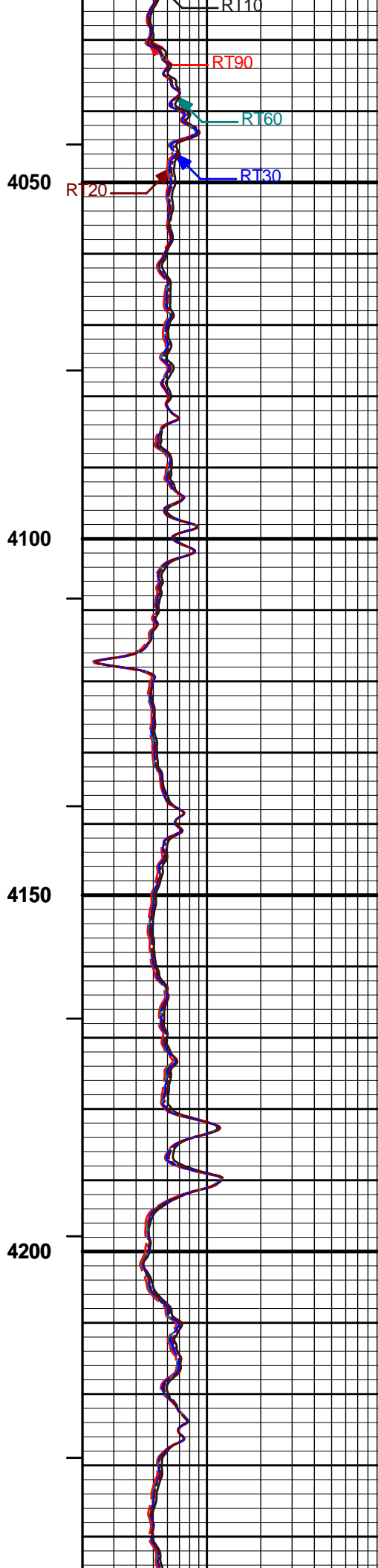
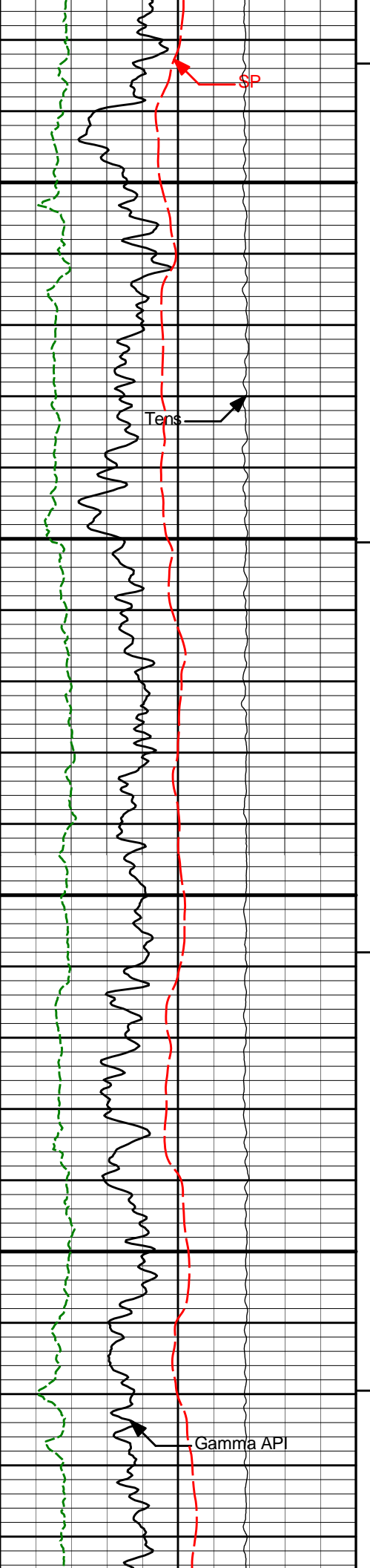


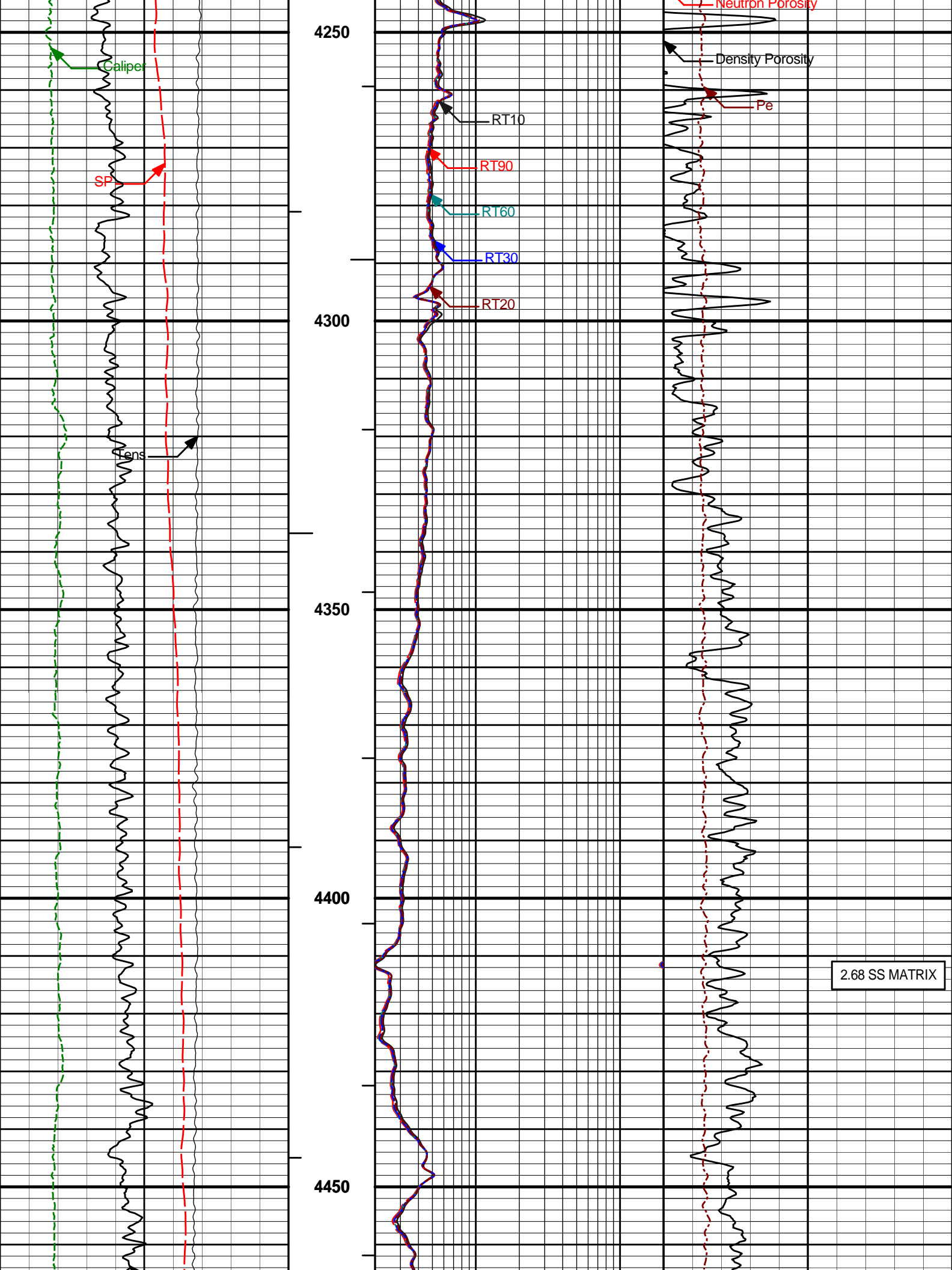


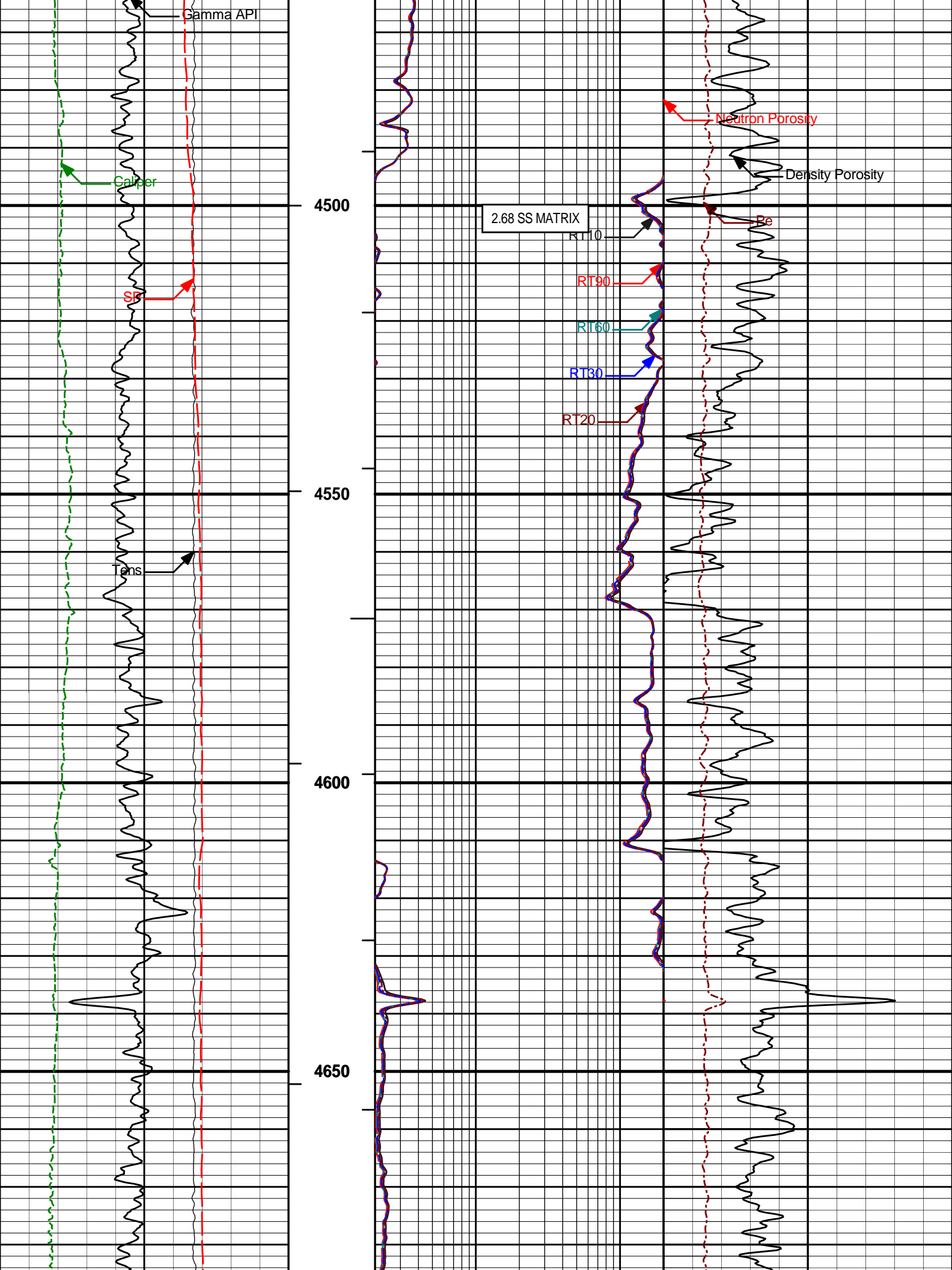


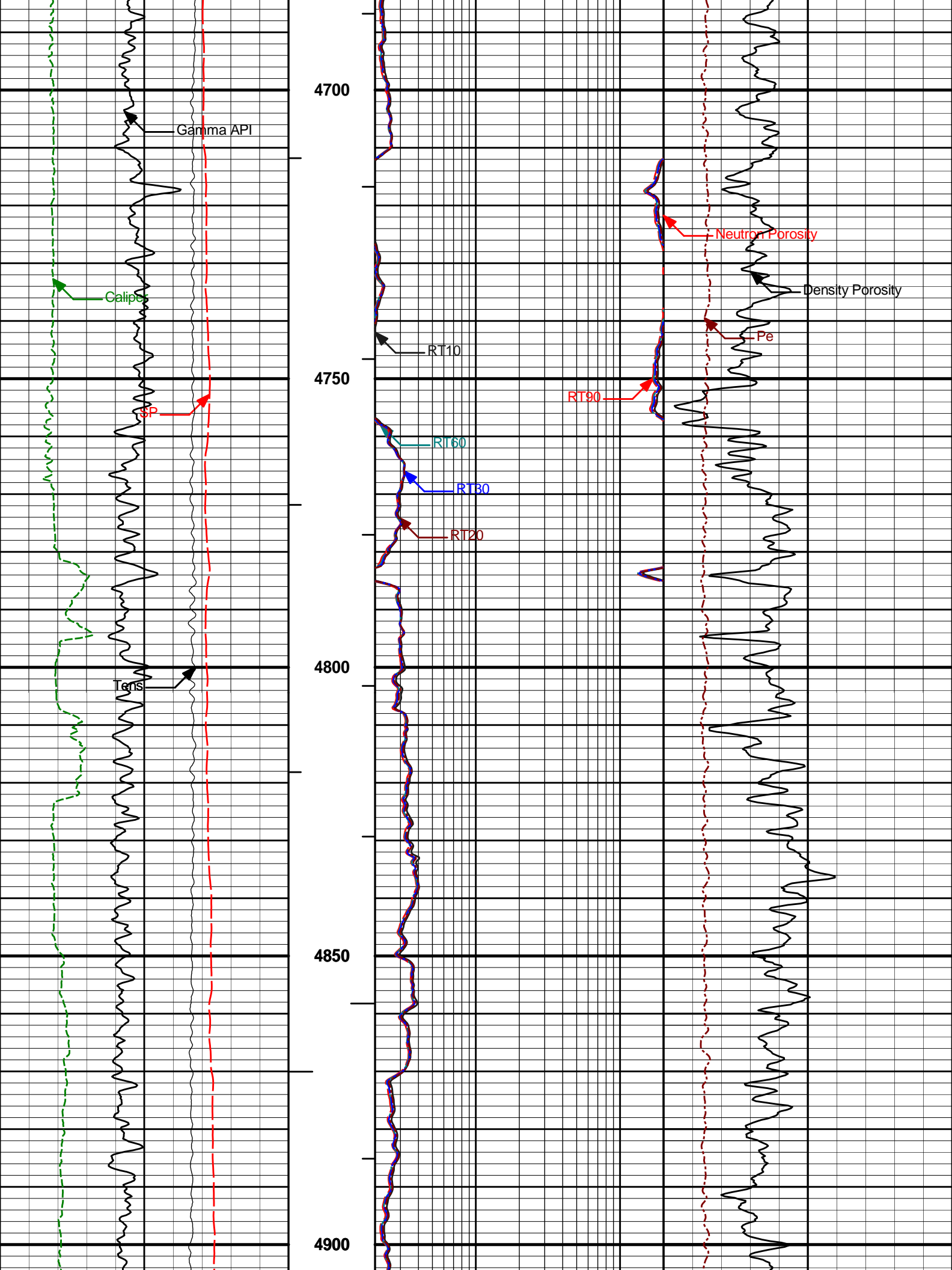


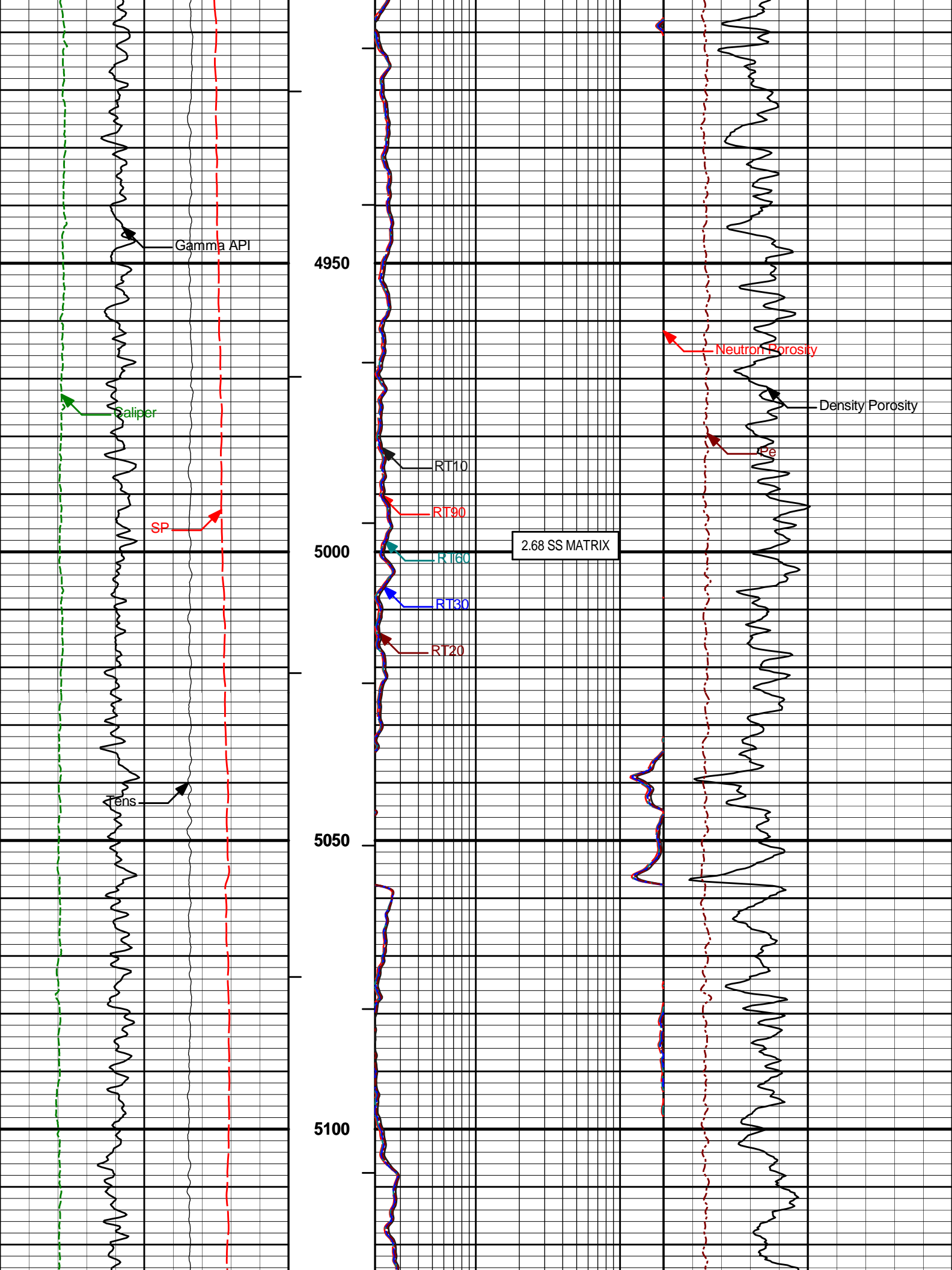


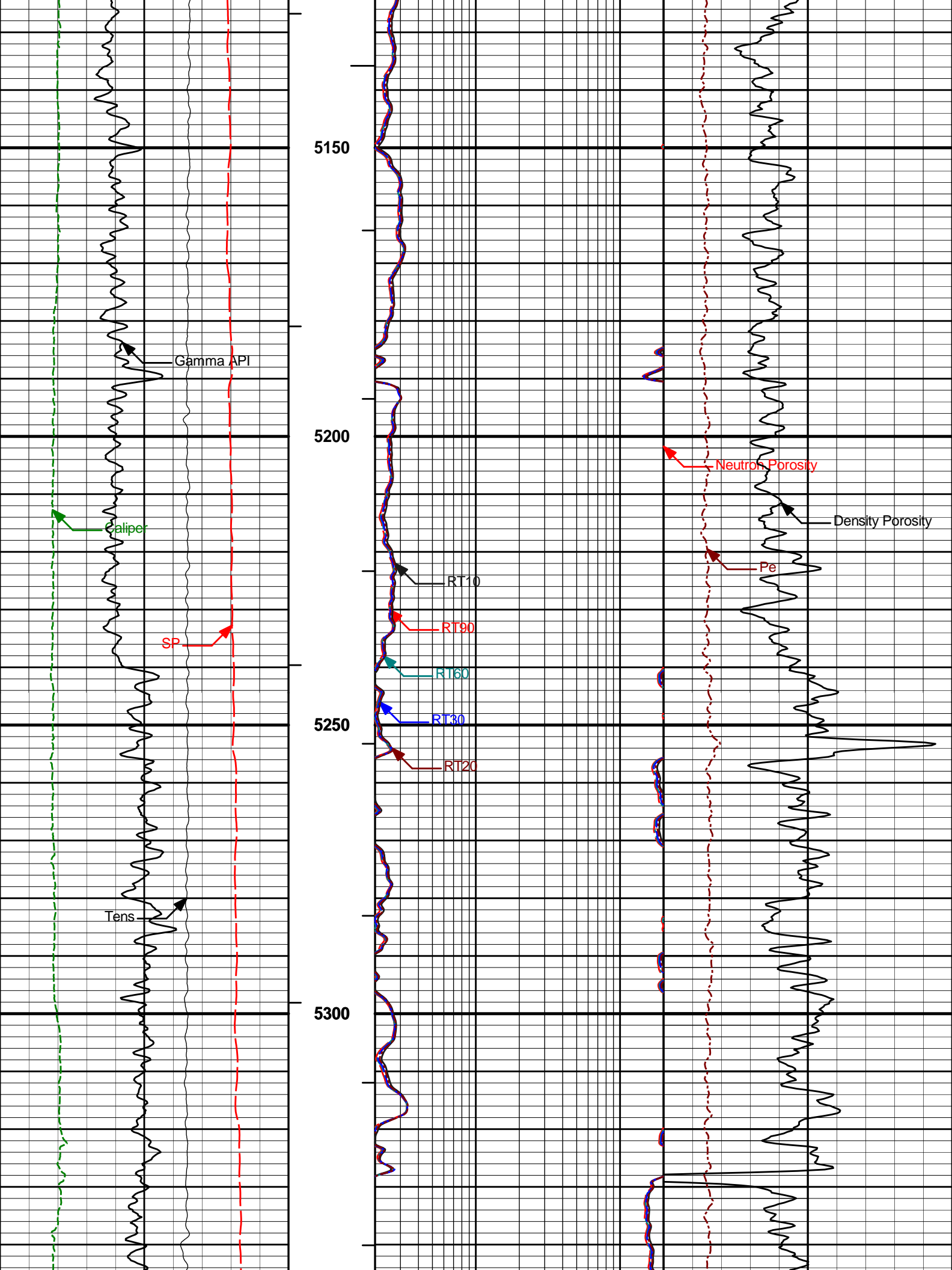


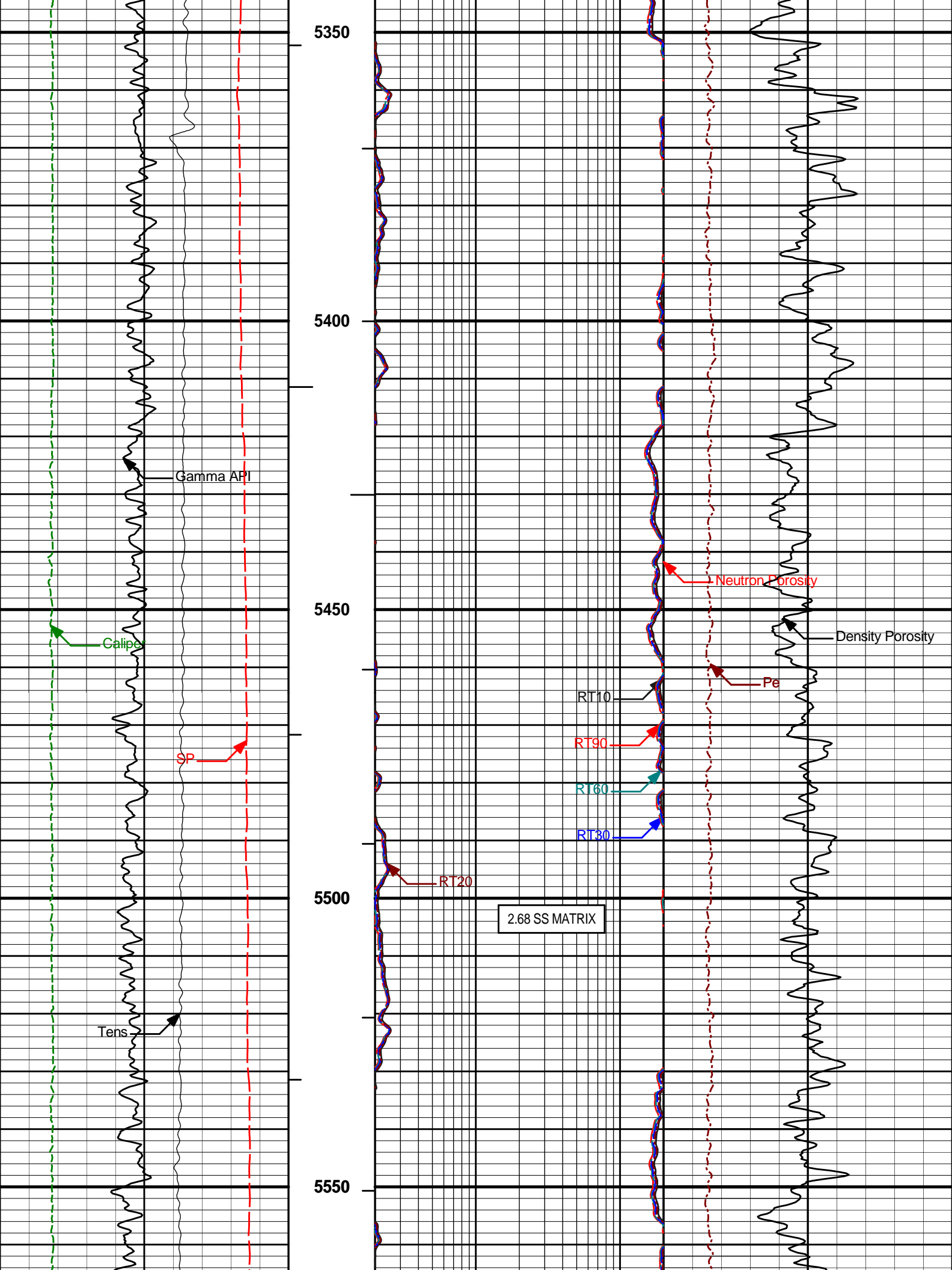


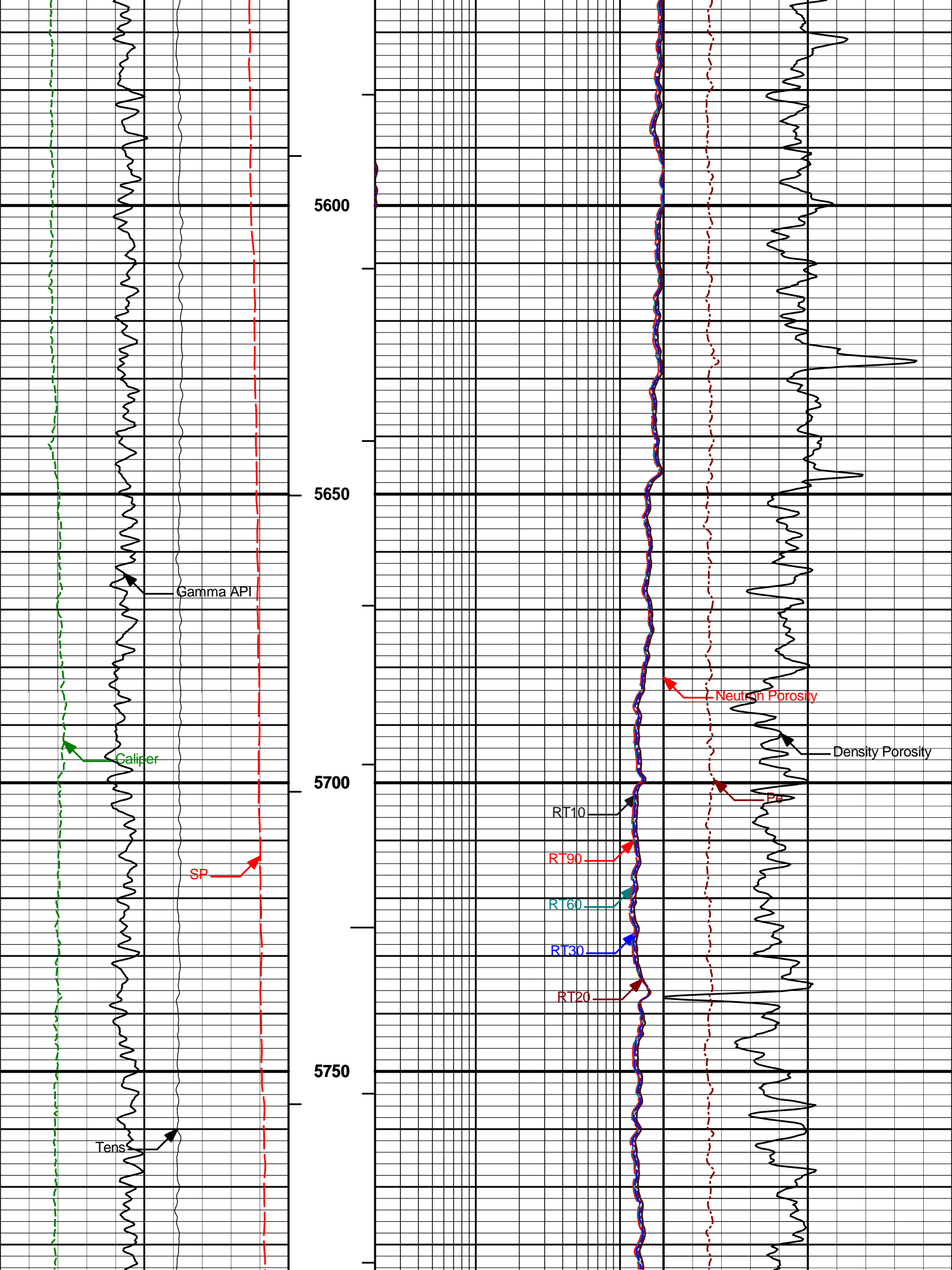


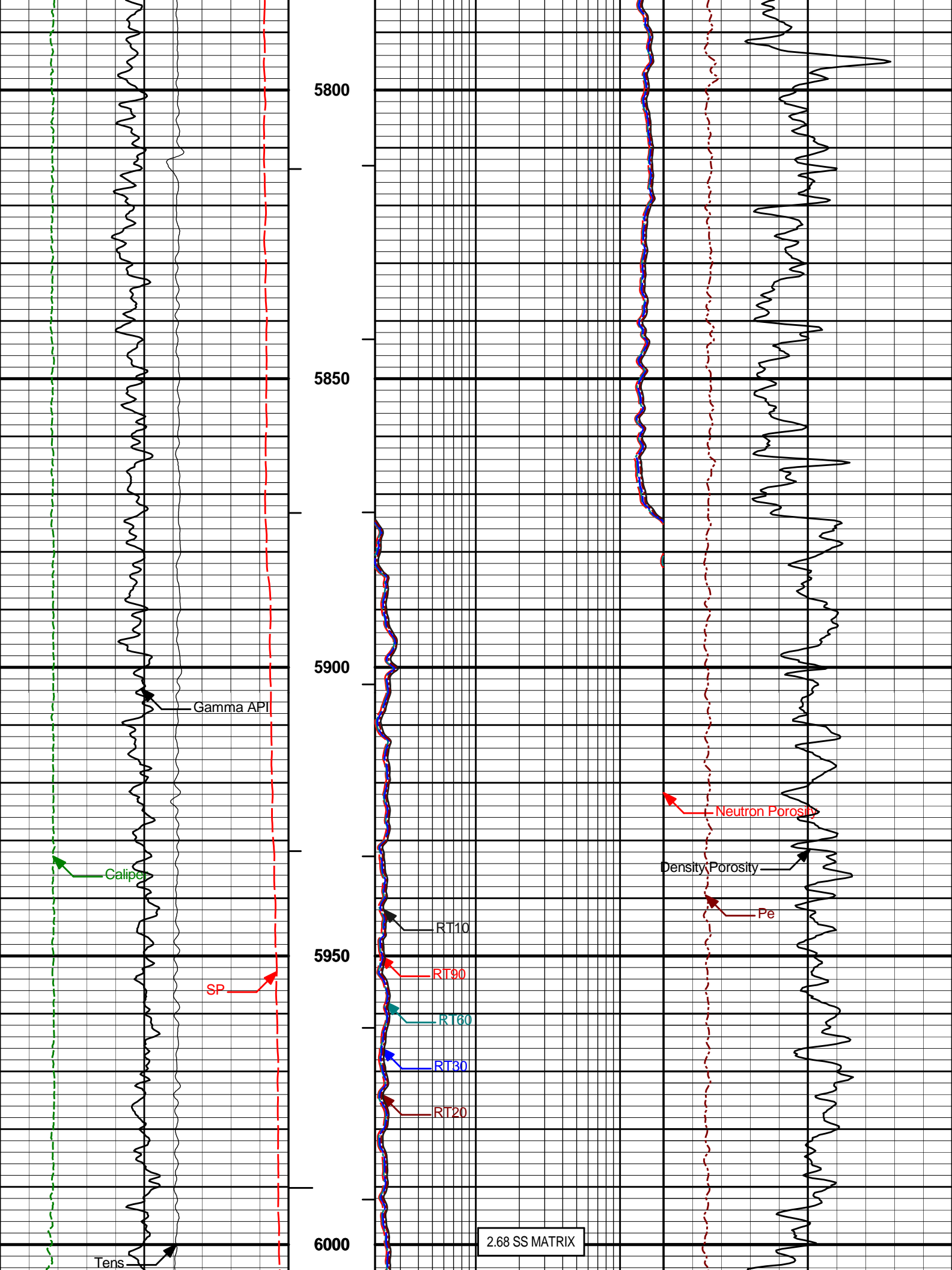


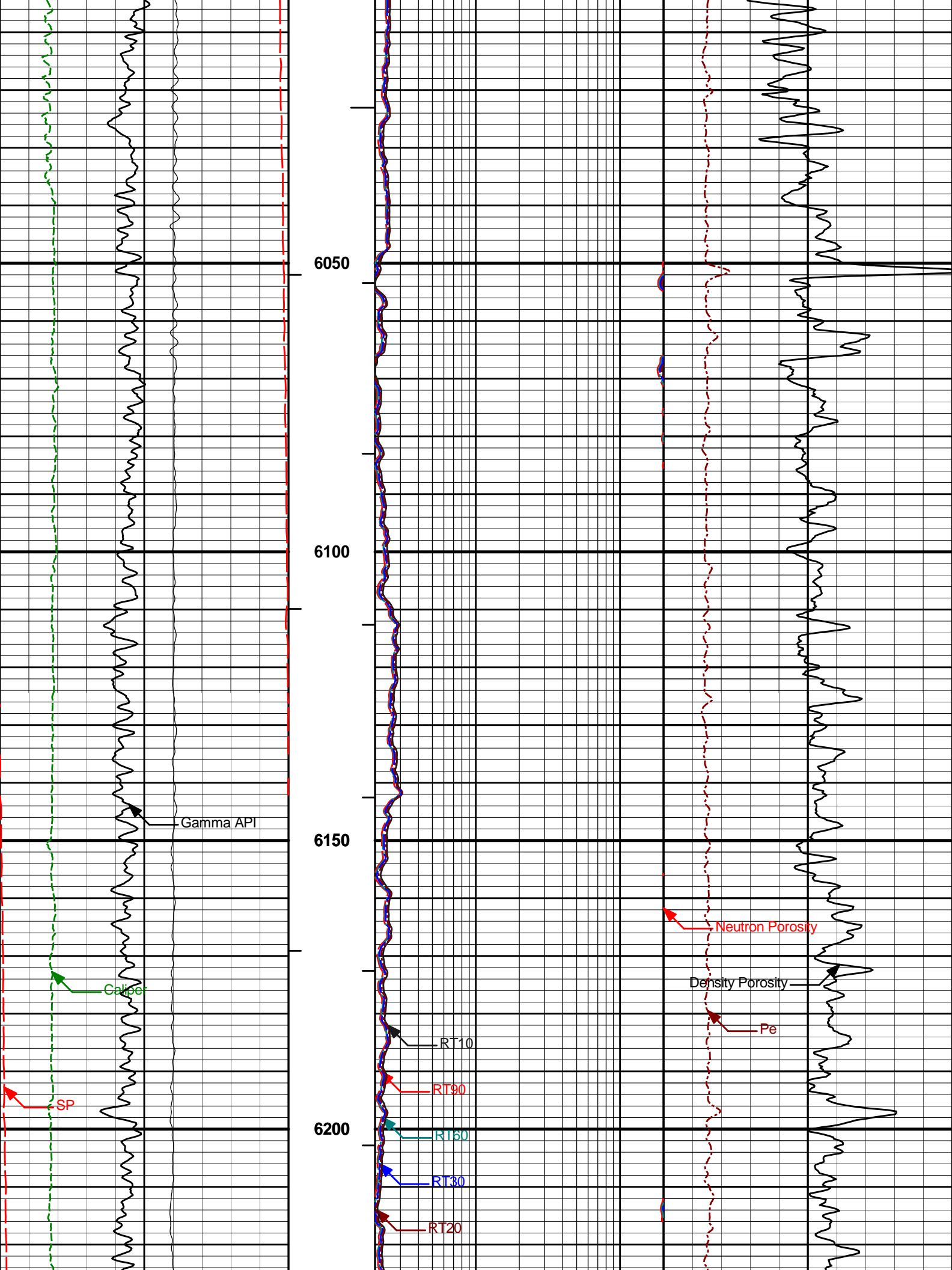


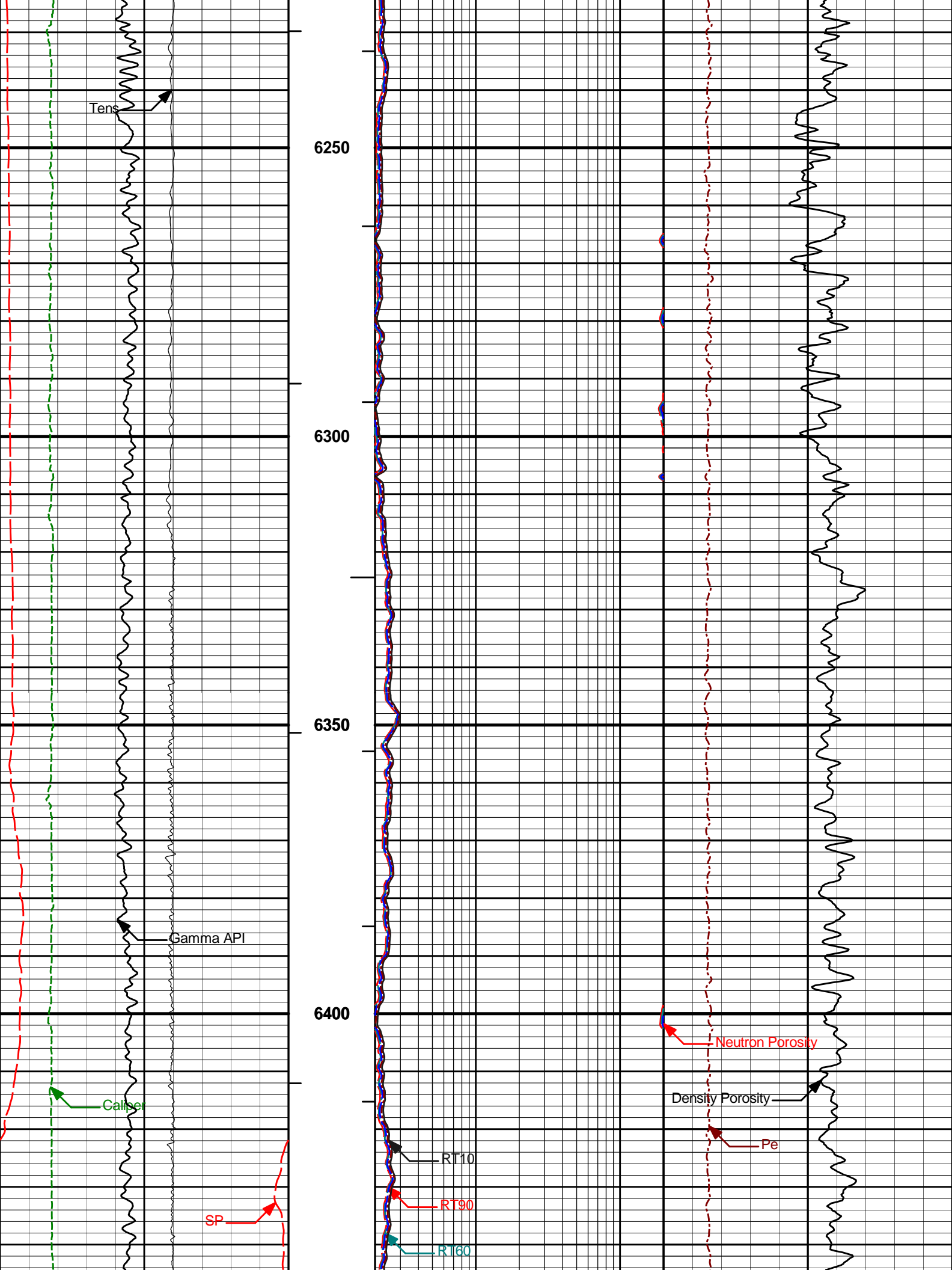


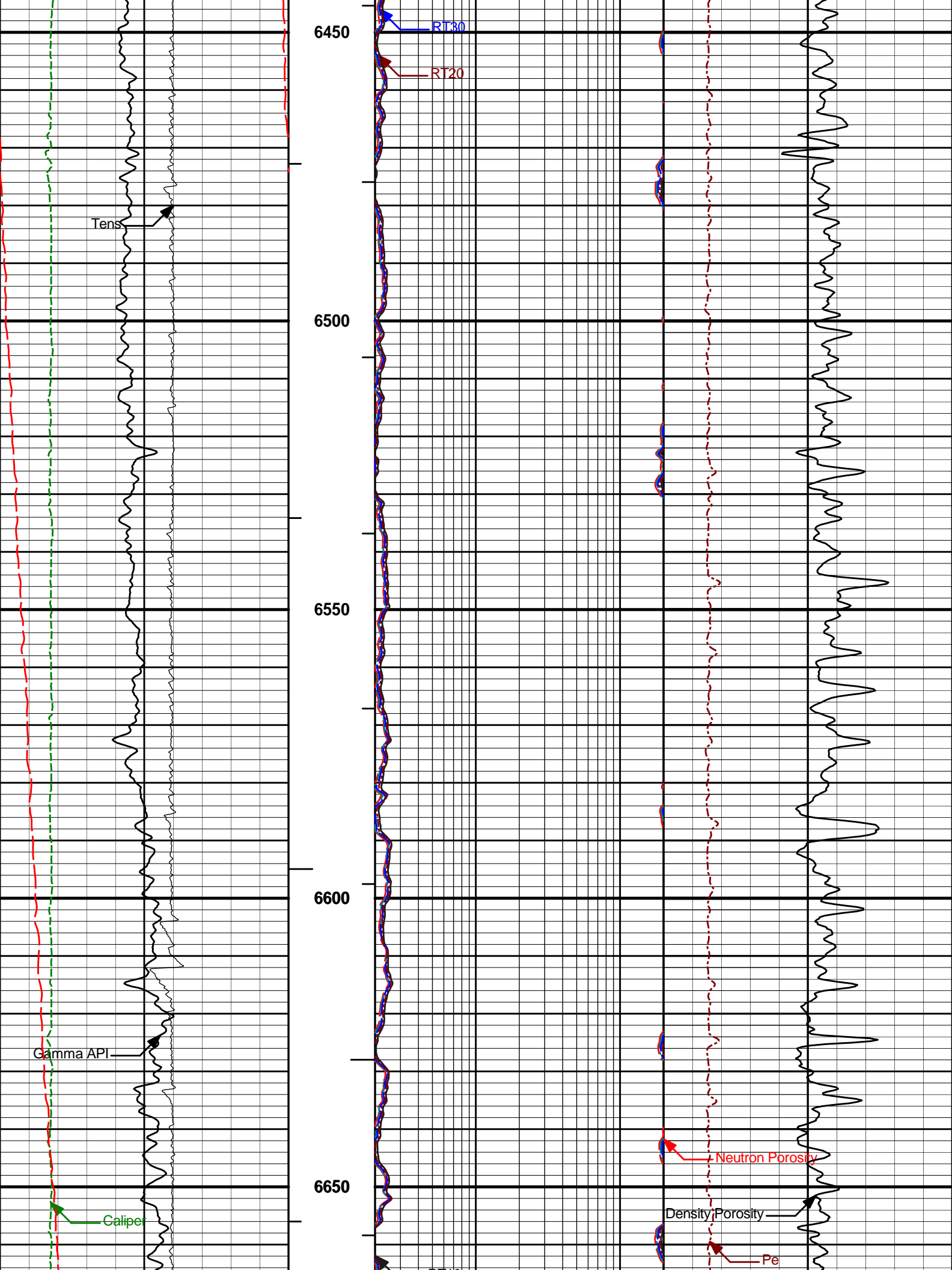


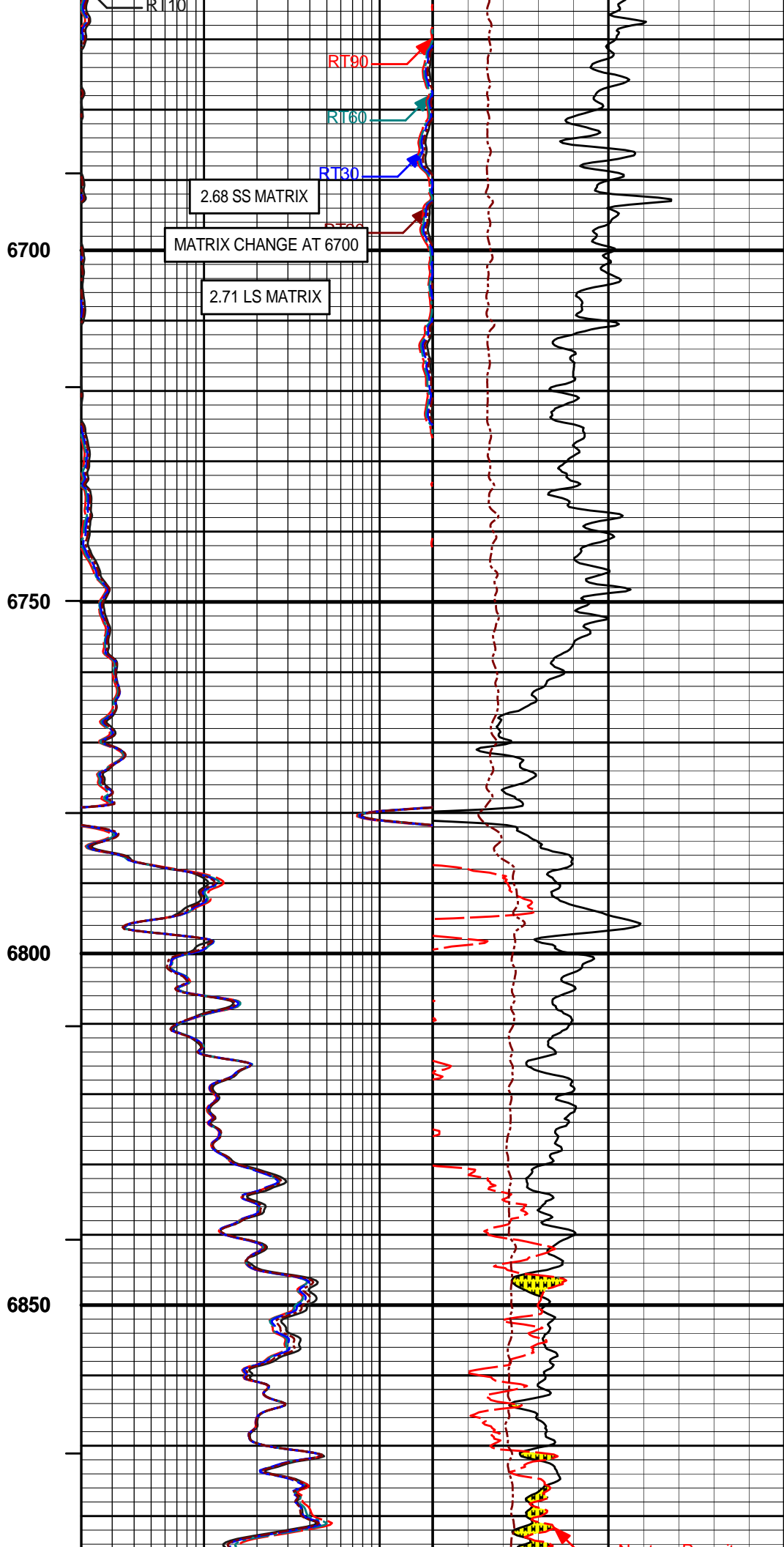
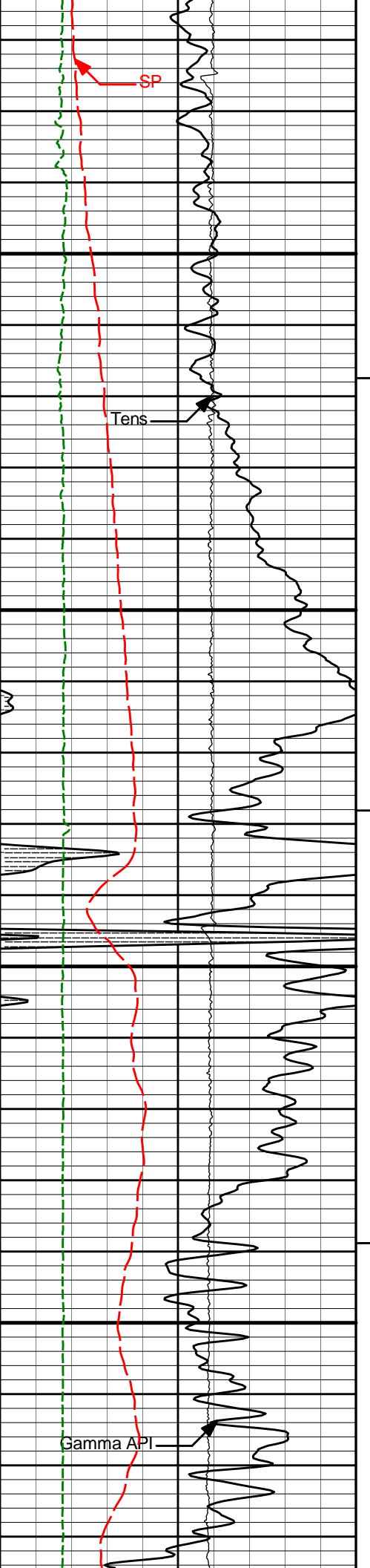


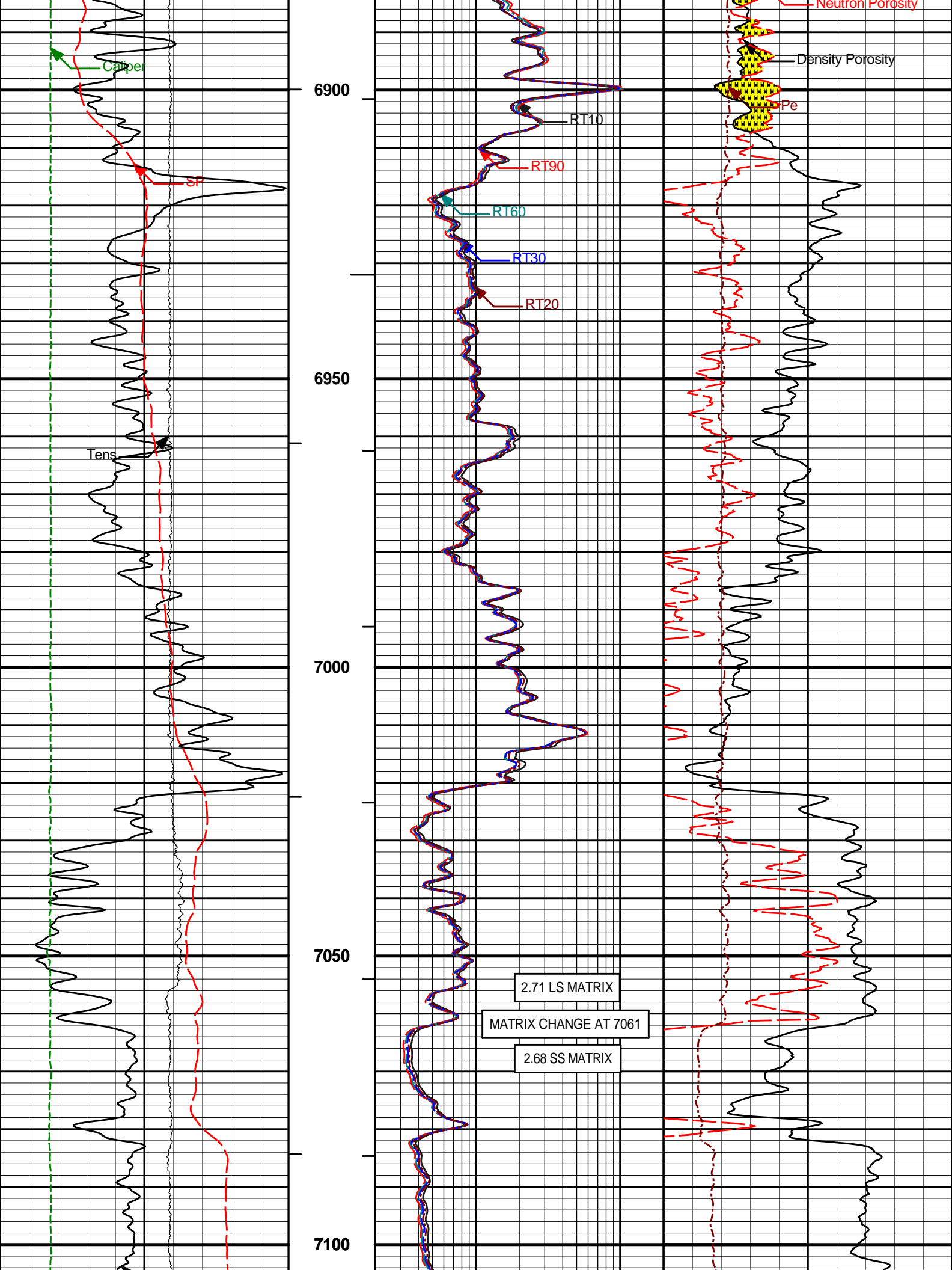


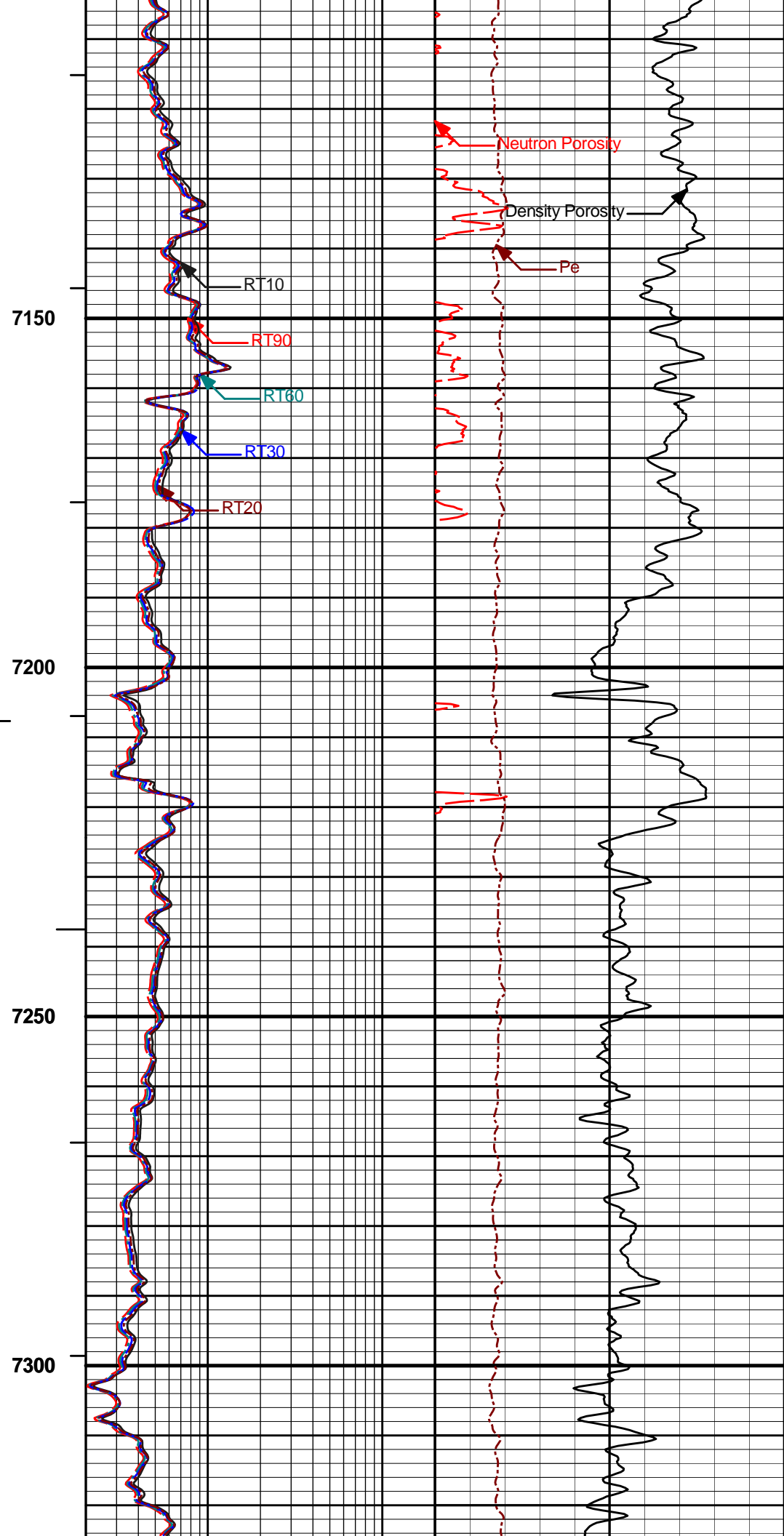
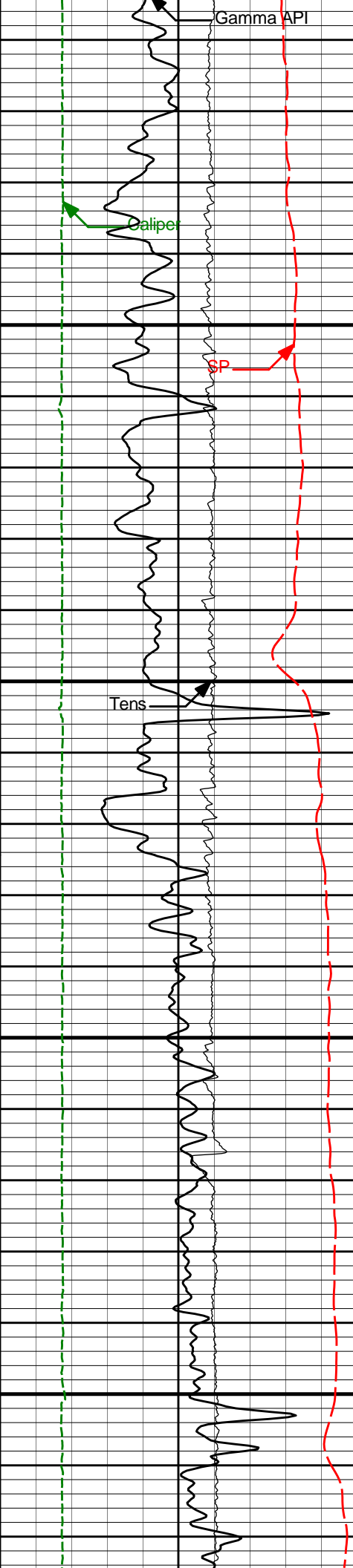


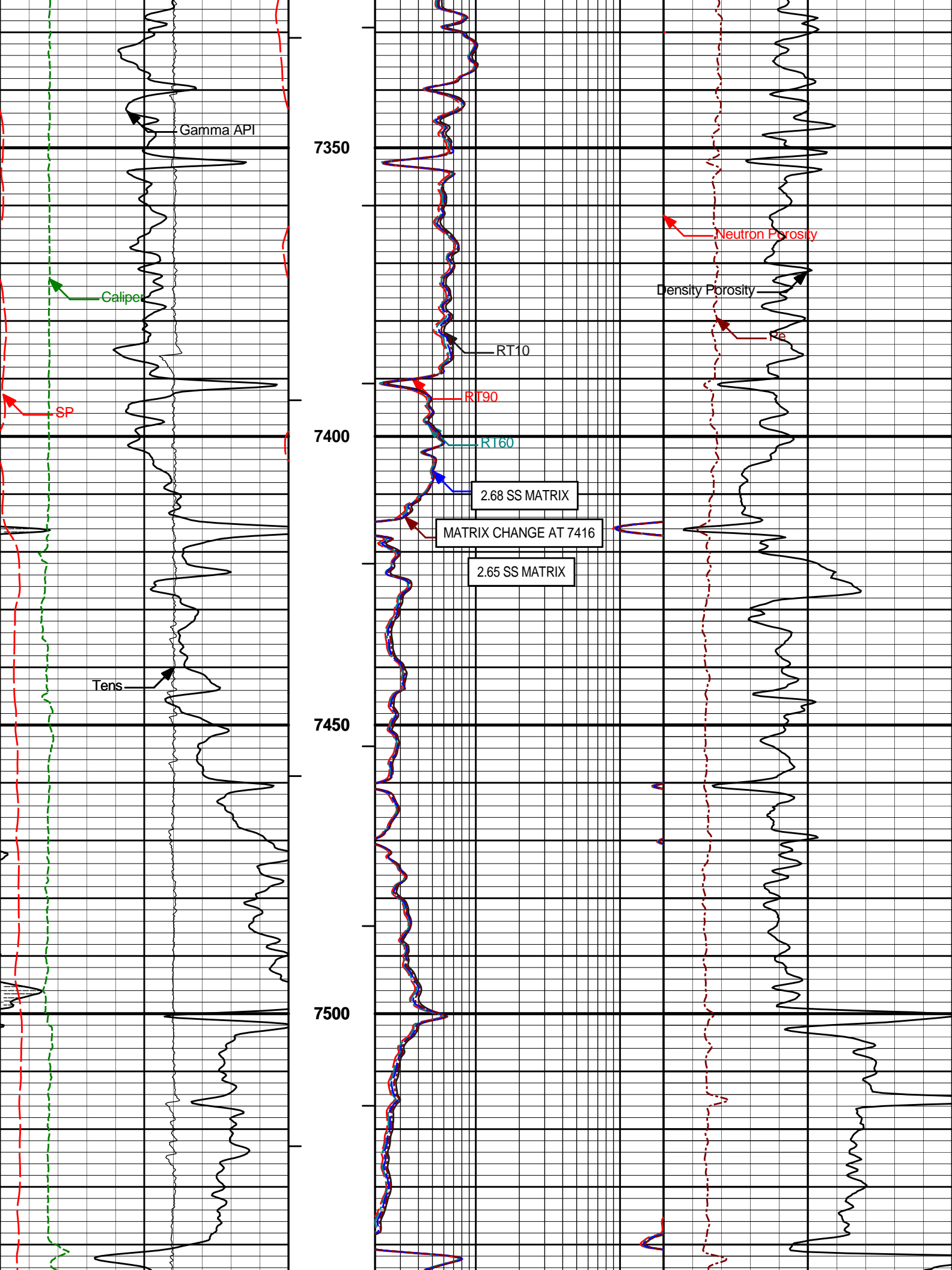


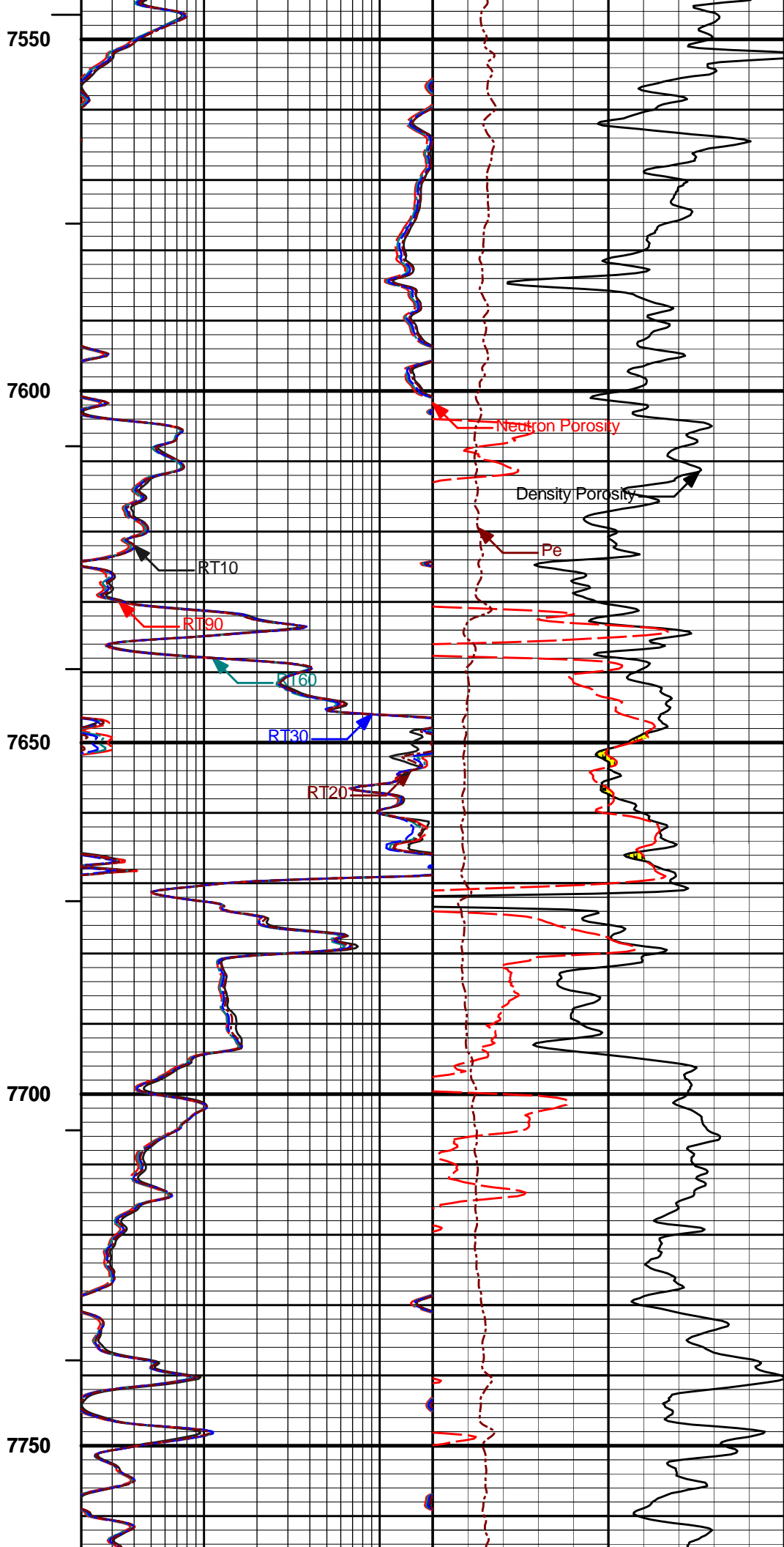
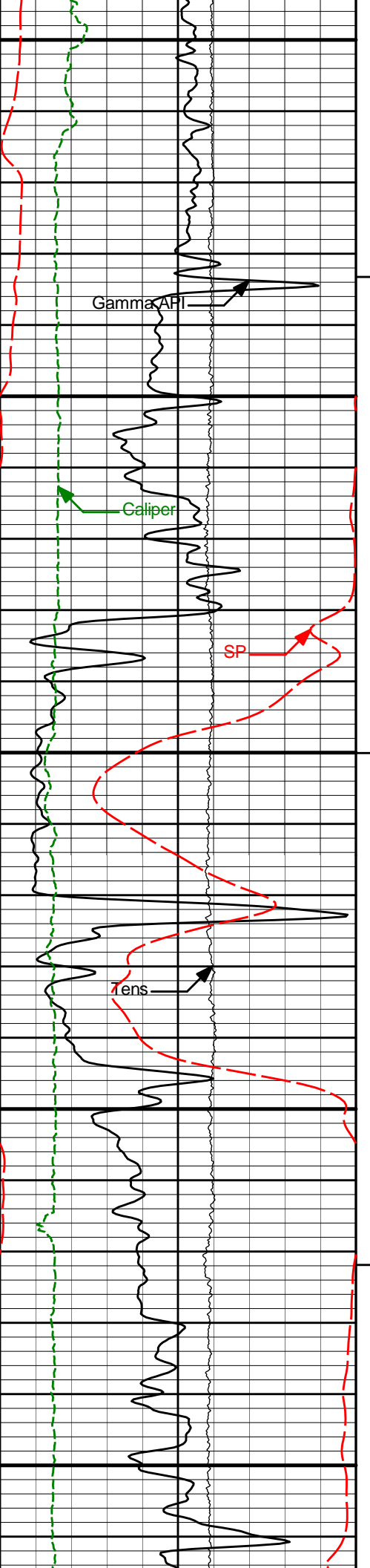


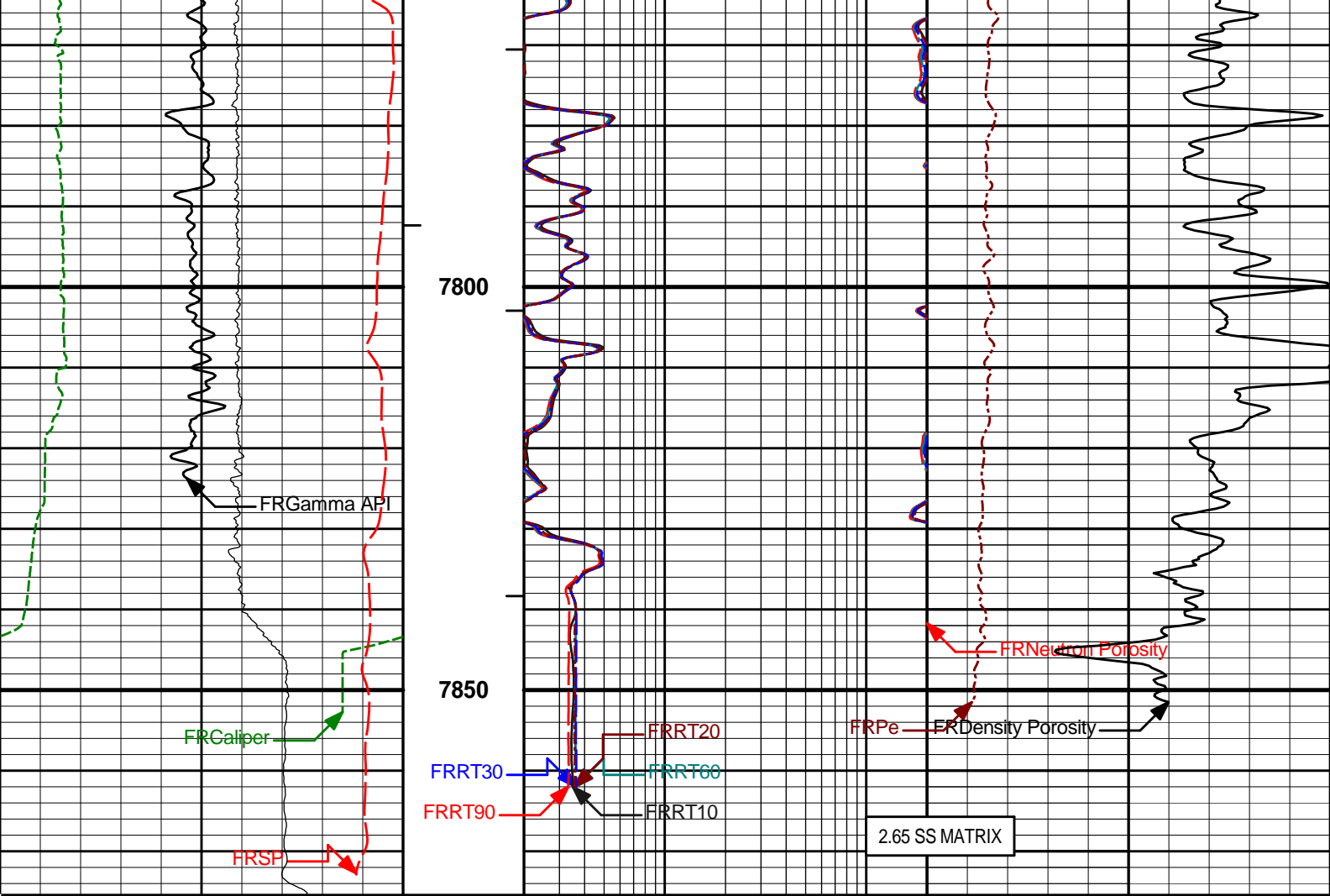












| | | | | | | | | | |
|-----|------------|-----|---------|---|-------|-----|----|------------------|----|
| 50 | SP | 150 | 1 : 240 | 2 | RT90 | 200 | 0 | Pe | 10 |
| | millivolts | | | | Ohm-m | | | | |
| 0 | Gamma API | 250 | BHVT | 2 | RT60 | 200 | 20 | Density Porosity | 0 |
| | api | | | | Ohm-m | | | percent | |
| 6 | Caliper | 16 | AHVT | 2 | RT30 | 200 | 20 | Neutron Porosity | 0 |
| | inches | | | | Ohm-m | | | percent | |
| 10K | Tens | 0 | | 2 | RT20 | 200 | | | |
| | pounds | | | | Ohm-m | | | | |
| | | | | 2 | RT10 | 200 | | | |
| | | | | | Ohm-m | | | | |

HALLIBURTON

Plot Time: 12-Jan-11 10:03:09
 Plot Range: 1225 ft to 7875.42 ft
 Data: PURCELLPCGK1110Well Based\MAIN*
 Plot File: \COMP\NIO_COD

MAIN PASS 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name: GTET - 11215095

Reference Calibration Date: 29-Nov-10 15:50:18

Engineer: C. BLUE

Calibration Date: 11-Jan-11 17:38:46

Software Version: WL INSITE R3.0.7 (Build 3)

Calibration Version: 1

Calibrator Source S/N: TB290

Calibrator API Reference: 235.00 api

| Measurement | Measured | Calibrated | Units |
|-------------------------|----------|------------|-------|
| Background | 74.1 | 73.9 | api |
| Background + Calibrator | 313.8 | 313.0 | api |
| Calibrator | 238.9 | 239.1 | api |

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name: GTET - 11215095

Reference Calibration Date: 11-Jan-11 17:38:46

Engineer: C. BLUE

Calibration Date: 11-Jan-11 17:41:16

Software Version: WL INSITE R3.0.7 (Build 3)

Calibration Version: 1

Calibrator Source S/N: TB290

Calibrator API Reference: 235.00 api

| Field Verification | Shop | Field | Units |
|-------------------------|-------|-------|-------|
| Background | 73.9 | 74.9 | api |
| Background + Calibrator | 313.0 | 313.4 | api |
| Calibrator | 239.1 | 238.5 | api |

| Shop | Field | Difference | Tolerance |
|-------|-------|------------|-----------|
| 239.1 | 238.5 | 0.6 | +/- 9.00 |

CSNG-FS SHOP CALIBRATION

Tool Name: CSNG - 11212563

Reference Calibration Date: 24-Nov-10 10:10:08

Engineer: C. BLUE

Calibration Date: 11-Jan-11 22:00:39

Software Version: WL INSITE R3.0.7 (Build 3)

Calibration Version: 1

Source SN: TB290

| TITANIUM CASE | Measured | Calibrated | Units |
|-------------------------|----------|------------|-----------|
| 60 KEV Peak Channel # | 48.0 | 48.0 | Channel # |
| 239 KEV Peak Channel # | 23.1 | 23.1 | Channel # |
| 583 KEV Peak Channel # | 51.9 | 51.7 | Channel # |
| 2614 KEV Peak Channel # | 212.6 | 212.2 | Channel # |
| Calibrate Temperature | 46.2 | 52.6 | degF |

| Pass/Fail Summary | Centroid |
|-------------------|----------|
| 239 KEV Peak | Passed |
| 583 KEV Peak | Passed |
| 2614 KEV Peak | Passed |

Blanket Reference Value: 235.00 API

Calibrator Value: 266.9 API

| | Counts | Units | Measured | Calibrated | Units |
|-----------------|--------|-------|----------|------------|-------|
| Thorium Blanket | 1595.4 | CPS | 325.6 | 333.2 | API |
| Background | 317.5 | CPS | 64.4 | 66.3 | API |

Gamma Ray Gain: 1.05

CSNG-FS FIELD CALIBRATION

| | | | |
|-------------------|----------------------------|-----------------------------|--------------------|
| Tool Name: | CSNG - 11212563 | Reference Calibration Date: | 11-Jan-11 22:00:39 |
| Engineer: | C. BLUE | Calibration Date: | 11-Jan-11 22:11:55 |
| Software Version: | WL INSITE R3.0.7 (Build 3) | Calibration Version: | 1 |
| Source SN: | | | |

| TITANIUM CASE | Shop | Field | Units |
|-------------------------|-------|-------|-----------|
| 60 KEV Peak Channel # | 48.0 | 48.0 | Channel # |
| 239 KEV Peak Channel # | 23.1 | 23.1 | Channel # |
| 583 KEV Peak Channel # | 51.7 | 51.8 | Channel # |
| 2614 KEV Peak Channel # | 212.2 | 212.6 | Channel # |
| Calibrate Temperature | 52.6 | 56.1 | degF |

| Pass/Fail Summary | Centroid |
|-------------------|----------|
| 239 KEV Peak | Passed |
| 583 KEV Peak | Passed |
| 2614 KEV Peak | Passed |

Blanket Reference Value: 235.00 API
Calibrator Value: 266.9 API

| | Counts | Units | Measured | Calibrated | Units |
|-----------------|--------|-------|----------|------------|-------|
| Thorium Blanket | 1602.6 | CPS | 333.2 | 332.4 | API |
| Background | 315.8 | CPS | 66.3 | 65.5 | API |

Gamma Ray Gain: 1.04
Gamma Gain Check: Passed

DUAL SPACED NEUTRON SHOP CALIBRATION

| | | | |
|-------------------|----------------------------|-----------------------------|--------------------|
| Tool Name: | DSNT - 11219332 | Reference Calibration Date: | 11-Jan-11 18:09:27 |
| Engineer: | C. BLUE | Calibration Date: | 11-Jan-11 18:24:20 |
| Software Version: | WL INSITE R3.0.7 (Build 3) | Calibration Version: | 1 |

Logging Source S/N: DSN430
Tank Serial Number: BRIGHTON
Reference value assigned to Tank: 55.000
Snow Block S/N: BRIGHTON
Calibration Tank Water Temperature: 40 degF
Min. Tool Housing Outside Diameter: 3.625 in

| CALIBRATION CONSTANTS | | | |
|-----------------------|-------------|-----------|----------------------------|
| Measurement | Prev. Value | New Value | Control Limit On New Value |
| Gain: | 0.995 | 0.998 | 0.900 - 1.100 |

| WATER TANK SUMMARY (Horizontal Water Tank) | | | | |
|--|----------------------------------|------------------------|--------|-------------------------|
| Measurement | Current Reading (Previous Coef.) | Calibrated (New Coef.) | Change | Control Limit On Change |
| Porosity (decp): | 0.2287 | 0.2295 | 0.0008 | +/- 0.0020 |
| Calibrated Ratio: | 10.32 | 10.35 | 0.028 | +/- 0.050 |

| VERIFIER | | |
|-----------------------------|--------|-------------------|
| Measurement | Value | Control Limit |
| Snow-Block Porosity (decp): | 0.0747 | 0.02000 - 0.09000 |
| PASS/FAIL SUMMARY | | |
| Background Check: | Passed | |
| Gain-Range Check: | Passed | |
| Snow-Block Check: | Passed | |

| DUAL SPACED NEUTRON FIELD CALIBRATION | | | |
|---------------------------------------|----------------------------|-----------------------------|--------------------|
| Tool Name: | DSNT - 11219332 | Reference Calibration Date: | 11-Jan-11 18:24:20 |
| Engineer: | C. BLUE | Calibration Date: | 11-Jan-11 18:26:55 |
| Software Version: | WL INSITE R3.0.7 (Build 3) | Calibration Version: | 1 |

Logging Source S/N: DSN430
Snow Block S/N: BRIGHTON

| NEUTRON FIELD-CHECK SUMMARY | | | | |
|-----------------------------|--------|--------|------------|----------------------------|
| | Shop | Field | Difference | Control Limit On Change |
| Snow-Block Porosity (decp): | 0.0747 | 0.0747 | -0.0000 | +/- 0.0150 |
| PASS/FAIL SUMMARY | | | | |
| Block Change Check: | Passed | | | |
| Snow Block Stat Check: | Passed | | | |
| Temperature Check: | Passed | | | |

| SPECTRAL DENSITY SHOP CALIBRATION | | | |
|-----------------------------------|----------------------------|-----------------------------|--------------------|
| Tool Name: | SDLT - I332M271 | Reference Calibration Date: | 11-Jan-11 23:16:03 |
| Engineer: | C. BLUE | Calibration Date: | 11-Jan-11 23:33:53 |
| Software Version: | WL INSITE R3.0.7 (Build 3) | Calibration Version: | 1 |

Logging Source S/N: 5256GW
Aluminum Block S/N: BRIGHTON
Magnesium Block S/N: BRIGHTON

Density: 2.600g/cc
Density: 1.680g/cc

Pe: 3.100
Pe: 2.594

| DENSITY CALIBRATION SUMMARY | | | |
|-----------------------------|----------------|-----------|---------------|
| Measurement | Previous Value | New Value | Control Limit |
| Near Bar Gain | 1.0588 | 1.0321 | 0.90 - 1.10 |
| Near Dens Gain | 1.0258 | 1.0040 | 0.90 - 1.10 |
| Near Peak Gain | 1.0145 | 0.9560 | 0.90 - 1.10 |
| Near Lith Gain | 0.9910 | 0.9524 | 0.90 - 1.10 |
| Far Bar Gain | 1.0104 | 1.0136 | 0.90 - 1.10 |
| Far Dens Gain | 1.0051 | 1.0061 | 0.90 - 1.10 |
| Far Peak Gain | 1.0019 | 1.0020 | 0.90 - 1.10 |
| Far Lith Gain | 0.9861 | 0.9874 | 0.90 - 1.10 |
| | | | |
| Near Bar Offset | -0.5460 | -0.2981 | NONE |
| Near Dens Offset | -0.1952 | -0.0052 | NONE |
| Near Peak Offset | -0.0821 | 0.4078 | NONE |
| Near Lith Offset | 0.1079 | 0.4295 | NONE |
| Far Bar Offset | -0.1366 | -0.1681 | NONE |
| Far Dens Offset | -0.0942 | -0.1035 | NONE |
| Far Peak Offset | -0.0766 | -0.0761 | NONE |
| Far Lith Offset | 0.0340 | 0.0272 | NONE |

| | | | |
|----------------------|---------|---------|------------|
| Near Bar Background | 1070.41 | 1068.53 | 700 - 1450 |
| Near Dens Background | 351.79 | 349.88 | 230 - 480 |
| Near Peak Background | 152.27 | 152.93 | 100 - 210 |
| Near Lith Background | 187.29 | 186.26 | 125 - 260 |
| Far Bar Background | 558.86 | 556.62 | 450 - 900 |
| Far Dens Background | 218.61 | 216.90 | 175 - 345 |
| Far Peak Background | 85.24 | 84.88 | 70 - 140 |
| Far Lith Background | 89.48 | 89.81 | 75 - 145 |

| CALIBRATION BLOCK SUMMARY | | | | |
|---------------------------|------------------------------------|--------------------------|--------|----------------------------|
| Measurement | Current Reading (Previous Coef) | Calibrated (New Coef) | Change | Control Limit On Change |
| MAGNESIUM | | | | |
| Density (g/cc) | 1.688 | 1.681 | -0.007 | +/- 0.015 |
| Pe | 2.527 | 2.577 | 0.050 | +/- 0.150 |
| ALUMINUM | | | | |
| Density (g/cc) | 2.598 | 2.600 | 0.002 | +/- 0.01500 |
| Pe | 3.076 | 3.081 | 0.005 | +/- 0.150 |

| TOOL SUMMARY | | | | |
|----------------------------|---------------|----------------|--------------|----------------|
| Measurement | Near Detector | | Far Detector | |
| | Value | Control Limits | Value | Control Limits |
| QUALITY | | | | |
| Background | -0.0011 | +/- 0.0110 | -0.0023 | +/- 0.0140 |
| Magnesium Block | -0.0006 | +/- 0.0110 | -0.0018 | +/- 0.0140 |
| Aluminum Block | -0.0010 | +/- 0.0110 | -0.0001 | +/- 0.0140 |
| Resolution | 9.22 | 6.00 - 11.50 | 9.71 | 6.00 - 11.50 |
| Internal Verifier(B+D+P+L) | 1758 | 1200 - 2700 | 948 | 800 - 1700 |

| PASS/FAIL SUMMARY | |
|--------------------------------|--------|
| Background Quality Check: | Passed |
| Background Range Check: | Passed |
| Background Resolution Check: | Passed |
| Background Verification Check: | Passed |
| Magnesium Quality Check: | Passed |
| Aluminum Quality Check: | Passed |
| Gains Check: | Passed |
| Changes in Calibration Blocks: | Passed |

DENSITY CALIPER SHOP CALIBRATION

Tool Name: SDLT - I332M271

Reference Calibration Date: 01-Jan-70 00:00:00

Engineer: C. BLUE

Calibration Date: 11-Jan-11 23:57:26

Software Version: WL INSITE R3.0.7 (Build 3)

Calibration Version: 1

| CALIBRATION COEFFICIENTS | | | |
|--------------------------|----------------|--------------|-------------------------------|
| Measurement | Previous Value | New Value | Control Limit On New Value |
| Pad Offset | -1597.40 | -1597.40 | -7000.00 - -1000.00 |
| Pad Gain | 0.0004030 | 0.0004030 | 0.000200 - 0.000600 |
| Arm Offset | 164.86 | 164.86 | -5000.00 - 3000.00 |
| Arm Gain | 0.0005189 | 0.0005189 | 0.000300 - 0.000700 |
| Arm Power | -0.000004908 | -0.000004908 | -0.000010 - 0.000010 |

The ring diameter is computed from: DIAMETER = PAD EXTENSION + ARM EXTENSION + TOOL DIAMETER

Tool Diameter: 4.50 in

| CALIBRATION RINGS | | | | | |
|-------------------|--------------------------------------|----------------------------|--------|-------------------------------|--|
| Measurement | Current Reading (Previous Coeff.) | Calibrated (New Coeff.) | Change | Control Limit On New Value | |
| PAD EXTENSION: | | | | | |
| Small Ring (in) | 2.00 | 2.00 | 0.00 | +/- 0.20 | |
| Medium Ring (in) | 3.75 | 3.75 | 0.00 | +/- 0.20 | |
| RING DIAMETER: | | | | | |
| Small Ring (in) | 6.50 | 6.50 | 0.00 | +/- 0.20 | |
| Medium Ring (in) | 8.25 | 8.25 | 0.00 | +/- 0.20 | |
| Large Ring (in) | 15.00 | 15.00 | 0.00 | +/- 0.20 | |

| PASS/FAIL SUMMARY | |
|---------------------------------------|--------|
| Calibration-Coefficients Range Check: | Passed |
| Ring-Measurement Check: | Passed |
| PASS/FAIL SUMMARY | |
| Calibration-Coefficients Range Check: | Passed |

| ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION | | | | | |
|---|--|--|--|--|--|
| Tool Name: ACRt - E9336-S4042 | | | Reference Calibration Date: 29-Nov-10 10:05:24 | | |
| Engineer: C. BLUE | | | Calibration Date: 29-Nov-10 10:24:28 | | |
| Software Version: WL INSITE R3.0.4 (Build 6) | | | Calibration Version: 1 | | |

| TYPICAL GAIN RANGE | | | | | | | | | |
|--------------------|--------|----------|-------|--------|----------|-------|--------|----------|-------|
| Subarray | R12KHz | | | R36KHz | | | R72KHz | | |
| | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper |
| A1 (80") | 0.95 | 1.0124 | 1.05 | 0.95 | 1.0112 | 1.05 | 0.95 | 1.0087 | 1.05 |
| A2 (50") | 0.95 | 0.9999 | 1.05 | 0.95 | 0.9994 | 1.05 | 0.95 | 0.9992 | 1.05 |
| A3 (29") | 0.95 | 1.0027 | 1.05 | 0.95 | 1.0017 | 1.05 | 0.95 | 0.9984 | 1.05 |
| A4 (17") | 0.95 | 0.9959 | 1.05 | 0.95 | 0.9923 | 1.05 | 0.95 | 0.9933 | 1.05 |
| A5 (10") | N/A | N/A | N/A | 0.95 | 0.9818 | 1.05 | 0.95 | 0.9804 | 1.05 |
| A6 (6") | N/A | N/A | N/A | 0.95 | 0.9703 | 1.05 | 0.95 | 0.9694 | 1.05 |

| TYPICAL SONDE OFFSET RANGE | | | | | | | | | |
|----------------------------|--------|----------|-------|--------|----------|-------|--------|----------|-------|
| Subarray | R12KHz | | | R36KHz | | | R72KHz | | |
| | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper |
| A1 (80") | -5 | 0.658 | 2 | -6 | -3.458 | -2 | -8 | -5.078 | -2 |
| A2 (50") | -7 | -1.854 | -1 | -6 | -3.756 | -2 | -7 | -4.493 | -2 |
| A3 (29") | -27 | -13.021 | -9 | -9 | -3.753 | -3 | -7 | -3.013 | -1 |
| A4 (17") | -180 | -98.689 | -60 | -45 | -31.432 | -15 | -39 | -25.166 | -13 |
| A5 (10") | N/A | N/A | N/A | -150 | -69.697 | -50 | -80 | -36.680 | -10 |
| A6 (6") | N/A | N/A | N/A | 175 | 268.707 | 525 | 90 | 139.940 | 270 |

| TRANSMITTER CURRENT GAIN | | | | |
|--------------------------|-------|--------|-------|--|
| Signal | Lower | R | Upper | |
| 12K | 0.6 | 0.8512 | 1.3 | |
| 36K | 1.0 | 1.8893 | 2.0 | |
| 72K | 1.0 | 1.0922 | 2.0 | |

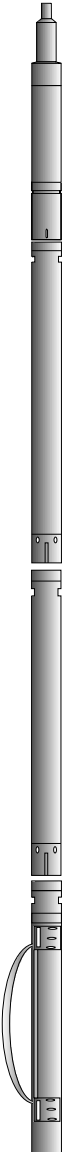
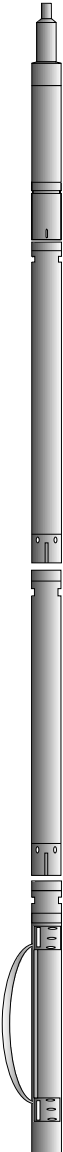
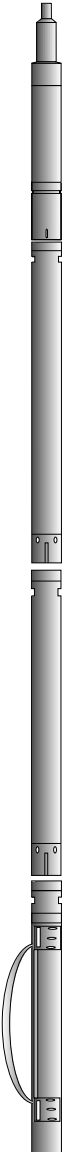
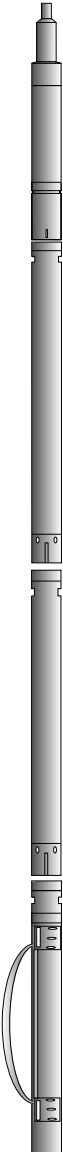
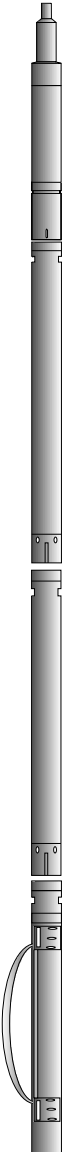
| R-MUD VERIFICATION | | | |
|--------------------|------------------|---------------------|------------------|
| Signal | Lower (ohm-m) | Measured (ohm-m) | Upper (ohm-m) |
| Mud Cell | 0.95 | 1.008 | 1.05 |

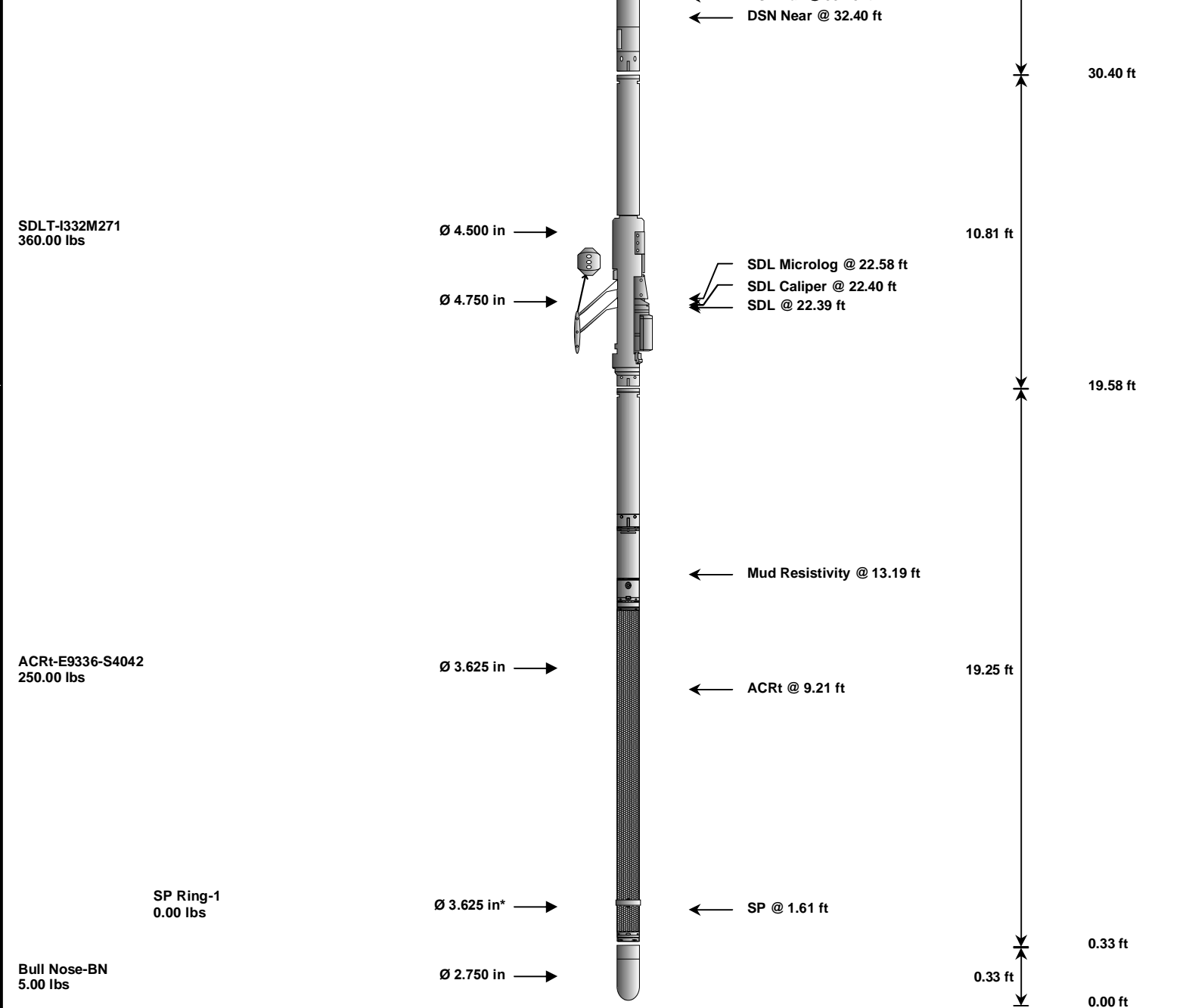
| CALIBRATION SUMMARY | | | | | | | |
|---------------------|------|-------|------|------------|-----------|-------|--|
| Sensor | Shop | Field | Post | Difference | Tolerance | Units | |

| GTET-11215095 | | | | | | |
|--|----------|--------|-------|--------|--------------------------|-----------|
| Gamma Ray Calibrator | 239.1 | 238.5 | ----- | 0.6 | +/- 9.00 | api |
| CSNG-11212563 | | | | | | |
| 60 KEV Peak Channel # | 48.0 | 48.0 | ----- | 0.0 | ----- | Channel # |
| 239 KEV Peak Channel # | 23.1 | 23.1 | ----- | 0.0 | ----- | Channel # |
| 583 KEV Peak Channel # | 51.7 | 51.8 | ----- | -0.1 | ----- | Channel # |
| 2614 KEV Peak Channel # | 212.2 | 212.6 | ----- | -0.4 | ----- | Channel # |
| DSNT-11219332 | | | | | | |
| Snow-Block Porosity | 0.0747 | 0.0747 | ----- | 0.0000 | +/- 0.0150 | decp |
| SDLT-I332M271 | | | | | | |
| Near(B+D+P+L) | 1757.601 | ----- | ----- | 0.000 | +/-14.692 | cps |
| Far(B+D+P+L) | 948.213 | ----- | ----- | 0.000 | +/-15.057 | cps |
| Pad Extension | 3.75 | ----- | ----- | 0.00 | +/-0.20 | in |
| Ring Diameter | 8.25 | ----- | ----- | 0.00 | +/-0.20 | in |
| ACRt-E9336-S4042 | | | | | | |
| Mud Cell | 1.008 | ----- | ----- | 0.000 | ----- | ohm-m |
| Data: PURCELLPCGK11110\0001 NOBLE\IDLE | | | | | Date: 12-Jan-11 08:46:38 | |

HALLIBURTON

TOOL STRING DIAGRAM REPORT

| Description | Overbody Description | O.D. | Diagram | Sensors @ Delays | Length | Accumulated Length |
|--|----------------------|---------------|--|---|---------|--------------------|
| RWCH-10895163 135.00 lbs | | Ø 3.625 in → |  | Load Cell @ 59.34 ft BH Temperature @ 58.77 ft | 6.25 ft | 63.02 ft |
| | | | | | | |
| GTET-11215095 165.00 lbs | | Ø 3.625 in → |  | GammaRay @ 50.71 ft | 8.52 ft | 56.77 ft |
| | | | | | | |
| CSNG-11212563 114.00 lbs | | Ø 3.625 in → |  | CSNG @ 42.62 ft | 8.17 ft | 48.25 ft |
| | | | | | | |
| DSN Decentralizer-10813523 6.60 lbs | | Ø 3.625 in* → |  | | | 40.08 ft |
| | | | | | | |
| DSNT-11219332 174.00 lbs | | Ø 3.625 in → |  | DSN Far @ 33.15 ft | 9.69 ft | 63.02 ft |
| | | | | | | |



| Mnemonic | Tool Name | Serial Number | Weight (lbs) | Length (ft) | Accumulated Length (ft) | Max.Log. Speed (fpm) |
|--------------|------------------------------------|---------------|-----------------|--------------|-------------------------|----------------------|
| RWCH | Releasable Wireline Cable Head | 10895163 | 135.00 | 6.25 | 56.77 | 300.00 |
| GTET | Gamma Telemetry Tool | 11215095 | 165.00 | 8.52 | 48.25 | 60.00 |
| CSNG | Compensated Spectral Natural Gamma | 11212563 | 114.00 | 8.17 | 40.08 | 15.00 |
| DSNT | Dual Spaced Neutron | 11219332 | 174.00 | 9.69 | 30.40 | 60.00 |
| DCNT | DSN Decentralizer | 10813523 | 6.60 | 5.13 | 33.73 | 300.00 |
| SDLT | Spectral Density Tool | I332M271 | 360.00 | 10.81 | 19.58 | 60.00 |
| ACRt | Array Compensated True Resistivity | E9336-S4042 | 250.00 | 19.25 | 0.33 | 300.00 |
| SP | SP Ring | 1 | 0.00 | 0.25 | 1.61 | 300.00 |
| BLNS | Bull Nose | BN | 5.00 | 0.33 | 0.00 | 300.00 |
| Total | | | 1,209.60 | 63.02 | | |

* Not included in Total Length and Length Accumulation.

Date: 12-Jan-11 05:47:57

| | |
|---------|--------------------|
| COMPANY | NOBLE ENERGY |
| WELL | PURCELL PC GK11-10 |
| FIELD | WATTENBERG |

| | | | |
|--------------------|------------|--|----|
| FIELD | WATTENBERG | | |
| COUNTY | WELD | STATE | CO |
| HALLIBURTON | | SPECTRAL DENSITY DUAL SPACED NEUTRON ARRAY COMPENSATED TRUE RESISTIVITY | |