



**REPORT OF MECHANICAL INTEGRITY  
OF INJECTION WELL #2-12**

**ENVIRONMENTAL GEO-TECHNOLOGIES, LLC  
Romulus, Michigan**

**Subsurface Project No. 60D6957**

**JULY 2013**

**Prepared By:  
SUBSURFACE TECHNOLOGY, INC.  
54520 Northern Avenue, Unit A  
South Bend, Indiana 46635**

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## FIGURE

FIGURE 1: WELL SCHEMATIC

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## 1.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency's (U.S. EPA), requirements for the Class I UIC permit number MI-163-1W-CO11 granted to Environmental Geo-Technologies, LLC (EGT) and with the State of Michigan permit number M-453, an annulus pressure test, temperature survey and radioactive tracer needed to be run in Well #2-12 to demonstrate the mechanical integrity of the well.

The mechanical integrity tests (MITs) are designed to demonstrate that (1) "there is no significant leak in the casing, tubing or packer" and (2) "the cement at the top of the injection interval has integrity." The test procedures to perform mechanical integrity tests were reviewed and approved by the U.S. EPA and the Michigan Department of Environmental Quality (MDEQ) prior to initiating the fieldwork.

In addition to the mechanical integrity tests, a temperature survey was run in Well #2-12 to assist in evaluating the injection zone.

## 2.0 SUMMARY OF RESULTS

An amplified annulus pressure test (APT) was performed on June 26, 2013 to demonstrate that there is no significant leak in the tubing, casing or packer. The fluid-filled annulus was pressurized to 906-psi for one (1) hour. There was a 3-psi rise in pressure for the duration of the test. This constitutes a successful pressure test with a 0.3% change in pressure.

The annulus was then pressurized to 1045-psi for one (1) hour. There was a 6-psi drop in pressure for the duration of the test. This constitutes a successful pressure test with a 0.5% change in pressure.

A temperature survey (TS) was run on June 27, 2013 from surface to 4180 feet. The survey displayed no indication of a loss of external mechanical integrity and did not display any signs of upward fluid movement into unpermitted formations.



A Radioactive Tracer Survey (RTS) was run on June 27, 2013 to test the bottom hole cement. The RTS survey confirmed the leak-free condition of the tubing within the test interval as well as depicting that all injected fluids exited the injection tubing below the packer and moved out into the injection zone. The RTS further verified that the cement at the top of the injection interval has integrity and there is no upward migration of injection fluids around the casing shoe.

Mr. Steve Roy and Mr. Jeff Wawczak of the U.S. EPA, John Frost with EGT, and Richard Schildhouse with Subsurface Technology, Inc., witnessed the amplified APT temperature log and tracer log.

### **3.0 ANNULUS PRESSURE TESTING**

The APT was performed on Well #2-12 on June 26, 2013. This test was amplified based on a discussion with Region 5 and explained in the procedures contained in Appendix A. The annulus would be pressurized twice for a one (1) hour period rather than the normal once for a one (1) hour period. The second period was tested at a higher pressure. The purpose of this test would further confirm the integrity of the injection string, the long string casing, the wellhead and the packer. The test was monitored by a digital test gauge with proper certification. This gauge had been calibrated within one (1) year of this testing. A calibration form can be found in Appendix C.

#### **3.1 Annulus Pressure Test Procedures**

The procedure for testing the integrity of the annulus was performed in two (2) steps. Copies of these procedures, as sent to the EPA, are provided in Appendix A. Step one (1) involved the annulus pressure to be raised to 906-psi and was monitored for a one (1) hour period and recorded at 10-minute intervals. The second step had the annulus pressure to be raised to 1045-psi for a one (1) hour period with recorded readings at 10-minute intervals.

### **3.2 Amplified Annulus Pressure Test Results**

The amplified annulus pressure test on Well 2-12 was run on June 26, 2013. The gauge that was used was APG Digital Model #PG3000, Serial No. U0951 diameter, 0-3000 psi capacity, calibrated August 29, 2012. During the step 1 test, the annulus had 906-psi applied and gained 3-psi during the one (1) hour period. Based on the applied pressure of 906, an allowed gain of 27.2-psi (3% of applied), and since the 3-psi gain is only 0.3% of the applied, the well successfully passed the first step of the amplified APT.

During the step 2 test, the annulus had 1045-psi applied with an allowable loss of 31.4-psi. The well annulus lost a total of 6-psi during the one (1) hour period resulting in a loss of 0.5% of the applied. Based on these loss/gain calculations, it is demonstrated that wellhead, packer, injection string and long casing show integrity and thus fulfill all regulatory demands. Forms showing actual data can be found in Appendix C.

### **4.0 TEMPERATURE SURVEY**

In response to a regulatory requirement, a temperature survey was run on June 27, 2013 on Well #2-12. The purpose of the requirement is to insure that there is no evidence of any upward movement of fluid that may travel toward the Underground Source of Drinking Water (USDW).

#### **4.1 Temperature Survey Procedures**

The procedures for the temperature survey are discussed in Appendix A of this report which was submitted and approved by the U.S. EPA before any fieldwork was started. The temperature tool calibration was confirmed by using a bucket test incorporating the use of a cold and hot sample as well as a plant-supplied, calibrated lab thermometer. This test is displayed at the beginning of the temperature log which can be found in Appendix D. The base temperature was run from surface down to 4180 feet.

## 4.2 Temperature Survey Results

The last two (2) times that temperature surveys were run on well #2-12 were January 3, 2007 and January 16, 2013. The data that was collected at that time was compared to the June 27 2013 data and is displayed in Table 1 below.

<i>WELL #2-12</i>				
<i>TABLE 1</i>				
<i>Depth</i>	<i>January 3, 2007</i>	<i>Gradient/1000'</i>	<i>January 13, 2013</i>	<i>Gradient/1000'</i>
100	53.2	-	44.2	-
500	53.8	1.5	53.2	22.5
1000	56.3	5.0	55.8	5.2
1500	59.0	5.4	58.6	5.6
2000	62.6	7.2	60.6	4.0
2500	66.3	7.4	66.1	11.0
3000	75.8	19.0	75.8	19.4
3500	80.4	9.2	80.0	8.4
4000	85.3	9.8	84.8	9.6
4100	89.0	32	85.9	11.0

As can be seen in the table above, both the actual temperatures and calculated gradients for June 27, 2013 are very similar in most cases from the January 2007 and January 2013 logs. The noted difference is at 100 feet, near the top of the injection tubing, which can be explained since the sonde had not had time to equilibrate from the bucket test. The differences seen at 2000 feet and 2500 feet are the result of the obstruction at 2300 feet and its removal. The open hole temperatures were slightly lower for the 2013 logs over that of 2007. The results that produced by the June 27, 2013 survey did not show any indications of upward fluid movement at the zone, thus satisfying all regulatory requirements for mechanical integrity.

## **5.0 RADIOACTIVE TRACER SURVEY**

In order to verify that no fluid is moving upward around the casing shoe, a radioactive tracer log is run. Interpretation of the RTS indicates whether or not there is migration of injection fluids through channels in the cement sheath surrounding the protection casing.

This RTS is run by first recording a base gamma ray log over the interval of interest. Fluid is injected and a radioactive slug of Iodine 131 is released above the area to be tested. Fluid is injected and the progress of the slug monitored by repeatedly lowering the logging tool below the moving slug and logging upward through the slug. A second verification of the absence of upward fluid movement is obtained by releasing a slug of Iodine 131 above the area to be tested. The logging tool is set at the depth of interest and gamma radiation is recorded for approximately 30 minutes with the logging tool stationary. A final gamma ray survey is run to complete the logging procedure.

### **5.1 Radioactive Tracer Survey Procedure**

An RTS was run between 4180 feet and 3090 feet in injection Well #2-12 on June 27, 2013.

- A. First Base Log: 4180 feet to 3090 feet

- B. Five (5) minute statistical check at 3855 feet  
Five (5) minute statistical check at 3800 feet
- C. First radioactive slug ejected at 3750 feet. The following table contains the depth of the top and bottom of each pass as well as the depth of the peak based on the bottom detector.

	<b>START</b>	<b>STOP</b>	<b>PEAK DEPTH</b>	<b>FLOW GPM</b>
1	3834	3764	3793	36
2	3930	3834	3880	36
3	4000	3910	3973	36
4	4030	3950	4001	36
5	4050	3970	4013	36
6	4100	3960	4033	36

- D. Second radioactive slug ejection at 3750 feet  
Stationary time drive sequence  
Fluid pump rate – 36 GPM  
Bottom detector set at 3980 feet  
Top detector set at 3971.5 feet  
Monitored for 30 minutes
- E. Final Base Log 4180 feet to 3090 feet

## 5.2 Results of the Radioactive Tracer Survey

The radioactive tracer run in Well #2-12 on June 27, 2013 confirmed the leak-free condition of the tubing within the test interval as well as depicting that all injection fluids exited the injection tubing below the packer and moved out into the injection zone. The RTS verified that the cement at the top of the injection interval has integrity and there is no upward migration of injection fluids around the casing shoe.



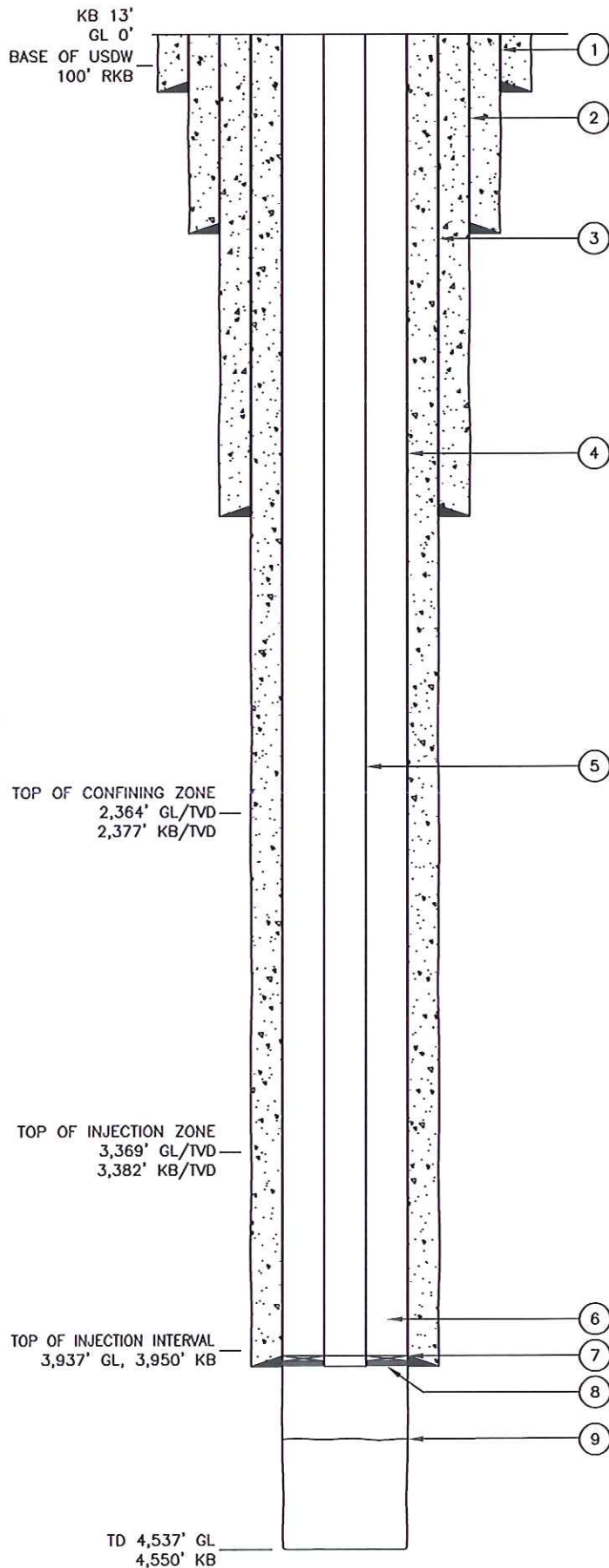
The final base log indicated that all RA material had exited tubing and dissipated into the open hole.

## 6.0 CONCLUSIONS

In conclusion, the Environmental Geo-Technologies, LLC Well #2-12 has displayed internal and external mechanical integrity. All procedures and evaluations have been done in accordance with state and federal requirements mandated in regard to U.S. EPA Permit MI-163-1W-C011 and Michigan Permit M-453.

- There is no significant leak in the casing, tubing or packer as evidenced by an amplified annulus pressure test conducted on June 26, 2013.
- The temperature survey that was run on June 27, 2013 was comparable to the previous surveys conducted on January 3, 2007 and January 16, 2013. The June 27, 2013 survey displayed no indication of any fluid having an upward movement, thus confirming external integrity.
- The cement at the top of the injection interval and around the casing shoe has integrity. The survey that was run on January 16, 2013 indicated that all fluids left the injection string and entered into the formation and showed no indication of upward movements.

**FIGURE**



**BELOW GROUND DETAILS**

- ① **CONDUCTOR CASING:** 20" O.D., 94 lb/ft, SET AT 169' KB IN 24" HOLE AND CEMENTED TO SURFACE
- ② **SURFACE CASING:** 13 $\frac{3}{8}$ " O.D., 48 lb/ft, H-40 SET AT 598' KB IN 17 $\frac{1}{2}$ " HOLE AND CEMENTED TO SURFACE
- ③ **INTERMEDIATE CASING:** 9 $\frac{5}{8}$ " O.D., 36 lb/ft, J-55 SET AT 1,444' KB IN 12 $\frac{1}{4}$ " HOLE AND CEMENTED TO SURFACE
- ④ **LONG STRING CASING:** 7" O.D., 26 lb/ft, J-55 SET AT 3,983' KB IN 8 $\frac{1}{4}$ " HOLE AND CEMENTED TO SURFACE
- ⑤ **INJECTION TUBING:** 4-1/2" O.D. FIBERGLASS TO 3,953' KB
- ⑥ **ANNULUS FLUID:** OIL BASED FLUID
- ⑦ **PACKER AND SEAL ASSEMBLY:** 4-1/2" X 7" GPS PACKER, TOP AT 3,953' KB. BOTTOM AT 3,958' KB
- ⑧ **DIESEL PAD UNDER PACKER**
- ⑨ **TOP OF FILL AT 4,180' KB**

TOP OF CONFINING ZONE  
2,364' GL/TVD  
2,377' KB/TVD

TOP OF INJECTION ZONE  
3,369' GL/TVD  
3,382' KB/TVD

TOP OF INJECTION INTERVAL  
3,937' GL, 3,950' KB

TD 4,537' GL  
4,550' KB

<b>SUBSURFACE</b>		HOUSTON, TX. SOUTH BEND, IN. BATON ROUGE, LA.
<p>FIGURE 1  <b>ENVIRONMENTAL GEO-TECHNOLOGIES, LLC</b>          ROMULUS, MICHIGAN          EGT #2-12 WELL SCHEMATIC</p>		
DATE: 7/12/13	CHECKED BY: <i>ZWS</i>	JOB NO: 60D6957
DRAWN BY: CRB	APPROVED BY: <i>ZWS</i>	DWG. NO:

## APPENDICES

**ATTACHMENT A**  
**REGULATORY CORRESPONDENCE**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

NOV 28 2012

REPLY TO THE ATTENTION OF:  
WU-16J

Mr. Tom Athans  
Helicon Holdings  
1001 Woodward Ave., Suite 400  
Detroit, Michigan 48226

Subject: Approval of Proposed Procedures for a radioactive tracer survey, temperature log, and amplified annulus pressure test scheduled for December 3, 4, and 5, 2012 in Environmental GeoTechnologies (EGT) well #s 1-12 and 2-12, United States Environmental Protection Agency Underground Injection Control (UIC) Permit #MI-163-1W-C010 and #MI-163-1W-C011

Dear Mr. Athans:

I have reviewed the procedures attached to Jeffrey Woolstrum's letter of October 31, 2012, for the testing referenced above. The test procedures are approved with the addition of the following requirements for each well:

- The annulus fluid returned at the conclusion of the Amplified Annulus Pressure Test must be recorded and reported with the test results.
- Prior to running the temperature log, the temperature logging tool must be compared with a calibrated thermometer in ice water and water of ambient temperature. These temperature readings must be recorded and reported with the test results.
- A gamma ray log must be run in conjunction with the temperature logs.
- Injection of fresh water at a flow rate between 20 and 50 gallons per minute is approved for conducting the radioactive tracer surveys.

Please remember to submit the digital data either on diskette, CD or by email when the report is submitted.

Our policies require that testing be witnessed by our contract field inspectors. Please contact Jeff McDonald at (312) 353-6288 to schedule the witnessing of these tests. Unwitnessed tests are only acceptable if it is impossible for the field inspectors to be present. If tests do not provide definitive information concerning the conditions which they are designed to ascertain, EGT will be required to rerun them.

If you have any questions or comments about the contents of this letter, please contact me by phone at (312) 353-7316 or by email to [batka.allan@epa.gov](mailto:batka.allan@epa.gov).

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Allan Batka".

Allan Batka, Engineer  
Underground Injection Control Branch

cc: MDEQ, Raymond Vugrinovich

**AMPLIFIED**  
**ANNULUS PRESSURE TEST PROCEDURES**  
**FOR**  
**EGT WELL #1-12 AND EGT WELL #2-12**

- Record last date of injection
- Well must be shut in a minimum of 48-hours prior to annulus testing
- Install digital test gauge at test port that has been certified within the last 12 months (certificates to be at hand)
- Pressure up annulus to approximately 900 psi for one (1) hour prior to test to allow for annulus to equilibrate
- Record current annulus pressure
- Record current injection pressure
- Record current annulus fluid in storage tank
- Pressure up annulus to 900 +25/-0 psi and allow annulus to equilibrate
- Record data at 10-minute intervals for a one (1) hour period. (Pressure change limited to 3% of applied pressure for a one (1) hour period)
- Raise annulus pressure to 1050 +25/-0 psi and allow annulus to equilibrate
- Record data at 10-minute intervals for a one (1) hour period. (Pressure change limited to 3% of applied pressure for a one (1) hour period)



**AMPLIFIED**  
**ANNULUS PRESSURE TEST PROCEDURES**  
**FOR**  
**EGT WELL #1-12 AND EGT WELL #2-12**  
**(CONTINUED FROM PAGE 1)**

- The testing is considered acceptable if pressure fluctuation is less than 3% from original applied pressure for each of the one (1) hour periods
- Return annulus to normal stand-by pressure
- Put WAMS system back on line
- Return well to operator control

**PROCEDURES FOR RUNNING**  
**STATIC TEMPERATURE LOG**  
**ON**  
**EGT WELL #2-12**

- Rig-up wireline unit on hole
- Verify temperature sonde has been calibrated and has certification
- Run tool well and record temperature from surface to K.D. (4550') or top of fill
- Tool to be run at a consistent speed and not to exceed 30 feet per minute
- Once tool reaches bottom, stabilized temperature readings (3 minutes) should be made at 500' intervals while coming out of well
- After completion of temperature survey, wireline rig should be made ready to perform radioactive tracer survey (RTS)

**PROCEDURES FOR RUNNING**  
**RADIOACTIVE TRACER SURVEY**  
**ON**  
**EGT WELL #2-12**

- Radioactive tracer material to be iodine 131
- Rig-up surface read out wireline unit on hole
- Run into hole with casing collar locator and radioactive tracer tool
- Run bottom up base run survey from 4550' (or deepest attainable) to 3093' (sensitivity at 40 counts per second per inch (CPSPI))
- Run first 5-minute stat with bottom detector at 3855'
- Run second 5-minute stat with bottom detector at 3800'
- Start injection at a rate of 50 gpm
- Release first slug at 3750'
- Chase slug approximately nine (9) chases with a minimum of two (2) chasers in tubing
- Release second slug at 3750'
- Run 30-minute time drive with bottom detector at 3977'
- Run final base bottom-up from 4550' to 3600'
- Rig down wireline
- Turn over to operator

**After Procedures Have Been Submitted**  
**Prior to Performing Mechanical Integrity Testing**

- **Verify that regulating agencies have received procedures a minimum of 30 days prior to performing MIT**
- **Provide agencies with a proposed date for running MIT in order to allow a witness to be present, if required**
- **Verify that all personnel and services have satisfied safety requirements of operator**
- **Provide JSA and/or review procedures with all on site**
- **Insure that all individuals are fitted with required safety attire**

**ATTACHMENT B**  
**CHRONOLOGY OF FIELD ACTIVITIES**

## CHRONOLOGY OF FIELD ACTIVITIES

### ENVIRONMENTAL-GEO TECHNOLOGIES, LLC

#### WEDNESDAY, JUNE 26, 2013

- Rig-up and perform amplified annulus pressure test on Well #1-12
- Set-up and run cold and hot bucket test for Well #1-12
- Rig-up and perform amplified annulus pressure test on Well #2-12
- Rig-up and run temperature for Well #1-12
- Rig up and run radioactive tracer survey on Well #1-12

#### THURSDAY, JUNE 27, 2013

- Set-up and run cold and hot bucket test for Well #2-12
- Rig-up and run temperature for Well #2-12
- Rig up and run radioactive tracer survey on Well #2-12



**ATTACHMENT C**

**ANNULUS PRESSURE TEST DATA AND CALIBRATION**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator ENVIRONMENTAL GEO-TECHNOLOGIES  
 Address 1216 BEAUBIEN ST.  
DETROIT MICHIGAN 48226  
 Well Name Well 2-12 (TEST 1)

State Permit No. M15 M452  
 USEPA Permit No. M1-163-1W-C010  
 Date of Test 6/26/2013  
 Well Type CLASS I - HAZARDOUS COMM.

LOCATION INFORMATION \_\_\_\_\_ Quarter of the \_\_\_\_\_ Quarter of the \_\_\_\_\_ Quarter  
 of Section 12; Range 9e; Township 35; County WAYNE;  
 Company Representative R. Schildhouse; Field Inspector J. Wawczak;  
 Type of Pressure Gauge DIGITAL inch face; 3000 psi full scale; 1 psi increments;

New Gauge? Yes  No  If no, date of calibration 8/29/12 Calibration certification submitted? Yes  No

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.  
 For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.  
 Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes  No   
 2-year test for TA'd wells on time? Yes  No   
 After rework? Yes  No   
 Newly permitted well? Yes  No

Time	Pressure (in psig)	
	Annulus	Tubing
<u>10:30</u>	<u>906</u>	<u>101</u>
<u>10:40</u>	<u>909</u>	<u>101</u>
<u>10:50</u>	<u>909</u>	<u>101</u>
<u>11:00</u>	<u>908</u>	<u>101</u>
<u>11:10</u>	<u>907</u>	<u>101</u>
<u>11:20</u>	<u>908</u>	<u>101</u>
<u>11:30</u>	<u>909</u>	<u>101</u>

Casing size 7" (STEEL)  
 Tubing size 4.5" (Fiberglass)  
 Packer type GPS MODEL 12  
 Packer set @ 3953' - 3958' KB  
 Top of Permitted Injection Zone 3937  
 Is packer 100 ft or less above top of  
 Injection Zone? Yes  No   
 If not, please submit a justification.  
 Fluid return (gal.) 11.88

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 27.2 psi  
 Test Period Pressure change +3 psi

Test Passed  Test Failed

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

RICHARD E. SCHILDHOUSE [Signature] 7-12-13  
 Printed Name of Company Representative Signature of Company Representative Date



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator: Environmental Geo-Technologies  
 Address: 1216 BEAUBIEN ST.  
DETROIT Michigan 48226  
 Well Name: WELL 2-12 (TEST 2)

State Permit No. MISM452  
 USEPA Permit No. M1-163-1W-C010  
 Date of Test 6/26/2013  
 Well Type CLASS I - HAZARDOUS COMM

LOCATION INFORMATION \_\_\_\_\_ Quarter of the \_\_\_\_\_ Quarter of the \_\_\_\_\_ Quarter  
 of Section 12; Range 9e; Township 35; County WAYNE;  
 Company Representative R. Schildhouse; Field Inspector J. Wawrzak;  
 Type of Pressure Gauge DIGITAL inch face; 3000 psi full scale; 1 psi increments;

New Gauge? Yes  No  If no, date of calibration 8/29/12 Calibration certification submitted? Yes  No

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.  
 For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.  
 Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes  No   
 2-year test for TA'd wells on time? Yes  No   
 After rework? Yes  No   
 Newly permitted well? Yes  No

Time	Pressure (in psig)	
	Annulus	Tubing
<u>11:40</u>	<u>1045</u>	<u>102</u>
<u>11:50</u>	<u>1044</u>	<u>101</u>
<u>12:00</u>	<u>1043</u>	<u>101</u>
<u>12:10</u>	<u>1041</u>	<u>101</u>
<u>12:20</u>	<u>1039</u>	<u>101</u>
<u>12:30</u>	<u>1038</u>	<u>101</u>
<u>12:40</u>	<u>1039</u>	<u>101</u>

Casing size 7" (Steel)  
 Tubing size 4.5" (Fiber Glass)  
 Packer type GPS MODEL 12  
 Packer set @ 3953' - 3958' 12B  
 Top of Permitted Injection Zone 3937  
 Is packer 100 ft or less above top of  
 Injection Zone? Yes  No   
 If not, please submit a justification.  
 Fluid return (gal.) 14.61

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 31.3 psi  
 Test Period Pressure change 6 psi

Test Passed  Test Failed

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

RICHARD W SCHILDHOUSE [Signature] 7-12-13  
 Printed Name of Company Representative Signature of Company Representative Date

B&B INSTRUMENTS INC  
145 WEST TAFT DR  
SOUTH HOLLAND IL 60473

PHONE: 708-596-1700  
FAX: 708-596-1755  
EMAIL [bbinst1@gmail.com](mailto:bbinst1@gmail.com)

# CERTIFICATE OF CALIBRATION

CERT #: 673

## CUSTOMER:

SUBSURFACE TECHNOLOGY  
54520 NORTHERN AVE  
SUITE A  
SOUTH BEND IN 46635

## EQUIPMENT:

MAKE : APG  
TYPE : DIGITAL GAUGE  
MODEL : PG3000 3000 PSI  
SERIAL#: U0951  
ID# :

CALIBRATION DATE: 8-29-2012  
RECALIBRATION DATE: 8-29-2013  
RECEIVED CONDITION: IN TOLERANCE  
WORK PERFORMED: CERT TO SPECS  
TECHNICIAN: JEFF LEWELLEN  
TEST CONDITIONS: 68F  
STANDARDS USED: DMT 150 S/N: 6575 CERTIFIED 8-17-2012  
STANDARD ACCURACY: .1% INDICATED READING

<u>DATA:</u>	PSI	AS FOUND		AS LEFT		
	UP	DOWN	ERROR	UP	DOWN	ERROR
PRESSURE						
300	300	300				
600	598	600				
900	897	898				
1200	1197	1198				
1500	1496	1497				
1800	1796	1797				
2100	2096	2096				
2400	2397	2397				
2700	2697	2697				
3000	2999	2999				



ALL STANDARDS USED ARE TRACEABLE TO NIST

THIS DOCUMENT MAY NOT BE REPRODUCED EXCEPT IN ITS ENTIRETY WITHOUT THE WRITTEN APPROVAL OF B&B INSTRUMENTS





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**Baker Atlas**

January 28, 2013

**Baker Atlas**  
930 S. West Street  
Olney, Illinois 62450  
Tel (618) 393 - 2919  
Fax (618) 395 - 7872

To whom it may concern:

Jeff Uhlmann  
District Manager  
Northeast District

On this date I performed the in house tool calibrations on the following series 2120 Temperature tools, below are my findings. Tools were checked using our standard calibration procedures. Performed by Mike Bailey Electronic tech.

80 Degrees = 800 Hz. + or – 5%  
300 Degrees = 3000 Hz. = or – 5%

Tool Serial Number 50033 (2120)

Low end 800 Hz. Frequency Which equals 80 Degrees F. check = 806.5Hz.

High end 3000 Hz. Frequency Which equals 300 degrees F. check = 3012.0 Hz.

Tool Serial Number 361252 (2120)

Low end 800 Hz. Frequency Which equals 80 Degrees F. check = 799.6 Hz.

High end 3000 Hz. Frequency Which equals 300 degrees F. check = 3004.3 Hz.

Tool Serial Number 68732 (2142)


Low end 800 Hz Frequency Which equals 80 Degrees F. check = 800.0 Hz. .

High end 3000 Hz Frequency Which equals 300 degrees F. check = 3003.2 Hz

Jeff Uhlmann

**ATTACHMENT D**  
**TEMPERATURE LOG**

# REFER TO CD

		<h2 style="margin: 0;">Differential Temperature Gamma Ray</h2>	
<h3 style="margin: 0;">Baker Atlas</h3>			
File No:	Company	<u>ENVIROMENTAL GEOTECH TECHNOLOGIES</u>	
	Well	<u>EGT 2-12</u>	
API No:	Field	<u>ROMULUS STORAGE</u>	
	County	<u>WAYNE</u>	State <u>MICHIGAN</u>
<b>THANK YOU!</b>	<b>Location</b> <u>1670' ESL &amp; 2372' EBL</u>  SEC <u>12</u> TWP <u>3S</u> RGE <u>9B</u>		Other Services <u>TRACER</u>
Permanent Datum	<u>G.L.</u>	Elevation	<u>626 ft</u>
Log Measured From	<u>K.B.</u>	<u>13 ft</u>	Above P. D.
Drill Measured From	<u>KELLY BUSHING</u>		
			Elevations KB <u>639 ft</u> DF <u>638 ft</u> GL <u>626 ft</u>

Date	<u>27-JUNE-2013</u>	
Run	<u>SUB</u>	
Service Order	<u>625736</u>	
Depth Driller	<u>4550 ft</u>	
Depth Logger	<u>4181 ft</u>	
Bottom Logged Interval	<u>4180 ft</u>	
Top Logged Interval	<u>0 ft</u>	
Time Started	<u>09:00</u>	
Time Finished	<u>12:30</u>	
Operator Rig Time	<u>PRODUCTION LOGGER</u>	
Type of Fluid In Hole	<u>WATER</u>	
Fluid Density	<u>N/A</u>	
Salinity	<u>N/A</u>	
Fluid Level	<u>INJECTION</u>	
Logged Cement Top	<u>N/A</u>	
Wellhead Pressure	<u>0 psi</u>	
Maximum Hole Deviation	<u>N/A</u>	
Nominal Logging Speed	<u>30 fpm</u>	
Maximum Recorded Temperature	<u>86 degF</u>	
Reference Log	<u>TRMP</u>	
Reference Log Date	<u>16-JAN-2013</u>	
Equipment No.	Location	<u>9747</u> <u>OLNEY, IL</u>
Recorded By	<u>JERRY GINDER</u>	
Witnessed By	<u>MR. SCHILDHOUSE</u>	<u>MR. STEVE ROY (RPA)</u>



Baker Atlas



File No: \_\_\_\_\_ Company: ENVIRONMENTAL GEOTECH TECHNOLOGIES  
 Well: EGT 2-12  
 Field: ROMULUS STORAGE  
 County: WAYNE State: MICHIGAN

Location: 1670'FSL & 2372'FEL  
 Other Services: TRACER

THANK YOU!  
 SEC 12 TWP 3S RGE 9E

Permanent Datum: G.L. \_\_\_\_\_ Elevation: 626 ft  
 Log Measured From: K.B. \_\_\_\_\_ 13 ft Above P. D.  
 Drill Measured From: KELLY BUSHING  
 Elevations: KB 639 ft, DF 638 ft, GL 626 ft

Date	27-JUNE-2013
Run	SUB
Service Order	625736
Depth Driller	4550 ft
Depth Logger	4181 ft
Bottom Logged Interval	4180 ft
Top Logged Interval	0 ft
Time Started	09:00
Time Finished	12:30
Operator Rig Time	PRODUCTION LOGGER
Type of Fluid in Hole	WATER
Fluid Density	N/A
Salinity	N/A
Fluid Level	INJECTION
Logged Cement Top	N/A
Wellhead Pressure	0 psi
Maximum Hole Deviation	N/A
Nominal Logging Speed	30 fpm
Maximum Recorded Temperature	86 degF
Reference Log	TEMP
Reference Log Date	16-JAN-2013
Equipment No.	9747
Location	OLNEY, IL
Recorded By	JERRY GINDER
Witnessed By	MR. SCHILDHOUSE
	MR. STEVE ROY (EPA)

- FOLD HERE

In making interpretations of logs, our employees will give the customer the benefit of their best judgement. But since all interpretations are opinions based on inferences from electrical or other measurements, we cannot, and we do not guarantee the accuracy or correctness of any interpretation. We shall not be liable or responsible for any loss, cost, damages, or expenses whatsoever incurred or sustained by the customer resulting from any interpretation made by any of our employees.

Bit Size	From	To

Size	Weight	Grade	From	To
16 in	65 lbm/ft		0 ft	178 ft
13.375 in	48 lbm/ft	H-40	0 ft	598 ft
9.625 in	36 lbm/ft		0 ft	1444 ft
7 in	26 lbm/ft		0 ft	3983 ft
4.5 in		FGL	0 ft	3953 ft

Remarks  
 BAKER HUGHES CREW: C.BREWER  
 WELL HEAD CONNECTION 2" 11V  
 HIGH GAMMA COUNTS ON BUCKET TEST DUE TO RESIDUAL IN LUBRICATOR

Equipment Data

Run	Trip	Tool	Series Number	Serial Number	Position
1	1	GR	1311XA	52665	FREE
1	1	TEMP	2120XA	50033	FREE

# BUCKET TEST ICE WATER

TOOL = 40.6 DEG

THERM = 49.0 DEG

## DEPTH OFFSETS

(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
		NAME	TYPE
2321NA	-8.000	CCL	ACCL
1311XA	-2.000	GR	GRBU
2121XA	0.000	TEMP	DTEM COMPOSIT
2421XA	0.000	NEU	
SYSTEM	0.000	TEN	TTEM

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

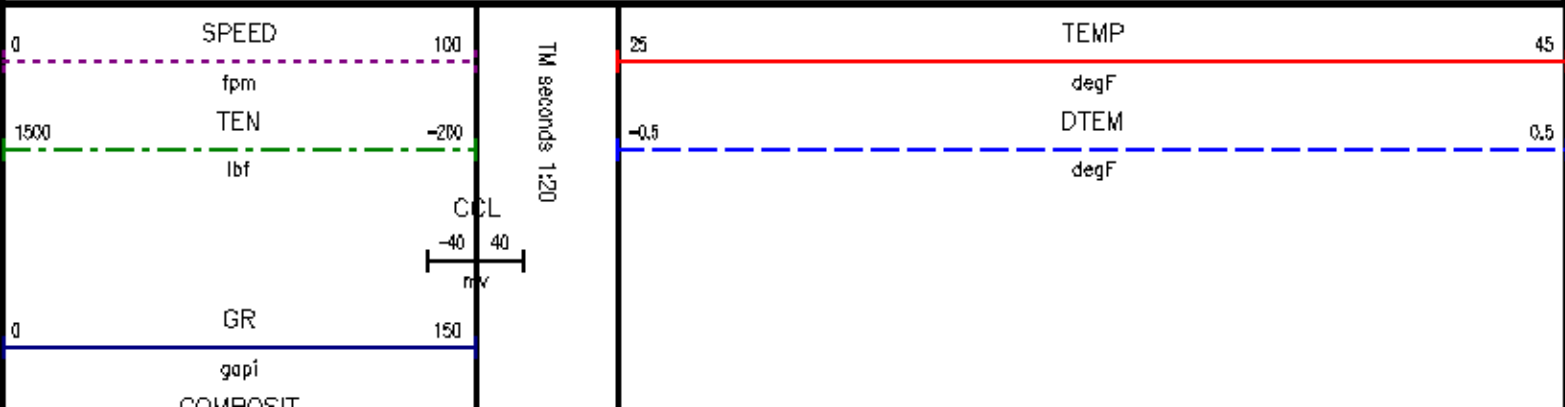
Well : 2-12

File Name : dz:\welldata\825736\temp00.xtf

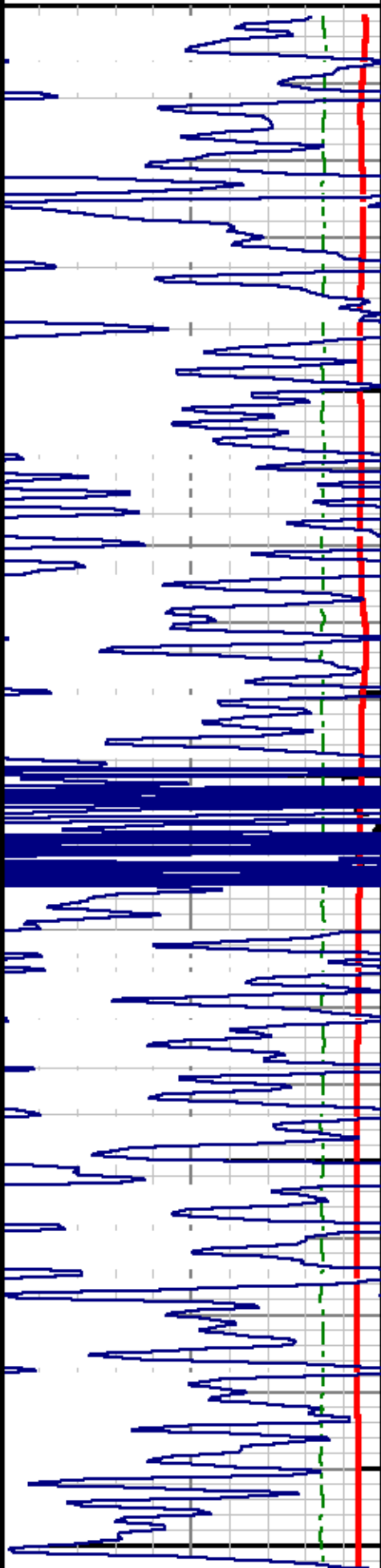
Mode : PlotMgr 5.4.504

Interval : 0 to 300

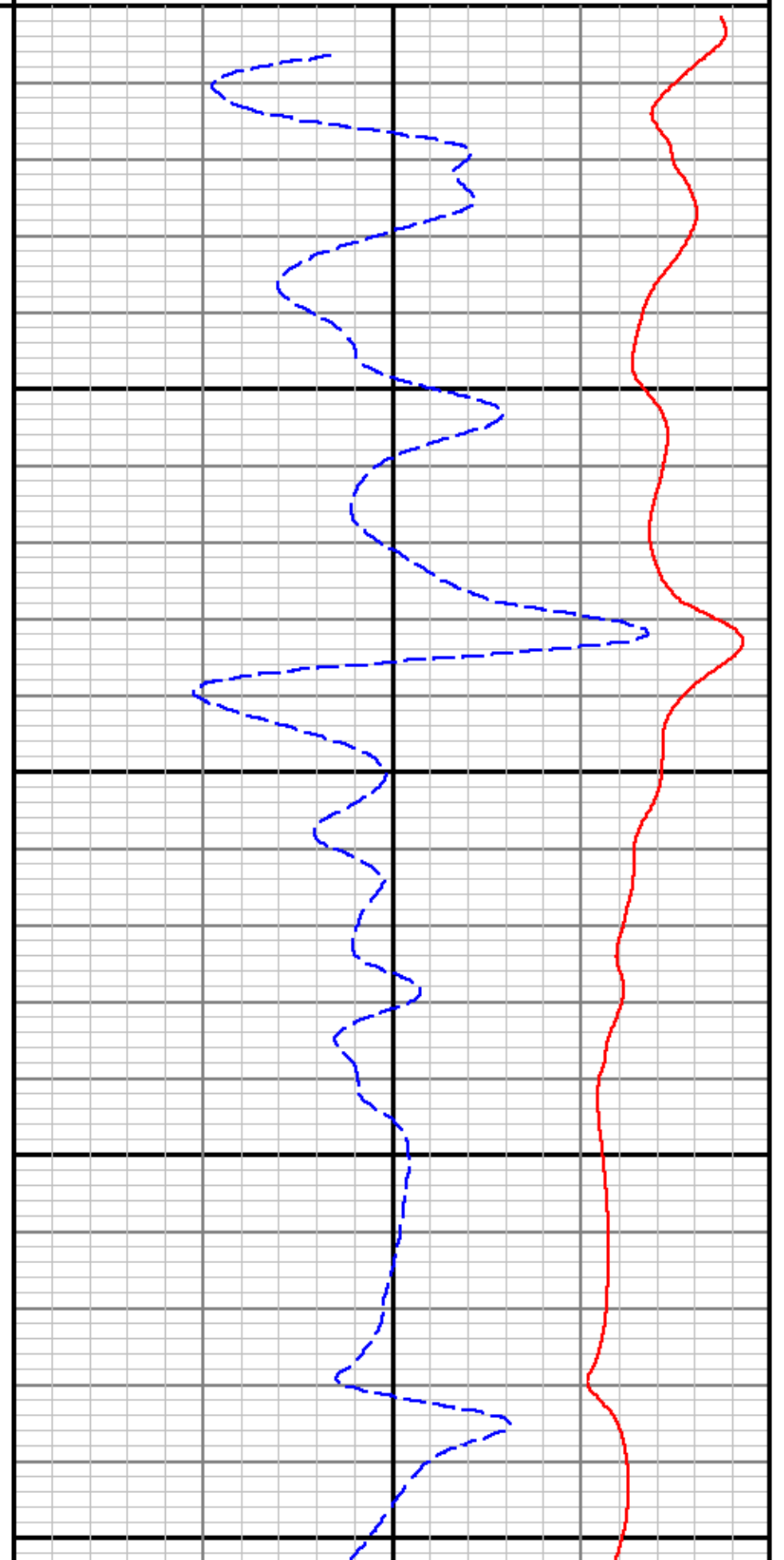
Created : 6/27/2013 8:42:52 AM



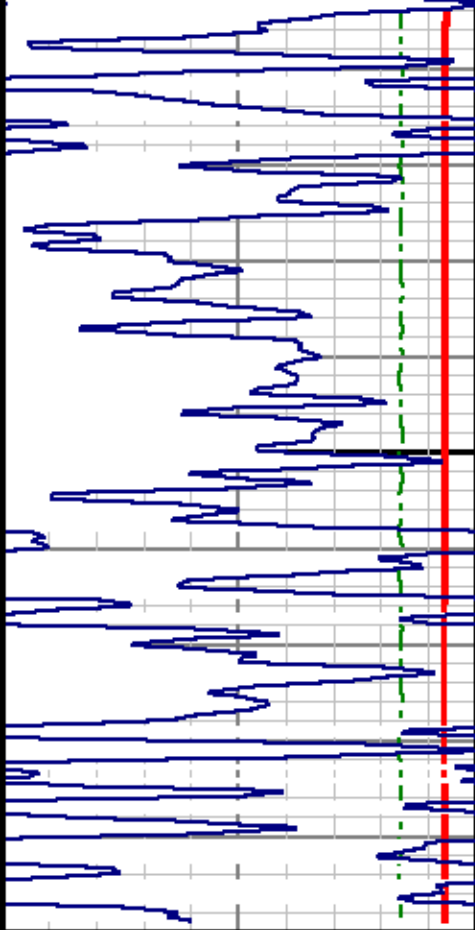
50 200  
degF  
GRBU  
150 300  
gapi



100 200







0	SPEED	100
	fpm	
1500	TEN	-200
	lbf	
	CCL	
	-40	40
	mv	
0	GR	180
	gapi	
50	COMPOSIT	200
	degF	
150	GRBU	300
	gapi	

TM seconds 1:20

26	TEMP	45
	degF	
-0.5	DTEM	0.5
	degF	

## *BUCKET TEST HOT WATER*

*TOOL = 131.8*

*THERM = 135.0*

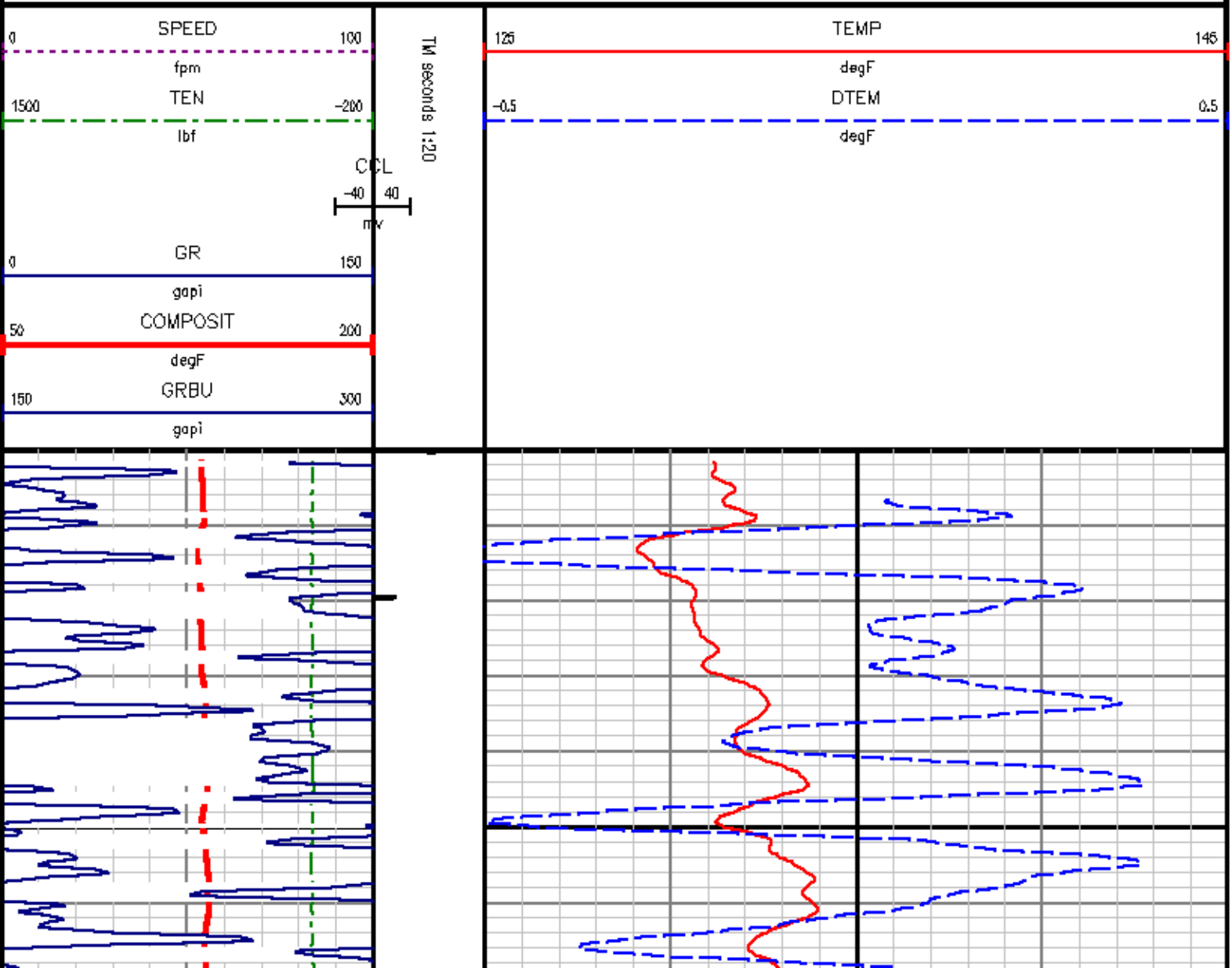
# DEPTH OFFSETS

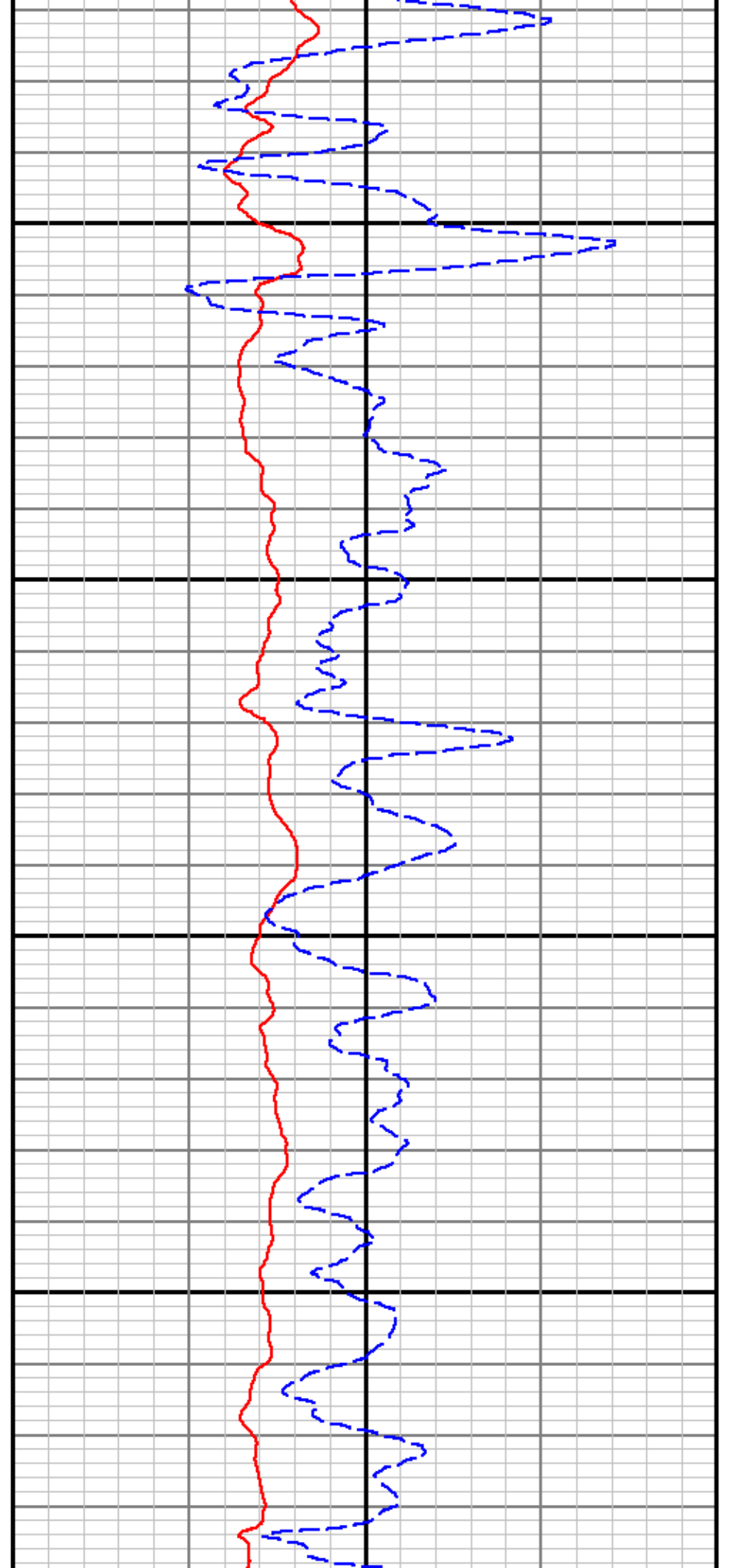
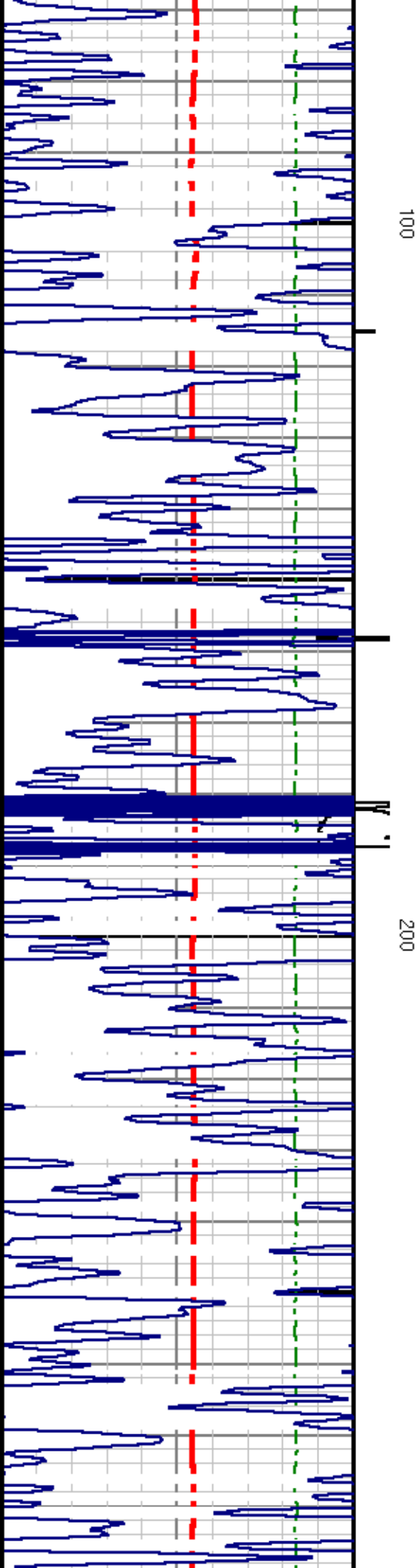
(for Acquired Curves)

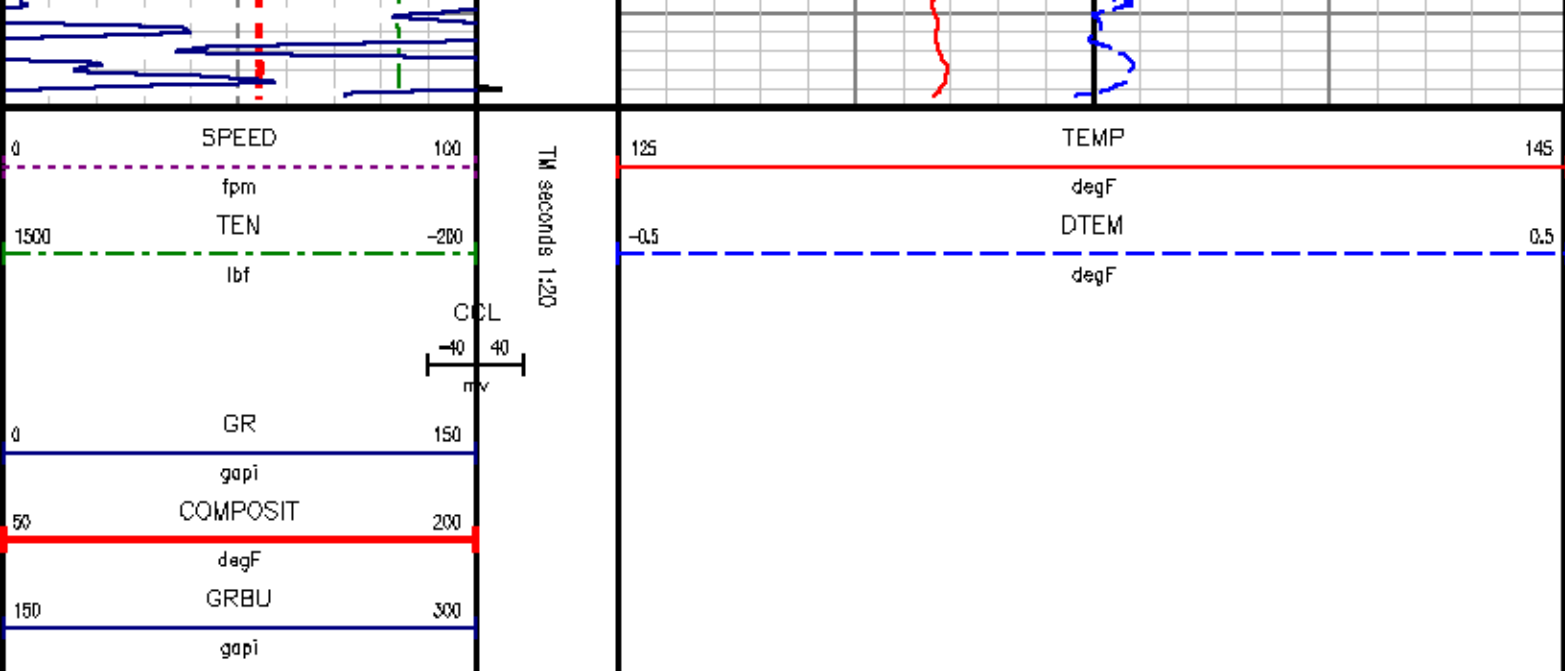
SERIES	DEPTH OFFSET	ACQUIRED CURVES		
2321NA	-8.000	CCL	ACCL	
1311XA	-2.000	GR	GRBU	
2121XA	0.000	TEMP	DTEM	COMPOSIT
2421XA	0.000	NEU		
SYSTEM	0.000	TEN	TTEN	

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504

Company : EGT  
 Well : 2-12  
 File Name : d:\well\data\625736\temp01.xtf  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 300  
 Created : 6/27/2013 8:50:33 AM





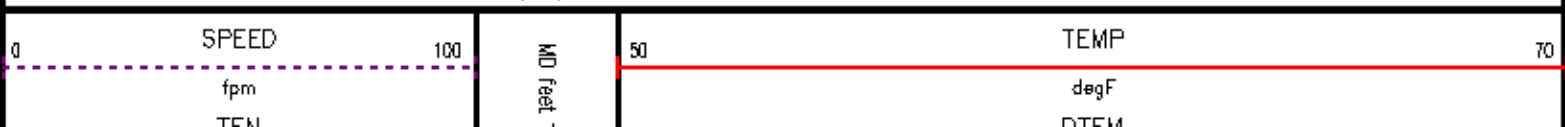


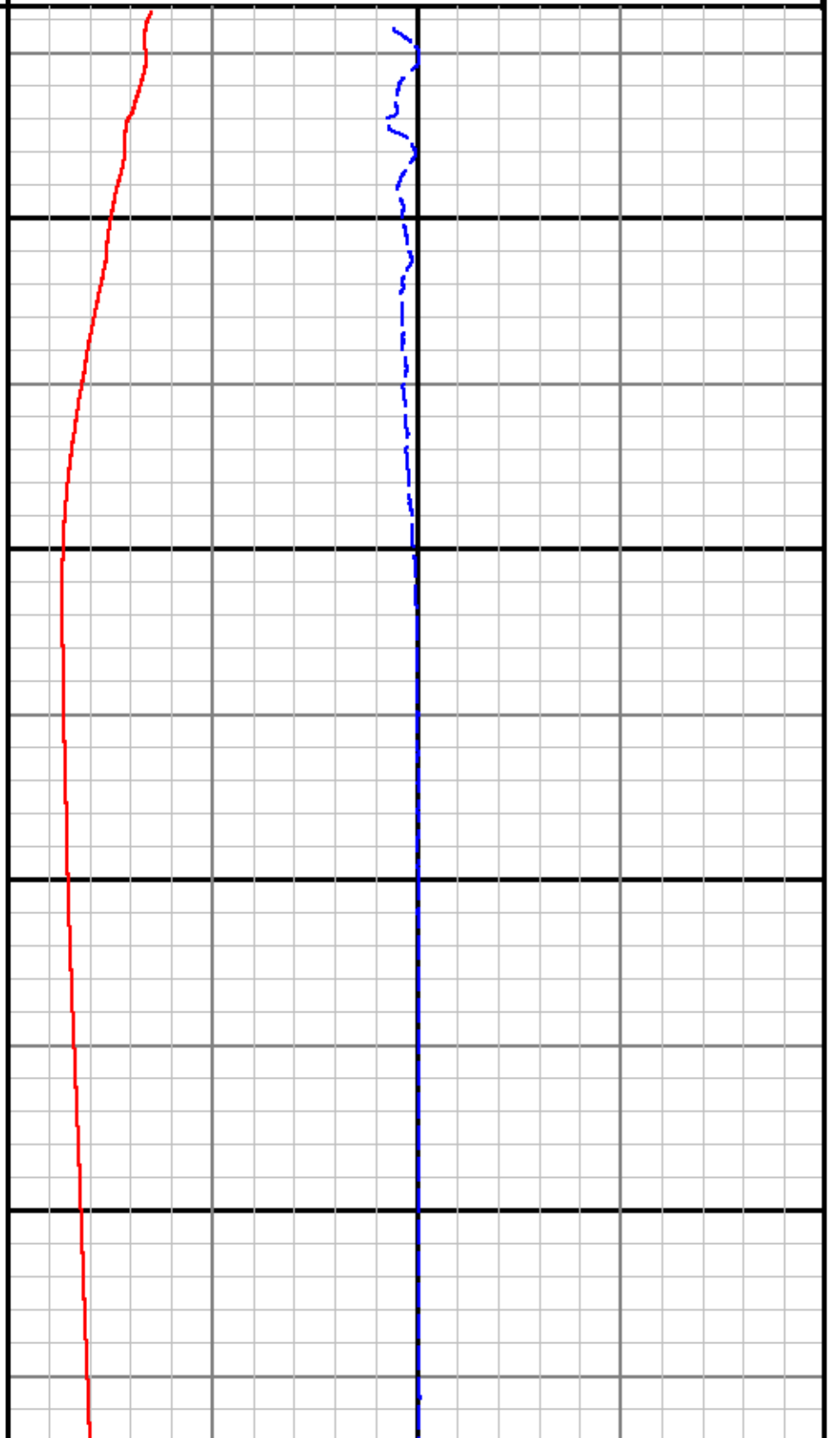
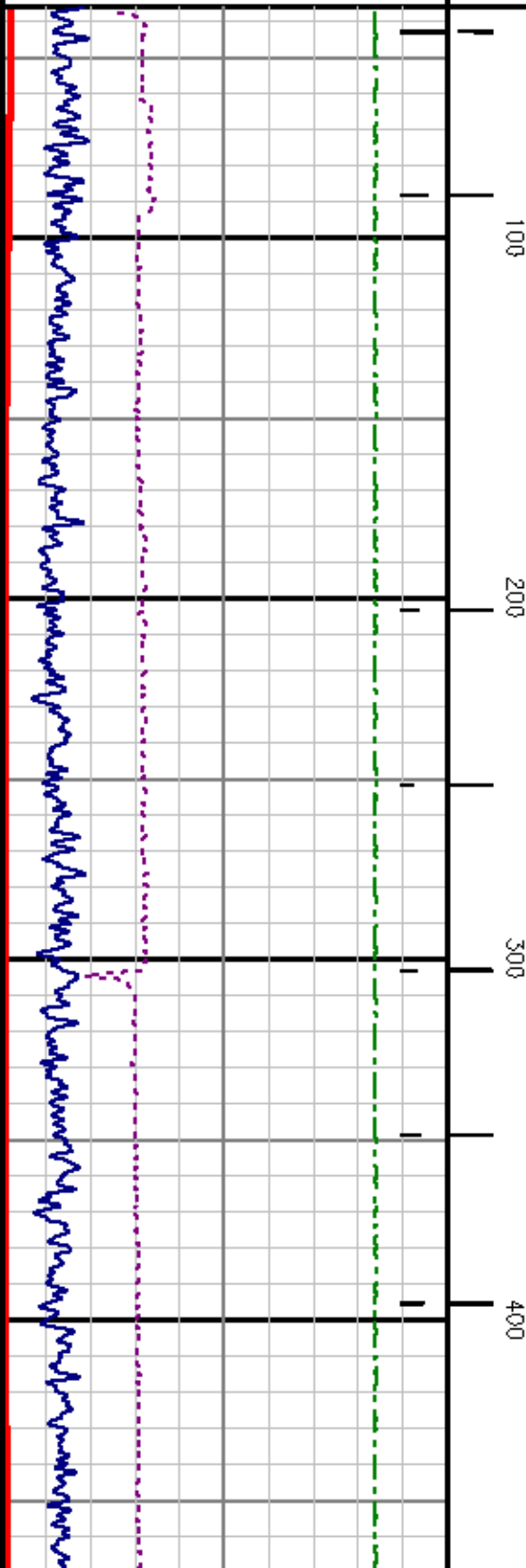
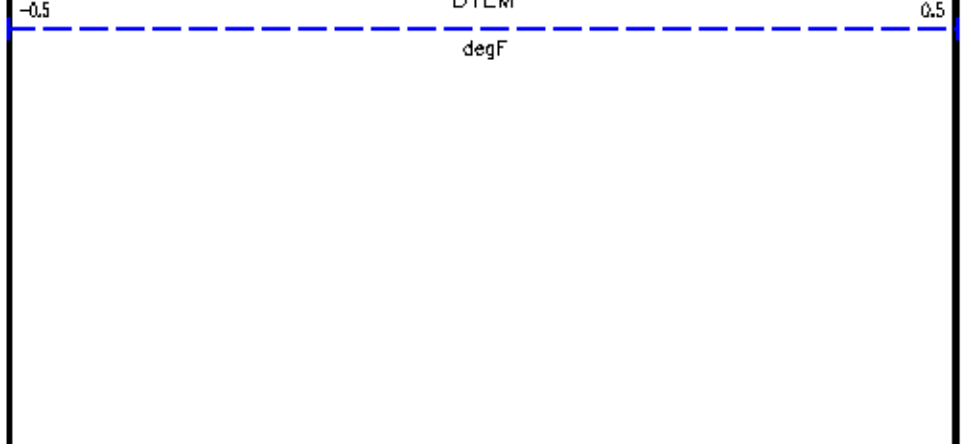
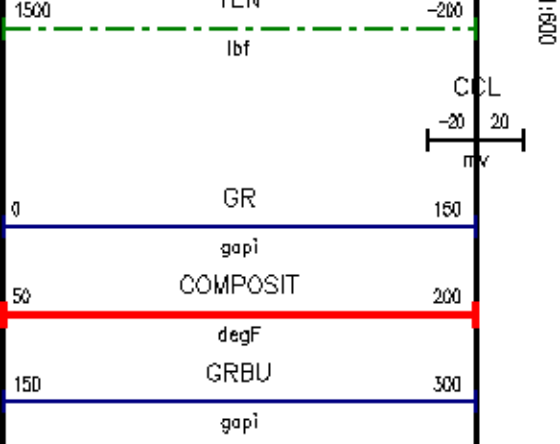
BASE TEMP PASS

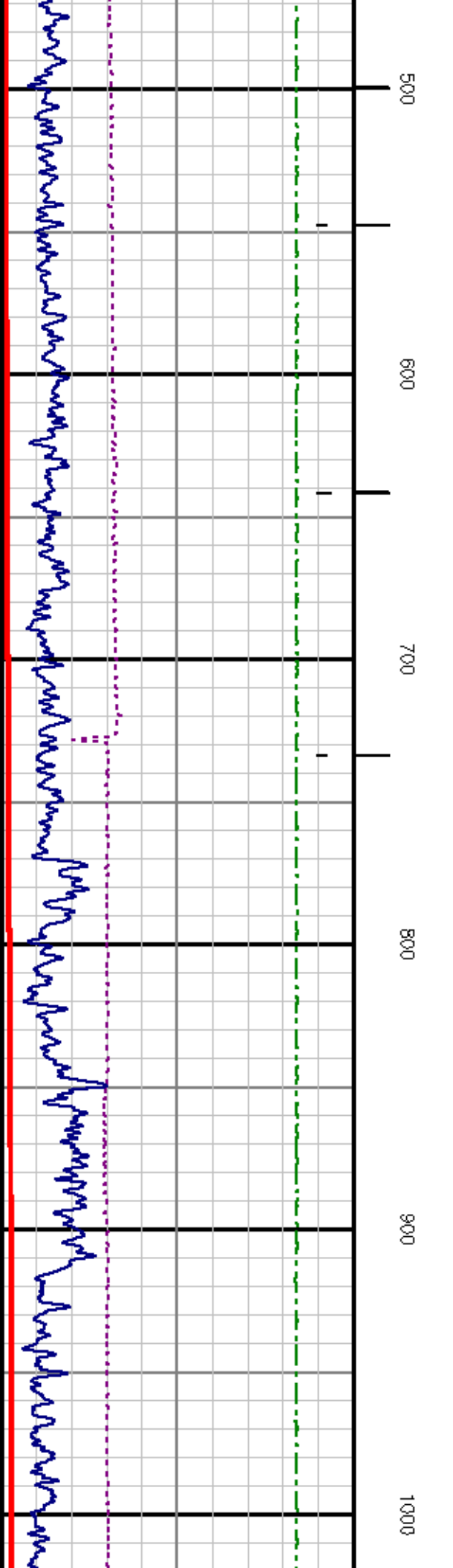
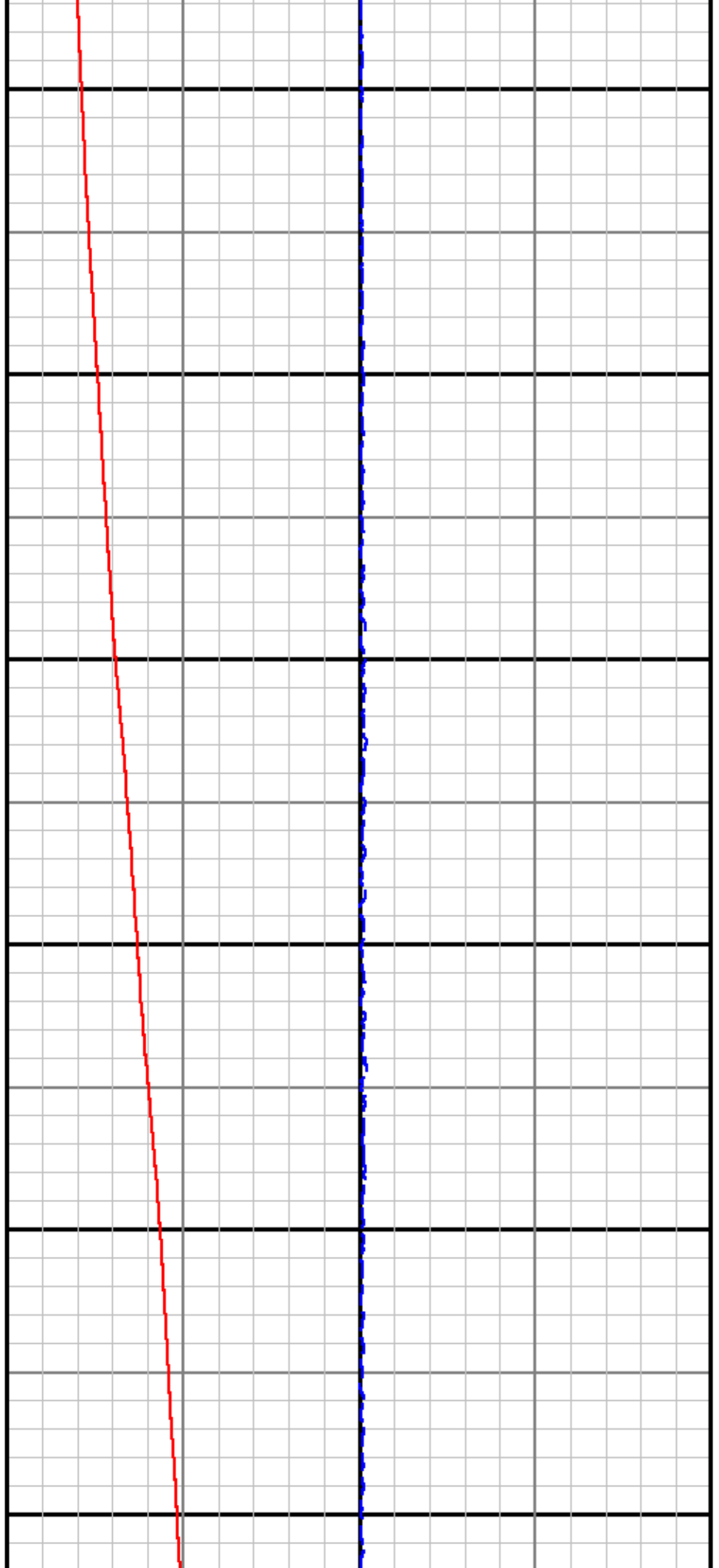
DEPTH OFFSETS  
(for Acquired Curves)

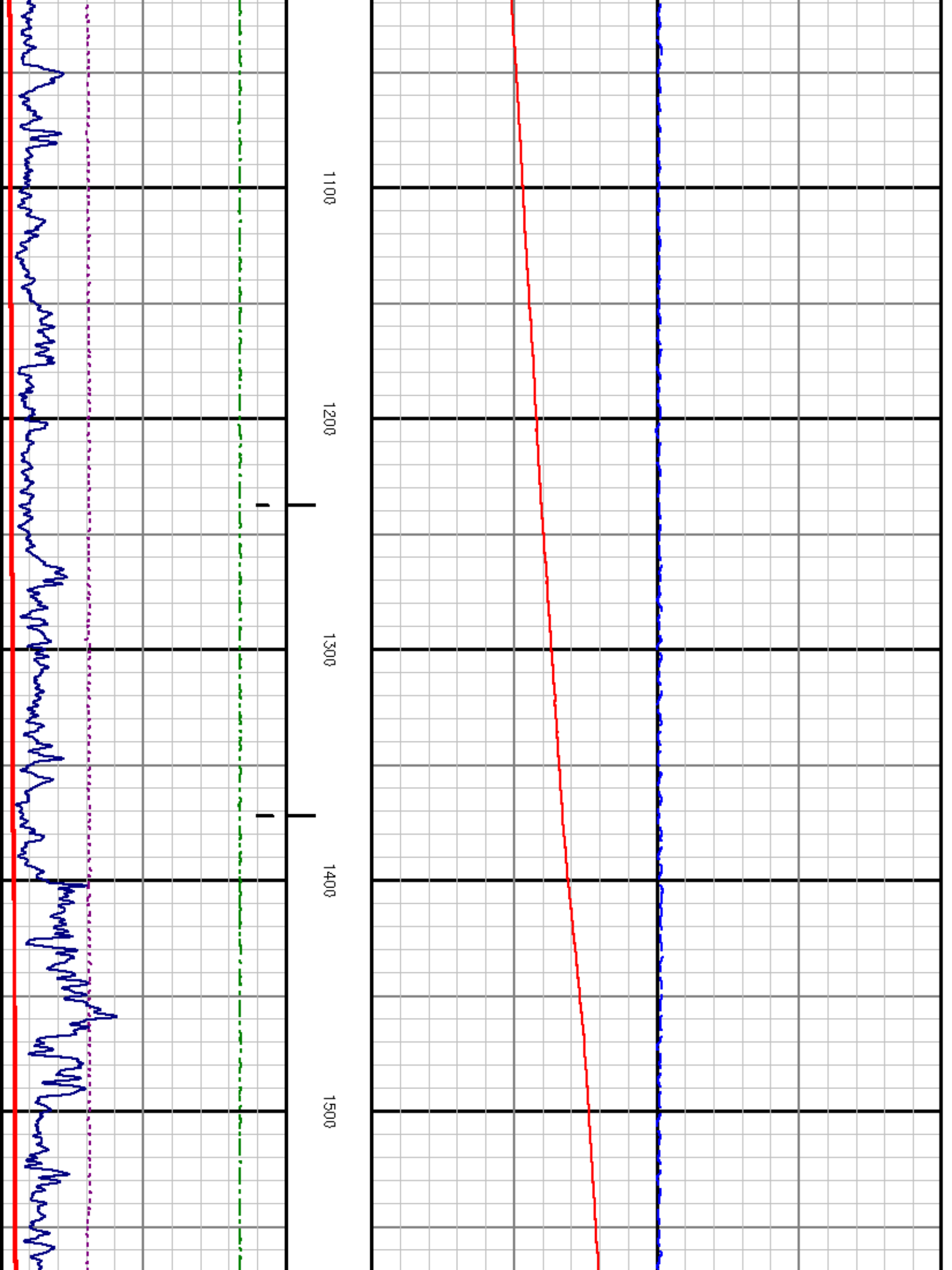
SERIES	DEPTH OFFSET	ACQUIRED CURVES
2321NA	-8.000	CCL ACCL
1311XA	-2.000	GR GRBU
2121XA	0.000	TEMP DTEM COMPOSIT
2421XA	0.000	NEU
SYSTEM	0.000	TEN TTEN

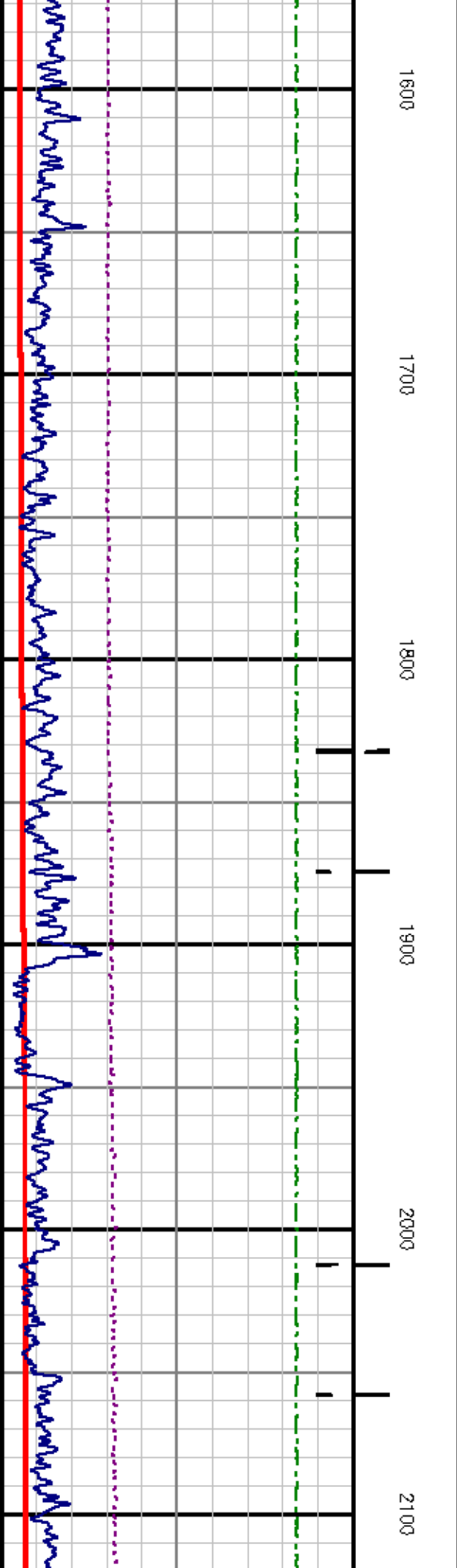
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP02.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 36.00 - 4196.00 feet DOWN  
 Created : 6/27/2013 9:16:23 AM



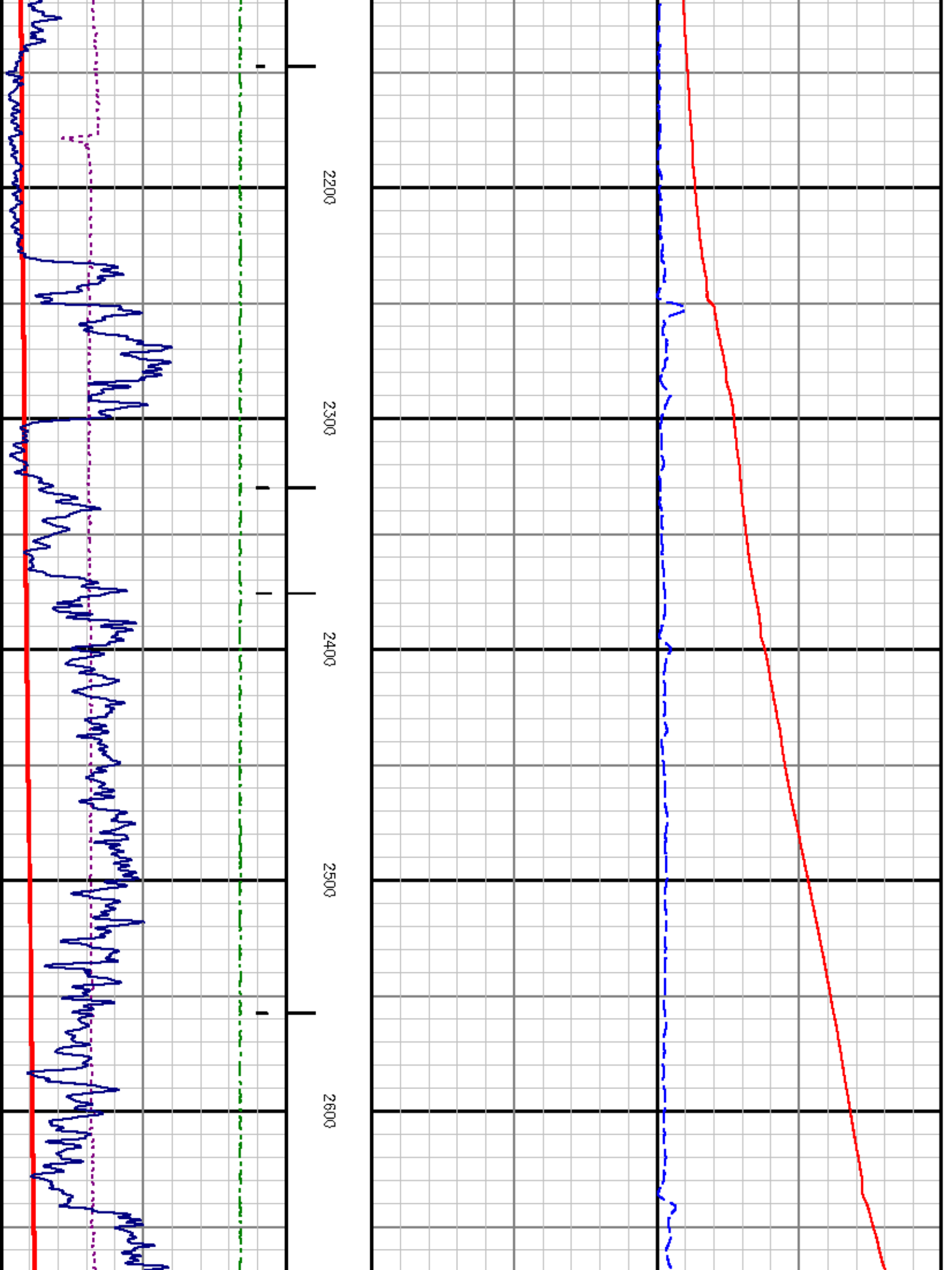


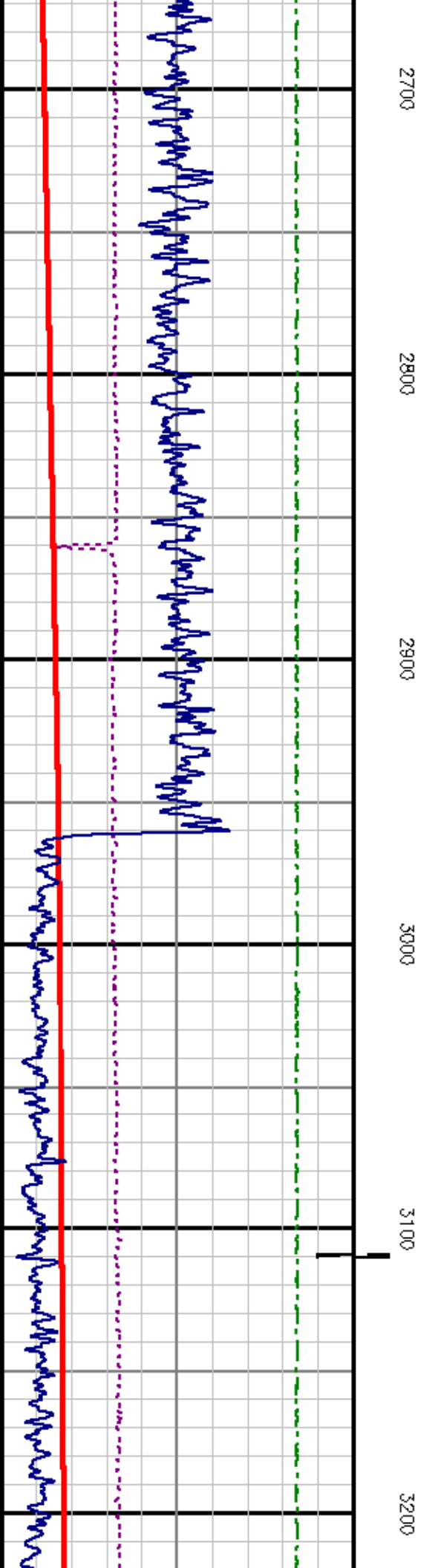
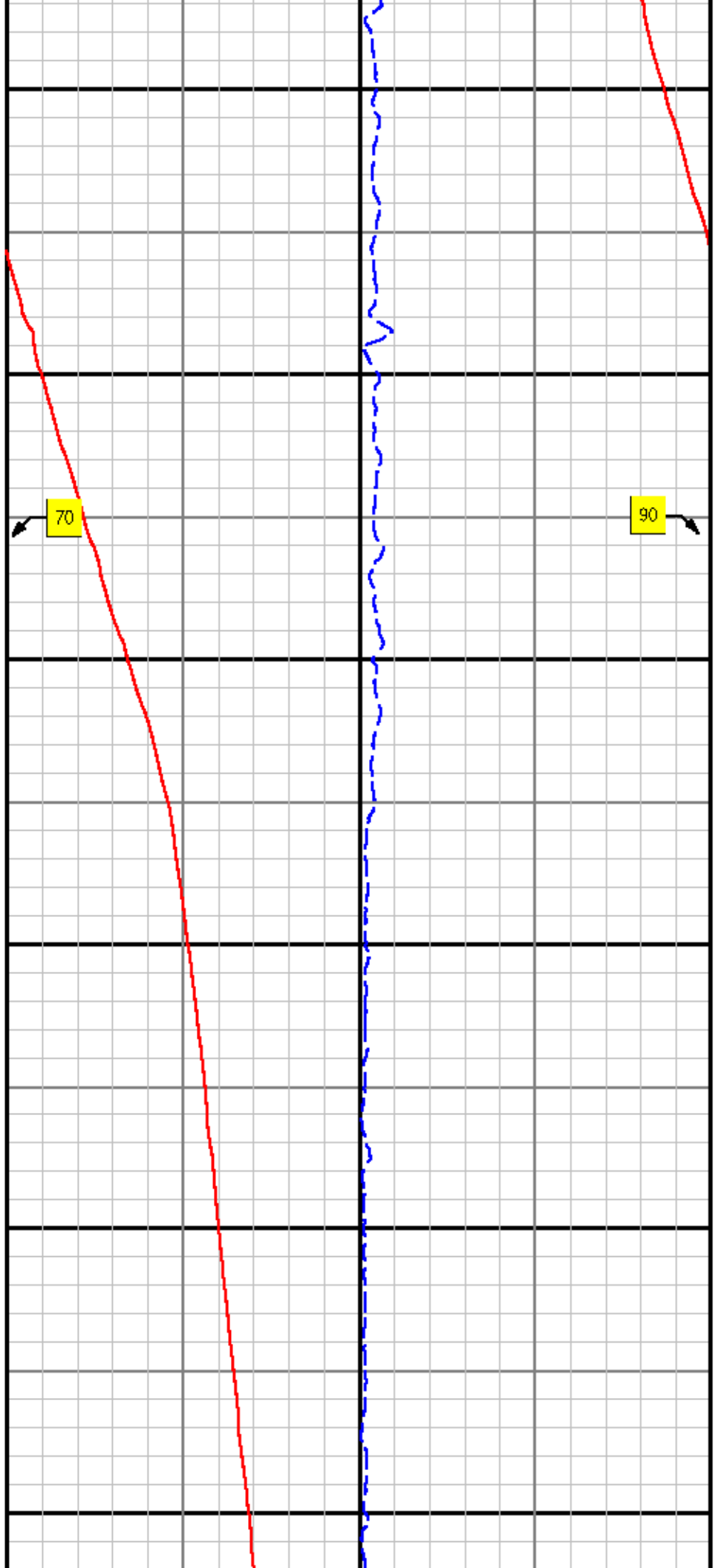


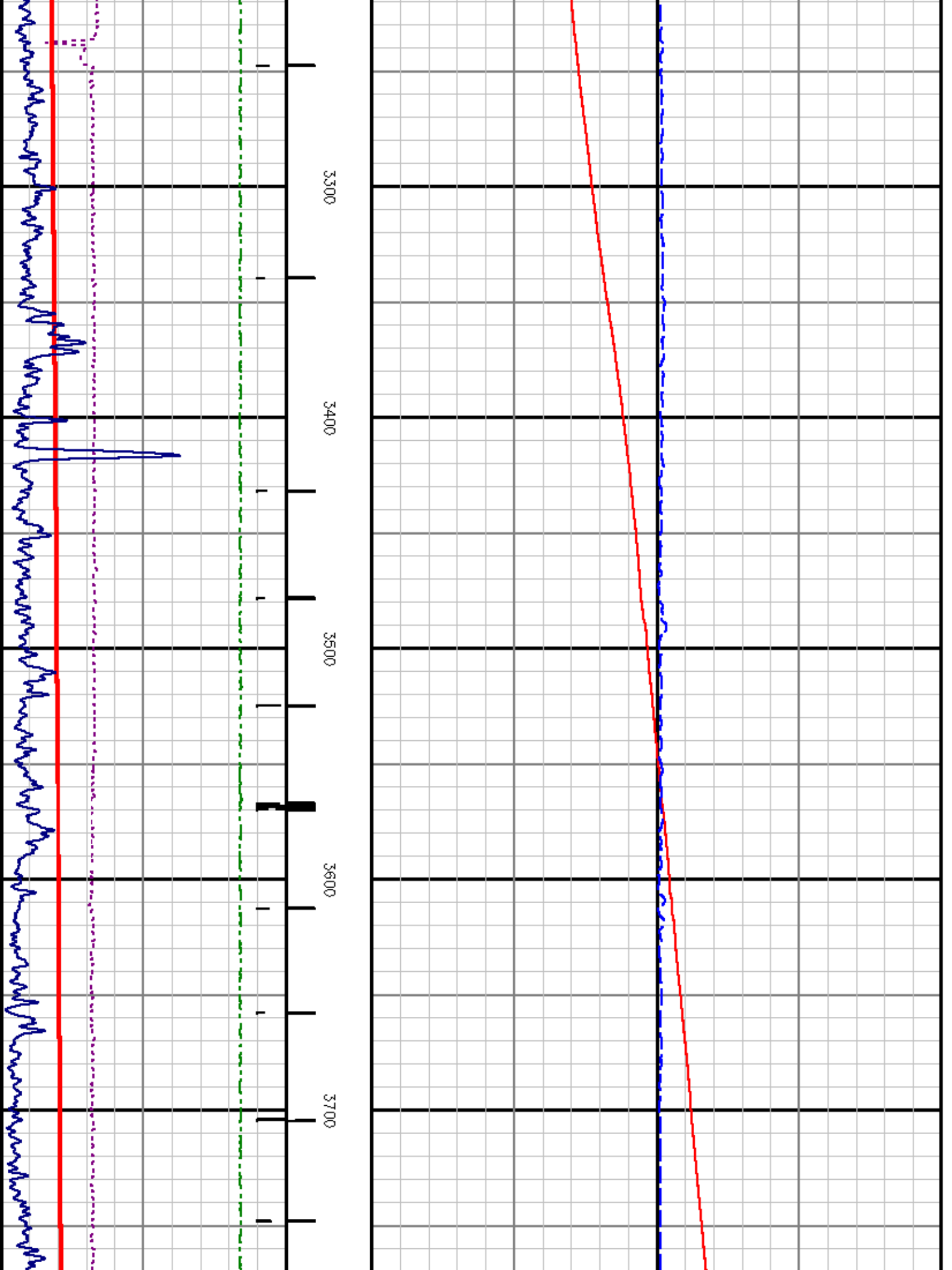


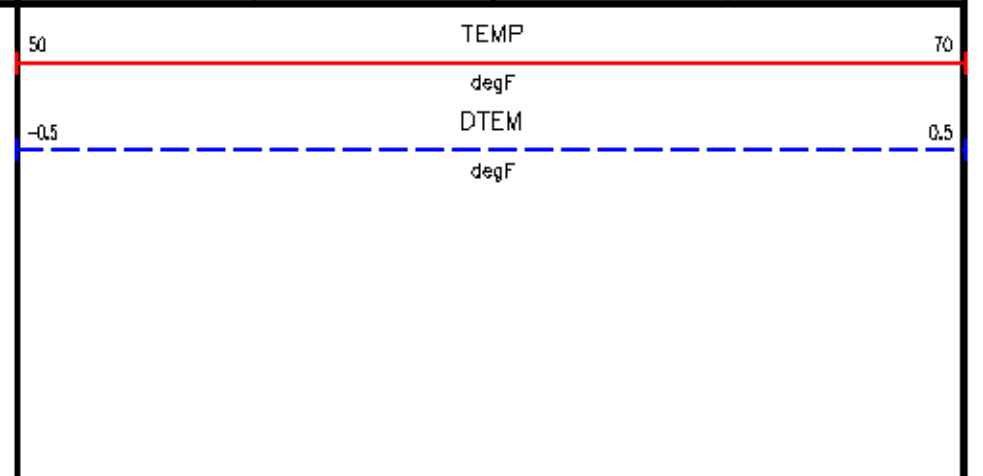
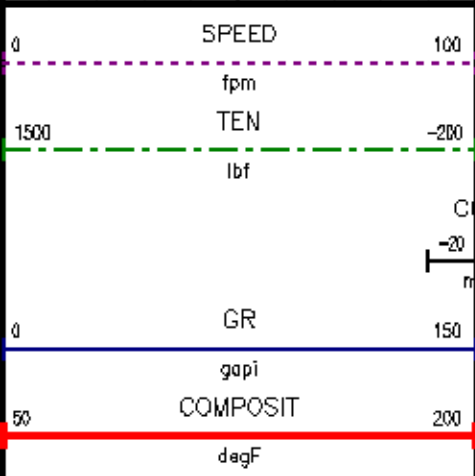
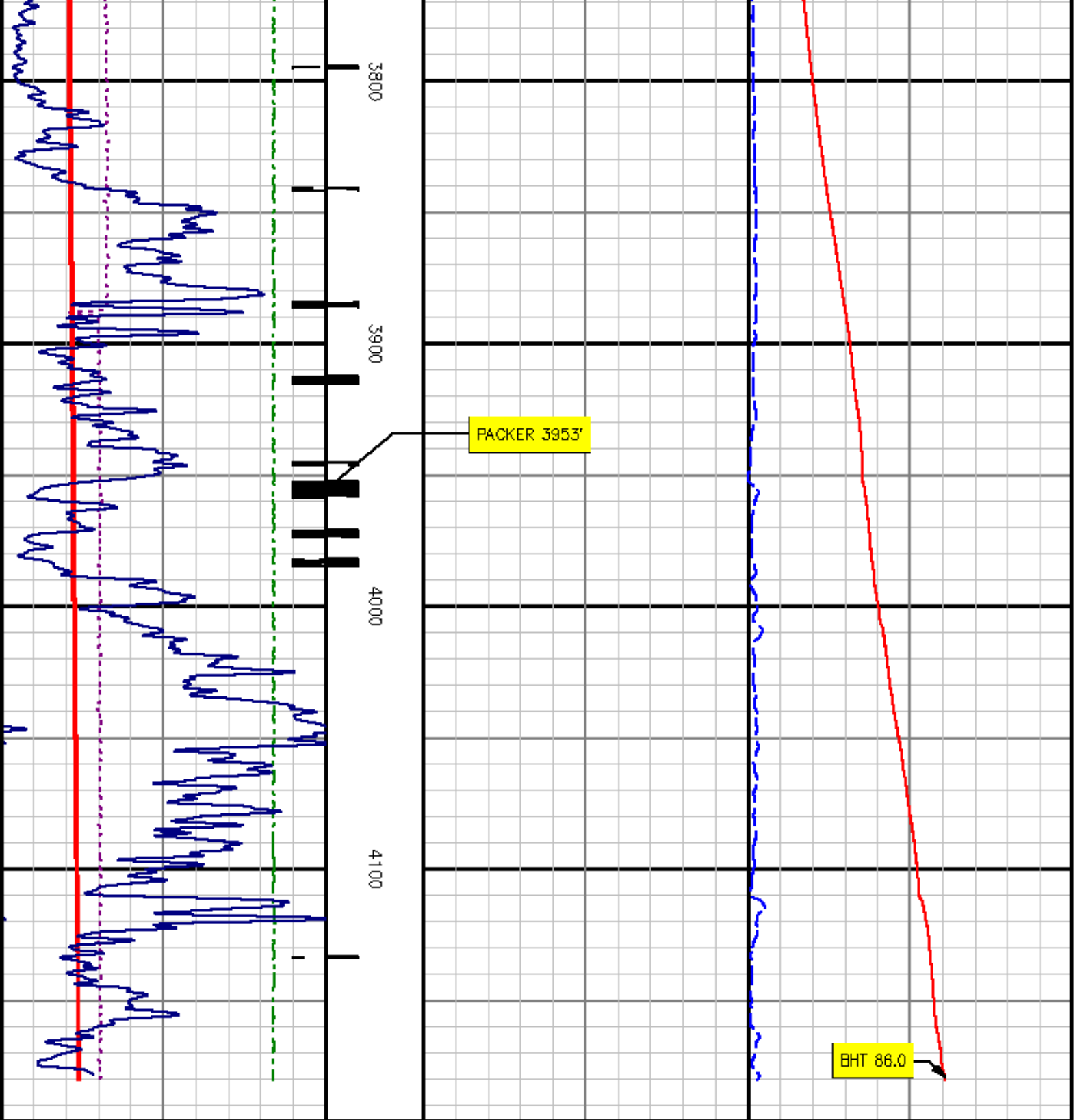












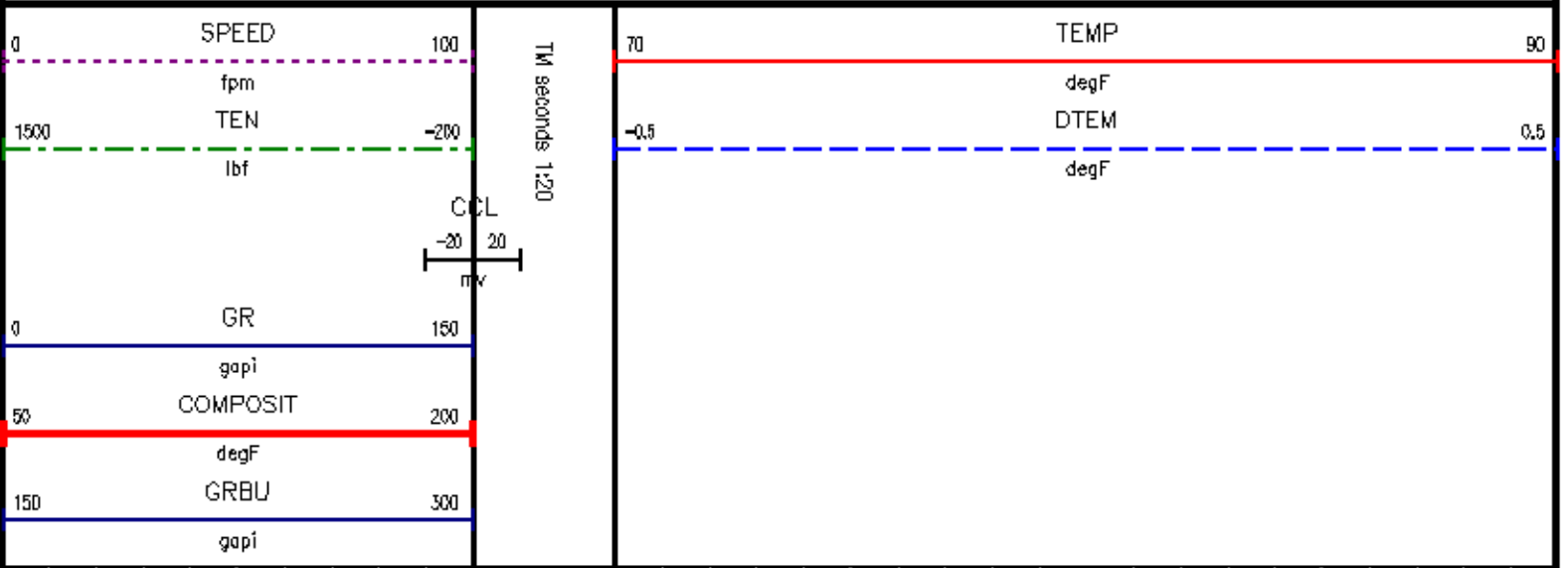
150	GRBU	300
	gapi	

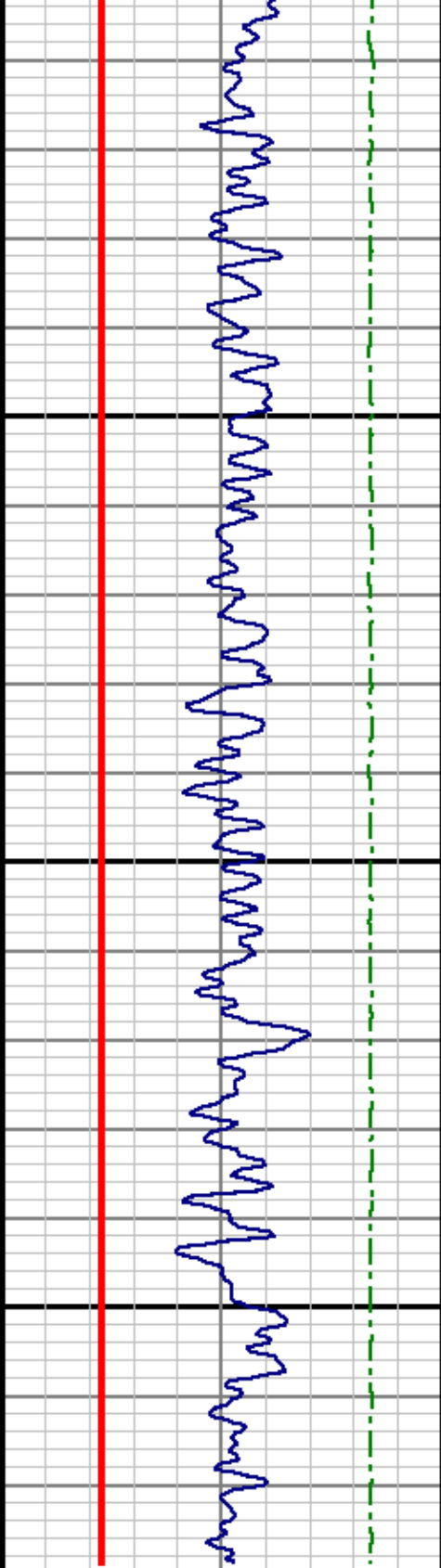
STAT CHECK 4000'  
5 MIN

DEPTH OFFSETS  
(for Acquired Curves)

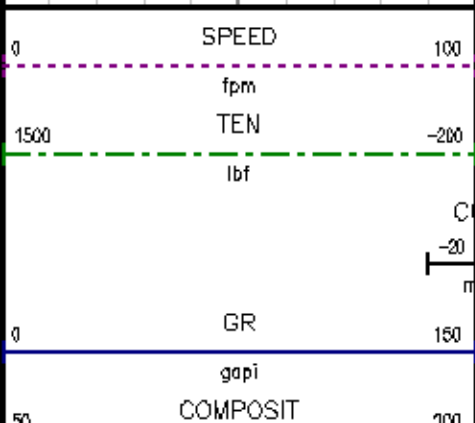
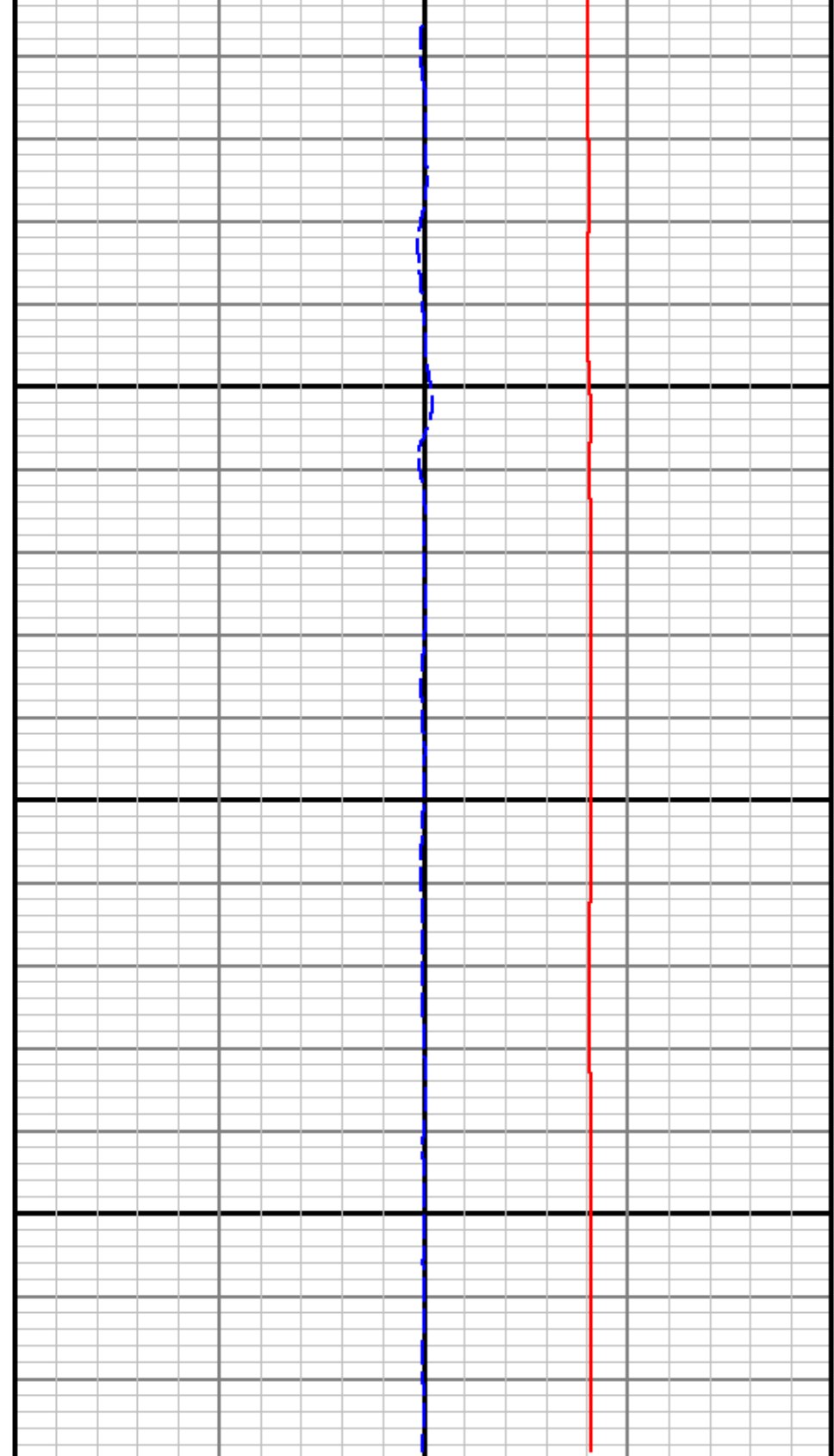
SERIES	DEPTH OFFSET	ACQUIRED CURVES		
2321NA	-8.000	CCL	ACCL	
1311XA	-2.000	GR	GRBU	
2121XA	0.000	TEMP	DTEM	COMPOSIT
2421XA	0.000	NEU		
SYSTEM	0.000	TEN	TTEN	

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP03.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 11:31:31 AM

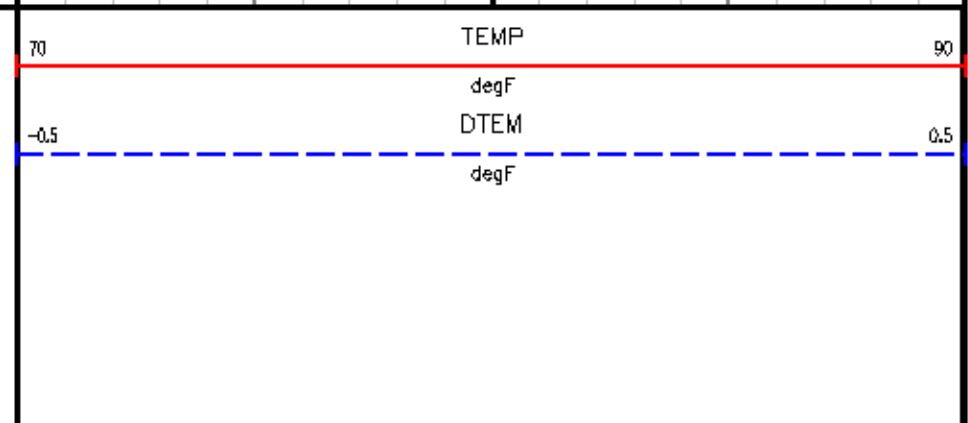




100



TM seconds 1:20



SPEED 0 100

fpm

TEN

lbf

CCL

-20 20

mv

GR 0 150

gapi

COMPOSIT 0 100

TEMP 70 90

degF

DTEM

degF

-0.5

0.5

150	degF	200
	GRBU	300
	gapi	

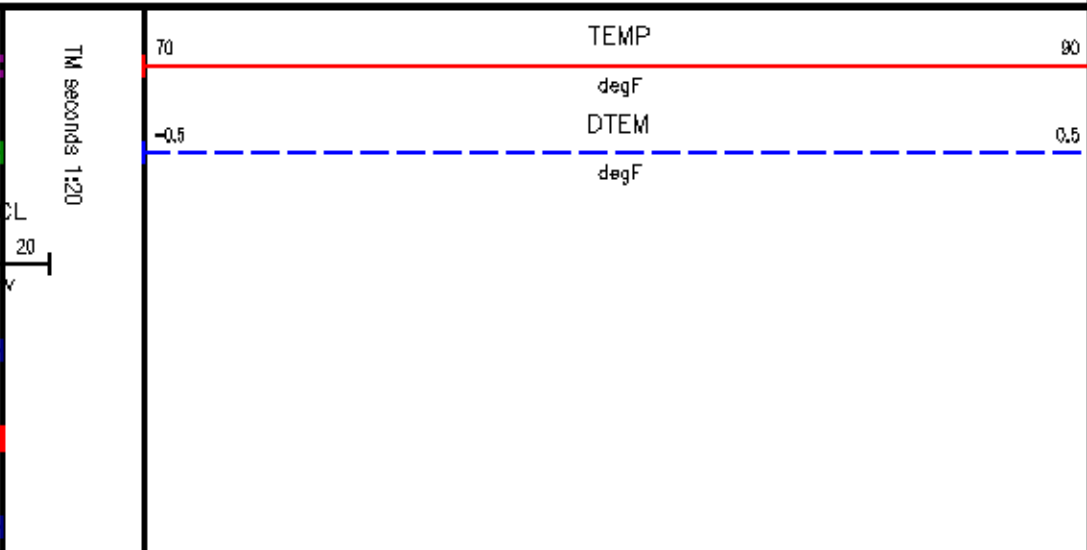
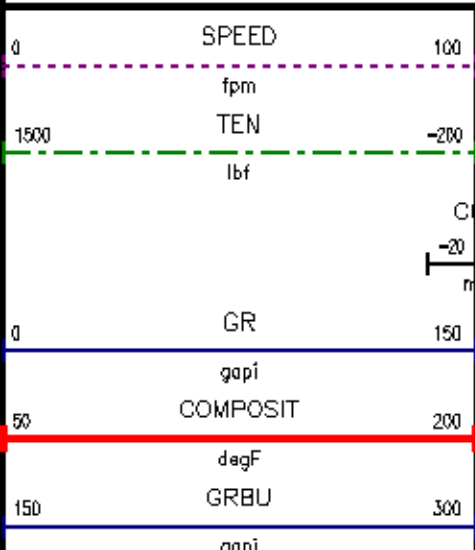
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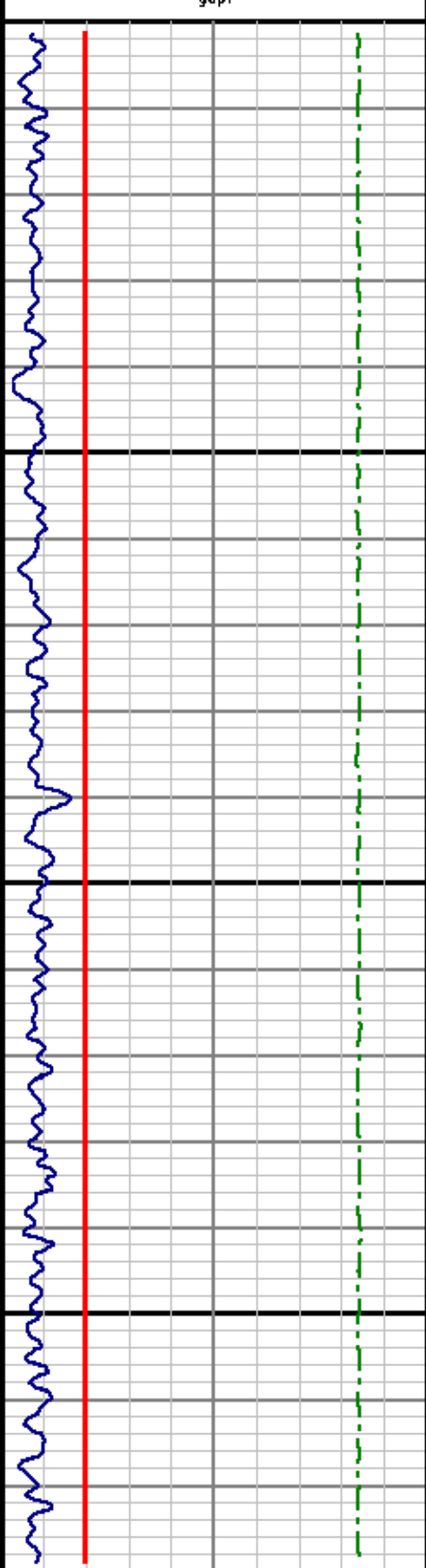
*STAT CHECK @ 3500'*  
*3 MIN*

DEPTH OFFSETS  
(for Acquired Curves)

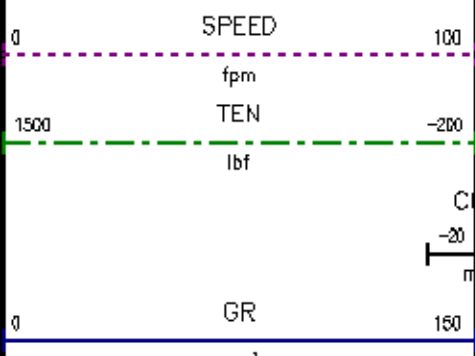
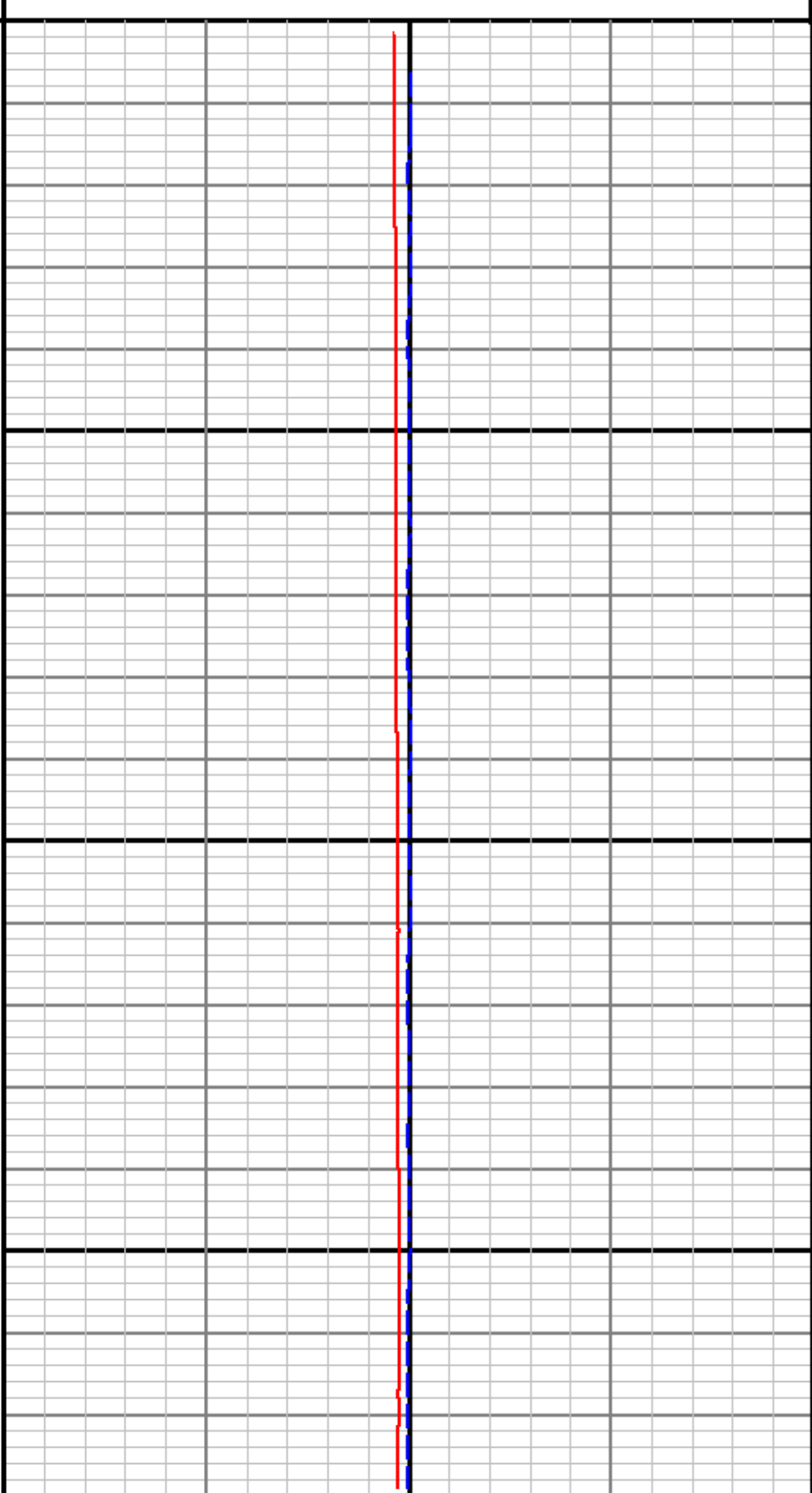
SERIES	DEPTH OFFSET	ACQUIRED CURVES
2321NA	-8.000	CCL ACCL
1311XA	-2.000	GR GRBU
2121XA	0.000	TEMP DTEM COMPOSIT
2421XA	0.000	NEU
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP04.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 11:38:28 AM

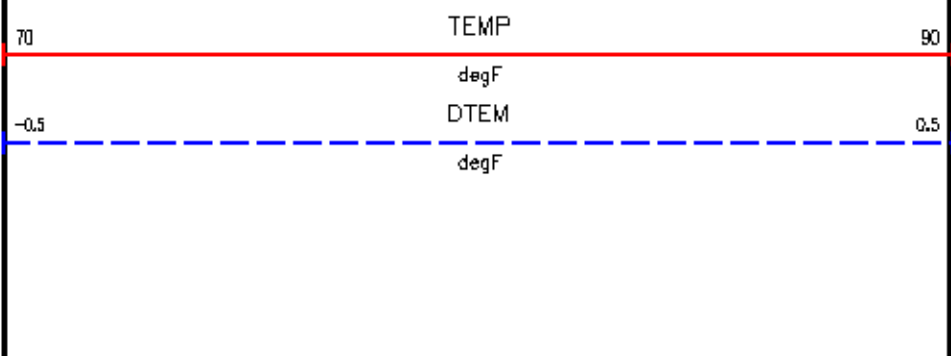




100



TM seconds 1:20





50	COMPOSIT	200
	degF	
150	GRBU	300
	gapi	

--	--	--

*STAT CHECK @ 3000'*  
*3 MIN*

DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2321NA	-8.000	CCL ACCL
1311XA	-2.000	GR GRBU
2121XA	0.000	TEMP DTEM COMPOSIT
2421XA	0.000	NEU
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

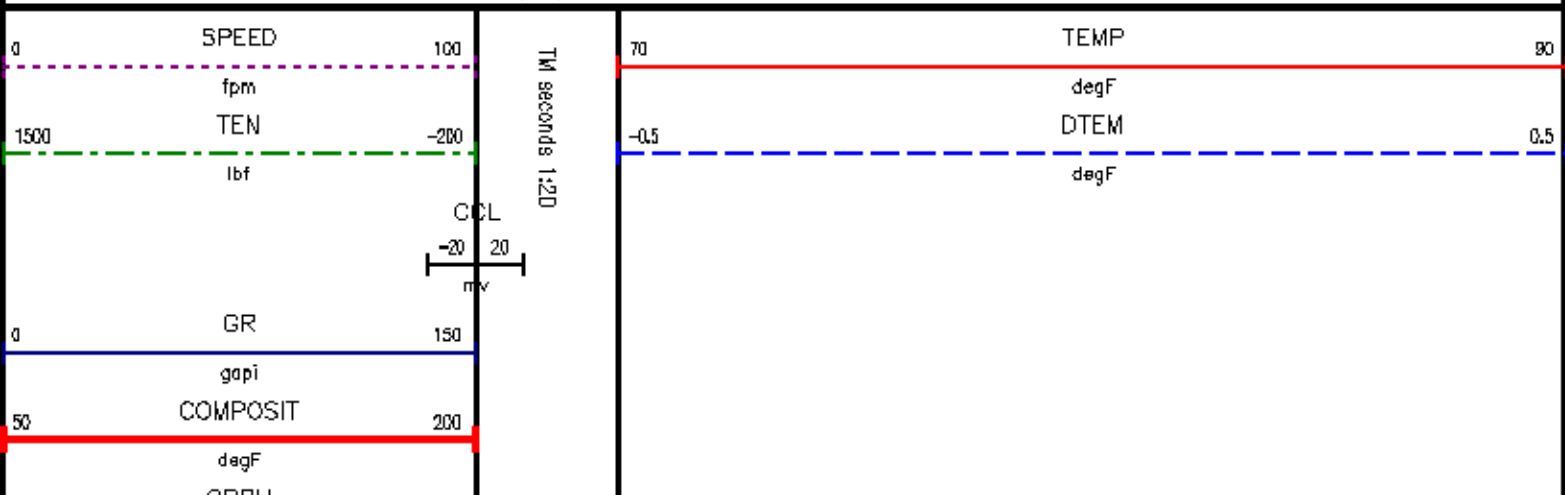
Well : 2-12

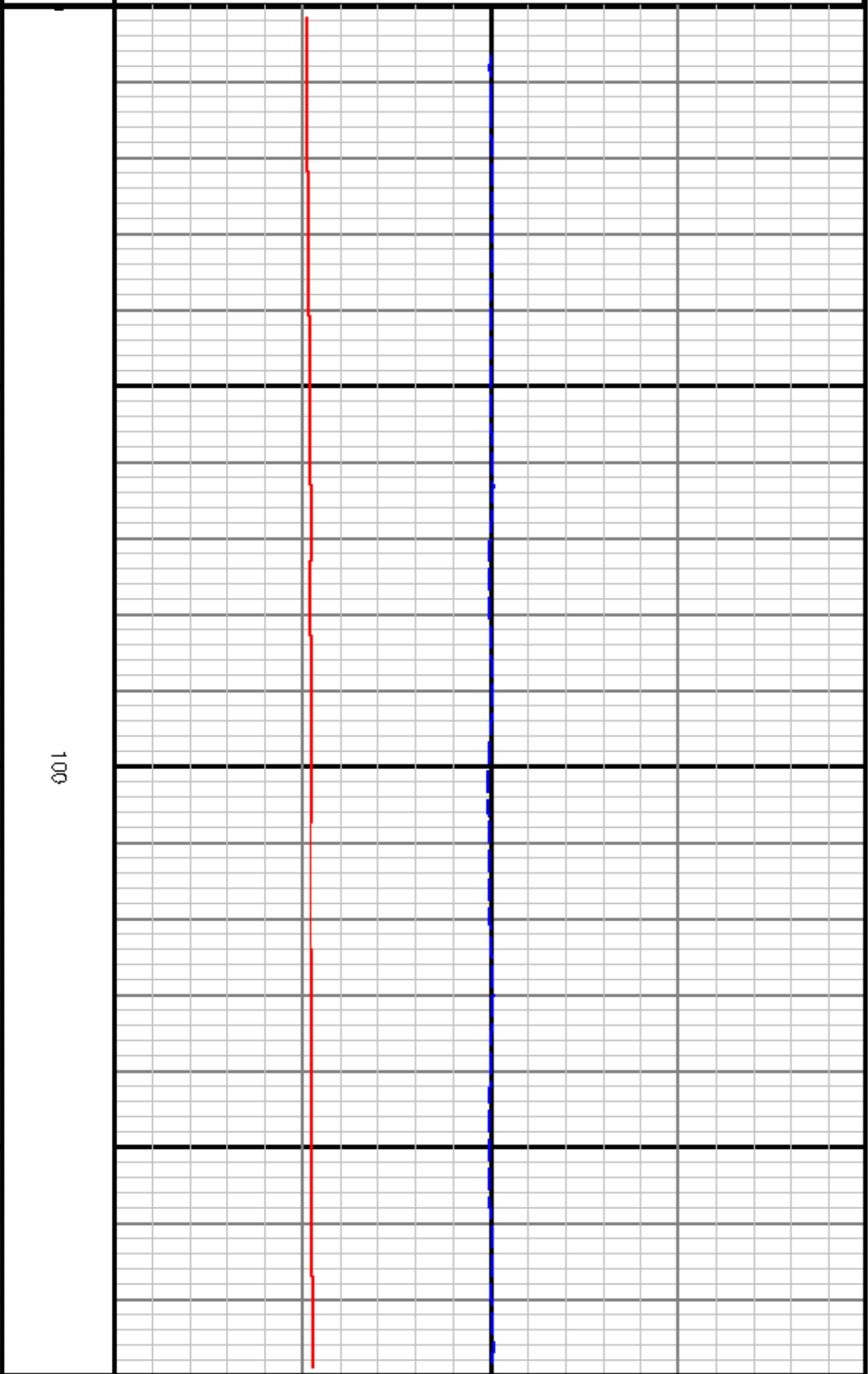
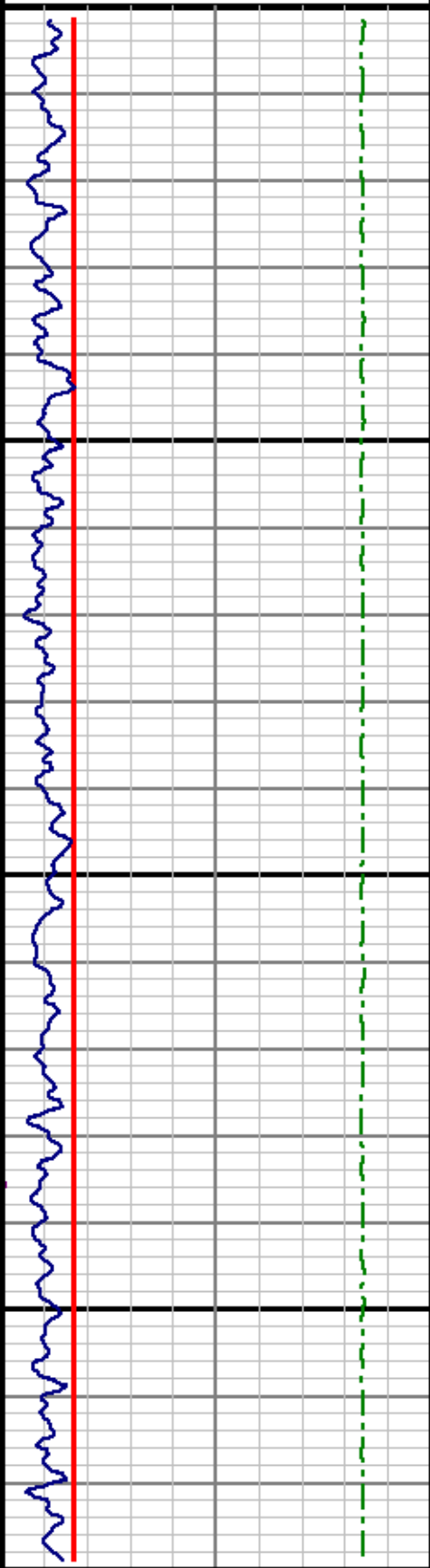
File Name : D:\WELLDATA\625736\TEMP05.XTF

Mode : PlotMgr 5.4.504

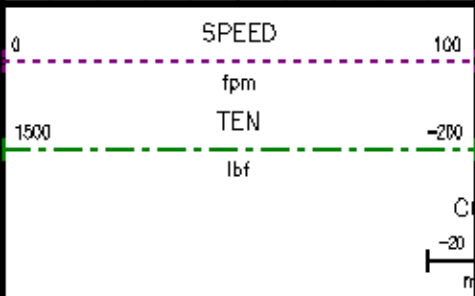
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Created : 6/27/2013 11:43:54 AM

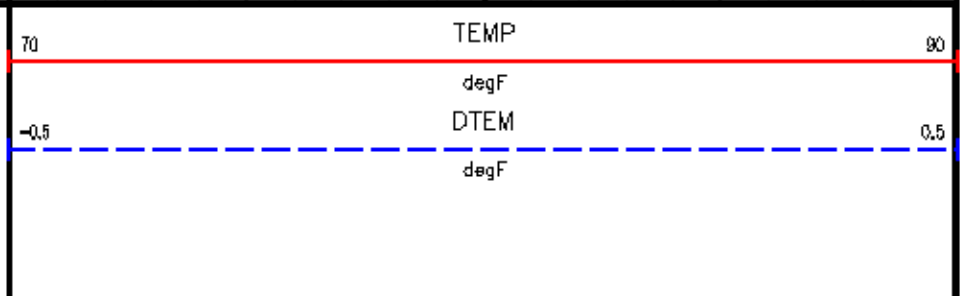




100



TM seconds 1:20



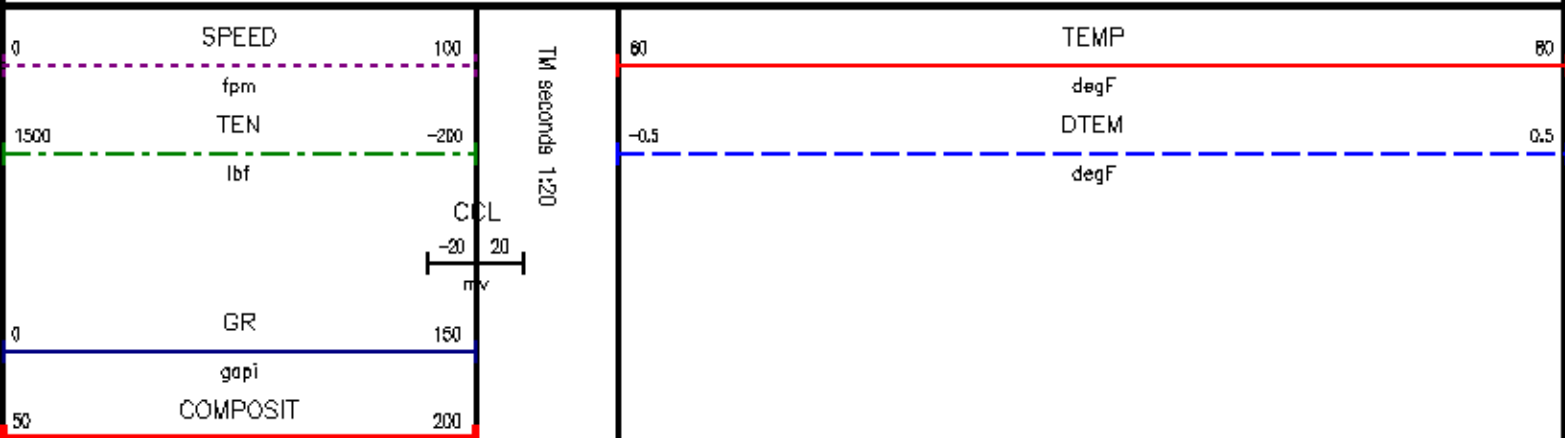
0	GR	150
	gapi	
50	COMPOSIT	200
	degF	
150	GRBU	300
	gapi	

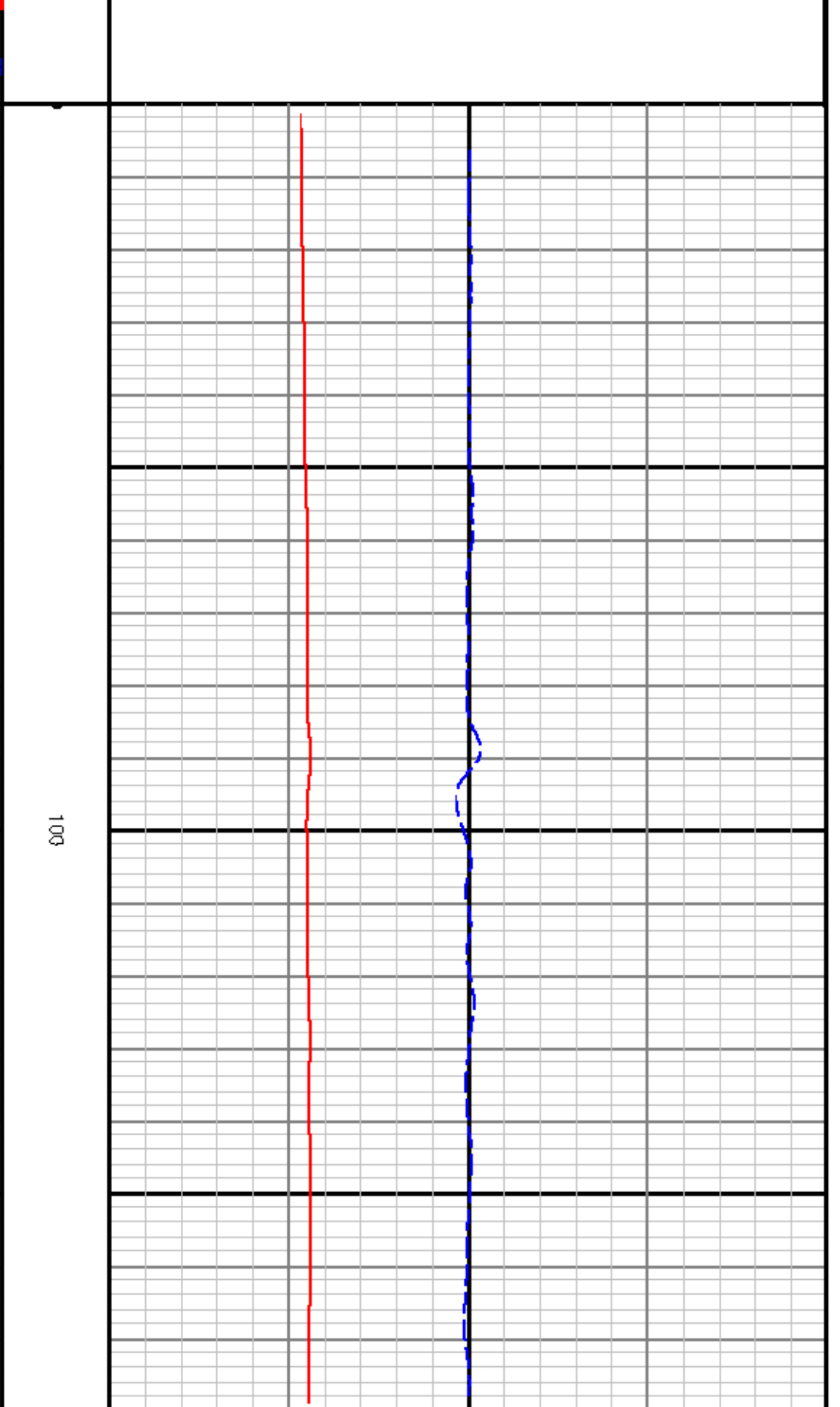
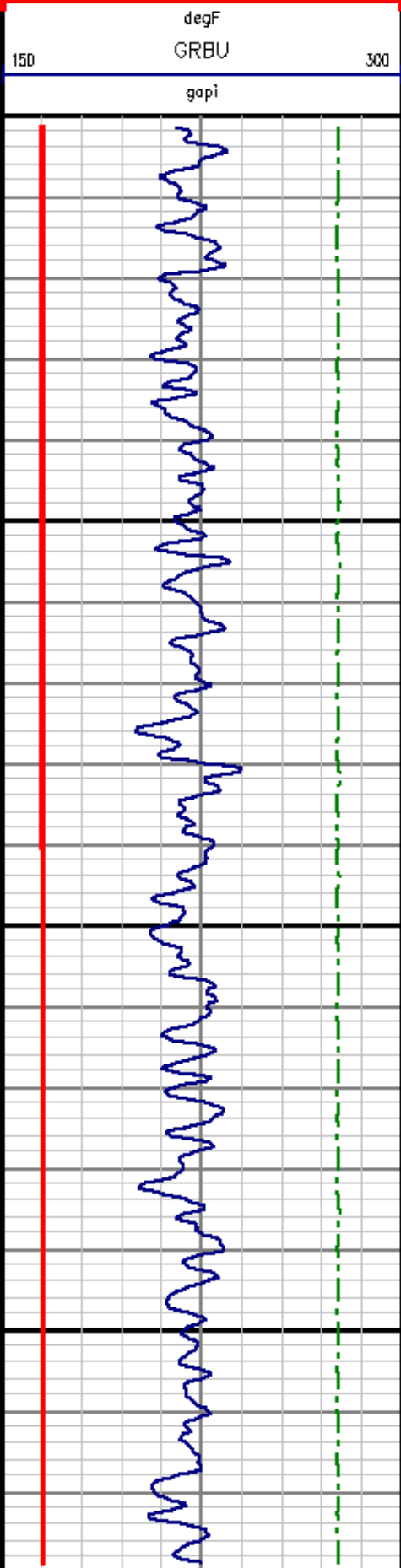
STAT CHECK @ 2500'  
3 MIN

DEPTH OFFSETS  
(for Acquired Curves)

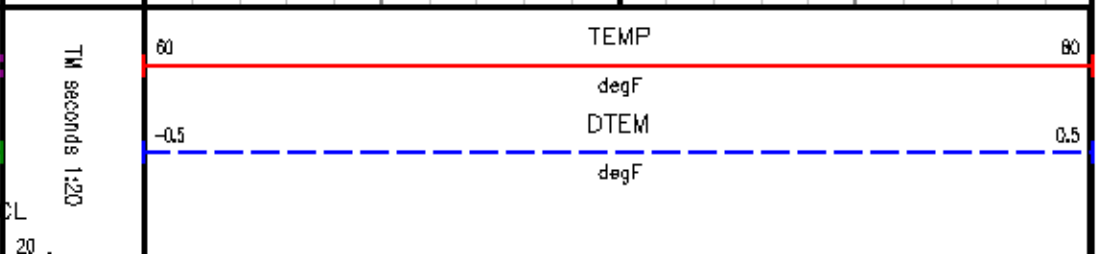
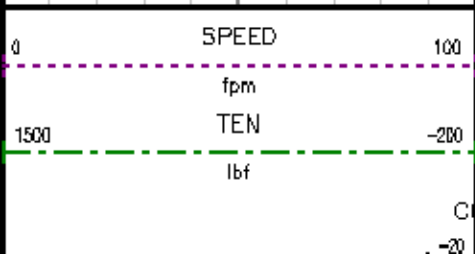
SERIES	DEPTH OFFSET	ACQUIRED CURVES		
2321NA	-8.000	CCL	ACCL	
1311XA	-2.000	GR	GRBU	
2121XA	0.000	TEMP	DTEM	COMPOSIT
2421XA	0.000	NEU		
SYSTEM	0.000	TEN	TTEN	

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EST  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP06.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 11:49:35 AM





100



0	GR	150
	gapi	
50	COMPOSIT	200
	degF	
150	GRBU	300
	gapi	

STAT CHECK @ 2000'  
3 MIN

DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2321NA	-8.000	CCL ACCL
1311XA	-2.000	GR GRBU
2121XA	0.000	TEMP DTEM COMPOSIT
2421XA	0.000	NEU
SYSTEM	0.000	TEN TTEN

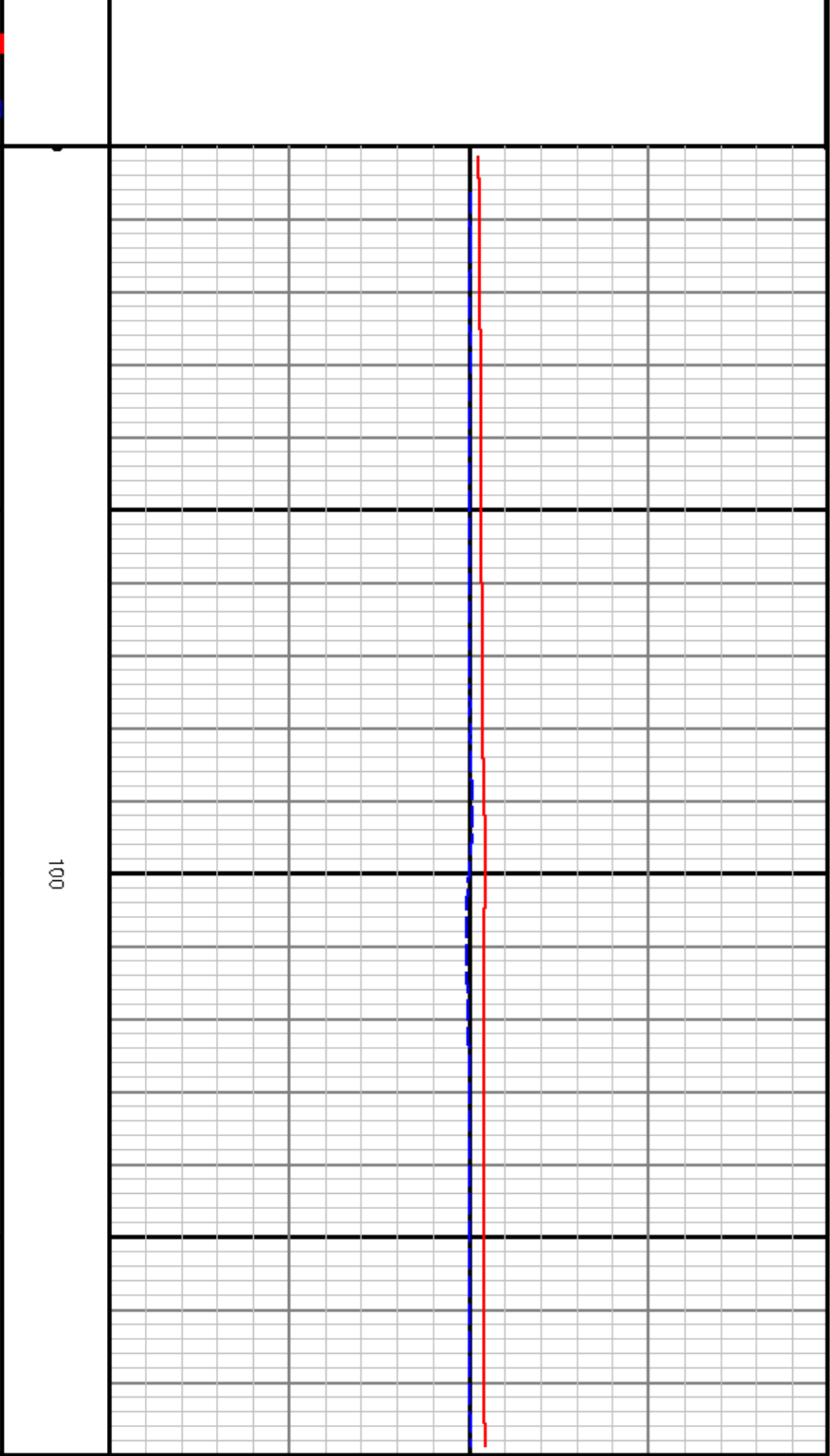
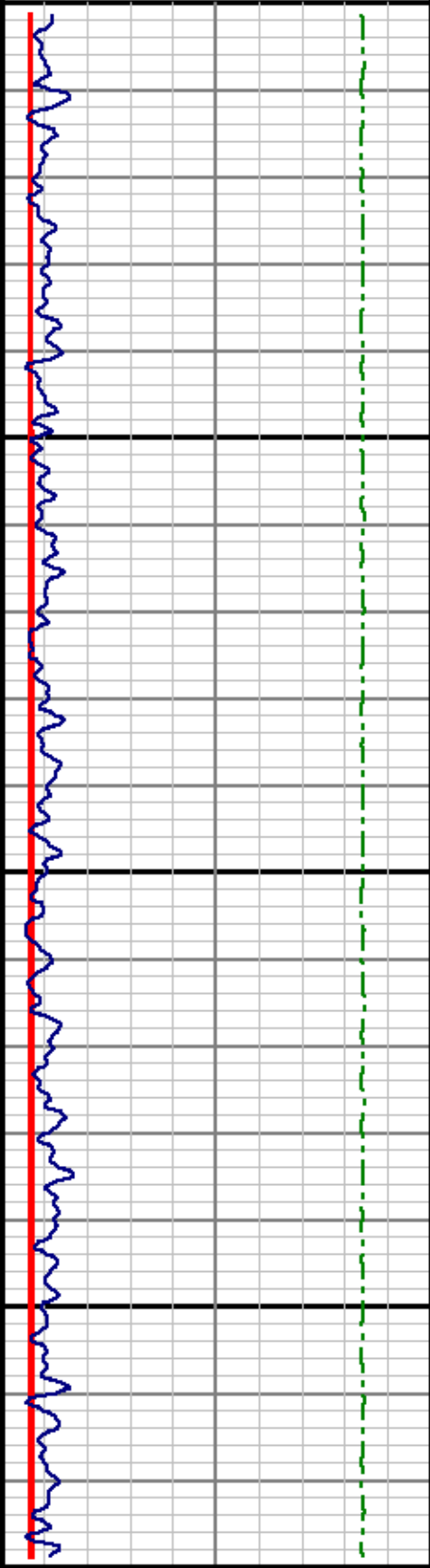
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP07.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 11:55:04 AM

0	SPEED	100
	fpm	
1500	TEN	-200
	lbf	
	CCL	
	-20 20	
	mv	
0	GR	150
	gapi	

TM seconds 1:20

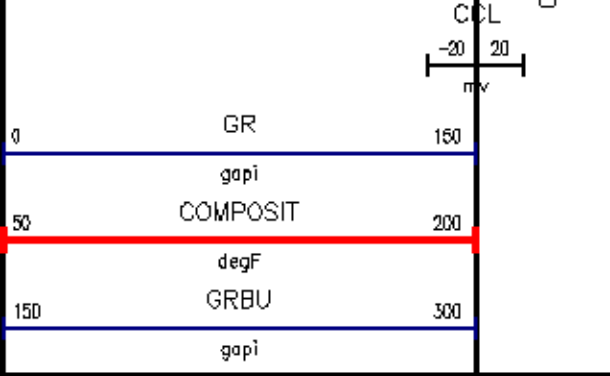
50	TEMP	70
	degF	
-0.5	DTEM	0.5
	degF	

50 COMPOSIT 200  
 degF  
 150 GRBU 300  
 gapi



0 SPEED 100  
 fpm  
 1500 TEN -200  
 lbf

TM seconds 1:21  
 50 TEMP 70  
 degF  
 -0.5 DTEM 0.5  
 degF

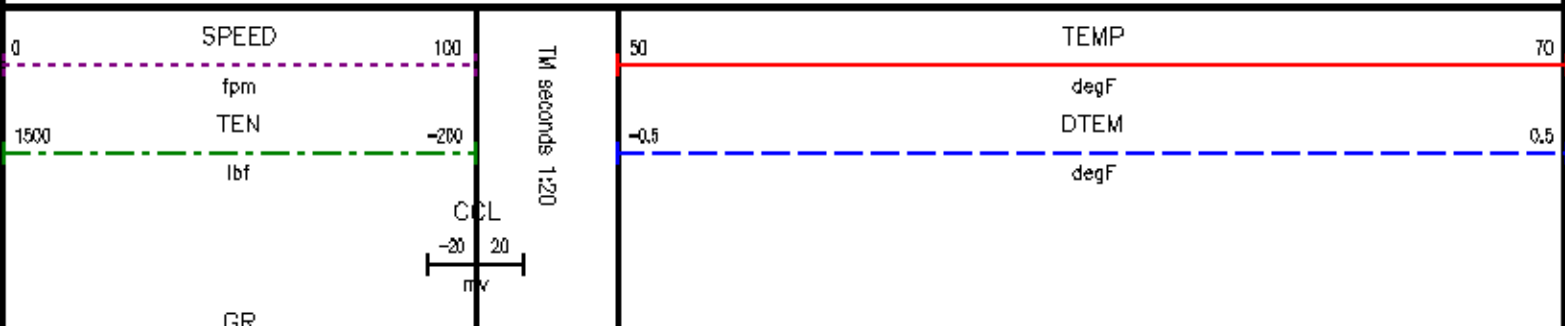


STAT CHECK @ 1500'  
3 MIN

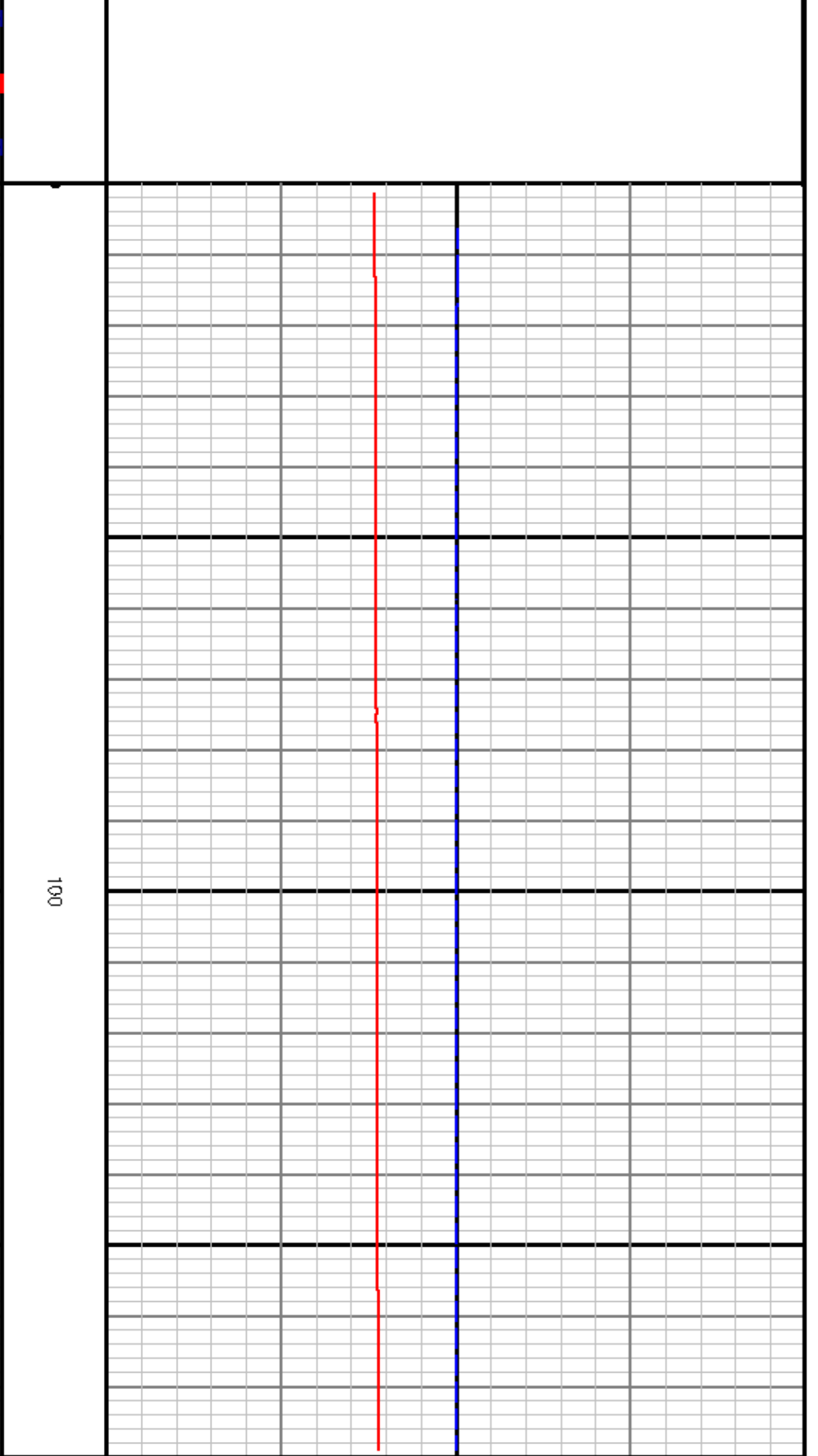
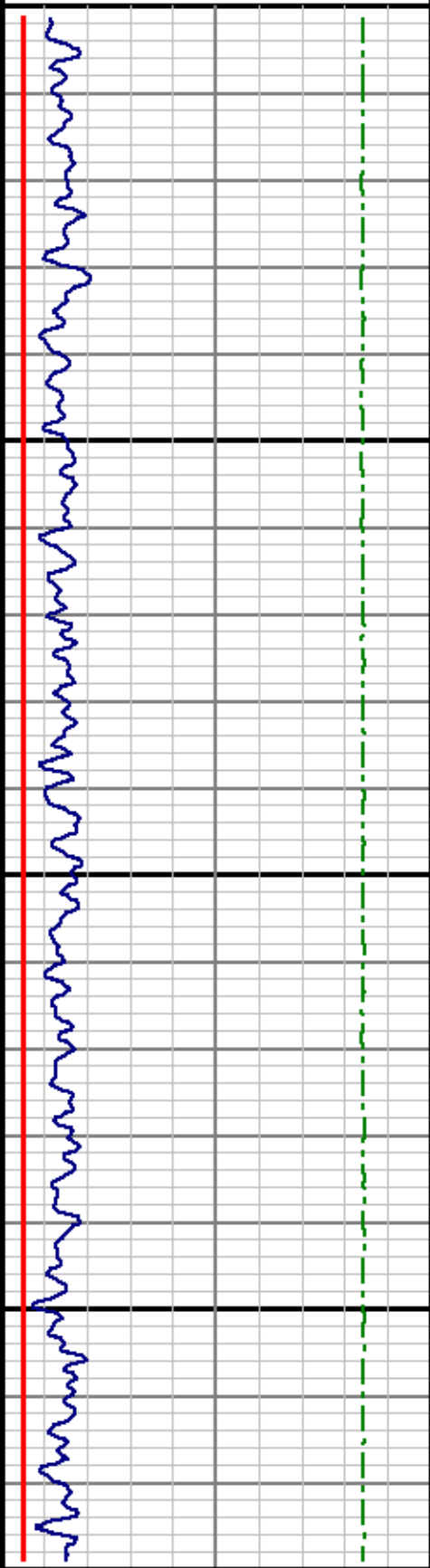
DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2321NA	-8.000	CCL ACCL
1311XA	-2.000	GR GRBU
2121XA	0.000	TEMP DTEM COMPOSIT
2421XA	0.000	NEU
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\825736\TEMP08.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 12:00:43 PM



50	gpi COMPOSIT	150
150	degF GRBU	300
	gpi	



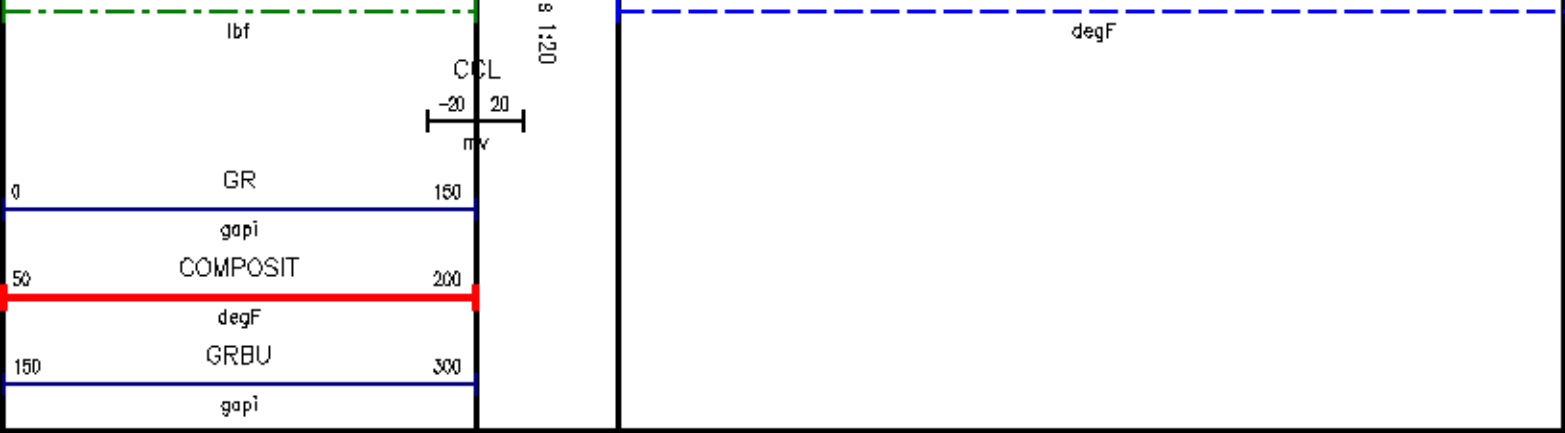
0	SPEED	100
1500	fpm TEN	-200

50	TEMP	70
-0.5	degF DTEM	0.5

100

TM second



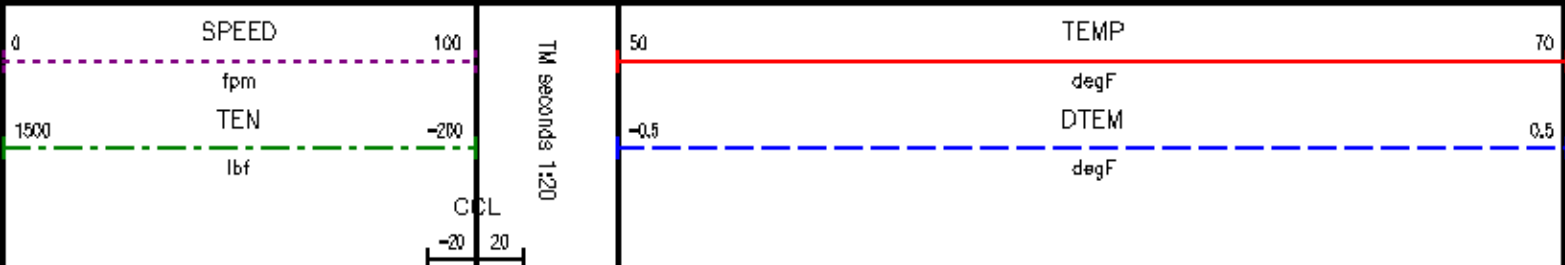


*STAT CHECK @ 1000'  
3 MIN*

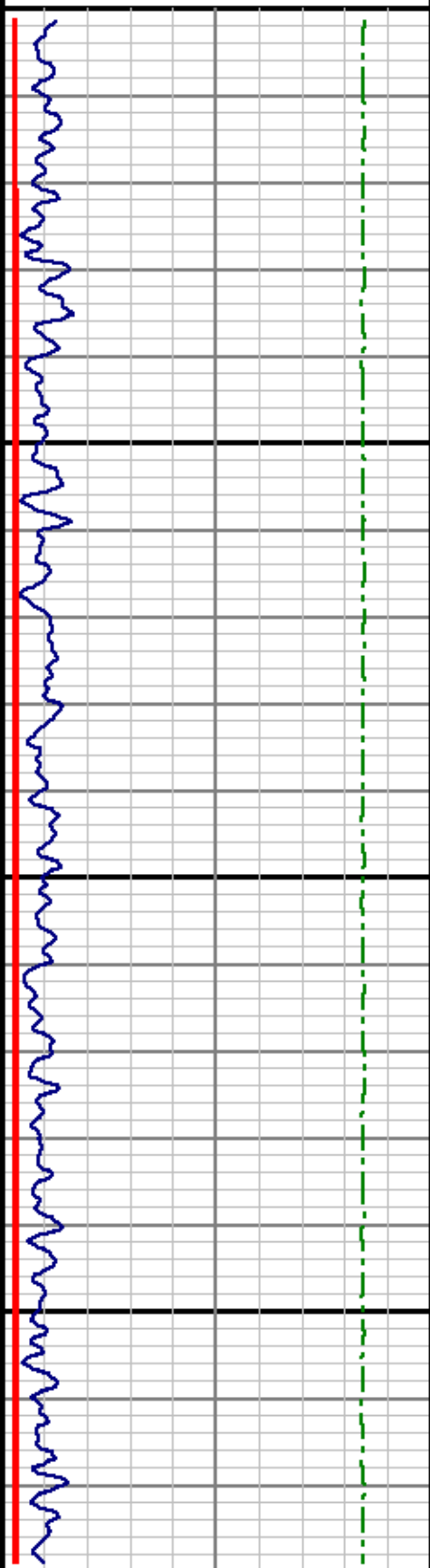
DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES		
		CCL	ACCL	COMPOSIT
2321NA	-8.000	GR	GRBU	
1311XA	-2.000	TEMP	DTEM	COMPOSIT
2121XA	0.000	NEU		
2421XA	0.000	TEN	TTEM	
SYSTEM	0.000			

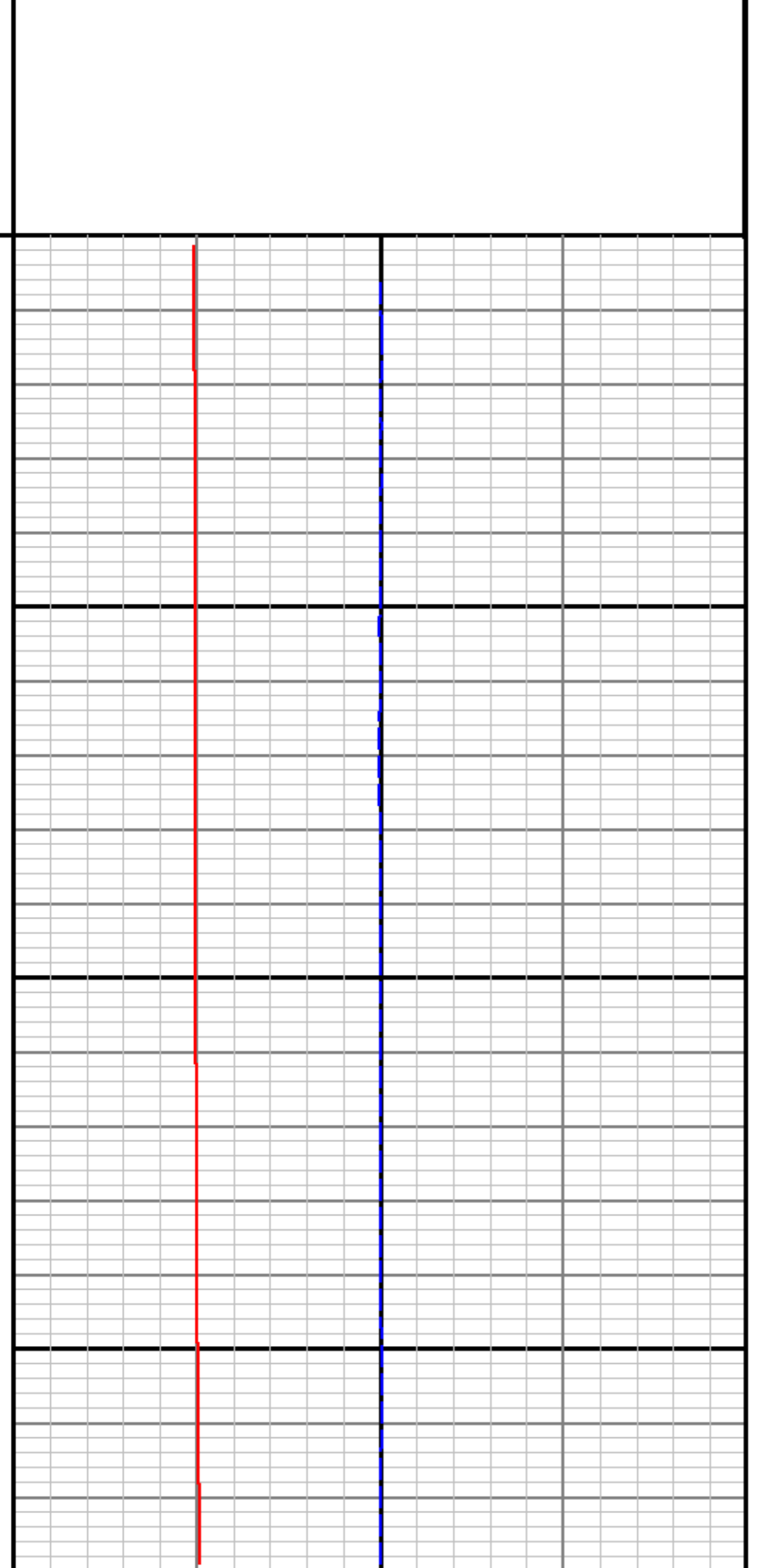
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP09.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 12:06:37 PM



0	GR	150
	gapi	
50	COMPOSIT	200
	degF	
150	GRBU	300
	gapi	



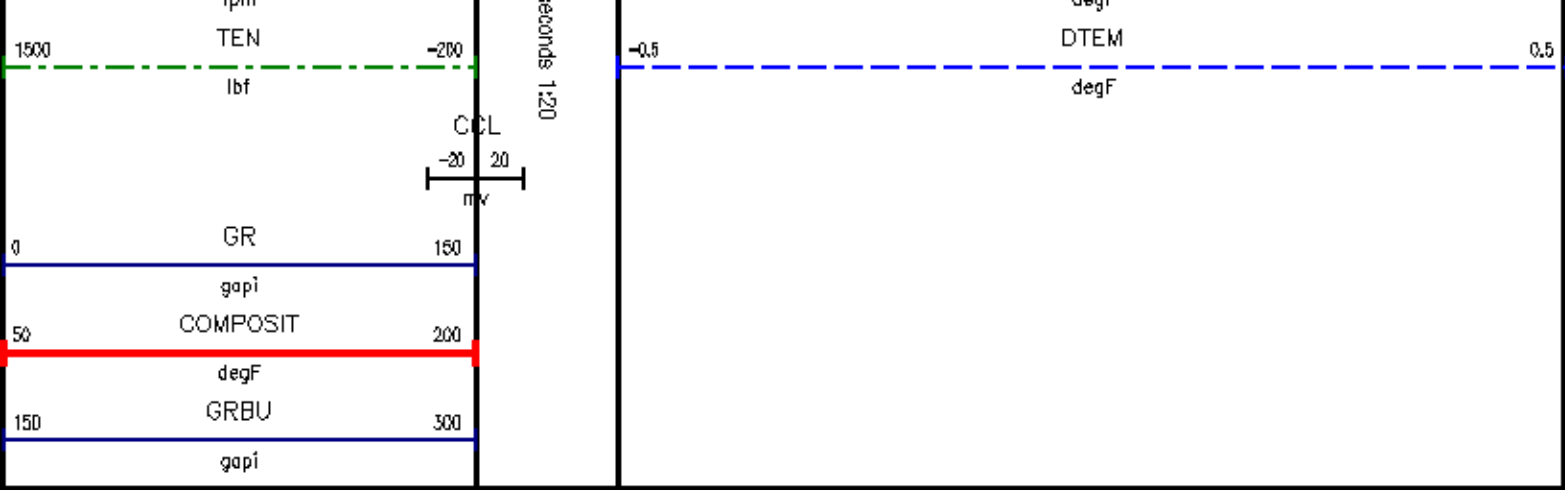
100



0	SPEED	100
	fpm	

TM

50	TEMP	70
	degF	



*STAT CHECK @ 500'  
3 MIN*

DEPTH OFFSETS  
(for Acquired Curves)

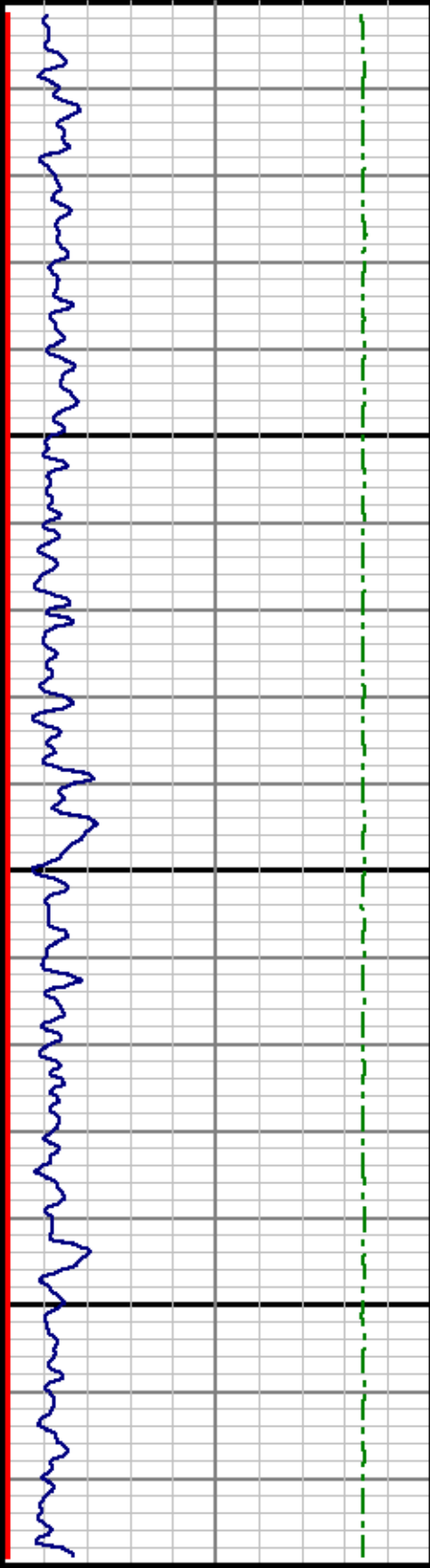
SERIES	DEPTH OFFSET	ACQUIRED CURVES		
		CCL	DTEM	COMPOSIT
2321NA	-8.000	CCL	ACCL	
1311XA	-2.000	GR	GRBU	
2121XA	0.000	TEMP	DTEM	COMPOSIT
2421XA	0.000	NEU		
SYSTEM	0.000	TEN	TTEN	

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\625736\TEMP10.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 180  
 Created : 6/27/2013 12:11:50 PM

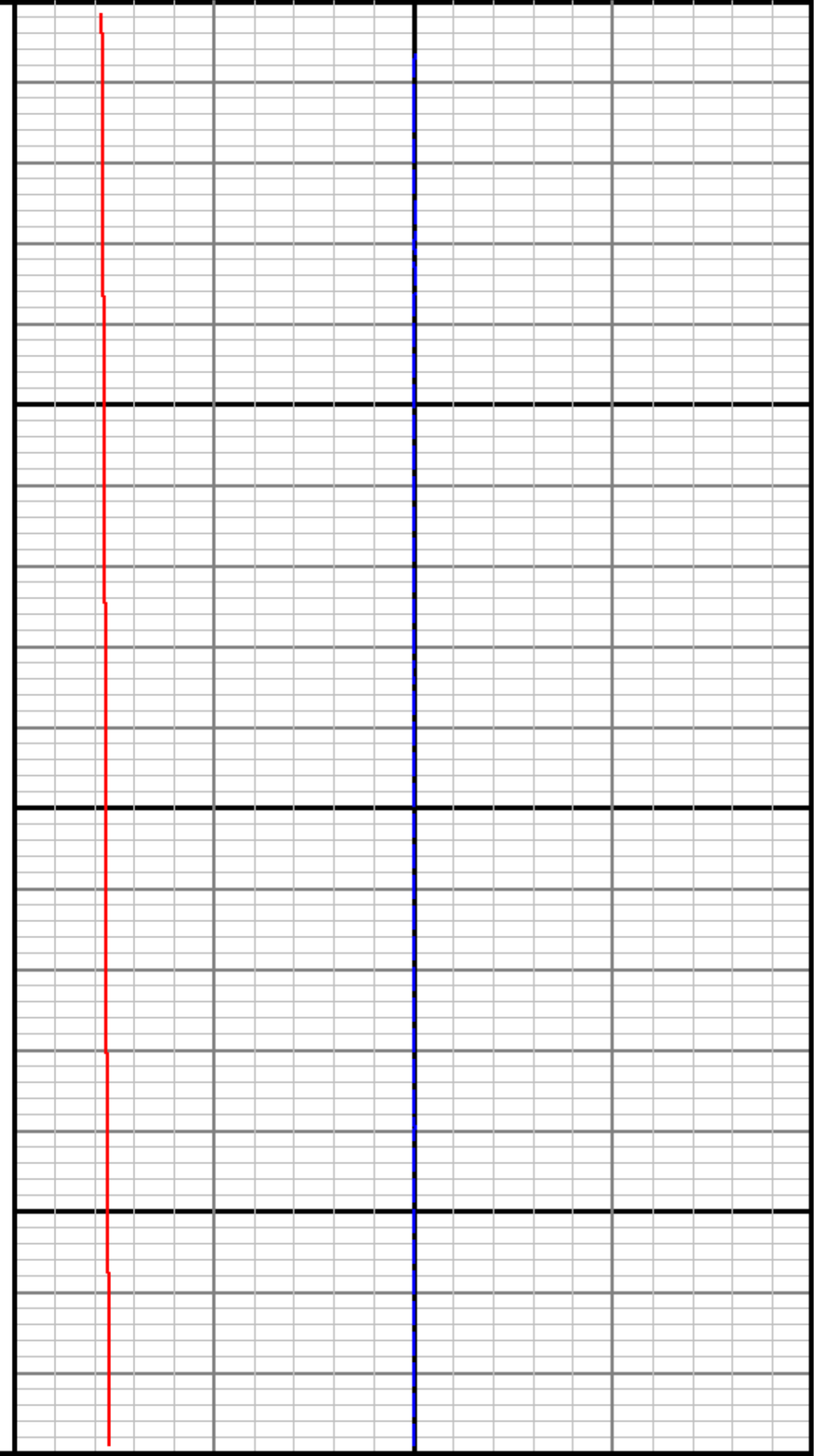


0 20  
-20 20  
mv

0	GR	150
	gap1	
50	COMPOSIT	200
	degF	
150	GRBU	300
	gap1	

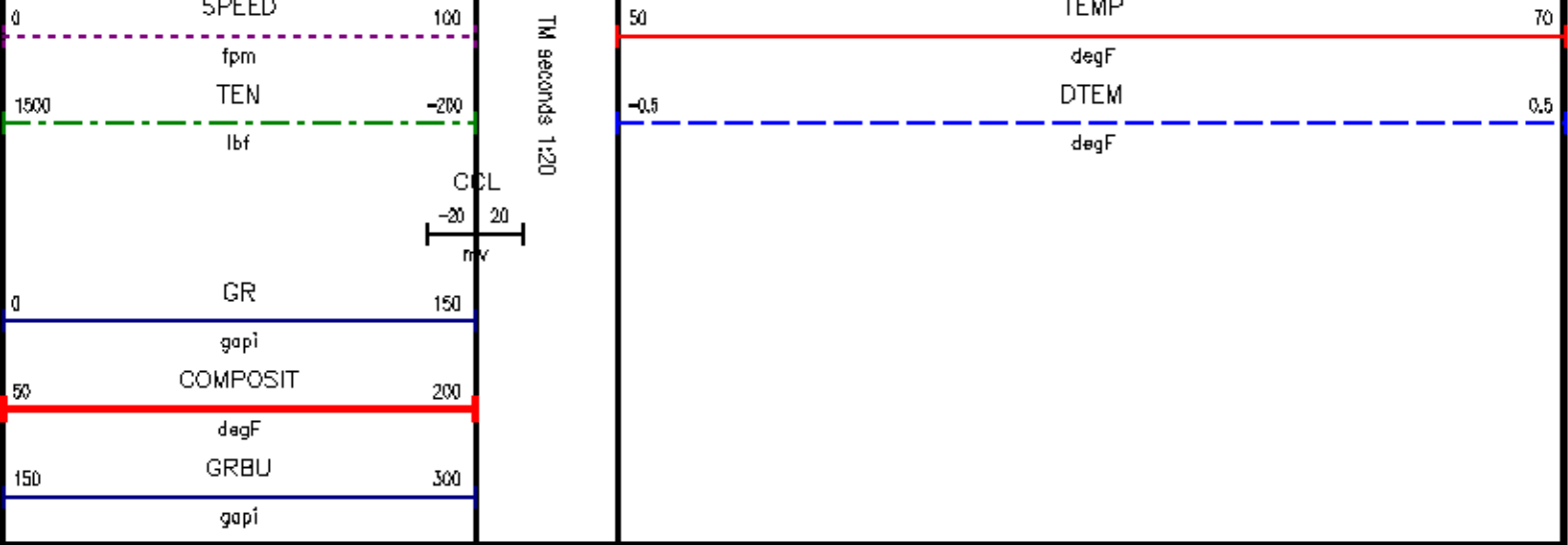


100



SPEED

TEMP



Baker Atlas



Company ENVIRONMENTAL GEOTECH TECHNOLOGIES  
 Well EGT 2-12  
 Field ROMULUS STORAGE  
 County WAYNE State MICHIGAN

File No: \_\_\_\_\_  
 API No: \_\_\_\_\_

Location  
 1670' FSL & 2372' FEL  
 SEC 12 TWP 3S RGE 9E

Elevations  
 KB 639 ft  
 DF 638 ft  
 GL 626 ft

THANK YOU!

**ATTACHMENT E**  
**RADIOACTIVE TRACER SURVEY**



REFER TO CD



# Nuclear Tracer Log

## Baker Atlas

File No:	Company	<u>ENVIROMENTAL GEOTECH TECHNOLOGIES</u>	
API No:	Well	<u>EGT 2-12</u>	
	Field	<u>ROMULUS STORAGE</u>	
	County	<u>WAYNE</u>	State <u>MICHIGAN</u>
<b>THANK YOU!</b>	Location	<u>1670' ESL &amp; 2372' EBL</u>	
		SEC <u>12</u>	TWP <u>3S</u> RGE <u>9E</u>
Permanent Datum	<u>G.L.</u>	Elevation	<u>626 ft</u>
Log Measured From	<u>K.B.</u>	<u>13 ft</u>	Above P. D.
Drill Measured From	<u>KELLY BUSHING</u>		
		Other Services <u>TRMP</u>	
		Elevations KB <u>639 ft</u> DF <u>638 ft</u> GL <u>626 ft</u>	

Date	<u>27-JUN-2013</u>	
Run	<u>SUB</u>	
Service Order	<u>625736</u>	
Depth Driller	<u>4550 ft</u>	
Depth Logger	<u>4180 ft</u>	
Bottom Logged Interval	<u>4179 ft</u>	
Top Logged Interval	<u>3090 ft</u>	
Time Started	<u>12:30</u>	
Time Finished	<u>16:30</u>	
Operator Rlg Time	<u>PRODUCTION LOGGER</u>	
Type of Fluid in Hole	<u>WATER</u>	
Fluid Density	<u>N/A</u>	
Salinity	<u>N/A</u>	
Fluid Level	<u>INJECTION</u>	
Logged Cement Top	<u>N/A</u>	
Wellhead Pressure	<u>0 psi</u>	
Maximum Hole Deviation	<u>N/A</u>	
Nominal Logging Speed	<u>30 fpm</u>	
Maximum Recorded Temperature	<u>N/A</u>	
Reference Log	<u>TRL</u>	
Reference Log Date	<u>16-JAN-2013</u>	
Equipment No.	<u>9747</u>	<u>OLNEY, IL</u>
Recorded By	<u>JERRY GINDER</u>	
Witnessed By	<u>MR. SCHILDHOUSE</u>	<u>MR. STEVE ROY (RPA)</u>



**Baker Atlas**

File No: \_\_\_\_\_ Company **ENVIRONMENTAL GEOTECH TECHNOLOGIES**

Well **EGT 2-12**

Field **ROMULUS STORAGE**

County **WAYNE** State **MICHIGAN**

THANK YOU! Location **1670'FSL & 2372'FEL**

SEC 12 TWP 3S RGE 9E

Other Services  
TEMP

Permanent Datum **G.L. \_\_\_\_\_ Elevation **626 ft****  
 Log Measured From **K.B. \_\_\_\_\_ 13 ft \_\_\_\_\_ Above P. D.**  
 Drill Measured From **KELLY BUSHING \_\_\_\_\_**

Elevations  
KB **639 ft**  
DF **638 ft**  
GL **626 ft**

Date **27-JUNE-2013**

Run	SUB
Service Order	625736
Depth Driller	4550 ft
Depth Logger	4180 ft
Bottom Logged Interval	4179 ft
Top Logged Interval	3090 ft
Time Started	12:30
Time Finished	16:30
Operator Rig Time	PRODUCTION LOGGER
Type of Fluid in Hole	WATER
Fluid Density	N/A
Salinity	N/A
Fluid Level	INJECTION
Logged Cement Top	N/A
Wellhead Pressure	0 psi
Maximum Hole Deviation	N/A
Nominal Logging Speed	30 fpm
Maximum Recorded Temperature	N/A
Reference Log	TRL
Reference Log Date	16-JAN-2013
Equipment No.	9747
Location	OLNEY, IL
Recorded By	JERRY GINDER
Witnessed By	MR. SCHILDHOUSE

- FOLD HERE

In making interpretations of logs, our employees will give the customer the benefit of their best judgement. But since all interpretations are opinions based on inferences from electrical or other measurements, we cannot, and we do not guarantee the accuracy or correctness of any interpretation. We shall not be liable or responsible for any loss, cost, damages, or expenses whatsoever incurred or sustained by the customer resulting from any interpretation made by any of our employees.

Bit Size	From	To

Size	Weight	Grade	From	To
16 in	65 lbm/ft		0 ft	178 ft
13.375 in	48 lbm/ft	H-40	0 ft	598 ft
9.625 in	36 lbm/ft		0 ft	1444 ft
7 in	26 lbm/ft		0 ft	3983 ft
4.5 in		FGL	0 ft	3953 ft

Remarks  
BAKER HUGHES CREW: C.BREWER

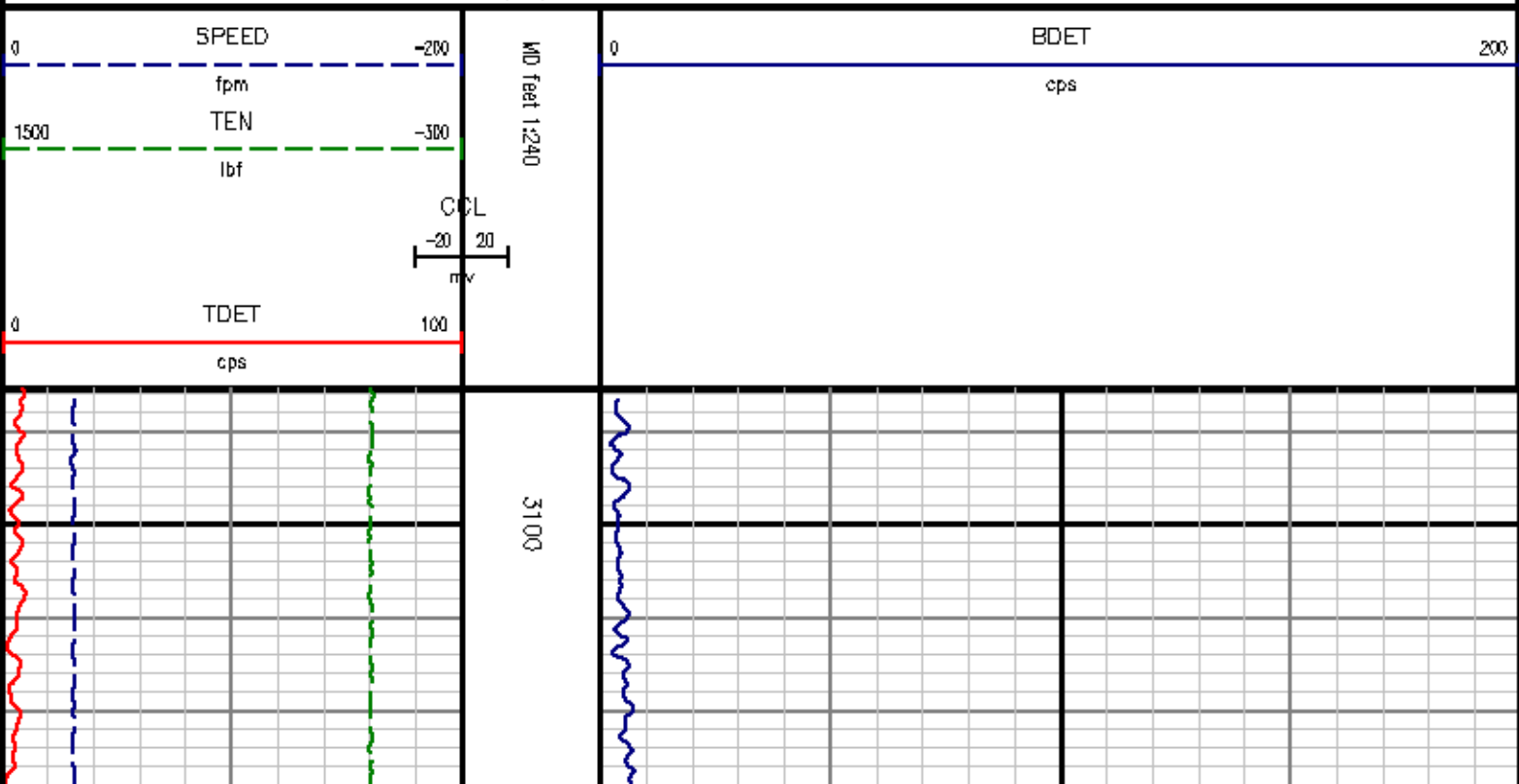


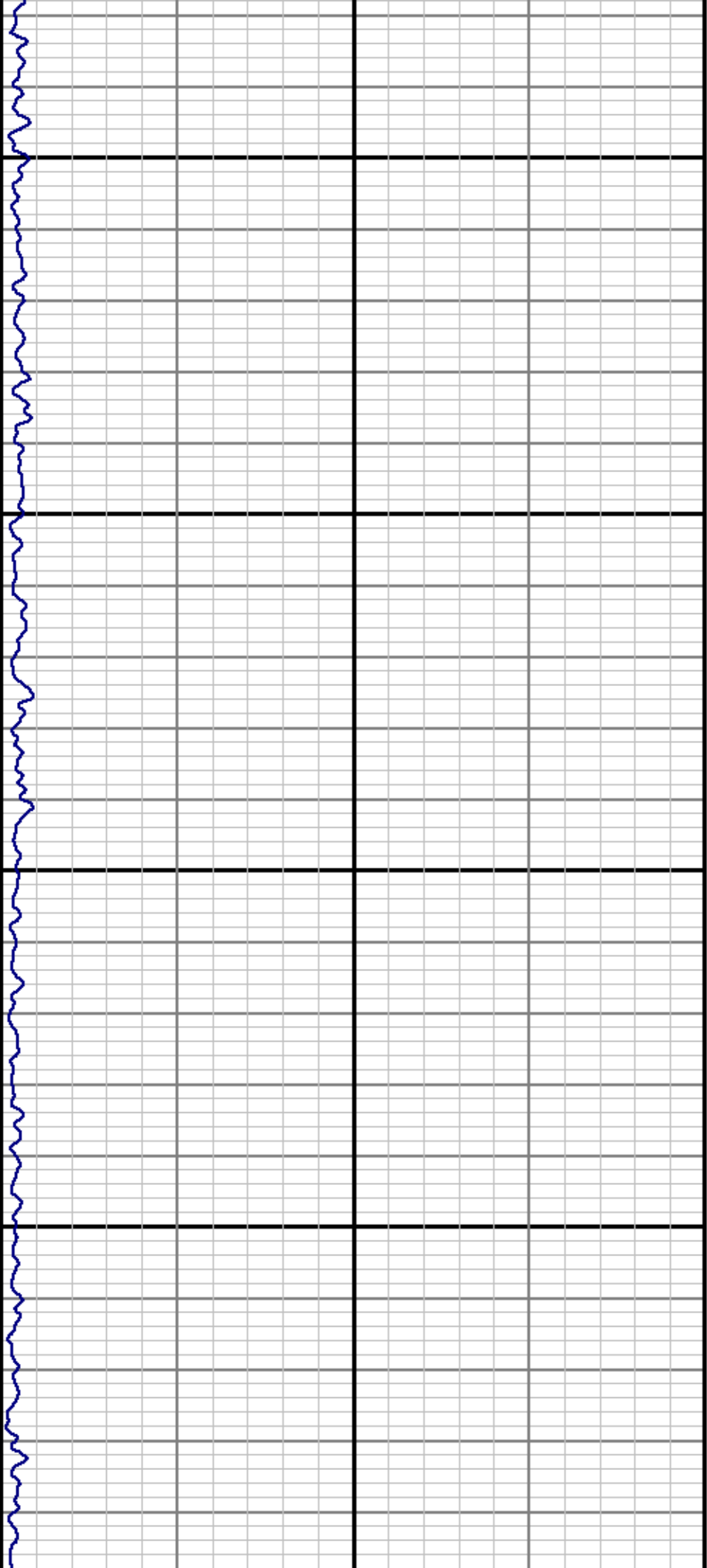
# BASE GAMMA RAY NO FLOW

## DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
B219XA	-8.500	TDET	TDETB
B219XA	0.000	BDET	BDETB
SYSTEM	0.000	TEN	TTE

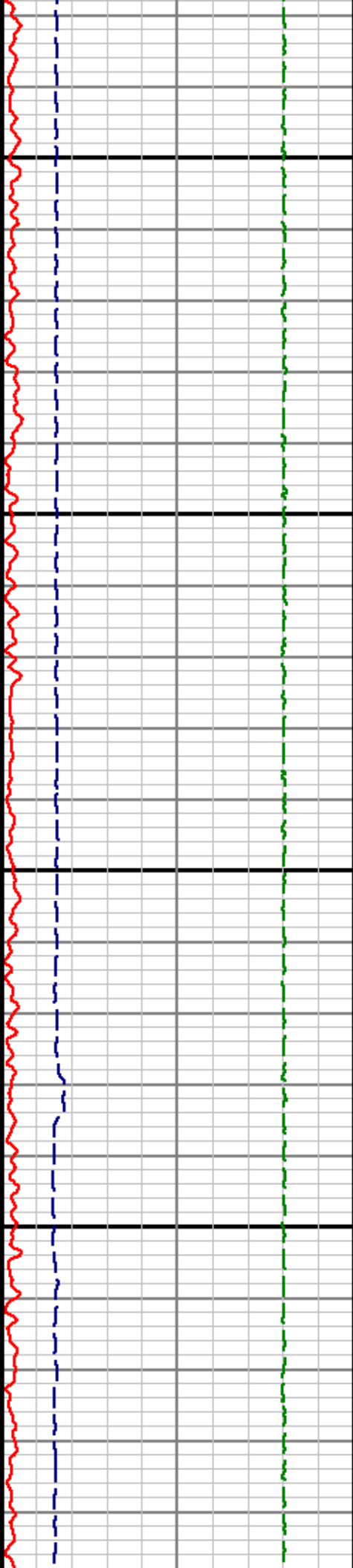
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : d:\well\data\tr1736\tr100.txt  
 Mode : PlotMgr 5.4.504  
 Interval : 3085.50 - 4180.50 feet UP  
 Created : 6/27/2013 1:19:52 PM

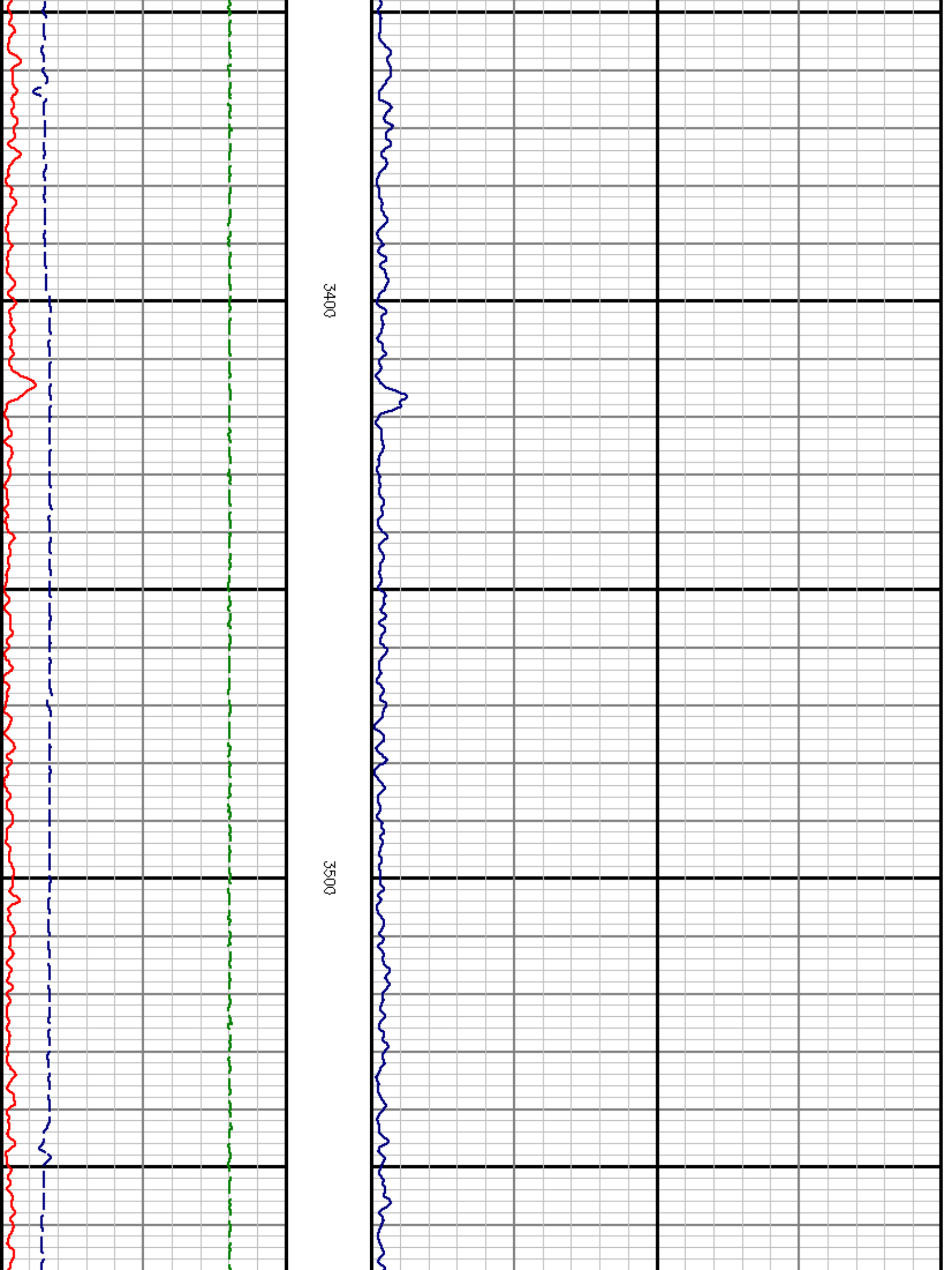


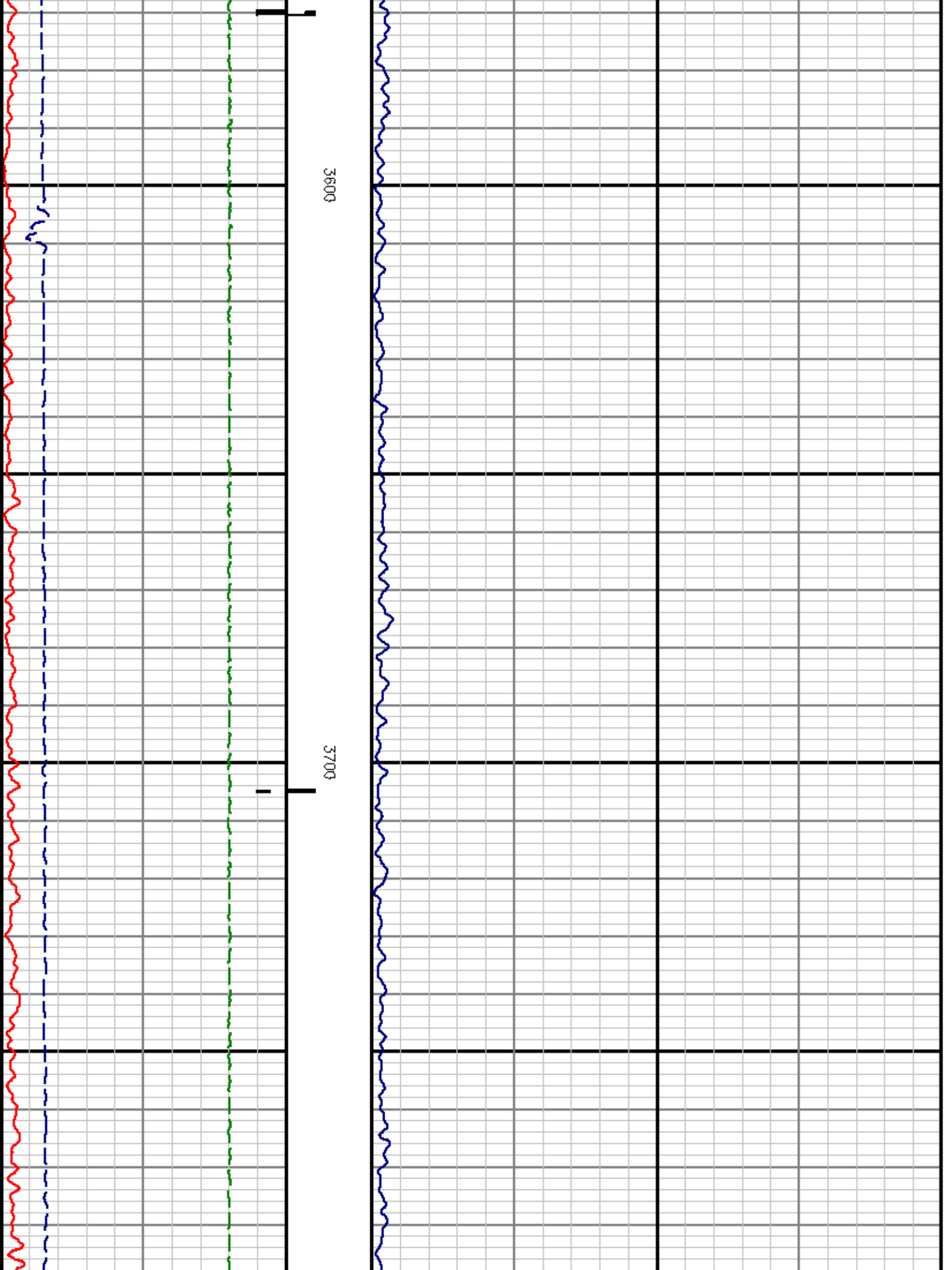


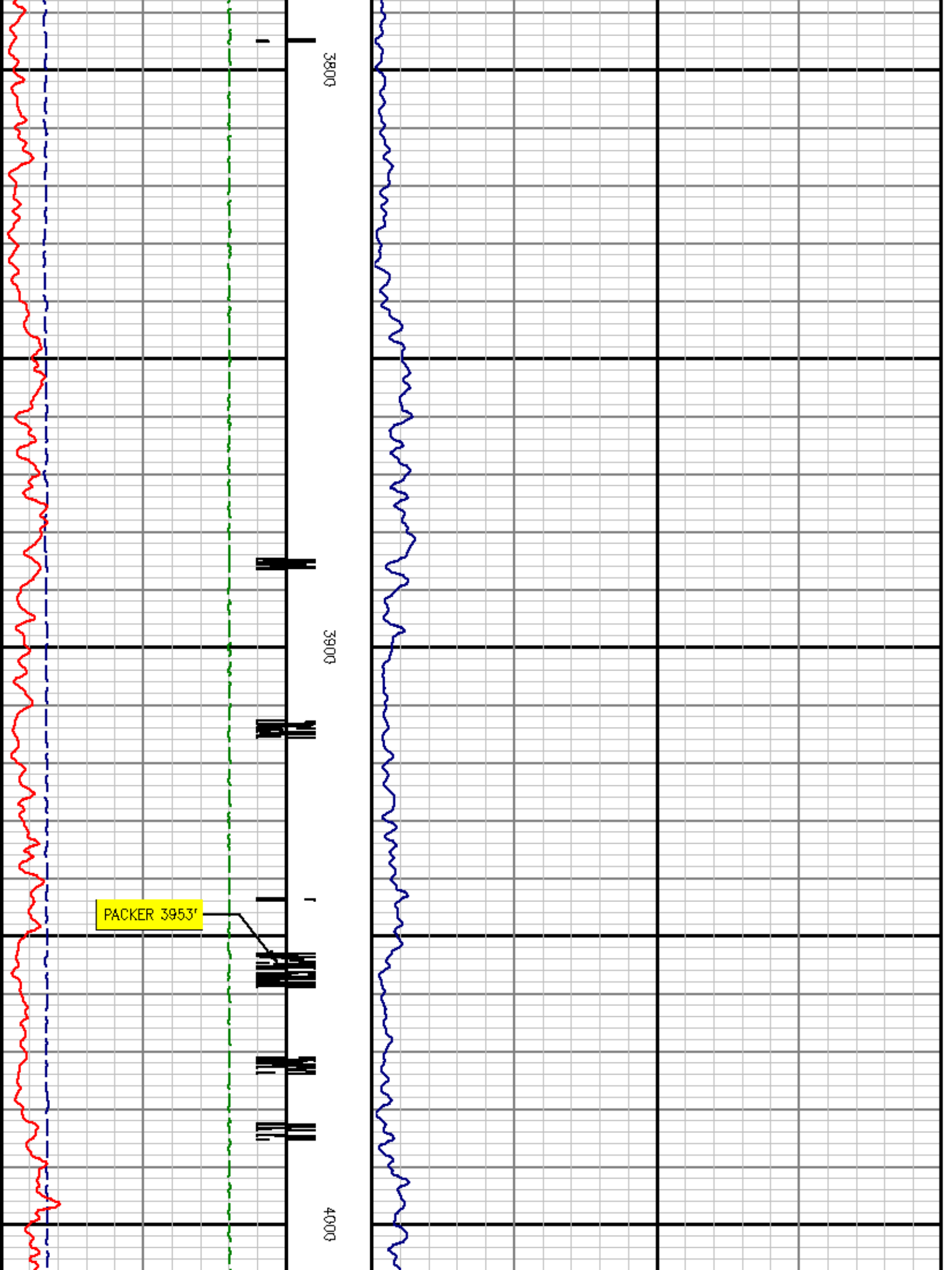
3200

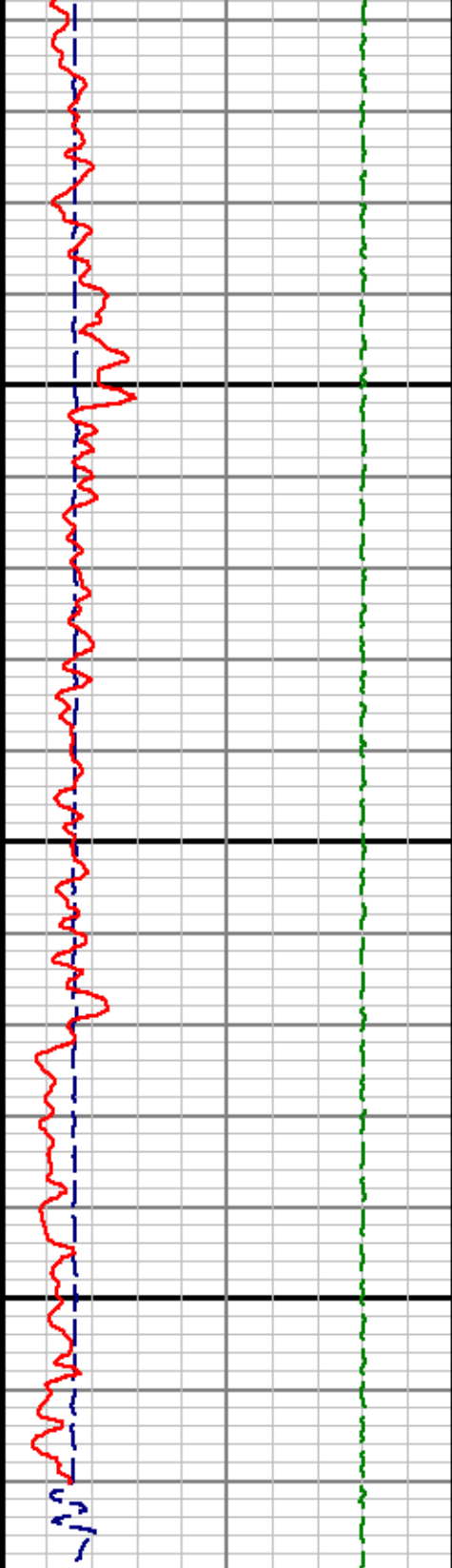
3300





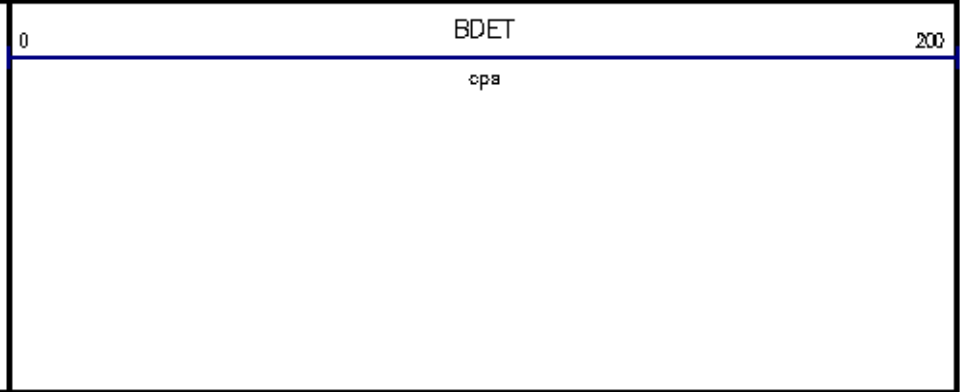
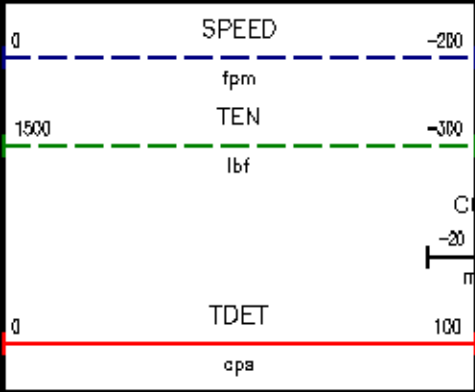
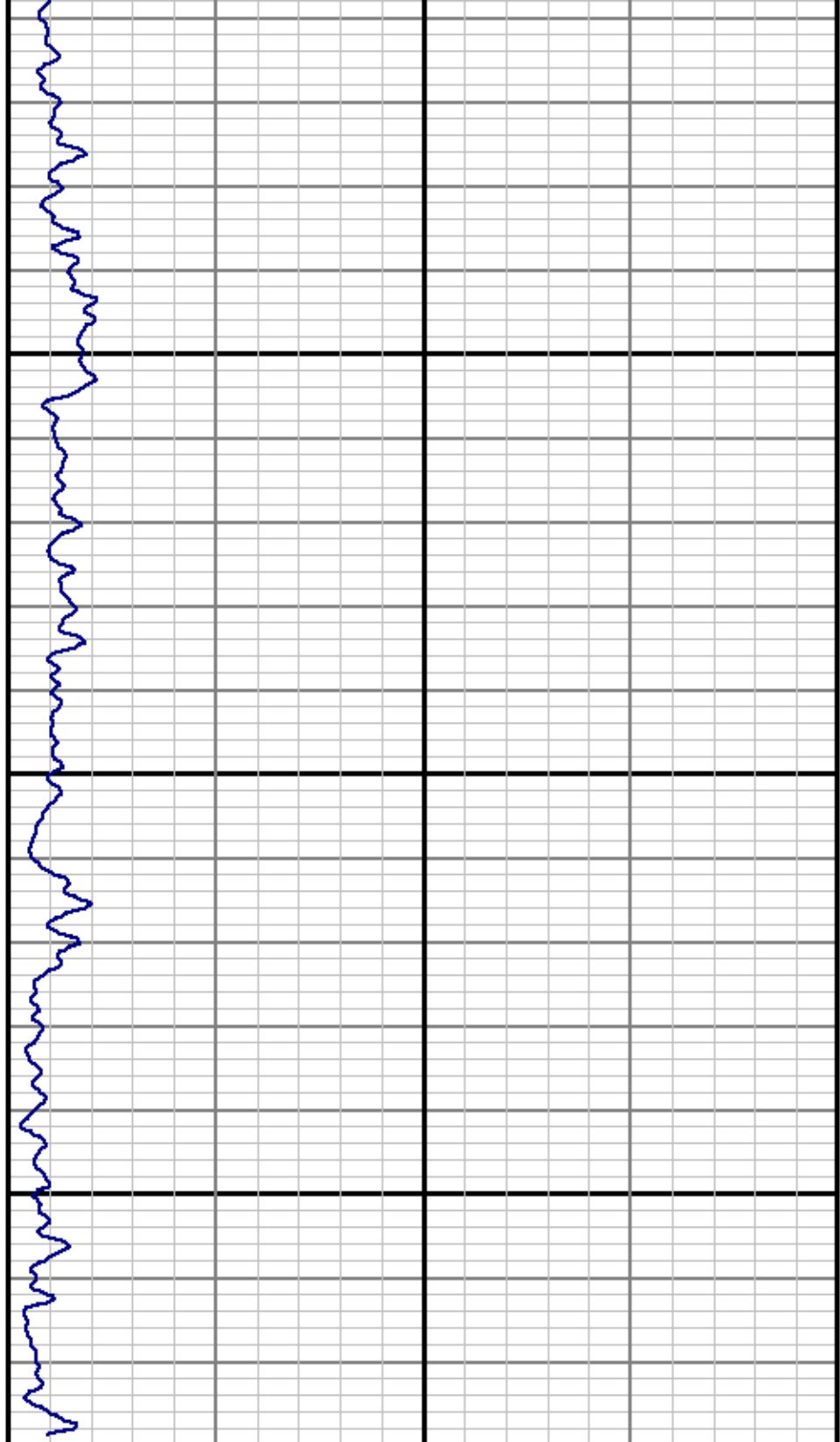






4100

MD Feet 1:240



# STAT CHECK @ 3855'

## 5 MIN

### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

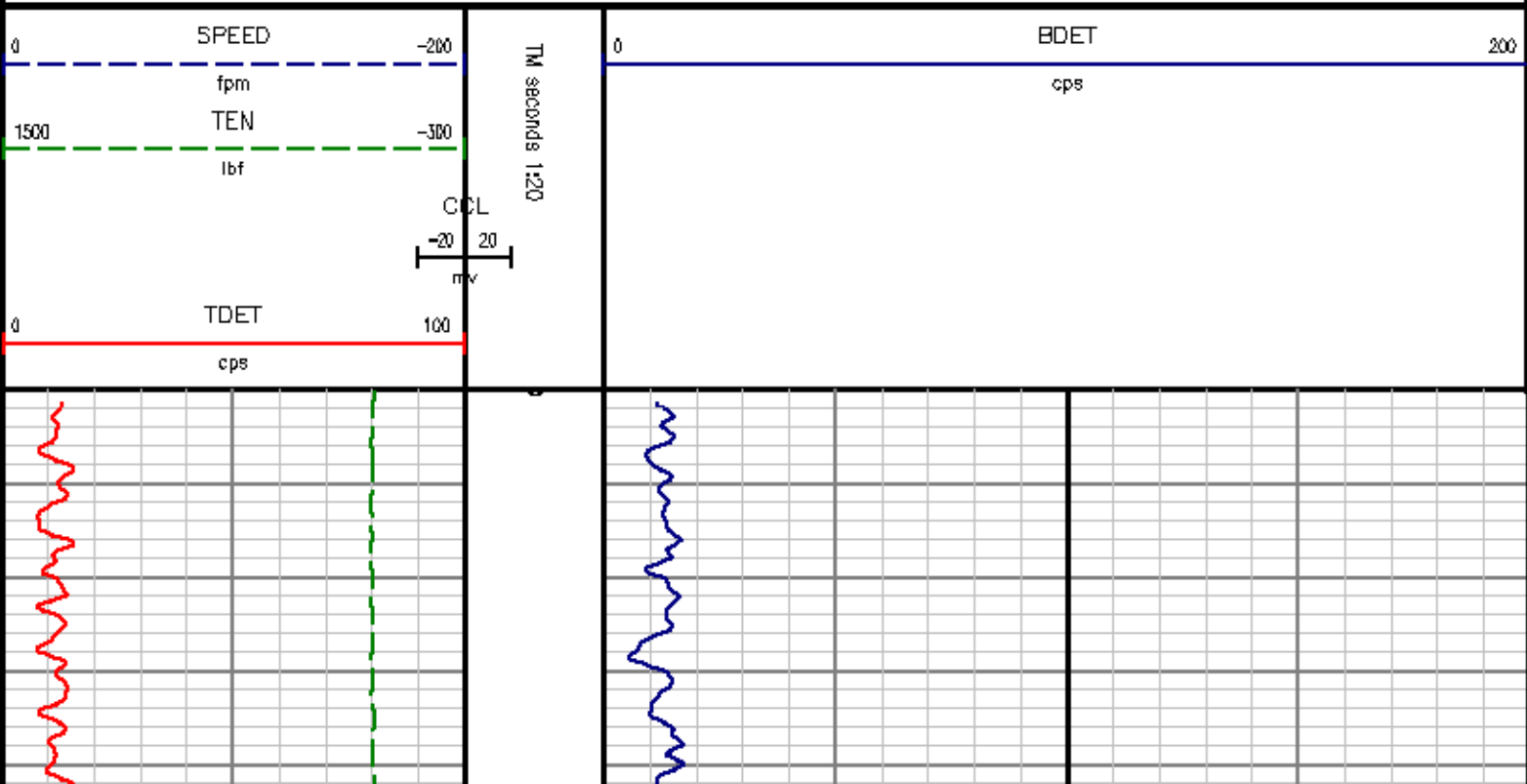
Well : 2-12

File Name : d:\well\data\tr1736\tr101.xtf

Mode : PlotMgr 5.4.504

Interval : 0 to 300

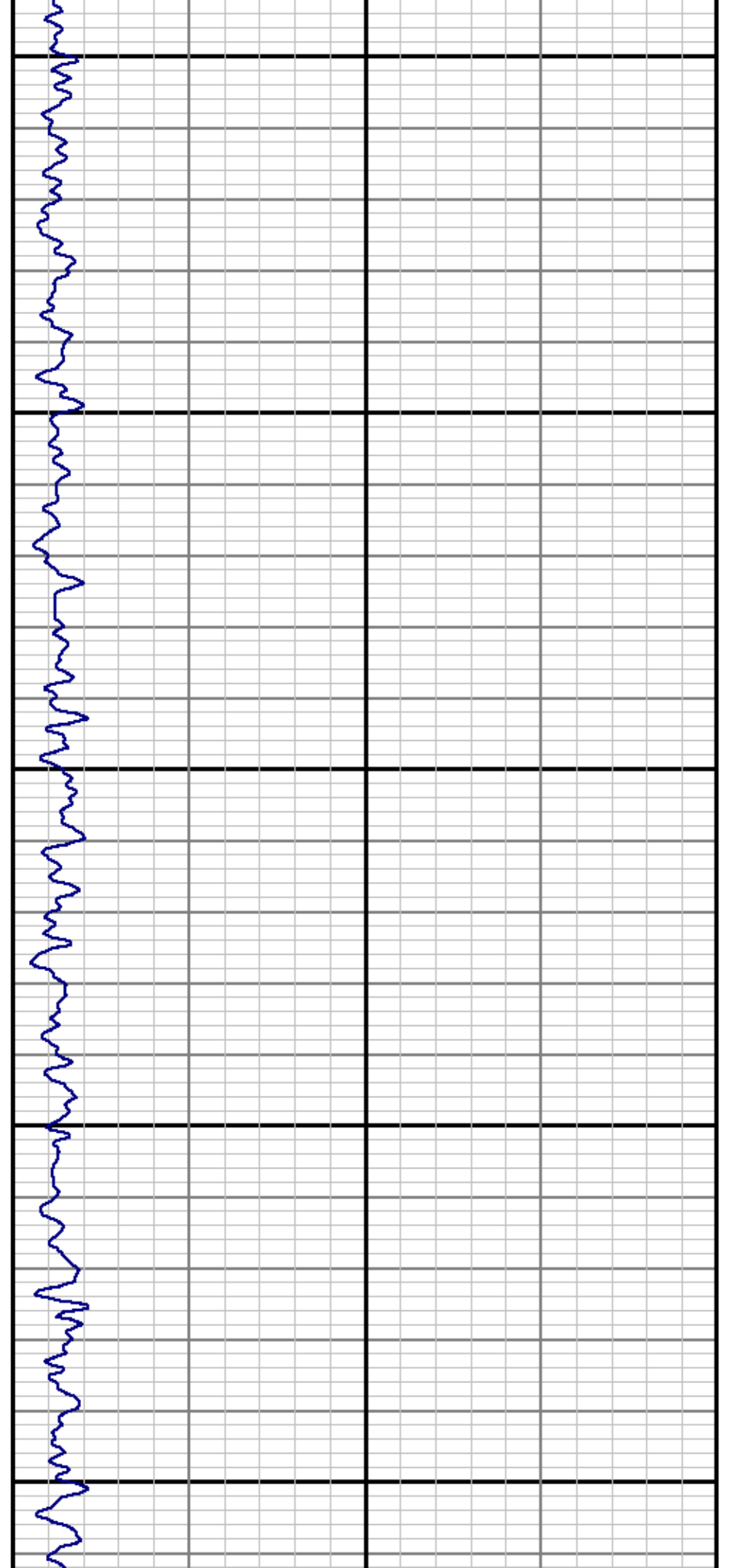
Created : 6/27/2013 2:00:54 PM



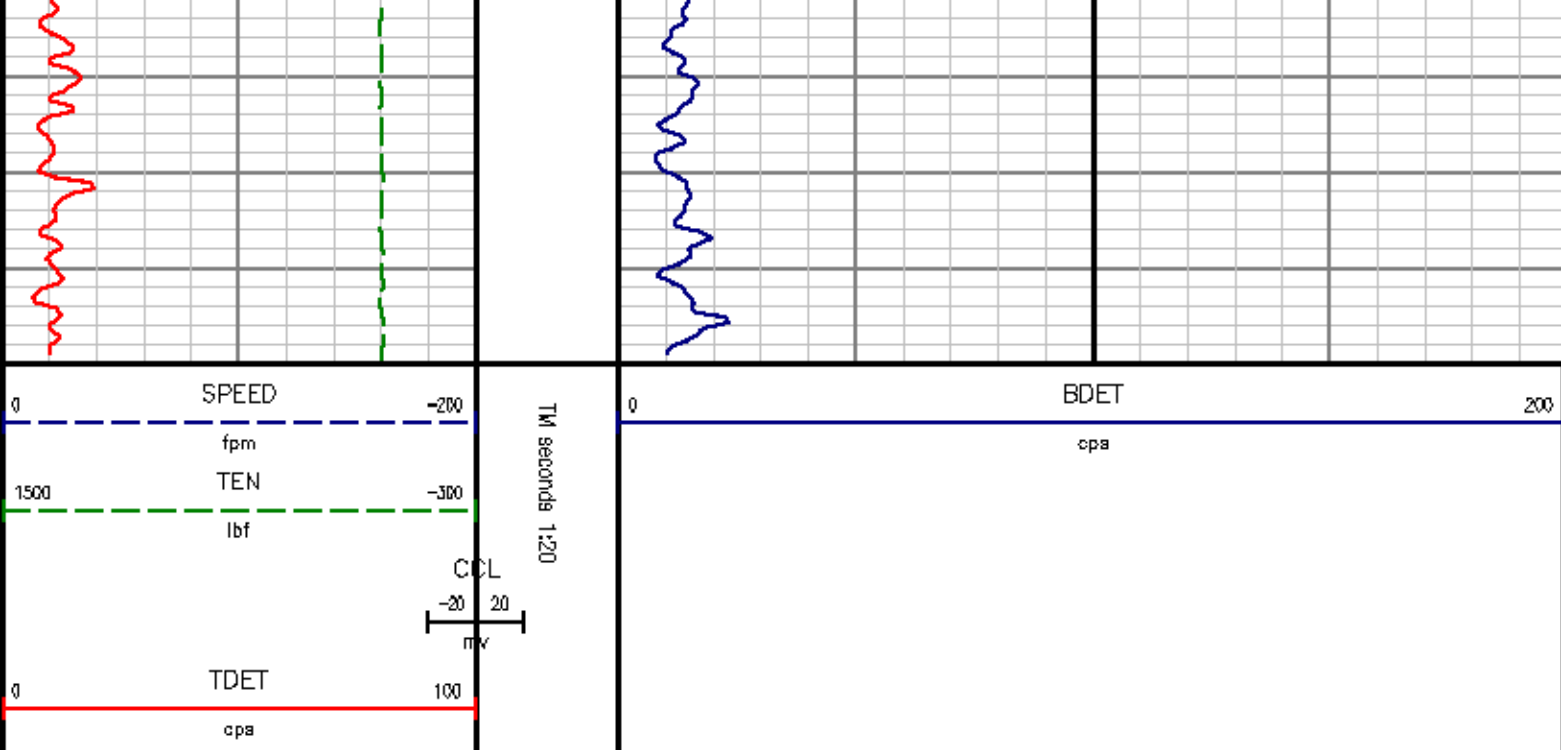


100

200





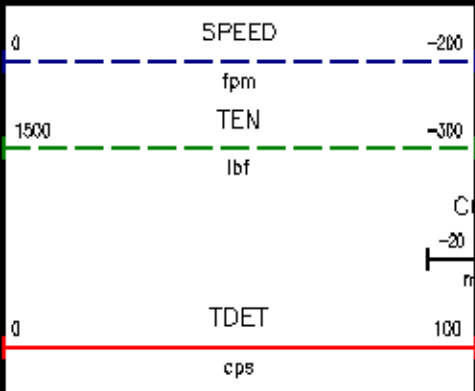


*STAT CHECK @ 3800'*  
*5 MIN*

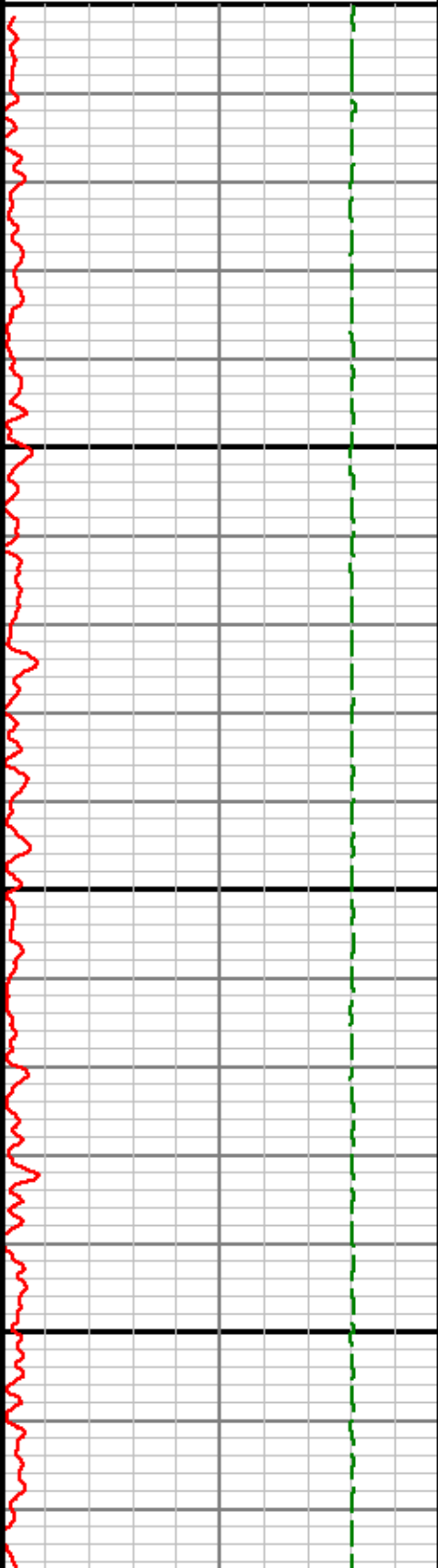
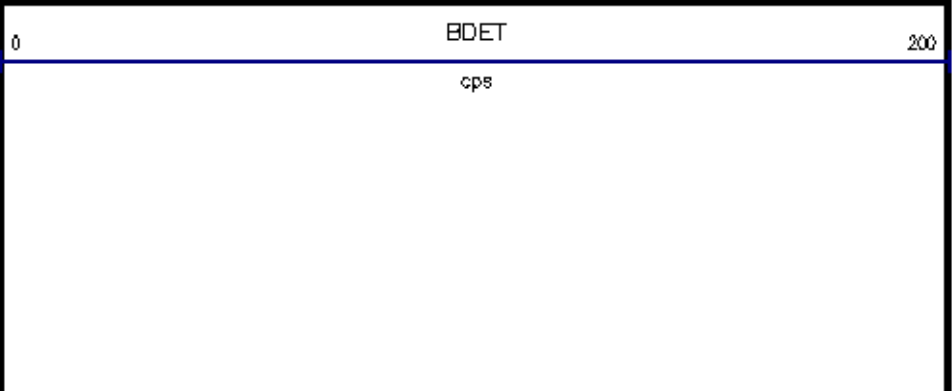
DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

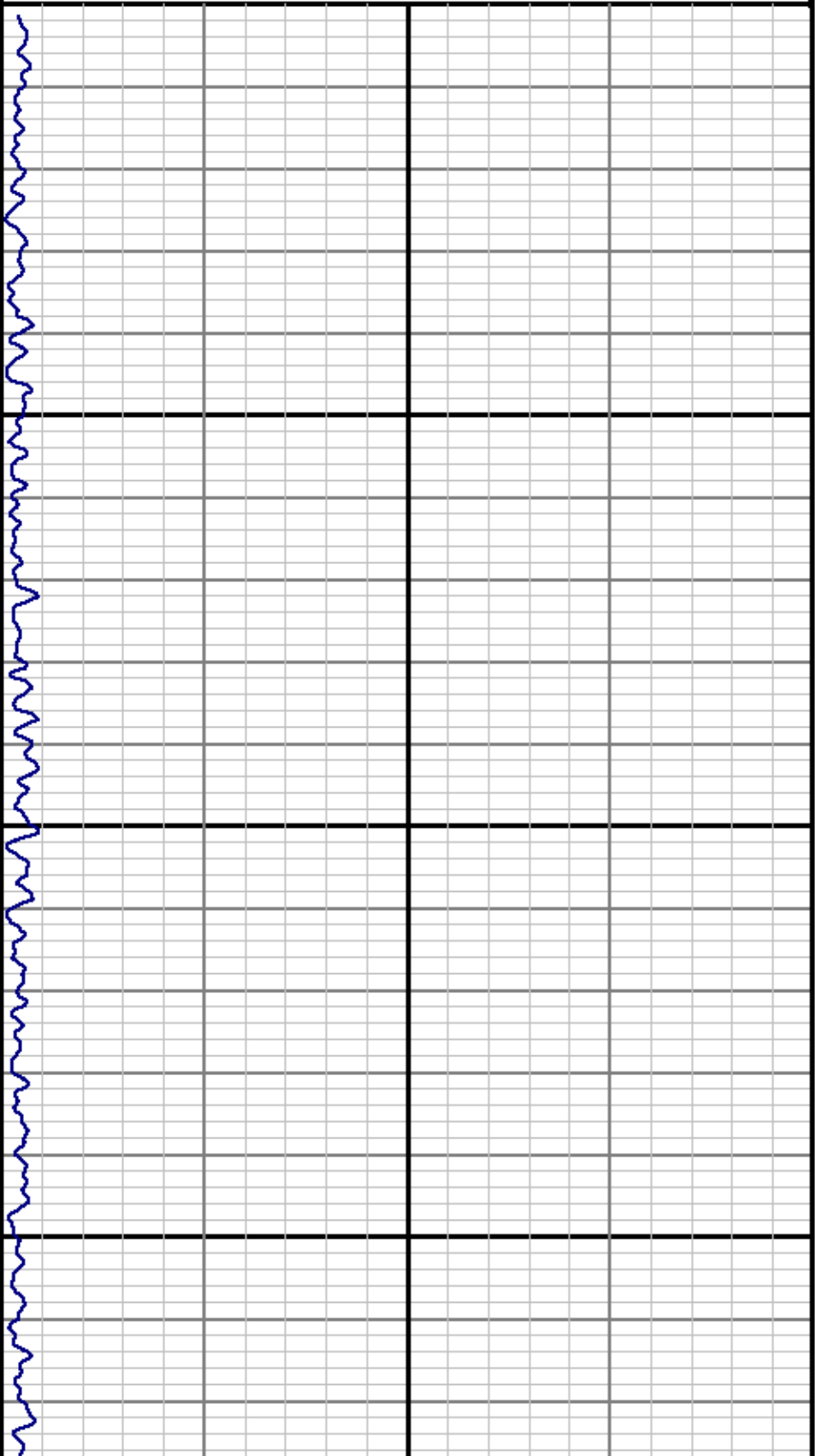
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\TRL736\TRL02.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 0 to 300

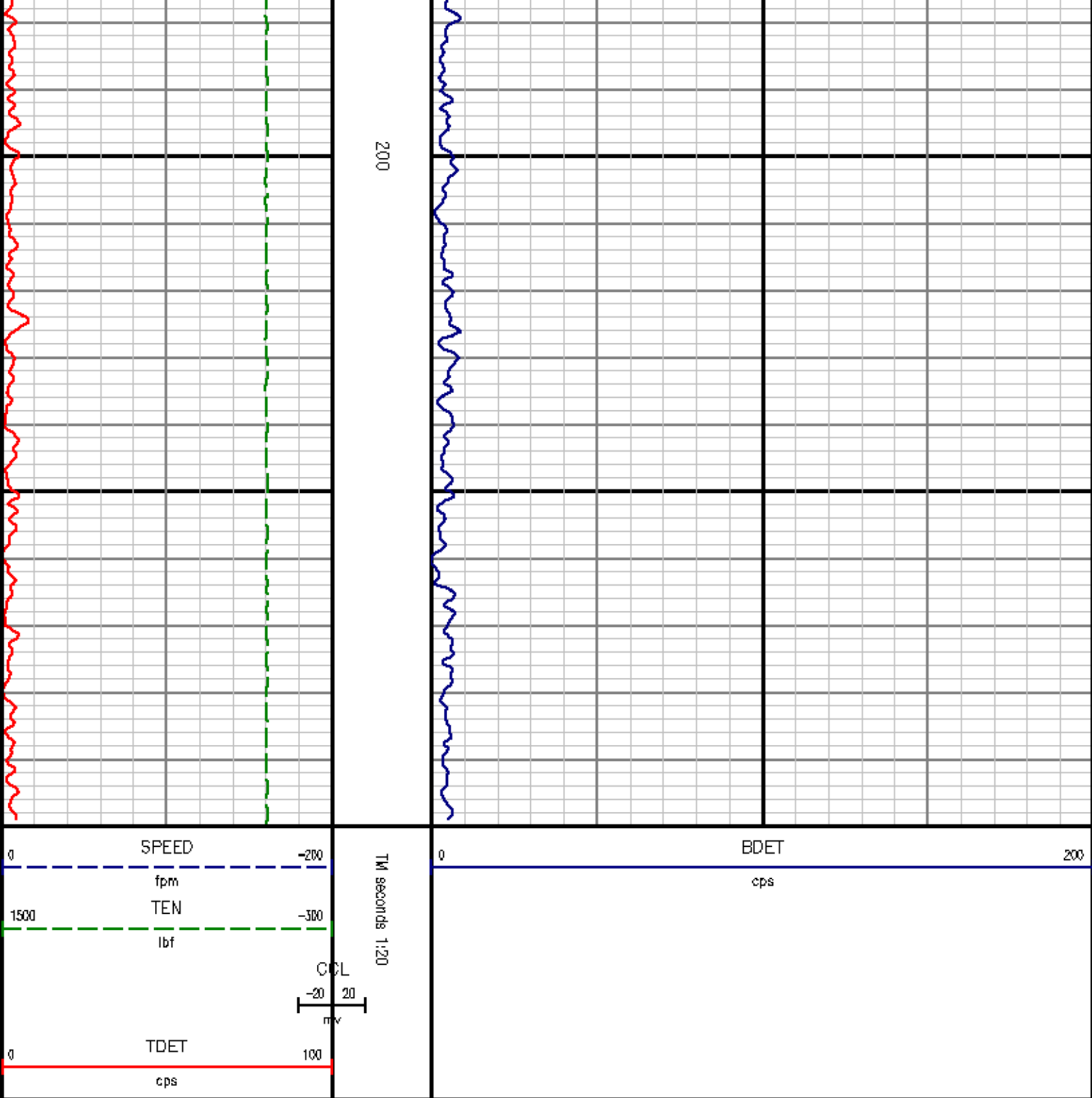


TM seconds 1.20



0  
100





SLUG #1  
 RELEASE @ 3750  
 FILES 3-8

## DEPTH OFFSETS

(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
B219XA	-8.500	TDET	TDETB
B219XA	0.000	BDET	BDETB
SYSTEM	0.000	TEN	TTEB

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

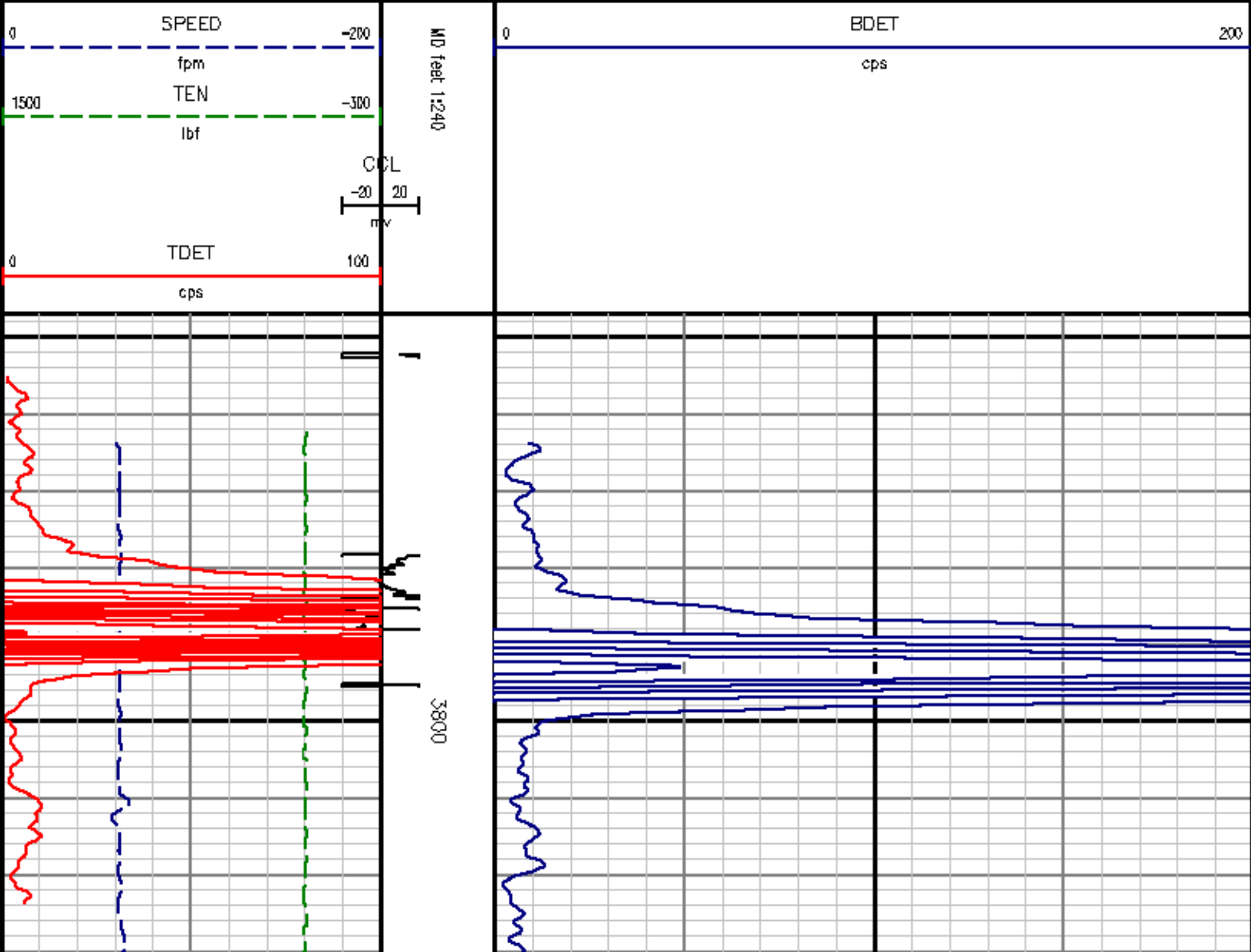
Well : 2-12

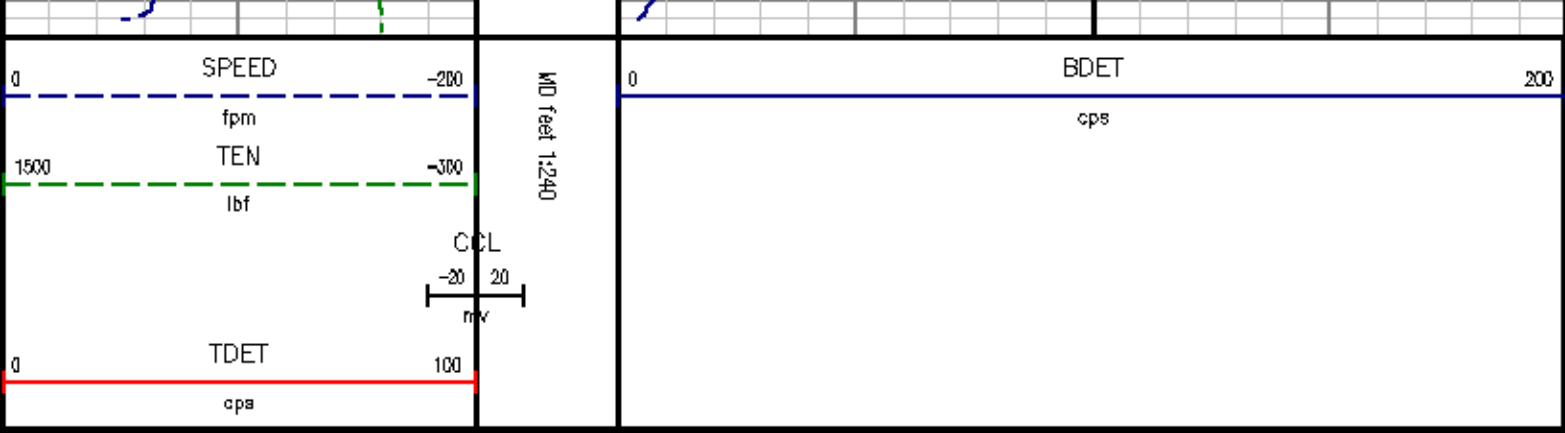
File Name : D:\WELLDATA\TRL736\TRL03.XTF

Mode : PlotMgr 5.4.504

Interval : 3747.00 - 3834.00 feet UP

Created : 6/27/2013 2:21:51 PM

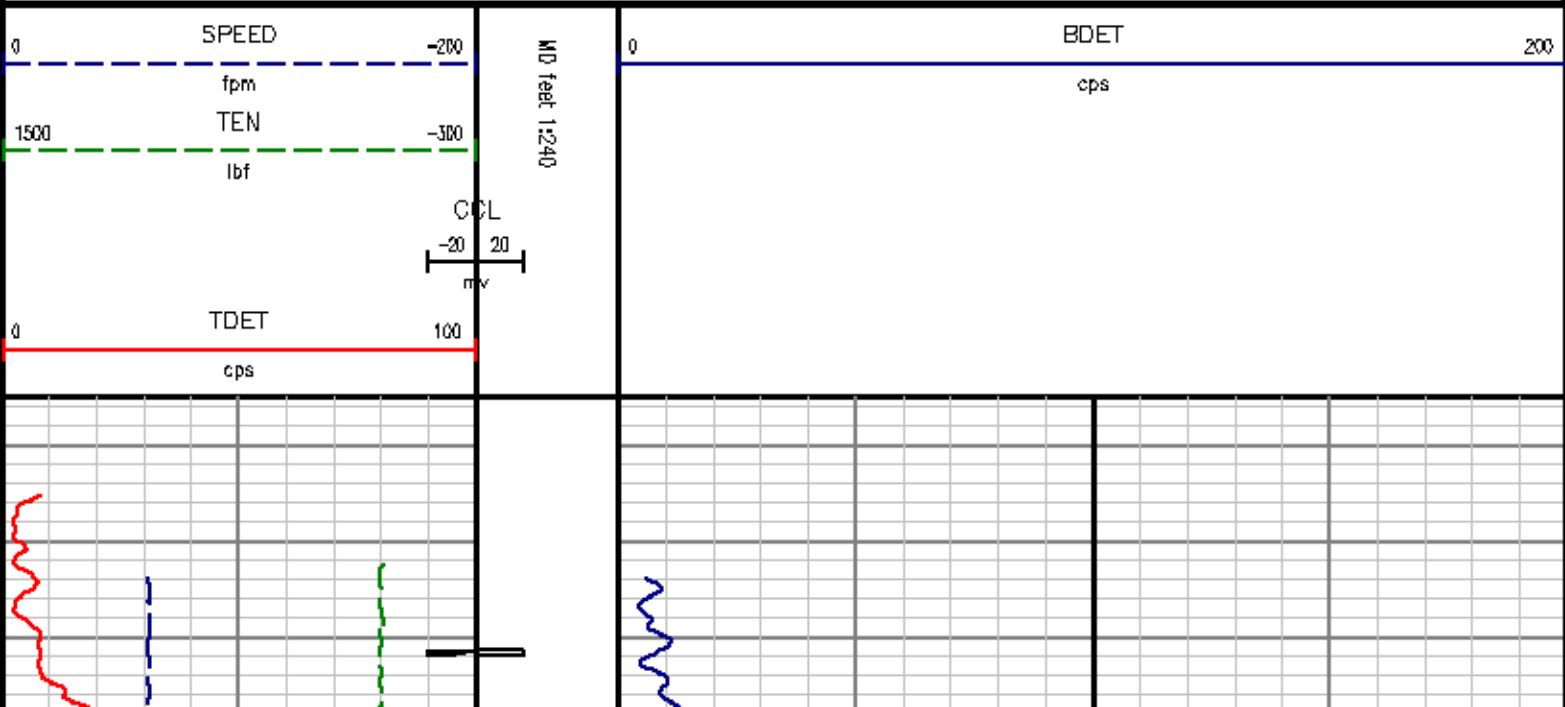


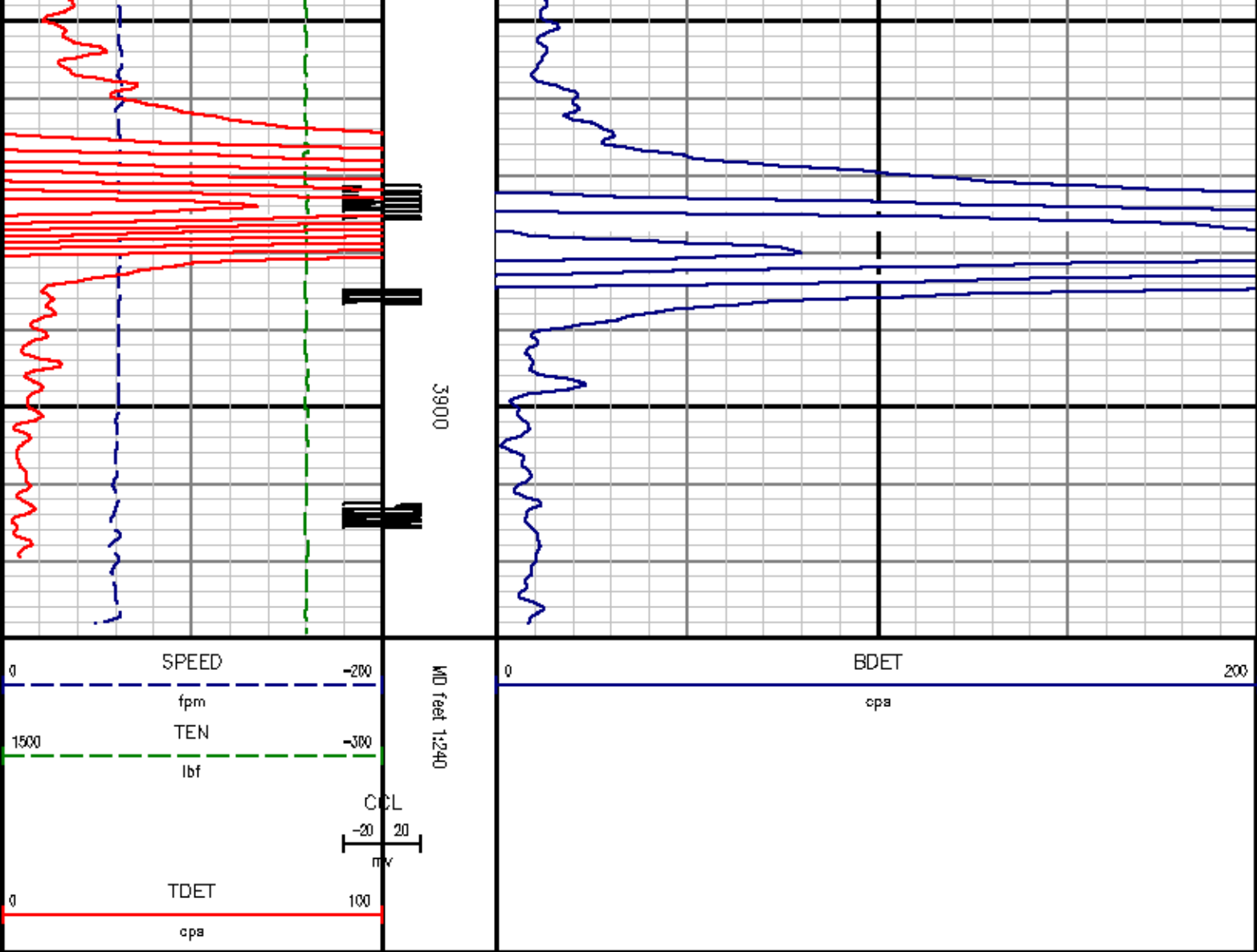


DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL
8219XA	-8.500	TDET TDETB
8219XA	0.000	BDET BDETB
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\TRL736\TRL04.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 3815.00 - 3930.00 feet UP  
 Created : 6/27/2013 2:23:36 PM





### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL
8219XA	-8.500	TDET TDETBU
8219XA	0.000	BDET BDETBU
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

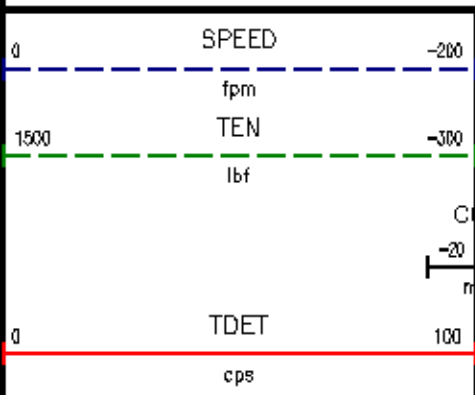
Company : EGT

Well : 2-12

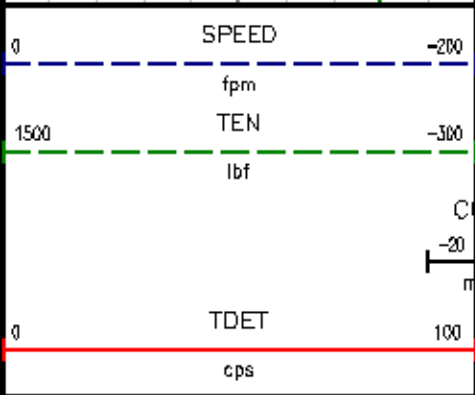
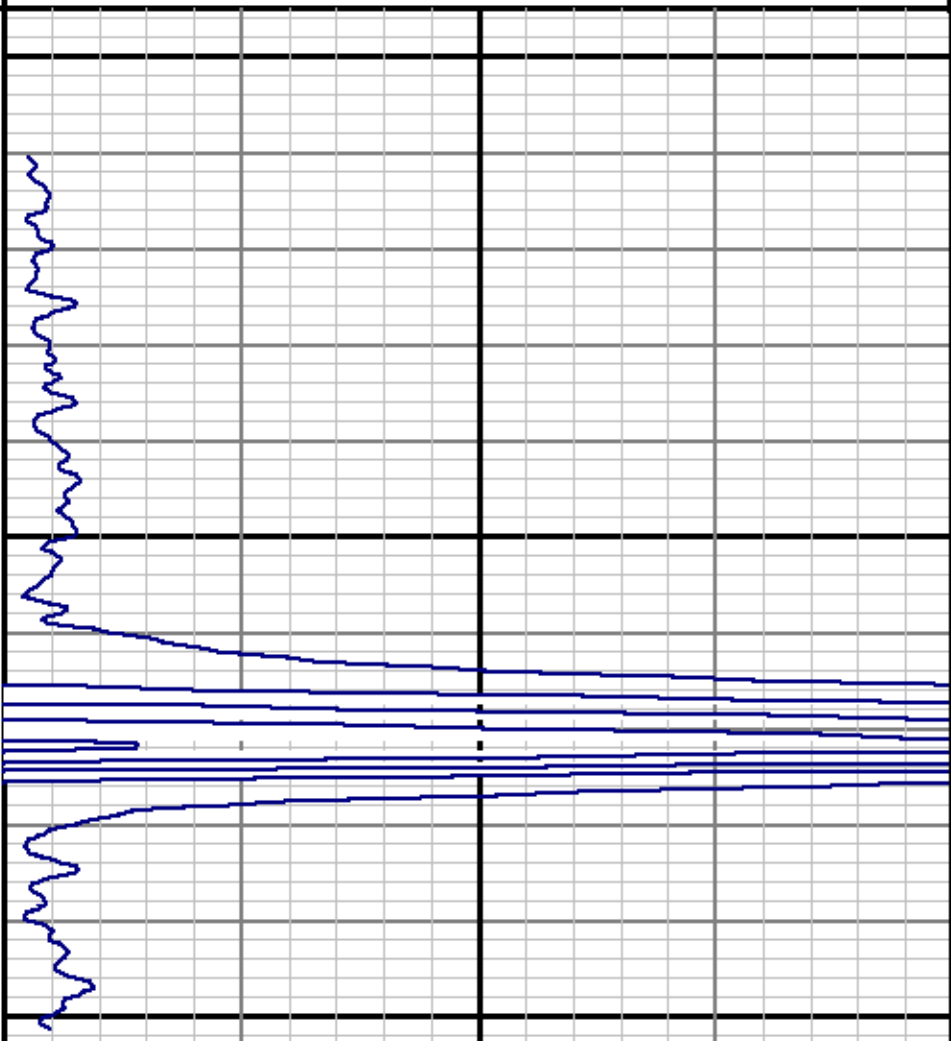
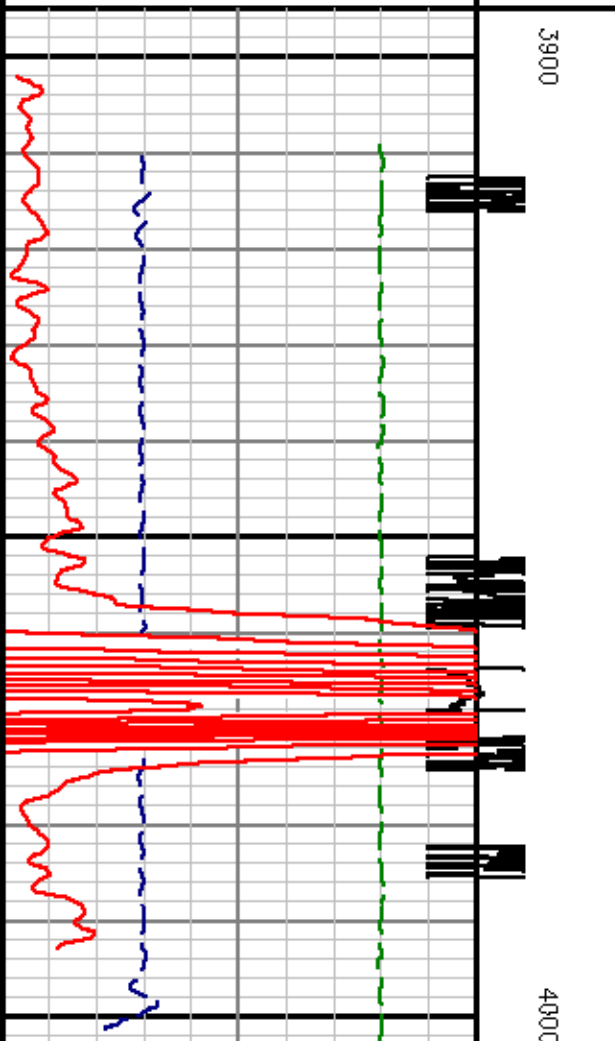
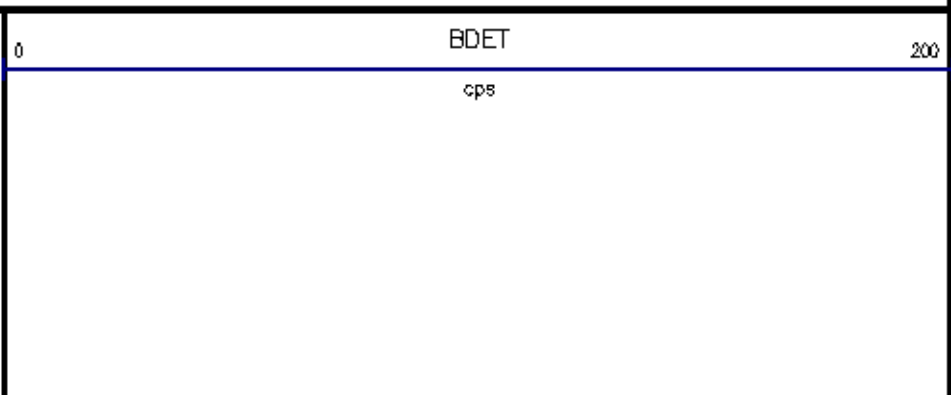
File Name : D:\WELLDATA\TRL736\TRL05.XTF

Mode : PlotMgr 5.4.504

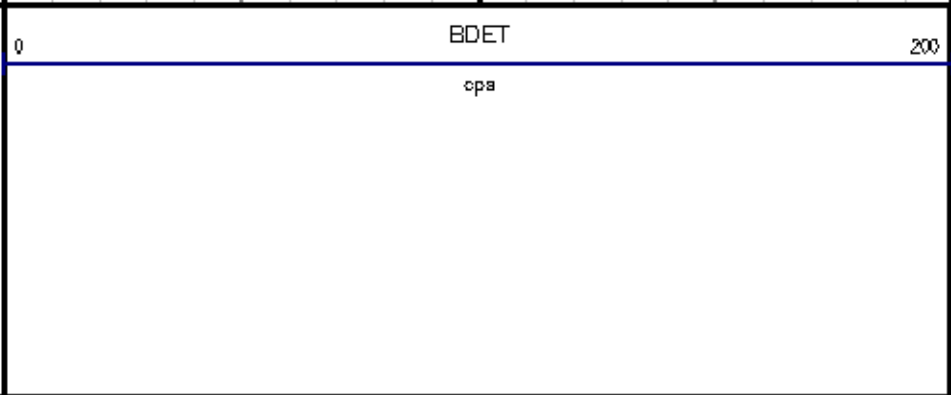
Interval : 3895.00 - 4003.00 feet UP



MD feet 1:240



MD feet 1:240



DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETB
8219XA	0.000	BDET	BDETB
SYSTEM	0.000	TEN	TTE

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

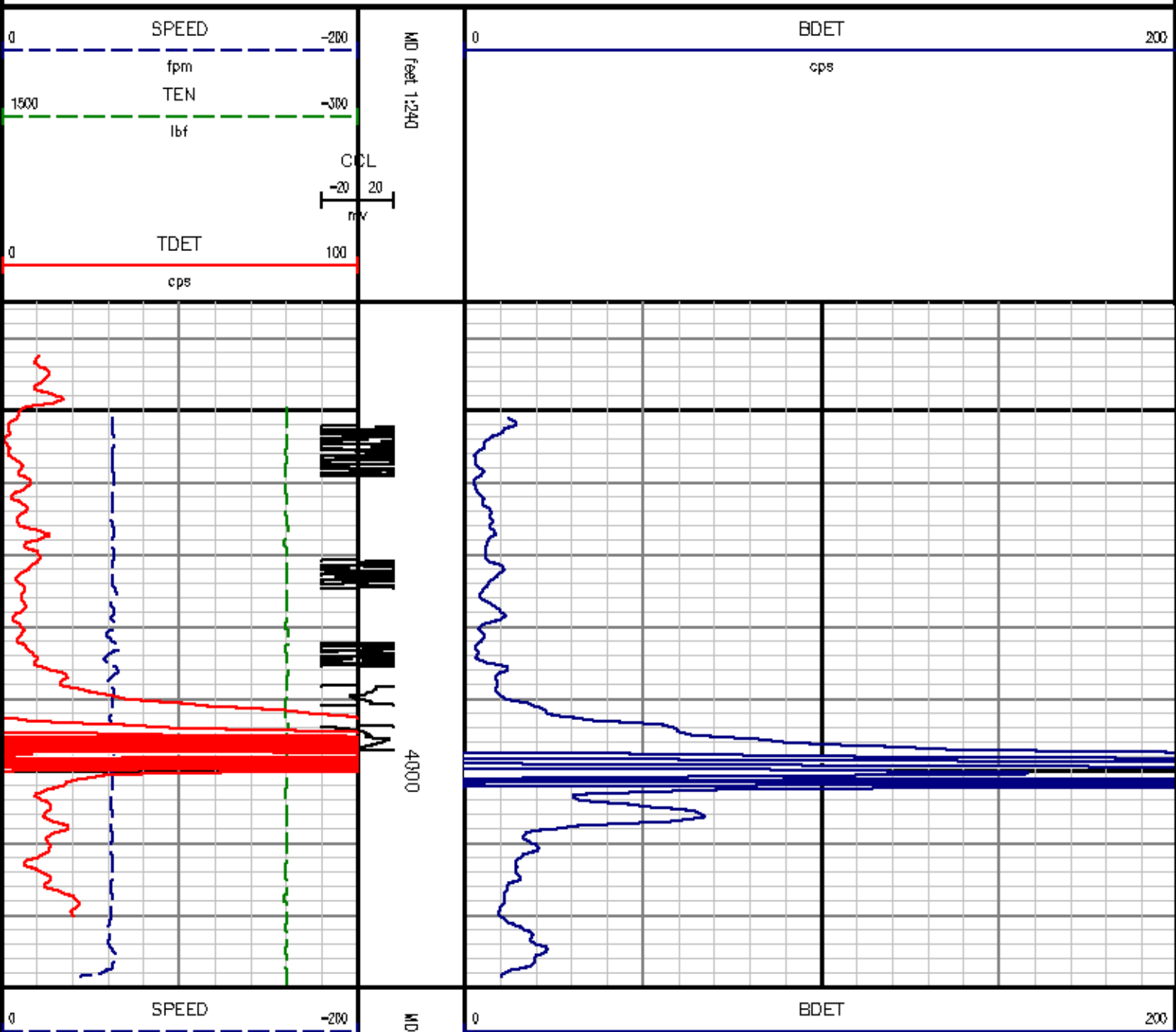
Well : 2-12

File Name : D:\WELLDATA\TRL736\TRL06.XTF

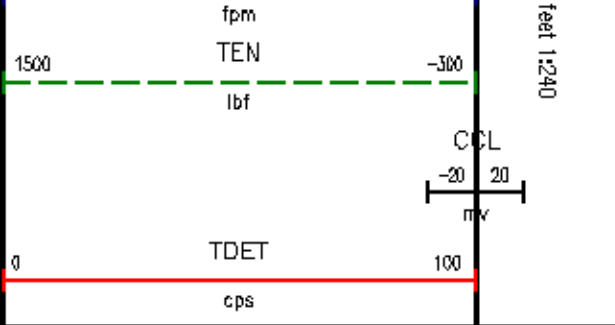
Mode : PlotMgr 5.4.504

Interval : 3935.00 - 4030.00 feet UP

Created : 6/27/2013 2:29:14 PM



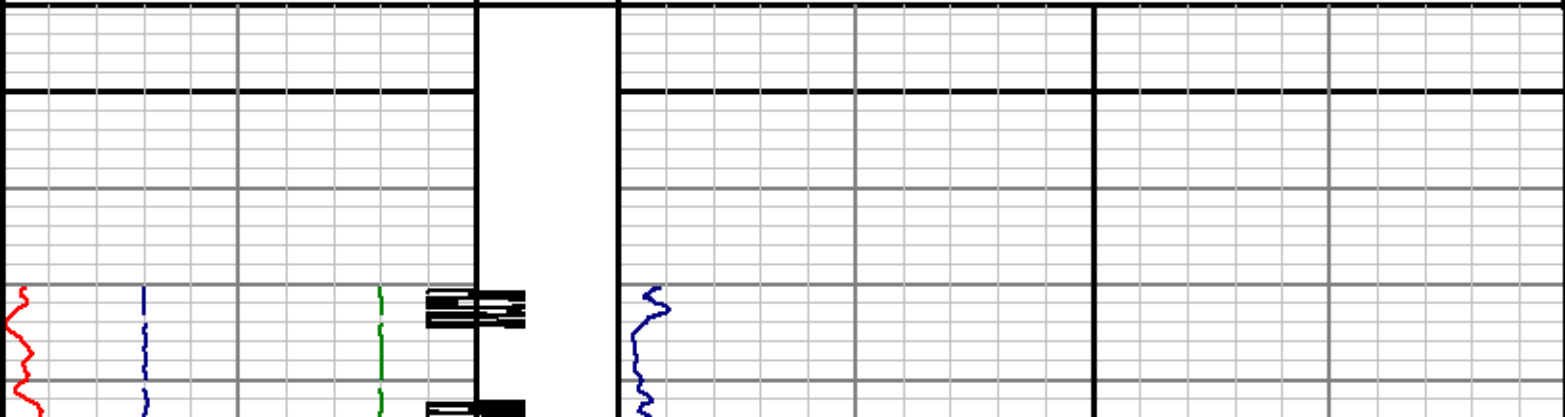
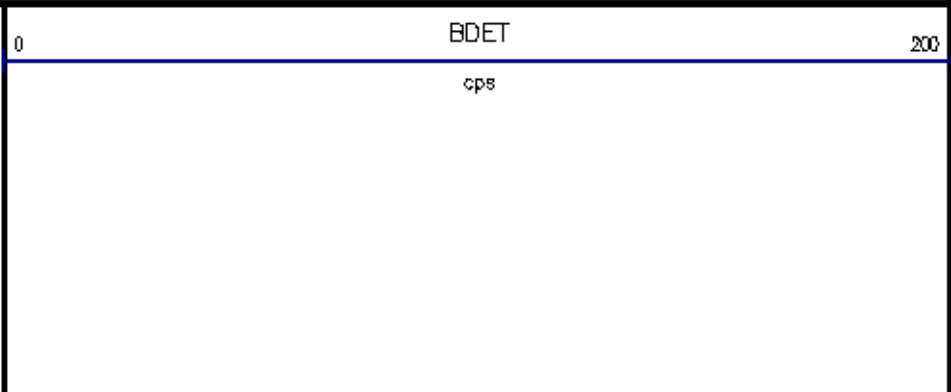
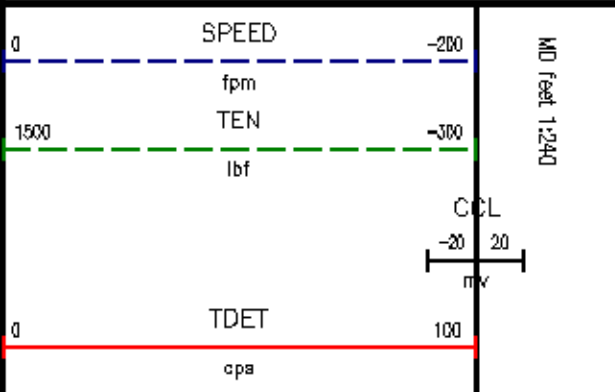


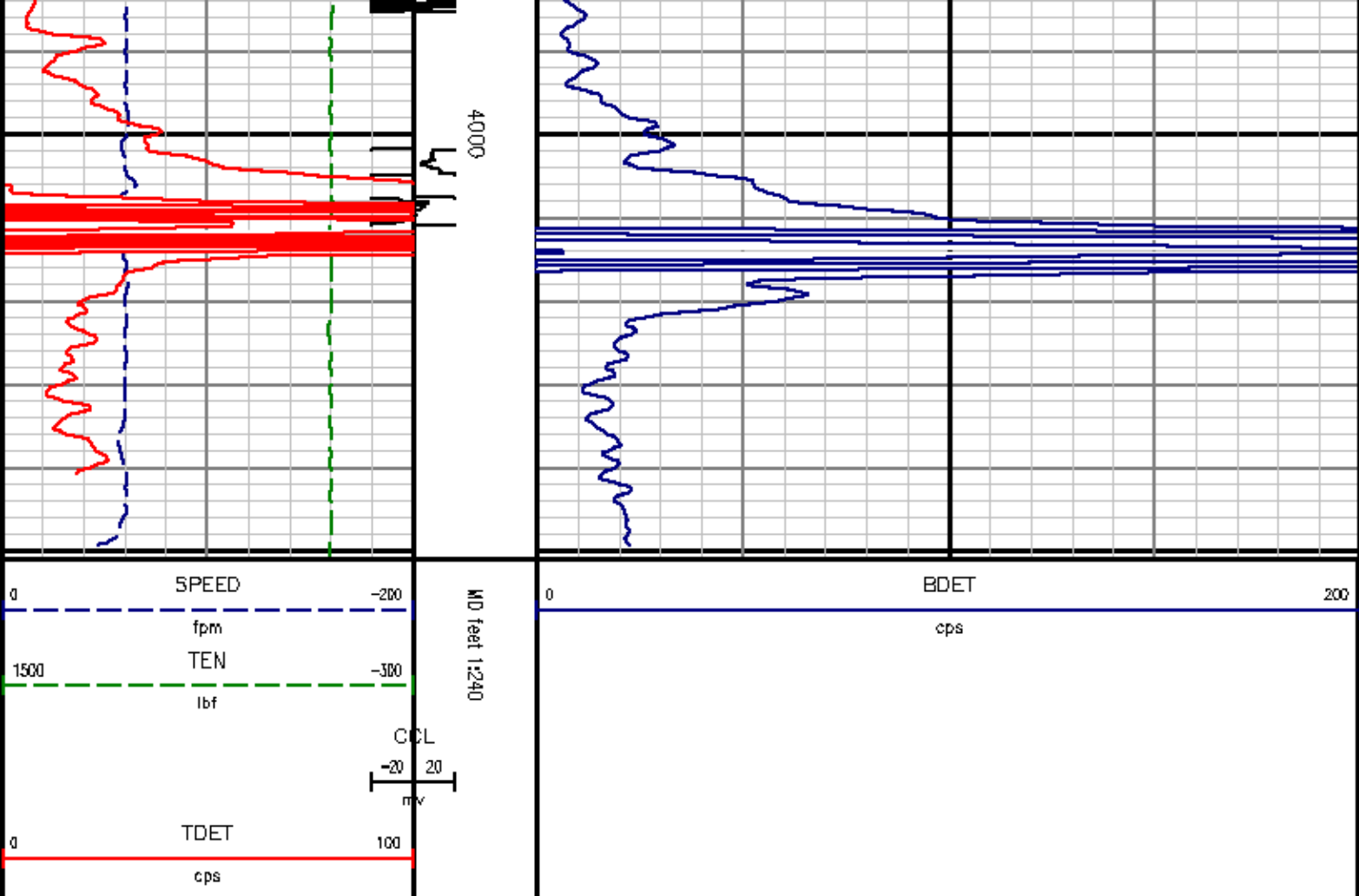


### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL
8219XA	-8.500	TDET TDETB
8219XA	0.000	BDET BDETB
SYSTEM	0.000	TEN TTEN

Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EGT  
 Well : 2-12  
 File Name : D:\WELLDATA\TRL736\TRL07.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 3941.00 - 4051.00 feet UP  
 Created : 6/27/2013 2:31:32 PM



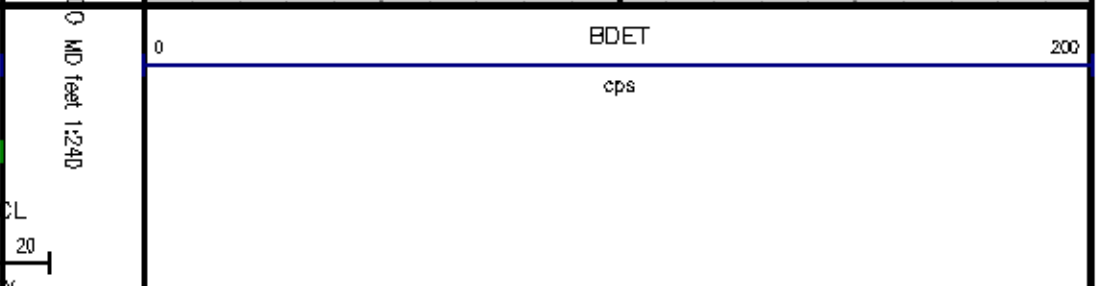
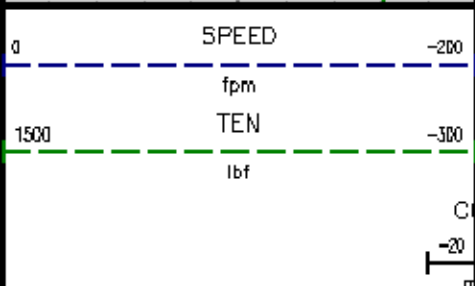
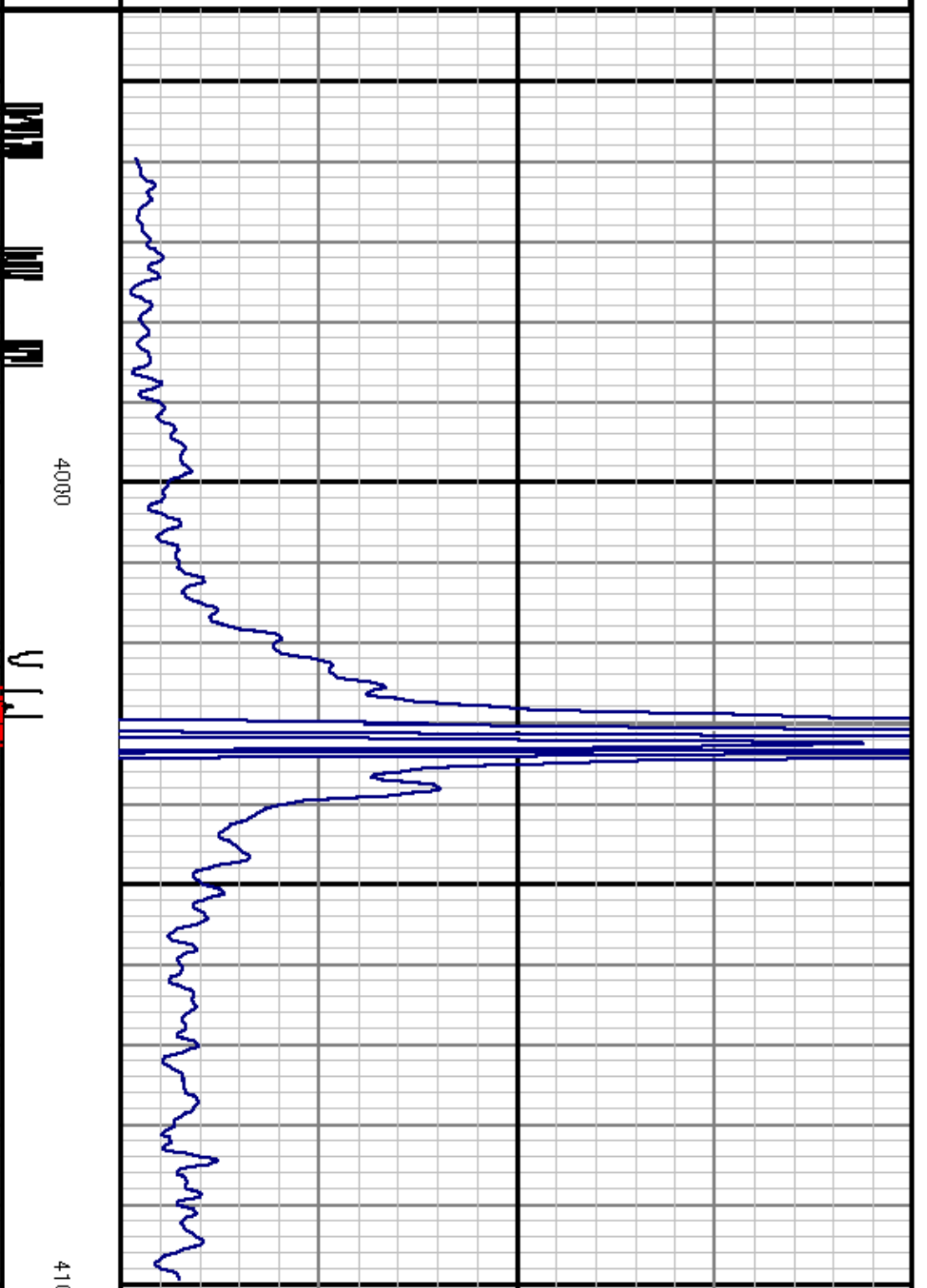
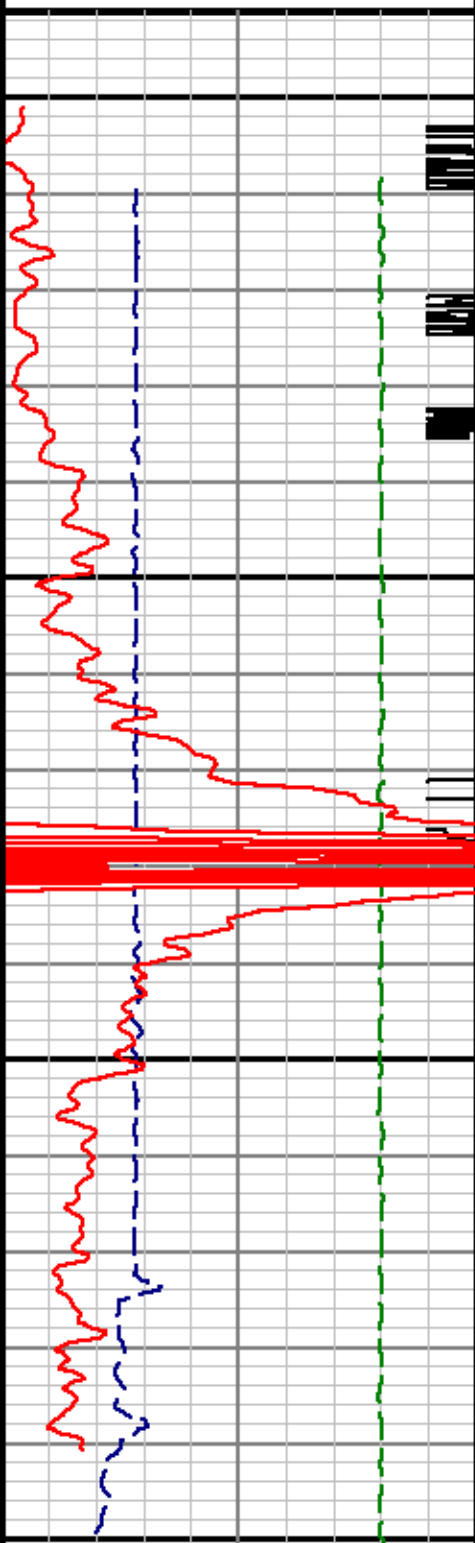
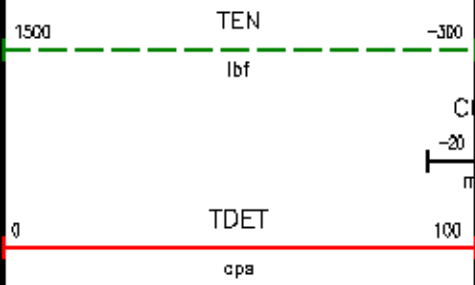


### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL
8219XA	-8.500	TDET TDETBU
8219XA	0.000	BDET BDETBU
SYSTEM	0.000	TEN TTEN

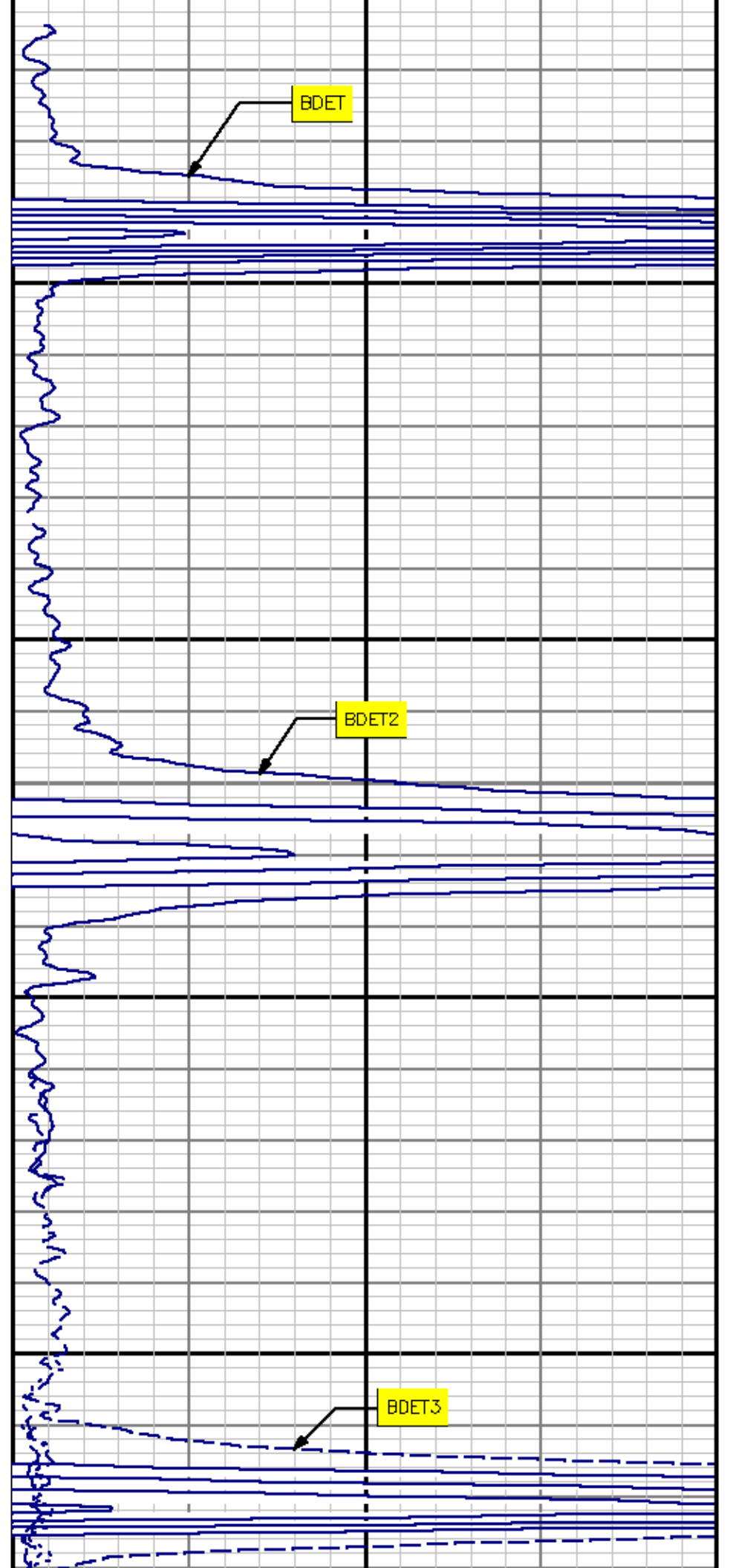
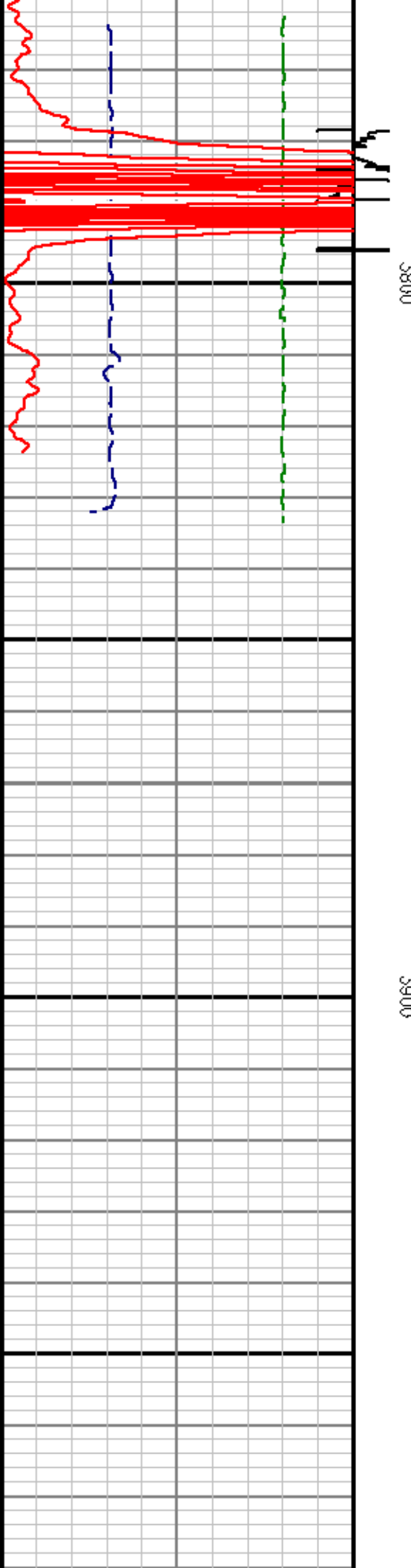
Created by : CNT, v4.07.00  
 Plotted by : PlotMgr, v5.4.504  
 Company : EST  
 Well : 2-12  
 File Name : D:\WELLDATA\TRL736\TRL08.XTF  
 Mode : PlotMgr 5.4.504  
 Interval : 3941.00 - 4101.00 feet UP  
 Created : 6/27/2013 2:34:33 PM

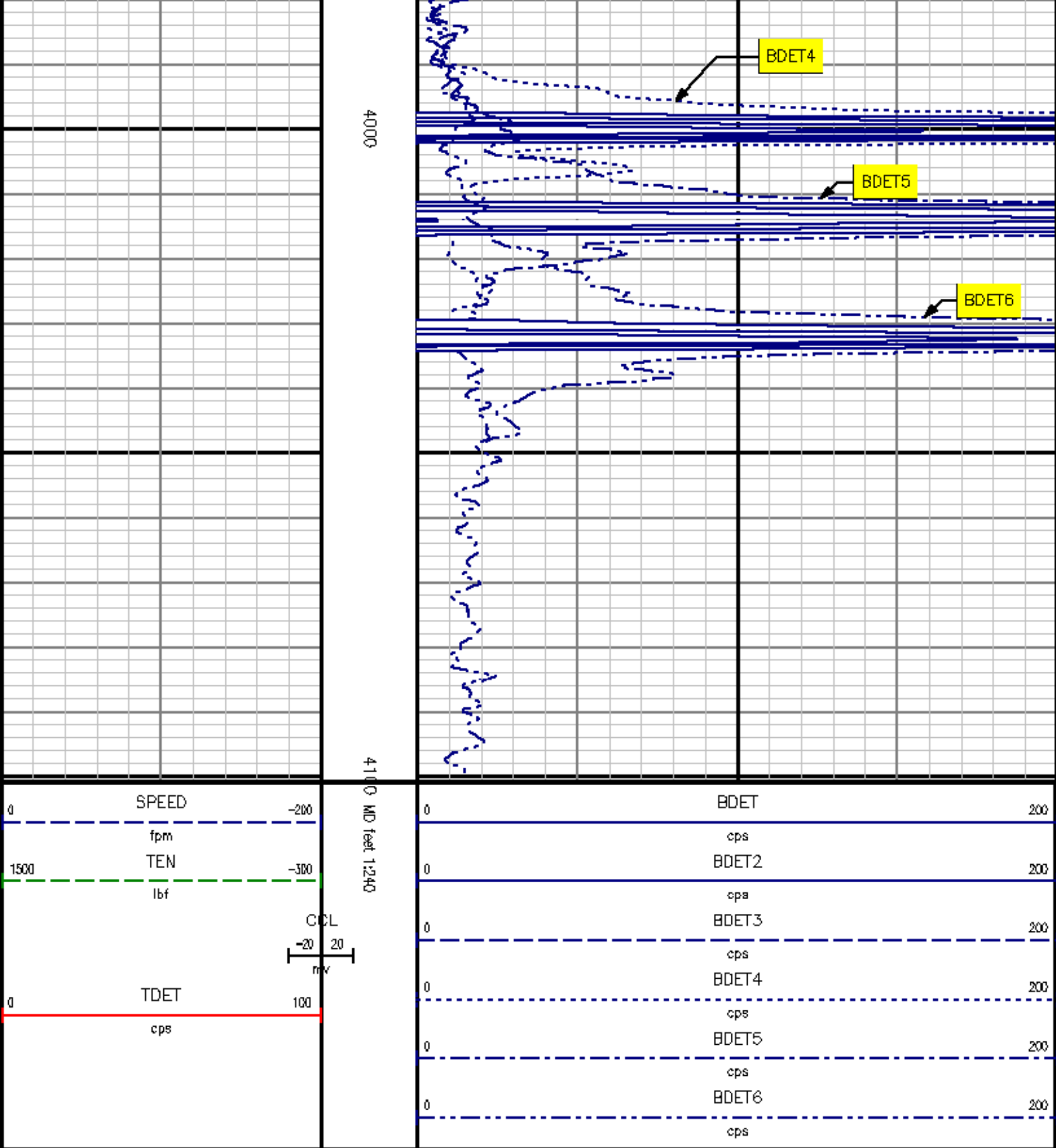




41100 MD Feet 1:240







## TIME DRIVE

RELEASE SLUG @ 3750'

SET BDET @ 3980'

30 MIN

### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETBU
8219XA	0.000	BDET	BDETBU
SYSTEM	0.000	TEN	TTEN

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

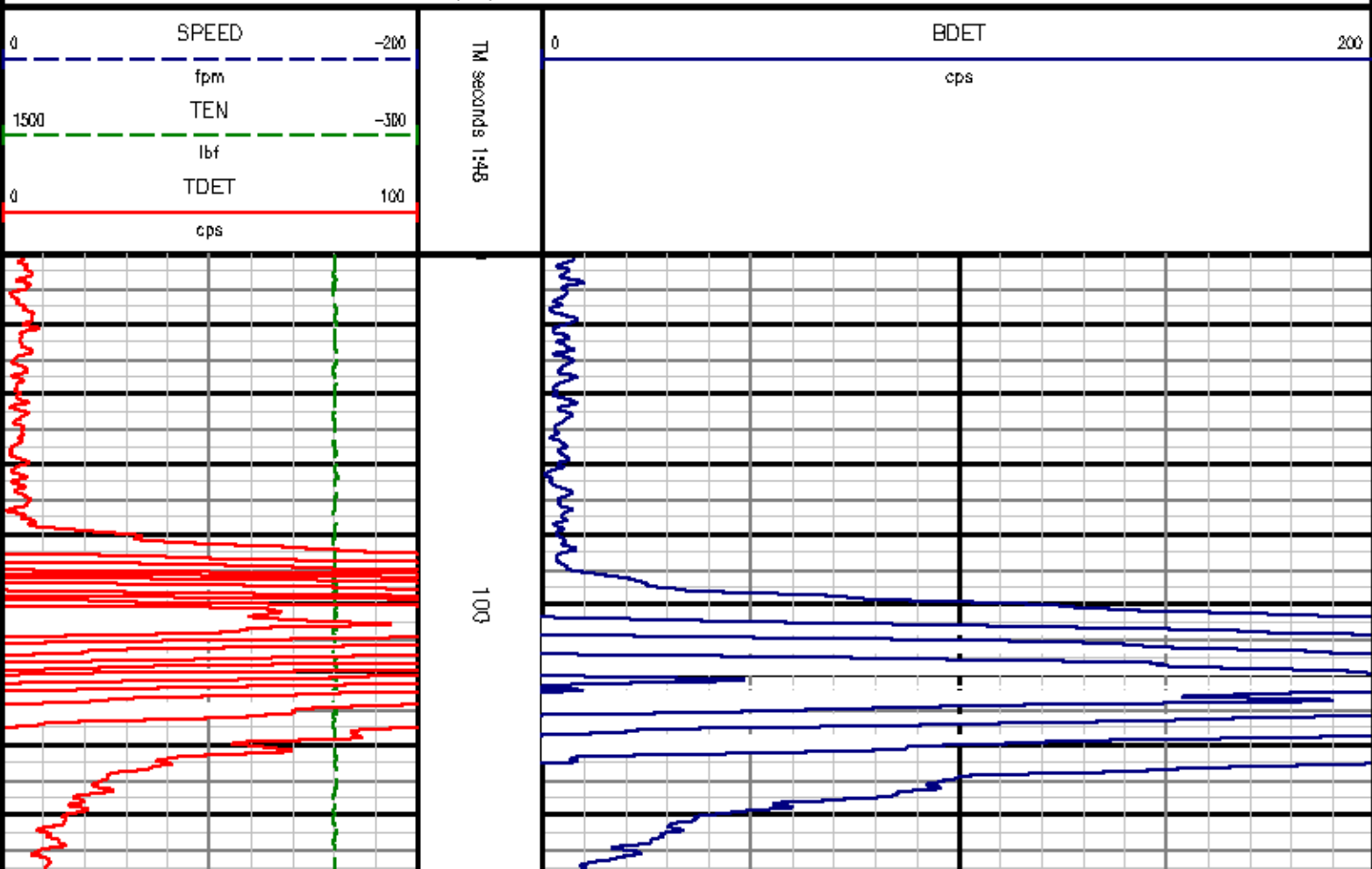
Well : 2-12

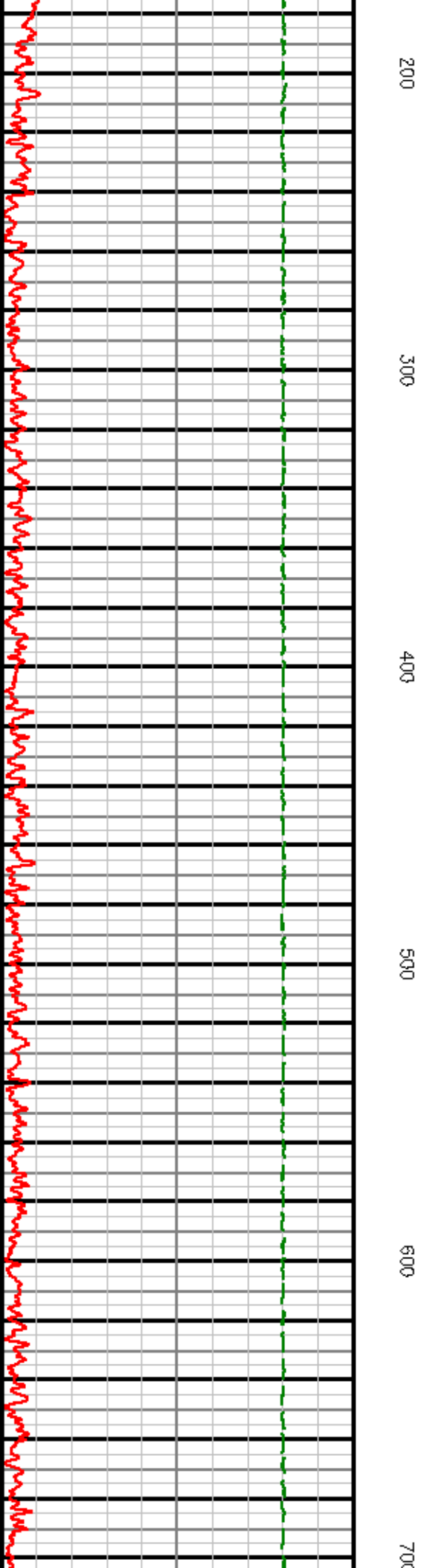
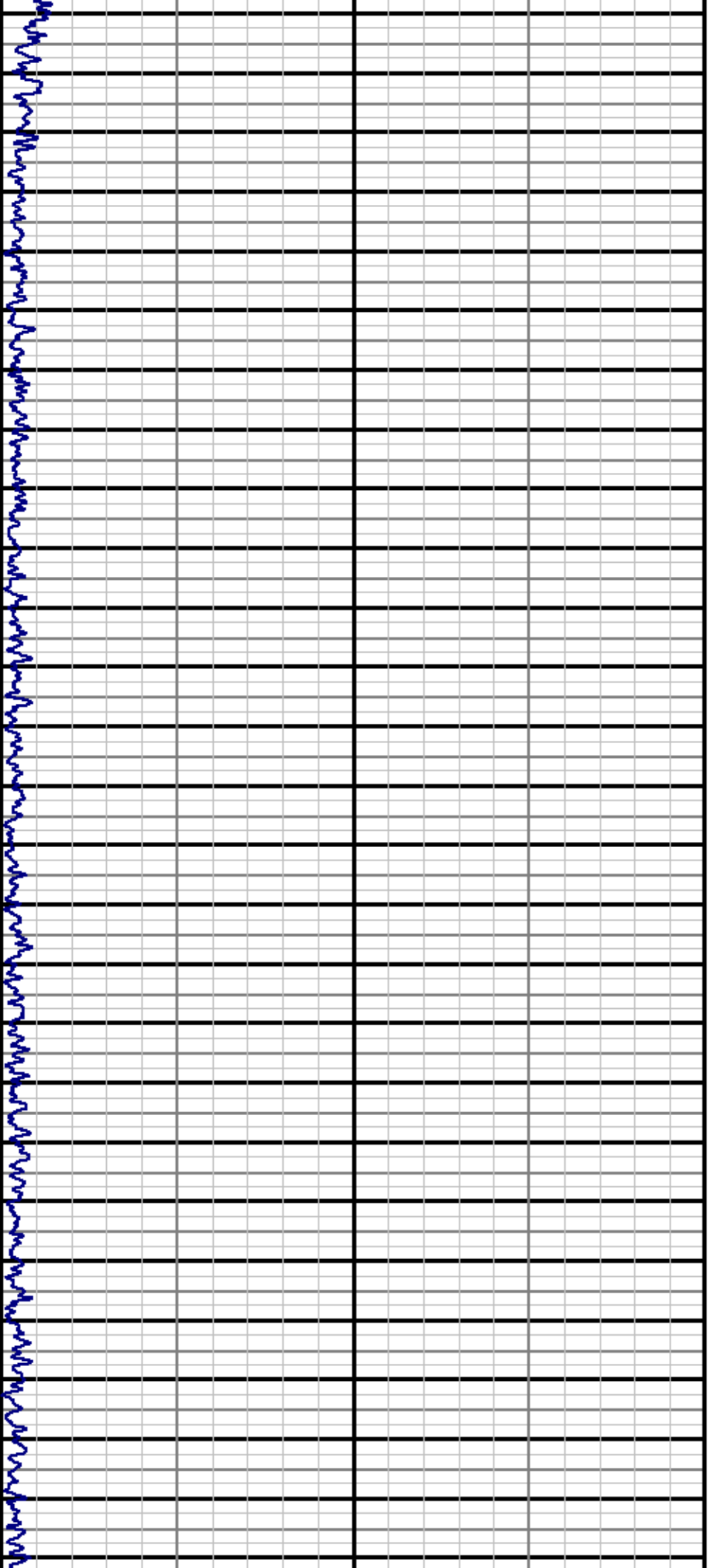
File Name : D:\WELLDATA\TRL736\TRL10.XTF

Mode : PlotMgr 5.4.504

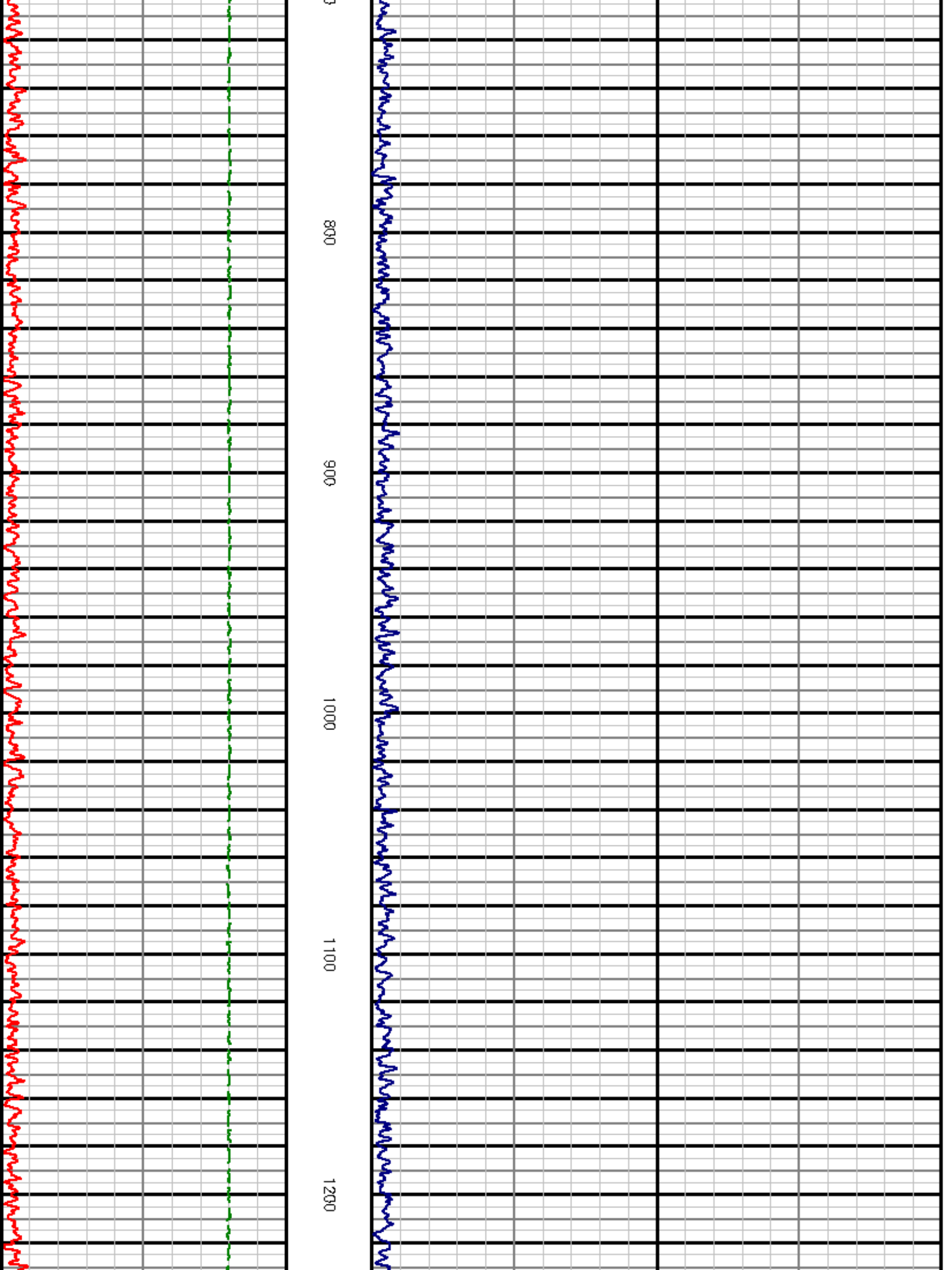
Interval : 0 to 2020

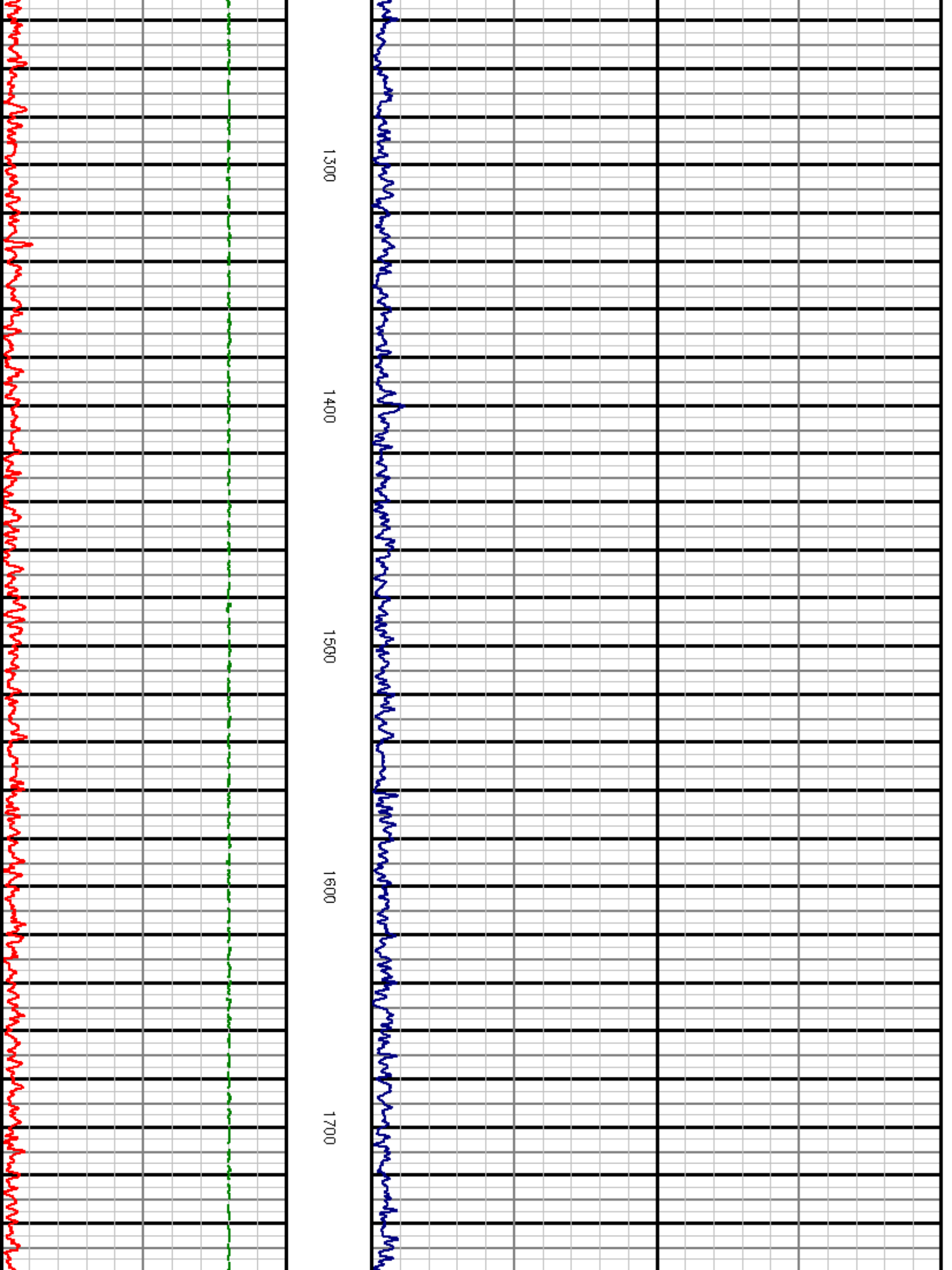
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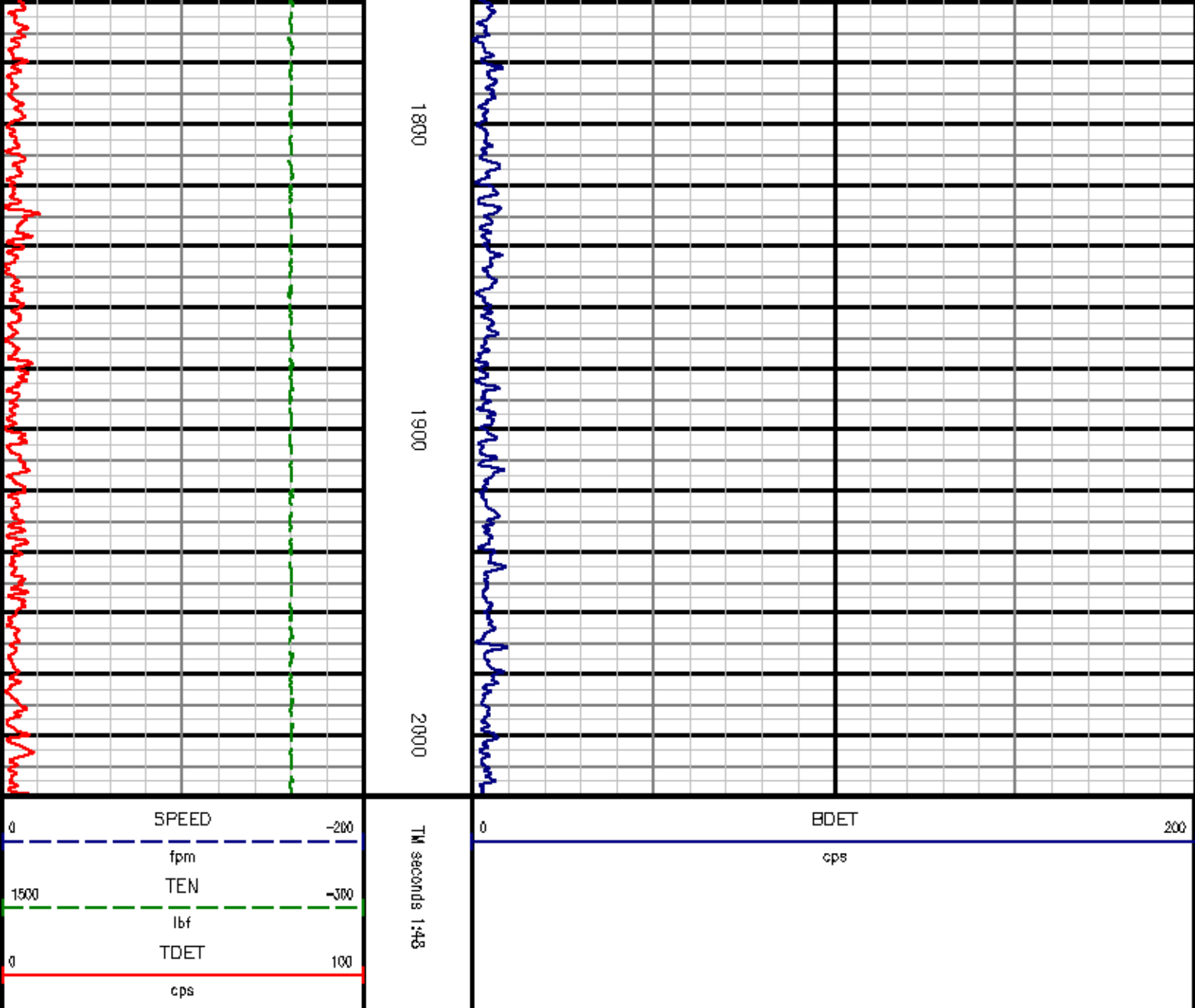












*AFTER BASE GAMMA RAY PASS*

DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES
2324NA	-10.500	CCL ACCL
8219XA	-8.500	TDET TDETB
8219XA	0.000	BDET BDETB

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

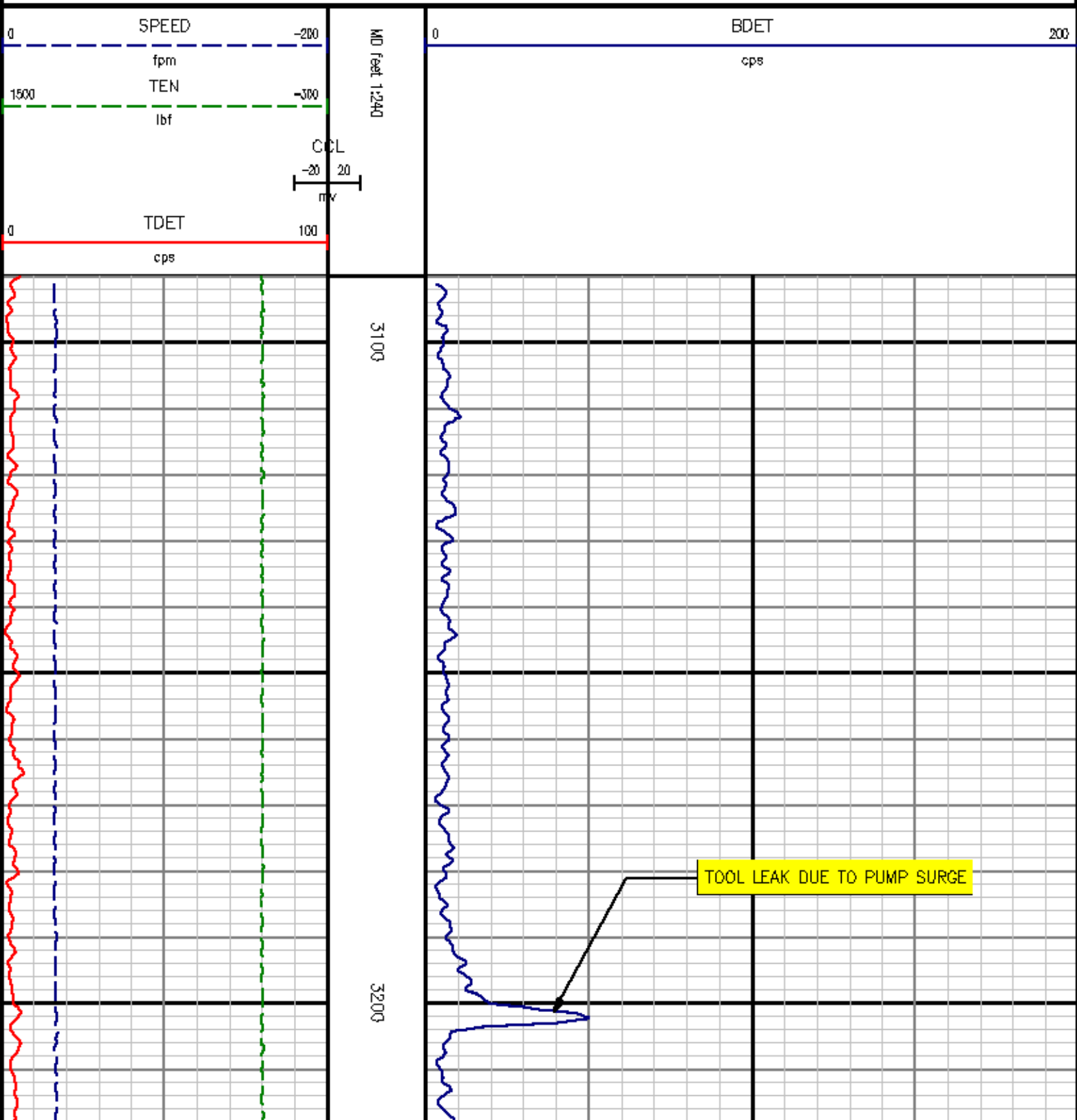
Well : 2-12

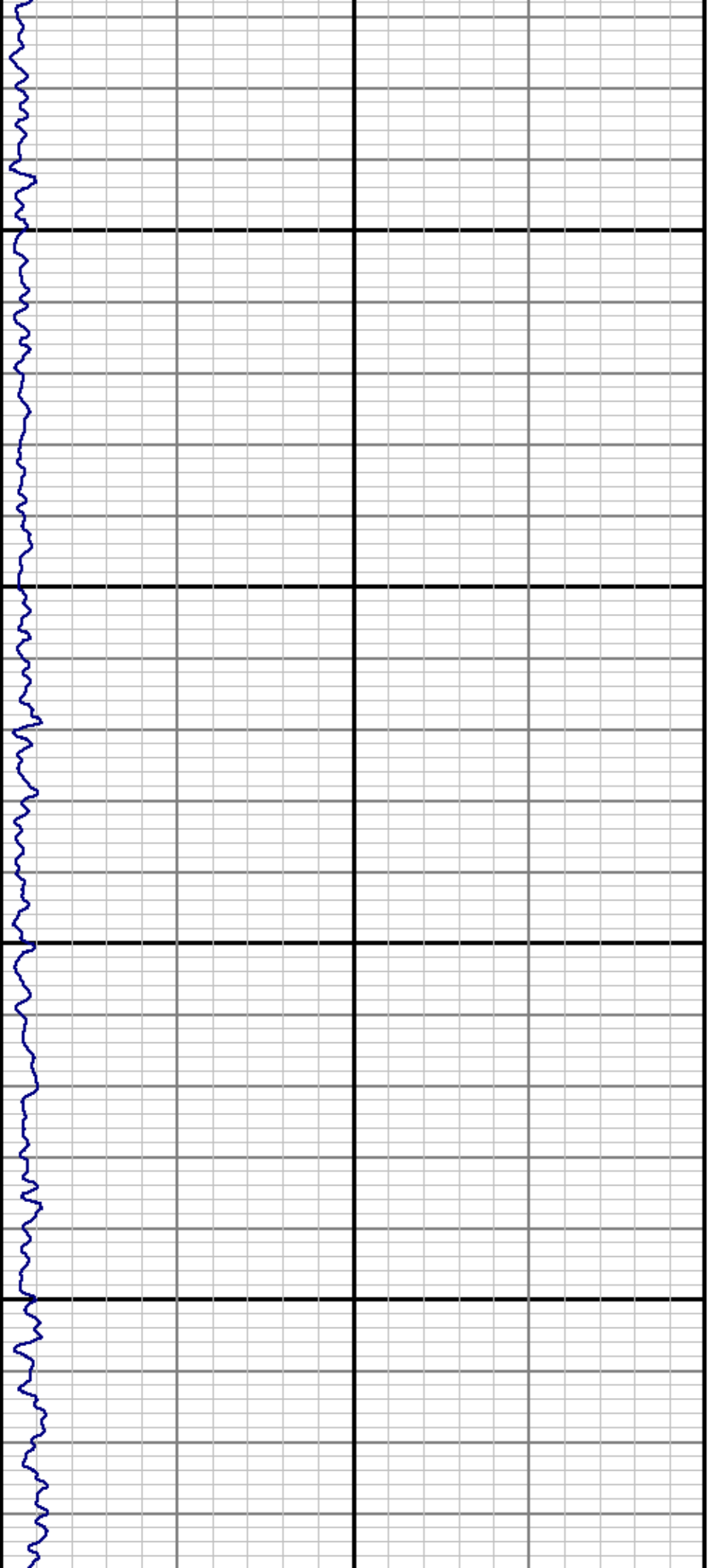
File Name : D:\WELLDATA\TRL736\TRL11.XTF

Mode : PlotMgr 5.4.504

Interval : 3090.00 - 4180.00 feet UP

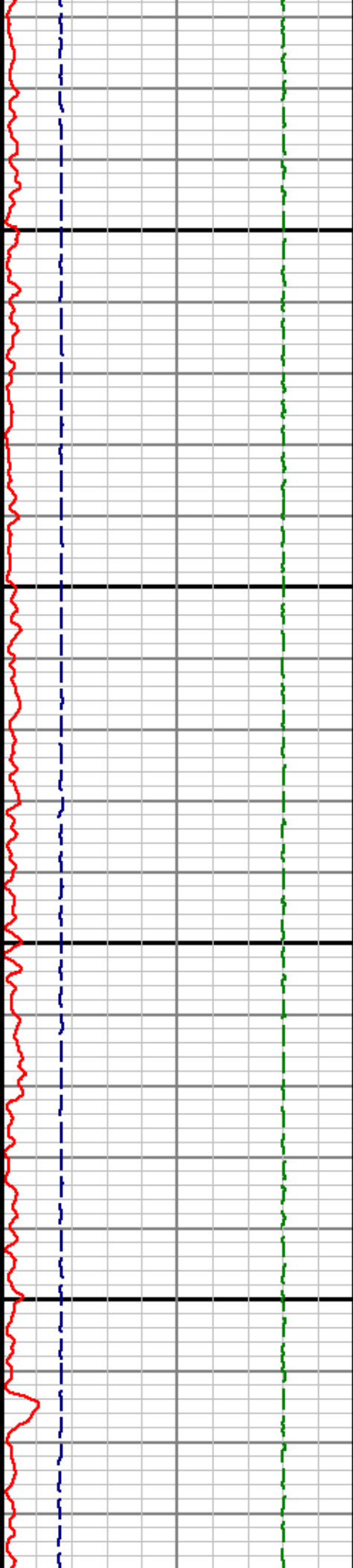
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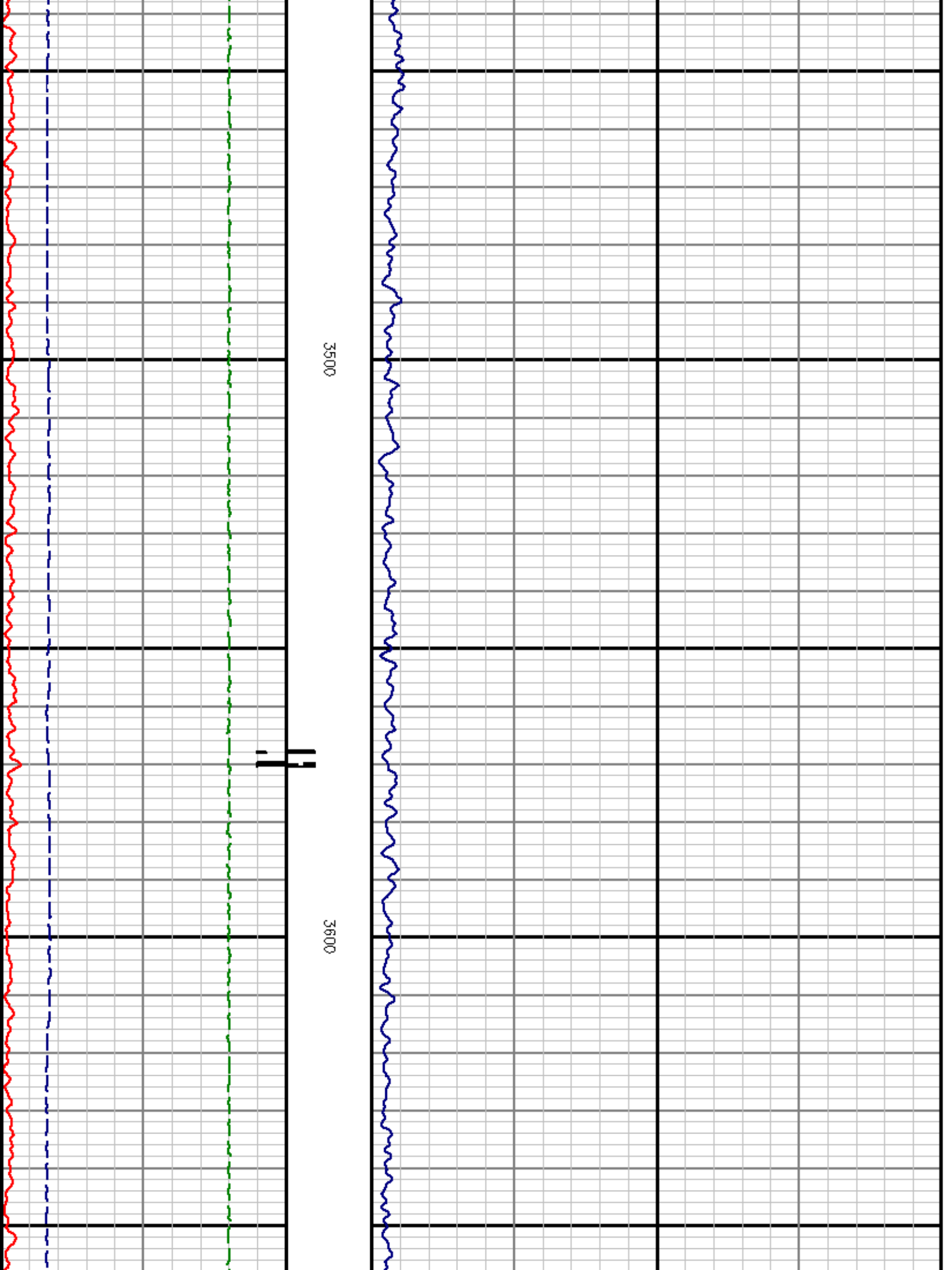


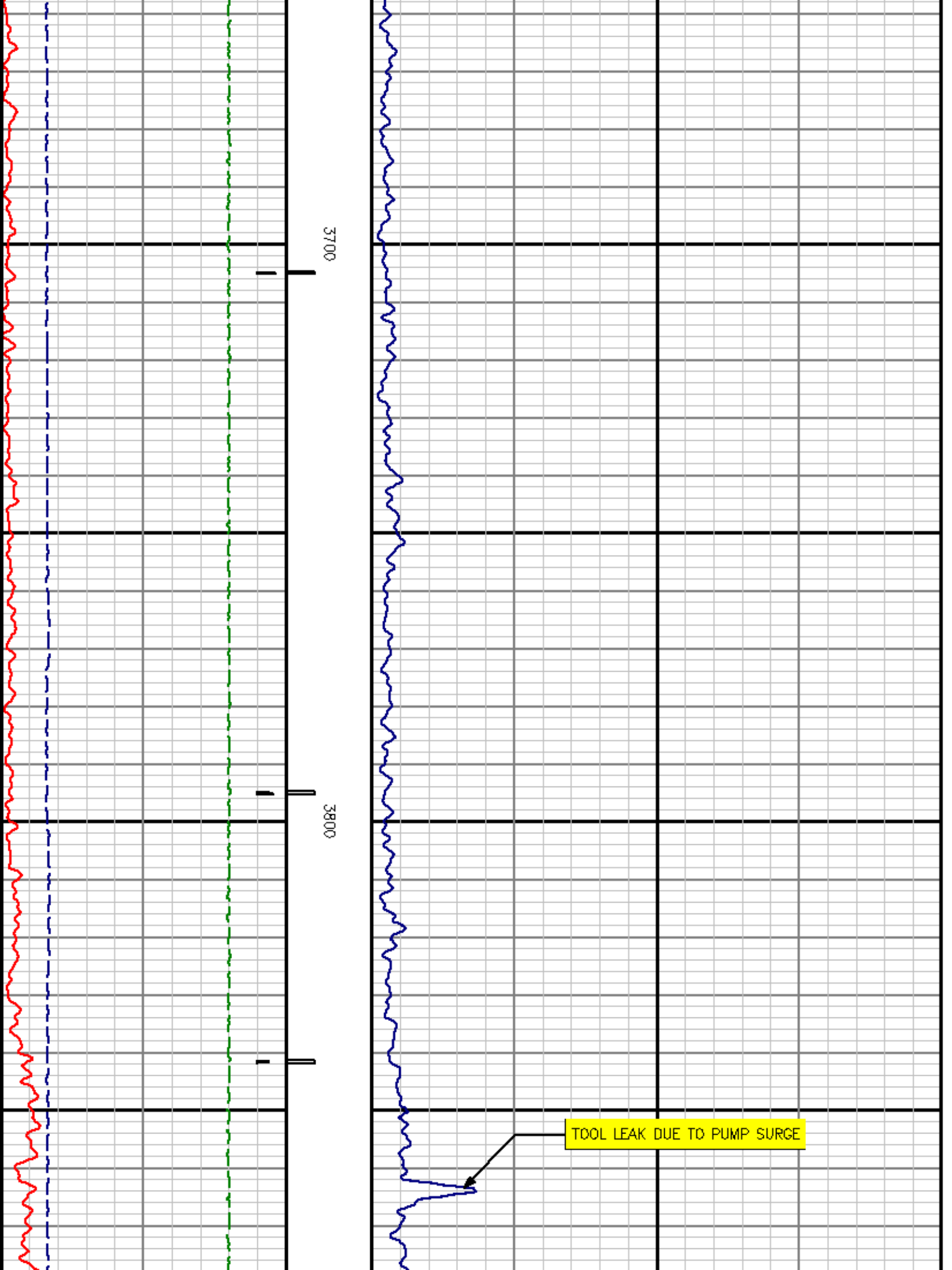


3300

3400



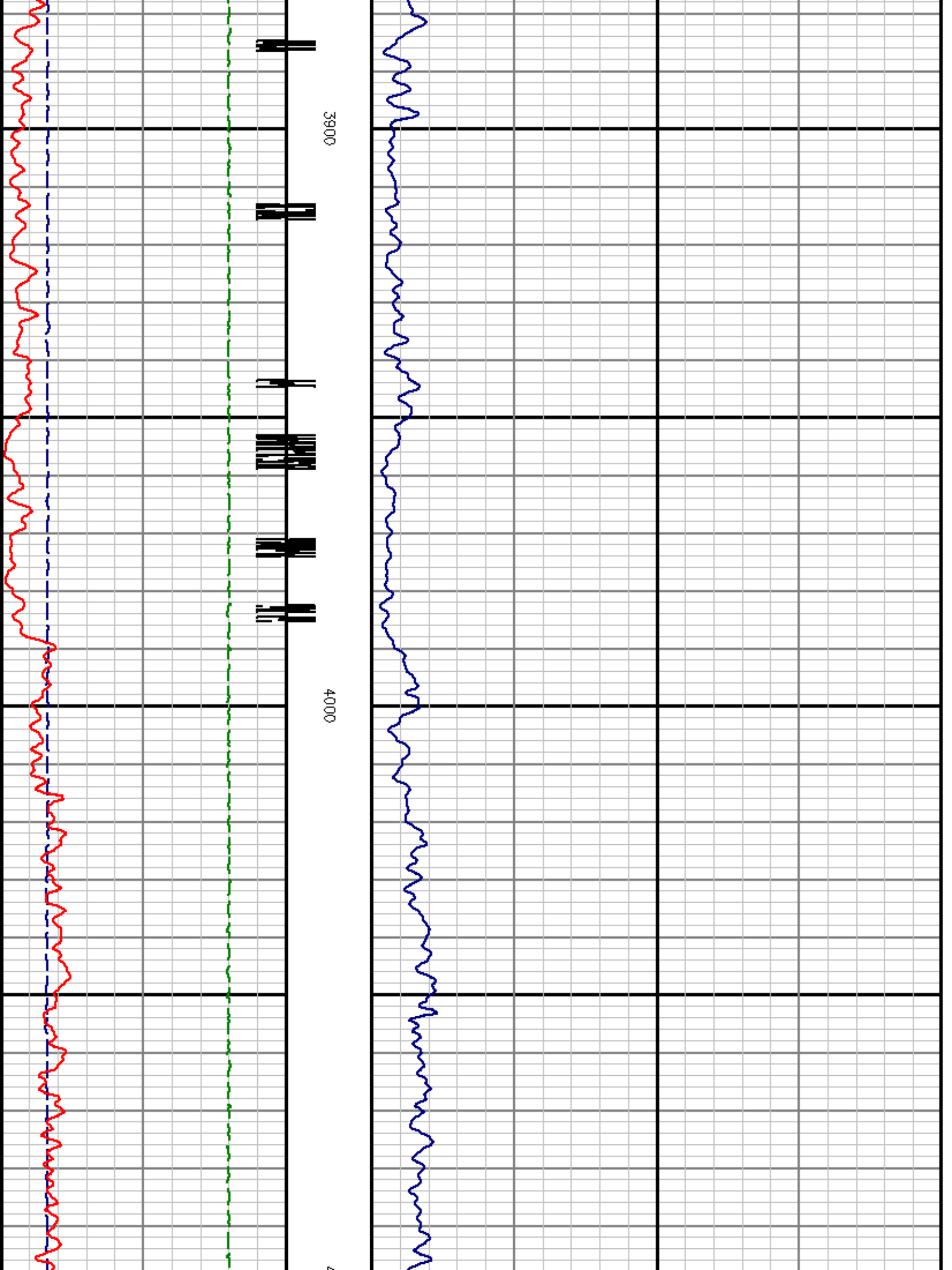




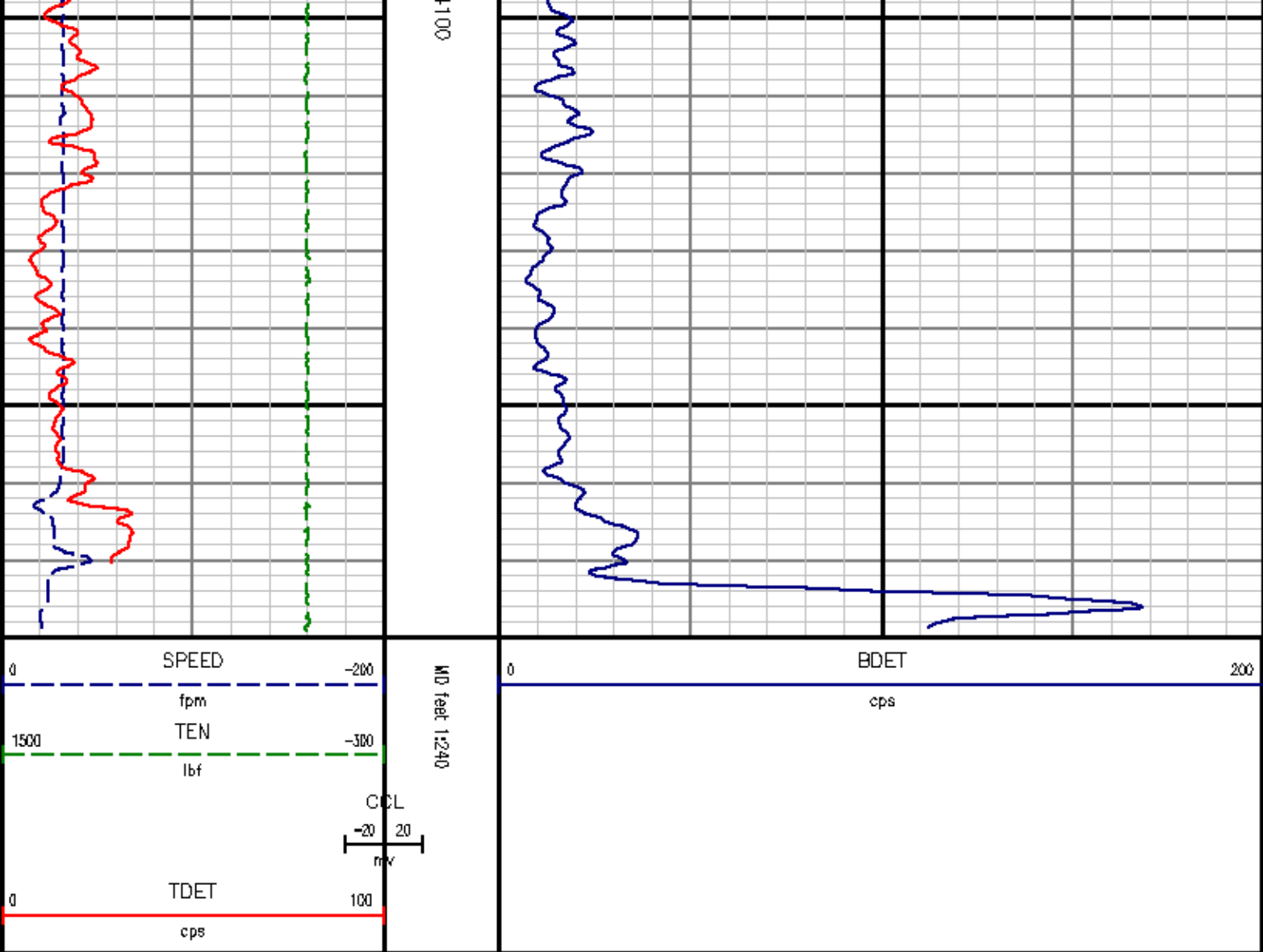
TOOL LEAK DUE TO PUMP SURGE

3700

3800







*REPEAT AREA @ 3200'  
DUE TO PUMP SURGE*

DEPTH OFFSETS  
(for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
		CCL	ACCL
2324NA	-10.500	TDET	TDETBU
B219XA	-8.500	BDET	BDETB
B219XA	0.000	TEN	TEN
SYSTEM	0.000		

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

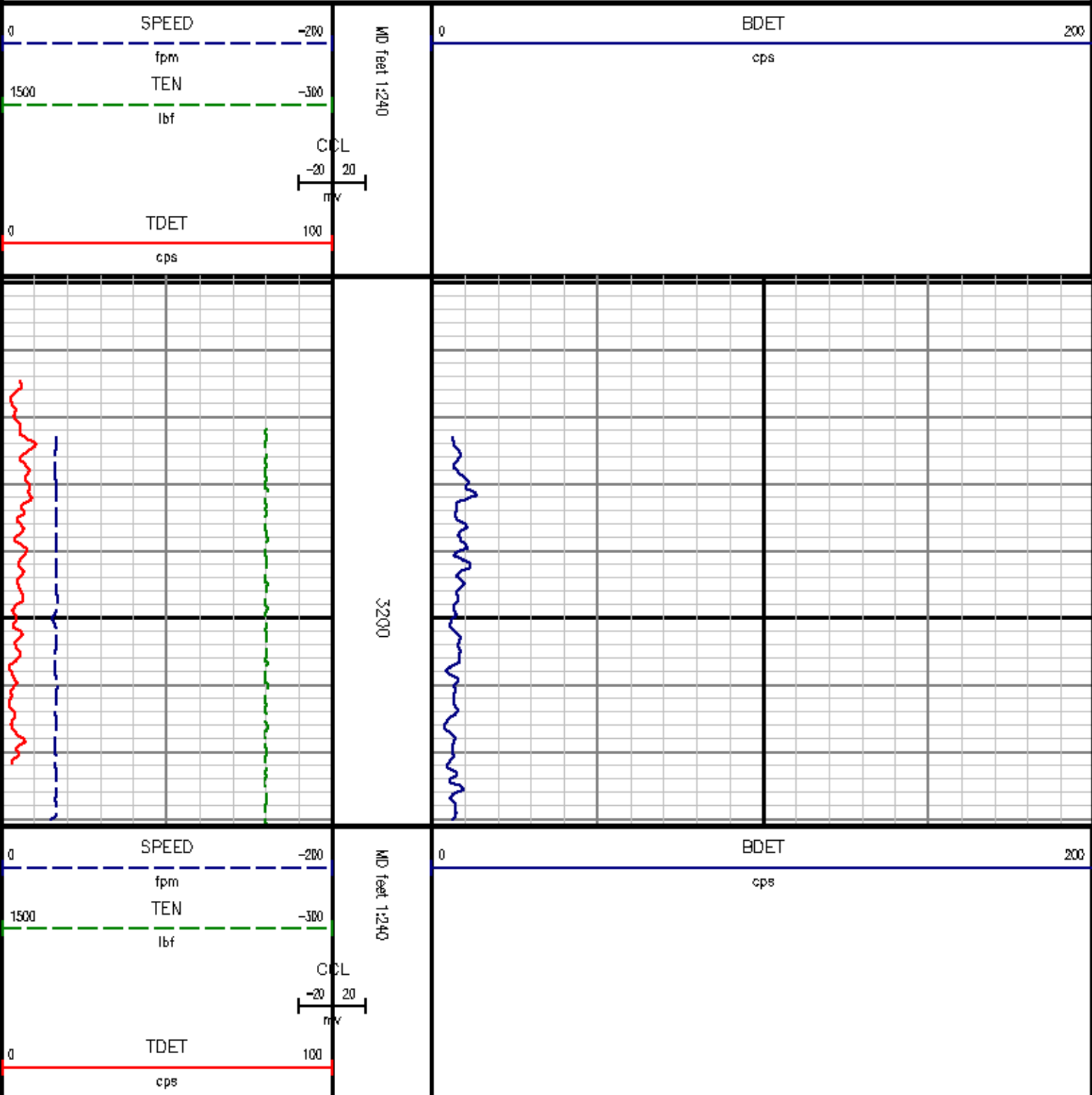
Well : 2-12

File Name : D:\WELLDATA\TRL736\TRL13.XTF

Mode : PlotMgr 5.4.504

Interval : 3149.00 - 3231.00 feet UP

Created : 6/27/2013 4:22:26 PM



# REPEAT AREA @ 3868' DUE TO PUMP SURGE

## DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETB
8219XA	0.000	BDET	BDETB
SYSTEM	0.000	TEN	TTE

Created by : CNT, v4.07.00

Plotted by : PlotMgr, v5.4.504

Company : EGT

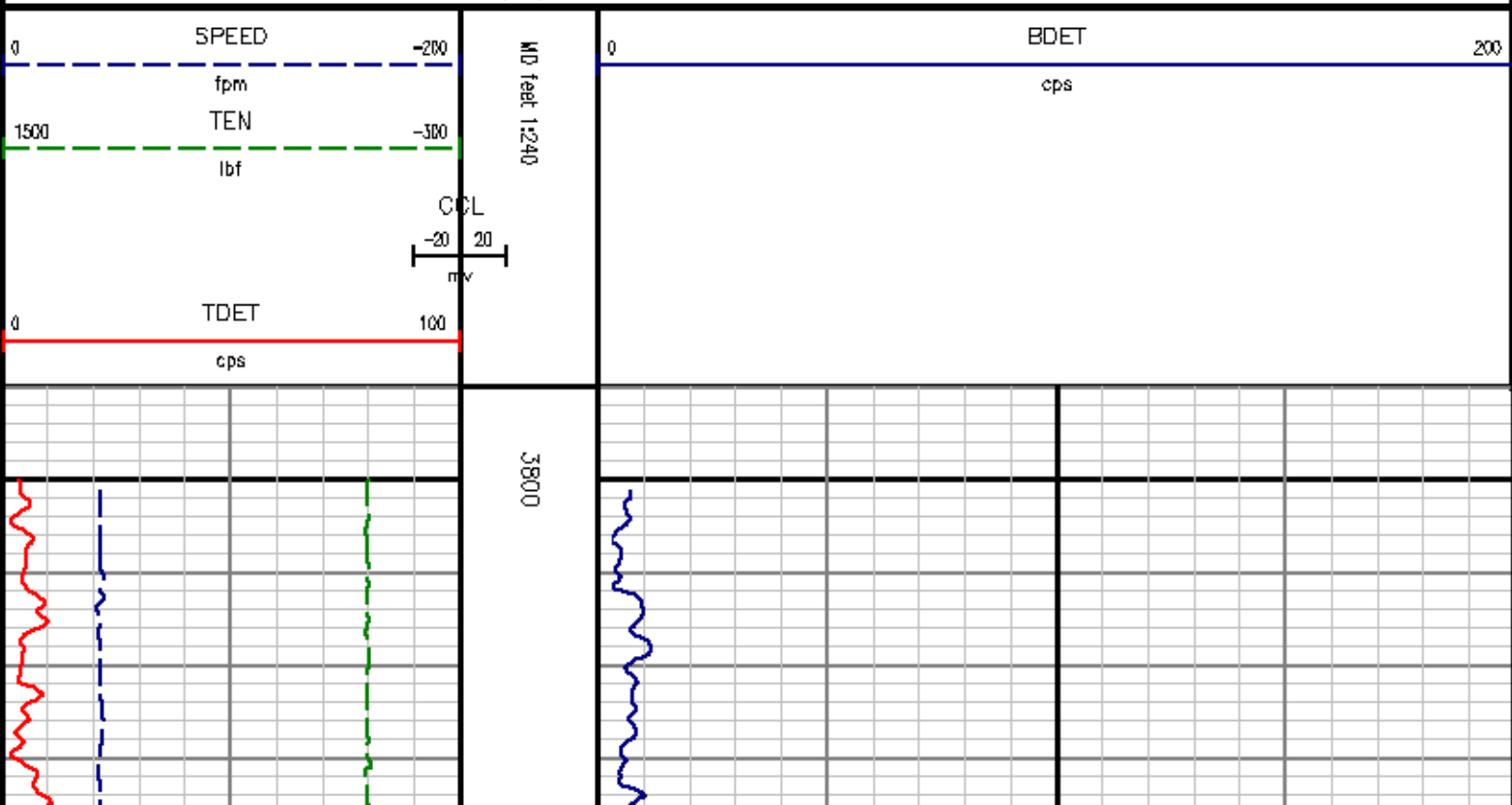
Well : 2-12

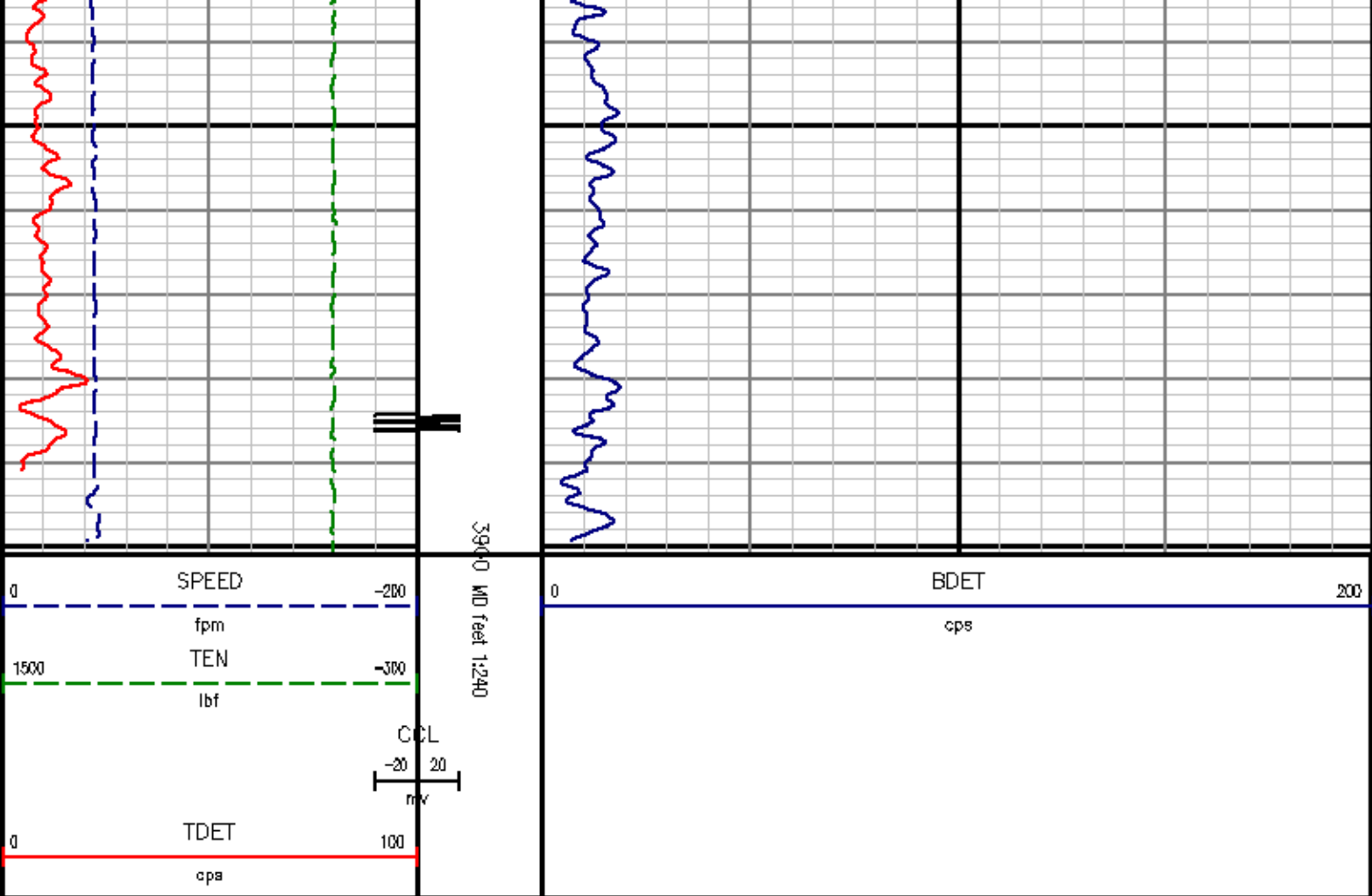
File Name : D:\WELLDATA\TRL736\TRL12.XTF

Mode : PlotMgr 5.4.504

Interval : 3790.00 - 3901.00 feet UP

Created : 6/27/2013 4:13:40 PM



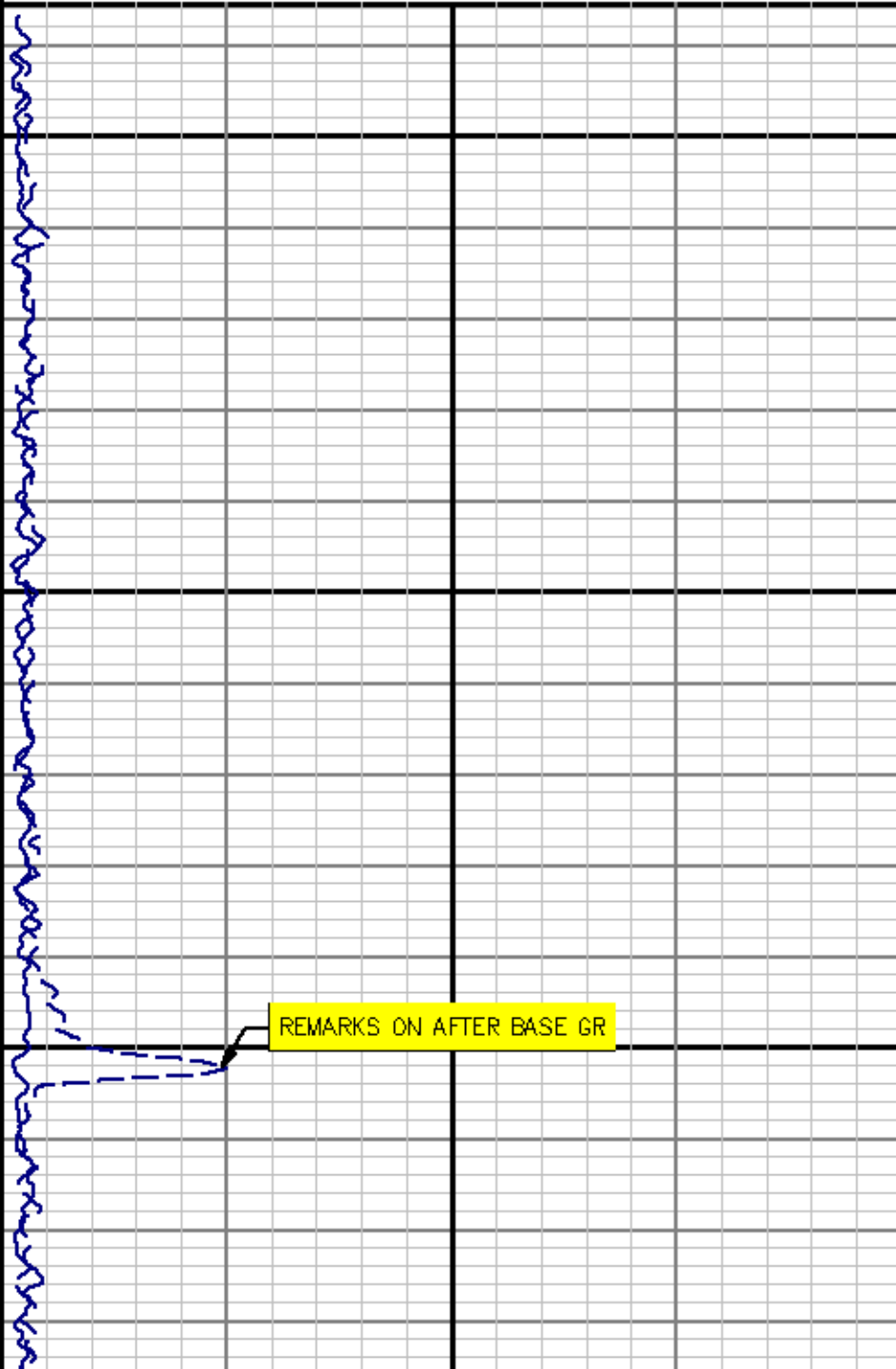
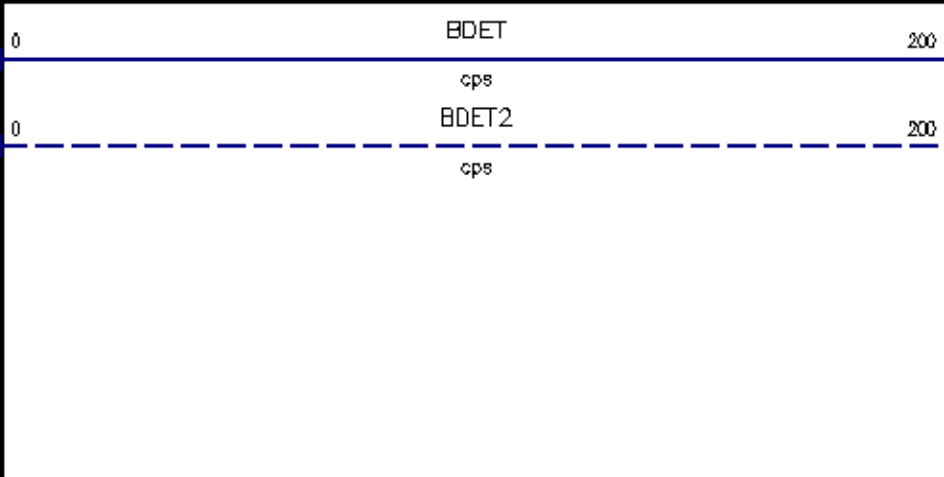
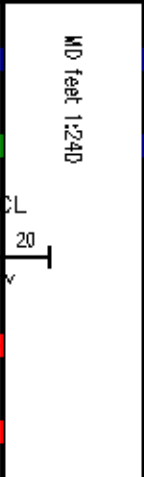
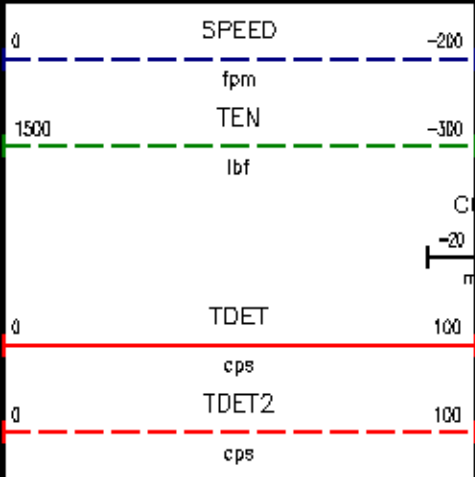


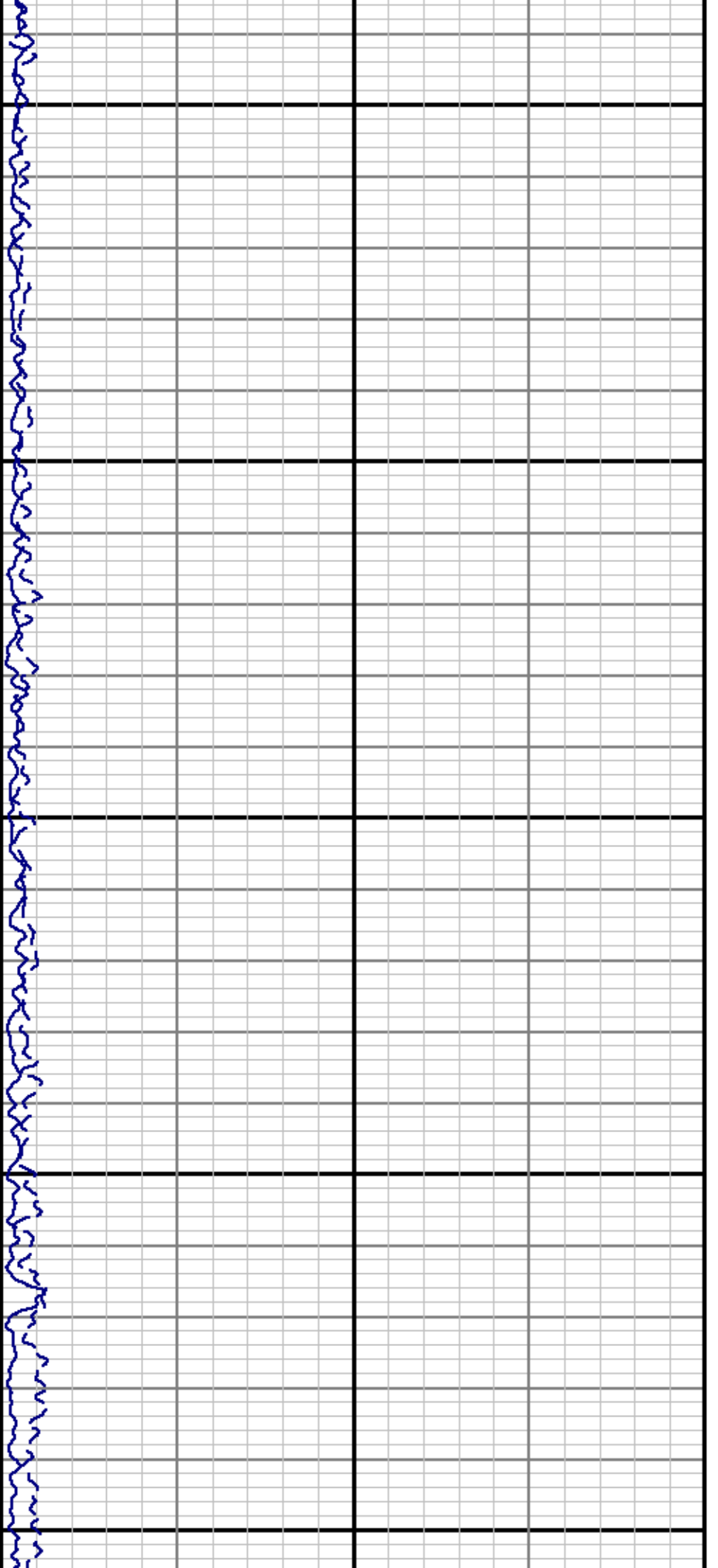
## *BEFORE & AFTER GAMMA RAY*

### DEPTH OFFSETS (for Acquired Curves)

SERIES	DEPTH OFFSET	ACQUIRED CURVES	
2324NA	-10.500	CCL	ACCL
8219XA	-8.500	TDET	TDETB
8219XA	0.000	BDET	BDETB
SYSTEM	0.000	TEN	TEN

Well : 2-12  
 File Name : D:\WELLDATA\TRL736\GAMMA RAY MERGE.xtf  
 Mode : PlotMgr 5.4.504  
 Interval : 3085.50 - 4180.50 feet UP  
 Created : 6/27/2013 1:19:52 PM

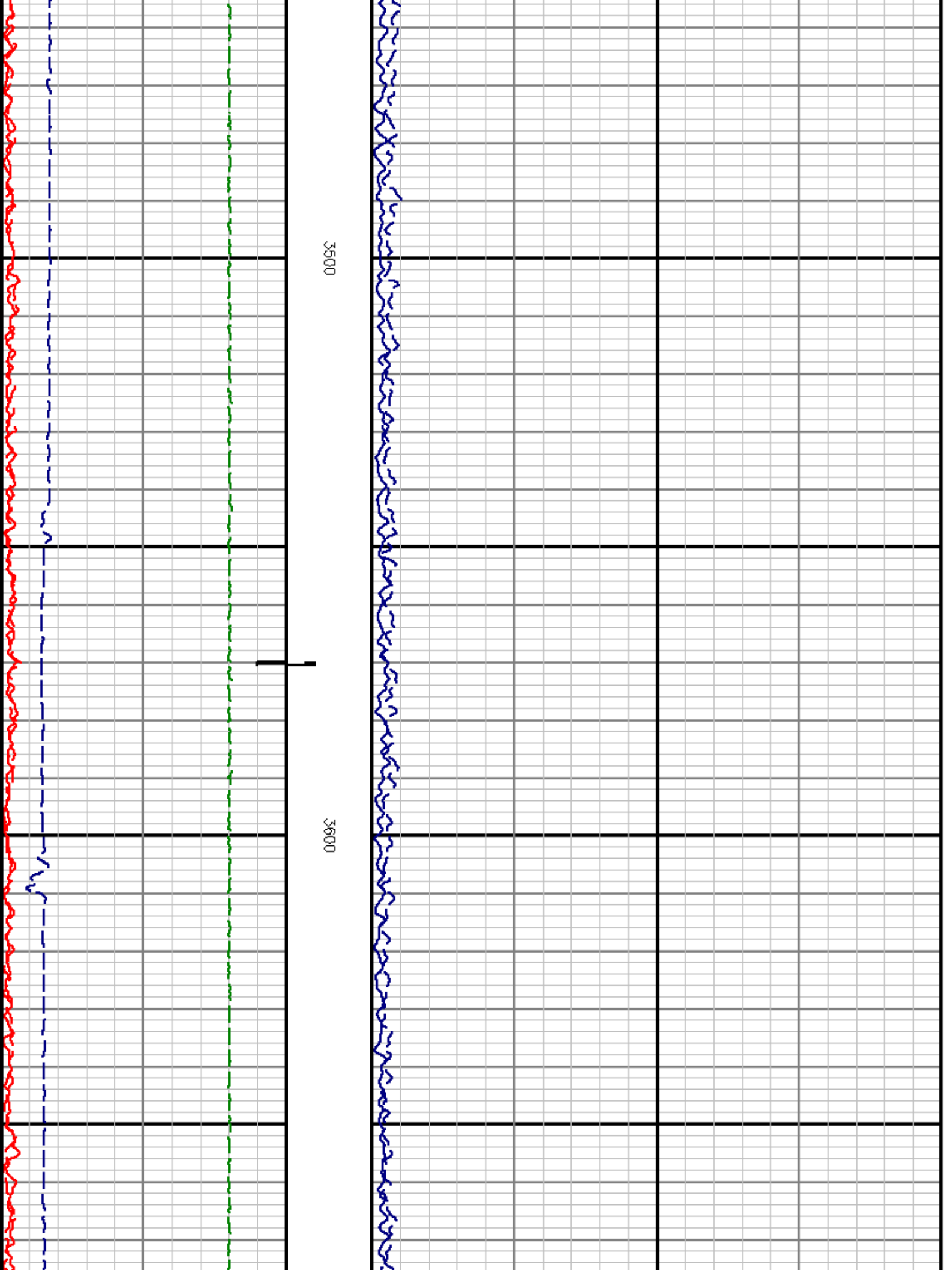


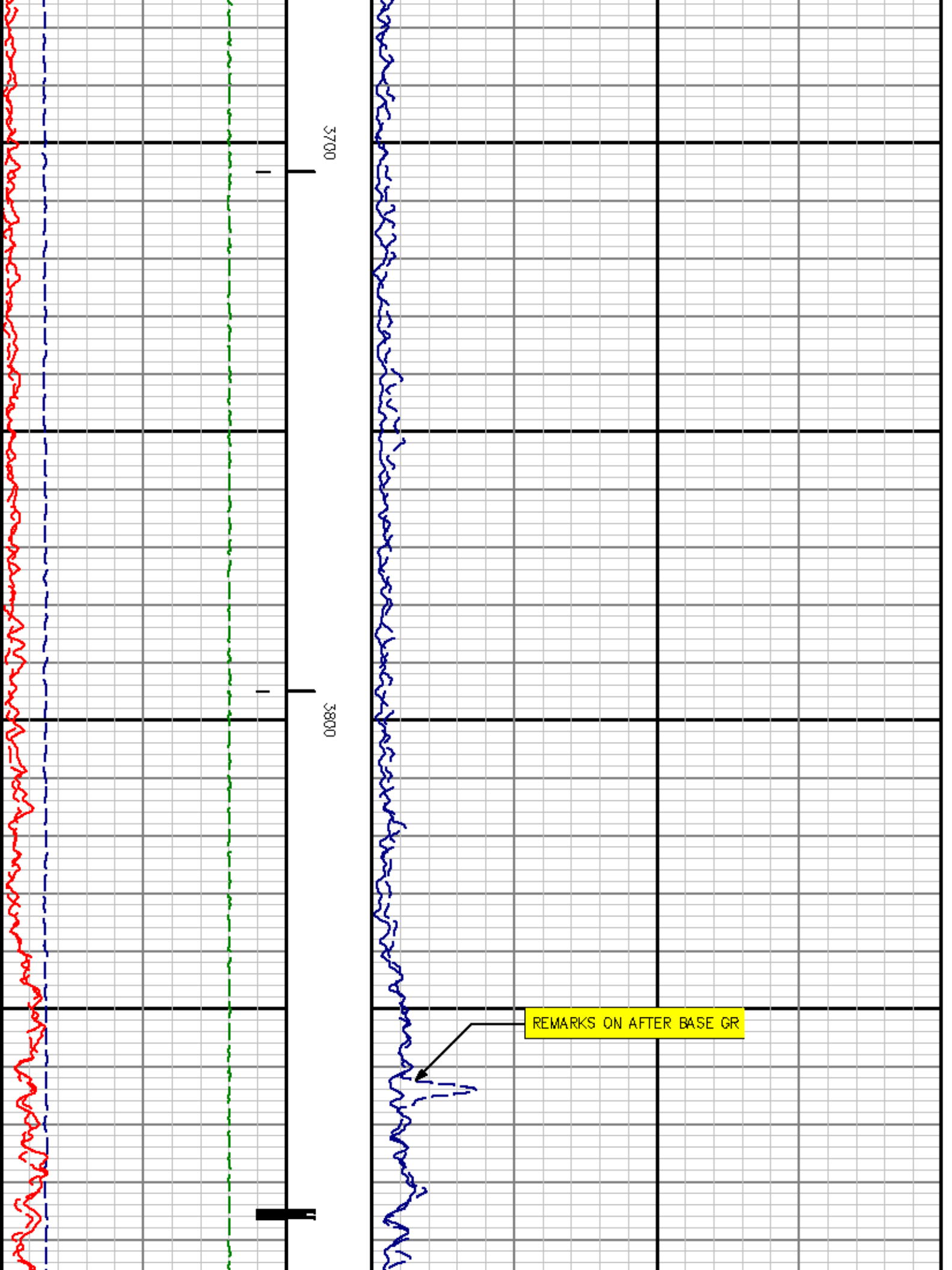


3300

3400





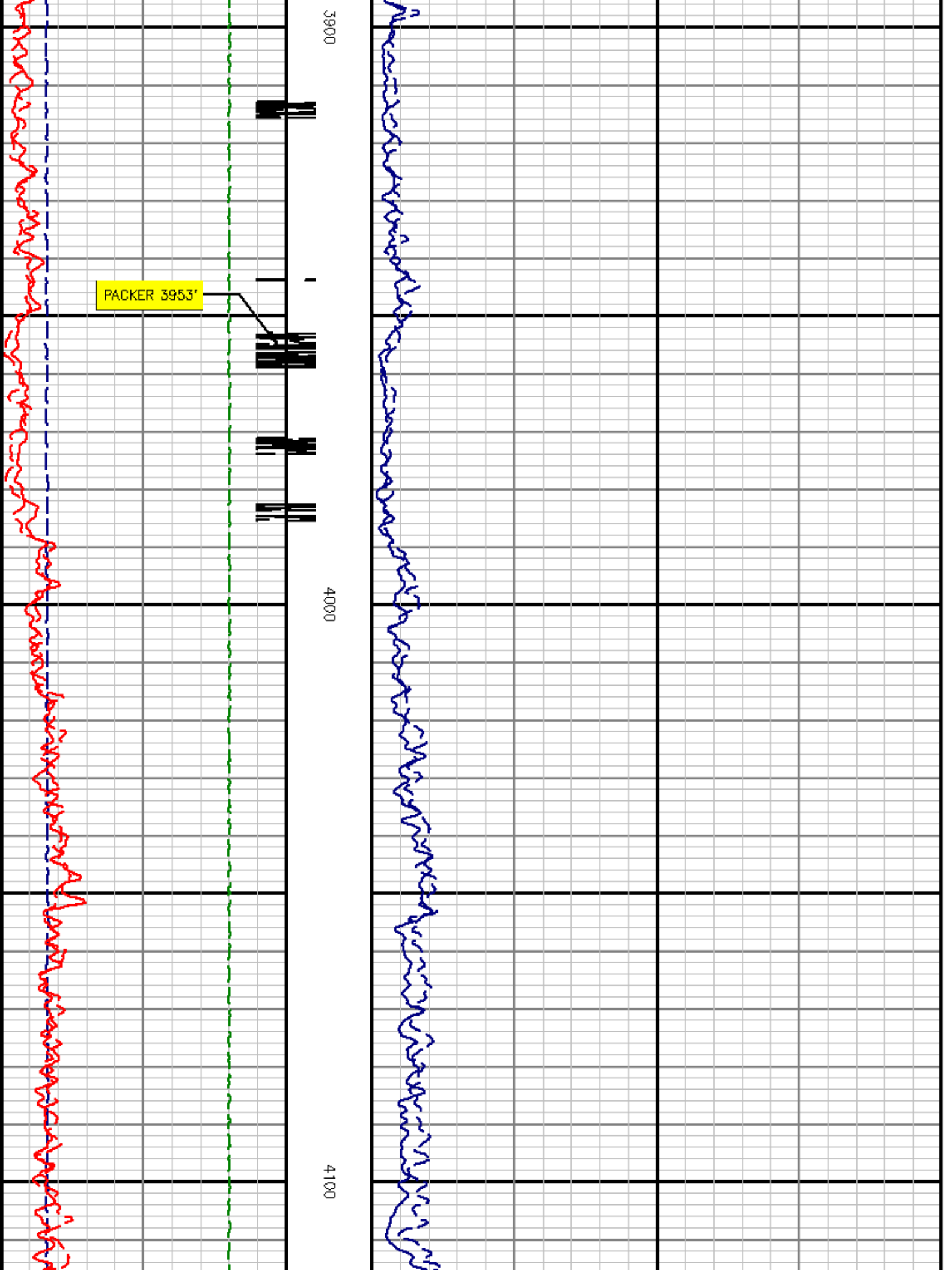


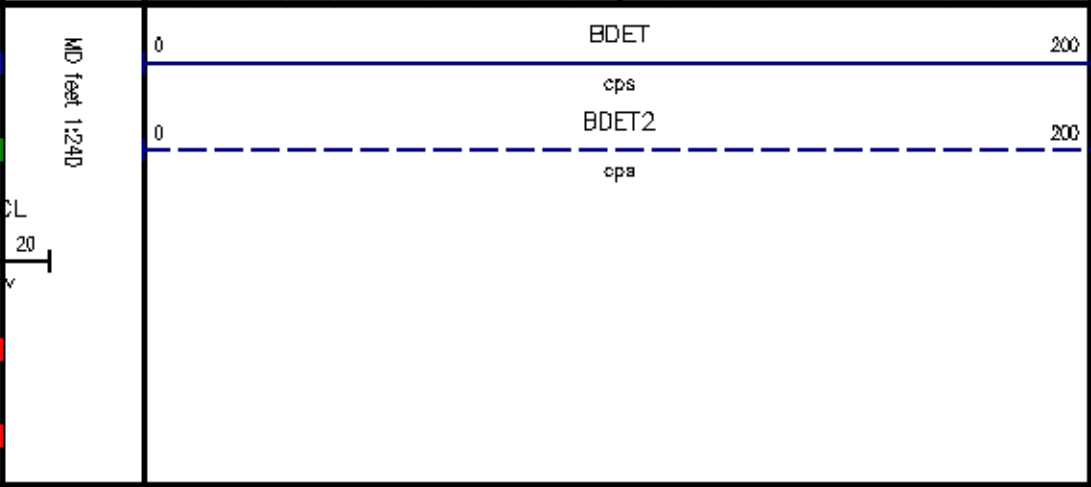
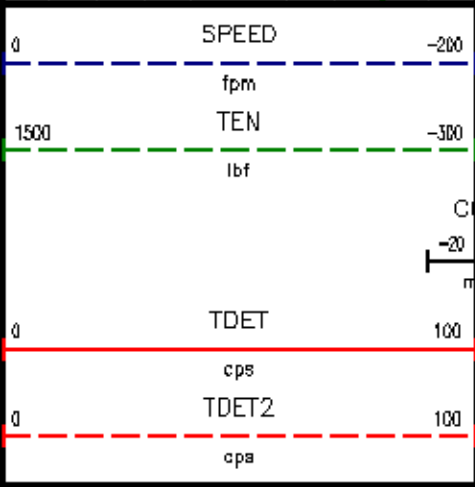
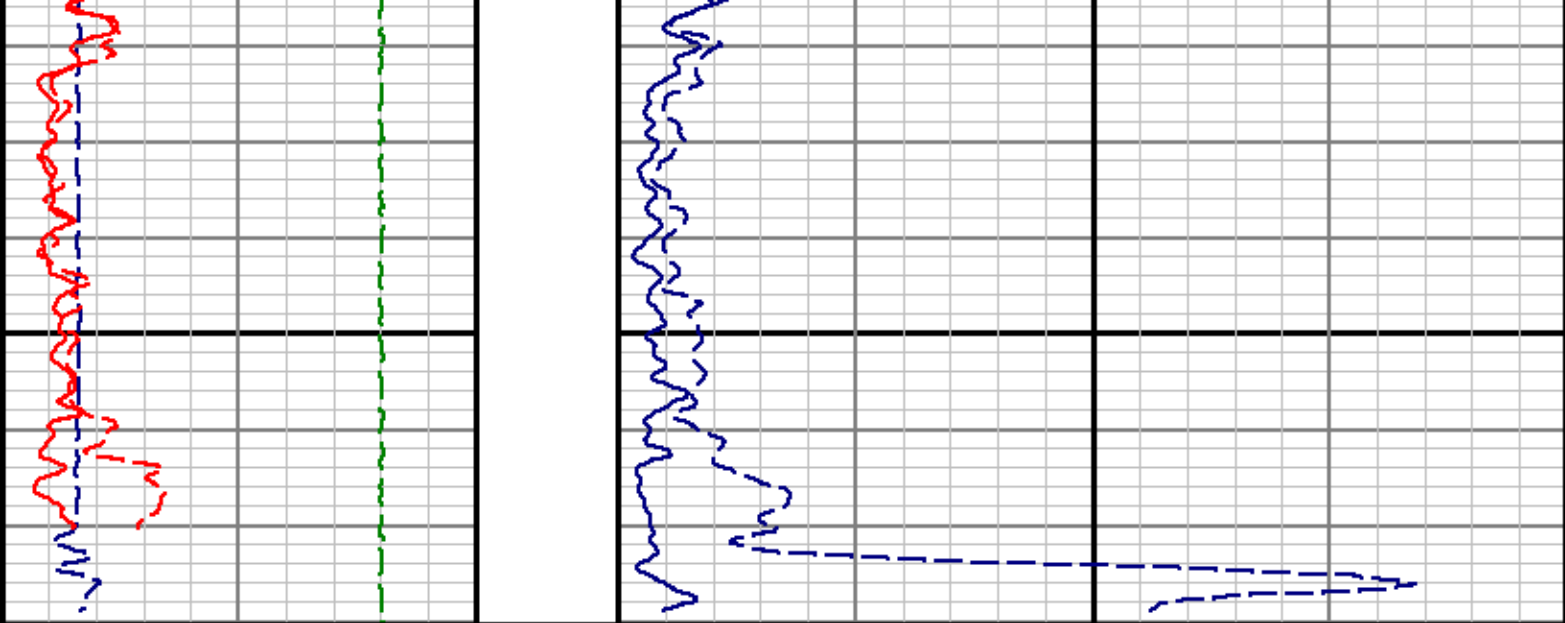
3700

3800

REMARKS ON AFTER BASE GR







Company ENVIRONMENTAL GEOTECH TECHNOLOGIES  
 Well EGT 2-12  
 Field ROMULUS STORAGE  
 County WAYNE State MICHIGAN

File No: \_\_\_\_\_  
 API No: \_\_\_\_\_

Location  
1670' FSL & 2372' FEL  
  
 SEC 12 TWP 35 RGE 9E

Elevations  
 KB 639 ft  
 DF 638 ft  
 GL 626 ft

THANK YOU!

**ATTACHMENT F**

**ELECTRONIC DATA OF TEMPERATURE AND TRACER SURVEY**



**SUBSURFACE**  
54520 Northern Ave., Unit A  
South Bend, Indiana 46635  
574-287-2282  
574-233-0026 Fax

60D6957



**SUBSURFACE**

**APPENDIX F**

**ENVIRONMENTAL GEO  
TECHNOLOGIES  
WELL #2-12  
ELECTRONIC DATA  
TEMPERATURE AND TRACER  
SURVEY**

EGT 60D6957